ML11

LOGIC TEST
CZMLADO

AH-S390D-MC
FICHE 1 OF 3

JUL 1982

ML11

LOGIC TEST
CZMLADO

AH-S390D-MC
FICHE 2 OF 3

JUL 1982

ML11

LOGIC TEST
CZMLADO

AH-S390D-MC
FICHE 3 OF 3

JUL 1982

```
     1                                  .TITLE CZMLADO ML-11 LOGIC TEST
              .SBTTL USER DOCUMENTATION
                                                               .REM &
```

IDENTIFICATION

PRODUCT CODE:	AC-S388D-MC
PRODUCT NAME:	CZMLADO ML11 LOGIC TEST
PRODUCT DATE:	19-MAR-82
MAINTAINER:	MEMORY DIAGNOSTIC ENGINEERING
AUTHOR:	D.W. NEALE

TABLE OF CONTENTS

1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

DIAGNOSTIC ENGINEERING WAS CONTRACTED BY MEMORY ENGINEERING TO MAKE THIS DIAGNOSTIC IN ORDER TO AID MEMORY ENGINEERING TO DESIGN AND DEBUG THE ML-11, AID FIELD SERVICE FOR FIELD REPAIRS AND INSTALLATIONS THE ML-11.

THIS DIAGNOSTIC PRODUCT WILL BE DESIGNED TO TEST FROM ONE TO EIGHT ML-11A OR ML-11B UNITS OFF A SINGLE RH11 OR RH70 CONTROLLER.

THE FUNCTIONAL LEVEL (FRU) OF THIS DIAGNOSTIC PRODUCT WILL BE TO THE LOGIC FUNCTION LEVEL. UPON DETECTION OF AN ERROR BY THE DIAGNOSTIC, THE LOGIC FUNCTION AND RESPECTIVE MODULE WHICH IT IS LOCATED ON WILL BE PRINTED TO THE OPERATOR.

THIS DIAGNOSTIC HAS BEEN WRITTEN FOR USE WITH THE DIAGNOSTIC RUNTIME SERVICES SOFTWARE (SUPERVISOR). THESE SERVICES PROVIDE THE INTERFACE TO THE OPERATOR AND TO THE SOFTWARE ENVIRONMENT.

THIS PROGRAM CAN BE USED WITH XXDP+, ACT, APT, SLIDE AND PAPER TAPE. FOR A COMPLETE DESCRIPTION OF THE RUNTIME SERVICES, REFER TO THE XXDP+ USER'S MANUAL. THERE IS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES IN SECTION 2 OF THIS DOCUMENT.

1.2 SYSTEM REQUIREMENTS

PDP-11 WITH MINIMUM OF 28K WORDS OF MEMORY

CONSOLE TERMINAL

RH11 OR RH70

1 TO 8 ML-11A OR ML-11B DRIVES ON INTERMIXED BUS

XXDP+ LOAD MEDIA

1.3 RELATED DOCUMENTS AND STANDARDS

1. SUPPRGC.DOC
2. SUPINT.MEN
3. SUPFUN.C
4. XXDPPLUS.DOC
5. BLISS LANGUAGE GUIDE
6. BLISS-16 USER'S GUIDE

1.4 ASSUMPTIONS

IT WILL BE ASSUMED THAT PRIOR TO THE RUNNING OF THIS DIAGNOSTIC THAT ALL APPROPRIATE CPU, MAIN MEMORY AND RH CONTROLLER DIAGNOSTICS HAVE BEEN SUCCESSFULLY RUN.

THIS DIAGNOSTIC WILL HOWEVER PERFORM MINIMAL RH TESTS TO ENSURE ITS EXISTANCE AND BASIC FUNCTIONALITY BEFORE LOGIC TESTS ARE ALLOWED TO RUN.

2.0 OPERATING INSTRUCTIONS

THIS SECTION CONTAINS A BRIEF DESCRIPTION OF THE RUNTIME SERVICES. FOR DETAILED INFORMATION, REFER TO THE XXDP+ USER'S MANUAL (CHQUS).

2.1 COMMANDS

THERE ARE ELEVEN LEGAL COMMANDS FOR THE DIAGNOSTIC RUNTIME SERVICES (SUPERVISOR). THIS SECTION LISTS THE COMMANDS AND GIVES A VERY BRIEF DESCRIPTION OF THEM. THE XXDP+ USER'S MANUAL HAS MORE DETAILS.

COMMAND	EFFECT
START	START THE DIAGNOSTIC FROM AN INITIAL STATE
RESTART	START THE DIAGNOSTIC WITHOUT INITIALIZING
CONTINUE	CONTINUE AT TEST THAT WAS INTERRUPTED (AFTER ^C)
PROCEED	CONTINUE FROM AN ERROR HALT
EXIT	RETURN TO XXDP+ MONITOR (XXDP+ OPERATION ONLY!)
ADD	ACTIVATE A UNIT FOR TESTING (ALL UNITS ARE CONSIDERED TO BE ACTIVE AT START TIME
DROP	DEACTIVATE A UNIT
PRINT	PRINT STATISTICAL INFORMATION (IF IMPLEMENTED BY THE DIAGNOSTIC - SECTION 4.0)
DISPLAY	TYPE A LIST OF ALL DEVICE INFORMATION
FLAGS	TYPE THE STATE OF ALL FLAGS (SEE SECTION 2.3)
ZFLAGS	CLEAR ALL FLAGS (SEE SECTION 2.3)

A COMMAND CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. SO YOU MAY, FOR EXAMPLE, TYPE ''STA'' INSTEAD OF ''START''.

2.2 SWITCHES

THERE ARE SEVERAL SWITCHES WHICH ARE USED TO MODIFY SUPERVISOR OPERATION. THESE SWITCHES ARE APPENDED TO THE LEGAL COMMANDS. ALL OF THE LEGAL SWITCHES ARE TABULATED BELOW WITH A BRIEF DESCRIPTION OF EACH. IN THE DESCRIPTIONS BELOW, A DECIMAL NUMBER IS DESIGNATED BY ''DDDDD''.

SWITCH	EFFECT
/TESTS:LIST	EXECUTE ONLY THOSE TESTS SPECIFIED IN THE LIST. LIST IS A STRING OF TEST NUMBERS, FOR EXAMPLE - /TESTS:1:5:7-10. THIS LIST WILL CAUSE TESTS 1,5,7,8,9,10 TO BE RUN. ALL OTHER TESTS WILL NOT BE RUN.
/PASS:DDDDD	EXECUTE DDDDD PASSES (DDDDD = 1 TO 64000)
/FLAGS:FLGS	SET SPECIFIED FLAGS. FLAGS ARE DESCRIBED IN SECTION 2.3.
/EOP:DDDDD	REPORT END OF PASS MESSAGE AFTER EVERY DDDDD PASSES ONLY. (DDDDD = 1 TO 64000)

/UNITS:LIST	TEST/ADD/DROP ONLY THOSE UNITS SPECIFIED IN THE LIST. LIST EXAMPLE - /UNITS:0:5:10-12 USE UNITS 0,5,10,11,12 (UNIT NUMBERS = 0-63)

EXAMPLE OF SWITCH USAGE:

START/TESTS:1-5/PASS:1000/EOP:100

THE EFFECT OF THIS COMMAND WILL BE: 1) TESTS 1 THROUGH 5 WILL BE EXECUTED, 2) ALL UNITS WILL TESTED 1000 TIMES AND 3) THE END OF PASS MESSAGES WILL BE PRINTED AFTER EACH 100 PASSES ONLY. A SWITCH CAN BE RECOGNIZED BY THE FIRST THREE CHARACTERS. YOU MAY, FOR EXAMPLE, TYPE "/TES:1-5" INSTEAD OF "/TESTS:1-5".

BELOW IS A TABLE THAT SPECIFIES WHICH SWITCHES CAN BE USED BY EACH COMMAND.

	TESTS	PASS	FLAGS	EOP	UNITS
START	X	X	X	X	X
RESTART	X	X	X	X	X
CONTINUE		X	X	X	
PROCEED			X		
DROP					X
ADD					X
PRINT					
DISPLAY					X
FLAGS					
ZFLAGS					
EXIT					

2.3 FLAGS

FLAGS ARE USED TO SET UP CERTAIN OPERATIONAL PARAMETERS SUCH AS LOOPING ON ERROR. ALL FLAGS ARE CLEARED AT STARTUP AND REMAIN CLEARED UNTIL EXPLICITLY SET USING THE FLAGS SWITCH. FLAGS ARE ALSO CLEARED AFTER A START COMMAND UNLESS SET USING THE FLAG SWITCH. THE ZFLAGS COMMAND MAY ALSO BE USED TO CLEAR ALL FLAGS. WITH THE EXCEPTION OF THE START AND ZFLAGS COMMANDS, NO COMMANDS AFFECT THE STATE OF THE FLAGS; THEY REMAIN SET OR CLEARED AS SPECIFIED BY THE LAST FLAG SWITCH.

FLAG	EFFECT
HOE	HALT ON ERROR - CONTROL IS RETURNED TO RUNTIME SERVICES COMMAND MODE
LOE	LOOP ON ERROR
IER*	INHIBIT ALL ERROR REPORTS
IBE*	INHIBIT ALL ERROR REPORTS EXCEPT FIRST LEVEL (FIRST LEVEL CONTAINS ERROR TYPE, NUMBER, PC, TEST AND UNIT)
IXE*	INHIBIT EXTENDED ERROR REPORTS (THOSE CALLED BY PRINTX MACRO'S)
PRI	DIRECT MESSAGES TO LINE PRINTER
PNT	PRINT TEST NUMBER AS TEST EXECUTES
BOE	"BELL" ON ERROR

```
UAM             UNATTENDED MODE (NO MANUAL INTERVENTION)
ISR             INHIBIT STATISTICAL REPORTS (DOES NOT
                APPLY TO DIAGNOSTICS WHICH DO NOT SUPPORT
                STATISTICAL REPORTING)
IDU             INHIBIT PROGRAM DROPPING OF UNITS
ADR             EXECUTE AUTODROP CODE
LOT             LOOP ON TEST
EVL             EXECUTE EVALUATION (ON DIAGNOSTICS WHICH
                HAVE EVALUATION SUPPORT)
```

*ERROR MESSAGES ARE DESCRIBED IN SECTION 3.1

SEE THE XXDP+ USER'S MANUAL FOR MORE DETAILS ON FLAGS. YOU MAY SPECIFY MORE THAN ONE FLAG WITH THE FLAG SWITCH. FOR EXAMPLE, TO CAUSE THE PROGRAM TO LOOP ON ERROR, INHIBIT ERROR REPORTS AND TYPE A "BELL" ON ERROR, YOU MAY USE THE FOLLOWING STRING:

```
/FLAGS:LOE:IER:BOE
```

2.4 HARDWARE QUESTIONS

WHEN A DIAGNOSTIC IS STARTED, THE RUNTIME SERVICES WILL PROMPT THE USER FOR HARDWARE INFORMATION BY TYPING "CHANGE HW (L) ?" YOU MUST ANSWER "Y" AFTER A START COMMAND UNLESS THE HARDWARE INFORMATION HAS BEEN "PRELOADED" USING THE SETUP UTILITY (SEE CHAPTER 6 OF THE XXDP+ USER'S MANUAL). WHEN YOU ANSWER THIS QUESTION WITH A "Y", THE RUNTIME SERVICES WILL ASK FOR THE NUMBER OF UNITS (IN DECIMAL). YOU WILL THEN BE ASKED THE FOLLOWING QUESTIONS FOR EACH UNIT.

PARAMETER CODING CALLS

```
GPRMA   MSGH1,0,0,0,177777,YES          ;RH ADDRESS
GPRMD   MSGH2,2,0,77,11,70,YES          ;RH TYPE
GPRMD   MSGH3,4,0,777,0,777,YES         ;RH VECTOR ADDRESS
GPRMD   MSGH4,6,D,77,1,16.,YES          ;NUMBER OF ARRAYS
GPRML   MSGH5,10,1,YES                  ;DRIVE OPTION TYPE
GPRMD   MSGH6,12,0,7,0,7,YES            ;DRIVE NUMBER
GPRML   MSGH7,14,1,YES                  ;PARITY DISABLED
```

PARAMETER CODING MESSAGES

```
MSGH1:  .ASCIZ  /RH ADDRESS?/
MSGH2:  .ASCIZ  /IS RH AN '70' OR '11?/
MSGH3:  .ASCIZ  /RH VECTOR ADDRESS?/
MSGH4:  .ASCIZ  /NUMBER OF ARRAY MODULES?/
MSGH5:  .ASCIZ  /IS DRIVE OPTION AN ML11A?/
MSGH6:  .ASCIZ  /ML-11 DRIVE NUMBER?/
MSGH7:  .ASCIZ  /IS PARITY DISABLED?/
```

SAMPLE DIALOGE

```
DR> STA  <CR>
```

```
CHANGE HW <L> ? Y <CR>

# UNITS <D> ? 1 <CR>

UNIT 0
RH ADDRESS <O> 176400 ? <CR>
IS RH AN '70' OR '11' <O> ? <CR>
RH VECTOR ADDRESS <O> 204 ? <CR>
NUMBER OF ARRAYS MODULES ? <D> 16 ? 14 <CR>
IS DRIVE OPTION AN ML11A ? <L> Y ? <CR>
ML-11 DRIVE NUMBER ? <O> 0 ? <CR>
IS PARITY DISABLED ? <L> N ? <CR>
```

2.5 SOFTWARE QUESTIONS

AFTER YOU HAVE ANSWERED THE HARDWARE QUESTIONS OR AFTER A RESTART OR CONTINUE COMMAND, THE RUNTIME SERVICES WILL ASK FOR SOFTWARE PARAMETERS. THESE PARAMETERS WILL GOVERN SOME DIAGNOSTIC SPECIFIC OPERATION MODES. YOU WILL BE PROMPTED BY "CHANGE SW (L) ?" IF YOU WISH TO CHANGE ANY PARAMETERS, ANSWER BY TYPING "Y".

THE FOLLOWING OPTIONS ARE AVAILABLE FOR OPERATOR SELECTION:

1. ENABLE PRINTING OF DRIVE SERIAL NUMBERS.
2. LIMIT THE NUMBER OF ERRORS PRINTED PER EACH DETECTED ERROR. A MAXIMUM OF 10 ERRORS WILL BE PRINTED PER ERROR BEFORE THE ERROR IS EXITED.
3. ENABLE RH AND ML11 REGISTER DUMP ON ERRORS.
4. ABORTING PROGRAM EXECUTION AFTER ONE COMPLETE PASS.
5. ENABLE MANUAL INTERVENTION TESTS.

2.6 EXTENDED P-TABLE DIALOGUE

WHEN YOU ANSWER THE HARDWARE QUESTIONS, YOU ARE BUILDING ENTRIES IN A TABLE THAT DESCRIBES THE DEVICES UNDER TEST. THE SIMPLEST WAY TO BUILD THIS TABLE IS TO ANSWER ALL QUESTIONS FOR EACH UNIT TO BE TESTED. IF YOU HAVE A MULTIPLEXED DEVICE SUCH AS A MASS STORAGE CONTROLLER WITH SEVERAL DRIVES OR A COMMUNICATION DEVICE WITH SEVERAL LINES, THIS BECOMES TEDIOUS SINCE MOST OF THE ANSWERS ARE REPETITIOUS.

TO ILLUSTRATE A MORE EFFICIENT METHOD, SUPPOSE YOU ARE TESTING A FICTIONAL DEVICE, THE XY11. SUPPOSE THIS DEVICE CONSISTS OF A CONTROL MODULE WITH EIGHT UNITS (SUB-DEVICES) ATTACHED TO IT. THESE UNITS ARE DESCRIBED BY THE OCTAL NUMBERS 0 THROUGH 7. THERE IS ONE HARDWARE PARAMETER THAT CAN VARY AMONG UNITS CALLED THE Q-FACTOR. THIS Q-FACTOR MAY BE 0 OR 1. BELOW IS A SIMPLE WAY TO BUILD A TABLE FOR ONE XY11 WITH EIGHT UNITS.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0<CR>
Q-FACTOR (O) 0 ?  1<CR>

UNIT 2
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  1<CR>
Q-FACTOR (O) 1 ?  0<CR>

UNIT 3
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  2<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 4
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  3<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 5
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  4<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 6
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  5<CR>
Q-FACTOR (O) 0 ?  <CR>

UNIT 7
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  6<CR>
Q-FACTOR (O) 0 ?  1<CR>

UNIT 8
CSR ADDRESS (O)  160000<CR>
SUB-DEVICE # (O) ?  7<CR>
Q-FACTOR (O) 1 ?  <CR>
```

NOTICE THAT THE DEFAULT VALUE FOR THE Q-FACTOR CHANGES WHEN A NON-DEFAULT RESPONSE IS GIVEN. BE CAREFUL WHEN SPECIFYING MULTIPLE UNITS!

AS YOU CAN SEE FROM THE ABOVE EXAMPLE, THE HARDWARE PARAMETERS DO NOT VARY SIGNIFICANTLY FROM UNIT TO UNIT. THE PROCEDURE SHOWN IS NOT VERY EFFICIENT.

THE RUNTIME SERVICES CAN TAKE MULTIPLE UNIT SPECIFICATIONS HOWEVER. LET'S BUILD THE SAME TABLE USING THE MULTIPLE SPECIFICATION FEATURE.

```
# UNITS (D) ?  8<CR>
```

```
UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0,1<CR>
Q-FACTOR (O) 0 ?  1,0<CR>

UNIT 3
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  2-5<CR>
Q-FACTOR (O) 0 ?  0<CR>

UNIT 7
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  6,7<CR>
Q-FACTOR (O) 0 ?  1<CR>
```

AS YOU CAN SEE IN THE ABOVE DIALOGUE, THE RUNTIME SERVICES WILL BUILD AS MANY ENTRIES AS IT CAN WITH THE INFORMATION GIVEN IN ANY ONE PASS THROUGH THE QUESTIONS. IN THE FIRST PASS, TWO ENTRIES ARE BUILT SINCE TWO SUB-DEVICES AND Q-FACTORS WERE SPECIFIED. THE SERVICES ASSUME THAT THE CSR ADDRESS IS 160000 FOR BOTH SINCE IT WAS SPECIFIED ONLY ONCE. IN THE SECOND PASS, FOUR ENTRIES WERE BUILT. THIS IS BECAUSE FOUR SUB-DEVICES WERE SPECIFIED. THE "-" CONSTRUCT TELLS THE RUNTIME SERVICES TO INCREMENT THE DATA FROM THE FIRST NUMBER TO THE SECOND. IN THIS CASE, SUB-DEVICES 2, 3, 4 AND 5 WERE SPECIFIED. (IF THE SUB-DEVICE WERE SPECIFIED BY ADDRESSES, THE INCREMENT WOULD BE BY 2 SINCE ADDRESSES MUST BE ON AN EVEN BOUNDARY.) THE CSR ADDRESSES AND Q-FACTORS FOR THE FOUR ENTRIES ARE ASSUMED TO BE 160000 AND 0 RESPECTIVELY SINCE THEY WERE ONLY SPECIFIED ONCE. THE LAST TWO UNITS ARE SPECIFIED IN THE THIRD PASS.

THE WHOLE PROCESS COULD HAVE BEEN ACCOMPLISHED IN ONE PASS AS SHOWN BELOW.

```
# UNITS (D) ?  8<CR>

UNIT 1
CSR ADDRESS (O) ?  160000<CR>
SUB-DEVICE # (O) ?  0-7<CR>
Q-FACTOR (O) 0 ?  0,1,0,,,,1,1<CR>
```

AS YOU CAN SEE FROM THIS EXAMPLE, NULL REPLIES (COMMAS ENCLOSING A NULL FIELD) TELL THE RUNTIME SERVICES TO REPEAT THE LAST REPLY.

2.7 QUICK START-UP PROCEDURE (XXDP+)

TO START-UP THIS PROGRAM:

1. BOOT XXDP+
2. GIVE THE DATE
3. TYPE "R CZMLA"
4. TYPE "START"
5. ANSWER THE "CHANGE HW" QUESTION WITH "Y"

6. ANSWER ALL THE HARDWARE QUESTIONS

7. ANSWER THE ''CHANGE SW'' QUESTION WITH 'N''

WHEN YOU FOLLOW THIS PROCEDURE YOU WILL BE USING ONLY THE DEFAULTS FOR FLAGS AND SOFTWARE PARAMETERS. THESE DEFAULTS ARE DESCRIBED IN SECTIONS 2.3 AND 2.5.

3.0 ERROR INFORMATION

3.1 TYPES OF ERROR MESSAGES

THERE ARE THREE LEVELS OF ERROR MESSAGES THAT MAY BE ISSUED BY A DIAGNOSTIC: GENERAL, BASIC AND EXTENDED. GENERAL ERROR MESSAGES ARE ALWAYS PRINTED UNLESS THE ''IER'' FLAG IS SET (SECTION 2.3). THE GENERAL ERROR MESSAGE IS OF THE FORM:

```
        NAME  TYPE  NUMBER  ON UNIT NUMBER  TST NUMBER PC:XXXXXX
        ERROR MESSAGE

,WHERE; NAME = DIAGNOSTIC NAME
        TYPE = ERROR TYPE (SYS FATAL, DEV FATAL, HARD OR SOFT)
        NUMBER = ERROR NUMBER
        UNIT NUMBER = 0 - N (N IS LAST UNIT IN PTABLE)
        TST NUMBER = TEST AND SUBTEST WHERE ERROR OCCURRED
        PC:XXXXXX = ADDRESS OF ERROR MESSAGE CALL
```

BASIC ERROR MESSAGES ARE MESSAGES THAT CONTAIN SOME ADDITIONAL INFORMATION ABOUT THE ERROR. THESE ARE ALWAYS PRINTED UNLESS THE ''IER'' OR ''IBR'' FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL MESSAGE.

EXTENDED ERROR MESSAGES CONTAIN SUPPLEMENTARY ERROR INFORMATION SUCH AS REGISTER CONTENTS OR GOOD/BAD DATA. THESE ARE ALWAYS PRINTED UNLESS THE ''IER'', ''IBR'' OR ''IXR'' FLAGS ARE SET (SECTION 2.3). THESE MESSAGES ARE PRINTED AFTER THE ASSOCIATED GENERAL ERROR MESSAGE AND ANY ASSOCIATED BASIC ERROR MESSAGES.

3.2 SPECIFIC ERROR MESSAGES

ERROR MESSAGES ARE HANDLED VIA A DICTIONARY STRUCTURE.

WORDS AND PHRASES ARE MULTIPLY REFERENCED USING ONLY ONE COPY OF THE WORD OR PHRASE IN CORE.

THIS PERMITS EXTENSIVE ERROR MESSAGE PRINTING AT MINIMAL STORAGE REQUIREMENTS.

THE FOLLOWING DEMONSTRATES TYPICAL ERROR MESSAGES:

```
ML11 DVC FTL ERR 00077 ON UNIT 07 TST 027 SUB 002 PC: 050432
ASYNCHRONOUS MODULE FAILURE
EXCESSIVE DATA ERRORS DURING INITIAL ARR RD_WRT

ML11 DVC FTL ERR  00112 ON UNIT 03 TST 037 SUB 000 PC: 056466
ASYNCHRONOUS MODULE FAILURE
```

ARRAY ADRS MULTIPLEXER FAILURE
FAILED AT DSA: 000000

3.2.1 ERROR NUMBER DEFINITION

ERROR NO.	FAILING LOGIC
1	DRIVE DID NOT RESPOND WITHIN 1.5 US
2	DSA REG READ/WRITE ERROR DURING DRIVE SEL TEST
3	UNIQUE DRIVE SELECTION ERROR
4	ML REGISTER READ WRITE ONES/ZEROES ERROR
5	ML REGISTER SHIFTING ONES/ZEROES ERROR
6	ML REGISTER INITIALIZATION ERROR
7	CONTROL BUS BAD PARITY NOT DETECTED. (CPAR NOT SET)
8	CONTROL BUS GOOD PARITY NOT DETECTED. (CPAR SET)
9	CONTROL BUS BAD PARITY GENERATED. (MCPE SET)
10	ARRAY SIZING LOGIC ERROR
11	GO BIT NOT CLR AFTER NOOP FUNCTION
12	ILF BIT SET DURING NOOP FUNCTION
13	OPI BIT SET DURING NOOP FUNCTION
14	GO BIT NOT SET DURING WRITE CHECK FUNCTION
15	DRY BIT CLEARED WHILE GO CLEARED DURING WRITE CHECK FUNCTION TEST
16	DRY BIT SET WHEN GO SET DURING WRITE CHECK FUNCTION
17	ILF SET DURING WRITE CHECK FUNCTION
18	OPI BIT SET DURING WRITE CHECK FUNCTION
19	GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'ASYNC FAILURE'
20	GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'SYNC FUNCTION'
21	DRY BIT NOT SET AFTER WRITE CHECK FUNCTION
22	GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'ASYNC FAILURE'
23	GO BIT NOT CLEAR AFTER WRITE CHECK FUNCTION 'SYNC FAILURE'
24	GO BIT NOT SET DURING WRITE FUNCTION

25 DRY BIT CLEAR WITH GO CLEAR DURING WRITE FUNCTION.
26 DRY BIT SET WITH GO BIT DURING WRITE FUNCTION.
27 ILF BIT SET DURING WRITE FUNCTION
28 OPI BIT SET DURING WRITE FUNCTION
29 GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
30 GO BIT NOT CLEAR AFTER WRITE FUNCTION 'SYNC FAILURE'
31 DRY BIT NOT SET AFTER WRITE FUNCTION.
32 GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
33 GO BIT NOT CLEAR AFTER WRITE FUNCTION 'ASYNC FAILURE'
34 GO BIT NOT SET DURING READ FUNCTION.
35 DRY BIT SET WHILE GO CLEAR DURING READ FUNCTION.
36 DRY BIT SET WHILE GO SET DURING READ FUNCTION.
37 ILF BIT SET DURING READ FUNCTION.
38 OPI BIT SET DURING READ FUNCTION
39 GO BIT NOT CLEAR AFTER READ FUNCTION 'ASYNC FAILURE'
40 GO BIT NOT CLEAR AFTER READ FUNCTION 'SYNC FAILURE'
41 DRY BIT NOT SET AFTER READ FUNCTION
42 GO BIT NOT CLEAR AFTER READ FUNCTION 'ASYNC FAILURE'
43 GO BIT NOT CLEAR AFTER READ FUNCTION 'SYNC FAILURE'
44 GO BIT NOT CLEAR AFTER CLEAR FUNCTION
45 DRY BIT SET WHILE GO SET DURING CLEAR FUNCTION
46 DRY BIT NOT SET AFTER CLEAR FUNCTION.
47 ILF BIT SET DURING CLEAR FUNCTION
48 OPI BIT SET DURING CLEAR FUNCTION
49 ERROR REGISTER DID NOT CLEAR AFTER DRIVE CLEAR.
50 COMPOSITE ERROR BIT NOT SET AFTER MLER BITS SET
51 ATA BIT SETTING ERROR
52 ATTN BIT SETTING ERROR
53 ATTN BIT NOT CLEARED BY MLCS1 NOOP FUNCTION

54	ATA BIT NOT CLEAR AFTER WRITING A ONE TO IT
55	WRITING A ONE TO OTHER DRIVES ATA BIT CLEARED THIS DRIVES ATA BIT
56	GO BIT NOT CLEARED AFTER SEARCH FUNCTION
57	ILF BIT SET DURING SEARCH FUNCTION
58	NO-OP FUNCTION DID NOT CLEAR THE ATA BIT AFTER BEING SET
59	ATTN BIT NOT SET AFTER SEARCH FUNCTION
60	OPI BIT SET DURING SEARCH FUNCTION AT PRESENT ARRAYS
61	OPI BIT NOT SET AFTER SEARCH AT NON-PRESENT ARRAYS
62	GO BIT NOT CLEAR AFTER READ-IN-PRESET FUNCTION
63	ILF BIT SET DURING READ-IN-PRESET FUNCTION
64	OPI BIT SET DURING READ-IN-PRESET FUNCTION
65	ECC INITIALIZE DID NOT CLEAR MEMORY AFTER POWER UP WITH BAD BATTERY BACK-UP
66	GO BIT NOT CLEARED AFTER ILLEGAL FUNCTION
67	ILLEGAL FUNCTION NOT DETECTED
68	OPI BIT SET WITH ILLEGAL FUNCTION
69	RMR BIT NOT SET AFTER MODIFYING REG WITH FUNCTION IN PROGRESS
70	MEMORY ARRAY PROM CHECK SUM ERRORS DURING INITIAL PROM READS
71	NIBBLE OFF SET COUNTS GREATER THAN 14 DETECTED
72	UNS BIT SET WITH GOOD UV DATA
73	UNS BIT SET WITH GOOD UV DATA
74	UNS BIT NOT SET WITH BAD UV DATA
75	UNS BIT NOT SET WITH BAD UV DATA
76	MEMORY ARRAY PROM ROW/COL DATA ORING ERROR
77	BAD NIBBLE THRESHOLD OF 36 EXCEEDED DURING INITIAL ARRAY READ/WRITE TEST
78	UNIQUE PROM SELECTION ERROR
79	FAILURE TO FIND GOOD ROW DURING READ WRITE ARRAY WITH PROM DATA
80	MEMORY ARRAY TIMING AND CONTROL FAILURE TO REFRESH MEMORY
81	DATA ERRORS DETECTED AT LAST BLOCK DURING ADDRESSES COUNTER TEST. (TEST ABORTED)

82	ADDRESS COUNTER ERROR
83	UNIQUE MEMORY ARRAY MODULE SELECTION FAILURE
84	ALL BITS IN ALL NIBBLES TESTED DURING SEQUENCER EXISTENCE TEST WERE IN ERROR (FAIL
85	INTERMEDIATE FAILURE. SOME BITS IN NIBBLES TESTED WERE IN ERROR (CONTINUE TESTING)
86	SYNC BUS DATA BIT WRITE PATH CONTINUITY FAILURE
87	SYNC BUS DATA BIT READ PATH CONTINUITY FAILURE
88	RAM BUS ADRS COUNTER FAILURE TO LOAD/UNLOAD SKIP RAM DURING WRITE FUNCTION
89	RAM BUS ADRS COUNTER FAILURE TO LOAD/UNLOAD SKIP RAM DURING READ FUNCTION
90	SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (ALL ONES NIBBLE PATTERN)
91	SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (SHIFTED BIT NIBBLE PATTERN)
92	SYNC DATA BUS WRITE PATH UNIQUE DATA BIT FAILURE (ALL ONES NIBBLE PATTERN)
93	SYNC DATA BUS READ PATH UNIQUE DATA BIT FAILURE
94	NIBBLE OFF SET COUNTERS FAILURE
95	CS1 FUNCTION ABORT FAILURE DURING CLASS 'A' ERROR
96	CS1 FUNCTION ABORT FAILURE DURING CLASS 'B' ERROR
97	LBT BIT SET BEFORE A LAST BLOCK TRANSFER
98	DSA REGISTER INCREMENT FAILURE DURING NON LAST BLOCK TRANSFERS.
99	LBT BIT NOT CLEAR AFTER LOADING DSA REG
100	LBT BIT NOT SET AFTER A LAST BLOCK TRANSFER
101	DSA REGISTER INCREMENT FAILURE AFTER A LAST BLOCK TRANSFER
102	IAE BIT NOT SET AT INVALID SECTOR ADDRESSES
103	AOE BIT NOT SET AFTER ADDRESS OVERFLOW
104	SC BIT NOT AFTER CS1 FUNCTION ADORT
105	GOOD DATA BUS PARITY NOT DETECTED
106	GOOD DATA BUS PARITY NOT GENERATED
107	UNS BIT SET AFTER WRITING TO A SECTOR DURING PROM DATA TEST
108	UNS BIT NOT SET WITH BAD UV DATA
109	WCE BIT SET DURING MBUS WRITE/READ FUNCTION TROUBLE SHOOTING LOOP TEST
110	UNIQUE REGISTER SELECTION TEST FAILURE

111	FAILURE TO FIND GOOD MOS RAM ROW DURING ARRAY ADRS MUX TEST (INTERMEDIATE DIAG MSG)
112	UNIQUE ARRAY MODULE ROW/COL ADDRESSING FAILURE
113	DRIVE TYPE REGISTER VALUE WAS NOT CORRECT
114	TRE BIT SET UNEXPECTEDLY DURING A WRITE CHECK TRANSFER (INTERMEDIATE DIAG ERROR)
115	TRE BIT SET UNEXPECTEDLY DURING A WRITE TRANSFER (INTERMEDIATE DIAG ERROR)
116	TRE BIT SET UNEXPECTEDLY DURING A READ TRANSFER (INTERMEDIATE DIAG ERROR)
117	TRE BIT DID NOT SET AFTER A REGISTER MODIFICATION ERROR (EXCEPTION WAS NOT ASSERTED)
118	DATA DIAGNOSTIC REGISTER (D1 D2 E2) INITIALIZATION ERRORS
119	RH CONTROLLER FAILED EXISTANCE PROBE TEST
120	NED BIT SET DURING MASS BUS HANDSHAKE PROBE
121	DATA DIAGNOSTIC REGISTER (D1 D2 E2) ONE'S ZERO'S READ/WRITE ERRORS
122	DATA DIAGNOSTIC REGISTER (D1 D2 E2) SHIFTING 1'S AND 0'S READ/WRITE ERRORS
123	ECC HARD ERROR BIT NOT SET WHEN UNCORRECTABLE ECC ERRORS WERE READ
124	ECC ERROR REGISTER FAILURE TO LATCH FAILING ERROR CORRECTION INFORMATION
125	ECC ERROR REGISTER FAILURE TO CLEAR
126	ECC ERROR LOCATION REGISTER FAILED TO CLOCK IN DSA ADDRESS
127	ECC ERROR LOCATION REGISTER DATA BIT ERRORS
128	ECC ERROR LOCATION REGISTER INITIALIZATION ERRORS
129	ECC HARD ERROR BIT FAILED TO SET NOT SET
130	DATA CHECK ERROR BIT FAILED TO SET / NOT SET
131	CRC DATA BUS FAILURE. BIT CONTINUITY / UNIQUENESS ERRORS
132	UNIQUE NIBBLE CRC GENERATION CODE FAILURES
133	UNIQUE WORD CRC GENERATION CODE FAILURES
134	CORRECTABLE ERROR SYNDRONE DECODE FAILURE. FAILURE TO COMPLIMENT EXPECTED FAILING B
135	CORRECTABLE ERROR SYNDRONE DECODE FAILURE. UNEXPECTED BIT(S) FOUND COMPLIMENTED
136	ECH OR UNC BIT NOT SET DURING READS WITH ECC ERRORS IN CHANNEL > 35
137	ERROR CORRECTION WAS NOT INHIBITED DURING UNCORRECTABLE ECC ERRORS. UNEXPECTED BIT(S) WERE FOUND COMPLIMENTED
138	ECH OR UNC BIT NOT SET WHEN MULTIPLE CHANNEL ERRORS WERE READ

139	ERROR CORRECTION WAS NOT INHIBITED DURING UNCORRECTABLE ECC ERROR. UNEXPECTED BIT(S) WERE FOUND COMPLIMENTED
140	ECC FAILURE TO DETECT AND CORRECT SINGLE BIT CHANNEL ERRORS
141	ECC FAILURE TO DETECT AND CORRECT MULTIPLE BIT CHANNEL ERRORS
142	FAILURE TO FIND GOOD BLOCK DURING ARRAY SELECT TEST
148	SC BIT SET DURING MASS BUS WRITE OR WRITE CHECK TRANSFERS DURING TEST 21 AND 61
149	VV BIT WAS SET WHEN TESTED AND GOT CLEARED AFTER A READ-IN-PRESET FUNCTION WAS PERFO
150	VV BIT WAS CLEARED WHEN TESTED AND DID NOT GET SET WHEN A READ-IN-PRESET FUNCTION WA
151	THE UNS BIT DID NOT SET WHEN BOX POWER WAS LOST
152	THE VV BIT DID NOT CLEAR WHEN DRIVE AC POWER RESUMED WITH BAD BATTERY BACK-UP
153	DC LO DID NOT INITIATE 'MB DIS LO' RESULTING IN THE ML-11 REGISTERS NOT GETTING CLEA POWER UP.
154	VV BIT GOT CLEARED AFTER POWER FAIL WITH GOOD BATTERY BACK-UP
155	ECC INIT CLEARED OUT MEMORY AFTER POWER FAILED WITH GOOD BATTERY BACK-UP
156	BATTERY BACK-UP FAILED TO MAINTAIN DATA INTEGRITY DURING POWER FAIL

4.0 PERFORMANCE AND PROGRESS REPORTS

AT THE END OF EACH PASS, THE PASS COUNT IS GIVEN ALONG WITH THE TOTAL NUMBER OF ERRORS REPORTED SINCE THE DIAGNOSTIC WAS STARTED. THE ''EOP'' SWITCH CAN BE USED TO CONTROL HOW OFTEN THE END OF PASS MESSAGE IS PRINTED. SECTION 2.2 DESCRIBES SWITCHES.

5.0 DEVICE INFORMATION TABLES

HARDWARE DEFAULT PTABLE

```
.WORD   176400          ;RH ADDRESS
.WORD   70              ;RH TYPE
.WORD   204             ;RH VECTOR ADDRESS
.WORD   16.             ;NUMBER OF ARRAY MODULES
.WORD   1               ;IS DRVE OPTION ML11A,  1=16K,  0=64K
.WORD   0               ;ML-11 DRIVE NUMBER
.WORD   0               ;IS PARITY DISABLED,  1=YES,  0=NO
```

6.0 TEST SUMMARIES

TST1. MASS BUS READY

TEST THE RH CONTROLLER FOR EXISTANCE

TST2. MASS BUS HANDSHAKE

TEST MASS BUS ---> UNIBUS COMMUNICATIONS

TST3. DRIVE PRESENT

TEST TO SEE IF THE DRIVE UNDER TEST EXIST.

TST4. DRIVE SELECTION

SEE IF SELECTING OTHER DRIVES ON RH EFFECTS DRIVE UNDER TEST.

TST5. READ WRITE REGISTER ONE'S ZERO'S TEST

TEST REGISTERS READ WRITE CAPABILITY AND UNIQUENESS

TST6. READ WRITE REGISTER SHIFTING ONE'S AND ZEROES

TEST REGISTERS FOR UNIQUE DATA BITS.

TST7. REGISTER INITIALIZATION

TEST REGISTERS FOR CORRECT INIT DATA.

TST8 REGISTER SELECTION TEST

TEST FOR UNIQUE REGISTER SELECTION

TST9. PRINT DRIVE SERIAL NUMBER

PRINT THE CONTENTS OF MLSN IF THE SOFTWARE QUESTION WAS ANSWERED 'YES'.

TST10. C-BUS PARITY

TEST IF DRIVE CAN DETECT BAD PARITY ON C-BUS AND GENERATE GOOD PARITY.

TST11. MEMORY SIZING

SEE IF MEMORY SIZING LOGIC DETECTS AND RECORD CORRECT NUMBER OF ARRAYS PRESENT.

TST12. NO-OP FUNCTION

SEE IF A NO-OP FUNCTION CAN BE EXECUTED.

TST13. WRITE CHECK FUNCTION

SEE IF A WRITE CHECK FUNCTION CAUSES THE DRIVE TO HANG.

TST14. WRITE FUNCTION

SEE IF A WRITE FUNCTION CAUSES THE DRIVE TO HANG.

TST15. READ FUNCTION

SEE IF A READ FUNCTION CAUSES THE DRIVE TO HANG.

TST16. CLEAR FUNCTION

SEE IF A CLEAR FUNCTION CAN BE EXECUTED.

TST17. DIAGNOSTIC REGISTER READ WRITE

TEST THE DIAGNOSTIC REGISTERS FOR
1'S/0'S , SHIFTING 1'S/0'S AND
INITIALIZATION

TST18. COMPOSITE ERROR BIT TEST

SEE IF EACH INDIVIDUAL ERROR BIT IN MLER CAUSES A COMPOSITE ERROR.

TST19. ATA BIT

TEST IF THE ATA BIT CAN BE SET AND CLEARED.

TST20. SEARCH FUNCTION

SEE IF A SEARCH FUNCTION CAN BE EXECUTED ON ALL PRESENT ARRA-YS.

TST21. POWER FAIL TEST   *MANUAL INTERVENTION TEST*
TEST THE VV BIT SETTING/CLEARING, ECC INIT, REGISTER CLEARING UNS BIT SETTING, AC AND DC LOW.

TST22. ILLEGAL FUNCTION

SEE IF WRITING AN ILLEGAL FUNCTION TO CS1 CAN BE DETECTED AND THAT A TRANSFER IS NOT INITIATED.

TST23. REGISTER MODIFICATION REFUSED

TEST TO SEE IF WRITING TO SPECIFIC REGISTERS ARE ABORTED WHILE THE DRIVE IS ACTIVE. SEE IF WRITING TO NON-SPECIFIC REGISTERS ARE ALLOWED WHILE DRIVE IS ACTIVE.

TST24. INITIAL PROM TEST

TEST PROMS FOR EXISTENCE.

TST25. PROM 'OR' FUNCTION TEST

TEST THE PROM DATA ORING FUNC

TST26. UV ERROR TEST

TEST ABILITY OF UV ERR PROMS TO DETECT ALL POSSIBLE CHECK SUM ERRORS.

TST27. INITIAL ARRAY TEST

TEST ARRAY TIMING AND CONTROLFOR EXISTENCE.

TST28. PROM SELECTION TEST

TEST FOR UNIQUE PROM SELECTION.

TST29. READ WRITE MEMORY ARRAY WITH PROM DATA (DIAG MODE)

SEE IF MEMORY CAN BE WRITTEN AND READ.

ALSO FIND ERROR FREE BLOCK OF MEMORY FOR FUTURE TESTS.

TST30. REFRESH TIMING

TEST TO SEE IF MEMORY CAN BE REFRESHED.

TST31. ADDRESS COUNTER

TEST THE ADDRESS COUNTER FOR ABILITY TO COUNT THROUGH ALL POSSIBLE MEMORY ADDRESSES.

TST32. ARRAY MODULE SELECTION

TEST FOR UNIQUE ARRAY MODULE SELECTION

TST33. SEQUENCER EXISTENCE TEST

TEST TO SEE IF BASIC SEQUENCER TIMING EXISTS.

TST34. SYNC DATA BUS CONTINUITY/WRITE PATH

TEST SYNCHRONOUS DATA BUS WRITE PATH FOR CONTINUITY BY READ-ING WRITING ONE'S AND ZERO'S.

TST35. SYNC DATA BUS CONTINUITY/READ PATH

TEST SYNCHRONOUS DATA BUS READ PATH FOR CONTINUITY BY READING WRITING ONE'S AND ZEROES.

TST36. RAM-BUS ADDRESS COUNTER/WRITE PATH

TEST ABILITY OF THE RAM-BUS ADDRESS COUNTERS TO LOAD/UNLOAD THE SKIP DURING WRITE FUNCTIONS.

TST37. RAM BUS ADRS COUNTER/READ PATH

TEST ABILITY OF RAM/BUS ADRS COUNTERS TO LOAD/UNLOAD THE SKIP RAM DURING READ FUNCTIONS.

TST38. SYNC DATA BUS BIT UNIQUENESS/WRITE PATH

TEST SYNCHRONOUS DATA BUS FOR DATA BIT UNIQUENESS BY WRITING SHIFTING PATTERNS OF ONE'S AND ZERO'S TO THE ML.

TST39. SYNC DAT BUS BIT UNIQUENESS/READ PATH

TEST SYNCHRONOUS DATA BUS READ PATH FOR DATA BIT UNIQUENESS

BY WRITING SHIFTING PATTERNS OF ONES AND ZEROES TO THE

TST40. ARRAY ADDRESS MUX

TEST FOR UNIQUE ROW AND COLUMN ADDRESSING

TST41. NIBBLE OFFSET

TEST NIBBLE OFFSET COUNTERS TO COUNT TO 14 NIBBLE DATA TO BE SHIFTED ON DETECTION OF BAD NIBBLES.

TST42. CS1 FUNCTION ABORT

SEE IF A CLASS 'B' ERROR ABORTS A FUNCTION WHILE IN PROGRESS.

SEE IF A CLASS'A' ERROR IS DETECTED BUT FUNCTION IS ALLOWED TO COMPLETE.

TST43. LAST BLOCK INDICATOR

TEST THE LAST BLOCK INDICATOR BIT FOR NOT SETTING BELOW THE LAST AND SETTING AND CLRING AT THE LAST BLOCK

TST44. INVALID ADDRESS TEST

FOR ALL ILLEGAL DSA ADDRESSES READ THE IAE BIT SET.

TST45. ADDRESS OVERFLOW

TEST FOR AOE ON TRANSFERS WHICH EXTEND BEYOND THE LAST BLOCK.

TST46. SYNC BUS PARITY

TEST FOR BAD PARITY DETECTION AND GOOD PARITY GENERATION.

TST47. WRITE READ MEMORY ARRAY (M-BUS BLOCK MODE)

WRITE READ MEMORY VIA M-BUS BLOCK WITH MINIMUM OVERHEAD

TST48. TEST THE CRC DATA BUS BETWEEN THE CRC GENERATORS AND THE CRC/MBUS DATA MUX FOR CONTINUITY AND BIT UNIQUENESS

TST49. TEST CRC CODES GENERATED FOR ONE CRC GROUP (52 UNIQUE NIBBLES)

TST50. TEST CRC CODES GENERATED FOR ONE CRC GROUP (13 UNIBUS WORDS)

TST51. TEST SYNDRONE DECODE AND ERROR CORRECTION TO DECODE AND CORRECT SINGLE BIT AND MULTIPLE BIT CHANNEL ERRORS

TST52. TEST SYNDRONE DECODE TO DETECT BUT NOT CORRECT UNCORRECTABLE CHANNEL

ERRORS

TST53. TEST SYNDRONE DECODE TO DETECT BUT NOT CORRECT UNCORRECTABLE MULTIPLE CHANNEL ERRORS

TST54. TEST SYNDRONE GENERATION, SYNDRONE DECODE AND ERROR CORRECTION FOR SIGLE BIT CHANNEL ERRORS

TST55. TEST SYNDRONE GENERATION, SYNDRONE DECODE AND ERROR CORRECTION FOR MULTIPLE BIT CHANNEL ERRORS

TST56. TEST THE ECC ERROR REGISTER FOR CLEARING AND LATCHING OF ECC ERROR INFORMATION ON DETECTION OF ECC ERRORS

TST57. TEST THE ECC ERROR LOCATION REGISTER FOR CLOCKING, BIT UNIQUENESS, CLEARING AND LATCHING

TST58. VIA ECC_DM AND ECC_DIS TEST THE ECH BIT FOR SETTING AND NOT SETTING

TST59. VIA ECC_EN, ECC_DM AND ECC_DIS TEST THE DCK BIT FOR SETTING AND NOT SETTING

TST60. PROM DATA TEST

VERIFY THAT CHECK SUM VALUES FOR ALL PROM LOCATIONS ARE CORRECT.

TST61. BATTERY BACK-UP TEST *MANUAL INTERVENTION TEST*
TEST THE DRIVE BATTERY BACK-UP DURING POWER FAILS AND ALSO
TEST VV BIT, ECC INIT.

```
                                         .SBTTL  PROGRAM HEADER AND TABLES

000000                                          .ENABL  ABS,AMA
          002000                                .       =       2000

002000                                          BGNMOD

                                         ;++
                                         ; THE PROGRAM HEADER IS THE INTERFACE BETWEEN
                                         ; THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
                                         ;--

002000                                          POINTER ALL

002000                                          HEADER  CZMLA,D,0,1800.,0

                                         ;
                                         ;      NAMES OF DEVICES SUPPORTED BY THIS PROGRAM
                                         ;
002122                                          DEVTYP <ML-11>



                                         ;
                                         ;      TEST DESCRIPTION
                                         ;
002130                                          DESCRIPT <ML-11 LOGIC TEST>



                                         ;
                                         ;      THE GLOBAL ERROR TABLE (INFORMATION
                                         ;      USED IN A CALL TO THE MACRO "ERROR")
                                         ;

002152                                   ERRTBL
002152    000000                         ERRTYP::       .WORD   0
002154    000000                         ERRNBR::       .WORD   0
002156    000000                         ERRMSG::       .WORD   0
002160    000000                         ERRBLK::       .WORD   0

                                         ;++
                                         ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRES OF EACH TEST.
                                         ; IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
                                         ;--

002162                                          DISPATCH 61


                                         ;++
                                         ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
                                         ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                                         ; IS IDENTICAL TO THE STRUCTURE OF THE HARDWARE P-TABLES,
                                         ; AND IS USED AS A "TEMPLATE" FOR BUILDING THE P-TABLES.
                                         ;--
```

```
002356                          BGNHW   DFPTBL


002360  176400                  .WORD   176400          ;RH ADDRESS
002362  000070                  .WORD   70              ;RH TYPE
002364  000204                  .WORD   204             ;RH VECTOR ADDRESS
002366  000001                  .WORD   1               ;NUMBER OF ARRAY MODULES
002370  000001                  .WORD   1               ;IS DRIVE OPTION ML11A,  1=16K,  0=64K
002372  000000                  .WORD   0               ;ML-11 DRIVE NUMBER
002374  000000                  .WORD   0               ;IS PARITY DISABLED,  1=YES,  0=NO

002376                          ENDHW



                        ;++
                        ; THE DEFAULT SOFTWARE P-TABLE CONTAINS VARIOUS DATA USED BY THE
                        ; PROGRAM AS OPERATIONAL PARAMETERS.  THESE PARAMETERS ARE SET
                        ; UP AT ASSEMBLY TIME AND MAY BE VARIED BY THE OPERATOR AT RUN
                        ; TIME.
                        ;--

002376                          BGNSW   SFPTBL


002400  000000          PRSN::          .WORD   0       ;PRINT SERIAL NUMBER, 1=YES,  0=NO
002402  000001          ERRTHR::        .WORD   1       ;ENABLE ERROR THRESHOLD 1=YES, 0=NO
002404  000000          REGDMP::        .WORD   0       ;ENABLE REGISTER DUMPS 1=YES, 0=NO
002406  000001          ONEPAS::        .WORD   1       ;DROP UNIT AFTER ONE (EOP)
002410  000000          INTERVEN::      .WORD   0       ;MANUAL INTERVENTION TESTS 1=YES, 0=NO
002412                          ENDSW
```

```
                                    ;++
                                    ; THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
                                    ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                    ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                    ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                    ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                    ; WITH THE OPERATOR.
                                    ;--

 002412                                     BGNHRD


 002414                                     GPRMA   MSGH1,0,0,0,177777,YES
 002424                                     GPRMD   MSGH2,2,0,77,11,70,YES
 002436                                     GPRMD   MSGH3,4,0,777,0,777,YES
 002450                                     GPRMD   MSGH4,6,D,77,1,16.,YES
 002462                                     GPRML   MSGH5,10,1,YES
 002470                                     GPRMD   MSGH6,12,0,7,0,7,YES
 002502                                     GPRML   MSGH7,14,1,YES

 002510                                     ENDHRD


 002510      122     110     040    MSGH1:  .ASCIZ  /RH CONTROLER BASE REGISTER ADDRESS  ?/
 002556      122     110     040    MSGH2:  .ASCIZ  /RH CONTROLER TYPE '70  OR  11'      ?/
 002624      122     110     040    MSGH3:  .ASCIZ  /RH CONTROLER VECTOR ADDRESS         ?/
 002670      116     125     115    MSGH4:  .ASCIZ  /NUMBER OF ARRAY MODULES IN THIS UUT ?/
 002736      111     123     040    MSGH5:  .ASCIZ  /IS UUT DRIVE OPTION TYPE AN 'ML11A' ?/
 003004      104     122     111    MSGH6:  .ASCIZ  /DRIVE SELECT NUMBER OF THIS UUT     ?/
 003052      111     123     040    MSGH7:  .ASCIZ  /IS PARITY DISABLED IN THIS UUT      ?/
                                            .EVEN

                                    ;++
                                    ; THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
                                    ; THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES.  THE
                                    ; MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
                                    ; INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES.  THE
                                    ; MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
                                    ; WITH THE OPERATOR.
                                    ;--

 003120                                     BGNSFT


 003122                                     GPRML   MSGS1,0,1,YES
 003130                                     GPRML   MSGS2,2,1,YES
 003136                                     GPRML   MSGS3,4,1,YES
 003144                                     GPRML   MSGS4,6,1,YES
 003152                                     GPRML   MSGS5,10,1,YES
                                            .EVEN

 003160                                     ENDSFT
```

```
003160    120    122    111  MSGS1:  .ASCIZ  /PRINT DRIVE SERIAL NUMBER         ?/     ;PRINT DRIVE SERIAL NUMBER?
003224    105    116    101  MSGS2:  .ASCIZ  /ENABLE ERROR MESSAGE THRESHOLD    ?/     ;ERROR THRESHOLD FLAG
003270    105    116    101  MSGS3:  .ASCIZ  /ENABLE REGISTER DUMP ON ERRORS    ?/     ;REG DUMP FLAG
003334    105    130    111  MSGS4:  .ASCIZ  /EXIT PROGRAM AFTER ONE PASS       ?/     ;EXIT PROG FLAG
003400    105    116    101  MSGS5:  .ASCIZ  /ENABLE MANUAL INTERVENTION TESTS  ?/
                                     .EVEN

                             ;++
                             ; THIS TABLE IS USED BY THE RUNTIME SERVICES
                             ; TO PROTECT THE LOAD MEDIA.
                             ;--

003444                               BGNPROT

003444  177777                       -1              ;OFFSET INTO P-TABLE FOR CSR ADDRESS
003446  177777                       -1              ;OFFSET INTO P-TABLE FOR MASSBUS ADDRESS
003450  177777                       -1              ;OFFSET INTO P-TABLE FOR DRIVE NUMBER

003452                               ENDPROT


003452                       $PATCH::
003452                               .BLKW   20


003512                               ENDMOD
```

```
;ML3AD                                                  22-Mar-1982 11:35:31    TOPS-20 Bliss-16 V2(212)
;                                                       22-Mar-1982 11:32:50    PA:<NEALE>ML3AD.BLI.1 (1)

;          0001   MODULE ML3AD =
;          0002   BEGIN
;          0003
;          0004   %SBTTL 'REPORT CODE SECTION'
;          0005
;          0006   REQUIRE 'BLSMAC.REQ';
;          1496
;          1497   !+
;          1498   !  THE REPORT CODING SECTION CONTAINS THE
;          1499   ! "PRINTS" CALLS THAT GENERATE STATISTICAL REPORTS.
;          1500   !-
;          1501
;          1502   BGNRPT;
;          1503   RETURN;
;          1504   ENDRPT;



                                        .SBTTL  LRPT REPORT CODE SECTION

 004646  000207                  LRPT:   RTS     PC                              ;          1495

                                 ; Routine Size:  1 word
                                 ; Maximum stack depth per invocation:  0 words



                                        .SBTTL  L$RPT REPORT CODE SECTION
 004650  004767  177772          L$RPT:: JSR     PC,LRPT                         ;          1503
 004654  104425                          TRAP    25
 004656  000207                          RTS     PC

                                 ; Routine Size:  4 words
                                 ; Maximum stack depth per invocation:  0 words
```

```
;         1505
;         1506   !+
;         1507   ! THE AUTODROP CODE IS EXECUTED IMMEDIATELY AFTER THE INITIALIZE
;         1508   ! CODE IF THE ''ADR'' FLAG WAS SET.  THE UNIT(S) UNDER TEST ARE
;         1509   ! CHECKED TO SEE IF THEY WILL RESPOND.  THOSE THAT DON'T ARE IMMEDIATELY
;         1510   ! DROPPED FROM TESTING.  ISSUE A 'DODU'' FOR THOSE THAT DON'T RESPOND.
;         1511   !-
;         1512
;         1513   BGNAUTO;
;         1514   RETURN;
;         1515   ENDAUTO;

                                        .SBTTL  LAUTO REPORT CODE SECTION
  004660  000207                 LAUTO:  RTS     PC                      ;                1504

                                 ; Routine Size:  1 word
                                 ; Maximum stack depth per invocation:  0 words

                                        .SBTTL  L$AUTO REPORT CODE SECTION
  004662  004767  177772         L$AUTO::JSR     PC,LAUTO                ;                1514
  004666  104461                         TRAP    61
  004670  000207                         RTS     PC

                                 ; Routine Size:  4 words
                                 ; Maximum stack depth per invocation:  0 words
```

```
 ;ML3AD                                                              22-Mar-1982 11:35:31    TOPS-20 Bliss-16 V2(212)
 ;                      REPORT CODE SECTION                          22-Mar-1982 11:32:50    PA:<NEALE>ML3AD.BLI.1 (1)

 ;              1516
 ;              1517    !+
 ;              1518    ! THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
 ;              1519    ! TO NO LONGER BE TESTED.
 ;              1520    !-
 ;              1521
 ;              1522    BGNDU;
 ;              1523    RETURN;
 ;              1524    ENDDU;


                                           .SBTTL  LDU REPORT CODE SECTION
 004672  000207                    LDU:    RTS     PC                             ;                    1515

                                   ; Routine Size:  1 word
                                   ; Maximum stack depth per invocation:  0 words



                                           .SBTTL  L$DU REPORT CODE SECTION
 004674  004767  177772            L$DU::  JSR     PC,LDU                         ;                    1523
 004700  104453                            TRAP    53
 004702  000207                            RTS     PC

                                   ; Routine Size:  4 words
                                   ; Maximum stack depth per invocation:  0 words


 ;              1525
 ;              1526    !+
 ;              1527    ! THE ADD-UNIT SECTION CONTAINS ANY CODE THE PROGRAMMER WISHES
 ;              1528    ! TO BE EXECUTED IN CONJUNCTION WITH THE ADDING OF A UNIT BACK
 ;              1529    ! TO THE TEST CYCLE.
```

```
172 ;ML3AD                                                                22-Mar-1982 11:35:31    TOPS-20 Bliss-16 V2(212)
173 ;                     REPORT CODE SECTION                            22-Mar-1982 11:32:50    PA:<NEALE>ML3AD.BLI.1 (1)
174
175 ;            1530  !-
176 ;            1531
177 ;            1532  BGNAU;
178 ;            1533  RETURN;
179 ;            1534  ENDAU;
183
184                                            .SBTTL  LAU REPORT CODE SECTION
188 004704  000207                      LAU:    RTS     PC                              ;                    1524
189
190                                     ; Routine Size:  1 word
191                                     ; Maximum stack depth per invocation:  0 words
196
197
201
202                                            .SBTTL  L$AU REPORT CODE SECTION
206 004706  004767  177772              L$AU::  JSR     PC,LAU                          ;                    1533
207 004712  104452                              TRAP    52
208 004714  000207                              RTS     PC
209
210                                     ; Routine Size:  4 words
211                                     ; Maximum stack depth per invocation:  0 words
216
217
218 ;            1535  END
219 ;            1536
220 ;            1537  ELUDOM
224
225
226
```

```
;ML3AD                                                      22-Mar-1982 11:35:31   TOPS
;                    REPORT CODE SECTION                    22-Mar-1982 11:32:50   PA:<



; Size:              20 code + 0 data words
; Run Time:          00:02.9
; Elapsed Time:      00:05.5
; Memory Used:       24 pages
; Compilation Complete
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                                                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (1)
;
;   MODULE ML4AD =
;   BEGIN
;   !
;   ! PRETTY BLF COMMANDS
;   !
;   !<BLF/LOWERCASE_KEY>
;   !
;   ! REQUIRE
;   !
;
;   %SBTTL 'DECLARATION SECTION'
;
;   require 'BLSMAC.REQ';                              !BLISS INTERFACE MODULE
;
;   !
;   ! CONSTANT LITERALS
;   !
;
;   literal
;       ONE = 1,                                       !DATA BIT OF ONE
;       ONES = %o'177777',                             !DATA PATTERN OF ONES
;       ZERO = 0,                                      !DATA BIT OF ZERO
;       ZEROES = 0,                                    !DATA PATTERN OF ZEROES
;       NUM_OF_REG = 22,                               !NUMBER OF BLOCKS IN GLOBAL STORAGE 'ML-REG'
;       FIELD_SIZ = 4,                                 !FIELD SIZ FOR FIELD DECLARATIONS 'WORD_MAP'
;       !
;       !MLCS1 FUNCTION CODES
;       !
;       NOOP = 1,                                      !NOOP FUNCTION
;       DRV_CLR = %o'11',                              !DRIVE CLEAR FUNCTION
;       RD_IN_PRE = %o'21',                            !READ IN PRESET FUNCTION
;       SEARCH = %o'31',                               !SEARCH FUNCTION
;       WRT_CHK = %o'51',                              !WRITE CHECK FUNCTION
;       write = %o'61',                                !WRITE FUNCTION
;       read = %o'71',                                 !READ FUNCTION
;       !
;       ! DELAY ARGUMENTS
;       !
;       ONE_US = 1,                                    !ONE MICRO SECOND DELAY
;       FRTY_US = 40,                                  !FORTY MICRO SECOND DELAY
;       TWO_TH_US = 2000,                              !TWO THOUSAND MICRO SECOND DELAY
;       ONE_SEC = 100,                                 !ONE SECOND DELAY
;       ONE_MS = 10;                                   !ONE MILL SECOND DELAY
;
;   !
;   ! FIELD DECLARATIONS
;   !
;
;   field
;       WORD_MAP =                                     !MAPS GLOBAL STORAGE 'ML_REG' INTO REGISTER PERSONALITIES
;           set
;           REGISTER_ADD = [0, 0, 16, 0],              !REGISTERS ADDRESS
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                DECLARATION SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (1)
;
;                    FORCE_HI = [1, 0, 16, 0],                 !REGISTERS  FORCED HI BITS
;                    FORCE_LO = [2, 0, 16, 0],                 !REGISTERS FORCED LO BITS
;                    DONT_CARE = [3, 0, 16, 0]                 !REGISTERS IGNORE BITS
;                    tes,
;                NIB_MAP =                                     !MAPS OWN STORAGE NIB_SAVE INTO TEN FOUR BIT NIBBLES
;                    set
;                    NIB_0 = [0, 0, 4, 0],                     !NIBBLE 0 BITS <0:3>
;                    NIB_1 = [0, 4, 4, 0],                     !NIBBLE 1 BITS <4:7>
;                    NIB_2 = [0, 8, 4, 0],                     !NIBBLE 2 BITS <8:11>
;                    NIB_3 = [0, 12, 4, 0],                    !NIBBLE 3 BITS <12:15>
;                    NIB_4 = [1, 0, 4, 0],                     !NIBBLE 4 BITS <16:19>
;                    NIB_5 = [1, 4, 4, 0],                     !NIBBLE 5 BITS <20:23>
;                    NIB_6 = [1, 8, 4, 0],                     !NIBBLE 6 BITS <24:27>
;                    NIB_7 = [1, 12, 4, 0],                    !NIBBLE 7 BITS <28:31>
;                    NIB_8 = [2, 8, 4, 0],                     !NIBBLE 8 BITS <32:35>
;                    NIB_9 = [2, 12, 3, 0]                     !NIBBLE 9 BITS <36:39>
;                    tes,
;                DT1_FLD =
;                    set
;                    E0_5 = [0, 0, 6, 0],
;                    C0_5 = [0, 6, 6, 0],
;                    CRC_DATA = [0, 13, 1, 0],
;                    SGL_DATA = [0, 14, 1, 0],
;                    UNC_DATA = [0, 15, 1, 0],
;                    EE_DATA = [0, 0, 16, 0],
;                    A0_5 = [1, 0, 6, 0],
;                    P0_5 = [1, 6, 6, 0],
;                    ECR_DATA = [1, 12, 1, 0],
;                    B0_5 = [2, 0, 6, 0]
;                    tes;
;
;            external
;                REGDMP : volatile,                            !REGISTER DUMP ON ERROR FLAG
;                ONEPAS : volatile,                            !DROP UNIT AFTER ONE PASS
;                INTERVEN : volatile,                                  !MANUAL INTERVENTION FLAG
;                PRSN : volatile,                              !PRINT SERIAL NUMBER FLAG
;                ERRTHR : volatile;                            !ENABLE ERROR THRESHOLD FLAG
;
;            !<BLF/PAGE>
```

```
;ML4AD                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (2)

;                 !
;                 ! OWN STORAGE
;                 !
;
;                 own
;                     NIB_SAVE : block [3] field (NIB_MAP) volatile,
;                                                                 !STORAGE LOCATION TO SAVE NIBBLE DATA READ DURING DIAG MODE
;                     HW_OR_TBL : vector [127] volatile,          !STORES HARDWARE ORED PROM DATA DURING PROM OR FUNC TEST
;                     PTBL_PTR : volatile,                        !HARDWARE P-TABLE POINTER
;                     OP_NOM_ARR : volatile,                      !OPERATORS NUMBER  OF ARRAY INPUTTED
;                     ARR_INC : volatile,                         !ARRAY SELECTION INCREMENT VALUE
;                     GOOD_BLK : volatile,                        !GOOD BLOCK ADRS
;                     PAR_DIS : volatile,                         !PARITY DISABLE FLAG
;                     CHIP_SIZ : volatile,                        !MOS RAM CHIP SIZE
;                     LST_BLK : volatile,                         !LAST ADDRESSABLE BLOCK
;                     ARR_16 : volatile,                          !MAX NUMBER OF ARRAY ALLOWED
;                     LST_ARR : volatile,                         !LAST ADDRESSABLE ARRAY
;                     IO_BUF : vector [256] volatile,             !INPUT OUTPUT BUFFER
;                     STK_OFF : vector [10, byte] volatile,       !STACK OFFSET STORAGE LOCATION
;                     stack : vector [198, byte] volatile,        !STACK OF 198 BYTE LOCATIONS
;                     PD_TEMP : bitvector [16] volatile,          !PROM DATA STORAGE LOCATION DURING DIAG MODES
;                     W_C_SIZE : volatile,                        !STORES WORD COUNT FOR 16K OR 64K XFERS
;                     RAS_INC : volatile,                         !ROW ADRS STROBE INCREMENT
;                     WT_DATA : volatile,                         !SAVE WRITE DATA DURING REG READ WRITE TEST
;                     RD_DATA : volatile,                         !SAVE READ DATA DURING REG READ WRITE TEST
;                     DRIVE_TYPE : volatile,                      !DRIVE TYPE STORAGE LOCATION
;                     LST_DOT_REG : volatile,                     !LAST ML-11 REG INDEX FOR THIS TYPE RH CONTROLLER
;                     REG_INIT_FLG : initial (0) volatile,        !FLAG TO DETECT DOING REG INIT TEST
;                     A_CAL : volatile,                           !CALCULATED CRC STORAGE LOCATION
;                     B_CAL : volatile,                           !CALCULATED CRC STORAGE LOCATION
;                     P_CAL : volatile,                           !CALCULATED CRC STORAGE LOCATION
;                     A_GEN : volatile,                           !GENERATED CRC STORAGE LOCATION
;                     B_GEN : volatile,                           !GENERATED CRC STORAGE LOCATION
;                     P_GEN : volatile,                           !GENERATED CRC STORAGE LOCATION
;                     P_CNT : volatile,                           !ERROR MESSAGE PRINT COUNTER
;                     LIMIT : volatile,                           !LIMIT OF ERROR MESSAGES PRINTED
;                     DROP_CNT : volatile,                        !COUNTS NUMBER OF PASSES DONE
;                 !
;                 !<BLF/NOFORMAT>
;                 !
;                    ML_REG: blockvector [NUM_OF_REG,FIELD_SIZ] field(WORD_MAP) !ML11 REGISTERS
;                       preset (                                                !STRUCTURE TO STORE INDIVIDULA
;                                                                               !REGISTER PERSONALITIES
;                                                                               !ie. REGISTER ADDRESSES
;                                                                               !BITS FORCED HIGH
;                                                                               !BITS FORCED LOW
;                                                                               !READ ONLY BITS
;                         [0,FORCE_HI]     = %o'004000',    !MLCS1
;
;                         [0,FORCE_LO]     = %o'173701',
;                         [0,DONT_CARE]    = %o'160200',
;
```

```
;ML4AD                                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    DECLARATION SECTION                                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (2)
;
;                       [5,FORCE_LO]      = %o'25077',        !MLDS
;                       [5,FORCE_HI]      = %o'010600',
;                       [5,DONT_CARE]     = %o'000100',
;
;                       [6,FORCE_LO]      = %o'014620',       !MLER
;
;                       [7,DONT_CARE]     = %o'177400',       !MLAS
;
;                       [8,FORCE_LO]      = %o'100000',       !MLPA
;
;                       [10,FORCE_LO]     = %o'000020',       !MLMR
;                       [10,DONT_CARE]    = %o'177400',
;
;                       [11,FORCE_HI]     = %o'000110',       !MLDT
;                       [11,FORCE_LO]     = %o'177666',
;                       [11,DONT_CARE]    = %o'000001',
;
;                       [13,FORCE_LO]     = %o'140300',       !MLE1
;
;                       [14,FORCE_LO]     = %o'100300',       !MLE2
;
;                       [17,FORCE_LO]     = %o'010000',       !MLEE
;                       [21,DONT_CARE]    = %o'000000'        !MLCS2
;                               ) volatile,
;
;
;               REM_TBL:vector [63,byte]             !REMAINDER TABLE
;                 preset (                           !STRUCTURE TO STORE PRECALCULATED
;                       [0] = %b'000001',            !CRC REMAINDER VALUES FOR CRC CODE
;                       [1] = %b'000010',            !GENERATION
;                       [2] = %b'000100',
;                       [3] = %b'001000',
;                       [4] = %b'010000',
;                       [5] = %b'100000',
;                       [6] = %b'000011',
;                       [7] = %b'000110',
;                       [8] = %b'001100',
;                       [9] = %b'011000',
;                       [10] = %b'110000',
;                       [11] = %b'100011',
;                       [12] = %b'000101',
;                       [13] = %b'001010',
;                       [14] = %b'010100',
;                       [15] = %b'101000',
;                       [16] = %b'010011',
;                       [17] = %b'100110',
;                       [18] = %b'001111',
;                       [19] = %b'011110',
;                       [20] = %b'111100',
;                       [21] = %b'111011',
;                       [22] = %b'110101',
;                       [23] = %b'101001',
```

```
:ML4AD                                                    29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
:                    DECLARATION SECTION                  29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (2)

                [24] = %b'010001',
                [25] = %b'100010',
                [26] = %b'000111',
                [27] = %b'001110',
                [28] = %b'011100',
                [29] = %b'111000',
                [30] = %b'110011',
                [31] = %b'100101',
                [32] = %b'001001',
                [33] = %b'010010',
                [34] = %b'100100',
                [35] = %b'001011',
                [36] = %b'010110',
                [37] = %b'101100',
                [38] = %b'011011',
                [39] = %b'110110',
                [40] = %b'101111',
                [41] = %b'011101',
                [42] = %b'111010',
                [43] = %b'110111',
                [44] = %b'101101',
                [45] = %b'011001',
                [46] = %b'110010',
                [47] = %b'100111',
                [48] = %b'001101',
                [49] = %b'011010',
                [50] = %b'110100',
                [51] = %b'101011',
                [52] = %b'010101',
                [53] = %b'101010',
                [54] = %b'010111',
                [55] = %b'101110',
                [56] = %b'011111',
                [57] = %b'111110',
                [58] = %b'111111',
                [59] = %b'111101',
                [60] = %b'111001',
                [61] = %b'110001',
                [62] = %b'100001')volatile,

        DT_1:blockvector[5,3] field (DT1_FLD)             !DATA TABLE 1
        preset (                                          !STRUCTURE TO STORE TEST DATA
                [0,E0_5] = %b'111111',                    !FOR TEST 56 'ECC ERROR LOCATION TEST'
                [0,C0_5] = %b'100100',
                [0,CRC_DATA] = %b'1',
                [0,SGL_DATA] = %b'1',
                [0,UNC_DATA] = %b'0',
                [0,A0_5] = %b'000000',
                [0,P0_5] = %b'111111',
                [0,ECR_DATA] = %b'0',
                [0,B0_5] = %b'000000',
                [1,E0_5] = %b'111111',
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 DECLARATION SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (2)
;
;                       [1,C0_5] = %b'100100',
;                       [1,CRC_DATA] = %b'1',
;                       [1,SGL_DATA] = %b'1',
;                       [1,UNC_DATA] = %b'0',
;                       [1,A0_5] = %b'111111',
;                       [1,P0_5] = %b'000000',
;                       [1,ECA_DATA] = %b'0',
;                       [1,B0_5] = %b'000000',
;                       [2,E0_5] = %b'111111',
;                       [2,C0_5] = %b'000101',
;                       [2,CRC_DATA] = %b'0',
;                       [2,SGL_DATA] = %b'0',
;                       [2,UNC_DATA] = %b'1',
;                       [2,A0_5] = %b'000000',
;                       [2,P0_5] = %b'111111',
;                       [2,ECA_DATA] = %b'1',
;                       [2,B0_5] = %b'111111',
;                       [3,E0_5] = %b'111111',
;                       [3,C0_5] = %b'000101',
;                       [3,CRC_DATA] = %b'0',
;                       [3,SGL_DATA] = %b'0',
;                       [3,UNC_DATA] = %b'1',
;                       [3,A0_5] = %b'000000',
;                       [3,P0_5] = %b'000000',
;                       [3,ECA_DATA] = %b'0',
;                       [3,B0_5] = %b'111111',
;                       [4,E0_5] = %b'111111',
;                       [4,C0_5] = %b'000101',
;                       [4,CRC_DATA] = %b'0',
;                       [4,SGL_DATA] = %b'0',
;                       [4,UNC_DATA] = %b'1',
;                       [4,A0_5] = %b'111111',
;                       [4,P0_5] = %b'000000',
;                       [4,ECA_DATA] = %b'1',
;                       [4,B0_5] = %b'111111')volatile,
;
;       !
;       !<BLF/FORMAT>
;       !
;           RH_ADD : volatile,                          !RH CONTROLLER BASE ADDRESS
;           RH_TYP : volatile,                          !RH CONTROLLER TYPE
;           RH_VEC : volatile,                          !RH CONTROLLER VECTOR ADDRESS
;           ML_LUN : volatile,                          !ML LOGICAL UNIT NO.
;           ML_DUT : volatile;                          !ML DRIVE NUMBER
;
;       !
;       !<BLF/PAGE>
```

```
;ML4AD                                                   29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;             DECLARATION SECTION                        29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (3)

;             !
;             EQUALS;
;             !
;             ! MACRO DEFINITIONS
;             !
;
;             macro
;             !
;             ! REGISTER NAMES:
;             !
;        M        MLCS1 =
;             .ML_REG [0,REGISTER_ADD]%,                !CONTROL AND STATUS REGISTER 1
;        M        MLWC =
;             .ML_REG [1,REGISTER_ADD]%,                !WORD COUNT REGISTER
;        M        MLBA =
;             .ML_REG [2,REGISTER_ADD]%,                !UNIBUS ADDRESS REGISTER
;        M        MLDA =
;             .ML_REG [3,REGISTER_ADD]%,                !DESIRED ADDRESS REGISTER
;        M        MLCS2 =
;             .ML_REG [4,REGISTER_ADD]%,                !CONTROL AND STATUS REGISTER 2
;        M        MLDS =
;             .ML_REG [5,REGISTER_ADD]%,                !DRIVE STATUS REGISTER
;        M        MLER =
;             .ML_REG [6,REGISTER_ADD]%,                !ERROR REGISTER
;        M        MLAS =
;             .ML_REG [7,REGISTER_ADD]%,                !ATTENTION SUMMARY REGISTER
;        M        MLLA =
;             .ML_REG [8,REGISTER_ADD]%,                !LOOK AHEAD REGISTER
;        M        MLPA =
;             .ML_REG [8,REGISTER_ADD]%,                !PROM ADDRESS REGISTER
;        M        MLDB =
;             .ML_REG [9,REGISTER_ADD]%,                !DATA BUFFER REGISTER
;        M        MLMR =
;             .ML_REG [10,REGISTER_ADD]%,               !MAINTENANCE REGISTER
;        M        MLDT =
;             .ML_REG [11,REGISTER_ADD]%,               !DRIVE TYPE REGISTER
;        M        MLSN =
;             .ML_REG [12,REGISTER_ADD]%,               !SERIAL NUMBER REGISTER
;        M        MLE1 =
;             .ML_REG [13,REGISTER_ADD]%,               !ECC CRC WORD REGISTER 1
;        M        MLE2 =
;             .ML_REG [14,REGISTER_ADD]%,               !ECC CRC WORD REGISTER 2
;        M        MLD1 =
;             .ML_REG [15,REGISTER_ADD]%,               !DATA DIAGNOSTIC REGISTER 1
;        M        MLD2 =
;             .ML_REG [16,REGISTER_ADD]%,               !DATA DIAGNOSTIC REGISTER 2
;        M        MLEE =
;             .ML_REG [17,REGISTER_ADD]%,               !ECC ERROR REGISTER
;        M        MLEL =
;             .ML_REG [18,REGISTER_ADD]%,               !ECC ERROR LCOATION REGISTER
;        M        MLPD =
;             .ML_REG [19,REGISTER_ADD]%,               !PROM DATA REGISTER
```

```
;ML4AD                                                            29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       DECLARATION SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)

;          M 1836         MLBAE =
;            1837      .ML_REG [20,REGISTER_ADD]%,               !BUS ADDRESS EXTENSION REGISTER
;          M 1838         MLCS3 =
;            1839      .ML_REG [21,REGISTER_ADD]%,               !CONTROL AND STATUS REGISTER 3
;            1840   !
;            1841   !  BIT ASSIGNMENTS:
;            1842   !
;          M 1843         SC =
;            1844       (MLCS1)<15,1>%,                          !MLCS1 BIT ASSIGNMENTS
;          M 1845         TRE =
;            1846       (MLCS1)<14,1>%,
;          M 1847         MCPE =
;            1848       (MLCS1)<13,1>%,
;          M 1849         DVA =
;            1850       (MLCS1)<11,1>%,
;          M 1851         RDY =
;            1852       (MLCS1)<7,1>%,
;          M 1853         IE =
;            1854       (MLCS1)<6,1>%,
;          M 1855         GO =
;            1856      (MLCS1)<0,1>%,
;          M 1857         ML_FUNC =
;            1858       (MLCS1)<0,6>%,
;          M 1859         DLT =
;            1860       (MLCS2)<15,1>%,                          !MLCS2 BIT ASSIGNMENTS
;          M 1861         WCE =
;            1862       (MLCS2)<14,1>%,
;          M 1863         PE =
;            1864       (MLCS2)<13,1>%,
;          M 1865         NED =
;            1866       (MLCS2)<12,1>%,
;          M 1867         NEM =
;            1868       (MLCS2)<11,1>%,
;          M 1869         PGE =
;            1870       (MLCS2)<10,1>%,
;          M 1871         MXF =
;            1872       (MLCS2)<9,1>%,
;          M 1873         MDPE =
;            1874       (MLCS2)<8,1>%,
;          M 1875         ORDY =
;            1876       (MLCS2)<7,1>%,
;          M 1877         IRDY =
;            1878       (MLCS2)<6,1>%,
;          M 1879         CLR =
;            1880       (MLCS2)<5,1>%,
;          M 1881         PAT =
;            1882       (MLCS2)<4,1>%,
;          M 1883         BAI =
;            1884       (MLCS2)<3,1>%,
;          M 1885         DRV_NUM =
;            1886      (MLCS2)<0,3>%,
;          M 1887         ATTN =
```

```
436 ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
437 ;                  DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)
438
439 ;          1888      (MLDS)<15,1>%,                       !MLDS BIT ASSIGNMENTS
440 ;        M 1889        COMP_ERR =
441 ;          1890      (MLDS)<14,1>%,
442 ;        M 1891        MOL =
443 ;          1892      (MLDS)<12,1>%,
444 ;        M 1893        LBT =
445 ;          1894      (MLDS)<10,1>%,
446 ;        M 1895        DPR =
447 ;          1896      (MLDS)<8,1>%,
448 ;        M 1897        DRY =
449 ;          1898      (MLDS)<7,1>%,
450 ;        M 1899        VV =
451 ;          1900      (MLDS)<6,1>%,
452 ;        M 1901        DCK =
453 ;          1902      (MLER)<15,1>%,                       !MLER BIT ASSIGNMENTS
454 ;        M 1903        UNS =
455 ;          1904      (MLER)<14,1>%,
456 ;        M 1905        OPI =
457 ;          1906      (MLER)<13,1>%,
458 ;        M 1907        IAE =
459 ;          1908      (MLER)<10,1>%,
460 ;        M 1909        AOE =
461 ;          1910      (MLER)<9,1>%,
462 ;        M 1911        ECH_ERR =
463 ;          1912      (MLER)<6,1>%,
464 ;        M 1913        DPAR =
465 ;          1914      (MLER)<5,1>%,
466 ;        M 1915        CPAR =
467 ;          1916      (MLER)<3,1>%,
468 ;        M 1917        RMR =
469 ;          1918      (MLER)<2,1>%,
470 ;        M 1919        ILR =
471 ;          1920      (MLER)<1,1>%,
472 ;        M 1921        ILF =
473 ;          1922      (MLER)<0,1>%,
474 ;        M 1923        ARR_TYP =
475 ;          1924      (MLMR)<10,1>%,                       !MLMR BIT ASSIGNMENTS
476 ;        M 1925        ML_NUM_ARR =
477 ;          1926      (MLMR)<11,5>%,
478 ;        M 1927        REF_MAR =
479 ;          1928      (MLMR)<7,1>%,
480 ;        M 1929        PROM_RW =
481 ;          1930      (MLMR)<6,1>%,
482 ;        M 1931        PROM_DIS =
483 ;          1932      (MLMR)<5,1>%,
484 ;        M 1933        DAT_CLK =
485 ;          1934      (MLMR)<4,1>%,
486 ;        M 1935        DAT_DM =
487 ;          1936      (MLMR)<3,1>%,
488 ;        M 1937        DCK_EN =
489 ;          1938      (MLMR)<2,1>%,
490 ;        M 1939        ECC_DIS =
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;            DECLARATION SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)
;
;            (MLMR)<1,1>%,
;   M           ECC_DM =
;             (MLMR)<0,1>%,
;   M           DRV_TYP =
;             (MLDT)<0,1>%,                                  !MLDT BIT ASSIGNMENTS
;   M           CRC_A =
;   M                                              !MLE1 BIT ASSIGNMENTS
;            (MLE1)<0,6>%,
;   M           PAR_CRC_WRD =
;            (MLE1)<8,6>%,
;   M           CRC_B =
;   M                                              !MLE2 BIT ASSIGNMENTS
;            (MLE2)<0,6>%,
;   M           UNC_ERR =
;             (MLEE)<15,1>%,                                 !MLEE BIT ASSIGNMENTS
;   M           SGL_ERR =
;             (MLEE)<14,1>%,
;   M           CRC_ERR =
;             (MLEE)<13,1>%,
;   M           BIT_IN_ERR =
;            (MLEE)<0,8>%,
;   M           CHAN_IN_ERR =
;            (MLEE)<8,6>%,
;           !
;           ! MISCELLANEOUS MACRO DEFINITIONS:
;           !
;   M           SN3 =
;            (MLSN)<12,4>%,
;   M           SN2 =
;            (MLSN)<8,4>%,
;   M           SN1 =
;            (MLSN)<4,4>%,
;   M           SN0 =
;            (MLSN)<0,4>%,
;   M           IS_SET =
;   M                                              !TEST IF BIT IS EQUAL 1
;            eql 1%,
;   M           IS_NOT_SET =
;   M                                              !TEST IF BIT IS EQUAL 0
;            eql 0%,
;   M           HI =
;   M                                              !READS REGISTERS FORCED HI BITS FROM PERSONALITY TABLE
;            ML_REG[.index,FORCE_HI]%,
;   M           LO =
;   M                                              !READS REGISTERS FORCED LO BITS FROM PERSONALITY TABLE
;            ML_REG[.index,FORCE_LO]%,
;   M           IGNORE =
;   M                                              !READS REGISTERS DONT_CARE BITS FROM PERSONALITY TABLE
;            ML_REG[.index,DONT_CARE]%,
;   M           MLE2_MASK =
;   M                                              !READS MLE2 DONT CARE MASK EITHER DATA DIAG OR ECC CIE REG
;            ML_REG[14,DONT_CARE]%,
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;          DECLARATION SECTION                                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)

;    M        WRT_MASK =
;    M                                          !GENERATE MASK DATA PATTERN USING REGISTER FORCE LO, HI AND IGNORE B
;          .IGNORE or ((not .LO) and (.HI or .TST_PAT))%,
;    M        CLR_MBUS =
;    M                                          !CLEAR MASS BUS RESTORE DRIVE NUMBER
;          CLR = ONE; DRV_NUM = .ML_DUT%,
;         !<BLF/SYNONYM IS_SET = EQL 1 * >
;         !<BLF/SYNONYM IS_NOT_SET = EQL 0 * >
;         !
;         ! DIAGNOSTIC DATA REGISTER MACROS
;         !
;    M        RD_LNG_WRD =
;    M                                   !READ DATA DIAG REGS INTO BIND LOCATIONS
;    M     D1_TEMP = .MLD1;
;    M     D2_TEMP = .MLD2;
;          E2_TEMP = .MLE2%,
;    M        WRT_LNG_WRD =
;    M                                   !LOADS DATA DIAG REG WITH CONTENTS OF BIND LOCATIONS
;    M     MLD1 = .D1_TEMP;
;    M     MLD2 = .D2_TEMP;
;          MLE2 = .E2_TEMP%,
;    M        TIME_OUT_LOOP =
;    M                  !WAIT LOOP DIRING MASS BUS TRANSFER
;    M          do
;    M            0
;               until .DRY;%,
;         !
;         ! ERROR PRINTING THRESHOLD MACROS
;         !
;    M        CLR_THRESHOLD =
;         P_CNT = ZERO;%,
;    M        CMP_THRESHOLD =
;    M    P_CNT = .P_CNT + 1;
;    M
;    M    if .P_CNT gtr .LIMIT
;         then exitloop;%;
;
;         !
;         ! BIND DECLARATIONS
;         !
;
;         bind
;         !
;         ! MANUAL INTERVENTION TEST ERROR AND OPERATOR PROMPT MESSAGES.
;         ! TESTS 21 'POWER FAIL TEST' AND TEST 61 'BATTERY BACK-UP TEST'
;         !
;            T_21 = uplit (%asciz'********* MANUAL INTERVENTION TEST 21 POWER FAIL *********'),
;            T_61 = uplit (%asciz'********* MANUAL INTERVENTION TEST 61 BATTERY BACK-UP *********'),
;            PWR_OFF = uplit (%asciz'WITH BATTERY BACK-UP ON TURN BOX AC CIRCUIT BREAKER OFF'),
;            PWR_ON = uplit (%asciz'WITH BATTERY BACK-UP OFF TURN BOX AC CIRCUIT BREAKER ON'),
;            UNS_ERR = uplit (%asciz'UNS BIT NOT SET DURING AC POWER FAIL'),
;            VV_NOT_SET = uplit (%asciz'VV BIT NOT SET AFTER RD_IN_PRESET FUNCTION'),
```

```
;ML4AD                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;           DECLARATION SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)

        VV_CLEAR = uplit (%asciz'VV BIT CLEARED AFTER RD-IN-PRESET FUNCTION'),
        NO_INIT = uplit (%asciz'MEMORY NOT INITIALIZED AFTER POWER UP WITH BAD BATTERY BACK-UP'),
        MB_DIS_ERR = uplit (%asciz'REGISTERS NOT CLEARED BY MB_DIS AFTER POWER FAIL'),
        WC_ERR = uplit (%asciz'SC BIT SET DURING WRITE CHECK TRANSFER'),
        W_ERR = uplit (%asciz'SC BIT SET DURING WRITE TRANSFER'),
        VV_SET = uplit (%asciz'VV BIT STILL SET AFTER POWER LOSS WITH BAD BATTERY BACK-UP'),
        PUP_BB = uplit (%asciz'WITH BATTERY BACK-UP ON TURN BOX AC CIRCUIT BREAKER ON'),
        BB_VV_ERR = uplit (%asciz'VV BIT CLEARED AFTER POWER FAIL WITH GOOD BATTERY BACK-UP'),
        BB_INIT_ERR = uplit (%asciz'MEMORY INITED AFTER POWER FAIL WITH GOOD BATTERY BACK-UP'),
        BB_BB_ERR = uplit (%asciz'BATTERY BACK-UP FAILED TO MAINTAIN MEMORY INTEGRITY DURING POWER FAIL'),
    !
    ! ERROR DATA MAPPING FORMATS
    !
        FMT_1 = uplit (%asciz'%AEXPECTED: %O6%A    READ: %O6%N%N'),
        FMT_2 = uplit (%asciz'%AGOOD DATA: %O6%A    BAD DATA: %O6%A    XOR: %O6%N%N'),
        FMT_3 = uplit (%asciz'%ADRIVE SN: %O6%N%N'),
        FMT_4 = uplit (%asciz'%ABIT IN ERROR: %O6%N%N'),
        FMT_5 = uplit (%asciz'%AGOOD NIB DATA: %O2%A    BAD NIB DATA: %O2%A    NIB POS: %O4%N%N'),
        FMT_6 = uplit (%asciz'%ANIB IN ERROR: %D4%N%N'),
        FMT_7 = uplit (%asciz'%AFAILED AT: %O6%N%N'),
        FMT_8 = uplit (%asciz'%AREPLACE ARR MOD: %D2%N%N'),
        FMT_9 = uplit (%asciz'%AFAILED AT DSA: %O6%N%N'),
        FMT_10 = uplit (%asciz'%ABIT<15:10>: %B6%A    BIT<9:0>: %B10%N%N'),
        FMT_11 = uplit (%asciz'%AFAILING REG ADRS: %O6%N%N'),
        FMT_12 = uplit (%asciz'%AFAILING FUNC: %O6%N%N'),
        FMT_13 = uplit (%asciz' %AOFF_SET CNT FOR NIB : %D2 %A = %D2 %N%N'),
        FMT_14 = uplit (%asciz'%AWROTE: %D2%A    READ: %D2%N%N'),
        FMT_15 = uplit (%asciz'%ANIBBLES XFERED BEFORE ERROR: %D3%N'),
        FMT_16 = uplit (%asciz'%AFAILING REG: %O6%A GOOD DATA: %O6%A BAD DATA: %O6%N%N'),
        FMT_17 = uplit (%asciz'%N%ADIAGNOSING UNIT %O1%N%N'),
        FMT_18 = uplit (%asciz'%ATIMED OUT DURING MBUS %O2%A FUNC%N%N'),
        FMT_19 = uplit (%asciz'%ACRC GEN = B: %B6%A A: %B6%A P: %B6%N'),
        FMT_20 = uplit (%asciz'%ACRC CAL = B: %B6%A A: %B6%A P: %B6%N%N'),
        FMT_21 = uplit (%asciz'%AFAILED AT PLOG: %D2%A CHANNEL: %D2%N%N'),
        FMT_22 = uplit (%asciz'%AFAILED AT WRD: %D2%A BIT: %D2%N%N'),
        FMT_23 = uplit (%asciz'%AREGISTER%S3%AADDRESS%S7%ACONTENTS%N%N'),
        FMT_24 = uplit (%asciz'%S%T%S5%O6%S4%O16%N'),
        FMT_25 = uplit (%asciz'%S4%T%A:%S%O6%N'),
        FMT_26 = uplit (%asciz'%S4%T%A:%S%D1%D1%D1%D1%N'),
    !
    ! ERROR MESSAGE MAPPING FORMATS
    !
        ONE_FMT = uplit (%asciz'%T%N'),
        TWO_FMT = uplit (%asciz'%T%T%N'),
        THR_FMT = uplit (%asciz'%T%T%T%N'),
        FOR_FMT = uplit (%asciz'%T%T%T%T%N'),
        FIV_FMT = uplit (%asciz'%T%T%T%T%T%N'),
        SIX_FMT = uplit (%asciz'%T%T%T%T%T%T%N'),
        SEV_FMT = uplit (%asciz'%T%T%T%T%T%T%T%N'),
        EIG_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%N'),
        NIN_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%N'),
        TEN_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%T%N'),
```

```
;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)

;          ELV_FMT = uplit (%asciz'%T%T%T%T%T%T%T%T%T%T%N'),
;       !
;       ! DIAGNOSTIC VOCABULARY
;       !
;          !
;          ! WORDS
;          !
;          WRD_1 = uplit (%asciz' GO'),
;          WRD_2 = uplit (%asciz' DRV_RDY'),
;          WRD_3 = uplit (%asciz' ILF'),
;          WRD_4 = uplit (%asciz' OPI'),
;          WRD_5 = uplit (%asciz' BAD'),
;          WRD_6 = uplit (%asciz' GOOD'),
;          WRD_7 = uplit (%asciz' PARITY NOT'),
;          WRD_8 = uplit (%asciz' GENERATED'),
;          WRD_9 = uplit (%asciz' DETECTED'),
;          WRD_10 = uplit (%asciz' ERROR'),
;          WRD_11 = uplit (%asciz' AFTER'),
;          WRD_12 = uplit (%asciz' DURING'),
;          WRD_13 = uplit (%asciz' AT'),
;          WRD_14 = uplit (%asciz' FAILURE'),
;          WRD_15 = uplit (%asciz' ATA'),
;          WRD_16 = uplit (%asciz' ATTN'),
;          WRD_17 = uplit (%asciz' WRITING'),
;          WRD_18 = uplit (%asciz' VV'),
;          WRD_19 = uplit (%asciz' FUNC'),
;          WRD_20 = uplit (%asciz' TRE'),
;          WRD_21 = uplit (%asciz' RMR'),
;          WRD_22 = uplit (%asciz' EXCESSIVE'),
;          WRD_23 = uplit (%asciz' MBUS'),
;          WRD_24 = uplit (%asciz' DATA'),
;          WRD_25 = uplit (%asciz' CONTINUITY'),
;          WRD_26 = uplit (%asciz' AOE'),
;          WRD_27 = uplit (%asciz' LBT'),
;          WRD_29 = uplit (%asciz' PREMATURLY'),
;          WRD_30 = uplit (%asciz' IAE'),
;          WRD_31 = uplit (%asciz' INCREMENT'),
;          WRD_32 = uplit (%asciz' WITH'),
;          WRD_33 = uplit (%asciz' UV'),
;          WRD_34 = uplit (%asciz' UNS'),
;          WRD_35 = uplit (%asciz' PROM'),
;          WRD_36 = uplit (%asciz' OR'),
;          WRD_37 = uplit (%asciz' SELECT'),
;          WRD_38 = uplit (%asciz' REG'),
;          WRD_39 = uplit (%asciz' UNIQUE'),
;          WRD_40 = uplit (%asciz' 14'),
;          WRD_41 = uplit (%asciz' NIBBLE CNT'),
;          WRD_42 = uplit (%asciz' GTR'),
;          WRD_43 = uplit (%asciz' WHILE'),
;          WRD_44 = uplit (%asciz' TRE'),
;          WRD_45 = uplit (%asciz' INITIAL'),
;          WRD_46 = uplit (%asciz' OFF_SET'),
```

```
;ML4AD                                                29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;                DECLARATION SECTION                  29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (3)

;           WRD_47 = uplit (%asciz' COUNT'),
;           WRD_48 = uplit (%asciz' DELAY'),
;           WRD_49 = uplit (%asciz' TESTS'),
;           WRD_50 = uplit (%asciz' ADRS'),
;           WRD_51 = uplit (%asciz' COUNTER'),
;           WRD_52 = uplit (%asciz' REG'),
;           WRD_53 = uplit (%asciz' TESTED'),
;           WRD_54 = uplit (%asciz' NIBBLE'),
;           WRD_55 = uplit (%asciz' ALL'),
;           WRD_56 = uplit (%asciz' TEST'),
;           WRD_57 = uplit (%asciz' XFERED'),
;           WRD_58 = uplit (%asciz' NIBBLES'),
;           WRD_59 = uplit (%asciz' SC'),
;           WRD_60 = uplit (%asciz' MULTIPLEXER'),
;           WRD_61 = uplit (%asciz' UNEXPECTED'),
;           WRD_62 = uplit (%asciz' NED'),
;           WRD_63 = uplit (%asciz' ILR'),
;           WRD_64 = uplit (%asciz' CRC'),
;           WRD_65 = uplit (%asciz' SGL'),
;           WRD_67 = uplit (%asciz' ECH'),
;           WRD_68 = uplit (%asciz'UNC'),
;           WRD_69 = uplit (%asciz' BIT'),
;           WRD_70 = uplit (%asciz' CHANNEL'),
;           WRD_71 = uplit (%asciz' LATCH'),
;           WRD_72 = uplit (%asciz' DCK'),
;           WRD_73 = uplit (%asciz' BUS'),
;           WRD_74 = uplit (%asciz' SYNDRONE'),
;           WRD_75 = uplit (%asciz' DECODE'),
;           WRD_76 = uplit (%asciz' NOT'),
;           WRD_77 = uplit (%asciz' UNCORRECTABLE'),
;           !
;           ! PHRASES
;           !
;           PHR_1 = uplit (%asciz' BIT NOT SET'),
;           PHR_2 = uplit (%asciz' BIT NOT CLR'),
;           PHR_3 = uplit (%asciz' NO RESPONCE AFTER 1.5 US'),
;           PHR_4 = uplit (%asciz' DATA ERRORS'),
;           PHR_5 = uplit (%asciz' BIT SET'),
;           PHR_6 = uplit (%asciz' BIT CLR'),
;           PHR_7 = uplit (%asciz' OF OTHER DRIVES'),
;           PHR_8 = uplit (%asciz' CLASS A'),
;           PHR_9 = uplit (%asciz' CLASS B'),
;           PHR_10 = uplit (%asciz' TO FIND'),
;           PHR_11 = uplit (%asciz' NOT LATCHED'),
;           PHR_12 = uplit (%asciz' SINGLE BIT ERROR'),
;           PHR_13 = uplit (%asciz' MULTIPLE BIT ERROR'),
;           PHR_14 = uplit (%asciz'          REGISTER   DUMP'),
;           PHR_15 = uplit (%asciz'SERIAL #'),
;           !
;           ! FUNCTIONS
;           !
;           FNC_1 = uplit (%asciz' MEM SIZING'),
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;            DECLARATION SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)
;
;       FNC_2 = uplit (%asciz' NOOP'),
;       FNC_3 = uplit (%asciz' DRV'),
;       FNC_4 = uplit (%asciz' WRITE CHECK'),
;       FNC_5 = uplit (%asciz' WRITE'),
;       FNC_6 = uplit (%asciz' READ'),
;       FNC_7 = uplit (%asciz' CLEAR'),
;       FNC_8 = uplit (%asciz' COMP ERROR'),
;       FNC_9 = uplit (%asciz' SYS CLR'),
;       FNC_10 = uplit (%asciz' SEARCH'),
;       FNC_11 = uplit (%asciz' READ-IN-PRESET'),
;       FNC_12 = uplit (%asciz' ILLEGAL'),
;       FNC_13 = uplit (%asciz' ABORT'),
;       FNC_14 = uplit (%asciz' ARR RD WRT'),
;       FNC_15 = uplit (%asciz' GOOD BLK'),
;       FNC_16 = uplit (%asciz' REFRESH'),
;       FNC_17 = uplit (%asciz' ARRAY'),
;       FNC_18 = uplit (%asciz' RAM-BUS'),
;       FNC_19 = uplit (%asciz' OVERFLOW'),
;       FNC_21 = uplit (%asciz' CHK SUM'),
;       FNC_22 = uplit (%asciz' LAST BLK'),
;       FNC_23 = uplit (%asciz' INITIALIZE'),
;       !
;       ! REGISTERS
;       !
;       REG_1 = uplit (%asciz' MLCS1'),
;       REG_2 = uplit (%asciz' MLDS'),
;       REG_3 = uplit (%asciz' MLER'),
;       REG_4 = uplit (%asciz' MLMR'),
;       REG_5 = uplit (%asciz' MLAS'),
;       REG_6 = uplit (%asciz' MLDA'),
;       REG_7 = uplit (%asciz' MLDT'),
;       REG_8 = uplit (%asciz' MLPA'),
;       REG_9 = uplit (%asciz' MLSN'),
;       REG_10 = uplit (%asciz' MLE1'),
;       REG_11 = uplit (%asciz' MLE2'),
;       REG_12 = uplit (%asciz' MLD1'),
;       REG_13 = uplit (%asciz' MLD2'),
;       REG_14 = uplit (%asciz' MLEE'),
;       REG_15 = uplit (%asciz' MLEL'),
;       REG_16 = uplit (%asciz' MLPD'),
;       REG_17 = uplit (%asciz' MLCS2'),
;       REG_18 = uplit (%asciz' MLWC'),
;       REG_19 = uplit (%asciz' MLBA'),
;       REG_20 = uplit (%asciz' MLBAI'),
;       REG_21 = uplit (%asciz' MLCS3'),
;       !
;       ! MODULES IN ERROR MESSAGES
;       !
;       ASYNC = uplit (%asciz'ASYNCHRONOUS FAILURE MODULE 7361'),
;       SYNC = uplit (%asciz'SYNCHRONOUS FAILURE MODULE 7362 '),
;       ARR_DAT = uplit (%asciz'ARRAY DATA FAILURE MODULE 7363 '),
;       MEM_ARR = uplit (%asciz'MEMORY ARRAY FAILURE MODULE 7357'),
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;        DECLARATION SECTION                             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (3)

;            INTER = uplit (%asciz'INTERMEDIATE DIAGNOSTIC MESSAGE'),
;            DATA_LATE = uplit (%asciz'DATA LATE ERROR DURING TRANSFER'),
;            SC_SET = uplit (%asciz'SC BIT SET DURING TRANSFER'),
;            TRBLE_LOOP = uplit (%asciz'TROUBLE SHOOT LOOP ERRORS'),
;            RH_ERROR = uplit (%asciz'RH CONTROLLER ERRORS'),
;            TIME_OUT = uplit (%asciz'DRIVE HUNG AFTER MASS BUS TRANSFER'),
;        !
;        ! DATA DIAGNOSTIC REGISTER SAVE LOCATIONS
;        !
;            D1_TEMP = NIB_SAVE,
;            D2_TEMP = NIB_SAVE [1, 0, 16, 0],
;            E2_TEMP = NIB_SAVE [2, 0, 16, 0];
;
;        %SBTTL 'ROUTINE DECLARATION SECTION'
;
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;       ROUTINE DECLARATION SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (4)
;
;       routine LOAD_STACK (STK_PTR, NIB_PTR) : novalue =
;           begin
;
;       !++
;       ! FUNCTIONAL DESCRIPTION:
;       !         LOAD STACK TAKES GOOD NIBBLE DATA
;       !         FOUND IN THE STRUCTURE 'NIB_SAVE'
;       !         AND STORES IT INTO THE STRUCTURE
;       !         'STACK' REWRITING ANY BAD NIBBLE
;       !         'STACK' LOCATIONS WITH GOOD NIBBLE
;       !         DATA
;       !
;       ! FORMAL PARAMETERS:
;       ! STK_PTR
;       !         POINTS TO PRESENT DEPTH OF THE
;       !         'STACK' WHERE PRESENT GOOD NIBBLE
;       !         DATA IS TO BE STORED.
;       !
;       ! NIB_PTR
;       !         POINTS TO CURRENT NIBBLE POSITION BEING
;       !         MANIPULATED.
;       !
;       ! IMPLICIT INPUTS:
;       ! STACK
;       !         VECTOR OF 198 BYTE LOCATIONS WHERE
;       !         GOOD NIBBLE DATA IS STORED
;       !         DURING DIAGNOSTIC MODE READS, AFTER
;       !         BAD NIBBLE LOCATIONS HAVE BEEN
;       !         STRIPPED AWAY.
;       !
;       ! STK_OFF
;       !
;       !     vector of 9 byte LOCATIONS WHICH
;       !         STORES AWAY A BAD NIBBLE OFF SET
;       !         COUNT FOR EACH NIBBLE POSITION
;       !
;       ! NIB_SAVE
;       !         BLOCK OF 3 WORDS TO STORE THE
;       !         DATA FOUND IN MLD1, MLD2 AND
;       !         MLE2 AFTER A DIAGNOSTIC MODE READ.
;       !
;       ! IMPLICIT OUTPUTS:
;       !         'STACK' LOADED WITH GOOD NIBBLE
;       !         DATA
;       !
;       ! COMPLETETION CODES:    NONE
;       !
;       ! SIDE EFFECTS:          NONE
;       !
;       !--
;
;         case .NIB_PTR from 0 to 9 of              !SELECT NIBBLE DATA TO BE LOADED INTO THE STACK
```

```
;ML4AD                                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (4)

;                           set
;
;                           [0] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_0];
;                                                               !LOAD NIBBLE DATA 0 INTO SELECTED STACK LOCATION
;
;                           [1] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_1];
;                                                               !LOAD NIBBLE DATA 1 INTO SELECTED STACK LOCATION
;
;                           [2] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_2];
;                                                               !LOAD NIBBLE DATA 2 INTO SELECTED STACK LOCATION
;
;                           [3] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_3];
;                                                               !LOAD NIBBLE DATA 3 INTO SELECTED STACK LOCATION
;
;                           [4] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_4];
;                                                               !LOAD NIBBLE DATA 4 INTO SELECTED STACK LOCATION
;
;                           [5] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_5];
;                                                               !LOAD NIBBLE DATA 5 INTO SELECTED STACK LOCATION
;
;                           [6] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_6];
;                                                               !LOAD NIBBLE DATA 6 INTO SELECTED STACK LOCATION
;
;                           [7] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_7];
;                                                               !LOAD NIBBLE DATA 7 INTO SELECTED STACK LOCATION
;
;                           [8] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_8];
;                                                               !LOAD NIBBLE DATA 8 INTO SELECTED STACK LOCATION
;
;                           [9] :
;                               stack [(.STK_PTR - (.STK_OFF [.NIB_PTR]))] = .NIB_SAVE [NIB_9];
;                                                               !LOAD NIBBLE DATA 9 INTO SELECTED STACK LOCATION
;                           tes;
;
;                       end;
```

```
                                ;ML4AD                                         29-Mar-1982 16:23:04   TOPS
                                ;               ROUTINE DECLARATION SECTION    29-Mar-1982 16:21:03   PA:<
004716   052   052   052   P.AAA:  .ASCII  /***/
004721   052   052   052           .ASCII  /***/
004724   052   052   052           .ASCII  /***/
004727   040   115   101           .ASCII  / MA/
004732   116   125   101           .ASCII  /NUA/
004735   114   040   111           .ASCII  /L I/
004740   116   124   105           .ASCII  /NTE/
004743   122   126   105           .ASCII  /RVE/
004746   116   124   111           .ASCII  /NTI/
004751   117   116   040           .ASCII  /ON /
004754   124   105   123           .ASCII  /TES/
004757   124   040   062           .ASCII  /T 2/
004762   061   040   120           .ASCII  /1 P/
004765   117   127   105           .ASCII  /OWE/
004770   122   040   106           .ASCII  /R F/
004773   101   111   114           .ASCII  /AIL/
004776   040   052   052           .ASCII  / **/
005001   052   052   052           .ASCII  /***/
005004   052   052   052           .ASCII  /***/
005007   052   000   000           .ASCII  /*/<00><00>
005012   052   052   052   P.AAB:  .ASCII  /***/
005015   052   052   052           .ASCII  /***/
005020   052   052   052           .ASCII  /***/
005023   040   115   101           .ASCII  / MA/
005026   116   125   101           .ASCII  /NUA/
005031   114   040   111           .ASCII  /L I/
005034   116   124   105           .ASCII  /NTE/
005037   122   126   105           .ASCII  /RVE/
005042   116   124   111           .ASCII  /NTI/
005045   117   116   040           .ASCII  /ON /
005050   124   105   123           .ASCII  /TES/
005053   124   040   066           .ASCII  /T 6/
005056   061   040   102           .ASCII  /1 B/
005061   101   124   124           .ASCII  /ATT/
005064   105   122   131           .ASCII  /ERY/
005067   040   102   101           .ASCII  / BA/
005072   103   113   055           .ASCII  /CK-/
005075   125   120   040           .ASCII  /UP /
005100   052   052   052           .ASCII  /***/
005103   052   052   052           .ASCII  /***/
005106   052   052   052           .ASCII  /***/
005111   000                       .ASCII  <00>
005112   127   111   124   P.AAC:  .ASCII  /WIT/
005115   110   040   102           .ASCII  /H B/
005120   101   124   124           .ASCII  /ATT/
005123   105   122   131           .ASCII  /ERY/
005126   040   102   101           .ASCII  / BA/
005131   103   113   055           .ASCII  /CK-/
005134   125   120   040           .ASCII  /UP /
005137   117   116   040           .ASCII  /ON /
005142   124   125   122           .ASCII  /TUR/
005145   116   040   102           .ASCII  /N B/
```

```
                                   ;ML4AD                                             29-Mar-1982 16:23:04   TOPS
                                   ;               ROUTINE DECLARATION SECTION        29-Mar-1982 16:21:03   PA:<
005150    117    130    040              .ASCII  /OX /
005153    101    103    040              .ASCII  /AC /
005156    103    111    122              .ASCII  /CIR/
005161    103    125    111              .ASCII  /CUI/
005164    124    040    102              .ASCII  /T B/
005167    122    105    101              .ASCII  /REA/
005172    113    105    122              .ASCII  /KER/
005175    040    117    106              .ASCII  / OF/
005200    106    000                     .ASCII  /F/<00>
005202    127    111    124   P.AAD:     .ASCII  /WIT/
005205    110    040    102              .ASCII  /H B/
005210    101    124    124              .ASCII  /ATT/
005213    105    122    131              .ASCII  /ERY/
005216    040    102    101              .ASCII  / BA/
005221    103    113    055              .ASCII  /CK-/
005224    125    120    040              .ASCII  /UP /
005227    117    106    106              .ASCII  /OFF/
005232    040    124    125              .ASCII  / TU/
005235    122    116    040              .ASCII  /RN /
005240    102    117    130              .ASCII  /BOX/
005243    040    101    103              .ASCII  / AC/
005246    040    103    111              .ASCII  / CI/
005251    122    103    125              .ASCII  /RCU/
005254    111    124    040              .ASCII  /IT /
005257    102    122    105              .ASCII  /BRE/
005262    101    113    105              .ASCII  /AKE/
005265    122    040    117              .ASCII  /R O/
005270    116    000                     .ASCII  /N/<00>
005272    125    116    123   P.AAE:     .ASCII  /UNS/
005275    040    102    111              .ASCII  / BI/
005300    124    040    116              .ASCII  /T N/
005303    117    124    040              .ASCII  /OT /
005306    123    105    124              .ASCII  /SET/
005311    040    104    125              .ASCII  / DU/
005314    122    111    116              .ASCII  /RIN/
005317    107    040    101              .ASCII  /G A/
005322    103    040    120              .ASCII  /C P/
005325    117    127    105              .ASCII  /OWE/
005330    122    040    106              .ASCII  /R F/
005333    101    111    114              .ASCII  /AIL/
005336    000    000                     .ASCII  <00><00>
005340    126    126    040   P.AAF:     .ASCII  /VV /
005343    102    111    124              .ASCII  /BIT/
005346    040    116    117              .ASCII  / NO/
005351    124    040    123              .ASCII  /T S/
005354    105    124    040              .ASCII  /ET /
005357    101    106    124              .ASCII  /AFT/
005362    105    122    040              .ASCII  /ER /
005365    122    104    137              .ASCII  /RD_/
005370    111    116    137              .ASCII  /IN_/
005373    120    122    105              .ASCII  /PRE/
005376    123    105    124              .ASCII  /SET/
```

```
                                          ;ML4AD                                                29-Mar-1982 16:23:04   TOPS
                                          ;                ROUTINE DECLARATION SECTION          29-Mar-1982 16:21:03   PA:<

005401      040     106     125                    .ASCII   / FU/
005404      116     103     124                    .ASCII   /NCT/
005407      111     117     116                    .ASCII   /ION/
005412      000     000                            .ASCII   <00><00>
005414      126     126     040     P.AAG:         .ASCII   /VV /
005417      102     111     124                    .ASCII   /BIT/
005422      040     103     114                    .ASCII   / CL/
005425      105     101     122                    .ASCII   /EAR/
005430      105     104     040                    .ASCII   /ED /
005433      101     106     124                    .ASCII   /AFT/
005436      105     122     040                    .ASCII   /ER /
005441      122     104     055                    .ASCII   /RD-/
005444      111     116     055                    .ASCII   /IN-/
005447      120     122     105                    .ASCII   /PRE/
005452      123     105     124                    .ASCII   /SET/
005455      040     106     125                    .ASCII   / FU/
005460      116     103     124                    .ASCII   /NCT/
005463      111     117     116                    .ASCII   /ION/
005466      000     000                            .ASCII   <00><00>
005470      115     105     115     P.AAH:         .ASCII   /MEM/
005473      117     122     131                    .ASCII   /ORY/
005476      040     116     117                    .ASCII   / NO/
005501      124     040     111                    .ASCII   /T I/
005504      116     111     124                    .ASCII   /NIT/
005507      111     101     114                    .ASCII   /IAL/
005512      111     132     105                    .ASCII   /IZE/
005515      104     040     101                    .ASCII   /D A/
005520      106     124     105                    .ASCII   /FTE/
005523      122     040     120                    .ASCII   /R P/
005526      117     127     105                    .ASCII   /OWE/
005531      122     040     125                    .ASCII   /R U/
005534      120     040     127                    .ASCII   /P W/
005537      111     124     110                    .ASCII   /ITH/
005542      040     102     101                    .ASCII   / BA/
005545      104     040     102                    .ASCII   /D B/
005550      101     124     124                    .ASCII   /ATT/
005553      105     122     131                    .ASCII   /ERY/
005556      040     102     101                    .ASCII   / BA/
005561      103     113     055                    .ASCII   /CK-/
005564      125     120     000                    .ASCII   /UP/<00>
005567      000                                    .ASCII   <00>
005570      122     105     107     P.AAI:         .ASCII   /REG/
005573      111     123     124                    .ASCII   /IST/
005576      105     122     123                    .ASCII   /ERS/
005601      040     116     117                    .ASCII   / NO/
005604      124     040     103                    .ASCII   /T C/
005607      114     105     101                    .ASCII   /LEA/
005612      122     105     104                    .ASCII   /RED/
005615      040     102     131                    .ASCII   / BY/
005620      040     115     102                    .ASCII   / MB/
005623      137     104     111                    .ASCII   /_DI/
005626      123     040     101                    .ASCII   /S A/
```

```
                                 ;ML4AD
                                 ;            ROUTINE DECLARATION SECTION

005631   106   124   105             .ASCII   /FTE/
005634   122   040   120             .ASCII   /R P/
005637   117   127   105             .ASCII   /OWE/
005642   122   040   106             .ASCII   /R F/
005645   101   111   114             .ASCII   /AIL/
005650   000   000                   .ASCII   <00><00>
005652   123   103   040   P.AAJ:    .ASCII   /SC /
005655   102   111   124             .ASCII   /BIT/
005660   040   123   105             .ASCII   / SE/
005663   124   040   104             .ASCII   /T D/
005666   125   122   111             .ASCII   /URI/
005671   116   107   040             .ASCII   /NG /
005674   127   122   111             .ASCII   /WRI/
005677   124   105   040             .ASCII   /TE /
005702   103   110   105             .ASCII   /CHE/
005705   103   113   040             .ASCII   /CK /
005710   124   122   101             .ASCII   /TRA/
005713   116   123   106             .ASCII   /NSF/
005716   105   122   000             .ASCII   /ER/<00>
005721   000                         .ASCII   <00>
005722   123   103   040   P.AAK:    .ASCII   /SC /
005725   102   111   124             .ASCII   /BIT/
005730   040   123   105             .ASCII   / SE/
005733   124   040   104             .ASCII   /T D/
005736   125   122   111             .ASCII   /URI/
005741   116   107   040             .ASCII   /NG /
005744   127   122   111             .ASCII   /WRI/
005747   124   105   040             .ASCII   /TE /
005752   124   122   101             .ASCII   /TRA/
005755   116   123   106             .ASCII   /NSF/
005760   105   122   000             .ASCII   /ER/<00>
005763   000                         .ASCII   <00>
005764   126   126   040   P.AAL:    .ASCII   /VV /
005767   102   111   124             .ASCII   /BIT/
005772   040   123   124             .ASCII   / ST/
005775   111   114   114             .ASCII   /ILL/
006000   040   123   105             .ASCII   / SE/
006003   124   040   101             .ASCII   /T A/
006006   106   124   105             .ASCII   /FTE/
006011   122   040   120             .ASCII   /R P/
006014   117   127   105             .ASCII   /OWE/
006017   122   040   114             .ASCII   /R L/
006022   117   123   123             .ASCII   /OSS/
006025   040   127   111             .ASCII   / WI/
006030   124   110   040             .ASCII   /TH /
006033   102   101   104             .ASCII   /BAD/
006036   040   102   101             .ASCII   / BA/
006041   124   124   105             .ASCII   /TTE/
006044   122   131   040             .ASCII   /RY /
006047   102   101   103             .ASCII   /BAC/
006052   113   055   125             .ASCII   /K-U/
006055   120   000   000             .ASCII   /P/<00><00>
```

```
                                        ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                                        ;               ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03   PA:<

006060     127     111     124    P.AAM:   .ASCII  /WIT/
006063     110     040     102             .ASCII  /H B/
006066     101     124     124             .ASCII  /ATT/
006071     105     122     131             .ASCII  /ERY/
006074     040     102     101             .ASCII  / BA/
006077     103     113     055             .ASCII  /CK-/
006102     125     120     040             .ASCII  /UP /
006105     117     116     040             .ASCII  /ON /
006110     124     125     122             .ASCII  /TUR/
006113     116     040     102             .ASCII  /N B/
006116     117     130     040             .ASCII  /OX /
006121     101     103     040             .ASCII  /AC /
006124     103     111     122             .ASCII  /CIR/
006127     103     125     111             .ASCII  /CUI/
006132     124     040     102             .ASCII  /T B/
006135     122     105     101             .ASCII  /REA/
006140     113     105     122             .ASCII  /KER/
006143     040     117     116             .ASCII  / ON/
006146     000     000                     .ASCII  <00><00>
006150     126     126     040    P.AAN:   .ASCII  /VV /
006153     102     111     124             .ASCII  /BIT/
006156     040     103     114             .ASCII  / CL/
006161     105     101     122             .ASCII  /EAR/
006164     105     104     040             .ASCII  /ED /
006167     101     106     124             .ASCII  /AFT/
006172     105     122     040             .ASCII  /ER /
006175     120     117     127             .ASCII  /POW/
006200     105     122     040             .ASCII  /ER /
006203     106     101     111             .ASCII  /FAI/
006206     114     040     127             .ASCII  /L W/
006211     111     124     110             .ASCII  /ITH/
006214     040     107     117             .ASCII  / GO/
006217     117     104     040             .ASCII  /OD /
006222     102     101     124             .ASCII  /BAT/
006225     124     105     122             .ASCII  /TER/
006230     131     040     102             .ASCII  /Y B/
006233     101     103     113             .ASCII  /ACK/
006236     055     125     120             .ASCII  /-UP/
006241     000                             .ASCII  <00>
006242     115     105     115    P.AAO:   .ASCII  /MEM/
006245     117     122     131             .ASCII  /ORY/
006250     040     111     116             .ASCII  / IN/
006253     111     124     105             .ASCII  /ITE/
006256     104     040     101             .ASCII  /D A/
006261     106     124     105             .ASCII  /FTE/
006264     122     040     120             .ASCII  /R P/
006267     117     127     105             .ASCII  /OWE/
006272     122     040     106             .ASCII  /R F/
006275     101     111     114             .ASCII  /AIL/
006300     040     127     111             .ASCII  / WI/
006303     124     110     040             .ASCII  /TH /
006306     107     117     117             .ASCII  /GOO/
```

```
                                        ;ML4AD
                                        ;               ROUTINE DECLARATION SECTION
                                        ;
006311  104     040     102                     .ASCII  /D B/
006314  101     124     124                     .ASCII  /ATT/
006317  105     122     131                     .ASCII  /ERY/
006322  040     102     101                     .ASCII  / BA/
006325  103     113     055                     .ASCII  /CK-/
006330  125     120     000                     .ASCII  /UP/<00>
006333  000                                     .ASCII  <00>
006334  102     101     124     P.AAP:          .ASCII  /BAT/
006337  124     105     122                     .ASCII  /TER/
006342  131     040     102                     .ASCII  /Y B/
006345  101     103     113                     .ASCII  /ACK/
006350  055     125     120                     .ASCII  /-UP/
006353  040     106     101                     .ASCII  / FA/
006356  111     114     105                     .ASCII  /ILE/
006361  104     040     124                     .ASCII  /D T/
006364  117     040     115                     .ASCII  /O M/
006367  101     111     116                     .ASCII  /AIN/
006372  124     101     111                     .ASCII  /TAI/
006375  116     040     115                     .ASCII  /N M/
006400  105     115     117                     .ASCII  /EMO/
006403  122     131     040                     .ASCII  /RY /
006406  111     116     124                     .ASCII  /INT/
006411  105     107     122                     .ASCII  /EGR/
006414  111     124     131                     .ASCII  /ITY/
006417  040     104     125                     .ASCII  / DU/
006422  122     111     116                     .ASCII  /RIN/
006425  107     040     120                     .ASCII  /G P/
006430  117     127     105                     .ASCII  /OWE/
006433  122     040     106                     .ASCII  /R F/
006436  101     111     114                     .ASCII  /AIL/
006441  000                                     .ASCII  <00>
006442  045     101     105     P.AAQ:          .ASCII  /%AE/
006445  130     120     105                     .ASCII  /XPE/
006450  103     124     105                     .ASCII  /CTE/
006453  104     072     040                     .ASCII  /D: /
006456  045     117     066                     .ASCII  /%O6/
006461  045     101     040                     .ASCII  /%A /
006464  040     040     040                     .ASCII  /   /
006467  122     105     101                     .ASCII  /REA/
006472  104     072     040                     .ASCII  /D: /
006475  045     117     066                     .ASCII  /%O6/
006500  045     116     045                     .ASCII  /%N%/
006503  116     000     000                     .ASCII  /N/<00><00>
006506  045     101     107     P.AAR:          .ASCII  /%AG/
006511  117     117     104                     .ASCII  /OOD/
006514  040     104     101                     .ASCII  / DA/
006517  124     101     072                     .ASCII  /TA:/
006522  040     045     117                     .ASCII  / %O/
006525  066     045     101                     .ASCII  /6%A/
006530  040     040     040                     .ASCII  /   /
006533  040     102     101                     .ASCII  / BA/
006536  104     040     104                     .ASCII  /D D/
```

```
                                    ;ML4AD                                                29-Mar-1982 16:23:04   TOPS
                                    ;            ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03   PA:<

006541   101   124   101                 .ASCII  /ATA/
006544   072   040   045                 .ASCII  /: %/
006547   117   066   045                 .ASCII  /O6%/
006552   101   040   040                 .ASCII  /A  /
006555   040   040   130                 .ASCII  /  X/
006560   117   122   072                 .ASCII  /OR:/
006563   040   045   117                 .ASCII  / %O/
006566   066   045   116                 .ASCII  /6%N/
006571   045   116   000                 .ASCII  /%N/<00>
006574   045   101   104     P.AAS:      .ASCII  /%AD/
006577   122   111   126                 .ASCII  /RIV/
006602   105   040   123                 .ASCII  /E S/
006605   116   072   040                 .ASCII  /N: /
006610   045   117   066                 .ASCII  /%O6/
006613   045   116   045                 .ASCII  /%N%/
006616   116   000                         .ASCII  /N/<00>
006620   045   101   102     P.AAT:      .ASCII  /%AB/
006623   111   124   040                 .ASCII  /IT /
006626   111   116   040                 .ASCII  /IN /
006631   105   122   122                 .ASCII  /ERR/
006634   117   122   072                 .ASCII  /OR:/
006637   040   045   117                 .ASCII  / %O/
006642   066   045   116                 .ASCII  /6%N/
006645   045   116   000                 .ASCII  /%N/<00>
006650   045   101   107     P.AAU:      .ASCII  /%AG/
006653   117   117   104                 .ASCII  /OOD/
006656   040   116   111                 .ASCII  / NI/
006661   102   040   104                 .ASCII  /B D/
006664   101   124   101                 .ASCII  /ATA/
006667   072   040   045                 .ASCII  /: %/
006672   117   062   045                 .ASCII  /O2%/
006675   101   040   040                 .ASCII  /A  /
006700   040   040   102                 .ASCII  /  B/
006703   101   104   040                 .ASCII  /AD /
006706   116   111   102                 .ASCII  /NIB/
006711   040   104   101                 .ASCII  / DA/
006714   124   101   072                 .ASCII  /TA:/
006717   040   045   117                 .ASCII  / %O/
006722   062   045   101                 .ASCII  /2%A/
006725   040   040   040                 .ASCII  /   /
006730   040   116   111                 .ASCII  / NI/
006733   102   040   120                 .ASCII  /B P/
006736   117   123   072                 .ASCII  /OS:/
006741   040   045   117                 .ASCII  / %O/
006744   064   045   116                 .ASCII  /4%N/
006747   045   116   000                 .ASCII  /%N/<00>
006752   045   101   116     P.AAV:      .ASCII  /%AN/
006755   111   102   040                 .ASCII  /IB /
006760   111   116   040                 .ASCII  /IN /
006763   105   122   122                 .ASCII  /ERR/
006766   117   122   072                 .ASCII  /OR:/
006771   040   045   104                 .ASCII  / %D/
```

```
                                           ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                           ;                      ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03   PA:<
006774    064    045    116                        .ASCII  /4%N/
006777    045    116    000                        .ASCII  /%N/<00>
007002    045    101    106    P.AAW:              .ASCII  /%AF/
007005    101    111    114                        .ASCII  /AIL/
007010    105    104    040                        .ASCII  /ED /
007013    101    124    072                        .ASCII  /AT:/
007016    040    045    117                        .ASCII  / %O/
007021    066    045    116                        .ASCII  /6%N/
007024    045    116    000                        .ASCII  /%N/<00>
007027    000                                      .ASCII  <00>
007030    045    101    122    P.AAX:              .ASCII  /%AR/
007033    105    120    114                        .ASCII  /EPL/
007036    101    103    105                        .ASCII  /ACE/
007041    040    101    122                        .ASCII  / AR/
007044    122    040    115                        .ASCII  /R M/
007047    117    104    072                        .ASCII  /OD:/
007052    040    045    104                        .ASCII  / %D/
007055    062    045    116                        .ASCII  /2%N/
007060    045    116    000                        .ASCII  /%N/<00>
007063    000                                      .ASCII  <00>
007064    045    101    106    P.AAY:              .ASCII  /%AF/
007067    101    111    114                        .ASCII  /AIL/
007072    105    104    040                        .ASCII  /ED /
007075    101    124    040                        .ASCII  /AT /
007100    104    123    101                        .ASCII  /DSA/
007103    072    040    045                        .ASCII  /: %/
007106    117    066    045                        .ASCII  /O6%/
007111    116    045    116                        .ASCII  /N%N/
007114    000    000                               .ASCII  <00><00>
007116    045    101    102    P.AAZ:              .ASCII  /%AB/
007121    111    124    074                        .ASCII  /IT</
007124    061    065    072                        .ASCII  /15:/
007127    061    060    076                        .ASCII  /10>/
007132    072    040    045                        .ASCII  /: %/
007135    102    066    045                        .ASCII  /B6%/
007140    101    040    040                        .ASCII  /A  /
007143    040    040    102                        .ASCII  /  B/
007146    111    124    074                        .ASCII  /IT</
007151    071    072    060                        .ASCII  /9:0/
007154    076    072    040                        .ASCII  />: /
007157    045    102    061                        .ASCII  /%B1/
007162    060    045    116                        .ASCII  /0%N/
007165    045    116    000                        .ASCII  /%N/<00>
007170    045    101    106    P.ABA:              .ASCII  /%AF/
007173    101    111    114                        .ASCII  /AIL/
007176    111    116    107                        .ASCII  /ING/
007201    040    122    105                        .ASCII  / RE/
007204    107    040    101                        .ASCII  /G A/
007207    104    122    123                        .ASCII  /DRS/
007212    072    040    045                        .ASCII  /: %/
007215    117    066    045                        .ASCII  /O6%/
007220    116    045    116                        .ASCII  /N%N/
```

```
                                        ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                                        ;                  ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03   PA:<
007223   000                                    .ASCII  <00>
007224   045     101     106    P.ABB:  .ASCII  /%AF/
007227   101     111     114            .ASCII  /AIL/
007232   111     116     107            .ASCII  /ING/
007235   040     106     125            .ASCII  / FU/
007240   116     103     072            .ASCII  /NC:/
007243   040     045     117            .ASCII  / %O/
007246   066     045     116            .ASCII  /6%N/
007251   045     116     000            .ASCII  /%N/<00>
007254   040     045     101    P.ABC:  .ASCII  / %A/
007257   117     106     106            .ASCII  /OFF/
007262   137     123     105            .ASCII  /_SE/
007265   124     040     103            .ASCII  /T C/
007270   116     124     040            .ASCII  /NT /
007273   106     117     122            .ASCII  /FOR/
007276   040     116     111            .ASCII  / NI/
007301   102     040     072            .ASCII  /B :/
007304   040     045     104            .ASCII  / %D/
007307   062     040     045            .ASCII  /2 %/
007312   101     040     075            .ASCII  /A =/
007315   040     045     104            .ASCII  / %D/
007320   062     040     045            .ASCII  /2 %/
007323   116     045     116            .ASCII  /N%N/
007326   000     000                    .ASCII  <00><00>
007330   045     101     127    P.ABD:  .ASCII  /%AW/
007333   122     117     124            .ASCII  /ROT/
007336   105     072     040            .ASCII  /E: /
007341   045     104     062            .ASCII  /%D2/
007344   045     101     040            .ASCII  /%A /
007347   040     040     040            .ASCII  /   /
007352   122     105     101            .ASCII  /REA/
007355   104     072     040            .ASCII  /D: /
007360   045     104     062            .ASCII  /%D2/
007363   045     116     045            .ASCII  /%N%/
007366   116     000                    .ASCII  /N/<00>
007370   045     101     116    P.ABE:  .ASCII  /%AN/
007373   111     102     102            .ASCII  /IBB/
007376   114     105     123            .ASCII  /LES/
007401   040     130     106            .ASCII  / XF/
007404   105     122     105            .ASCII  /ERE/
007407   104     040     102            .ASCII  /D B/
007412   105     106     117            .ASCII  /EFO/
007415   122     105     040            .ASCII  /RE /
007420   105     122     122            .ASCII  /ERR/
007423   117     122     072            .ASCII  /OR:/
007426   040     045     104            .ASCII  / %D/
007431   063     045     116            .ASCII  /3%N/
007434   000     000                    .ASCII  <00><00>
007436   045     101     106    P.ABF:  .ASCII  /%AF/
007441   101     111     114            .ASCII  /AIL/
007444   111     116     107            .ASCII  /ING/
007447   040     122     105            .ASCII  / RE/
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                        ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03   PA:<

     007452   107   072   040                   .ASCII  /G: /
     007455   045   117   066                   .ASCII  /%06/
     007460   045   101   040                   .ASCII  /%A /
     007463   107   117   117                   .ASCII  /GOO/
     007466   104   040   104                   .ASCII  /D D/
     007471   101   124   101                   .ASCII  /ATA/
     007474   072   040   045                   .ASCII  /: %/
     007477   117   066   045                   .ASCII  /06%/
     007502   101   040   102                   .ASCII  /A B/
     007505   101   104   040                   .ASCII  /AD /
     007510   104   101   124                   .ASCII  /DAT/
     007513   101   072   040                   .ASCII  /A: /
     007516   045   117   066                   .ASCII  /%06/
     007521   045   116   045                   .ASCII  /%N%/
     007524   116   000                         .ASCII  /N/<00>
     007526   045   116   045   P.ABG:          .ASCII  /%N%/
     007531   101   104   111                   .ASCII  /ADI/
     007534   101   107   116                   .ASCII  /AGN/
     007537   117   123   111                   .ASCII  /OSI/
     007542   116   107   040                   .ASCII  /NG /
     007545   125   116   111                   .ASCII  /UNI/
     007550   124   040   045                   .ASCII  /T %/
     007553   117   061   045                   .ASCII  /01%/
     007556   116   045   116                   .ASCII  /N%N/
     007561   000                               .ASCII  <00>
     007562   045   101   124   P.ABH:          .ASCII  /%AT/
     007565   111   115   105                   .ASCII  /IME/
     007570   104   040   117                   .ASCII  /D O/
     007573   125   124   040                   .ASCII  /UT /
     007576   104   125   122                   .ASCII  /DUR/
     007601   111   116   107                   .ASCII  /ING/
     007604   040   115   102                   .ASCII  / MB/
     007607   125   123   040                   .ASCII  /US /
     007612   045   117   062                   .ASCII  /%02/
     007615   045   101   040                   .ASCII  /%A /
     007620   106   125   116                   .ASCII  /FUN/
     007623   103   045   116                   .ASCII  /C%N/
     007626   045   116   000                   .ASCII  /%N/<00>
     007631   000                               .ASCII  <00>
     007632   045   101   103   P.ABI:          .ASCII  /%AC/
     007635   122   103   040                   .ASCII  /RC /
     007640   107   105   116                   .ASCII  /GEN/
     007643   040   075   040                   .ASCII  / = /
     007646   102   072   040                   .ASCII  /B: /
     007651   045   102   066                   .ASCII  /%B6/
     007654   045   101   040                   .ASCII  /%A /
     007657   101   072   040                   .ASCII  /A: /
     007662   045   102   066                   .ASCII  /%B6/
     007665   045   101   040                   .ASCII  /%A /
     007670   120   072   040                   .ASCII  /P: /
     007673   045   102   066                   .ASCII  /%B6/
     007676   045   116   000                   .ASCII  /%N/<00>
```

```
                                          ;ML4AD                                                   29-Mar-1982 16:23:04   TOPS
                                          ;                         ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03   PA:<
007701   000                                             .ASCII  <00>
007702   045     101     103     P.ABJ:   .ASCII  /%AC/
007705   122     103     040              .ASCII  /RC /
007710   103     101     114              .ASCII  /CAL/
007713   040     075     040              .ASCII  / = /
007716   102     072     040              .ASCII  /B: /
007721   045     102     066              .ASCII  /%B6/
007724   045     101     040              .ASCII  /%A /
007727   101     072     040              .ASCII  /A: /
007732   045     102     066              .ASCII  /%B6/
007735   045     101     040              .ASCII  /%A /
007740   120     072     040              .ASCII  /P: /
007743   045     102     066              .ASCII  /%B6/
007746   045     116     045              .ASCII  /%N%/
007751   116     000     000              .ASCII  /N/<00><00>
007754   045     101     106     P.ABK:   .ASCII  /%AF/
007757   101     111     114              .ASCII  /AIL/
007762   105     104     040              .ASCII  /ED /
007765   101     124     040              .ASCII  /AT /
007770   120     114     117              .ASCII  /PLO/
007773   107     072     040              .ASCII  /G: /
007776   045     104     062              .ASCII  /%D2/
010001   045     101     040              .ASCII  /%A /
010004   103     110     101              .ASCII  /CHA/
010007   116     116     105              .ASCII  /NNE/
010012   114     072     040              .ASCII  /L: /
010015   045     104     062              .ASCII  /%D2/
010020   045     116     045              .ASCII  /%N%/
010023   116     000     000              .ASCII  /N/<00><00>
010026   045     101     106     P.ABL:   .ASCII  /%AF/
010031   101     111     114              .ASCII  /AIL/
010034   105     104     040              .ASCII  /ED /
010037   101     124     040              .ASCII  /AT /
010042   127     122     104              .ASCII  /WRD/
010045   072     040     045              .ASCII  /: %/
010050   104     062     045              .ASCII  /D2%/
010053   101     040     102              .ASCII  /A B/
010056   111     124     072              .ASCII  /IT:/
010061   040     045     104              .ASCII  / %D/
010064   062     045     116              .ASCII  /2%N/
010067   045     116     000              .ASCII  /%N/<00>
010072   045     101     122     P.ABM:   .ASCII  /%AR/
010075   105     107     111              .ASCII  /EGI/
010100   123     124     105              .ASCII  /STE/
010103   122     045     123              .ASCII  /R%S/
010106   063     045     101              .ASCII  /3%A/
010111   101     104     104              .ASCII  /ADD/
010114   122     105     123              .ASCII  /RES/
010117   123     045     123              .ASCII  /S%S/
010122   067     045     101              .ASCII  /7%A/
010125   103     117     116              .ASCII  /CON/
010130   124     105     116              .ASCII  /TEN/
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                        ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03   PA:<

010133     124    123    045              .ASCII  /TS%/
010136     116    045    116              .ASCII  /N%N/
010141     000                            .ASCII  <00>
010142     045    123    045    P.ABN:    .ASCII  /%S%/
010145     124    045    123              .ASCII  /T%S/
010150     065    045    117              .ASCII  /5%O/
010153     066    045    123              .ASCII  /6%S/
010156     064    045    117              .ASCII  /4%O/
010161     061    066    045              .ASCII  /16%/
010164     116    000                     .ASCII  /N/<00>
010166     045    123    064    P.ABO:    .ASCII  /%S4/
010171     045    124    045              .ASCII  /%T%/
010174     101    072    045              .ASCII  /A:%/
010177     123    045    117              .ASCII  /S%O/
010202     066    045    116              .ASCII  /6%N/
010205     000                            .ASCII  <00>
010206     045    123    064    P.ABP:    .ASCII  /%S4/
010211     045    124    045              .ASCII  /%T%/
010214     101    072    045              .ASCII  /A:%/
010217     123    045    104              .ASCII  /S%D/
010222     061    045    104              .ASCII  /1%D/
010225     061    045    104              .ASCII  /1%D/
010230     061    045    104              .ASCII  /1%D/
010233     061    045    116              .ASCII  /1%N/
010236     000    000                     .ASCII  <00><00>
010240     045    124    045    P.ABQ:    .ASCII  /%T%/
010243     116    000    000              .ASCII  /N/<00><00>
010246     045    124    045    P.ABR:    .ASCII  /%T%/
010251     124    045    116              .ASCII  /T%N/
010254     000    000                     .ASCII  <00><00>
010256     045    124    045    P.ABS:    .ASCII  /%T%/
010261     124    045    124              .ASCII  /T%T/
010264     045    116    000              .ASCII  /%N/<00>
010267     000                            .ASCII  <00>
010270     045    124    045    P.ABT:    .ASCII  /%T%/
010273     124    045    124              .ASCII  /T%T/
010276     045    124    045              .ASCII  /%T%/
010301     116    000    000              .ASCII  /N/<00><00>
010304     045    124    045    P.ABU:    .ASCII  /%T%/
010307     124    045    124              .ASCII  /T%T/
010312     045    124    045              .ASCII  /%T%/
010315     124    045    116              .ASCII  /T%N/
010320     000    000                     .ASCII  <00><00>
010322     045    124    045    P.ABV:    .ASCII  /%T%/
010325     124    045    124              .ASCII  /T%T/
010330     045    124    045              .ASCII  /%T%/
010333     124    045    124              .ASCII  /T%T/
010336     045    116    000              .ASCII  /%N/<00>
010341     000                            .ASCII  <00>
010342     045    124    045    P.ABW:    .ASCII  /%T%/
010345     124    045    124              .ASCII  /T%T/
010350     045    124    045              .ASCII  /%T%/
```

```
                                        ;ML4AD                                     29-Mar-1982 16:23:04   TOPS
                                        ;              ROUTINE DECLARATION SECTION 29-Mar-1982 16:21:03   PA:<
010353    124    045    124                    .ASCII  /T%T/
010356    045    124    045                    .ASCII  /%T%/
010361    116    000    000                    .ASCII  /N/<00><00>
010364    045    124    045     P.ABX:         .ASCII  /%T%/
010367    124    045    124                    .ASCII  /T%T/
010372    045    124    045                    .ASCII  /%T%/
010375    124    045    124                    .ASCII  /T%T/
010400    045    124    045                    .ASCII  /%T%/
010403    124    045    116                    .ASCII  /T%N/
010406    000    000                           .ASCII  <00><00>
010410    045    124    045     P.ABY:         .ASCII  /%T%/
010413    124    045    124                    .ASCII  /T%T/
010416    045    124    045                    .ASCII  /%T%/
010421    124    045    124                    .ASCII  /T%T/
010424    045    124    045                    .ASCII  /%T%/
010427    124    045    124                    .ASCII  /T%T/
010432    045    116    000                    .ASCII  /%N/<00>
010435    000                                  .ASCII  <00>
010436    045    124    045     P.ABZ:         .ASCII  /%T%/
010441    124    045    124                    .ASCII  /T%T/
010444    045    124    045                    .ASCII  /%T%/
010447    124    045    124                    .ASCII  /T%T/
010452    045    124    045                    .ASCII  /%T%/
010455    124    045    124                    .ASCII  /T%T/
010460    045    124    045                    .ASCII  /%T%/
010463    116    000    000                    .ASCII  /N/<00><00>
010466    045    124    045     P.ACA:         .ASCII  /%T%/
010471    124    045    124                    .ASCII  /T%T/
010474    045    124    045                    .ASCII  /%T%/
010477    124    045    124                    .ASCII  /T%T/
010502    045    124    045                    .ASCII  /%T%/
010505    124    045    124                    .ASCII  /T%T/
010510    045    124    045                    .ASCII  /%T%/
010513    124    045    116                    .ASCII  /T%N/
010516    000    000                           .ASCII  <00><00>
010520    040    107    117     P.ACB:         .ASCII  / GO/
010523    000                                  .ASCII  <00>
010524    040    104    122     P.ACC:         .ASCII  / DR/
010527    126    137    122                    .ASCII  /V_R/
010532    104    131    000                    .ASCII  /DY/<00>
010535    000                                  .ASCII  <00>
010536    040    111    114     P.ACD:         .ASCII  / IL/
010541    106    000    000                    .ASCII  /F/<00><00>
010544    040    117    120     P.ACE:         .ASCII  / OP/
010547    111    000    000                    .ASCII  /I/<00><00>
010552    040    102    101     P.ACF:         .ASCII  / BA/
010555    104    000    000                    .ASCII  /D/<00><00>
010560    040    107    117     P.ACG:         .ASCII  / GO/
010563    117    104    000                    .ASCII  /OD/<00>
010566    040    120    101     P.ACH:         .ASCII  / PA/
010571    122    111    124                    .ASCII  /RIT/
010574    131    040    116                    .ASCII  /Y N/
```

```
                                           ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                                           ;                  ROUTINE DECLARATION SECTION      29-Mar-1982 16:21:03   PA:<

010577  117  124  000             .ASCII  /OT/<00>
010602  040  107  105   P.ACI:    .ASCII  / GE/
010605  116  105  122             .ASCII  /NER/
010610  101  124  105             .ASCII  /ATE/
010613  104  000  000             .ASCII  /D/<00><00>
010616  040  104  105   P.ACJ:    .ASCII  / DE/
010621  124  105  103             .ASCII  /TEC/
010624  124  105  104             .ASCII  /TED/
010627  000                       .ASCII  <00>
010630  040  105  122   P.ACK:    .ASCII  / ER/
010633  122  117  122             .ASCII  /ROR/
010636  000  000                  .ASCII  <00><00>
010640  040  101  106   P.ACL:    .ASCII  / AF/
010643  124  105  122             .ASCII  /TER/
010646  000  000                  .ASCII  <00><00>
010650  040  104  125   P.ACM:    .ASCII  / DU/
010653  122  111  116             .ASCII  /RIN/
010656  107  000                  .ASCII  /G/<00>
010660  040  101  124   P.ACN:    .ASCII  / AT/
010663  000                       .ASCII  <00>
010664  040  106  101   P.ACO:    .ASCII  / FA/
010667  111  114  125             .ASCII  /ILU/
010672  122  105  000             .ASCII  /RE/<00>
010675  000                       .ASCII  <00>
010676  040  101  124   P.ACP:    .ASCII  / AT/
010701  101  000  000             .ASCII  /A/<00><00>
010704  040  101  124   P.ACQ:    .ASCII  / AT/
010707  124  116  000             .ASCII  /TN/<00>
010712  040  127  122   P.ACR:    .ASCII  / WR/
010715  111  124  111             .ASCII  /ITI/
010720  116  107  000             .ASCII  /NG/<00>
010723  000                       .ASCII  <00>
010724  040  126  126   P.ACS:    .ASCII  / VV/
010727  000                       .ASCII  <00>
010730  040  106  125   P.ACT:    .ASCII  / FU/
010733  116  103  000             .ASCII  /NC/<00>
010736  040  124  122   P.ACU:    .ASCII  / TR/
010741  105  000  000             .ASCII  /E/<00><00>
010744  040  122  115   P.ACV:    .ASCII  / RM/
010747  122  000  000             .ASCII  /R/<00><00>
010752  040  105  130   P.ACW:    .ASCII  / EX/
010755  103  105  123             .ASCII  /CES/
010760  123  111  126             .ASCII  /SIV/
010763  105  000  000             .ASCII  /E/<00><00>
010766  040  115  102   P.ACX:    .ASCII  / MB/
010771  125  123  000             .ASCII  /US/<00>
010774  040  104  101   P.ACY:    .ASCII  / DA/
010777  124  101  000             .ASCII  /TA/<00>
011002  040  103  117   P.ACZ:    .ASCII  / CO/
011005  116  124  111             .ASCII  /NTI/
011010  116  125  111             .ASCII  /NUI/
011013  124  131  000             .ASCII  /TY/<00>
```

```
                                        ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                                        ;               ROUTINE DECLARATION SECTION               29-Mar-1982 16:21:03   PA:<
011016    040    101    117    P.ADA:   .ASCII  / AO/
011021    105    000    000             .ASCII  /E/<00><00>
011024    040    114    102    P.ADB:   .ASCII  / LB/
011027    124    000    000             .ASCII  /T/<00><00>
011032    040    120    122    P.ADC:   .ASCII  / PR/
011035    105    115    101             .ASCII  /EMA/
011040    124    125    122             .ASCII  /TUR/
011043    114    131    000             .ASCII  /LY/<00>
011046    040    111    101    P.ADD:   .ASCII  / IA/
011051    105    000    000             .ASCII  /E/<00><00>
011054    040    111    116    P.ADE:   .ASCII  / IN/
011057    103    122    105             .ASCII  /CRE/
011062    115    105    116             .ASCII  /MEN/
011065    124    000    000             .ASCII  /T/<00><00>
011070    040    127    111    P.ADF:   .ASCII  / WI/
011073    124    110    000             .ASCII  /TH/<00>
011076    040    125    126    P.ADG:   .ASCII  / UV/
011101    000                           .ASCII  <00>
011102    040    125    116    P.ADH:   .ASCII  / UN/
011105    123    000    000             .ASCII  /S/<00><00>
011110    040    120    122    P.ADI:   .ASCII  / PR/
011113    117    115    000             .ASCII  /OM/<00>
011116    040    117    122    P.ADJ:   .ASCII  / OR/
011121    000                           .ASCII  <00>
011122    040    123    105    P.ADK:   .ASCII  / SE/
011125    114    105    103             .ASCII  /LEC/
011130    124    000                    .ASCII  /T/<00>
011132    040    122    105    P.ADL:   .ASCII  / RE/
011135    107    000    000             .ASCII  /G/<00><00>
011140    040    125    116    P.ADM:   .ASCII  / UN/
011143    111    121    125             .ASCII  /IQU/
011146    105    000                    .ASCII  /E/<00>
011150    040    061    064    P.ADN:   .ASCII  / 14/
011153    000                           .ASCII  <00>
011154    040    116    111    P.ADO:   .ASCII  / NI/
011157    102    102    114             .ASCII  /BBL/
011162    105    040    103             .ASCII  /E C/
011165    116    124    000             .ASCII  /NT/<00>
011170    040    107    124    P.ADP:   .ASCII  / GT/
011173    122    000    000             .ASCII  /R/<00><00>
011176    040    127    110    P.ADQ:   .ASCII  / WH/
011201    111    114    105             .ASCII  /ILE/
011204    000    000                    .ASCII  <00><00>
011206    040    124    122    P.ADR:   .ASCII  / TR/
011211    105    000    000             .ASCII  /E/<00><00>
011214    040    111    116    P.ADS:   .ASCII  / IN/
011217    111    124    111             .ASCII  /ITI/
011222    101    114    000             .ASCII  /AL/<00>
011225    000                           .ASCII  <00>
011226    040    117    106    P.ADT:   .ASCII  / OF/
011231    106    137    123             .ASCII  /F_S/
011234    105    124    000             .ASCII  /ET/<00>
```

```
                                         ;ML4AD                                         29-Mar-1982 16:23:04   TOPS
                                         ;                ROUTINE DECLARATION SECTION   29-Mar-1982 16:21:03   PA:<
011237    000                                     .ASCII  <00>
011240    040    103    117    P.ADU:     .ASCII  / CO/
011243    125    116    124               .ASCII  /UNT/
011246    000    000                      .ASCII  <00><00>
011250    040    104    105    P.ADV:     .ASCII  / DE/
011253    114    101    131               .ASCII  /LAY/
011256    000    000                      .ASCII  <00><00>
011260    040    124    105    P.ADW:     .ASCII  / TE/
011263    123    124    123               .ASCII  /STS/
011266    000    000                      .ASCII  <00><00>
011270    040    101    104    P.ADX:     .ASCII  / AD/
011273    122    123    000               .ASCII  /RS/<00>
011276    040    103    117    P.ADY:     .ASCII  / CO/
011301    125    116    124               .ASCII  /UNT/
011304    105    122    000               .ASCII  /ER/<00>
011307    000                             .ASCII  <00>
011310    040    122    105    P.ADZ:     .ASCII  / RE/
011313    107    000    000               .ASCII  /G/<00><00>
011316    040    124    105    P.AEA:     .ASCII  / TE/
011321    123    124    105               .ASCII  /STE/
011324    104    000                      .ASCII  /D/<00>
011326    040    116    111    P.AEB:     .ASCII  / NI/
011331    102    102    114               .ASCII  /BBL/
011334    105    000                      .ASCII  /E/<00>
011336    040    101    114    P.AEC:     .ASCII  / AL/
011341    114    000    000               .ASCII  /L/<00><00>
011344    040    124    105    P.AED:     .ASCII  / TE/
011347    123    124    000               .ASCII  /ST/<00>
011352    040    130    106    P.AEE:     .ASCII  / XF/
011355    105    122    105               .ASCII  /ERE/
011360    104    000                      .ASCII  /D/<00>
011362    040    116    111    P.AEF:     .ASCII  / NI/
011365    102    102    114               .ASCII  /BBL/
011370    105    123    000               .ASCII  /ES/<00>
011373    000                             .ASCII  <00>
011374    040    123    103    P.AEG:     .ASCII  / SC/
011377    000                             .ASCII  <00>
011400    040    115    125    P.AEH:     .ASCII  / MU/
011403    114    124    111               .ASCII  /LTI/
011406    120    114    105               .ASCII  /PLE/
011411    130    105    122               .ASCII  /XER/
011414    000    000                      .ASCII  <00><00>
011416    040    125    116    P.AEI:     .ASCII  / UN/
011421    105    130    120               .ASCII  /EXP/
011424    105    103    124               .ASCII  /ECT/
011427    105    104    000               .ASCII  /ED/<00>
011432    040    116    105    P.AEJ:     .ASCII  / NE/
011435    104    000    000               .ASCII  /D/<00><00>
011440    040    111    114    P.AEK:     .ASCII  / IL/
011443    122    000    000               .ASCII  /R/<00><00>
011446    040    103    122    P.AEL:     .ASCII  / CR/
011451    103    000    000               .ASCII  /C/<00><00>
```

```
                                        ;ML4AD
                                        ;               ROUTINE DECLARATION SECTION
       011454   040    123    107   P.AEM:  .ASCII  / SG/
       011457   114    000    000           .ASCII  /L/<00><00>
       011462   040    105    103   P.AEN:  .ASCII  / EC/
       011465   110    000    000           .ASCII  /H/<00><00>
       011470   125    116    103   P.AEO:  .ASCII  /UNC/
       011473   000                         .ASCII  <00>
       011474   040    102    111   P.AEP:  .ASCII  / BI/
       011477   124    000    000           .ASCII  /T/<00><00>
       011502   040    103    110   P.AEQ:  .ASCII  / CH/
       011505   101    116    116           .ASCII  /ANN/
       011510   105    114    000           .ASCII  /EL/<00>
       011513   000                         .ASCII  <00>
       011514   040    114    101   P.AER:  .ASCII  / LA/
       011517   124    103    110           .ASCII  /TCH/
       011522   000    000                  .ASCII  <00><00>
       011524   040    104    103   P.AES:  .ASCII  / DC/
       011527   113    000    000           .ASCII  /K/<00><00>
       011532   040    102    125   P.AET:  .ASCII  / BU/
       011535   123    000    000           .ASCII  /S/<00><00>
       011540   040    123    131   P.AEU:  .ASCII  / SY/
       011543   116    104    122           .ASCII  /NDR/
       011546   117    116    105           .ASCII  /ONE/
       011551   000                         .ASCII  <00>
       011552   040    104    105   P.AEV:  .ASCII  / DE/
       011555   103    117    104           .ASCII  /COD/
       011560   105    000                  .ASCII  /E/<00>
       011562   040    116    117   P.AEW:  .ASCII  / NO/
       011565   124    000    000           .ASCII  /T/<00><00>
       011570   040    125    116   P.AEX:  .ASCII  / UN/
       011573   103    117    122           .ASCII  /COR/
       011576   122    105    103           .ASCII  /REC/
       011601   124    101    102           .ASCII  /TAB/
       011604   114    105    000           .ASCII  /LE/<00>
       011607   000                         .ASCII  <00>
       011610   040    102    111   P.AEY:  .ASCII  / BI/
       011613   124    040    116           .ASCII  /T N/
       011616   117    124    040           .ASCII  /OT /
       011621   123    105    124           .ASCII  /SET/
       011624   000    000                  .ASCII  <00><00>
       011626   040    102    111   P.AEZ:  .ASCII  / BI/
       011631   124    040    116           .ASCII  /T N/
       011634   117    124    040           .ASCII  /OT /
       011637   103    114    122           .ASCII  /CLR/
       011642   000    000                  .ASCII  <00><00>
       011644   040    116    117   P.AFA:  .ASCII  / NO/
       011647   040    122    105           .ASCII  / RE/
       011652   123    120    117           .ASCII  /SPO/
       011655   116    103    105           .ASCII  /NCE/
       011660   040    101    106           .ASCII  / AF/
       011663   124    105    122           .ASCII  /TER/
       011666   040    061    056           .ASCII  / 1./
       011671   065    040    125           .ASCII  /5 U/
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                        ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03   PA:<
011674  123   000                          .ASCII  /S/<00>
011676  040   104   101   P.AFB:           .ASCII  / DA/
011701  124   101   040                    .ASCII  /TA /
011704  105   122   122                    .ASCII  /ERR/
011707  117   122   123                    .ASCII  /ORS/
011712  000   000                          .ASCII  <00><00>
011714  040   102   111   P.AFC:           .ASCII  / BI/
011717  124   040   123                    .ASCII  /T S/
011722  105   124   000                    .ASCII  /ET/<00>
011725  000                                .ASCII  <00>
011726  040   102   111   P.AFD:           .ASCII  / BI/
011731  124   040   103                    .ASCII  /T C/
011734  114   122   000                    .ASCII  /LR/<00>
011737  000                                .ASCII  <00>
011740  040   117   106   P.AFE:           .ASCII  / OF/
011743  040   117   124                    .ASCII  / OT/
011746  110   105   122                    .ASCII  /HER/
011751  040   104   122                    .ASCII  / DR/
011754  111   126   105                    .ASCII  /IVE/
011757  123   000   000                    .ASCII  /S/<00><00>
011762  040   103   114   P.AFF:           .ASCII  / CL/
011765  101   123   123                    .ASCII  /ASS/
011770  040   101   000                    .ASCII  / A/<00>
011773  000                                .ASCII  <00>
011774  040   103   114   P.AFG:           .ASCII  / CL/
011777  101   123   123                    .ASCII  /ASS/
012002  040   102   000                    .ASCII  / B/<00>
012005  000                                .ASCII  <00>
012006  040   124   117   P.AFH:           .ASCII  / TO/
012011  040   106   111                    .ASCII  / FI/
012014  116   104   000                    .ASCII  /ND/<00>
012017  000                                .ASCII  <00>
012020  040   116   117   P.AFI:           .ASCII  / NO/
012023  124   040   114                    .ASCII  /T L/
012026  101   124   103                    .ASCII  /ATC/
012031  110   105   104                    .ASCII  /HED/
012034  000   000                          .ASCII  <00><00>
012036  040   123   111   P.AFJ:           .ASCII  / SI/
012041  116   107   114                    .ASCII  /NGL/
012044  105   040   102                    .ASCII  /E B/
012047  111   124   040                    .ASCII  /IT /
012052  105   122   122                    .ASCII  /ERR/
012055  117   122   000                    .ASCII  /OR/<00>
012060  040   115   125   P.AFK:           .ASCII  / MU/
012063  114   124   111                    .ASCII  /LTI/
012066  120   114   105                    .ASCII  /PLE/
012071  040   102   111                    .ASCII  / BI/
012074  124   040   105                    .ASCII  /T E/
012077  122   122   117                    .ASCII  /RRO/
012102  122   000                          .ASCII  /R/<00>
012104  040   040   040   P.AFL:           .ASCII  /   /
012107  040   040   040                    .ASCII  /   /
```

```
                                        ;ML4AD                                              29-Mar-1982 16:23:04    TOPS
                                        ;               ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03    PA:<

012112    040    040    040             .ASCII  /   /
012115    122    105    107             .ASCII  /REG/
012120    111    123    124             .ASCII  /IST/
012123    105    122    040             .ASCII  /ER /
012126    040    040    104             .ASCII  /  D/
012131    125    115    120             .ASCII  /UMP/
012134    000    000                    .ASCII  <00><00>
012136    123    105    122   P.AFM:    .ASCII  /SER/
012141    111    101    114             .ASCII  /IAL/
012144    040    043    000             .ASCII  / #/<00>
012147    000                           .ASCII  <00>
012150    040    115    105   P.AFN:    .ASCII  / ME/
012153    115    040    123             .ASCII  /M S/
012156    111    132    111             .ASCII  /IZI/
012161    116    107    000             .ASCII  /NG/<00>
012164    040    116    117   P.AFO:    .ASCII  / NO/
012167    117    120    000             .ASCII  /OP/<00>
012172    040    104    122   P.AFP:    .ASCII  / DR/
012175    126    000    000             .ASCII  /V/<00><00>
012200    040    127    122   P.AFQ:    .ASCII  / WR/
012203    111    124    105             .ASCII  /ITE/
012206    040    103    110             .ASCII  / CH/
012211    105    103    113             .ASCII  /ECK/
012214    000    000                    .ASCII  <00><00>
012216    040    127    122   P.AFR:    .ASCII  / WR/
012221    111    124    105             .ASCII  /ITE/
012224    000    000                    .ASCII  <00><00>
012226    040    122    105   P.AFS:    .ASCII  / RE/
012231    101    104    000             .ASCII  /AD/<00>
012234    040    103    114   P.AFT:    .ASCII  / CL/
012237    105    101    122             .ASCII  /EAR/
012242    000    000                    .ASCII  <00><00>
012244    040    103    117   P.AFU:    .ASCII  / CO/
012247    115    120    040             .ASCII  /MP /
012252    105    122    122             .ASCII  /ERR/
012255    117    122    000             .ASCII  /OR/<00>
012260    040    123    131   P.AFV:    .ASCII  / SY/
012263    123    040    103             .ASCII  /S C/
012266    114    122    000             .ASCII  /LR/<00>
012271    000                           .ASCII  <00>
012272    040    123    105   P.AFW:    .ASCII  / SE/
012275    101    122    103             .ASCII  /ARC/
012300    110    000                    .ASCII  /H/<00>
012302    040    122    105   P.AFX:    .ASCII  / RE/
012305    101    104    055             .ASCII  /AD-/
012310    111    116    055             .ASCII  /IN-/
012313    120    122    105             .ASCII  /PRE/
012316    123    105    124             .ASCII  /SET/
012321    000                           .ASCII  <00>
012322    040    111    114   P.AFY:    .ASCII  / IL/
012325    114    105    107             .ASCII  /LEG/
012330    101    114    000             .ASCII  /AL/<00>
```

```
                                        ;ML4AD                                    29-Mar-1982 16:23:04   TOPS
                                        ;               ROUTINE DECLARATION SECTION    29-Mar-1982 16:21:03   PA:<

 012333   000                                   .ASCII  <00>
 012334   040    101    102    P.AFZ:   .ASCII  / AB/
 012337   117    122    124             .ASCII  /ORT/
 012342   000    000                    .ASCII  <00><00>
 012344   040    101    122    P.AGA:   .ASCII  / AR/
 012347   122    040    122             .ASCII  /R R/
 012352   104    137    127             .ASCII  /D_W/
 012355   122    124    000             .ASCII  /RT/<00>
 012360   040    107    117    P.AGB:   .ASCII  / GO/
 012363   117    104    040             .ASCII  /OD /
 012366   102    114    113             .ASCII  /BLK/
 012371   000                           .ASCII  <00>
 012372   040    122    105    P.AGC:   .ASCII  / RE/
 012375   106    122    105             .ASCII  /FRE/
 012400   123    110    000             .ASCII  /SH/<00>
 012403   000                           .ASCII  <00>
 012404   040    101    122    P.AGD:   .ASCII  / AR/
 012407   122    101    131             .ASCII  /RAY/
 012412   000    000                    .ASCII  <00><00>
 012414   040    122    101    P.AGE:   .ASCII  / RA/
 012417   115    055    102             .ASCII  /M-B/
 012422   125    123    000             .ASCII  /US/<00>
 012425   000                           .ASCII  <00>
 012426   040    117    126    P.AGF:   .ASCII  / OV/
 012431   105    122    106             .ASCII  /ERF/
 012434   114    117    127             .ASCII  /LOW/
 012437   000                           .ASCII  <00>
 012440   040    103    110    P.AGG:   .ASCII  / CH/
 012443   113    137    123             .ASCII  /K_S/
 012446   125    115    000             .ASCII  /UM/<00>
 012451   000                           .ASCII  <00>
 012452   040    114    101    P.AGH:   .ASCII  / LA/
 012455   123    124    040             .ASCII  /ST /
 012460   102    114    113             .ASCII  /BLK/
 012463   000                           .ASCII  <00>
 012464   040    111    116    P.AGI:   .ASCII  / IN/
 012467   111    124    111             .ASCII  /ITI/
 012472   101    114    111             .ASCII  /ALI/
 012475   132    105    000             .ASCII  /ZE/<00>
 012500   040    115    114    P.AGJ:   .ASCII  / ML/
 012503   103    123    061             .ASCII  /CS1/
 012506   000    000                    .ASCII  <00><00>
 012510   040    115    114    P.AGK:   .ASCII  / ML/
 012513   104    123    000             .ASCII  /DS/<00>
 012516   040    115    114    P.AGL:   .ASCII  / ML/
 012521   105    122    000             .ASCII  /ER/<00>
 012524   040    115    114    P.AGM:   .ASCII  / ML/
 012527   115    122    000             .ASCII  /MR/<00>
 012532   040    115    114    P.AGN:   .ASCII  / ML/
 012535   101    123    000             .ASCII  /AS/<00>
 012540   040    115    114    P.AGO:   .ASCII  / ML/
 012543   104    101    000             .ASCII  /DA/<00>
```

```
                                        ;ML4AD                                  29-Mar-1982 16:23:04   TOPS
                                        ;          ROUTINE DECLARATION SECTION  29-Mar-1982 16:21:03   PA:<

012546  040  115  114  P.AGP:  .ASCII  / ML/
012551  104  124  000          .ASCII  /DT/<00>
012554  040  115  114  P.AGQ:  .ASCII  / ML/
012557  120  101  000          .ASCII  /PA/<00>
012562  040  115  114  P.AGR:  .ASCII  / ML/
012565  123  116  000          .ASCII  /SN/<00>
012570  040  115  114  P.AGS:  .ASCII  / ML/
012573  105  061  000          .ASCII  /E1/<00>
012576  040  115  114  P.AGT:  .ASCII  / ML/
012601  105  062  000          .ASCII  /E2/<00>
012604  040  115  114  P.AGU:  .ASCII  / ML/
012607  104  061  000          .ASCII  /D1/<00>
012612  040  115  114  P.AGV:  .ASCII  / ML/
012615  104  062  000          .ASCII  /D2/<00>
012620  040  115  114  P.AGW:  .ASCII  / ML/
012623  105  105  000          .ASCII  /EE/<00>
012626  040  115  114  P.AGX:  .ASCII  / ML/
012631  105  114  000          .ASCII  /EL/<00>
012634  040  115  114  P.AGY:  .ASCII  / ML/
012637  120  104  000          .ASCII  /PD/<00>
012642  040  115  114  P.AGZ:  .ASCII  / ML/
012645  103  123  062          .ASCII  /CS2/
012650  000  000               .ASCII  <00><00>
012652  040  115  114  P.AHA:  .ASCII  / ML/
012655  127  103  000          .ASCII  /WC/<00>
012660  040  115  114  P.AHB:  .ASCII  / ML/
012663  102  101  000          .ASCII  /BA/<00>
012666  040  115  114  P.AHC:  .ASCII  / ML/
012671  102  101  111          .ASCII  /BAI/
012674  000  000               .ASCII  <00><00>
012676  040  115  114  P.AHD:  .ASCII  / ML/
012701  103  123  063          .ASCII  /CS3/
012704  000  000               .ASCII  <00><00>
012706  101  123  131  P.AHE:  .ASCII  /ASY/
012711  116  103  110          .ASCII  /NCH/
012714  122  117  116          .ASCII  /RON/
012717  117  125  123          .ASCII  /OUS/
012722  040  106  101          .ASCII  / FA/
012725  111  114  125          .ASCII  /ILU/
012730  122  105  040          .ASCII  /RE /
012733  115  117  104          .ASCII  /MOD/
012736  125  114  105          .ASCII  /ULE/
012741  040  067  063          .ASCII  / 73/
012744  066  061  000          .ASCII  /61/<00>
012747  000                    .ASCII  <00>
012750  123  131  116  P.AHF:  .ASCII  /SYN/
012753  103  110  122          .ASCII  /CHR/
012756  117  116  117          .ASCII  /ONO/
012761  125  123  040          .ASCII  /US /
012764  106  101  111          .ASCII  /FAI/
012767  114  125  122          .ASCII  /LUR/
012772  105  040  115          .ASCII  /E M/
```

```
                                  ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                                  ;               ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<

012775   117   104   125                 .ASCII  /ODU/
013000   114   105   040                 .ASCII  /LE /
013003   067   063   066                 .ASCII  /736/
013006   062   040   000                 .ASCII  /2 /<00>
013011   000                             .ASCII  <00>
013012   101   122   122     P.AHG:      .ASCII  /ARR/
013015   101   131   040                 .ASCII  /AY /
013020   104   101   124                 .ASCII  /DAT/
013023   101   040   106                 .ASCII  /A F/
013026   101   111   114                 .ASCII  /AIL/
013031   125   122   105                 .ASCII  /URE/
013034   040   115   117                 .ASCII  / MO/
013037   104   125   114                 .ASCII  /DUL/
013042   105   040   067                 .ASCII  /E 7/
013045   063   066   063                 .ASCII  /363/
013050   040   000                       .ASCII  / /<00>
013052   115   105   115     P.AHH:      .ASCII  /MEM/
013055   117   122   131                 .ASCII  /ORY/
013060   040   101   122                 .ASCII  / AR/
013063   122   101   131                 .ASCII  /RAY/
013066   040   106   101                 .ASCII  / FA/
013071   111   114   125                 .ASCII  /ILU/
013074   122   105   040                 .ASCII  /RE /
013077   115   117   104                 .ASCII  /MOD/
013102   125   114   105                 .ASCII  /ULE/
013105   040   067   063                 .ASCII  / 73/
013110   065   067   000                 .ASCII  /57/<00>
013113   000                             .ASCII  <00>
013114   111   116   124     P.AHI:      .ASCII  /INT/
013117   105   122   115                 .ASCII  /ERM/
013122   105   104   111                 .ASCII  /EDI/
013125   101   124   105                 .ASCII  /ATE/
013130   040   104   111                 .ASCII  / DI/
013133   101   107   116                 .ASCII  /AGN/
013136   117   123   124                 .ASCII  /OST/
013141   111   103   040                 .ASCII  /IC /
013144   115   105   123                 .ASCII  /MES/
013147   123   101   107                 .ASCII  /SAG/
013152   105   000                       .ASCII  /E/<00>
013154   104   101   124     P.AHJ:      .ASCII  /DAT/
013157   101   040   114                 .ASCII  /A L/
013162   101   124   105                 .ASCII  /ATE/
013165   040   105   122                 .ASCII  / ER/
013170   122   117   122                 .ASCII  /ROR/
013173   040   104   125                 .ASCII  / DU/
013176   122   111   116                 .ASCII  /RIN/
013201   107   040   124                 .ASCII  /G T/
013204   122   101   116                 .ASCII  /RAN/
013207   123   106   105                 .ASCII  /SFE/
013212   122   000                       .ASCII  /R/<00>
013214   123   103   040     P.AHK:      .ASCII  /SC /
013217   102   111   124                 .ASCII  /BIT/
```

```
                                      ;ML4AD                                        29-Mar-1982 16:23:04    TOPS
                                      ;               ROUTINE DECLARATION SECTION   29-Mar-1982 16:21:03    PA:<
013222     040     123     105                .ASCII  / SE/
013225     124     040     104                .ASCII  /T D/
013230     125     122     111                .ASCII  /URI/
013233     116     107     040                .ASCII  /NG /
013236     124     122     101                .ASCII  /TRA/
013241     116     123     106                .ASCII  /NSF/
013244     105     122     000                .ASCII  /ER/<00>
013247     000                                .ASCII  <00>
013250     124     122     117    P.AHL:      .ASCII  /TRO/
013253     125     102     114                .ASCII  /UBL/
013256     105     040     123                .ASCII  /E S/
013261     110     117     117                .ASCII  /HOO/
013264     124     040     114                .ASCII  /T L/
013267     117     117     120                .ASCII  /OOP/
013272     040     105     122                .ASCII  / ER/
013275     122     117     122                .ASCII  /ROR/
013300     123     000                        .ASCII  /S/<00>
013302     122     110     040    P.AHM:      .ASCII  /RH /
013305     103     117     116                .ASCII  /CON/
013310     124     122     117                .ASCII  /TRO/
013313     114     114     105                .ASCII  /LLE/
013316     122     040     105                .ASCII  /R E/
013321     122     122     117                .ASCII  /RRO/
013324     122     123     000                .ASCII  /RS/<00>
013327     000                                .ASCII  <00>
013330     104     122     111    P.AHN:      .ASCII  /DRI/
013333     126     105     040                .ASCII  /VE /
013336     110     125     116                .ASCII  /HUN/
013341     107     040     101                .ASCII  /G A/
013344     106     124     105                .ASCII  /FTE/
013347     122     040     115                .ASCII  /R M/
013352     101     123     123                .ASCII  /ASS/
013355     040     102     125                .ASCII  / BU/
013360     123     040     124                .ASCII  /S T/
013363     122     101     116                .ASCII  /RAN/
013366     123     106     105                .ASCII  /SFE/
013371     122     000     000                .ASCII  /R/<00><00>



013374                            NIB.SAVE:
013374                                        .BLKW   3
013402                            HW.OR.TBL:
013402                                        .BLKW   177
014000                            PTBL.PTR:
014000                                        .BLKW   1
014002                            OP.NUM.ARR:
014002                                        .BLKW   1
014004                            ARR.INC:.BLKW   1
014006                            GOOD.BLK:
014006                                        .BLKW   1
```

```
                                ;ML4AD                                              29-Mar-1982 16:23:04    TOPS
                                ;               ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03    PA:<

     014010                     PAR.DIS:.BLKW   1
     014012                     CHIP.SIZ:
     014012                             .BLKW   1
     014014                     LST.BLK:.BLKW   1
     014016                     ARR.16: .BLKW   1
     014020                     LST.ARR:.BLKW   1
     014022                     IO.BUF: .BLKW   400
     015022                     STK.OFF:.BLKW   5
     015034                     STACK:  .BLKW   143
     015342                     PD.TEMP:.BLKW   1
     015344                     W.C.SIZE:
     015344                             .BLKW   1
     015346                     RAS.INC:.BLKW   1
     015350                     WT.DATA:.BLKW   1
     015352                     RD.DATA:.BLKW   1
     015354                     DRIVE.TYPE:
     015354                             .BLKW   1
     015356                     LST.DUT.REG:
     015356                             .BLKW   1
     015360                     REG.INIT.FLG:
     015360     000000                  .WORD   0
     015362                     A.CAL:  .BLKW   1
     015364                     B.CAL:  .BLKW   1
     015366                     P.CAL:  .BLKW   1
     015370                     A.GEN:  .BLKW   1
     015372                     B.GEN:  .BLKW   1
     015374                     P.GEN:  .BLKW   1
     015376                     P.CNT:  .BLKW   1
     015400                     LIMIT:  .BLKW   1
     015402                     DROP.CNT:
     015402                             .BLKW   1
     015404        000          ML.REG: .BYTE   0
     015405        000                  .BYTE   0
     015406     004000                  .WORD   4000
     015410     173701                  .WORD   -4077
     015412     160200                  .WORD   -17600
     015414        000                  .BYTE   0
     015415        000                  .BYTE   0
     015416        000                  .BYTE   0
     015417        000                  .BYTE   0
     015420        000                  .BYTE   0
     015421        000                  .BYTE   0
     015422        000                  .BYTE   0
     015423        000                  .BYTE   0
     015424        000                  .BYTE   0
     015425        000                  .BYTE   0
     015426        000                  .BYTE   0
     015427        000                  .BYTE   0
     015430        000                  .BYTE   0
     015431        000                  .BYTE   0
     015432        000                  .BYTE   0
     015433        000                  .BYTE   0
```

```
                              ;ML4AD                                        29-Mar-1982 16:23:04   TOPS
                              ;          ROUTINE DECLARATION SECTION        29-Mar-1982 16:21:03   PA:<
015434        000                   .BYTE   0
015435        000                   .BYTE   0
015436        000                   .BYTE   0
015437        000                   .BYTE   0
015440        000                   .BYTE   0
015441        000                   .BYTE   0
015442        000                   .BYTE   0
015443        000                   .BYTE   0
015444        000                   .BYTE   0
015445        000                   .BYTE   0
015446        000                   .BYTE   0
015447        000                   .BYTE   0
015450        000                   .BYTE   0
015451        000                   .BYTE   0
015452        000                   .BYTE   0
015453        000                   .BYTE   0
015454        000                   .BYTE   0
015455        000                   .BYTE   0
015456     010600                   .WORD   10600
015460     025077                   .WORD   25077
015462     000100                   .WORD   100
015464        000                   .BYTE   0
015465        000                   .BYTE   0
015466        000                   .BYTE   0
015467        000                   .BYTE   0
015470     014620                   .WORD   14620
015472        000                   .BYTE   0
015473        000                   .BYTE   0
015474        000                   .BYTE   0
015475        000                   .BYTE   0
015476        000                   .BYTE   0
015477        000                   .BYTE   0
015500        000                   .BYTE   0
015501        000                   .BYTE   0
015502     177400                   .WORD   -400
015504        000                   .BYTE   0
015505        000                   .BYTE   0
015506        000                   .BYTE   0
015507        000                   .BYTE   0
015510     100000                   .WORD   -100000
015512        000                   .BYTE   0
015513        000                   .BYTE   0
015514        000                   .BYTE   0
015515        000                   .BYTE   0
015516        000                   .BYTE   0
015517        000                   .BYTE   0
015520        000                   .BYTE   0
015521        000                   .BYTE   0
015522        000                   .BYTE   0
015523        000                   .BYTE   0
015524        000                   .BYTE   0
015525        000                   .BYTE   0
```

29-Mar-1982 16:23:04 TOPS
29-Mar-1982 16:21:03 PA:<

```
                                        ;ML4AD
                                        ;               ROUTINE DECLARATION SECTION

015526     000                          .BYTE   0
015527     000                          .BYTE   0
015530  000020                          .WORD   20
015532  177400                          .WORD   -400
015534     000                          .BYTE   0
015535     000                          .BYTE   0
015536  000110                          .WORD   110
015540  177666                          .WORD   -112
015542  000001                          .WORD   1
015544     000                          .BYTE   0
015545     000                          .BYTE   0
015546     000                          .BYTE   0
015547     000                          .BYTE   0
015550     000                          .BYTE   0
015551     000                          .BYTE   0
015552     000                          .BYTE   0
015553     000                          .BYTE   0
015554     000                          .BYTE   0
015555     000                          .BYTE   0
015556     000                          .BYTE   0
015557     000                          .BYTE   0
015560  140300                          .WORD   -37500
015562     000                          .BYTE   0
015563     000                          .BYTE   0
015564     000                          .BYTE   0
015565     000                          .BYTE   0
015566     000                          .BYTE   0
015567     000                          .BYTE   0
015570  100300                          .WORD   -77500
015572     000                          .BYTE   0
015573     000                          .BYTE   0
015574     000                          .BYTE   0
015575     000                          .BYTE   0
015576     000                          .BYTE   0
015577     000                          .BYTE   0
015600     000                          .BYTE   0
015601     000                          .BYTE   0
015602     000                          .BYTE   0
015603     000                          .BYTE   0
015604     000                          .BYTE   0
015605     000                          .BYTE   0
015606     000                          .BYTE   0
015607     000                          .BYTE   0
015610     000                          .BYTE   0
015611     000                          .BYTE   0
015612     000                          .BYTE   0
015613     000                          .BYTE   0
015614     000                          .BYTE   0
015615     000                          .BYTE   0
015616     000                          .BYTE   0
015617     000                          .BYTE   0
015620  010000                          .WORD   10000
```

```
                                    ;ML4AD
                                    ;
                                                ROUTINE DECLARATION SECTION
015622      000                             .BYTE   0
015623      000                             .BYTE   0
015624      000                             .BYTE   0
015625      000                             .BYTE   0
015626      000                             .BYTE   0
015627      000                             .BYTE   0
015630      000                             .BYTE   0
015631      000                             .BYTE   0
015632      000                             .BYTE   0
015633      000                             .BYTE   0
015634      000                             .BYTE   0
015635      000                             .BYTE   0
015636      000                             .BYTE   0
015637      000                             .BYTE   0
015640      000                             .BYTE   0
015641      000                             .BYTE   0
015642      000                             .BYTE   0
015643      000                             .BYTE   0
015644      000                             .BYTE   0
015645      000                             .BYTE   0
015646      000                             .BYTE   0
015647      000                             .BYTE   0
015650      000                             .BYTE   0
015651      000                             .BYTE   0
015652      000                             .BYTE   0
015653      000                             .BYTE   0
015654      000                             .BYTE   0
015655      000                             .BYTE   0
015656      000                             .BYTE   0
015657      000                             .BYTE   0
015660      000                             .BYTE   0
015661      000                             .BYTE   0
015662   000000                             .WORD   0
015664   001001                   REM.TBL:  .WORD   1001
015666   004004                             .WORD   4004
015670   020020                             .WORD   20020
015672   003003                             .WORD   3003
015674   014014                             .WORD   14014
015676   021460                             .WORD   21460
015700   005005                             .WORD   5005
015702   024024                             .WORD   24024
015704   023023                             .WORD   23023
015706   017017                             .WORD   17017
015710   035474                             .WORD   35474
015712   024465                             .WORD   24465
015714   021021                             .WORD   21021
015716   007007                             .WORD   7007
015720   034034                             .WORD   34034
015722   022463                             .WORD   22463
015724   011011                             .WORD   11011
015726   005444                             .WORD   5444
015730   026026                             .WORD   26026
```

```
                                ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                ;                       ROUTINE DECLARATION SECTION     29-Mar-1982 16:21:03    PA:<
015732  033033                          .WORD   33033
015734  016457                          .WORD   16457
015736  033472                          .WORD   33472
015740  014455                          .WORD   14455
015742  023462                          .WORD   23462
015744  015015                          .WORD   15015
015746  025464                          .WORD   25464
015750  025025                          .WORD   25025
015752  027027                          .WORD   27027
015754  037037                          .WORD   37037
015756  036477                          .WORD   36477
015760  030471                          .WORD   30471
015762     041                          .BYTE   41
                                        .EVEN
015764  064477                  DT.1:   .WORD   64477
015766  007700                          .WORD   7700
015770     000                          .BYTE   0
015771     000                          .BYTE   0
015772  064477                          .WORD   64477
015774  000077                          .WORD   77
015776     000                          .BYTE   0
015777     000                          .BYTE   0
016000  100577                          .WORD   -77201
016002  017700                          .WORD   17700
016004     077                          .BYTE   77
016005     000                          .BYTE   0
016006  100577                          .WORD   -77201
016010  000000                          .WORD   0
016012     077                          .BYTE   77
016013     000                          .BYTE   0
016014  100577                          .WORD   -77201
016016  010077                          .WORD   10077
016020     077                          .BYTE   77
                                        .EVEN
016022                          RH.ADD: .BLKW   1
016024                          RH.TYP: .BLKW   1
016026                          RH.VEC: .BLKW   1
016030                          ML.LUN: .BLKW   1
016032                          ML.DUT: .BLKW   1


                                        .GLOBL  REGDMP, ONEPAS, INTERVEN, PRSN
                                        .GLOBL  ERRTHR



        100000                  BIT15==                 -100000
        040000                  BIT14==                 40000
        020000                  BIT13==                 20000
        010000                  BIT12==                 10000
        004000                  BIT11==                 4000
        002000                  BIT10==                 2000
        001000                  BIT09==                 1000
```

```
                        ;ML4AD
                        ;               ROUTINE DECLARATION SECTION

        000400          BIT08==         400
        000200          BIT07==         200
        000100          BIT06==         100
        000040          BIT05==         40
        000020          BIT04==         20
        000010          BIT03==         10
        000004          BIT02==         4
        000002          BIT01==         2
        000001          BIT00==         1
        001000          BIT9==          1000
        000400          BIT8==          400
        000200          BIT7==          200
        000100          BIT6==          100
        000040          BIT5==          40
        000020          BIT4==          20
        000010          BIT3==          10
        000004          BIT2==          4
        000002          BIT1==          2
        000001          BIT0==          1
        000040          EF.START==      40
        000037          EF.RESTART==    37
        000036          EF.CONTINUE==   36
        000035          EF.NEW==        35
        000034          EF.PWR==        34
        000340          PRI07==         340
        000300          PRI06==         300
        000240          PRI05==         240
        000200          PRI04==         200
        000140          PRI03==         140
        000100          PRI02==         100
        000040          PRI01==         40
        000000          PRI00==         0
        000004          EVL==           4
        000010          LOT==           10
        000020          ADR==           20
        000040          IDU==           40
        000100          ISR==           100
        000200          UAM==           200
        000400          BOE==           400
        001000          PNT==           1000
        002000          PRI==           2000
        004000          IXE==           4000
        010000          IBE==           10000
        020000          IER==           20000
        040000          LOE==           40000
        100000          HOE==           -100000
        004716          T.21=           P.AAA
        005012          T.61=           P.AAB
        005112          PWR.OFF=        P.AAC
        005202          PWR.ON=         P.AAD
        005272          UNS.ERR=        P.AAE
        005340          VV.NOT.SET=     P.AAF
```

```
                        ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03   PA:<

        005414          VV.CLEAR=       P.AAG
        005470          NO.INIT=        P.AAH
        005570          MB.DIS.ERR=     P.AAI
        005652          WC.ERR=         P.AAJ
        005722          W.ERR=          P.AAK
        005764          VV.SET=         P.AAL
        006060          PUP.BB=         P.AAM
        006150          BB.VV.ERR=      P.AAN
        006242          BB.INIT.ERR=    P.AAO
        006334          BB.BB.ERR=      P.AAP
        006442          FMT.1=          P.AAQ
        006506          FMT.2=          P.AAR
        006574          FMT.3=          P.AAS
        006620          FMT.4=          P.AAT
        006650          FMT.5=          P.AAU
        006752          FMT.6=          P.AAV
        007002          FMT.7=          P.AAW
        007030          FMT.8=          P.AAX
        007064          FMT.9=          P.AAY
        007116          FMT.10=         P.AAZ
        007170          FMT.11=         P.ABA
        007224          FMT.12=         P.ABB
        007254          FMT.13=         P.ABC
        007330          FMT.14=         P.ABD
        007370          FMT.15=         P.ABE
        007436          FMT.16=         P.ABF
        007526          FMT.17=         P.ABG
        007562          FMT.18=         P.ABH
        007632          FMT.19=         P.ABI
        007702          FMT.20=         P.ABJ
        007754          FMT.21=         P.ABK
        010026          FMT.22=         P.ABL
        010072          FMT.23=         P.ABM
        010142          FMT.24=         P.ABN
        010166          FMT.25=         P.ABO
        010206          FMT.26=         P.ABP
        010240          ONE.FMT=        P.ABQ
        010246          TWO.FMT=        P.ABR
        010256          THR.FMT=        P.ABS
        010270          FOR.FMT=        P.ABT
        010304          FIV.FMT=        P.ABU
        010322          SIX.FMT=        P.ABV
        010342          SEV.FMT=        P.ABW
        010364          EIG.FMT=        P.ABX
        010410          NIN.FMT=        P.ABY
        010436          TEN.FMT=        P.ABZ
        010466          ELV.FMT=        P.ACA
        010520          WRD.1=          P.ACB
        010524          WRD.2=          P.ACC
        010536          WRD.3=          P.ACD
        010544          WRD.4=          P.ACE
        010552          WRD.5=          P.ACF
```

```
                    ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                    ;               ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03   PA:<

        010560      WRD.6=          P.ACG
        010566      WRD.7=          P.ACH
        010602      WRD.8=          P.ACI
        010616      WRD.9=          P.ACJ
        010630      WRD.10=         P.ACK
        010640      WRD.11=         P.ACL
        010650      WRD.12=         P.ACM
        010660      WRD.13=         P.ACN
        010664      WRD.14=         P.ACO
        010676      WRD.15=         P.ACP
        010704      WRD.16=         P.ACQ
        010712      WRD.17=         P.ACR
        010724      WRD.18=         P.ACS
        010730      WRD.19=         P.ACT
        010736      WRD.20=         P.ACU
        010744      WRD.21=         P.ACV
        010752      WRD.22=         P.ACW
        010766      WRD.23=         P.ACX
        010774      WRD.24=         P.ACY
        011002      WRD.25=         P.ACZ
        011016      WRD.26=         P.ADA
        011024      WRD.27=         P.ADB
        011032      WRD.29=         P.ADC
        011046      WRD.30=         P.ADD
        011054      WRD.31=         P.ADE
        011070      WRD.32=         P.ADF
        011076      WRD.33=         P.ADG
        011102      WRD.34=         P.ADH
        011110      WRD.35=         P.ADI
        011116      WRD.36=         P.ADJ
        011122      WRD.37=         P.ADK
        011132      WRD.38=         P.ADL
        011140      WRD.39=         P.ADM
        011150      WRD.40=         P.ADN
        011154      WRD.41=         P.ADO
        011170      WRD.42=         P.ADP
        011176      WRD.43=         P.ADQ
        011206      WRD.44=         P.ADR
        011214      WRD.45=         P.ADS
        011226      WRD.46=         P.ADT
        011240      WRD.47=         P.ADU
        011250      WRD.48=         P.ADV
        011260      WRD.49=         P.ADW
        011270      WRD.50=         P.ADX
        011276      WRD.51=         P.ADY
        011310      WRD.52=         P.ADZ
        011316      WRD.53=         P.AEA
        011326      WRD.54=         P.AEB
        011336      WRD.55=         P.AEC
        011344      WRD.56=         P.AED
        011352      WRD.57=         P.AEE
        011362      WRD.58=         P.AEF
```

```
                        ;ML4AD
                        ;               ROUTINE DECLARATION SECTION

        011374          WRD.59=         P.AEG
        011400          WRD.60=         P.AEH
        011416          WRD.61=         P.AEI
        011432          WRD.62=         P.AEJ
        011440          WRD.63=         P.AEK
        011446          WRD.64=         P.AEL
        011454          WRD.65=         P.AEM
        011462          WRD.67=         P.AEN
        011470          WRD.68=         P.AEO
        011474          WRD.69=         P.AEP
        011502          WRD.70=         P.AEQ
        011514          WRD.71=         P.AER
        011524          WRD.72=         P.AES
        011532          WRD.73=         P.AET
        011540          WRD.74=         P.AEU
        011552          WRD.75=         P.AEV
        011562          WRD.76=         P.AEW
        011570          WRD.77=         P.AEX
        011610          PHR.1=          P.AEY
        011626          PHR.2=          P.AEZ
        011644          PHR.3=          P.AFA
        011676          PHR.4=          P.AFB
        011714          PHR.5=          P.AFC
        011726          PHR.6=          P.AFD
        011740          PHR.7=          P.AFE
        011762          PHR.8=          P.AFF
        011774          PHR.9=          P.AFG
        012006          PHR.10=         P.AFH
        012020          PHR.11=         P.AFI
        012036          PHR.12=         P.AFJ
        012060          PHR.13=         P.AFK
        012104          PHR.14=         P.AFL
        012136          PHR.15=         P.AFM
        012150          FNC.1=          P.AFN
        012164          FNC.2=          P.AFO
        012172          FNC.3=          P.AFP
        012200          FNC.4=          P.AFQ
        012216          FNC.5=          P.AFR
        012226          FNC.6=          P.AFS
        012234          FNC.7=          P.AFT
        012244          FNC.8=          P.AFU
        012260          FNC.9=          P.AFV
        012272          FNC.10=         P.AFW
        012302          FNC.11=         P.AFX
        012322          FNC.12=         P.AFY
        012334          FNC.13=         P.AFZ
        012344          FNC.14=         P.AGA
        012360          FNC.15=         P.AGB
        012372          FNC.16=         P.AGC
        012404          FNC.17=         P.AGD
        012414          FNC.18=         P.AGE
        012426          FNC.19=         P.AGF
```

```
                              ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS
                              ;                   ROUTINE DECLARATION SECTION           29-Mar-1982 16:21:03    PA:<

        012440                FNC.21=             P.AGG
        012452                FNC.22=             P.AGH
        012464                FNC.23=             P.AGI
        012500                REG.1=              P.AGJ
        012510                REG.2=              P.AGK
        012516                REG.3=              P.AGL
        012524                REG.4=              P.AGM
        012532                REG.5=              P.AGN
        012540                REG.6=              P.AGO
        012546                REG.7=              P.AGP
        012554                REG.8=              P.AGQ
        012562                REG.9=              P.AGR
        012570                REG.10=             P.AGS
        012576                REG.11=             P.AGT
        012604                REG.12=             P.AGU
        012612                REG.13=             P.AGV
        012620                REG.14=             P.AGW
        012626                REG.15=             P.AGX
        012634                REG.16=             P.AGY
        012642                REG.17=             P.AGZ
        012652                REG.18=             P.AHA
        012660                REG.19=             P.AHB
        012666                REG.20=             P.AHC
        012676                REG.21=             P.AHD
        012706                ASYNC=              P.AHE
        012750                SYNC=               P.AHF
        013012                ARR.DAT=            P.AHG
        013052                MEM.ARR=            P.AHH
        013114                INTER=              P.AHI
        013154                DATA.LATE=          P.AHJ
        013214                SC.SET=             P.AHK
        013250                TRBLE.LOOP=         P.AHL
        013302                RH.ERROR=           P.AHM
        013330                TIME.OUT=           P.AHN
        013374                D1.TEMP=            NIB.SAVE
        013376                D2.TEMP=            NIB.SAVE+2
        013400                E2.TEMP=            NIB.SAVE+4



                                    .SBTTL  LOAD.STACK ROUTINE DECLARATION SECTION

 016034                       LOAD.STACK:
 016034  004167  166514             JSR     R1,$SAVE3                                                         2267
 016040  016601  000012             MOV     12(SP),R1                   ; NIB.PTR,*                           2322
 016044  012702  015022             MOV     #STK.OFF,R2
 016050  060102                     ADD     R1,R2
 016052  016601  000014             MOV     14(SP),R1                   ; STK.PTR,*
 016056  016600  000012             MOV     12(SP),R0                   ; NIB.PTR,*                           2318
```

```
                                  ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                  ;              ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03   PA:<

        016062  006300                    ASL     R0
        016064  066007  016070            ADD     1$(R0),PC
        016070  000024            1$:     .WORD   2$-1$
        016072  000042                    .WORD   3$-1$
        016074  000060                    .WORD   4$-1$
        016076  000076                    .WORD   5$-1$
        016100  000114                    .WORD   6$-1$
        016102  000132                    .WORD   7$-1$
        016104  000160                    .WORD   9$-1$
        016106  000176                    .WORD   10$-1$
        016110  000224                    .WORD   12$-1$
        016112  000260                    .WORD   15$-1$
        016114  005003            2$:     CLR     R3                                   ;      2322
        016116  151203                    BISB    (R2),R3
        016120  010100                    MOV     R1,R0
        016122  160300                    SUB     R3,R0
        016124  016703  175244            MOV     NIB.SAVE,R3
        016130  000500                    BR      14$
        016132  005003            3$:     CLR     R3                                   ;      2326
        016134  151203                    BISB    (R2),R3
        016136  010100                    MOV     R1,R0
        016140  160300                    SUB     R3,R0
        016142  016703  175226            MOV     NIB.SAVE,R3
        016146  000433                    BR      8$
        016150  005003            4$:     CLR     R3                                   ;      2330
        016152  151203                    BISB    (R2),R3
        016154  010100                    MOV     R1,R0
        016156  160300                    SUB     R3,R0
        016160  016703  175210            MOV     NIB.SAVE,R3
        016164  000461                    BR      13$
        016166  005003            5$:     CLR     R3                                   ;      2334
        016170  151203                    BISB    (R2),R3
        016172  010100                    MOV     R1,R0
        016174  160300                    SUB     R3,R0
        016176  016703  175172            MOV     NIB.SAVE,R3
        016202  000437                    BR      11$
        016204  005003            6$:     CLR     R3                                   ;      2338
        016206  151203                    BISB    (R2),R3
        016210  010100                    MOV     R1,R0
        016212  160300                    SUB     R3,R0
        016214  016703  175156            MOV     NIB.SAVE+2,R3
        016220  000444                    BR      14$
        016222  005003            7$:     CLR     R3                                   ;      2342
        016224  151203                    BISB    (R2),R3
        016226  010100                    MOV     R1,R0
        016230  160300                    SUB     R3,R0
        016232  016703  175140            MOV     NIB.SAVE+2,R3
        016236  006203            8$:     ASR     R3
        016240  006203                    ASR     R3
        016242  006203                    ASR     R3
        016244  006203                    ASR     R3
        016246  000431                    BR      14$
```

```
                            ;ML4AD                                                      29-Mar-1982 16:27:04    TOPS
                            ;                   ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<
 016250  005003             9$:     CLR     R3
 016252  151203                     BISB    (R2),R3                 ;                                       2346
 016254  010100                     MOV     R1,R0
 016256  160300                     SUB     R3,R0
 016260  016703  175112             MOV     NIB.SAVE+2,R3
 016264  000421                     BR      13$
 016266  005003             10$:    CLR     R3
 016270  151203                     BISB    (R2),R3                 ;                                       2350
 016272  010100                     MOV     R1,R0
 016274  160300                     SUB     R3,R0
 016276  016703  175074             MOV     NIB.SAVE+2,R3
 016302  006203             11$:    ASR     R3
 016304  006203                     ASR     R3
 016306  006203                     ASR     R3
 016310  006203                     ASR     R3
 016312  000406                     BR      13$
 016314  005003             12$:    CLR     R3
 016316  151203                     BISB    (R2),R3                 ;                                       2354
 016320  010100                     MOV     R1,R0
 016322  160300                     SUB     R3,R0
 016324  016703  175050             MOV     NIB.SAVE+4,R3
 016330  000303             13$:    SWAB    R3
 016332  042703  177760     14$:    BIC     #177760,R3
 016336  105060  015034             CLRB    STACK(R0)
 016342  150360  015034             BISB    R3,STACK(R0)
 016346  000207                     RTS     PC
 016350  005003             15$:    CLR     R3                      ;                                       2318
 016352  151203                     BISB    (R2),R3                 ;                                       2358
 016354  160301                     SUB     R3,R1
 016356  016703  175016             MOV     NIB.SAVE+4,R3
 016362  006203                     ASR     R3
 016364  006203                     ASR     R3
 016366  006203                     ASR     R3
 016370  006203                     ASR     R3
 016372  000303                     SWAB    R3
 016374  042703  177770             BIC     #177770,R3
 016400  105061  015034             CLRB    STACK(R1)
 016404  150361  015034             BISB    R3,STACK(R1)
 016410  000207                     RTS     PC
                                                                    ;                                       2267
                            ; Routine Size:  119 words
                            ; Maximum stack depth per invocation:  4 words
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
:                       ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (5)

:               2363    routine DAT_DM_XFER : novalue =
:               2364
:               2365    !++
:               2366    ! FUNCTIONAL DESCRIPTION:
:               2367    !
:               2368    !       A REPEATEDLY CALLED SEQUENCE
:               2369    !       OF ASSIGNMENT EXPRESSIONS TO
:               2370    !       LOAD THE DSA, BUS ADRS  AND WORD
:               2371    !       COUNT REGISTERS WITH APPROPRIATE
:               2372    !       INFORMATION BEFORE A MASS BUS
:               2373    !       TRANSFER CAN COMMENCE
:               2374    !
:               2375    !       LOADS A MASS BUS BLOCK TRANSFER,
:               2376    !       IN DIAGNOSTIC MODE, AT THE GOOD
:               2377    !       BLOCK ADRS.
:               2378    !
:               2379    !--
:               2380
:               2381        begin
:               2382        DAT_DM = ONE;                                       !SET DATA DIAG MODE
:               2383        MLDA = .GOOD_BLK;                                   !LOAD DSA REG WITH THE GOOD BLOCK ADRS
:               2384        MLBA = IO_BUF;                                      !LOAD BUS ADRS REG WITH THE IO_BUF ADRS
:               2385        MLWC = not 255;                                     !LOAD WORD COUNT REG WITH COMPLIMENT 256
:               2386        end;


                                        .SBTTL  DAT.DM.XFER ROUTINE DECLARATION SECTION
016412                          DAT.DM.XFER:
016412  152777  000010  177104          BISB    #10,@ML.REG+120                 ;               2382
016420  016777  175362  177006          MOV     GOOD.BLK,@ML.REG+30             ;               2383
016426  012777  014022  176770          MOV     #IO.BUF,@ML.REG+20              ;               2384
016434  012777  177400  176752          MOV     #-400,@ML.REG+10                ;               2385
016442  000207                          RTS     PC                              ;               2363

                                ; Routine Size:  13 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                            29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;            ROUTINE DECLARATION SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (6)
;
;            routine STRIPPER (WRD_CNT, NIB_CNT) : novalue =
;                begin
;
;            !++
;            ! FUNCTIONAL DESCRIPTION:
;            !       STRIPPER RUNS IN DATA DIAG MODE AND STRIPS OUT
;            !       A VARIABLE NUMBER OF GOOD NIBBLES FROM THE
;            !       GOOD BLOCK AND STORES THEM INTO A CONTIGIOUS
;            !       STACK FOR SEQUENTIAL ACCESSING
;            !
;            ! FORMAL PARAMETERS:
;            !       WRD_CNT
;            !       TELLS STRIPPER HOW MANY WORDS IN THE GOOD
;            !       BLOCK TO READ OUT
;            !
;            !       NIB_CNT
;            !       TELLS STRIPPER HOW MANY NIBBLES TO
;            !       STRIP OUT OF EACH WORD.
;            !
;            ! IMPLICIT INPUTS:
;            !--
;
;                local
;                    STK_PTR;                                    !STACK POINTER
;
;                incr CNT from 0 to .NIB_CNT do                  !CLEAR OUT THE STACK OFFSETS
;                    STK_OFF [.CNT] = ZEROES;
;
;                CLR_MBUS;
;                STK_PTR = -1;                                   !RESET THE STACK POINTER
;                DAT_DM_XFER ();                                 !SET UP A DATA XFER AT THE GOOD BLOCK
;                MLCS1 = read;                                   !DO A READ XFER
;                DELAY (ONE_US);                                 !ALLOW PROM DATA TO GET INTO THE MLPD REG
;
;                incr CNT from 0 to .WRD_CNT do                  !LOAD THE STACK WITH ALL GOOD NIBBLE DATA
;                    begin
;                    PD_TEMP = .MLPD;                            !GET THE PROM DATA
;                    DAT_CLK = ONE;                              !CLOCK OUT THE DATA WORD
;                    DELAY (ONE_US);                             !
;                    RD_LNG_WRD;                                 !READ DATA DIAG REGS INTO NIBBLE SAVE
;
;                    incr NIB_PTR from 0 to .NIB_CNT do          !STRIP OUT X NUMBER OF NIBBLES
;                        begin
;                        STK_PTR = .STK_PTR + 1;                 !INCREMENT THE STACK POINTER
;
;                        if .PD_TEMP [.NIB_PTR] IS_SET           !SEE IF THIS A GOOD NIBBLE
;                        then
;                            STK_OFF [.NIB_PTR] = (.STK_OFF [.NIB_PTR]) + (.NIB_CNT + 1)
;                                                                !THEN INCREMENT IT'S STACK OFFSET
;                        else
;                            LOAD_STACK (.STK_PTR, .NIB_PTR);            !ELSE LOAD THE NIBBLE IN THE STACK
;
```

```
;ML4AD                                                             29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;                 ROUTINE DECLARATION SECTION                      29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (6)

;          2439                 end;
;          2440
;          2441             end;
;          2442
;          2443         CLR_MBUS;
;          2444         end;

                                            .GLOBL  L$DLY


                                            .SBTTL  STRIPPER ROUTINE DECLARATION SECTION
 016444                             STRIPPER:
 016444  004167  166142                     JSR     R1,$SAVE5                  ;                     2387
 016450  005746                             TST     -(SP)
 016452  016604  000020                     MOV     20(SP),R4                  ; NIB.CNT,*           2412
 016456  005001                             CLR     R1                         ; CNT
 016460  000403                             BR      2$
 016462  105061  015022             1$:     CLRB    STK.OFF(R1)                ; *(CNT)              2413
 016466  005201                             INC     R1                         ; CNT                 2412
 016470  020104                     2$:     CMP     R1,R4                      ; CNT,*
 016472  003773                             BLE     1$
 016474  152777  000040  176742             BISB    #40,@ML.REG+40             ;                     2413
 016502  016705  177324                     MOV     ML.DUT,R5
 016506  042705  177770                     BIC     #177770,R5
 016512  142777  000007  176724             BICB    #7,@ML.REG+40
 016520  150577  176720                     BISB    R5,@ML.REG+40
 016524  012705  177777                     MOV     #-1,R5                     ; *,STK.PTR           2416
 016530  004767  177656                     JSR     PC,DAT.DM.XFER             ;                     2417
 016534  012777  000071  176642             MOV     #71,@ML.REG                ;                     2418
 016542  012701  000001                     MOV     #1,R1                      ; *,$$TMP2            2419
 016546  001410                     3$:     BEQ     6$
 016550  016702  163342                     MOV     L$DLY,R2                   ; *,$$TMP1
 016554  001403                             BEQ     5$
 016556  005016                     4$:     CLR     (SP)                       ; $$TMP
 016560  005302                             DEC     R2                         ; $$TMP1
 016562  001375                             BNE     4$
 016564  005301                     5$:     DEC     R1                         ; $$TMP2
 016566  000767                             BR      3$
 016570  005003                     6$:     CLR     R3                         ; CNT                 2421
 016572  000502                             BR      16$
 016574  017767  177034  176540     7$:     MOV     @ML.REG+230,PD.TEMP        ;                     2423
 016602  152777  000020  176714             BISB    #20,@ML.REG+120            ;                     2424
 016610  012701  000001                     MOV     #1,R1                      ; *,$$TMP2            2425
 016614  001410                     8$:     BEQ     11$
 016616  016702  163274                     MOV     L$DLY,R2                   ; *,$$TMP1
 016622  001403                             BEQ     10$
```

```
                                        ;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS
                                        ;                       ROUTINE DECLARATION SECTION                     29-Mar-1982 16:21:03    PA:<

016624  005016                          9$:     CLR     (SP)                            ; $STMP
016626  005302                                  DEC     R2                              ; $STMP1
016630  001375                                  BNE     9$
016632  005301                          10$:    DEC     R1                              ; $STMP2
016634  000767                                  BR      8$
016636  017767  176732  174530          11$:    MOV     @ML.REG+170,D1.TEMP
016644  017767  176734  174524                  MOV     @ML.REG+200,D2.TEMP
016652  017767  176706  174520                  MOV     @ML.REG+160,E2.TEMP
016660  005002                                  CLR     R2                              ; NIB.PTR                       2428
016662  000443                                  BR      15$
016664  005205                          12$:    INC     R5                              ; STK.PTR                       2430
016666  010201                                  MOV     R2,R1                           ; NIB.PTR,*                     2432
016670  006201                                  ASR     R1
016672  006201                                  ASR     R1
016674  006201                                  ASR     R1
016676  062701  015342                          ADD     #PD.TEMP,R1
016702  010146                                  MOV     R1,-(SP)
016704  010246                                  MOV     R2,-(SP)                        ; NIB.PTR,*
016706  042716  177770                          BIC     #177770,(SP)
016712  012746  000001                          MOV     #1,-(SP)
016716  005046                                  CLR     -(SP)
016720  004767  164710                          JSR     PC,BL$GT2
016724  062706  000010                          ADD     #10,SP
016730  005300                                  DEC     R0
016732  001011                                  BNE     13$
016734  005001                                  CLR     R1                              ;                               2434
016736  156201  015022                          BISB    STK.OFF(R2),R1                  ; *(NIB.PTR),*
016742  060401                                  ADD     R4,R1
016744  010100                                  MOV     R1,R0
016746  005200                                  INC     R0
016750  110062  015022                          MOVB    R0,STK.OFF(R2)                  ; *,*(NIB.PTR)
016754  000405                                  BR      14$                             ;                               2432
016756  010546                          13$:    MOV     R5,-(SP)                        ; STK.PTR,*                     2437
016760  010246                                  MOV     R2,-(SP)                        ; NIB.PTR,*
016762  004767  177046                          JSR     PC,LOAD.STACK
016766  022626                                  CMP     (SP)+,(SP)+
016770  005202                          14$:    INC     R2                              ; NIB.PTR                       2428
016772  020204                          15$:    CMP     R2,R4                           ; NIB.PTR,*
016774  003733                                  BLE     12$
016776  005203                                  INC     R3                              ; CNT                           2421
017000  020366  000022                  16$:    CMP     R3,22(SP)                       ; CNT,WRD.CNT
017004  003673                                  BLE     7$
017006  152777  000040  176430                  BISB    #40,@ML.REG+40                  ;                               2441
017014  016705  177012                          MOV     ML.DUT,R5
017020  042705  177770                          BIC     #177770,R5
017024  142777  000007  176412                  BICB    #7,@ML.REG+40
017032  150577  176406                          BISB    R5,@ML.REG+40
017036  005726                                  TST     (SP)+                           ;                               2387
017040  000207                                  RTS     PC


                                        ; Routine Size:  127 words
                                        ; Maximum stack depth per invocation:  11 words
```

```
;ML4AD
;                       ROUTINE DECLARATION SECTION
```

```
:ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;           ROUTINE DECLARATION SECTION                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (7)

;           routine CAL_CRC : novalue =
;               begin
;
;           !++
;           ! FUNCTIONAL DESCRIPTION:
;           !       CALCULATE THE CRC CODE FOR THE GOOD BLOCKS
;           !       FIRST CRC GROUP (60 NIBBLES) BY STRIPPING
;           !       OUT GOOD NIBBLES AND MODULO 2 ADDING EACH
;           !       BITS WEIGHT RESULTING IN A_CAL,B_CAL,P_CAL.
;           !
;           ! IMPLICIT INPUTS:
;           !       P_CAL,A_CAL,B_CAL
;           !       GOLBAL STORAGE LOCATION WHERE CALCULATED
;           !       CRC CODES ARE STORED AND EXAMINED FROM
;           !
;           !       REM_TBL
;           !       TABLE CONTAINING PRECALCULATED BIT POSITION
;           !       WEIGHTS USED IN THE MODULO 2 CALCULATION OF THE
;           !       CRC CODE
;           !--
;
;               local
;                   CHANNEL,                            !CHANNEL POINTS TO THE BITS IN A WORD
;                   STK_PTR,                            !STACK POINTER
;                   NIB_SAV : bitvector [4],            !NIBBLE SAVE LOCATION
;                   ALOG,                               !INDEX INTO REMAINDER TABLE
;                   BLOG;                               !INDEX INTO REMAINDER TABLE
;
;               STRIPPER (12, 9);                       !STRIP OUT ALL 10 NIBBLE FROM 13 ARRAY WORDS
;               STK_PTR = -1;                           !RESET STACK POINTER
;
;               incr PLOG from 0 to 5 do                !PLOG POINTS TO ONE CRC GROUP '6 WORDS'
;                   begin
;                   CHANNEL = -1;                       !RESET CHANNEL FOR EACH WORD
;
;                   incr NIB_CNT from 0 to 8 do         !READ DATA NIBBLE 0-8 AND CALCULATE CRC
;                       begin
;                       STK_PTR = .STK_PTR + 1;         !INCREMENT THE STACK POINTER
;                       NIB_SAV = .stack [.STK_PTR];    !LOAD NIV_SAV WITH A STACK NIBBLE
;
;                       incr BIT_TST from 0 to 3 do     !TEST THE BIT FOR BEING SET
;                           begin
;                           CHANNEL = .CHANNEL + 1;     !CHANNEL POINTS TO THIS BIT
;
;                           if .NIB_SAV [.BIT_TST] IS_SET   !SEE IF THIS BIT IS SET
;                           then
;                               begin                   !IF SET THEN MOD 2 ADD THE REMAINDER
;                               ALOG = .PLOG + .CHANNEL;    !CALCULATE THE ALOG
;                               BLOG = .PLOG + .CHANNEL*2;  !CALCULATE THE BLOG
;
;                               while .ALOG geq 63 do   !REDUCE ALOG UNTIL < 64
;                                   ALOG = .ALOG - 63;
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (7)

;            2497
;            2498                     while .BLOG geq 63 do        !REDUCE BLOG UNTIL <64
;            2499                         BLOG = .BLOG - 63;
;            2500
;            2501                     P_CAL = (.P_CAL) xor (.REM_TBL [.PLOG]);     !MOD 2 P_CAL WITH REM_TBL
;            2502                     A_CAL = (.A_CAL) xor (.REM_TBL [.ALOG]);     !MOD 2 A_CAL WITH REM_TBL
;            2503                     B_CAL = (.B_CAL) xor (.REM_TBL [.BLOG]);     !MOD 2 B_CAL WITH REM_TBL
;            2504                     end;
;            2505
;            2506                 end;
;            2507
;            2508             end;
;            2509
;            2510         STK_PTR = .STK_PTR + 1;                    !SKIP OVER THE CRC NIB NT THE STACK
;            2511         end;
;            2512
;            2513     end;


                                         .SBTTL  CAL.CRC ROUTINE DECLARATION SECTION
 017042  004167  165544          CAL.CRC:JSR     R1,$SAVE5                           ;                 2445
 017046  162706  000012                  SUB     #12,SP
 017052  012746  000014                  MOV     #14,-(SP)                           ;                 2473
 017056  012746  000011                  MOV     #11,-(SP)
 017062  004767  177356                  JSR     PC,STRIPPER
 017066  012766  177777  000006          MOV     #-1,6(SP)                           ; *,STK.PTR       2474
 017074  005066  000004                  CLR     4(SP)                               ; PLOG            2476
 017100  012766  177777  000010  1$:     MOV     #-1,10(SP)                          ; *,CHANNEL       2478
 017106  005066  000012                  CLR     12(SP)                              ; NIB.CNT         2480
 017112  005266  000006          2$:     INC     6(SP)                               ; STK.PTR         2482
 017116  016605  000006                  MOV     6(SP),R5                            ; STK.PTR,*       2483
 017122  116566  015034  000014          MOVB    STACK(R5),14(SP)                    ; *,NIB.SAV
 017130  105066  000015                  CLRB    15(SP)                              ; NIB.SAV
 017134  005003                          CLR     R3                                  ; BIT.TST         2485
 017136  005266  000010          3$:     INC     10(SP)                              ; CHANNEL         2487
 017142  010305                          MOV     R3,R5                               ; BIT.TST,*       2489
 017144  006205                          ASR     R5
 017146  006205                          ASR     R5
 017150  006205                          ASR     R5
 017152  012704  000014                  MOV     #14,R4
 017156  060604                          ADD     SP,R4                               ; NIB.SAV,*
 017160  060405                          ADD     R4,R5
 017162  010546                          MOV     R5,-(SP)
 017164  010346                          MOV     R3,-(SP)                            ; BIT.TST,*
 017166  042716  177770                  BIC     #177770,(SP)
 017172  012746  000001                  MOV     #1,-(SP)
 017176  005046                          CLR     -(SP)
```

```
                                    ;ML4AD                                                                    29-Mar-1982 16:23:04   TOPS
                                    ;                  ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03   PA:<

017200  004767  164430                      JSR     PC,BL$GT2
017204  062706  000010                      ADD     #10,SP
017210  005300                              DEC     R0
017212  001066                              BNE     7$
017214  016601  000004                      MOV     4(SP),R1                ; PLOG,ALOG                 2492
017220  066601  000010                      ADD     10(SP),R1               ; CHANNEL,ALOG
017224  016605  000010                      MOV     10(SP),R5               ; CHANNEL,*                 2493
017230  006305                              ASL     R5
017232  066605  000004                      ADD     4(SP),R5                ; PLOG,*
017236  010502                              MOV     R5,R2                   ; *,BLOG
017240  020127  000077              4$:     CMP     R1,#77                  ; ALOG,*                    2495
017244  002403                              BLT     5$
017246  162701  000077                      SUB     #77,R1                  ; *,ALOG                    2496
017252  000772                              BR      4$                      ;                           2495
017254  020227  000077              5$:     CMP     R2,#77                  ; BLOG,*                    2498
017260  002403                              BLT     6$
017262  162702  000077                      SUB     #77,R2                  ; *,BLOG                    2499
017266  000772                              BR      5$                      ;                           2498
017270  005005                      6$:     CLR     R5                      ;                           2501
017272  016604  000004                      MOV     4(SP),R4                ; PLOG,*
017276  156405  015664                      BISB    REM.TBL(R4),R5
017302  010546                              MOV     R5,-(SP)
017304  046716  176056                      BIC     P.CAL,(SP)
017310  040567  176052                      BIC     R5,P.CAL
017314  052667  176046                      BIS     (SP)+,P.CAL
017320  005005                              CLR     R5                      ;                           2502
017322  156105  015664                      BISB    REM.TBL(R1),R5          ; *(ALOG),*
017326  010504                              MOV     R5,R4
017330  046704  176026                      BIC     A.CAL,R4
017334  040567  176022                      BIC     R5,A.CAL
017340  050467  176016                      BIS     R4,A.CAL
017344  005005                              CLR     R5                      ;                           2503
017346  156205  015664                      BISB    REM.TBL(R2),R5          ; *(BLOG),*
017352  010504                              MOV     R5,R4
017354  046704  176004                      BIC     B.CAL,R4
017360  040567  176000                      BIC     R5,B.CAL
017364  050467  175774                      BIS     R4,B.CAL
017370  005203                      7$:     INC     R3                      ; BIT.TST                   2485
017372  020327  000003                      CMP     R3,#3                   ; BIT.TST,*
017376  003657                              BLE     3$
017400  005266  000012                      INC     12(SP)                  ; NIB.CNT                   2480
017404  026627  000012  000010              CMP     12(SP),#10              ; NIB.CNT,*
017412  003637                              BLE     2$
017414  005266  000006                      INC     6(SP)                   ; STK.PTR                   2510
017420  005266  000004                      INC     4(SP)                   ; PLOG                      2476
017424  026627  000004  000005              CMP     4(SP),#5                ; PLOG,*
017432  003622                              BLE     1$
017434  062706  000016                      ADD     #16,SP                  ;                           2445
017440  000207                              RTS     PC


                                    ; Routine Size:  128 words
                                    ; Maximum stack depth per invocation:  17 words
```

```
;ML4AD                                                29-Mar-1982 16:23:04   TOPS
;        ROUTINE DECLARATION SECTION                  29-Mar-1982 16:21:03   PA:<
```

```
3318 :ML4AD                                                            29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
3319 :                    ROUTINE DECLARATION SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (8)
3320
3321 :           2514   routine ERR_CHK_CRC =
3322 :           2515       begin
3323 :           2516
3324 :           2517   !++
3325 :           2518   ! FUNCTIONAL DESCRIPTION:
3326 :           2519   !       'ERROR CHECK CRC' COMPARES HARDWARE GENERATED CRC
3327 :           2520   !       CODES TO SOFTWARE CALCULATED CRC CODE FOR ONE
3328 :           2521   !       CRC GROUP AND RETURNS A ONE ON DETECTION OF ERRORS
3329 :           2522   !
3330 :           2523   ! IMPLICIT INPUTS:
3331 :           2524   !       P_CAL,A_CAL,B_CAL
3332 :           2525   !       GLOBAL STORAGE LOCATIONS WHERE CALCULATED
3333 :           2526   !       CRC CODES ARE STORED AND EXAMINED FROM
3334 :           2527   !
3335 :           2528   !       P_GEN,A_GEN,B_GEN
3336 :           2529   !       GLOBAL STROAGE LOCATIONS WHERE HARDWARE GENERATED
3337 :           2530   !       CRC CODES ARE STORED AND EXAMINED FROM
3338 :           2531   !--
3339 :           2532
3340 :           2533       local
3341 :           2534           POS,                                        !VARIABLE FOR FIELD SELECTOR
3342 :           2535           TEMP;                                       !TEMPORARY STORAGE LOCATION
3343 :           2536
3344 :           2537       POS = -1;                                       !RESET THE POS
3345 :           2538
3346 :           2539       incr STK_PTR from 9 to 59 by 10 do              !CONVERT VERTICAL STACK CRC TO HORIZONTAL REPRESENTATION
3347 :           2540           begin
3348 :           2541           POS = .POS + 1;                             !INCREMENT POS
3349 :           2542           TEMP = .stack [.STK_PTR];                   !READ CRC NIB FROM THE STACK
3350 :           2543           (P_GEN)<.POS, 1> = .TEMP<0, 1>;             !CONVERT 1ST BIT
3351 :           2544           (A_GEN)<.POS, 1> = not .TEMP<1, 1>;         !CONVERT 2ND BIT
3352 :           2545           (B_GEN)<.POS, 1> = not .TEMP<2, 1>;         !CONVERT 3ED BIT
3353 :           2546           end;
3354 :           2547
3355 :           2548       if (.P_GEN neq .P_CAL) or (.A_GEN neq .A_CAL) or (.B_GEN neq .B_CAL) then return ONE else return ZERO;
3356 :           2549
3357 :           2550                                                       !COMPARE GENERATED CRC CODE TO CALCULATED CRC CODE
3358 :           2551       end;
3362
3363                                       .SBTTL  ERR.CHK.CRC ROUTINE DECLARATION SECTION
3367 017442                       ERR.CHK.CRC:
3368 017442  004167  165106                   JSR     R1,$SAVE3                    ;                   2514
3369 017446  012701  177777                   MOV     #-1,R1                       ; *,POS             2537
3370 017452  012702  000011                   MOV     #11,R2                       ; *,STK.PTR         2539
3371 017456  005201                   1$:     INC     R1                           ; POS               2541
3372 017460  005003                           CLR     R3                           ; TEMP              2542
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                        ;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03   PA:<

017462  156203  015034                          BISB    STACK(R2),R3            ; *(STK.PTR),TEMP
017466  012746  015374                          MOV     #P.GEN,-(SP)            ;                               2543
017472  010146                                  MOV     R1,-(SP)                ; POS,*
017474  012746  000001                          MOV     #1,-(SP)
017500  010346                                  MOV     R3,-(SP)                ; TEMP,*
017502  042716  177776                          BIC     #177776,(SP)
017506  004767  164360                          JSR     PC,BL$PU2
017512  012716  015370                          MOV     #A.GEN,(SP)             ;                               2544
017516  010146                                  MOV     R1,-(SP)                ; POS,*
017520  012746  000001                          MOV     #1,-(SP)
017524  005046                                  CLR     -(SP)
017526  032703  000002                          BIT     #2,R3                   ; *,TEMP
017532  001401                                  BEQ     2$
017534  005216                                  INC     (SP)
017536  005116                          2$:     COM     (SP)
017540  004767  164326                          JSR     PC,BL$PU2
017544  012716  015372                          MOV     #B.GEN,(SP)             ;                               2545
017550  010146                                  MOV     R1,-(SP)                ; POS,*
017552  012746  000001                          MOV     #1,-(SP)
017556  005046                                  CLR     -(SP)
017560  032703  000004                          BIT     #4,R3                   ; *,TEMP
017564  001401                                  BEQ     3$
017566  005216                                  INC     (SP)
017570  005116                          3$:     COM     (SP)
017572  004767  164274                          JSR     PC,BL$PU2
017576  062706  000024                          ADD     #24,SP                  ;                               2540
017602  062702  000012                          ADD     #12,R2                  ; *,STK.PTR                     2539
017606  020227  000073                          CMP     R2,#73                  ; STK.PTR,*
017612  003721                                  BLE     1$
017614  026767  175554  175544                  CMP     P.GEN,P.CAL             ;                               2548
017622  001010                                  BNE     4$
017624  026767  175540  175530                  CMP     A.GEN,A.CAL
017632  001004                                  BNE     4$
017634  026767  175532  175522                  CMP     B.GEN,B.CAL
017642  001403                                  BEQ     5$
017644  012701  000001                  4$:     MOV     #1,R1
017650  000401                                  BR      6$
017652  005001                          5$:     CLR     R1
017654  010100                          6$:     MOV     R1,R0                   ;                               2515
017656  000207                                  RTS     PC                      ;                               2514

                                        ; Routine Size:  71 words
                                        ; Maximum stack depth per invocation:  14 words
```

```
;ML4AD                                                          29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
;                       ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (9)

;            2552       routine FIND_COMP_BIT (BITS_XFERED) =
;            2553           begin
;            2554
;            2555       !++
;            2556       ! FUNCTIONAL DESCRIPTION:
;            2557       !       'FIND COMPLIMENT' BIT IS CALLED BY THE
;            2558       !       SYNDROME DECODE TESTS AND INDEXES INTO
;            2559       !       THE IO_BUF LOOKING FOR COMPLIMENTED
;            2560       !       BITS.  A COMPLIMENTED BIT IS BY DEF A ONE
;            2561       !
;            2562       !       A ONE IS RETURNED IF THE INDEXED BIT IS
;            2563       !       NOT SET
;            2564       !
;            2565       ! FORMAL PARAMETERS:
;            2566       !       BITS_XFERED
;            2567       !       REPRESENTS THE BIT BEING TESTED
;            2568       !       IN THE DRIVE AND FROM THIS THE
;            2569       !       WORD AND BIT INDEX INTO THE
;            2570       !       IO_BUF CAN BE CALCULATED
;            2571       !
;            2572       ! IMPLICIT INPUTS:
;            2573       !--
;            2574
;            2575           local
;            2576               COMP_WRD,                              !WORD WHERE COMPLINEMT BIT IS LOCATED
;            2577               COMP_BIT,                              !BIT THAT IS COMPLINEMTED
;            2578               BUF_SAV : bitvector [16];              !STORES THE WORD IN WHICH THE BIT IS COMPLIMENTED
;            2579
;            2580           COMP_WRD = .BITS_XFERED/16;                !CALCULATE THE COMP WORD
;            2581           COMP_BIT = .BITS_XFERED mod 16;            !CALCULATE THE COMP BIT
;            2582           BUF_SAV = .IO_BUF [.COMP_WRD];             !LOAD THE COMP WORD INTO BUF_SAV
;            2583           IO_BUF [.COMP_WRD] = ZEROES;               !ZERO THE COMP WORD
;            2584
;            2585           if .BUF_SAV [.COMP_BIT] IS_NOT_SET then return ZERO else return ONE;
;            2586
;            2587                                                      !FIND COMPLIMENTED BIT AND RETURN ERROR STATUS
;            2588           end;


                                        .SBTTL  FIND.COMP.BIT ROUTINE DECLARATION SECTION
017660                          FIND.COMP.BIT:
017660  004167  164654                  JSR     R1,$SAVE2                       ;                        2552
017664  005746                          TST     -(SP)
017666  016646  000012                  MOV     12(SP),-(SP)                    ; BITS.XFERED,*          2580
017672  012746  000020                  MOV     #20,-(SP)
017676  004767  164544                  JSR     PC,BL$DIV
017702  010001                          MOV     R0,R1                           ; *,COMP.WRD
```

```
                              ;ML4AD                                                       29-Mar-1982 16:23:04    TOPS
                              ;               ROUTINE DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<

017704  016616  000016                MOV     16(SP),(SP)              ; BITS.XFERED,*              2581
017710  012746  000020                MOV     #20,-(SP)
017714  004767  164540                JSR     PC,BL$MOD
017720  010002                        MOV     R0,R2                    ; *,COMP.BIT
017722  010100                        MOV     R1,R0                    ; COMP.WRD,*                 2582
017724  006300                        ASL     R0
017726  016066  014022  000006        MOV     IO.BUF(R0),6(SP)         ; *,BUF.SAV
017734  005060  014022                CLR     IO.BUF(R0)               ;                            2583
017740  010200                        MOV     R2,R0                    ; COMP.BIT,*                 2585
017742  006200                        ASR     R0
017744  006200                        ASR     R0
017746  006200                        ASR     R0
017750  012701  000006                MOV     #6,R1
017754  060601                        ADD     SP,R1                    ; BUF.SAV,*
017756  060100                        ADD     R1,R0
017760  010046                        MOV     R0,-(SP)
017762  010246                        MOV     R2,-(SP)                 ; COMP.BIT,*
017764  042716  177770                BIC     #177770,(SP)
017770  012746  000001                MOV     #1,-(SP)
017774  005046                        CLR     -(SP)
017776  004767  163632                JSR     PC,BL$GT2
020002  062706  000010                ADD     #10,SP
020006  005700                        TST     R0
020010  001002                        BNE     1$
020012  005001                        CLR     R1
020014  000402                        BR      2$
020016  012701  000001        1$:     MOV     #1,R1
020022  010100                2$:     MOV     R1,R0
020024  062706  000010                ADD     #10,SP                   ;                            2553
020030  000207                        RTS     PC                       ;                            2552

                              ; Routine Size:  53 words
                              ; Maximum stack depth per invocation:  11 words
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;       ROUTINE DECLARATION SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (10)
;
;       routine FORCE_REM (PLOG, CHAN) : novalue =
;           begin
;
;       !++
;       ! FUNCTIONAL DESCRIPTION:
;       !       VIA ECC_DM AND THE PRECALCULATED MODULO 2
;       !       REMAINDERS STORED IN REM_TBL[], THE
;       !       CRC_A,CRC_B AND PAR_CRC_WRD
;       !       ARE FORCED WITH ERRONEOUS CRC DATA TO
;       !       FORCE PERDICTABLE ECC ERRORS
;       !
;       ! FORMAL PARAMETERS:
;       !       PLOG
;       !       POINTS TO ONE OF THE SIX WORDS OF
;       !       A CRC GROUP
;       !
;       !       CHAN
;       !       POINTS TO ONE OF 36 CHANNELS IN
;       !       A CRC GROUP
;       !
;       ! IMPLICIT INPUTS:
;       !--
;
;           local
;               TMP_E1,                              !TEMP STORAGE FOR E1 DATA WORD
;               ALOG,                                !INDEX INTO REM_TBL
;               BLOG;                                !INDEX INTO REM_TBL
;
;           ALOG = .PLOG + .CHAN;                    !CALCULATE A_LOG
;           BLOG = .PLOG + .CHAN*2;                  !CALCULATE B_LOG
;
;           while .ALOG geq 63 do                    !REDUCE A_LOG UNTIL < 64
;               ALOG = .ALOG - 63;
;
;           while .BLOG geq 63 do                    !REDUCE B_LOG UNTIL < 64
;               BLOG = .BLOG - 63;
;
;           ECC_DM = ONE;                            !SET ECC DIAG MODE
;       !+
;       ! THE FOLLOWING ASSIGNMENT:
;       !
;       !       MLE1 = .TMP_E1
;       !
;       ! IS EQUIVALENT TO THE FOLLOWING
;       ! TWO ASSINGMENTS:
;       !
;       !  PAR_CRC_WRD = .REM_TBL [.PLOG];           !LOAD PAR_CRC_WRD WITH REM_TBL
;       !  CRC_A = .REM_TBL [.ALOG];                 !LOAD CRC_A WITH REM_TBL
;       !
;       ! THIS IS NECESSARY DUE TO THE FACT THAT
;       ! THE E1 REGISTER IS WORD ORIENTATED AND
;       ! THE BLISS COMPILER GENERATES BYTE INST
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                        ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (10)

;            2641       ! TO ACCESS THE REGISTER.
;            2642       !-
;            2643
;            2644          TMP_E1 = ZEROES;                              !CLEAR OUT THE TEMP WORD
;            2645          TMP_E1<0, 6> = .REM_TBL [.ALOG];              !LOAD CRC_A WITH REM_TBL
;            2646          TMP_E1<8, 6> = .REM_TBL [.PLOG];              !LOAD PAR_CRC_WRD WITH REM_TBL
;            2647          MLET = .TMP_E1;                               !LOAD THE E1 REGISTER WITH DATA
;            2648
;            2649          CRC_B = .REM_TBL [.BLOG];                     !LOAD CRC_B WITH REM_TBL
;            2650          end;


                                                  .SBTTL  FORCE.REM ROUTINE DECLARATION SECTION
020032                                  FORCE.REM:
020032  004167  164534                            JSR     R1,$SAVE4                       ;                    2589
020036  016601  000016                            MOV     16(SP),R1                       ; PLOG,*             2617
020042  010100                                    MOV     R1,R0                           ; *,ALOG
020044  066600  000014                            ADD     14(SP),R0                       ; CHAN,ALOG
020050  016602  000014                            MOV     14(SP),R2                       ; CHAN,*             2618
020054  006302                                    ASL     R2
020056  060102                                    ADD     R1,R2
020060  010203                                    MOV     R2,R3                           ; *,BLOG
020062  020027  000077                  1$:       CMP     R0,#77                          ; ALOG,*             2620
020066  002403                                    BLT     2$
020070  162700  000077                            SUB     #77,R0                          ; *,ALOG             2621
020074  000772                                    BR      1$                              ;                    2620
020076  020327  000077                  2$:       CMP     R3,#77                          ; BLOG,*             2623
020102  002403                                    BLT     3$
020104  162703  000077                            SUB     #77,R3                          ; *,BLOG             2624
020110  000772                                    BR      2$                              ;                    2623
020112  152777  000001  175404          3$:       BISB    #1,@ML.REG+120                  ;                    2626
020120  005002                                    CLR     R2                              ; TMP.E1             2644
020122  116004  015664                            MOVB    REM.TBL(R0),R4                  ; *(ALOG),*          2645
020126  042704  177700                            BIC     #177700,R4
020132  142702  000077                            BICB    #77,R2                          ; *,TMP.E1
020136  050402                                    BIS     R4,R2                           ; *,TMP.E1
020140  116104  015664                            MOVB    REM.TBL(R1),R4                  ;                    2646
020144  000304                                    SWAB    R4
020146  042704  140377                            BIC     #140377,R4
020152  042702  037400                            BIC     #37400,R2                       ; *,TMP.E1
020156  050402                                    BIS     R4,R2                           ; *,TMP.E1
020160  010277  175370                            MOV     R2,@ML.REG+150                  ; TMP.E1,*           2647
020164  116304  015664                            MOVB    REM.TBL(R3),R4                  ; *(BLOG),*          2649
020170  042704  177700                            BIC     #177700,R4
020174  142777  000077  175362                    BICB    #77,@ML.REG+160
020202  150477  175356                            BISB    R4,@ML.REG+160
020206  000207                                    RTS     PC                              ;                    2589
```

```
;ML4AD                                                          29-Mar-1982 16:23:04  TOPS
;                    ROUTINE DECLARATION SECTION                29-Mar-1982 16:21:03  PA:<


; Routine Size:  55 words
; Maximum stack depth per invocation:  5 words

```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
        ROUTINE DECLARATION SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (11)

        routine FOR_ECC_ERR (SGL, UNC) : novalue =
            begin

        !++
        ! FUNCTIONAL DESCRIPTION:
        !       'FORCE ECC ERROR' WHEN CALLED WILL FORCE
        !       VIA ECC DIAG MODE, SINGLE BIT ECC ERRORS
        !       OR UNCORRECTABLE ECC ERRORS INTO THE
        !       ECC DIAGNOSTIC REGISTERS
        !
        ! FORMAL PARAMETERS:
        !       SGL
        !       WHEN SET TO A ONE THIS
        !       ROUTINE WILL FORCE SINGLE BIT ERRORS
        !
        !       UNC
        !       WHEN SET TO A ONE THIS ROUTINE WILL
        !       FORCE UNCORRECTABLE ECC ERRORS
        !
        ! IMPLICIT INPUTS:
        !--

            local
                TMP_E1;                                  !TEMP STORAGE FOR E1 DATA WORD

            ECC_DM = ONE;                                !SET ECC DIAG MODE

            if .SGL                                      !IF SGL IS TRUE
            then
                begin                                    !THEN FORCE A SINGLE BIT ERROR
        !+
        ! THE FOLLOWING ASSIGNMENT:
        !
        !       MLE1 = .TMP_E1
        !
        ! IS EQUIVALENT TO THE FOLLOWING
        ! TWO ASSINGMENTS:
        !
        !   PAR_CRC_WRD = %b'111111';               !LOAD PAR_CRC_WRD WITH REM_TBL
        !   CRC_A = %b'000000';                     !LOAD CRC_A WITH REM_TBL
        !
        ! THIS IS NECESSARY DUE TO THE FACT THAT
        ! THE E1 REGISTER IS WORD ORIENTATED AND
        ! THE BLISS COMPILER GENERATES BYTE INST
        ! TO ACCESS THE REGISTER.
        !-

                TMP_E1 = ZEROES;                                 !CLEAR OUT THE TEMP WORD
                TMP_E1<0, 6> = %b'000000';               !LOAD CRC_A WITH REM_TBL
                TMP_E1<8, 6> = %b'111111';               !LOAD PAR_CRC_WRD WITH REM_TBL
                MLE1 = .TMP_E1;                          !LOAD THE E1 REGISTER WITH DATA
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (11)

;              2703            CRC_B = %b'000000';
;              2704            end
;              2705        else
;              2706            begin                                    !ELSE FORCE A UNCORRECTABLE ERROR
;              2707    !+
;              2708    ! THE FOLLOWING ASSIGNMENT:
;              2709    !
;              2710    !       MLE1 = .TMP_E1
;              2711    !
;              2712    ! IS EQUIVALENT TO THE FOLLOWING
;              2713    ! TWO ASSINGMENTS:
;              2714    !
;              2715    !   PAR_CRC_WRD = %b'111111';           !LOAD PAR_CRC_WRD WITH REM_TBL
;              2716    !   CRC_A = %b'111111';                 !LOAD CRC_A WITH REM_TBL
;              2717    !
;              2718    ! THIS IS NECESSARY DUE TO THE FACT THAT
;              2719    ! THE E1 REGISTER IS WORD ORIENTATED AND
;              2720    ! THE BLISS COMPILER GENERATES BYTE INST
;              2721    ! TO ACCESS THE REGISTER.
;              2722    !-
;              2723
;              2724            TMP_E1 = ZEROES;                             !CLEAR OUT THE TEMP WORD
;              2725            TMP_E1<0, 6> = %b'111111';               !LOAD CRC_A WITH REM_TBL
;              2726            TMP_E1<8, 6> = %b'111111';               !LOAD PAR_CRC_WRD WITH REM_TBL
;              2727            MLE1 = .TMP_E1;                          !LOAD THE E1 REGISTER WITH DATA
;              2728
;              2729            CRC_B = %b'000000';
;              2730            end;
;              2731
;              2732        end;


                                           .SBTTL  FOR.ECC.ERR ROUTINE DECLARATION SECTION
 020210                             FOR.ECC.ERR:
 020210  152777  000001  175306             BISB    #1,@ML.REG+120          ;                  2676
 020216  005000                             CLR     R0                      ; TMP.E1           2698
 020220  032766  000001  000004             BIT     #1,4(SP)                ; *,SGL            2678
 020226  001403                             BEQ     1$                      ;
 020230  142700  000077                     BICB    #77,R0                  ; *,TMP.E1         2699
 020234  000402                             BR      2$                      ;                  2700
 020236  152700  000077             1$:     BISB    #77,R0                  ; *,TMP.E1         2725
 020242  052700  037400             2$:     BIS     #37400,R0               ; *,TMP.E1         2726
 020246  010077  175302                     MOV     R0,@ML.REG+150          ; TMP.E1,*         2727
 020252  142777  000077  175304             BICB    #77,@ML.REG+160         ;                  2729
 020260  000207                             RTS     PC                      ;                  2651

                                    ; Routine Size:  21 words
```

```
;ML4AD                                                   29-Mar-1982 16:23:04   TOPS
;                  ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03   PA:<

; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                           29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
;                 ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (12)

;         2733    routine FIRST_BLK_XFER : novalue =
;         2734
;         2735    !++
;         2736    ! FUNCTIONAL DESCRIPTION:
;         2737    !       A REPEATEDLY CALLED SEQUENCE OF
;         2738    !       ASSIGNMENT EXPRESSION TO LOAD
;         2739    !       THE DSA, BUS ADRS AND WORD COUNT
;         2740    !       REGISTERS WITH APPROPRIATE INFORMATION
;         2741    !       BEFORE MASS BUS TRANSFERS CAN
;         2742    !       COMMENCE.
;         2743    !
;         2744    !       LOADS A MASS_BUS BLOCK XFERR AT
;         2745    !       BLOCK ZERO.
;         2746    !
;         2747    !--
;         2748
;         2749        begin
;         2750        ECC_DIS = ONE;                                 !DISABLE ERROR CORRECTION
;         2751        MLDA = ZEROES;                                 !LOAD THE DSA REG WITH SECTOR ZERO
;         2752        MLBA = IO_BUF;                                 !LOAD THE BUS ADDRESS REG WITH IO_BUF ADRS
;         2753        MLWC = not 255;                                !LOAD WORD COUNT REG WITH COMPLIMENT 256
;         2754        end;


                                       .SBTTL  FIRST.BLK.XFER ROUTINE DECLARATION SECTION
020262                         FIRST.BLK.XFER:
020262  152777  000002  175234          BISB    #2,@ML.REG+120          ;        2750
020270  005077  175140                  CLR     @ML.REG+30              ;        2751
020274  012777  014022  175122          MOV     #IO.BUF,@ML.REG+20      ;        2752
020302  012777  177400  175104          MOV     #-400,@ML.REG+10        ;        2753
020310  000207                          RTS     PC                      ;        2733

                               ; Routine Size:  12 words
                               ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                              29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
;                     ROUTINE DECLARATION SECTION                   29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (13)

;           2755  routine GD_BLK_XFER : novalue =
;           2756
;           2757  !++
;           2758  ! FUNCTIONAL DESCRIPTION:
;           2759  !         A REPEATEDLY CALLED SEQUENCE OF
;           2760  !         ASSIGNMENT EXPRESSIONS TO LOAD
;           2761  !         THE DSA, BUS ADRS AND WORD
;           2762  !         COUNT REGISTERS WITH APPROPRIATE
;           2763  !         INFORMATION BEFORE A MASS BUS
;           2764  !         TRANSFERS CAN COMMENCE
;           2765  !
;           2766  !         LOADS A MASS BUS BLOCK XFERR
;           2767  !         AT THE GOOD BLOCK ADRS FOUND
;           2768  !         BY THE READ WRITE ARRAYS WITH
;           2769  !         PROM DATA TEST
;           2770  !
;           2771  !--
;           2772
;           2773      begin
;           2774      ECC_DIS = ONE;                               !DISABLE ERROR CORRECTION
;           2775      MLDA = .GOOD_BLK;                            !LOAD DSA REG WITH THE GOOD BLOCK ADRS
;           2776      MLBA = IO_BUF;                               !LOAD BUS ADRS REG WITH IO_BUF ADRS
;           2777      MLWC = not 255;                              !LOAD WORD COUNT REG WITH COMPLIMENT 256
;           2778      end;


                                         .SBTTL  GD.BLK.XFER ROUTINE DECLARATION SECTION
020312                           GD.BLK.XFER:
020312  152777  000002  175204           BISB    #2,@ML.REG+120                   ;            2774
020320  016777  173462  175106           MOV     GOOD.BLK,@ML.REG+30              ;            2775
020326  012777  014022  175070           MOV     #IO.BUF,@ML.REG+20               ;            2776
020334  012777  177400  175052           MOV     #-400,@ML.REG+10                 ;            2777
020342  000207                           RTS     PC                               ;            2755

                                 ; Routine Size:  13 words
                                 ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                     ROUTINE DECLARATION SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (14)

;              2779   routine LAST_BLK_XFER : novalue =
;              2780
;              2781   !++
;              2782   ! FUNCTIONAL DESCRIPTION:
;              2783   !         A REPEATEDLY CALLED SEQUENCE OF
;              2784   !         ASSIGNMENT EXPRESSIONS TO LOAD
;              2785   !         THE DSA, BUS ADRS AND WORD
;              2786   !         COUNT REGISTERS WITH APPROPRIATE
;              2787   !         INFORMATION BEFORE A MBUS
;              2788   !         TRANSFER CAN COMMENCE
;              2789   !
;              2790   !         LOADS A MASS BUS BLOCK
;              2791   !         TRANSFER AT THE LAST BLOCK
;              2792   !         ADDRESS
;              2793   !
;              2794   !--
;              2795
;              2796       begin
;              2797       ECC_DIS = ONE;                                   !DISABLE ERROR CORRECTION
;              2798       MLDA = .LST_BLK;                                 !LOAD DSA REG WITH THE LAST BLOCK ADRS
;              2799       MLBA = IO_BUF;                                   !LOAD BUS ADRS REG WITH THE IO BUF ADRS
;              2800       MLWC = not 255;                                  !LOAD WORD COUNT REG WITH COMPLIMENT 256
;              2801       end;


                                          .SBTTL  LAST.BLK.XFER ROUTINE DECLARATION SECTION
 020344                            LAST.BLK.XFER:
 020344  152777  000002  175152            BISB    #2,@ML.REG+120                  ;                        2797
 020352  016777  173436  175054            MOV     LST.BLK,@ML.REG+30              ;                        2798
 020360  012777  014022  175036            MOV     #IO.BUF,@ML.REG+20              ;                        2799
 020366  012777  177400  175020            MOV     #-400,@ML.REG+10                ;                        2800
 020374  000207                            RTS     PC                              ;                        2779

                                   ; Routine Size:  13 words
                                   ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               ROUTINE DECLARATION SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (15)
;
;       routine TST_LNG_WRD (NIB_NUM, NIB_PAT, ERR_FLG) : novalue =
;           begin
;
;       !++
;       ! FUNCTIONAL DESCRIPTION:
;       !         COMPARES THE CURRENT NIBBLE
;       !         POSITION IN 'NIB_SAVE' WITH THE
;       !         CURRENT TEST PATTERN.  IF THE
;       !         TWO VALUES ARE NOT EQUAL AN
;       !         ERROR FLG IS SET WHICH THE
;       !         CALLER CAN INTERIGATE
;       !
;       ! FORMAL PARAMETERS:
;       !         NIB_NUM
;       !         CASE SELECT EXPRESSION TO SELECT THE
;       !         CURRENT NIBBLE TO BE EXAMINED
;       !
;       !         NIB_PAT
;       !         CURRENT NIBBLE PATTERN TO BE
;       !         COMPARED
;       !
;       !         ERR_FLG
;       !         CONTAINS THE ADDRESS (PASSED BY REF)
;       !         OF THE CALLERS ERROR FLG
;       !         TO ENABLE THE CALLER TO EXAMINE
;       !         THE ERROR STATUS OF THE ROUTINE CALL
;       !
;       ! IMPLICIT INPUTS:
;       !         NIB_SAVE
;       !         BLOCK OF 3 WORDS TO STORE
;       !         THE DATA FOUND IN MLD1, MLD2
;       !         AND MLE2 AFTER A DIAGNOSTIC MODE
;       !         READ
;       !
;       ! IMPLICIT OUTPUTS:     NONE
;       !--
;
;           .ERR_FLG = ZERO;                              !CLEAR THE ERROR FLAG BACK IN THE CALLING ROUTINE
;
;           case .(NIB_NUM) from 0 to 9 of                !SELECT THE NIBBLE TO BE TESTED
;               set
;
;               [0] :
;
;                   if .NIB_SAVE [NIB_0] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;
;                                                         !TEST NIBBLE 0 AND SET ERR FLG IF NEQ
;
;               [1] :
;
;                   if .NIB_SAVE [NIB_1] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (15)
;
;                                                       !TEST NIBBLE 1 AND SET ERR FLG IF NEQ
;          [2] :
;
;               if .NIB_SAVE [NIB_2] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;
;                                                       !TEST NIBBLE 2 AND SET ERR FLG IF NEQ
;          [3] :
;
;               if .NIB_SAVE [NIB_3] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;
;                                                       !TEST NIBBLE 3 AND SET ERR FLG IF NEQ
;          [4] :
;
;               if .NIB_SAVE [NIB_4] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;
;                                                       !TEST NIBBLE 4 AND SET ERR FLG IF NEQ
;          [5] :
;
;               if .NIB_SAVE [NIB_5] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;
;                                                       !TEST NIBBLE 5 AND SET ERR FLG IF NEQ
;          [6] :
;
;               if .NIB_SAVE [NIB_6] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;
;                                                       !TEST NIBBLE 6 AND SET ERR FLG IF NEQ
;          [7] :
;
;               if .NIB_SAVE [NIB_7] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;
;                                                       !TEST NIBBLE 7 AND SET ERR FLG IF NEQ
;          [8] :
;
;               if .NIB_SAVE [NIB_8] neq .(NIB_PAT)<0, 4> then .ERR_FLG = ONE;
;
;                                                       !TEST NIBBLE 8 AND SET ERR FLG IF NEQ
;          [9] :
;
;               if .NIB_SAVE [NIB_9] neq .(NIB_PAT)<0, 3>
;               then
;                   .ERR_FLG = ONE                      !TEST NIBBLE 9 AND SET ERR FLG IF NEQ
;          tes;
;
;       end;
```

```
;ML4AD                                                        29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;                 ROUTINE DECLARATION SECTION                 29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (15)



                                          .SBTTL  TST.LNG.WRD ROUTINE DECLARATION SECTION
020376                            TST.LNG.WRD:
020376  004167  164136                    JSR     R1,$SAVE2                    ;
020402  016600  000010                    MOV     10(SP),R0                    ;                    2802
020406  005010                            CLR     (R0)                         ; ERR.FLG,*          2839
020410  016601  000014                    MOV     14(SP),R1                    ; NIB.NUM,*          2841
020414  006301                            ASL     R1
020416  066107  020422                    ADD     1$(R1),PC
020422  000024                    1$:     .WORD   2$-1$
020424  000052                            .WORD   3$-1$
020426  000110                            .WORD   4$-1$
020430  000140                            .WORD   5$-1$
020432  000200                            .WORD   6$-1$
020434  000226                            .WORD   7$-1$
020436  000264                            .WORD   8$-1$
020440  000314                            .WORD   9$-1$
020442  000354                            .WORD   10$-1$
020444  000404                            .WORD   11$-1$
020446  016602  000012            2$:     MOV     12(SP),R2                    ; NIB.PAT,*          2846
020452  042702  177760                    BIC     #177760,R2
020456  016701  172712                    MOV     NIB.SAVE,R1
020462  042701  177760                    BIC     #177760,R1
020466  020102                            CMP     R1,R2
020470  001577                            BEQ     13$
020472  000574                            BR      12$
020474  016601  000012            3$:     MOV     12(SP),R1                    ; NIB.PAT,*          2852
020500  042701  177760                    BIC     #177760,R1
020504  016702  172664                    MOV     NIB.SAVE,R2
020510  006202                            ASR     R2
020512  006202                            ASR     R2
020514  006202                            ASR     R2
020516  006202                            ASR     R2
020520  042702  177760                    BIC     #177760,R2
020524  020201                            CMP     R2,R1
020526  001560                            BEQ     13$
020530  000555                            BR      12$
020532  016601  000012            4$:     MOV     12(SP),R1                    ; NIB.PAT,*          2858
020536  042701  177760                    BIC     #177760,R1
020542  016702  172626                    MOV     NIB.SAVE,R2
020546  000302                            SWAB    R2
020550  042702  177760                    BIC     #177760,R2
020554  020201                            CMP     R2,R1
020556  001544                            BEQ     13$
020560  000541                            BR      12$
020562  016601  000012            5$:     MOV     12(SP),R1                    ; NIB.PAT,*          2864
```

```
                                    ;ML4AD                                                            29-Mar-1982 16:23:04   TOPS
                                    ;            ROUTINE DECLARATION SECTION                          29-Mar-1982 16:21:03   PA:<
020566  042701  177760                  BIC     #177760,R1
020572  016702  172576                  MOV     NIB.SAVE,R2
020576  006202                          ASR     R2
020600  006202                          ASR     R2
020602  006202                          ASR     R2
020604  006202                          ASR     R2
020606  000302                          SWAB    R2
020610  042702  177760                  BIC     #177760,R2
020614  020201                          CMP     R2,R1
020616  001524                          BEQ     13$
020620  000521                          BR      12$
020622  016601  000012          6$:     MOV     12(SP),R1               ; NIB.PAT,*             2870
020626  042701  177760                  BIC     #177760,R1
020632  016702  172540                  MOV     NIB.SAVE+2,R2
020636  042702  177760                  BIC     #177760,R2
020642  020201                          CMP     R2,R1
020644  001511                          BEQ     13$
020646  000506                          BR      12$
020650  016601  000012          7$:     MOV     12(SP),R1               ; NIB.PAT,*             2876
020654  042701  177760                  BIC     #177760,R1
020660  016702  172512                  MOV     NIB.SAVE+2,R2
020664  006202                          ASR     R2
020666  006202                          ASR     R2
020670  006202                          ASR     R2
020672  006202                          ASR     R2
020674  042702  177760                  BIC     #177760,R2
020700  020201                          CMP     R2,R1
020702  001472                          BEQ     13$
020704  000467                          BR      12$
020706  016601  000012          8$:     MOV     12(SP),R1               ; NIB.PAT,*             2882
020712  042701  177760                  BIC     #177760,R1
020716  016702  172454                  MOV     NIB.SAVE+2,R2
020722  000302                          SWAB    R2
020724  042702  177760                  BIC     #177760,R2
020730  020201                          CMP     R2,R1
020732  001456                          BEQ     13$
020734  000453                          BR      12$
020736  016601  000012          9$:     MOV     12(SP),R1               ; NIB.PAT,*             2888
020742  042701  177760                  BIC     #177760,R1
020746  016702  172424                  MOV     NIB.SAVE+2,R2
020752  006202                          ASR     R2
020754  006202                          ASR     R2
020756  006202                          ASR     R2
020760  006202                          ASR     R2
020762  000302                          SWAB    R2
020764  042702  177760                  BIC     #177760,R2
020770  020201                          CMP     R2,R1
020772  001436                          BEQ     13$
020774  000433                          BR      12$
020776  016601  000012          10$:    MOV     12(SP),R1               ; NIB.PAT,*             2894
021002  042701  177760                  BIC     #177760,R1
021006  016702  172366                  MOV     NIB.SAVE+4,R2
```

```
                                    ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                    ;               ROUTINE DECLARATION SECTION                 29-Mar-1982 16:21:03   PA:<
021012  000302                              SWAB    R2
021014  042702  177760                      BIC     #177760,R2
021020  020201                              CMP     R2,R1
021022  001422                              BEQ     13$
021024  000417                              BR      12$
021026  016601  000012              11$:    MOV     12(SP),R1               ; NIB.PAT,*                          2900
021032  042701  177770                      BIC     #177770,R1
021036  016702  172336                      MOV     NIB.SAVE+4,R2
021042  006202                              ASR     R2
021044  006202                              ASR     R2
021046  006202                              ASR     R2
021050  006202                              ASR     R2
021052  000302                              SWAB    R2
021054  042702  177770                      BIC     #177770,R2
021060  020201                              CMP     R2,R1
021062  001402                              BEQ     13$
021064  012710  000001              12$:    MOV     #1,(R0)                 ;                                    2902
021070  000207                      13$:    RTS     PC                      ;                                    2802

                                    ; Routine Size:  158 words
                                    ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (16)

;                routine XOR_LNG_WRD (NIB_NUM, NIB_PAT, RESULT) : novalue =
;                    begin
;
;                !++
;                ! FUNCTIONAL DESCRIPTION:
;                !       EXCLUSIVE ORS THE CURRENT
;                !       NIBBLE POSITION IN 'NIB_SAVE'
;                !       WITH THE CURRENT TEST PATTERN
;                !       AND ASSIGNS THE RESULTS TO THE
;                !       FORMAL PARAMETER 'RESULT'.
;                !
;                ! FORMAL PARAMETERS:
;                !       NIB_NUM
;                !       CASE SELECT EXPRESSION TO
;                !       SELECT THE CURRENT NIBBLE TO BE
;                !        EXAMINED
;                !
;                !       NIB_PAT
;                !       CURRENT NIBBLE PATTERN TO BE
;                !       XOR'ED
;                !
;                !       RESULT
;                !       CONTAINS THE ADDRESS (PASSED BY REF)
;                !       OF AN OWN STORAGE LOCATION TO
;                !       ENABLE THE CALLER TO EXAMINE THE XOR RESULTS.
;                !
;                ! IMPLICIT INPUTS:
;                !       NIB_SAVE
;                !       BLOCK OF 3 WORDS TO STORE
;                !       THE DATA FOUND IN MLD1
;                !       MLD2 AND MLE2 AFTER A
;                !       DIAGNOSTIC MODE READ.
;                !
;                ! IMPLICIT OUTPUTS:     NONE
;                !--
;
;                    case .(NIB_NUM) from 0 to 9 of                    !SELECT THE NIBBLE TO BE XOR'ED
;                        set
;
;                        [0] :
;                            .RESULT = .NIB_SAVE [NIB_0] xor .NIB_PAT;
;                                                     !XOR NIBBLE 0 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;
;                        [1] :
;                            .RESULT = .NIB_SAVE [NIB_1] xor .NIB_PAT;
;                                                     !XOR NIBBLE 1 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;
;                        [2] :
;                            .RESULT = .NIB_SAVE [NIB_2] xor .NIB_PAT;
;                                                     !XOR NIBBLE 2 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;
;                        [3] :
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (16)
;
;                              .RESULT = .NIB_SAVE [NIB_3] xor .NIB_PAT;
;                                                  !XOR NIBBLE 3 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;
;                        [4] :
;                              .RESULT = .NIB_SAVE [NIB_4] xor .NIB_PAT;
;                                                  !XOR NIBBLE 4 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;
;                        [5] :
;                              .RESULT = .NIB_SAVE [NIB_5] xor .NIB_PAT;
;                                                  !XOR NIBBLE 5 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;
;                        [6] :
;                              .RESULT = .NIB_SAVE [NIB_6] xor .NIB_PAT;
;                                                  !XOR NIBBLE 6 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;
;                        [7] :
;                              .RESULT = .NIB_SAVE [NIB_7] xor .NIB_PAT;
;                                                  !XOR NIBBLE 7 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;
;                        [8] :
;                              .RESULT = .NIB_SAVE [NIB_8] xor .NIB_PAT;
;                                                  !XOR NIBBLE 8 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;
;                        [9] :
;                              .RESULT = .NIB_SAVE [NIB_9] xor .NIB_PAT
;                                                  !XOR NIBBLE 9 AND STORE RESULTS IN THE ADRS CONTAINED IN .RESULTS
;                        tes;
;
;                  end;


                                    .SBTTL  XOR.LNG.WRD ROUTINE DECLARATION SECTION
021072
021072  004167  163474      XOR.LNG.WRD:
                                    JSR     R1,$SAVE4                       ;                              2906
021076  016601  000016              MOV     16(SP),R1                       ; NIB.PAT,*                    2946
021102  016602  000014              MOV     14(SP),R2                       ; RESULT,*
021106  016600  000020              MOV     20(SP),R0                       ; NIB.NUM,*                    2942
021112  006300                      ASL     R0
021114  066007  021120              ADD     1$(R0),PC
021120  000024             1$:      .WORD   2$-1$
021122  000036                      .WORD   3$-1$
021124  000062                      .WORD   4$-1$
021126  000070                      .WORD   5$-1$
021130  000076                      .WORD   6$-1$
021132  000120                      .WORD   8$-1$
021134  000136                      .WORD   9$-1$
021136  000144                      .WORD   10$-1$
```

```
                                      ;ML4AD                                                         29-Mar-1982 16:23:04   TOPS
                                      ;             ROUTINE DECLARATION SECTION                      29-Mar-1982 16:21:03   PA:<
021140  000162                              .WORD   12$-1$
021142  000176                              .WORD   15$-1$
021144  016712  172224              2$:     MOV     NIB.SAVE,(R2)                  ;                          2946
021150  042712  177760                      BIC     #177760,(R2)
021154  000472                              BR      17$
021156  016703  172212              3$:     MOV     NIB.SAVE,R3                    ;                          2950
021162  006203                              ASR     R3
021164  006203                              ASR     R3
021166  006203                              ASR     R3
021170  006203                              ASR     R3
021172  042703  177760                      BIC     #177760,R3
021176  010312                              MOV     R3,(R2)
021200  000412                              BR      7$
021202  016704  172166              4$:     MOV     NIB.SAVE,R4                    ;                          2954
021206  000437                              BR      13$
021210  016704  172160              5$:     MOV     NIB.SAVE,R4                    ;                          2958
021214  000425                              BR      11$
021216  016712  172154              6$:     MOV     NIB.SAVE+2,(R2)                ;                          2962
021222  042712  177760                      BIC     #177760,(R2)
021226  010104                      7$:     MOV     R1,R4
021230  041204                              BIC     (R2),R4
021232  040112                              BIC     R1,(R2)
021234  050412                              BIS     R4,(R2)
021236  000207                              RTS     PC                             ;                          2942
021240  016704  172132              8$:     MOV     NIB.SAVE+2,R4                  ;                          2966
021244  006204                              ASR     R4
021246  006204                              ASR     R4
021250  006204                              ASR     R4
021252  006204                              ASR     R4
021254  000415                              BR      14$
021256  016704  172114              9$:     MOV     NIB.SAVE+2,R4                  ;                          2970
021262  000411                              BR      13$
021264  016704  172106              10$:    MOV     NIB.SAVE+2,R4                  ;                          2974
021270  006204                      11$:    ASR     R4
021272  006204                              ASR     R4
021274  006204                              ASR     R4
021276  006204                              ASR     R4
021300  000402                              BR      13$
021302  016704  172072              12$:    MOV     NIB.SAVE+4,R4                  ;                          2978
021306  000304                      13$:    SWAB    R4
021310  042704  177760              14$:    BIC     #177760,R4
021314  000411                              BR      16$
021316  016704  172056              15$:    MOV     NIB.SAVE+4,R4                  ;                          2982
021322  006204                              ASR     R4
021324  006204                              ASR     R4
021326  006204                              ASR     R4
021330  006204                              ASR     R4
021332  000304                              SWAB    R4
021334  042704  177770                      BIC     #177770,R4
021340  010412                      16$:    MOV     R4,(R2)
021342  010103                      17$:    MOV     R1,R3
021344  041203                              BIC     (R2),R3
```

```
                        ;ML4AD                                                            29-Mar-1982 16:23:04   TOPS
                        ;                     ROUTINE DECLARATION SECTION                 29-Mar-1982 16:21:03   PA:<
021346  040112                    BIC     R1,(R2)
021350  050312                    BIS     R3,(R2)
021352  000207                    RTS     PC                             ;                                       2906

                        ; Routine Size:  89 words
                        ; Maximum stack depth per invocation:  5 words
```

```
;ML4AD                                                   29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;            ROUTINE DECLARATION SECTION                 29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (17)
;
;            routine LD_LNG_WRD (NIB_NUM, NIB_PAT) : novalue =
;                begin
;
;            !++
;            ! FUNCTIONAL DESCRIPTION:
;            !        LOADS 'NIB_SAVE' WITH UNIQUE
;            !        NIBBLE PATTERNS PRIOR TO WRITING
;            !        TO MLD1, MLD2 AND MLE2
;            !        DATA DIAGNOSTIC REGISTERS.
;            !
;            ! FORMAL PARAMETERS:
;            !        NIB_NUM
;            !        CASE SELECT EXPRESSION TO SELECT
;            !        THE CURRENT NIBBLE TO BE LOADED
;            !
;            !        NIB_PAT
;            !        CURRENT NIBBLE PATTERN TO BE
;            !        LOADED
;            !
;            ! IMPLICIT INPUTS:
;            !        NIB_SAVE
;            !        BLOCK OF 3 WORDS TO STORE
;            !        THE DATA TO BE WRITTEN
;            !        INTO MLD1 MLD2 MLE2
;            !
;            ! IMPLICIT OUTPUTS:
;            !        NIB_SAVE IS LOADED WIH
;            !        THE CURRENT NIBBLE PATTERN
;            !--
;
;                case .(NIB_NUM) from 0 to 9 of          !SELECT THE NIBBLE LOCATION IN NIB_SAVE TO BE LOADED
;                    set
;
;                    [0] :
;                        NIB_SAVE [NIB_0] = .NIB_PAT;    !LOAD NIBBLE 0 WITH NIB_PAT
;
;                    [1] :
;                        NIB_SAVE [NIB_1] = .NIB_PAT;    !LOAD NIBBLE 1 WITH NIB_PAT
;
;                    [2] :
;                        NIB_SAVE [NIB_2] = .NIB_PAT;    !LOAD NIBBLE 2 WITH NIB_PAT
;
;                    [3] :
;                        NIB_SAVE [NIB_3] = .NIB_PAT;    !LOAD NIBBLE 3 WITH NIB_PAT
;
;                    [4] :
;                        NIB_SAVE [NIB_4] = .NIB_PAT;    !LOAD NIBBLE 4 WITH NIB_PAT
;
;                    [5] :
;                        NIB_SAVE [NIB_5] = .NIB_PAT;    !LOAD NIBBLE 5 WITH NIB_PAT
;
;                    [6] :
```

```
;ML4AD                                                       29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (17)

;           3039              NIB_SAVE [NIB_6] = .NIB_PAT;          !LOAD NIBBLE 6 WITH NIB_PAT
;           3040
;           3041          [7] :
;           3042              NIB_SAVE [NIB_7] = .NIB_PAT;          !LOAD NIBBLE 7 WITH NIB_PAT
;           3043
;           3044          [8] :
;           3045              NIB_SAVE [NIB_8] = .NIB_PAT;          !LOAD NIBBLE 8 WITH NIB_PAT
;           3046
;           3047          [9] :
;           3048              NIB_SAVE [NIB_9] = .NIB_PAT           !LOAD NIBBLE 9 WITH NIB_PAT
;           3049          tes;
;           3050
;           3051      end;


                                        .SBTTL  LD.LNG.WRD ROUTINE DECLARATION SECTION
021354                          LD.LNG.WRD:
021354  010146                          MOV     R1,-(SP)                        ;               2987
021356  016600  000004                  MOV     4(SP),R0                        ; NIB.PAT,*     3021
021362  016601  000006                  MOV     6(SP),R1                        ; NIB.NUM,*     3017
021366  006301                          ASL     R1
021370  066107  021374                  ADD     1$(R1),PC
021374  000024                  1$:     .WORD   2$-1$
021376  000040                          .WORD   3$-1$
021400  000064                          .WORD   4$-1$
021402  000102                          .WORD   5$-1$
021404  000134                          .WORD   7$-1$
021406  000150                          .WORD   8$-1$
021410  000174                          .WORD   9$-1$
021412  000212                          .WORD   10$-1$
021414  000244                          .WORD   12$-1$
021416  000262                          .WORD   13$-1$
021420  042700  177760          2$:     BIC     #177760,R0                      ;               3021
021424  142767  000017  171742          BICB    #17,NIB.SAVE
021432  000433                          BR      6$
021434  006300                  3$:     ASL     R0                              ;               3024
021436  006300                          ASL     R0
021440  006300                          ASL     R0
021442  006300                          ASL     R0
021444  042700  177417                  BIC     #177417,R0
021450  142767  000360  171716          BICB    #360,NIB.SAVE
021456  000421                          BR      6$
021460  000300                  4$:     SWAB    R0                              ;               3027
021462  042700  170377                  BIC     #170377,R0
021466  042767  007400  171700          BIC     #7400,NIB.SAVE
021474  000412                          BR      6$
021476  000300                  5$:     SWAB    R0                              ;               3030
```

```
                                    ;ML4AD                                                            29-Mar-1982 16:23:04   TOPS
                                    ;                 ROUTINE DECLARATION SECTION                     29-Mar-1982 16:21:03   PA:<
021500  006300                              ASL     R0
021502  006300                              ASL     R0
021504  006300                              ASL     R0
021506  006300                              ASL     R0
021510  042700  007777                      BIC     #7777,R0
021514  042767  170000  171652              BIC     #170000,NIB.SAVE
021522  050067  171646          6$:         BIS     R0,NIB.SAVE
021526  000467                              BR      15$
021530  042700  177760          7$:         BIC     #177760,R0                     ;                      3017
021534  142767  000017  171634              BICB    #17,NIB.SAVE+2                 ;                      3033
021542  000433                              BR      11$
021544  006300                  8$:         ASL     R0                             ;                      3036
021546  006300                              ASL     R0
021550  006300                              ASL     R0
021552  006300                              ASL     R0
021554  042700  177417                      BIC     #177417,R0
021560  142767  000360  171610              BICB    #360,NIB.SAVE+2
021566  000421                              BR      11$
021570  000300                  9$:         SWAB    R0                             ;                      3039
021572  042700  170377                      BIC     #170377,R0
021576  042767  007400  171572              BIC     #7400,NIB.SAVE+2
021604  000412                              BR      11$
021606  000300                  10$:        SWAB    R0                             ;                      3042
021610  006300                              ASL     R0
021612  006300                              ASL     R0
021614  006300                              ASL     R0
021616  006300                              ASL     R0
021620  042700  007777                      BIC     #7777,R0
021624  042767  170000  171544              BIC     #170000,NIB.SAVE+2
021632  050067  171540          11$:        BIS     R0,NIB.SAVE+2
021636  000423                              BR      15$
021640  000300                  12$:        SWAB    R0                             ;                      3017
021642  042700  170377                      BIC     #170377,R0                     ;                      3045
021646  042767  007400  171524              BIC     #7400,NIB.SAVE+4
021654  000412                              BR      14$
021656  000300                  13$:        SWAB    R0                             ;                      3048
021660  006300                              ASL     R0
021662  006300                              ASL     R0
021664  006300                              ASL     R0
021666  006300                              ASL     R0
021670  042700  107777                      BIC     #107777,R0
021674  042767  070000  171476              BIC     #70000,NIB.SAVE+4
021702  050067  171472          14$:        BIS     R0,NIB.SAVE+4
021706  012601                  15$:        MOV     (SP)+,R1                       ;                      2987
021710  000207                              RTS     PC

                                    ; Routine Size:  111 words
                                    ; Maximum stack depth per invocation:  2 words
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (18)

;               3052    routine WRT_CS1 (TST_PAT, index) : novalue =
;               3053        begin
;               3054
;               3055    !++
;               3056    ! FUNCTIONAL DESCRIPTION:
;               3057    !
;               3058    !       LOADS THE CONTROL & STATUS REGISTER 1 WITH A DATA PATTERN
;               3059    !       GENERATED BY THE MACRO WRT_MASK.
;               3060    !
;               3061    ! FORMAL PARAMETERS:
;               3062    !       TST_PAT
;               3063    !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;               3064    !
;               3065    !       INDEX
;               3066    !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;               3067    !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;               3068    !
;               3069    !--
;               3070
;               3071        MLCS1 = WRT_MASK;                               !LOAD GENERATED WRT_MASK PATTERN INTO MLCS1
;               3072        end;


                                        .SBTTL  WRT.CS1 ROUTINE DECLARATION SECTION
 021712  004167  162622        WRT.CS1:JSR      R1,$SAVE2                       ;                       3052
 021716  016600  000010                MOV      10(SP),R0                       ; INDEX,*               3071
 021722  006300                        ASL      R0
 021724  006300                        ASL      R0
 021726  006300                        ASL      R0
 021730  010001                        MOV      R0,R1
 021732  016100  015406                MOV      ML.REG+2(R1),R0
 021736  056600  000012                BIS      12(SP),R0                       ; TST.PAT,*
 021742  046100  015410                BIC      ML.REG+4(R1),R0
 021746  016102  015412                MOV      ML.REG+6(R1),R2
 021752  050002                        BIS      R0,R2
 021754  010277  173424                MOV      R2,@ML.REG
 021760  000207                        RTS      PC                              ;                       3052

                               ; Routine Size:  20 words
                               ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;          ROUTINE DECLARATION SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (19)

routine RD_CS1 (TST_PAT, index, ERR_FLG) : novalue =
    begin

!++
! FUNCTIONAL DESCRIPTION:
!
!       COMPARES THE CONTENTS OF THE
!       CONTROL & STATUS REGISTER 1
!       WITH THE MASKED DATA PATTERN
!       GENERATED BY THE MACRO 'WRT_MASK'
!
!       IF THE COMPARE IS NOT EQUAL THEN
!       THE FORMAL PARAMETER 'ERR_FLG' IS
!       ASSIGNED A ONE TO INDICATE THE
!       ERROR.
!
! FORMAL PARAMETERS:
!
!       TST_PAT
!       DATA PATTERN TO BE MASKED AND
!       COMPARED AGAINST THE CONTENTS
!       OF THE REGISTER UNDER TEST.
!
!       INDEX
!        USED BY THE MACRO WRT_MASK TO
!       SELECT THE CURRENT REGISTERS ADDRESS,
!       FORCED HI, FORCED LO AND DON'T CARE
!       MASK INFORMATION.
!
!       ERR_FLG
!       CONTAINS THE ADDRESS (PASSED BY REF)
!       OF THE CALLERS ERROR FLG TO ENABLE THE
!       CALLER TO EXAMINE THE ERROR STATUS
!       OF THE ROUTINE CALL.
!
! IMPLICIT INPUTS:
!       WT_DATA
!         GETS LOADED WITH THE GENERATED
!         WRT_MASK DATA PATTERN THUS ALLOWING
!         CALLER TO PRINT FAILING GOOD DATA.
!
!       RD_DATA
!         GETS LOADED WITH DATA READ FROM THE
!         REGISTER THUS ALLOWING CALLER
!         TO PRINT FAILING BAD DATA.
!
! IMPLICIT OUTPUTS:
!       GLOBAL LOCATION WR_DATA
!       AND RD_DATA LOADED WITH GOOD
!       AND BAD REGISTER DATA
!--
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                         ROUTINE DECLARATION SECTION      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (19)

;           3125       .ERR_FLG = ZERO;                    !CLEAR ERROR FLAG
;           3126       WT_DATA = WRT_MASK;                 !SAVE THE DATA WRITTEN TO THE REGISTER
;           3127       RD_DATA = .MLCS1 or .IGNORE;        !READ AND SAVE THE REGISTER
;           3128
;           3129       if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;     !READ THE REG FOR WRT_MASK
;           3130
;           3131                                           !SET ERROR FLAG IF NEQ
;           3132       end;


                                   .SBTTL  RD.CS1 ROUTINE DECLARATION SECTION
021762 004167 162552        RD.CS1: JSR    R1,$SAVE2                       ;                    3073
021766 005076 000010                CLR    @10(SP)                         ; ERR.FLG            3125
021772 016600 000012                MOV    12(SP),R0                       ; INDEX,*            3126
021776 006300                       ASL    R0
022000 006300                       ASL    R0
022002 006300                       ASL    R0
022004 010001                       MOV    R0,R1
022006 016100 015406                MOV    ML.REG+2(R1),R0
022012 056600 000014                BIS    14(SP),R0                       ; TST.PAT,*
022016 046100 015410                BIC    ML.REG+4(R1),R0
022022 016102 015412                MOV    ML.REG+6(R1),R2
022026 050002                       BIS    R0,R2
022030 010267 173314                MOV    R2,WT.DATA
022034 017702 173344                MOV    @ML.REG,R2                      ;                    3127
022040 056102 015412                BIS    ML.REG+6(R1),R2
022044 010267 173302                MOV    R2,RD.DATA
022050 026767 173274 173274         CMP    WT.DATA,RD.DATA                 ;                    3129
022056 001403                       BEQ    1$
022060 012776 000001 000010         MOV    #1,@10(SP)                      ; *,ERR.FLG
022066 000207               1$:     RTS    PC                              ;                    3073

                            ; Routine Size:  35 words
                            ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (20)
;
;                       routine WRT_ER (TST_PAT, index) : novalue =
;                           begin
;
;                       !++
;                       ! FUNCTIONAL DESCRIPTION:
;                       !
;                       !       LOADS THE ERROR REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;                       !
;                       ! FORMAL PARAMETERS:
;                       !
;                       !       TST_PAT
;                       !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;                       !
;                       !       INDEX
;                       !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;                       !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;                       !--
;
;                           MLER = WRT_MASK;                    !LOAD GENERATE WRT_MASK PATTERN INTO MLER
;                           end;


                                        .SBTTL  WRT.ER ROUTINE DECLARATION SECTION
022070  004167  162444          WRT.ER: JSR     R1,$SAVE2                       ;               3133
022074  016600  000010                  MOV     10(SP),R0                       ; INDEX,*       3151
022100  006300                          ASL     R0
022102  006300                          ASL     R0
022104  006300                          ASL     R0
022106  010001                          MOV     R0,R1
022110  016100  015406                  MOV     ML.REG+2(R1),R0
022114  056600  000012                  BIS     12(SP),R0                       ; TST.PAT,*
022120  046100  015410                  BIC     ML.REG+4(R1),R0
022124  016102  015412                  MOV     ML.REG+6(R1),R2
022130  050002                          BIS     R0,R2
022132  010277  173326                  MOV     R2,@ML.REG+60
022136  000207                          RTS     PC                              ;               3133

                                ; Routine Size:  20 words
                                ; Maximum stack depth per-invocation:  3 words

```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;            ROUTINE DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (21)
;
;            routine RD_ER (TST_PAT, index, ERR_FLG) : novalue =
;                begin
;
;            !++
;            ! FUNCTIONAL DESCRIPTION:
;            !
;            !          COMPARES THE CONTENTS OF THE
;            !          ERROR REGISTER WITH
;            !          THE MASKED DATA PATTERN
;            !          GENERATED BY THE MACRO 'WRT_MASK'.
;            !
;            !          IF THE COMPARE IS NOT EQUAL THEN
;            !          THE FORMAL PARAMETER 'ERR_FLG' IS
;            !          ASSIGNED A ONE TO INDICATE THE
;            !          ERROR.
;            !
;            ! FORMAL PARAMETERS:
;            !
;            !          TST_PAT
;            !          DATA PATTERN TO BE MASKED AND
;            !          COMPARED AGAINST THE CONTENTS
;            !          OF THE REGISTER UNDER TEST.
;            !
;            !          INDEX
;            !          USED BY THE MACRO WRT_MASK TO
;            !          SELECT THE CURRENT REGISTERS ADDRESS,
;            !          FORCED HI, FORCED LO AND DON'T CARE
;            !          MASK INFORMATION.
;            !
;            !          ERR_FLG
;            !          CONTAINS THE ADDRESS (PASSED BY REF)
;            !          OF THE CALLERS ERROR FLG TO ENABLE THE
;            !          CALLER TO EXAMINE THE ERROR STATUS
;            !          OF THE ROUTINE CALL.
;            !
;            ! IMPLICIT INPUTS:
;            !          WT_DATA
;            !             GETS LOADED WITH THE GENERATED
;            !             WRT_MASK DATA PATTERN THUS ALLOWING
;            !             CALLER TO PRINT FAILING GOOD DATA.
;            !
;            !          RD_DATA
;            !             GETS LOADED WITH DATA READ FROM THE
;            !             REGISTER THUS ALLOWING CALLER
;            !             TO PRINT FAILING BAD DATA.
;            !
;            ! IMPLICIT OUTPUTS:
;            !          GLOBAL LOCATION WR_DATA
;            !          AND RD_DATA LOADED WITH GOOD
;            !          AND BAD REGISTER DATA
;            !
;            !--
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                        ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (21)

;               3205
;               3206       .ERR_FLG = ZERO;                     !CLEAR THE ERROR FLAG
;               3207       WT_DATA = WRT_MASK;                  !SAVE THE DATA WRITTEN TO THE REGISTER
;               3208       RD_DATA = .MLER or .IGNORE;          !READ AND SAVE THE REGISTER
;               3209
;               3210       if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;        !READ THE REG FOR WRT_MASK
;               3211
;               3212                                            !SET ERROR FLAG IF NEQ
;               3213       end;


                                          .SBTTL  RD.ER ROUTINE DECLARATION SECTION
 022140  004167  162374          RD.ER:   JSR     R1,$SAVE2                     ;                       3153
 022144  005076  000010                   CLR     @10(SP)                       ; ERR.FLG               3206
 022150  016600  000012                   MOV     12(SP),R0                     ; INDEX,*               3207
 022154  006300                           ASL     R0
 022156  006300                           ASL     R0
 022160  006300                           ASL     R0
 022162  010001                           MOV     R0,R1
 022164  016100  015406                   MOV     ML.REG+2(R1),R0
 022170  056600  000014                   BIS     14(SP),R0                     ; TST.PAT,*
 022174  046100  015410                   BIC     ML.REG+4(R1),R0
 022200  016102  015412                   MOV     ML.REG+6(R1),R2
 022204  050002                           BIS     R0,R2
 022206  010267  173136                   MOV     R2,WT.DATA
 022212  017702  173246                   MOV     @ML.REG+60,R2                 ;                       3208
 022216  056102  015412                   BIS     ML.REG+6(R1),R2
 022222  010267  173124                   MOV     R2,RD.DATA
 022226  026767  173116  173116           CMP     WT.DATA,RD.DATA               ;                       3210
 022234  001403                           BEQ     1$
 022236  012776  000001  000010           MOV     #1,@10(SP)                    ; *,ERR.FLG
 022244  000207                  1$:      RTS     PC                            ;                       3153

                                 ; Routine Size:  35 words
                                 ; Maximum stack depth per invocation:  3 words
```

```
4851 ;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
4852 ;                    ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (22)
4853
4854 ;          3214  routine WRT_DA (TST_PAT, index) : novalue =
4855 ;          3215      begin
4856 ;          3216
4857 ;          3217  !++
4858 ;          3218  ! FUNCTIONAL DESCRIPTION:
4859 ;          3219  !
4860 ;          3220  !       LOADS THE DESIRED SECTOR WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
4861 ;          3221  !
4862 ;          3222  ! FORMAL PARAMETERS:
4863 ;          3223  !
4864 ;          3224  !       TST_PAT
4865 ;          3225  !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
4866 ;          3226  !
4867 ;          3227  !       INDEX
4868 ;          3228  !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
4869 ;          3229  !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
4870 ;          3230  !--
4871 ;          3231
4872 ;          3232      MLDA = WRT_MASK;                                 !LOAD MLDA WITH GENERATED WRT_MASK PATTERN
4873 ;          3233      end;
4877
4878                                    .SBTTL  WRT.DA ROUTINE DECLARATION SECTION
4882 022246  004167  162266    WRT.DA: JSR     R1,$SAVE2                  ;                       3214
4883 022252  016600  000010            MOV     10(SP),R0                  ; INDEX,*               3232
4884 022256  006300                    ASL     R0
4885 022260  006300                    ASL     R0
4886 022262  006300                    ASL     R0
4887 022264  010001                    MOV     R0,R1
4888 022266  016100  015406            MOV     ML.REG+2(R1),R0
4889 022272  056600  000012            BIS     12(SP),R0                  ; TST.PAT,*
4890 022276  046100  015410            BIC     ML.REG+4(R1),R0
4891 022302  016102  015412            MOV     ML.REG+6(R1),R2
4892 022306  050002                    BIS     R0,R2
4893 022310  010277  173120            MOV     R2,@ML.REG+30
4894 022314  000207                    RTS     PC                         ;                       3214
4895
4896                         ; Routine Size:  20 words
4897                         ; Maximum stack depth per invocation:  3 words
4902
4903
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;          ROUTINE DECLARATION SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (23)

;          routine RD_DA (TST_PAT, index, ERR_FLG) : novalue =
;              begin
;
;          !++
;          ! FUNCTIONAL DESCRIPTION:
;          !
;          !        COMPARES THE CONTENTS OF THE
;          !        DESIRED SECTOR ADDRESS REGISTER
;          !        WITH THE MASKED DATA PATTERN
;          !        GENERATED BY THE MACRO 'WRT_MASK'
;          !
;          !        IF THE COMPARE IS NOT EQUAL THEN
;          !        THE FORMAL PARAMETER 'ERR_FLG' IS
;          !        ASSIGNED A ONE TO INDICATE THE
;          !        ERROR
;          !
;          ! FORMAL PARAMETERS:
;          !
;          !        TST_PAT
;          !        DATA PATTERN TO BE MASKED AND
;          !        COMPARED AGAINST THE CONTENTS
;          !        OF THE REGISTER UNDER TEST
;          !
;          !        INDEX
;          !        USED BY THE MACRO WRT_MASK TO
;          !        SELECT THE CURRENT REGISTERS ADDRESS,
;          !        FORCED HI, FORCED LO AND DON'T CARE
;          !        MASK INFORMATION
;          !
;          !        ERR_FLG
;          !        CONTAINS THE ADDRESS (PASSED BY REF)
;          !        OF THE CALLERS ERROR FLG TO ENABLE THE
;          !        CALLER TO EXAMINE THE ERROR STATUS
;          !        OF THE ROUTINE CALL.
;          ! IMPLICIT INPUTS:
;          !        WT_DATA
;          !           GETS LOADED WITH THE GENERATED
;          !           WRT_MASK DATA PATTERN THUS ALLOWING
;          !           CALLER TO PRINT FAILING GOOD DATA.
;          !
;          !        RD_DATA
;          !           GETS LOADED WITH DATA READ FROM THE
;          !           REGISTER THUS ALLOWING CALLER
;          !           TO PRINT FAILING BAD DATA.
;          !
;          ! IMPLICIT OUTPUTS:
;          !        GLOBAL LOCATION WR_DATA
;          !        AND RD_DATA LOADED WITH GOOD
;          !        AND BAD REGISTER DATA
;          !
;          !--
;
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                               ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (23)

;              3286        .ERR_FLG = ZERO;                         !CLEAR THE ERROR FLAG
;              3287        WT_DATA = WRT_MASK;                      !SAVE THE DATA WRITTEN TO THE REGISTER
;              3288        RD_DATA = .MLDA or .IGNORE;              !READ AND SAVE THE REGISTER
;              3289
;              3290        if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;       !READ THE REG FOR WRT_MASK
;              3291
;              3292                                                 !SET ERROR FLAG IF NEQ
;              3293        end;


                                          .SBTTL  RD.DA ROUTINE DECLARATION SECTION
 022316  004167  162216          RD.DA:   JSR     R1,$SAVE2                    ;                        3234
 022322  005076  000010                   CLR     @10(SP)                      ; ERR.FLG                3286
 022326  016600  000012                   MOV     12(SP),R0                    ; INDEX,*                3287
 022332  006300                           ASL     R0
 022334  006300                           ASL     R0
 022336  006300                           ASL     R0
 022340  010001                           MOV     R0,R1
 022342  016100  015406                   MOV     ML.REG+2(R1),R0
 022346  056600  000014                   BIS     14(SP),R0                    ; TST.PAT,*
 022352  046100  015410                   BIC     ML.REG+4(R1),R0
 022356  016102  015412                   MOV     ML.REG+6(R1),R2
 022362  050002                           BIS     R0,R2
 022364  010267  172760                   MOV     R2,WT.DATA
 022370  017702  173040                   MOV     @ML.REG+30,R2                ;                        3288
 022374  056102  015412                   BIS     ML.REG+6(R1),R2
 022400  010267  172746                   MOV     R2,RD.DATA
 022404  026767  172740  172740           CMP     WT.DATA,RD.DATA              ;                        3290
 022412  001403                           BEQ     1$
 022414  012776  000001  000010           MOV     #1,@10(SP)                   ; *,ERR.FLG
 022422  000207                   1$:     RTS     PC                           ;                        3234

                                 ; Routine Size:  35 words
                                 ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                          29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
;                        ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (24)

;                3294    routine WRT_MR (TST_PAT, index) : novalue =
;                3295        begin
;                3296
;                3297    !++
;                3298    ! FUNCTIONAL DESCRIPTION:
;                3299    !
;                3300    !       LOADS THE MAINTENANCE REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;                3301    !
;                3302    ! FORMAL PARAMETERS:
;                3303    !
;                3304    !       TST_PAT
;                3305    !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;                3306    !
;                3307    !       INDEX
;                3308    !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;                3309    !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;                3310    !--
;                3311
;                3312        MLMR = WRT_MASK;                                   !LOAD MLMR WITH GENERATED WRT_MASK PATTERN
;                3313        end;


                                         .SBTTL  WRT.MR ROUTINE DECLARATION SECTION
022424  004167  162110          WRT.MR:  JSR     R1,$SAVE2                       ;                          3294
022430  016600  000010                   MOV     10(SP),R0                       ; INDEX,*                  3312
022434  006300                           ASL     R0
022436  006300                           ASL     R0
022440  006300                           ASL     R0
022442  010001                           MOV     R0,R1
022444  016100  015406                   MOV     ML.REG+2(R1),R0
022450  056600  000012                   BIS     12(SP),R0                       ; TST.PAT,*
022454  046100  015410                   BIC     ML.REG+4(R1),R0
022460  016102  015412                   MOV     ML.REG+6(R1),R2
022464  050002                           BIS     R0,R2
022466  010277  173032                   MOV     R2,@ML.REG+120
022472  000207                           RTS     PC                              ;                          3294

                                ; Routine Size:  20 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                       29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;       ROUTINE DECLARATION SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (25)
;
;       routine RD_MR (TST_PAT, index, ERR_FLG) : novalue =
;           begin
;
;       !++
;       ! FUNCTIONAL DESCRIPTION:
;       !
;       !       COMPARES THE CONTENTS OF THE
;       !       MAINTENANCE REGISTER WITH THE
;       !       MASKED DATA PATTERN
;       !       GENERATED BY THE MACRO 'WRT_MASK'.
;       !
;       !       IF THE COMPARE IS NOT EQUAL THEN
;       !       THE FORMAL PARAMETER 'ERR_FLG' IS
;       !       ASSIGNED A ONE TO INDICATE THE
;       !       ERROR.
;       !
;       ! FORMAL PARAMETERS:
;       !
;       !       TST_PAT
;       !       DATA PATTERN TO BE MASKED AND
;       !       COMPARED AGAINST THE CONTENTS
;       !       OF THE REGISTER UNDER TEST.
;       !
;       !       INDEX
;       !       USED BY THE MACRO WRT_MASK TO
;       !       SELECT THE CURRENT REGISTERS ADDRESS,
;       !       FORCED HI, FORCED LO AND DON'T CARE
;       !       MASK INFORMATION.
;       !
;       !       ERR_FLG
;       !       CONTAINS THE ADDRESS (PASSED BY REF)
;       !       OF THE CALLERS ERROR FLG TO ENABLE THE
;       !       CALLER TO EXAMINE THE ERROR STATUS
;       !       OF THE ROUTINE CALL.
;       !
;       ! IMPLICIT INPUTS:
;       !       WT_DATA
;       !         GETS LOADED WITH THE GENERATED
;       !         WRT_MASK DATA PATTERN THUS ALLOWING
;       !         CALLER TO PRINT FAILING GOOD DATA.
;       !
;       !       RD_DATA
;       !         GETS LOADED WITH DATA READ FROM THE
;       !         REGISTER THUS ALLOWING CALLER
;       !         TO PRINT FAILING BAD DATA.
;       !
;       ! IMPLICIT OUTPUTS:
;       !       GLOBAL LOCATION WR_DATA
;       !       AND RD_DATA LOADED WITH GOOD
;       !       AND BAD REGISTER DATA
;       !
;       !--
```

```
;ML4AD                                                             29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                          ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (25)

;          3366
;          3367       .ERR_FLG = ZERO;                             !CLEAR THE ERROR FLAG
;          3368       WT_DATA = WRT_MASK;                          !SAVE THE DATA WRITTEN TO THE REGISTER
;          3369       RD_DATA = .MLMR or .IGNORE;                  !READ AND SAVE THE REGISTER
;          3370
;          3371       if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;         !READ THE REG FOR WRT_MASK
;          3372
;          3373                                                    !SET ERROR FLAG IF NEQ
;          3374       end;


                                        .SBTTL  RD.MR ROUTINE DECLARATION SECTION
022474  004167  162040          RD.MR:  JSR     R1,$SAVE2                       ;                   3314
022500  005076  000010                  CLR     @10(SP)                         ; ERR.FLG           3367
022504  016600  000012                  MOV     12(SP),R0                       ; INDEX,*           3368
022510  006300                          ASL     R0
022512  006300                          ASL     R0
022514  006300                          ASL     R0
022516  010001                          MOV     R0,R1
022520  016100  015406                  MOV     ML.REG+2(R1),R0
022524  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
022530  046100  015410                  BIC     ML.REG+4(R1),R0
022534  016102  015412                  MOV     ML.REG+6(R1),R2
022540  050002                          BIS     R0,R2
022542  010267  172602                  MOV     R2,WT.DATA
022546  017702  172752                  MOV     @ML.REG+120,R2                  ;                   3369
022552  056102  015412                  BIS     ML.REG+6(R1),R2
022556  010267  172570                  MOV     R2,RD.DATA
022562  026767  172562  172562          CMP     WT.DATA,RD.DATA                 ;                   3371
022570  001403                          BEQ     1$
022572  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
022600  000207                  1$:     RTS     PC                              ;                   3314

                                ; Routine Size:  35 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                               29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       ROUTINE DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (26)

;               3375    routine WRT_PA (TST_PAT, index) : novalue =
;               3376        begin
;               3377
;               3378    !++
;               3379    ! FUNCTIONAL DESCRIPTION:
;               3380    !       LOADS THE PROM ADDRESS REGISTER WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;               3381    ! FORMAL PARAMETERS:
;               3382    !       TST_PAT
;               3383    !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;               3384    !       INDEX
;               3385    !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;               3386    !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;               3387    !--
;               3388
;               3389        PROM_DIS = ONE;                                          !SET PROM DISABLE BIT
;               3390        MLPA = WRT_MASK;                                         !LOAD MLPA WITH GENERATED WRT_MASK PATTERN
;               3391        PROM_DIS = ZERO;                                         !CLEAR PROM DISABLE BIT
;               3392        end;


                                                .SBTTL  WRT.PA ROUTINE DECLARATION SECTION
022602  004167  161732                  WRT.PA: JSR     R1,$SAVE2                          ;                  3375
022606  152777  000040  172710                  BISB    #40,@ML.REG+120                    ;                  3389
022614  016600  000010                          MOV     10(SP),R0                          ; INDEX,*          3390
022620  006300                                  ASL     R0
022622  006300                                  ASL     R0
022624  006300                                  ASL     R0
022626  010001                                  MOV     R0,R1
022630  016100  015406                          MOV     ML.REG+2(R1),R0
022634  056600  000012                          BIS     12(SP),R0                          ; TST.PAT,*
022640  046100  015410                          BIC     ML.REG+4(R1),R0
022644  016102  015412                          MOV     ML.REG+6(R1),R2
022650  050002                                  BIS     R0,R2
022652  010277  172626                          MOV     R2,@ML.REG+100
022656  142777  000040  172640                  BICB    #40,@ML.REG+120                    ;                  3391
022664  000207                                  RTS     PC                                 ;                  3375

                                        ; Routine Size:  26 words
                                        ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (27)
;
;                routine RD_PA (TST_PAT, index, ERR_FLG) : novalue =
;                    begin
;
;                !++
;                ! FUNCTIONAL DESCRIPTION:
;                !
;                !       COMPARES THE CONTENTS OF THE
;                !       PROM ADDRESS REGISTER
;                !       WITH THE MASKED DATA PATTERN
;                !       GENERATED BY THE MACRO 'WRT_MASK'.
;                !
;                !       IF THE COMPARE IS NOT EQUAL THEN
;                !       THE FORMAL PARAMETER 'ERR_FLG' IS
;                !       ASSIGNED A ONE TO INDICATE THE
;                !       ERROR.
;                !
;                ! FORMAL PARAMETERS:
;                !       TST_PAT
;                !       DATA PATTERN TO BE MASKED AND
;                !       COMPARED AGAINST THE CONTENTS
;                !       OF THE REGISTER UNDER TEST.
;                !
;                !       INDEX
;                !       USED BY THE MACRO WRT_MASK TO
;                !       SELECT THE CURRENT REGISTERS ADDRESS,
;                !       FORCED HI, FORCED LO AND DON'T CARE
;                !       MASK INFORMATION.
;                !
;                !       ERR_FLG
;                !       CONTAINS THE ADDRESS (PASSED BY REF)
;                !       OF THE CALLERS ERROR FLG TO ENABLE THE
;                !       CALLER TO EXAMINE THE ERROR STATUS
;                !       OF THE ROUTINE CALL.
;                !
;                ! IMPLICIT INPUTS:
;                !       WT_DATA
;                !         GETS LOADED WITH THE GENERATED
;                !         WRT_MASK DATA PATTERN THUS ALLOWING
;                !         CALLER TO PRINT FAILING GOOD DATA.
;                !
;                !       RD_DATA
;                !         GETS LOADED WITH DATA READ FROM THE
;                !         REGISTER THUS ALLOWING CALLER
;                !         TO PRINT FAILING BAD DATA.
;                !
;                ! IMPLICIT OUTPUTS:
;                !       GLOBAL LOCATION WR_DATA
;                !       AND RD_DATA LOADED WITH GOOD
;                !       AND BAD REGISTER DATA
;                !
;                !--
;
```

```
;ML4AD                                                      29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
;                  ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (27)

;          3445        .ERR_FLG = ZERO;                     !CLEAR THE ERROR FLAG
;          3446        PROM_DIS = ONE;                      !SET THE PROM DISABLE BIT
;          3447        WT_DATA = WRT_MASK;                  !SAVE THE DATA WRITTEN TO THE REGISTER
;          3448        RD_DATA = .MLPA or .IGNORE;          !READ AND SAVE THE REGISTER
;          3449
;          3450        if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;        !READ THE REG FOR WRT_MASK
;          3451
;          3452        PROM_DIS = ZERO;                     !SET ERROR IF NEQ
;          3453        end;                                 !CLEAR THE PROM DISABLE BIT


                                          .SBTTL  RD.PA ROUTINE DECLARATION SECTION
022666  004167  161646            RD.PA:  JSR     R1,$SAVE2                     ;
022672  005076  000010                    CLR     @10(SP)                       ; ERR.FLG                   3393
022676  152777  000040  172620            BISB    #40,@ML.REG+120               ;                           3445
022704  016600  000012                    MOV     12(SP),R0                     ; INDEX,*                   3446
022710  006300                            ASL     R0                                                        3447
022712  006300                            ASL     R0
022714  006300                            ASL     R0
022716  010001                            MOV     R0,R1
022720  016100  015406                    MOV     ML.REG+2(R1),R0
022724  056600  000014                    BIS     14(SP),R0                     ; TST.PAT,*
022730  046100  015410                    BIC     ML.REG+4(R1),R0
022734  016102  015412                    MOV     ML.REG+6(R1),R2
022740  050002                            BIS     R0,R2
022742  010267  172402                    MOV     R2,WT.DATA
022746  017702  172532                    MOV     @ML.REG+100,R2
022752  056102  015412                    BIS     ML.REG+6(R1),R2               ;                           3448
022756  010267  172370                    MOV     R2,RD.DATA
022762  026767  172362  172362            CMP     WT.DATA,RD.DATA               ;                           3450
022770  001403                            BEQ     1$
022772  012776  000001  000010            MOV     #1,@10(SP)                    ; *,ERR.FLG
023000  142777  000040  172516    1$:     BICB    #40,@ML.REG+120               ;                           3452
023006  000207                            RTS     PC                            ;                           3393

                                  ; Routine Size:  41 words
                                  ; Maximum stack depth per invocation:  3 words
```

```
 ;ML4AD                                                               29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 ;                              ROUTINE DECLARATION SECTION           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (28)

 ;              3454   routine WRT_E1 (TST_PAT, index) : novalue =
 ;              3455       begin
 ;              3456
 ;              3457   !++
 ;              3458   ! FUNCTIONAL DESCRIPTION:
 ;              3459   !       LOADS THE ECC CRC WORD REG 1 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
 ;              3460   ! FORMAL PARAMETERS:
 ;              3461   !       TST_PAT
 ;              3462   !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
 ;              3463   !       INDEX
 ;              3464   !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
 ;              3465   !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
 ;              3466   !--
 ;              3467
 ;              3468       ECC_DM = ONE;                                     !SET ECC DIAG MODE
 ;              3469       MLET = WRT_MASK;                                  !LOAD MLE1 WITH GENERATED WRT_MASK PATTERN
 ;              3470       ECC_DM = ZERO;                                    !CLEAR ECC DIAG MODE
 ;              3471       end;


                                          .SBTTL  WRT.E1 ROUTINE DECLARATION SECTION
 023010  004167  161524          WRT.E1:  JSR     R1,$SAVE2                        ;                 3454
 023014  152777  000001  172502           BISB    #1,@ML.REG+120                   ;                 3468
 023022  016600  000010                   MOV     10(SP),R0                        ; INDEX,*         3469
 023026  006300                           ASL     R0
 023030  006300                           ASL     R0
 023032  006300                           ASL     R0
 023034  010001                           MOV     R0,R1
 023036  016100  015406                   MOV     ML.REG+2(R1),R0
 023042  056600  000012                   BIS     12(SP),R0                        ; TST.PAT,*
 023046  046100  015410                   BIC     ML.REG+4(R1),R0
 023052  016102  015412                   MOV     ML.REG+6(R1),R2
 023056  050002                           BIS     R0,R2
 023060  010277  172470                   MOV     R2,@ML.REG+150
 023064  142777  000001  172432           BICB    #1,@ML.REG+120                   ;                 3470
 023072  000207                           RTS     PC                               ;                 3454

                                 ; Routine Size:  26 words
                                 ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;        ROUTINE DECLARATION SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (29)
;
;        routine RD_E1 (TST_PAT, index, ERR_FLG) : novalue =
;            begin
;
;        !++
;        ! FUNCTIONAL DESCRIPTION:
;        !
;        !       COMPARES THE CONTENTS OF THE
;        !       ECC CRC WORD REGISTER 1
;        !       WITH THE MASKED DATA PATTERN
;        !       GENERATED BY THE MACRO 'WRT_MASK'
;        !
;        !       IF THE COMPARE IS NOT EQUAL THEN
;        !        THE FORMAL PARAMETER 'ERR_FLG' IS
;        !       ASSIGNED A ONE TO INDICATE THE ERROR.
;        !
;        ! FORMAL PARAMETERS:
;        !       TST_PAT
;        !       DATA PATTERN TO BE MASKED AND
;        !       COMPARED AGAINST THE CONTENTS
;        !       OF THE REGISTER UNDER TEST.
;        !
;        !       INDEX
;        !       USED BY THE MACRO WRT_MASK TO
;        !       SELECT THE CURRENT REGISTERS ADDRESS,
;        !       FORCED HI, FORCED LO AND DON'T CARE
;        !       MASK INFORMATION.
;        !
;        !       ERR_FLG
;        !       CONTAINS THE ADDRESS (PASSED BY REF)
;        !       OF THE CALLERS ERROR FLG TO ENABLE THE
;        !       CALLER TO EXAMINE THE ERROR STATUS
;        !       OF THE ROUTINE CALL.
;        !
;        ! IMPLICIT INPUTS:
;        !       WT_DATA
;        !         GETS LOADED WITH THE GENERATED
;        !         WRT_MASK DATA PATTERN THUS ALLOWING
;        !         CALLER TO PRINT FAILING GOOD DATA.
;        !
;        !       RD_DATA
;        !         GETS LOADED WITH DATA READ FROM THE
;        !         REGISTER THUS ALLOWING CALLER
;        !         TO PRINT FAILING BAD DATA.
;        !
;        ! IMPLICIT OUTPUTS:
;        !       GLOBAL LOCATION WR_DATA
;        !       AND RD_DATA LOADED WITH GOOD
;        !       AND BAD REGISTER DATA
;        !
;        !--
;
;            .ERR_FLG = ZERO;                               !CLEAR THE ERROR FLAG
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  ROUTINE DECLARATION SECTION          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (29)

;            3524      ECC_DM = ONE;                     !SET ECC DIAG MODE
;            3525      WT_DATA = WRT_MASK;               !SAVE THE DATA WRITTEN TO THE REGISTER
;            3526      RD_DATA = .MLE1 or .IGNORE;       !READ AND SAVE THE REGISTER
;            3527
;            3528      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;      !READ THE REG FOR WRT_MASK
;            3529
;            3530      ECC_DM = ZERO;                    !SET ERROR FLAG IF NEQ
;            3531                                        !CLEAR ECC DIAG MODE
;            3532      end;


                                          .SBTTL  RD.E1 ROUTINE DECLARATION SECTION
023074  004167  161440           RD.E1:   JSR     R1,$SAVE2                       ;                      3472
023100  005076  000010                    CLR     @10(SP)                         ; ERR.FLG              3523
023104  152777  000001  172412            BISB    #1,@ML.REG+120                  ;                      3524
023112  016600  000012                    MOV     12(SP),R0                       ; INDEX,*              3525
023116  006300                            ASL     R0
023120  006300                            ASL     R0
023122  006300                            ASL     R0
023124  010001                            MOV     R0,R1
023126  016100  015406                    MOV     ML.REG+2(R1),R0
023132  056600  000014                    BIS     14(SP),R0                       ; TST.PAT,*
023136  046100  015410                    BIC     ML.REG+4(R1),R0
023142  016102  015412                    MOV     ML.REG+6(R1),R2
023146  050002                            BIS     R0,R2
023150  010267  172174                    MOV     R2,WT.DATA
023154  017702  172374                    MOV     @ML.REG+150,R2
023160  056102  015412                    BIS     ML.REG+6(R1),R2                 ;                      3526
023164  010267  172162                    MOV     R2,RD.DATA
023170  026767  172154  172154            CMP     WT.DATA,RD.DATA                 ;                      3528
023176  001403                            BEQ     1$
023200  012776  000001  000010            MOV     #1,@10(SP)                      ; *,ERR.FLG
023206  142777  000001  172310   1$:      BICB    #1,@ML.REG+120                  ;                      3530
023214  000207                            RTS     PC                              ;                      3472

                                 ; Routine Size:  41 words
                                 ; Maximum stack depth per invocation:  3 words
```

```
 ;ML4AD                                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 ;                          ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (30)

 ;                  3533    routine WRT_E2 (TST_PAT, index) : novalue =
 ;                  3534        begin
 ;                  3535
 ;                  3536    !++
 ;                  3537    ! FUNCTIONAL DESCRIPTION:
 ;                  3538    !
 ;                  3539    !        LOADS THE ECC CRC WORD
 ;                  3540    !        REGISTER 2 WITH A DATA PATTERN
 ;                  3541    !        GENERATED BY THE MACRO
 ;                  3542    !        WRT_MASK
 ;                  3543    !
 ;                  3544    ! FORMAL PARAMETERS:
 ;                  3545    !
 ;                  3546    !        TST_PAT
 ;                  3547    !        CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
 ;                  3548    !
 ;                  3549    !        INDEX
 ;                  3550    !        USED BY THE MACRO WRT_MASK
 ;                  3551    !        TO SELECT THE CURRENT REGISTERS
 ;                  3552    !        ADDRESS, FORCED HI, FORCED
 ;                  3553    !        LO AND DON'T CARE MASK
 ;                  3554    !        INFORMATION.
 ;                  3555    !
 ;                  3556    !--
 ;                  3557
 ;                  3558        ECC_DM = ONE;                                        !SET ECC DIAG MODE
 ;                  3559        MLE2_MASK = %o'177700';                              !MASK OUT DATA DIAG BITS
 ;                  3560        MLE2 = WRT_MASK;                                     !LOAD MLE2 WITH GENERATED WRT_MASK PATTERN
 ;                  3561        MLE2_MASK = %o'000000';                              !RESTORE MLE2_MASK
 ;                  3562        ECC_DM = ZERO;                                       !CLEAR ECC DIAG MODE
 ;                  3563        end;


                                            .SBTTL  WRT.E2 ROUTINE DECLARATION SECTION
 023216  004167  161316             WRT.E2: JSR     R1,$SAVE2                       ;                      3533
 023222  152777  000001  172274             BISB    #1,@ML.REG+120                  ;                      3558
 023230  012767  177700  172334             MOV     #-100,ML.REG+166                ;                      3559
 023236  016600  000010                     MOV     10(SP),R0                       ; INDEX,*              3560
 023242  006300                             ASL     R0
 023244  006300                             ASL     R0
 023246  006300                             ASL     R0
 023250  010001                             MOV     R0,R1
 023252  016100  015406                     MOV     ML.REG+2(R1),R0
 023256  056600  000012                     BIS     12(SP),R0                       ; TST.PAT,*
 023262  046100  015410                     BIC     ML.REG+4(R1),R0
 023266  016102  015412                     MOV     ML.REG+6(R1),R2
 023272  050002                             BIS     R0,R2
```

```
                                   ;ML4AD                                                              29-Mar-1982 16:23:04   TOPS
                                   ;                ROUTINE DECLARATION SECTION                        29-Mar-1982 16:21:03   PA:<

023274  010277  172264                     MOV     R2,@ML.REG+160
023300  005067  172266                     CLR     ML.REG+166
023304  142777  000001  172212             BICB    #1,@ML.REG+120                ;                                    3561
023312  000207                             RTS     PC                            ;                                    3562
                                                                                 ;                                    3533
                                   ; Routine Size:  31 words
                                   ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (31)
;
;                 routine RD_E2 (TST_PAT, index, ERR_FLG) : novalue =
;                     begin
;
;                 !++
;                 ! FUNCTIONAL DESCRIPTION:
;                 !
;                 !        COMPARES THE CONTENTS OF THE
;                 !        ECC CRC WORD REGISTER 2
;                 !        WITH THE MASKED DATA PATTERN
;                 !        GENERATED BY THE MACRO 'WRT_MASK'
;                 !
;                 !        IF THE COMPARE IS NOT EQUAL THEN
;                 !        THE FORMAL PARAMETER 'ERR_FLG' IS
;                 !        ASSIGNED A ONE TO INDICATE THE
;                 !        ERROR.
;                 !
;                 ! FORMAL PARAMETERS:
;                 !
;                 !        TST_PAT
;                 !        DATA PATTERN TO BE MASKED AND
;                 !        COMPARED AGAINST THE CONTENTS
;                 !        OF THE REGISTER UNDER TEST.
;                 !
;                 !        INDEX
;                 !        USED BY THE MACRO WRT_MASK TO
;                 !        SELECT THE CURRENT REGISTERS ADDRESS,
;                 !        FORCED HI, FORCED LO AND DON'T CARE
;                 !        MASK INFORMATION.
;                 !
;                 !        ERR_FLG
;                 !        CONTAINS THE ADDRESS (PASSED BY REF)
;                 !        OF THE CALLERS ERROR FLG TO ENABLE THE
;                 !        CALLER TO EXAMINE THE ERROR STATUS
;                 !        OF THE ROUTINE CALL.
;                 !
;                 ! IMPLICIT INPUTS:
;                 !        WT_DATA
;                 !          GETS LOADED WITH THE GENERATED
;                 !          WRT_MASK DATA PATTERN THUS ALLOWING
;                 !          CALLER TO PRINT FAILING GOOD DATA.
;                 !
;                 !        RD_DATA
;                 !          GETS LOADED WITH DATA READ FROM THE
;                 !          REGISTER THUS ALLOWING CALLER
;                 !          TO PRINT FAILING BAD DATA.
;                 !
;                 ! IMPLICIT OUTPUTS:
;                 !        GLOBAL LOCATION WR_DATA
;                 !        AND RD_DATA LOADED WITH GOOD
;                 !        AND BAD REGISTER DATA
;                 !
;                 !--
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                        ROUTINE DECLARATION SECTION            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (31)

;               3616
;               3617      .ERR_FLG = ZERO;                      !CLEAR ERROR FLAG
;               3618      ECC_DM = ONE;                         !SET ECC DIAG MODE
;               3619      MLE2_MASK = %o'177700';               !MASK OUT DATA DIAG BITS
;               3620      WT_DATA = WRT_MASK;                   !SAVE THE DATA WRITTEN TO THE REGISTER
;               3621      RD_DATA = .MLE2 or .IGNORE;           !READ AND SAVE THE REGISTER
;               3622
;               3623      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;        !READ THE REG FOR WRT_MASK
;               3624
;               3625                                            !SET ERROR FLG IF NEQ
;               3626      MLE2_MASK = %o'000000';               !RESTORE MLE2 MASK
;               3627      ECC_DM = ZERO;                        !CLEAR ECC DIAG MODE
;               3628      end;


                                          .SBTTL  RD.E2 ROUTINE DECLARATION SECTION
023314  004167  161220           RD.E2:   JSR     R1,$SAVE2                    ;                  3564
023320  005076  000010                    CLR     @10(SP)                      ; ERR.FLG          3617
023324  152777  000001  172172            BISB    #1,@ML.REG+120               ;                  3618
023332  012767  177700  172232            MOV     #-100,ML.REG+166             ;                  3619
023340  016600  000012                    MOV     12(SP),R0                    ; INDEX,*          3620
023344  006300                            ASL     R0
023346  006300                            ASL     R0
023350  006300                            ASL     R0
023352  010001                            MOV     R0,R1
023354  016100  015406                    MOV     ML.REG+2(R1),R0
023360  056600  000014                    BIS     14(SP),R0                    ; TST.PAT,*
023364  046100  015410                    BIC     ML.REG+4(R1),R0
023370  016102  015412                    MOV     ML.REG+6(R1),R2
023374  050002                            BIS     R0,R2
023376  010267  171746                    MOV     R2,WT.DATA
023402  017702  172156                    MOV     @ML.REG+160,R2
023406  056102  015412                    BIS     ML.REG+6(R1),R2              ;                  3621
023412  010267  171734                    MOV     R2,RD.DATA
023416  026767  171726  171726            CMP     WT.DATA,RD.DATA              ;                  3623
023424  001403                            BEQ     1$
023426  012776  000001  000010            MOV     #1,@10(SP)                   ; *,ERR.FLG
023434  005067  172132           1$:      CLR     ML.REG+166                   ;                  3626
023440  142777  000001  172056            BICB    #1,@ML.REG+120               ;                  3627
023446  000207                            RTS     PC                           ;                  3564

                                 ; Routine Size:  46 words
                                 ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (32)

;            3629    routine WRT_PD (TST_PAT, index) : novalue =
;            3630        begin
;            3631
;            3632    !++
;            3633    ! FUNCTIONAL DESCRIPTION:
;            3634    !
;            3635    !          LOADS THE PROM DATA
;            3636    !          REGISTER WITH A DATA PATTERN
;            3637    !          GENERATED BY THE MACRO
;            3638    !          WRT_MASK
;            3639    !
;            3640    ! FORMAL PARAMETERS:
;            3641    !
;            3642    !          TST_PAT
;            3643    !          CURRENT DATA PATTERN TO BE
;            3644    !          LOADED IN THE REGISTER.
;            3645    !
;            3646    !          INDEX
;            3647    !          USED BY THE MACRO WRT_MASK
;            3648    !          TO SELECT THE CURRENT REGISTERS
;            3649    !          ADDRESS, FORCED HI, FORCED
;            3650    !          LO AND DON'T CARE MASK
;            3651    !          INFORMATION
;            3652    !
;            3653    !--
;            3654
;            3655        PROM_RW = ONE;                                 !SET PROM READ WRITE
;            3656        DAT_DM = ONE;                                  !SET DATA DIAG MODE
;            3657        MLPD = WRT_MASK;                               !LOAD MLPD WITH GENERATED WRT_MASK PATTERN
;            3658        DAT_CLK = ONE;                                 !DO A DATA CLK
;            3659        PROM_RW = ZERO;                                !CLEAR PROM READ WRITE
;            3660        DAT_DM = ZERO;                                 !CLEAR DATA DIAG MODE
;            3661        end;


                                           .SBTTL  WRT.PD ROUTINE DECLARATION SECTION
023450  004167  161064            WRT.PD:  JSR     R1,$SAVE2                    ;                  3629
023454  152777  000100  172042             BISB    #100,@ML.REG+120             ;                  3655
023462  152777  000010  172034             BISB    #10,@ML.REG+120              ;                  3656
023470  016600  000010                     MOV     10(SP),R0                    ; INDEX,*          3657
023474  006300                             ASL     R0
023476  006300                             ASL     R0
023500  006300                             ASL     R0
023502  010001                             MOV     R0,R1
023504  016100  015406                     MOV     ML.REG+2(R1),R0
023510  056600  000012                     BIS     12(SP),R0                    ; TST.PAT,*
023514  046100  015410                     BIC     ML.REG+4(R1),R0
```

```
                                 ;ML4AD                                                            29-Mar-1982 16:23:04   TOPS
                                 ;              ROUTINE DECLARATION SECTION                        29-Mar-1982 16:21:03   PA:<

023520 016102 015412                     MOV    ML.REG+6(R1),R2
023524 050002                            BIS    R0,R2
023526 010277 172102                     MOV    R2,@ML.REG+230
023532 152777 000020 171764              BISB   #20,@ML.REG+120          ;                          3658
023540 142777 000100 171756              BICB   #100,@ML.REG+120         ;                          3659
023546 142777 000010 171750              BICB   #10,@ML.REG+120          ;                          3660
023554 000207                            RTS    PC                       ;                          3629

                                 ; Routine Size:  35 words
                                 ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;          ROUTINE DECLARATION SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (33)

;          routine RD_PD (TST_PAT, index, ERR_FLG) : novalue =
;              begin
;
;          !++
;          ! FUNCTIONAL DESCRIPTION:
;          !
;          !          COMPARES THE CONTENTS OF THE
;          !          PROM DATA REGISTER
;          !          WITH THE MASKED DATA PATTERN
;          !          GENERATED BY THE MACRO 'WRT_MASK'
;          !
;          !          IF THE COMPARE IS NOT EQUAL THEN
;          !          THE FORMAL PARAMETER 'ERR FLG' IS
;          !          ASSIGNED A ONE TO INDICATE THE
;          !          ERROR
;          !
;          ! FORMAL PARAMETERS:
;          !
;          !          TST_PAT
;          !          DATA PATTERN TO BE MASKED AND
;          !          COMPARED AGAINST THE CONTENTS
;          !          OF THE REGISTER UNDER TEST
;          !
;          !          INDEX
;          !          USED BY THE MACRO WRT_MASK TO
;          !          SELECT THE CURRENT REGISTERS ADDRESS,
;          !          FORCED HI, FORCED LO AND DON'T CARE
;          !          MASK INFORMATION.
;          !
;          !          ERR_FLG
;          !          CONTAINS THE ADDRESS (PASSED BY REF)
;          !          OF THE CALLERS ERROR FLG TO ENABLE THE
;          !          CALLER TO EXAMINE THE ERROR STATUS
;          !          OF THE ROUTINE CALL.
;          !
;          ! IMPLICIT INPUTS:
;          !          WT_DATA
;          !             GETS LOADED WITH THE GENERATED
;          !             WRT_MASK DATA PATTERN THUS ALLOWING
;          !             CALLER TO PRINT FAILING GOOD DATA.
;          !
;          !          RD_DATA
;          !             GETS LOADED WITH DATA READ FROM THE
;          !             REGISTER THUS ALLOWING CALLER
;          !             TO PRINT FAILING BAD DATA.
;          !
;          ! IMPLICIT OUTPUTS:
;          !          GLOBAL LOCATION WR_DATA
;          !          AND RD_DATA LOADED WITH GOOD
;          !          AND BAD REGISTER DATA
;          !
;          !--
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 ROUTINE DECLARATION SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (33)

;          3714
;          3715       .ERR_FLG = ZERO;                              !CLEAR ERROR FLG
;          3716       PROM_RW = ONE;                                !SET PROM READ WRITE
;          3717       DAT_DM = ONE;                                 !SET DATA DIAG MODE
;          3718       WT_DATA = WRT_MASK;                           !SAVE THE DATA WRITTEN TO THE REGISTER
;          3719       RD_DATA = .MLPD or .IGNORE;                   !READ AND SAVE THE REGISTER
;          3720
;          3721       if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;         !READ THE REG FOR WRT_MASK
;          3722
;          3723                                                     !SET ERROR FLAG IF NEQ
;          3724       PROM_RW = ZERO;                               !CLEAR PROM READ WRTE
;          3725       DAT_DM = ZERO;                                !CLEAR DATA DIAG MODE
;          3726       end;


                                         .SBTTL  RD.PD ROUTINE DECLARATION SECTION
023556  004167  160756           RD.PD:  JSR     R1,$SAVE2                   ;                    3662
023562  005076  000010                   CLR     @10(SP)                     ; ERR.FLG            3715
023566  152777  000100  171730           BISB    #100,@ML.REG+120            ;                    3716
023574  152777  000010  171722           BISB    #10,@ML.REG+120             ;                    3717
023602  016600  000012                   MOV     12(SP),R0                   ; INDEX,*            3718
023606  006300                           ASL     R0
023610  006300                           ASL     R0
023612  006300                           ASL     R0
023614  010001                           MOV     R0,R1
023616  016100  015406                   MOV     ML.REG+2(R1),R0
023622  056600  000014                   BIS     14(SP),R0                   ; TST.PAT,*
023626  046100  015410                   BIC     ML.REG+4(R1),R0
023632  016102  015412                   MOV     ML.REG+6(R1),R2
023636  050002                           BIS     R0,R2
023640  010267  171504                   MOV     R2,WT.DATA
023644  017702  171764                   MOV     @ML.REG+230,R2              ;                    3719
023650  056102  015412                   BIS     ML.REG+6(R1),R2
023654  010267  171472                   MOV     R2,RD.DATA
023660  026767  171464  171464           CMP     WT.DATA,RD.DATA             ;                    3721
023666  001403                           BEQ     1$
023670  012776  000001  000010           MOV     #1,@10(SP)                  ; *,ERR.FLG
023676  142777  000100  171620   1$:     BICB    #100,@ML.REG+120            ;                    3724
023704  142777  000010  171612           BICB    #10,@ML.REG+120             ;                    3725
023712  000207                           RTS     PC                          ;                    3662

                                 ; Routine Size:  47 words
                                 ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               ROUTINE DECLARATION SECTION                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (34)

;               routine WRT_EL (TST_PAT, index) : novalue =
;                   begin
;
;               !++
;               ! FUNCTIONAL DESCRIPTION:
;               !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
;               !       WRITE REGISTER ALGORITHEM
;               !
;               ! FORMAL PARAMETERS:
;               !       TST_PAT
;               !       DATA PATTERN TO BE MASKED AND
;               !       COMPARED AGAINST THE CONTENTS
;               !       OF THE REGISTER UNDER TEST
;               !
;               !       INDEX
;               !       USED BY THE MACRO WRT_MASK TO
;               !       SELECT THE CURRENT REGISTERS ADDRESS,
;               !       FORCED HI, FORCED LO AND DON'T CARE
;               !       MASK INFORMATION.
;               !
;               !--
;
;               !
;               !  ERROR LOCATION REG IS READ ONLY
;                   return;
;                   end;


                                  .SBTTL  WRT.EL ROUTINE DECLARATION SECTION
 023714  000207          WRT.EL: RTS     PC                                 ;                        3727

                         ; Routine Size:  1 word
                         ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  ROUTINE DECLARATION SECTION          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (35)
;
;       routine RD_EL (TST_PAT, index, ERR_FLG) : novalue =
;           begin
;
;       !++
;       ! FUNCTIONAL DESCRIPTION:
;       !
;       !          COMPARES THE CONTENTS OF THE
;       !          ERROR LOCATION REGISTER
;       !          WITH THE CONTENTS OF TST_PAT.
;       !
;       !          IF THE COMPARE IS NOT EQUAL THEN
;       !          THE FORMAL PARAMETER 'ERR FLG' IS
;       !          ASSIGNED A ONE TO INDICATE THE
;       !          ERROR
;       !
;       ! FORMAL PARAMETERS:
;       !          TST_PAT
;       !          DATA PATTERN TO BE MASKED AND
;       !          COMPARED AGAINST THE CONTENTS
;       !          OF THE REGISTER UNDER TEST
;       !
;       !          INDEX
;       !          USED BY THE MACRO WRT_MASK TO
;       !          SELECT THE CURRENT REGISTERS ADDRESS,
;       !          FORCED HI, FORCED LO AND DON'T CARE
;       !          MASK INFORMATION.
;       !
;       !          ERR_FLG
;       !          CONTAINS THE ADDRESS (PASSED BY REF)
;       !          OF THE CALLERS ERROR FLG TO ENABLE THE
;       !          CALLER TO EXAMINE THE ERROR STATUS
;       !          OF THE ROUTINE CALL.
;       !
;       ! IMPLICIT INPUTS:
;       !          WT_DATA
;       !            GETS LOADED WITH THE GENERATED
;       !            WRT_MASK DATA PATTERN THUS ALLOWING
;       !            CALLER TO PRINT FAILING GOOD DATA.
;       !
;       !          RD_DATA
;       !            GETS LOADED WITH DATA READ FROM THE
;       !            REGISTER THUS ALLOWING CALLER
;       !            TO PRINT FAILING BAD DATA.
;       !
;       ! IMPLICIT OUTPUTS:
;       !          GLOBAL LOCATION WR_DATA
;       !          AND RD_DATA LOADED WITH GOOD
;       !          AND BAD REGISTER DATA
;       !
;       !--
;
;           .ERR_FLG = ZERO;
```

```
;ML4AD                                                               29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                          ROUTINE DECLARATION SECTION               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (35)

;               3805          WT_DATA = .TST_PAT;                    !SAVE THE DATA WRITTEN TO THE REGISTER
;               3806          RD_DATA = .MLE[;                       !READ AND SAVE THE REGISTER
;               3807
;               3808          if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;        !READ REGISTER FOR WT_DATA
;               3809
;               3810          end;


                                        .SBTTL   RD.EL ROUTINE DECLARATION SECTION
023716  005076  000002          RD.EL:  CLR      @2(SP)                          ; ERR.FLG                  3804
023722  016667  000006  171420          MOV      6(SP),WT.DATA                   ; TST.PAT,*                3805
023730  017767  171670  171414          MOV      @ML.REG+220,RD.DATA             ;                          3806
023736  026767  171410  171404          CMP      RD.DATA,WT.DATA                 ;                          3808
023744  001403                          BEQ      1$
023746  012776  000001  000002          MOV      #1,@2(SP)                       ; *,ERR.FLG
023754  000207                  1$:     RTS      PC                              ;                          3753

                                ; Routine Size:  16 words
                                ; Maximum stack depth per invocation:  0 words
```

```
:ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                   ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (36)

;          3811     routine WRT_EE (TST_PAT, index) : novalue =
;          3812         begin
;          3813
;          3814     !++
;          3815     ! FUNCTIONAL DESCRIPTION:
;          3816     !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
;          3817     !       WRITE REGISTER ALGORITHEM
;          3818     !
;          3819     ! FORMAL PARAMETERS:
;          3820     !       TST_PAT
;          3821     !       DATA PATTERN TO BE MASKED AND
;          3822     !       COMPARED AGAINST THE CONTENTS
;          3823     !       OF THE REGISTER UNDER TEST
;          3824     !
;          3825     !       INDEX
;          3826     !       USED BY THE MACRO WRT_MASK TO
;          3827     !       SELECT THE CURRENT REGISTERS ADDRESS,
;          3828     !       FORCED HI, FORCED LO AND DON'T CARE
;          3829     !       MASK INFORMATION.
;          3830     !
;          3831     !--
;          3832
;          3833     ! ECC ERROR REGISTER IS READ ONLY
;          3834         return;
;          3835         end;


                                    .SBTTL  WRT.EE ROUTINE DECLARATION SECTION
023756  000207              WRT.EE: RTS     PC                              ;               3811

                            ; Routine Size:  1 word
                            ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;              ROUTINE DECLARATION SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (37)
;
;              routine RD_EE (TST_PAT, index, ERR_FLG) : novalue =
;                  begin
;
;              !++
;              ! FUNCTIONAL DESCRIPTION:
;              !
;              !         COMPARES THE CONTENTS OF THE
;              !         ECC ERROR REGISTER WITH TST_PAT.
;              !
;              !         IF THE COMPARE IS NOT EQUAL THEN
;              !         THE FORMAL PARAMETER "ERR_FLG" IS
;              !         ASSIGNED A ONE TO INDICATE THE
;              !         ERROR.
;              !
;              ! FORMAL PARAMETERS:
;              !         TST_PAT
;              !         DATA PATTERN TO BE
;              !         COMPARED AGAINST THE CONTENTS
;              !         OF THE REGISTER UNDER TEST.
;              !
;              !         INDEX
;              !         USED BY THE MACRO MLEE TO
;              !         SELECT THE CURRENT REGISTERS ADDRESS.
;              !
;              !         ERR_FLG
;              !         CONTAINS THE ADDRESS (PASSED
;              !         BY REF) OF THE CALLERS ERROR FLG TO ENABLE
;              !         THE CALLER TO EXAMINE THE ERROR STATUS
;              !         OF THE ROUTINE CALL.
;              !
;              ! IMPLICIT INPUTS:
;              !         WT_DATA
;              !           GETS LOADED WITH THE TST_PAT
;              !           THUS ALLOWING CALLER TO PRINT
;              !           THE FAILING DATA.
;              !
;              !         RD_DATA
;              !           GETS LOADED WITH DATA READ FROM THE
;              !           REGISTER THUS ALLOWING CALLER
;              !           TO PRINT FAILING BAD DATA.
;              !
;              ! IMPLICIT OUTPUTS:
;              !         GLOBAL LOCATION WR_DATA
;              !         AND RD_DATA LOADED WITH GOOD
;              !         AND BAD REGISTER DATA
;              !
;              !--
;
;                .ERR_FLG = ZERO;                                    !CLEAR THE ERROR FLAG
;                WT_DATA = .TST_PAT;                                 !SAVE DATA WRITTEN TO THE REGISTER
;                RD_DATA = .MLEE;                                    !READ AND SAVE THE REGISTER
;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                     ROUTINE DECLARATION SECTION               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (37)

;           3888        if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;        !READ MLEE FOR TST_PAT
;           3889
;           3890                                                     !SET THE ERROR FLAG IF NEQ
;           3891        end;


                                        .SBTTL  RD.EE ROUTINE DECLARATION SECTION
 023760  005076  000002          RD.EE:  CLR     a2(SP)                          ; ERR.FLG                      3884
 023764  016667  000006  171356          MOV     6(SP),WT.DATA                   ; TST.PAT,*                    3885
 023772  017767  171616  171352          MOV     aML.REG+210,RD.DATA             ;                              3886
 024000  026767  171346  171342          CMP     RD.DATA,WT.DATA                 ;                              3888
 024006  001403                          BEQ     1$
 024010  012776  000001  000002          MOV     #1,a2(SP)                       ; *.ERR.FLG
 024016  000207                  1$:     RTS     PC                              ;                              3836

                                 ; Routine Size:  16 words
                                 ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                         29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
;                          ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (38)

;               3892    routine WRT_D1 (TST_PAT, index) : novalue =
;               3893        begin
;               3894
;               3895    !++
;               3896    ! FUNCTIONAL DESCRIPTION:
;               3897    !       LOADS THE DATA DIAG REG 1 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;               3898    ! FORMAL PARAMETERS:
;               3899    !       TST_PAT
;               3900    !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;               3901    !       INDEX
;               3902    !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;               3903    !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;               3904    !--
;               3905
;               3906        DAT_DM = ONE;                                   !SET DATA DIAG MODE
;               3907        MLDT = WRT_MASK;                                !LOAD MLD1 WITH GENERATED WRT_MASK PATTERN
;               3908        DAT_DM = ZERO;                                  !CLEAR DATA DIAG MODE
;               3909        end;


                                          .SBTTL  WRT.D1 ROUTINE DECLARATION SECTION
024020  004167  160514           WRT.D1:  JSR     R1,$SAVE2                    ;                 3892
024024  152777  000010  171472            BISB    #10,@ML.REG+120              ;                 3906
024032  016600  000010                    MOV     10(SP),R0                    ; INDEX,*         3907
024036  006300                            ASL     R0
024040  006300                            ASL     R0
024042  006300                            ASL     R0
024044  010001                            MOV     R0,R1
024046  016100  015406                    MOV     ML.REG+2(R1),R0
024052  056600  000012                    BIS     12(SP),R0                    ; TST.PAT,*
024056  046100  015410                    BIC     ML.REG+4(R1),R0
024062  016102  015412                    MOV     ML.REG+6(R1),R2
024066  050002                            BIS     R0,R2
024070  010277  171500                    MOV     R2,@ML.REG+170
024074  142777  000010  171422            BICB    #10,@ML.REG+120              ;                 3908
024102  000207                            RTS     PC                           ;                 3892

                                  ; Routine Size:  26 words
                                  ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 ROUTINE DECLARATION SECTION                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (39)

;                 routine RD_D1 (TST_PAT, index, ERR_FLG) : novalue =
;                     begin
;
;                 !++
;                 ! FUNCTIONAL DESCRIPTION:
;                 !
;                 !         COMPARES THE CONTENTS OF THE
;                 !         DATA DIAG REGISTER 1
;                 !         WITH THE MASKED DATA PATTERN
;                 !         GENERATED BY THE MACRO "WRT_MASK".
;                 !
;                 !         IF THE COMPARE IS NOT EQUAL THEN
;                 !         THE FORMAL PARAMETER "ERR_FLG" IS
;                 !         ASSIGNED A ONE TO INDICATE THE
;                 !         ERROR.
;                 !
;                 ! FORMAL PARAMETERS:
;                 !
;                 !         TST_PAT
;                 !         DATA PATTERN TO BE MASKED AND
;                 !         COMPARED AGAINST THE CONTENTS
;                 !         OF THE REGISTER UNDER TEST.
;                 !
;                 !         INDEX
;                 !         USED BY THE MACRO WRT_MASK TO
;                 !         SELECT THE CURRENT REGISTERS ADDRESS,
;                 !         FORCED HI, FORCED LO AND DON'T CARE
;                 !         MASK INFORMATION.
;                 !
;                 !         ERR_FLG
;                 !         CONTAINS THE ADDRESS (PASSED BY REF)
;                 !         OF THE CALLERS ERROR FLG TO ENABLE THE
;                 !         CALLER TO EXAMINE THE ERROR STATUS
;                 !         OF THE ROUTINE CALL.
;                 !
;                 ! IMPLICIT INPUTS:
;                 !       WT_DATA
;                 !         GETS LOADED WITH THE GENERATED
;                 !         WRT_MASK DATA PATTERN THUS ALLOWING
;                 !         CALLER TO PRINT FAILING GOOD DATA.
;                 !
;                 !       RD_DATA
;                 !         GETS LOADED WITH DATA READ FROM THE
;                 !         REGISTER THUS ALLOWING CALLER
;                 !         TO PRINT FAILING BAD DATA.
;                 !
;                 ! IMPLICIT OUTPUTS:
;                 !       GLOBAL LOCATION WR_DATA
;                 !       AND RD_DATA LOADED WITH GOOD
;                 !       AND BAD REGISTER DATA
;                 !
;                 !--
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  ROUTINE DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (39)

;          3962
;          3963        .ERR_FLG = ZERO;                         !CLEAR THE ERROR FLG
;          3964        DAT_DM = ONE;                            !SET DATA DIAG MODE
;          3965        ML_FUNC = write;                         !LOAD MLCS1 WITH WRITE FUNCTION
;          3966        DAT_CLK = ONE;                           !DO A DATA CLK
;          3967
;          3968        if .REG_INIT_FLG IS_SET                  !SEE IF CALLER IS REG INIT TEST
;          3969                                                 !SET ERROR FLAG IF NEQ
;          3970        then
;          3971            begin
;          3972            CLR_MBUS;                            !CLEAR MBUS TO GENERATE INIT DATA
;          3973            DAT_DM = ONE;
;          3974            end;
;          3975
;          3976        WT_DATA = WRT_MASK;                      !SAVE THE DATA WRITTEN TO THE REGISTER
;          3977        RD_DATA = .MLD1;                         !READ AND SAVE THE REGISTER
;          3978
;          3979        if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;      !READ MLD1 FOR WRT_MASK
;          3980
;          3981                                                 !SET ERR FLG IF NEQ
;          3982        CLR_MBUS;                                !CLEAR THE MBUS
;          3983        end;


                                         .SBTTL  RD.D1 ROUTINE DECLARATION SECTION
024104  004167  160430          RD.D1:   JSR     R1,$SAVE2                      ;
024110  005076  000010                   CLR     @10(SP)                        ; ERR.FLG            3910
024114  152777  000010  171402           BISB    #10,@ML.REG+120                ;                    3963
024122  142777  000077  171254           BICB    #77,@ML.REG                    ;                    3964
024130  152777  000061  171246           BISB    #61,@ML.REG                    ;                    3965
024136  152777  000020  171360           BISB    #20,@ML.REG+120
024144  026727  171210  000001           CMP     REG.INIT.FLG,#1                ;                    3966
024152  001017                           BNE     1$                             ;                    3968
024154  152777  000040  171262           BISB    #40,@ML.REG+40                 ;                    3971
024162  016701  171644                   MOV     ML.DUT,R1
024166  042701  177770                   BIC     #177770,R1
024172  142777  000007  171244           BICB    #7,@ML.REG+40
024200  150177  171240                   BISB    R1,@ML.REG+40
024204  152777  000010  171312           BISB    #10,@ML.REG+120                ;                    3973
024212  016600  000012          1$:      MOV     12(SP),R0                      ; INDEX,*            3976
024216  006300                           ASL     R0
024220  006300                           ASL     R0
024222  006300                           ASL     R0
024224  010001                           MOV     R0,R1
024226  016100  015406                   MOV     ML.REG+2(R1),R0
024232  056600  000014                   BIS     14(SP),R0                      ; TST.PAT,*
024236  046100  015410                   BIC     ML.REG+4(R1),R0
```

```
                                          ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                          ;              ROUTINE DECLARATION SECTION                      29-Mar-1982 16:21:03   PA:<

024242  016102  015412                         MOV     ML.REG+6(R1),R2
024246  050002                                 BIS     R0,R2
024250  010267  171074                         MOV     R2,WT.DATA
024254  017767  171314  171070                 MOV     @ML.REG+170,RD.DATA               ;                                 3977
024262  026767  171064  171060                 CMP     RD.DATA,WT.DATA                   ;                                 3979
024270  001403                                 BEQ     2$
024272  012776  000001  000010                 MOV     #1,@10(SP)                        ; *,ERR.FLG
024300  152777  000040  171136  2$:            BISB    #40,@ML.REG+40
024306  016702  171520                         MOV     ML.DUT,R2
024312  042702  177770                         BIC     #177770,R2
024316  142777  000007  171120                 BICB    #7,@ML.REG+40
024324  150277  171114                         BISB    R2,@ML.REG+40
024330  000207                                 RTS     PC                                ;                                 3910

                                          ; Routine Size:  75 words
                                          ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       ROUTINE DECLARATION SECTION                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (40)

;               3984    routine WRT_D2 (TST_PAT, index) : novalue =
;               3985        begin
;               3986
;               3987    !++
;               3988    ! FUNCTIONAL DESCRIPTION:
;               3989    !       LOADS THE DATA DIAG REG 2 WITH A DATA PATTERN GENERATED BY THE MACRO WRT_MASK
;               3990    ! FORMAL PARAMETERS:
;               3991    !       TST_PAT
;               3992    !       CURRENT DATA PATTERN TO BE LOADED IN THE REGISTER.
;               3993    !       INDEX
;               3994    !       USED BY THE MACRO WRT_MASK TO SELECT THE CURRENT REGISTERS ADDRESS,
;               3995    !       FORCED HI, FORCED LO AND DON'T CARE MASK INFORMATION.
;               3996    !--
;               3997
;               3998        DAT_DM = ONE;                                       !SET DATA DIAG MODE
;               3999        MLD2 = WRT_MASK;                                    !LOAD MLD2 WITH GENERATED WRT_MASK PATTERN
;               4000        DAT_DM = ZERO;                                      !CLEAR DATA DIAG MODE
;               4001        end;


                                                .SBTTL  WRT.D2 ROUTINE DECLARATION SECTION
 024332  004167  160202            WRT.D2:    JSR     R1,$SAVE2                       ;                       3984
 024336  152777  000010  171160               BISB    #10,@ML.REG+120                 ;                       3998
 024344  016600  000010                       MOV     10(SP),R0                       ; INDEX,*               3999
 024350  006300                               ASL     R0
 024352  006300                               ASL     R0
 024354  006300                               ASL     R0
 024356  010001                               MOV     R0,R1
 024360  016100  015406                       MOV     ML.REG+2(R1),R0
 024364  056600  000012                       BIS     12(SP),R0                       ; TST.PAT,*
 024370  046100  015410                       BIC     ML.REG+4(R1),R0
 024374  016102  015412                       MOV     ML.REG+6(R1),R2
 024400  050002                               BIS     R0,R2
 024402  010277  171176                       MOV     R2,@ML.REG+200
 024406  142777  000010  171110               BICB    #10,@ML.REG+120                 ;                       4000
 024414  000207                               RTS     PC                              ;                       3984

                                   ; Routine Size:  26 words
                                   ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;           ROUTINE DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (41)

;           routine RD_D2 (TST_PAT, index, ERR_FLG) : novalue =
;               begin
;
;           !++
;           ! FUNCTIONAL DESCRIPTION:
;           !
;           !       COMPARE THE CONTENTS OF THE
;           !       DATA DIAG REGISTER 2
;           !       WITH THE MASKED DATA PATTERN
;           !       GENERATED BY THE MACRO 'WRT_MASK'.
;           !       IF THE COMPARE IS NOT EQUAL THEN THE
;           !       FORMAL PARAMETER 'ERR_FLG' IS
;           !       ASSIGNED A ONE TO INDICATE THE
;           !       ERROR.
;           !
;           ! FORMAL PARAMETERS:
;           !
;           !       TST_PAT
;           !       DATA PATTERN TO BE MASKED AND
;           !       COMPARED AGAINST THE CONTENTS
;           !       OF THE REGISTER UNDER TEST.
;           !
;           !       INDEX
;           !       USED BY THE MACRO WRT_MASK TO
;           !       SELECT THE CURRENT REGISTERS ADDRESS,
;           !       FORCED HI, FORCED LO AND DON'T CARE
;           !       MASK INFOMATION.
;           !
;           !       ERR_FLG
;           !       CONTAINS THE ADDRESS (PASSED BY REF)
;           !       OF THE CALLERS ERROR FLG TO ENABLE THE
;           !       CALLER TO EXAMINE THE ERROR STATUS
;           !       OF THE ROUTINE CALL.
;           !
;           ! IMPLICIT INPUTS:
;           !       WT_DATA
;           !          GETS LOADED WITH THE GENERATED
;           !          WRT_MASK DATA PATTERN THUS ALLOWING
;           !          CALLER TO PRINT FAILING GOOD DATA.
;           !
;           !       RD_DATA
;           !          GETS LOADED WITH DATA READ FROM THE
;           !          REGISTER THUS ALLOWING CALLER
;           !          TO PRINT FAILING BAD DATA.
;           !
;           ! IMPLICIT OUTPUTS:
;           !       GLOBAL LOCATION WR_DATA
;           !       AND RD_DATA LOADED WITH GOOD
;           !       AND BAD REGISTER DATA
;           !
;           !--
;
```

```
;ML4AD                                                               29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                     ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (41)

;          4054     .ERR_FLG = ZERO;                                 !CLEAR ERROR FLAG
;          4055     DAT_DM = ONE;                                    !SET DATA DIAG MODE
;          4056     ML_FUNC = write;                                 !LOAD WRITE FUNC TO CS1
;          4057     DAT_CLK = ONE;                                   !DO A DATA CLOCK
;          4058
;          4059     if .REG_INIT_FLG IS_SET                          !SEE IF CALLER IS REG INIT TEST
;          4060     then                                             !CLEAR MBUS TO GENERATE INIT DATA
;          4061         begin
;          4062         CLR_MBUS;
;          4063         DAT_DM = ONE;
;          4064         end;
;          4065
;          4066     WT_DATA = WRT_MASK;                              !SAVE THE DATA WRITTEN TO THE REGISTER
;          4067     RD_DATA = .MLD2;                                 !READ AND SAVE THE REGISTER
;          4068
;          4069     if .RD_DATA neq .WT_DATA then .ERR_FLG = ONE;          !READ MLD2 FR WRT_MASK PATTERN
;          4070
;          4071                                                      !SET ERROR FLAG IF NEQ
;          4072     CLR_MBUS;                                        !CLR MASS BUSS
;          4073     end;


                                                .SBTTL  RD.D2 ROUTINE DECLARATION SECTION
024416  004167  160116                 RD.D2:   JSR     R1,$SAVE2                        ;                   4002
024422  005076  000010                          CLR     @10(SP)                          ; ERR.FLG           4054
024426  152777  000010  171070                  BISB    #10,@ML.REG+120                  ;                   4055
024434  142777  000077  170742                  BICB    #77,@ML.REG                      ;                   4056
024442  152777  000061  170734                  BISB    #61,@ML.REG                      ;
024450  152777  000020  171046                  BISB    #20,@ML.REG+120                  ;                   4057
024456  026727  170676  000001                  CMP     REG.INIT.FLG,#1                  ;                   4059
024464  001017                                  BNE     1$                               ;
024466  152777  000040  170750                  BISB    #40,@ML.REG+40                   ;                   4061
024474  016701  171332                          MOV     ML.DUT,R1
024500  042701  177770                          BIC     #177770,R1
024504  142777  000007  170732                  BICB    #7,@ML.REG+40
024512  150177  170726                          BISB    R1,@ML.REG+40
024516  152777  000010  171000                  BISB    #10,@ML.REG+120                  ;                   4063
024524  016600  000012                 1$:      MOV     12(SP),R0                        ; INDEX,*           4066
024530  006300                                  ASL     R0
024532  006300                                  ASL     R0
024534  006300                                  ASL     R0
024536  010001                                  MOV     R0,R1
024540  016100  015406                          MOV     ML.REG+2(R1),R0
024544  056600  000014                          BIS     14(SP),R0                        ; TST.PAT,*
024550  046100  015410                          BIC     ML.REG+4(R1),R0
024554  016102  015412                          MOV     ML.REG+6(R1),R2
024560  050002                                  BIS     R0,R2
```

```
                                       ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                       ;            ROUTINE DECLARATION SECTION                        29-Mar-1982 16:21:03   PA:<

024562  010267  170562                       MOV    R2,WT.DATA
024566  017767  171012  170556               MOV    @ML.REG+200,RD.DATA
024574  026767  170552  170546               CMP    RD.DATA,WT.DATA            ;                                     4067
024602  001403                               BEQ    2$                         ;                                     4069
024604  012776  000001  000010               MOV    #1,@10(SP)                 ; *,ERR.FLG
024612  152777  000040  170624  2$:          BISB   #40,@ML.REG+40
024620  016702  171206                       MOV    ML.DUT,R2
024624  042702  177770                       BIC    #177770,R2
024630  142777  000007  170606               BICB   #7,@ML.REG+40
024636  150277  170602                       BISB   R2,@ML.REG+40
024642  000207                               RTS    PC                         ;                                     4002

                                       ; Routine Size:  75 words
                                       ; Maximum stack depth per invocation:  3 words
```

```
6522 ;ML4AD                                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
6523 ;                      ROUTINE DECLARATION SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (42)
6524
6525 ;           4074   routine WRT_D3 (TST_PAT, index) : novalue =
6526 ;           4075       begin
6527 ;           4076
6528 ;           4077   !++
6529 ;           4078   ! FUNCTIONAL DESCRIPTION:
6530 ;           4079   !
6531 ;           4080   !         LOADS THE DATA DIAG
6532 ;           4081   !         REGISTER 3 WITH A DATA PATTERN
6533 ;           4082   !         GENERATED BY THE MACRO
6534 ;           4083   !         WRT_MASK.
6535 ;           4084   !
6536 ;           4085   ! FORMAL PARAMETERS:
6537 ;           4086   !
6538 ;           4087   !         TST_PAT
6539 ;           4088   !         CURRENT DATA PATTERN TO BE
6540 ;           4089   !         LOADED IN THE REGISTER.
6541 ;           4090   !
6542 ;           4091   !         INDEX
6543 ;           4092   !         USE BY THE MACRO WRT_MASK
6544 ;           4093   !         TO SELECT THE CURRENT REGISTERS
6545 ;           4094   !         ADDRESS, FORCED HI, FORCED
6546 ;           4095   !         LO AND DON'T CARE MASK
6547 ;           4096   !         INFORMATION.
6548 ;           4097   !
6549 ;           4098   !--
6550 ;           4099
6551 ;           4100         DAT_DM = ONE;                                        !SET DATA DIAG MODE
6552 ;           4101         MLE2_MASK = %o'000377';                              !MASK OUT ECC CRC WORD BITS
6553 ;           4102         MLE2 = WRT_MASK;                                     !LOAD MLE2 WITH GENERATED WRT_MASK PATTERN
6554 ;           4103         MLE2_MASK = %o'100300';                              !RESTORE MASK
6555 ;           4104         DAT_DM = ZERO;                                       !CLEAR DATA DIAG MODE.
6556 ;           4105         end;
6560
6561
6565 024644  004167  157670                     .SBTTL  WRT.D3 ROUTINE DECLARATION SECTION
6566 024650  152777  000010  170646   WRT.D3: JSR     R1,$SAVE2                  ;                          4074
6567 024656  012767  000377  170706           BISB    #10,@ML.REG+120            ;                          4100
6568 024664  016600  000010                   MOV     #377,ML.REG+166            ;                          4101
6569 024670  006300                           MOV     10(SP),R0                  ; INDEX,*                  4102
6570 024672  006300                           ASL     R0
6571 024674  006300                           ASL     R0
6572 024676  010001                           ASL     R0
6573 024700  016100  015406                   MOV     R0,R1
6574 024704  056600  000012                   MOV     ML.REG+2(R1),R0
6575 024710  046100  015410                   BIS     12(SP),R0                  ; TST.PAT,*
6576 024714  016102  015412                   BIC     ML.REG+4(R1),R0
                                              MOV     ML.REG+6(R1),R2
```

```
                                    ;ML4AD                                                        29-Mar-1982 16:23:04   TOPS
                                    ;           ROUTINE DECLARATION SECTION                       29-Mar-1982 16:21:03   PA:<

 024720  050002                           BIS     R0,R2
 024722  010277  170636                   MOV     R2,@ML.REG+160
 024726  012767  100300  170636           MOV     #-77500,ML.REG+166              ;                                     4103
 024734  142777  000010  170562           BICB    #10,@ML.REG+120                 ;                                     4104
 024742  000207                           RTS     PC                              ;                                     4074

                                    ; Routine Size:  32 words
                                    ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               ROUTINE DECLARATION SECTION                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (43)
;
;               routine RD_D3 (TST_PAT, index, ERR_FLG) : novalue =
;                   begin
;
;               !++
;               ! FUNCTIONAL DESCRIPTION:
;               !
;               !       COMPARES THE CONTENTS OF THE
;               !       DATA DIAG REGISTER 3
;               !       WITH THE MASKED DATA PATTERN
;               !       GENERATED BY THE MACRO "WRT_MASK".
;               !
;               !       IF THE COMPARE IS NOT EQUAL THE
;               !       FORMAL PARAMETER "ERR_FLG" IS
;               !       ASSIGNED A ONE TO INDICATE THE
;               !       ERROR.
;               !
;               ! FORMAL PARAMETERS:
;               !
;               !       TST_PAT
;               !       DATA PATTERN TO BE MASKED AND
;               !       COMPARED AGAINST THE CONTENTS
;               !       OF THE REGISTER UNDER TEST.
;               !
;               !       INDEX
;               !       USED BY THE MACRO WRT_MASK TO
;               !       SELECT THE CURRENT REGISTERS ADDRESS,
;               !       FORCED HI, FORCED LO AND DON'T CARE
;               !       MASK INFORMATION
;               !
;               !       ERR_FLG
;               !       CONTAINS THE ADDRESS (PASSED BY REF)
;               !       OF THE CALLERS ERROR FLG TO ENABLE THE
;               !       CALLER TO EXAMINE THE ERROR STATUS
;               !       OF THE ROUTINE CALL.
;               !
;               ! IMPLICIT INPUTS:
;               !       WT_DATA
;               !         GETS LOADED WITH THE GENERATED
;               !         WRT_MASK DATA PATTERN THUS ALLOWING
;               !         CALLER TO PRINT FAILING GOOD DATA.
;               !
;               !       RD_DATA
;               !         GETS LOADED WITH DATA READ FROM THE
;               !         REGISTER THUS ALLOWING CALLER
;               !         TO PRINT FAILING BAD DATA.
;               !
;               ! IMPLICIT OUTPUTS:
;               !       GLOBAL LOCATION WR_DATA
;               !       AND RD_DATA LOADED WITH GOOD
;               !       AND BAD REGISTER DATA
;               !
;               !--
```

```
 6652 ;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 6653 ;                  ROUTINE DECLARATION SECTION                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (43)
 6654
 6655 ;        4158
 6656 ;        4159       .ERR_FLG = ZERO;                           !CLEAR ERROR FLAG
 6657 ;        4160       MLE2_MASK = %o'000377';                    !SET DATA DIAG MODE
 6658 ;        4161       DAT_DM = ONE;
 6659 ;        4162       ML_FUNC = write;                           !LOAD WRITE FUNCTION TO MLCS1
 6660 ;        4163       DAT_CLK = ONE;                             !DO A DATA CLOCK
 6661 ;        4164
 6662 ;        4165       if .REG_INIT_FLG IS_SET                    !SEE IF CALLER IS  REG INIT TEST
 6663 ;        4166       then                                       !CLEAR  MBUS TO GENERATE INIT DATA
 6664 ;        4167           begin
 6665 ;        4168           CLR_MBUS;
 6666 ;        4169           DAT_DM = ONE;
 6667 ;        4170           end;
 6668 ;        4171
 6669 ;        4172       WT_DATA = WRT_MASK;                        !SAVE THE DATA WRITTEN TO THE REGISTER
 6670 ;        4173       RD_DATA = .MLE2 or .IGNORE;                !READ AND SAVE THE REGISTER
 6671 ;        4174
 6672 ;        4175       if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;        !READ THE REG FOR WRT_MASK
 6673 ;        4176
 6674 ;        4177       MLE2_MASK = %o'100300';
 6675 ;        4178       CLR_MBUS;                                  !CLEAR THE MASS BUS
 6676 ;        4179       end;
 6680
 6681                                          .SBTTL  RD.D3 ROUTINE DECLARATION SECTION
 6685 024744 004167 157570           RD.D3:  JSR     R1,$SAVE2                       ;                       4106
 6686 024750 005076 000010                   CLR     @10(SP)                         ; ERR.FLG               4159
 6687 024754 012767 000377 170610           MOV     #377,ML.REG+166                 ;                       4160
 6688 024762 152777 000010 170534           BISB    #10,@ML.REG+120                 ;                       4161
 6689 024770 142777 000077 170406           BICB    #77,@ML.REG                     ;                       4162
 6690 024776 152777 000061 170400           BISB    #61,@ML.REG                     ;
 6691 025004 152777 000020 170512           BISB    #20,@ML.REG+120                 ;                       4163
 6692 025012 026727 170342 000001           CMP     REG.INIT.FLG,#1                 ;                       4165
 6693 025020 001017                          BNE     1$                              ;
 6694 025022 152777 000040 170414           BISB    #40,@ML.REG+40                  ;                       4167
 6695 025030 016701 170776                   MOV     ML.DUT,R1
 6696 025034 042701 177770                   BIC     #177770,R1
 6697 025040 142777 000007 170376           BICB    #7,@ML.REG+40
 6698 025046 150177 170372                   BISB    R1,@ML.REG+40
 6699 025052 152777 000010 170444           BISB    #10,@ML.REG+120                 ;                       4169
 6700 025060 016600 000012           1$:     MOV     12(SP),R0                       ; INDEX,*               4172
 6701 025064 006300                          ASL     R0
 6702 025066 006300                          ASL     R0
 6703 025070 006300                          ASL     R0
 6704 025072 010001                          MOV     R0,R1
 6705 025074 016100 015406                   MOV     ML.REG+2(R1),R0
 6706 025100 056600 000014                   BIS     14(SP),R0                       ; TST.PAT,*
```

```
                                ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                ;               ROUTINE DECLARATION SECTION                     29-Mar-1982 16:21:03   PA:<
025104  046100  015410                  BIC     ML.REG+4(R1),R0
025110  016102  015412                  MOV     ML.REG+6(R1),R2
025114  050002                          BIS     R0,R2
025116  010267  170226                  MOV     R2,WT.DATA
025122  017702  170436                  MOV     @ML.REG+160,R2
025126  056102  015412                  BIS     ML.REG+6(R1),R2         ;                              4173
025132  010267  170214                  MOV     R2,RD.DATA
025136  026767  170206  170206          CMP     WT.DATA,RD.DATA
025144  001403                          BEQ     2$                      ;                              4175
025146  012776  000001  000010          MOV     #1,@10(SP)              ; *,ERR.FLG
025154  012767  100300  170410  2$:     MOV     #-77500,ML.REG+166      ;
025162  152777  000040  170254          BISB    #40,@ML.REG+40                                         4177
025170  016702  170636                  MOV     ML.DUT,R2
025174  042702  177770                  BIC     #177770,R2
025200  142777  000007  170236          BICB    #7,@ML.REG+40
025206  150277  170232                  BISB    R2,@ML.REG+40
025212  000207                          RTS     PC                      ;                              4106

                                ; Routine Size:  84 words
                                ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               ROUTINE DECLARATION SECTION               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (44)

;       routine WRT_DS (TST_PAT, index) : novalue =
;           begin
;
;       !++
;       ! FUNCTIONAL DESCRIPTION:
;       !       DUMMY ROUTINE CALL TO ASSIST IN THE READ
;       !       WRITE REGISTER ALGORITHEM
;       !
;       ! FORMAL PARAMETERS:
;       !       TST_PAT
;       !       DATA PATTERN TO BE MASKED AND
;       !       COMPARED AGAINST THE CONTENTS
;       !       OF THE REGISTER UNDER TEST
;       !
;       !       INDEX
;       !       USED BY THE MACRO WRT_MASK TO
;       !       SELECT THE CURRENT REGISTERS ADDRESS,
;       !       FORCED HI, FORCED LO AND DON'T CARE
;       !       MASK INFORMATION.
;       !
;       !--
;
;       !
;       ! DRIVE STATUS REG IS READ ONLY
;         return;
;         end;


                        .SBTTL  WRT.DS ROUTINE DECLARATION SECTION
025214 000207   WRT.DS: RTS     PC                              ;          4180

                ; Routine Size:  1 word
                ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;          ROUTINE DECLARATION SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (45)
;
;          routine RD_DS (TST_PAT, index, ERR_FLG) : novalue =
;              begin
;
;          !++
;          ! FUNCTIONAL DESCRIPTION:
;          !
;          !          COMPARES THE CONTENTS OF THE
;          !          DRIVE STATUS REGISTER WITH THE
;          !          MASKED DATA PATTERN
;          !          GENERATED BY THE MACRO 'WRT_MASK'.
;          !
;          !          IF THE COMPARE IS NOT EQUAL THEN
;          !          THE FORMAL PARAMETER 'ERR_FLG' IS
;          !          ASSIGNED A ONE TO INDICATE THE
;          !          ERROR.
;          !
;          ! FORMAL PARAMETERS:
;          !
;          !          TST_PAT
;          !          DATA PATTERN TO BE MASKED AND
;          !          COMPARED AGAINST THE CONTENTS
;          !          OF THE REGISTER UNDER TEST.
;          !
;          !          INDEX
;          !          USED BY THE MACRO WRT_MASK TO
;          !          SELECT THE CURRENT REGISTERS ADDRESS.
;          !          FORCED HI, FORCED LO AND DON'T CARE
;          !          MASK INFORMATION.
;          !
;          !          ERR_FLG
;          !          CONTAINS THE ADDRESS (PASSED BY REF)
;          !          OF THE CALLERS ERROR FLG TO ENABLE THE
;          !          CALLER TO EXAMINE THE ERROR STATUS
;          !          OF THE ROUTINE CALL.
;          !
;          ! IMPLICIT INPUTS:
;          !          WT_DATA
;          !            GETS LOADED WITH THE GENERATED
;          !            WRT_MASK DATA PATTERN THUS ALLOWING
;          !            CALLER TO PRINT FAILING GOOD DATA.
;          !
;          !          RD_DATA
;          !            GETS LOADED WITH DATA READ FROM THE
;          !            REGISTER THUS ALLOWING CALLER
;          !            TO PRINT FAILING BAD DATA.
;          !
;          ! IMPLICIT OUTPUTS:
;          !          GLOBAL LOCATION WR_DATA
;          !          AND RD_DATA LOADED WITH GOOD
;          !          AND BAD REGISTER DATA
;          !
;          !--
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                      ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (45)

;              4258
;              4259      .ERR_FLG = ZERO;                   !CLEAR THE ERROR FLAG
;              4260      WT_DATA = WRT_MASK;                !SAVE THE DATA WRITTEN TO THE REGISTER
;              4261      RD_DATA = .MLDS or .IGNORE;        !READ AND SAVE THE REGISTER
;              4262
;              4263      if .WT_DATA neq .RD_DATA then .ERR_FLG = ONE;        !READ THE REG FOR WRT_MASK
;              4264
;              4265                                         !SET ERROR FLAG IF NEQ
;              4266      end;


                                        .SBTTL  RD.DS ROUTINE DECLARATION SECTION
025216  004167  157316          RD.DS:  JSR     R1,$SAVE2                       ;                       4206
025222  005076  000010                  CLR     @10(SP)                         ; ERR.FLG               4259
025226  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               4260
025232  006300                          ASL     R0
025234  006300                          ASL     R0
025236  006300                          ASL     R0
025240  010001                          MOV     R0,R1
025242  016100  015406                  MOV     ML.REG+2(R1),R0
025246  056600  000014                  BIS     14(SP),R0                       ; TST.PAT,*
025252  046100  015410                  BIC     ML.REG+4(R1),R0
025256  016102  015412                  MOV     ML.REG+6(R1),R2
025262  050002                          BIS     R0,R2
025264  010267  170060                  MOV     R2,WT.DATA
025270  017702  170160                  MOV     @ML.REG+50,R2                   ;
025274  056102  015412                  BIS     ML.REG+6(R1),R2                                         4261
025300  010267  170046                  MOV     R2,RD.DATA
025304  026767  170040  170040          CMP     WT.DATA,RD.DATA                 ;                       4263
025312  001403                          BEQ     1$
025314  012776  000001  000010          MOV     #1,@10(SP)                      ; *,ERR.FLG
025322  000207                  1$:     RTS     PC                              ;                       4206

                                ; Routine Size:  35 words
                                ; Maximum stack depth per invocation:  3 words


```

```
;ML4AD                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (46)

;                routine WRT_REG (TST_PAT, REG_SEL, index) : novalue =
;                    begin
;
;                !++
;                ! FUNCTIONAL DESCRIPTION:
;                !       A ROUTINE TO SELECTIVELY
;                !       CALLED ROUTINES WHICH
;                !       WRITE TO INDIVIDUAL ML11
;                !       REGISTERS
;                !
;                ! FORMAL PARAMETERS:
;                !       REG_SEL
;                !       CASE SELECT EXPRESSION TO
;                !       SELECT THE WRITE REGISTER
;                !       ROUTINE TO CALLED
;                !
;                !       TST_PAT
;                !       DATA PATTERN WHICH THE SELECTED
;                !       REGISTER WILL BE TESTED AGAINST
;                !
;                !       INDEX
;                !       LOADED WITH THE ML_REG INDEX
;                !       SELECT NUMBER OF THE REGISTER
;                !       BEING TESTED
;                !
;                ! SIDE EFFECTS:
;                !       WHEN A WRITE REGISTER ROUTINE IS CALLED
;                !       THE VARIABLE 'INDEX' FROM THE CALLING
;                !       TEST IS LOADED WITH THE REGISTERS
;                !       ML_REG INDEX NUMBER.
;                !
;                !       THIS ENABLES THE CALLING TEST TO FIND
;                !       THE FAILING REGISTER ADDRESS.
;                !
;                !--
;
;                    case .REG_SEL from 0 to 13 of              !SELECT THE WRITE REGISTER ROUTINE CALL
;                        set
;
;                        [0] :
;                            WRT_CS1 (.TST_PAT, .index = 0);     !CALL ROUTINE TO LOAD MLCS1
;
;                        [1] :
;                            WRT_ER (.TST_PAT, .index = 6);      !CALL ROUTINE TO LOAD MLER
;
;                        [2] :
;                            WRT_DA (.TST_PAT, .index = 3);      !CALL ROUTINE TO LOAD MLDA
;
;                        [3] :
;                            WRT_MR (.TST_PAT, .index = 10);     !CALL ROUTINE TO LOAD MLMR
;
;                        [4] :
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (46)

;                          WRT_E1 (.TST_PAT, .index = 13);      !CALL ROUTINE TO LOAD MLE1
;
;                     [5] :
;                          WRT_E2 (.TST_PAT, .index = 14);      !CALL ROUTINE TO LOAD MLE2
;
;                     [6] :
;                          WRT_PA (.TST_PAT, .index = 8);       !CALL ROUTINE TO LOAD MLPA
;
;                     [7] :
;                          WRT_PD (.TST_PAT, .index = 19);      !CALL ROUTINE TO LOAD MLPD
;
;                     [8] :
;                          WRT_EE (.TST_PAT, .index = 17);      !CALL ROUTINE TO LOAD MLEE
;
;                     [9] :
;                          WRT_EL (.TST_PAT, .index = 18);      !CALL ROUTINE TO LOAD MLEL
;
;                     [10] :
;                          WRT_DS (.TST_PAT, .index = 5);       !CALL ROUTINE TO LOAD MLDS
;
;                     [11] :
;                          WRT_D1 (.TST_PAT, .index = 15);      !CALL ROUTINE TO LOAD MLD1
;
;                     [12] :
;                          WRT_D2 (.TST_PAT, .index = 16);      !CALL ROUTINE TO LOAD MLD2
;
;                     [13] :
;                          WRT_D3 (.TST_PAT, .index = 14);      !CALL ROUTINE TO LOAD MLE2
;                     tes;
;                end;


                                           .SBTTL  WRT.REG ROUTINE DECLARATION SECTION
025324  004167  157210           WRT.REG:JSR     R1,$SAVE2                  ;                    4267
025330  016600  000010                   MOV     10(SP),R0                  ; INDEX,*            4307
025334  016601  000014                   MOV     14(SP),R1                  ; TST.PAT,*
025340  016602  000012                   MOV     12(SP),R2                  ; REG.SEL,*          4303
025344  006302                           ASL     R2
025346  066207  025352                   ADD     1$(R2),PC
025352  000034                   1$:     .WORD   2$-1$
025354  000050                           .WORD   3$-1$
025356  000066                           .WORD   4$-1$
025360  000104                           .WORD   5$-1$
025362  000122                           .WORD   6$-1$
025364  000140                           .WORD   7$-1$
025366  000156                           .WORD   8$-1$
```

```
                                  ;ML4AD                                                        29-Mar-1982 16:23:04   TOPS
                                  ;            ROUTINE DECLARATION SECTION                      29-Mar-1982 16:21:03   PA:<
      025370  000174                       .WORD   9$-1$
      025372  000212                       .WORD   10$-1$
      025374  000230                       .WORD   11$-1$
      025376  000246                       .WORD   12$-1$
      025400  000264                       .WORD   13$-1$
      025402  000302                       .WORD   14$-1$
      025404  000320                       .WORD   15$-1$
      025406  010146              2$:      MOV     R1,-(SP)                  ;                           4307
      025410  005010                       CLR     (R0)
      025412  005046                       CLR     -(SP)
      025414  004767  174272               JSR     PC,WRT.CS1
      025420  000532                       BR      16$                       ;                           4303
      025422  010146              3$:      MOV     R1,-(SP)                  ;                           4310
      025424  012710  000006               MOV     #6,(R0)
      025430  011046                       MOV     (R0),-(SP)
      025432  004767  174432               JSR     PC,WRT.ER
      025436  000523                       BR      16$                       ;                           4303
      025440  010146              4$:      MOV     R1,-(SP)                  ;                           4313
      025442  012710  000003               MOV     #3,(R0)
      025446  011046                       MOV     (R0),-(SP)
      025450  004767  174572               JSR     PC,WRT.DA
      025454  000514                       BR      16$                       ;                           4303
      025456  010146              5$:      MOV     R1,-(SP)                  ;                           4316
      025460  012710  000012               MOV     #12,(R0)
      025464  011046                       MOV     (R0),-(SP)
      025466  004767  174732               JSR     PC,WRT.MR
      025472  000505                       BR      16$                       ;                           4303
      025474  010146              6$:      MOV     R1,-(SP)                  ;                           4319
      025476  012710  000015               MOV     #15,(R0)
      025502  011046                       MOV     (R0),-(SP)
      025504  004767  175300               JSR     PC,WRT.E1
      025510  000476                       BR      16$                       ;                           4303
      025512  010146              7$:      MOV     R1,-(SP)                  ;                           4322
      025514  012710  000016               MOV     #16,(R0)
      025520  011046                       MOV     (R0),-(SP)
      025522  004767  175470               JSR     PC,WRT.E2
      025526  000467                       BR      16$                       ;                           4303
      025530  010146              8$:      MOV     R1,-(SP)                  ;                           4325
      025532  012710  000010               MOV     #10,(R0)
      025536  011046                       MOV     (R0),-(SP)
      025540  004767  175036               JSR     PC,WRT.PA
      025544  000460                       BR      16$                       ;                           4303
      025546  010146              9$:      MOV     R1,-(SP)                  ;                           4328
      025550  012710  000023               MOV     #23,(R0)
      025554  011046                       MOV     (R0),-(SP)
      025556  004767  175666               JSR     PC,WRT.PD
      025562  000451                       BR      16$                       ;                           4303
      025564  010146              10$:     MOV     R1,-(SP)                  ;                           4331
      025566  012710  000021               MOV     #21,(R0)
      025572  011046                       MOV     (R0),-(SP)
      025574  004767  176156               JSR     PC,WRT.EE
      025600  000442                       BR      16$                       ;                           4303
```

```
                                   ;ML4AD                                                               29-Mar-1982 16:23:04   TOPS
                                   ;                   ROUTINE DECLARATION SECTION                      29-Mar-1982 16:21:03   PA:<
 025602  010146                    11$:    MOV     R1,-(SP)
 025604  012710  000022                    MOV     #22,(R0)                        ;                                      4334
 025610  011046                            MOV     (R0),-(SP)
 025612  004767  176076                    JSR     PC,WRT.EL
 025616  000433                            BR      16$
 025620  010146                    12$:    MOV     R1,-(SP)                        ;                                      4303
 025622  012710  000005                    MOV     #5,(R0)                         ;                                      4337
 025626  011046                            MOV     (R0),-(SP)
 025630  004767  177360                    JSR     PC,WRT.DS
 025634  000424                            BR      16$
 025636  010146                    13$:    MOV     R1,-(SP)                        ;                                      4303
 025640  012710  000017                    MOV     #17,(R0)                        ;                                      4340
 025644  011046                            MOV     (R0),-(SP)
 025646  004767  176146                    JSR     PC,WRT.D1
 025652  000415                            BR      16$
 025654  010146                    14$:    MOV     R1,-(SP)                        ;                                      4303
 025656  012710  000020                    MOV     #20,(R0)                        ;                                      4343
 025662  011046                            MOV     (R0),-(SP)
 025664  004767  176442                    JSR     PC,WRT.D2
 025670  000406                            BR      16$
 025672  010146                    15$:    MOV     R1,-(SP)                        ;                                      4303
 025674  012710  000016                    MOV     #16,(R0)                        ;                                      4346
 025700  011046                            MOV     (R0),-(SP)
 025702  004767  176736                    JSR     PC,WRT.D3
 025706  022626                    16$:    CMP     (SP)+,(SP)+                     ;                                      4268
 025710  000207                            RTS     PC                              ;                                      4267

                                   ; Routine Size:  123 words
                                   ; Maximum stack depth per invocation:  5 words
```

```
;ML4AD
;                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                 ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (47)

;  routine RD_REG (TST_PAT, REG_SEL, ERR_FLG) : novalue =
;      begin
;
;  !++
;  ! FUNCTIONAL DESCRIPTION:
;  !        A ROUTINE TO SELECTIVELY
;  !        CALLED ROUTINES WHICH
;  !        READ TO INDIVIDUAL ML11
;  !        REGISTERS.
;  !
;  ! FORMAL PARAMETERS:
;  !        ERR_FLG
;  !        CONTAINS THE ADDRESS (PASSED BY REF)
;  !        OF THE CALLERS ERROR FLG TO ENABLE THE
;  !        CALLER TO EXAMINE THE ERROR STATUS
;  !        OF THE ROUTINE CALL.
;  !
;  !        REG_SEL
;  !        CASE SELECT EXPRESSION TO
;  !        SELECT THE WRITE REGISTER
;  !        ROUTINE TO CALLED
;  !
;  !        TST_PAT
;  !        DATA PATTERN WHICH THE SELECTED
;  !        REGISTER WILL BE TESTED AGAINST
;  !
;  !--
;
;     case .REG_SEL from 0 to 13 of                !SELECT THE READ REGISTER ROUTINE CALL
;         set
;
;         [0] :
;             RD_CS1 (.TST_PAT, 0, .ERR_FLG);      !CALL ROOUTINE TO READ MLCS1
;
;         [1] :
;             RD_ER (.TST_PAT, 6, .ERR_FLG);       !CALL ROUTINE TO READ MLER
;
;         [2] :
;             RD_DA (.TST_PAT, 3, .ERR_FLG);       !CALL ROUTINE TO READ MLDA
;
;         [3] :
;             RD_MR (.TST_PAT, 10, .ERR_FLG);      !CALL ROUTINE TO READ MLMR
;
;         [4] :
;             RD_E1 (.TST_PAT, 13, .ERR_FLG);      !CALL ROUTINE TO READ MLE1
;
;         [5] :
;             RD_E2 (.TST_PAT, 14, .ERR_FLG);      !CALL ROUTINE TO READ MLE2
;
;         [6] :
;             RD_PA (.TST_PAT, 8, .ERR_FLG);       !CALL ROUTINE TO READ MLPA
;
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (47)
;
;                            [7] :
;                                RD_PD (.TST_PAT, 19, .ERR_FLG);     !CALL ROUTINE TO READ MLPD
;                            [8] :
;                                RD_EE (.TST_PAT, 17, .ERR_FLG);     !CALL ROUTINE TO READ MLEE
;                            [9] :
;                                RD_EL (.TST_PAT, 18, .ERR_FLG);     !CALL ROUTINE TO READ MLEL
;                            [10] :
;                                RD_DS (.TST_PAT, 5, .ERR_FLG);      !CALL ROUTINE TO READ MLDS
;                            [11] :
;                                RD_D1 (.TST_PAT, 15, .ERR_FLG);     !CALL ROUTINE TO READ MLD1
;                            [12] :
;                                RD_D2 (.TST_PAT, 16, .ERR_FLG);     !CALL ROUTINE TO READ MLD2
;                            [13] :
;                                RD_D3 (.TST_PAT, 14, .ERR_FLG);     !CALL ROUTINE TO READ MLE2
;                            tes;
;                        end;

                                          .SBTTL  RD.REG ROUTINE DECLARATION SECTION
025712  004167  156622           RD.REG:  JSR     R1,$SAVE2                         ;                    4350
025716  016600  000010                    MOV     10(SP),R0                         ; ERR.FLG,*          4382
025722  016601  000014                    MOV     14(SP),R1                         ; TST.PAT,*
025726  016602  000012                    MOV     12(SP),R2                         ; REG.SEL,*          4378
025732  006302                            ASL     R2
025734  066207  025740                    ADD     1$(R2),PC
025740  000034                   1$:      .WORD   2$-1$
025742  000050                            .WORD   3$-1$
025744  000066                            .WORD   4$-1$
025746  000104                            .WORD   5$-1$
025750  000122                            .WORD   6$-1$
025752  000140                            .WORD   7$-1$
025754  000156                            .WORD   8$-1$
025756  000174                            .WORD   9$-1$
025760  000212                            .WORD   10$-1$
025762  000230                            .WORD   11$-1$
025764  000246                            .WORD   12$-1$
025766  000264                            .WORD   13$-1$
025770  000302                            .WORD   14$-1$
025772  000320                            .WORD   15$-1$
025774  010146                   2$:      MOV     R1,-(SP)                          ;                    4382
```

```
                                 ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                                 ;             ROUTINE DECLARATION SECTION                 29-Mar-1982 16:21:03   PA:<
025776  005046                         CLR     -(SP)
026000  010046                         MOV     R0,-(SP)
026002  004767  173754                 JSR     PC,RD.CS1
026006  000532                         BR      16$
026010  010146                  3$:    MOV     R1,-(SP)                    ;                             4378
026012  012746  000006                 MOV     #6,-(SP)                    ;                             4385
026016  010046                         MOV     R0,-(SP)
026020  004767  174114                 JSR     PC,RD.ER
026024  000523                         BR      16$
026026  010146                  4$:    MOV     R1,-(SP)                    ;                             4378
026030  012746  000003                 MOV     #3,-(SP)                    ;                             4388
026034  010046                         MOV     R0,-(SP)
026036  004767  174254                 JSR     PC,RD.DA
026042  000514                         BR      16$
026044  010146                  5$:    MOV     R1,-(SP)                    ;                             4378
026046  012746  000012                 MOV     #12,-(SP)                   ;                             4391
026052  010046                         MOV     R0,-(SP)
026054  004767  174414                 JSR     PC,RD.MR
026060  000505                         BR      16$
026062  010146                  6$:    MOV     R1,-(SP)                    ;                             4378
026064  012746  000015                 MOV     #15,-(SP)                   ;                             4394
026070  010046                         MOV     R0,-(SP)
026072  004767  174776                 JSR     PC,RD.E1
026076  000476                         BR      16$
026100  010146                  7$:    MOV     R1,-(SP)                    ;                             4378
026102  012746  000016                 MOV     #16,-(SP)                   ;                             4397
026106  010046                         MOV     R0,-(SP)
026110  004767  175200                 JSR     PC,RD.E2
026114  000467                         BR      16$
026116  010146                  8$:    MOV     R1,-(SP)                    ;                             4378
026120  012746  000010                 MOV     #10,-(SP)                   ;                             4400
026124  010046                         MOV     R0,-(SP)
026126  004767  174534                 JSR     PC,RD.PA
026132  000460                         BR      16$
026134  010146                  9$:    MOV     R1,-(SP)                    ;                             4378
026136  012746  000023                 MOV     #23,-(SP)                   ;                             4403
026142  010046                         MOV     R0,-(SP)
026144  004767  175406                 JSR     PC,RD.PD
026150  000451                         BR      16$
026152  010146                  10$:   MOV     R1,-(SP)                    ;                             4378
026154  012746  000021                 MOV     #21,-(SP)                   ;                             4406
026160  010046                         MOV     R0,-(SP)
026162  004767  175572                 JSR     PC,RD.EE
026166  000442                         BR      16$
026170  010146                  11$:   MOV     R1,-(SP)                    ;                             4378
026172  012746  000022                 MOV     #22,-(SP)                   ;                             4409
026176  010046                         MOV     R0,-(SP)
026200  004767  175512                 JSR     PC,RD.EL
026204  000433                         BR      16$
026206  010146                  12$:   MOV     R1,-(SP)                    ;                             4378
026210  012746  000005                 MOV     #5,-(SP)                    ;                             4412
026214  010046                         MOV     R0,-(SP)
```

```
                                ;ML4AD                                                            29-Mar-1982 16:23:04   TOPS
                                ;               ROUTINE DECLARATION SECTION                       29-Mar-1982 16:21:03   PA:<
026216  004767  176774                  JSR     PC,RD.DS
026222  000424                          BR      16$
026224  010146                  13$:    MOV     R1,-(SP)                ;                                                4378
026226  012746  000017                  MOV     #17,-(SP)               ;                                                4415
026232  010046                          MOV     R0,-(SP)
026234  004767  175644                  JSR     PC,RD.D1
026240  000415                          BR      16$
026242  010146                  14$:    MOV     R1,-(SP)                ;                                                4378
026244  012746  000020                  MOV     #20,-(SP)               ;                                                4418
026250  010046                          MOV     R0,-(SP)
026252  004767  176140                  JSR     PC,RD.D2
026256  000406                          BR      16$
026260  010146                  15$:    MOV     R1,-(SP)                ;                                                4378
026262  012746  000016                  MOV     #16,-(SP)               ;                                                4421
026266  010046                          MOV     R0,-(SP)
026270  004767  176450                  JSR     PC,RD.D3
026274  062706  000006          16$:    ADD     #6,SP                   ;                                                4351
026300  000207                          RTS     PC                      ;                                                4350

                                ; Routine Size:  124 words
                                ; Maximum stack depth per invocation:  6 words

;          4425  !<BLF/PAGE>
```

```
;ML4AD                                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                     ROUTINE DECLARATION SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (48)

;           4426                                                      !
;           4427      !
;           4428      BGNMSG (DUMPER);


                                        .SBTTL  DUMPER ROUTINE DECLARATION SECTION
 026302  004767  000004        DUMPER::JSR     PC,MSDUMPER                        ;                        4428
 026306  104423                         TRAP    23
 026310  000207                         RTS     PC

                               ; Routine Size:  4 words
                               ; Maximum stack depth per invocation:  0 words


;           4429
;           4430      !++
;           4431      !      FUNCTIONAL DESCRIPTION
;           4432      !            UPON COMPLETION OF ERROR MESSAGES
;           4433      !            DUMP OUT ALL PERTINENT DRIVE AND
;           4434      !            RH REGISTERS
;           4435      !--
;           4436
;           4437      if .REGDMP
;           4438      then
;           4439          begin
;           4440          PRINTB (ONE_FMT, PHR_14);                  !PRINT REGISTER DUMP MESSAGE
;           4441          PRINTB (FMT_23);                           !PRINT DUMPER COLUMN HEADINGS
;           4442          PRINTB (FMT_24, REG_1, MLCS1, .MLCS1);     !PRINT OUT THE RH & ML11 REGISTER CONTENTS
;           4443          PRINTB (FMT_24, REG_18, MLWC, .MLWC);
;           4444          PRINTB (FMT_24, REG_19, MLBA, .MLBA);
;           4445          PRINTB (FMT_24, REG_6, MLDA, .MLDA);
;           4446          PRINTB (FMT_24, REG_17, MLCS2, .MLCS2);
;           4447          PRINTB (FMT_24, REG_2, MLDS, .MLDS);
;           4448          PRINTB (FMT_24, REG_3, MLER, .MLER);
;           4449          PRINTB (FMT_24, REG_5, MLAS, .MLAS);
;           4450          PRINTB (FMT_24, REG_4, MLMR, .MLMR);
;           4451          PRINTB (FMT_24, REG_7, MLDT, .MLDT);
;           4452          PRINTB (FMT_24, REG_9, MLSN, .MLSN);
;           4453          PRINTB (FMT_24, REG_14, MLEE, .MLEE);
;           4454          PRINTB (FMT_24, REG_15, MLEL, .MLEL);
;           4455
;           4456          if .LST_DUT_REG eql 21                     !SEE IF THIS IS A RH70
;           4457          then                                       !IF YES THEN PRINT RH70 REGISTERS
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                     ROUTINE DECLARATION SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (48)

;            4458               begin
;            4459               PRINTB (FMT_24, REG_20, MLBAE, .MLBAE);
;            4460               PRINTB (FMT_24, REG_21, MLCS3, .MLCS3);
;            4461               end;
;            4462
;            4463           end;
;            4464
;            4465       ENDMSG;


                                                 .SBTTL  MSDUMPER ROUTINE DECLARATION SECTION
 026312                                   MSDUMPER:
 026312  032767  000001  154064                  BIT     #1,REGDMP                      ;              4437
 026320  001001                                  BNE     1$
 026322  000207                                  RTS     PC
 026324  012746  012104              1$:         MOV     #PHR.14,-(SP)                  ;              4440
 026330  012746  010240                          MOV     #ONE.FMT,-(SP)
 026334  012746  000002                          MOV     #2,-(SP)
 026340  010600                                  MOV     SP,R0                          ; SP,*
 026342  104414                                  TRAP    14
 026344  012716  010072                          MOV     #FMT.23,(SP)                   ;              4441
 026350  012746  000001                          MOV     #1,-(SP)
 026354  010600                                  MOV     SP,R0                          ; SP,*
 026356  104414                                  TRAP    14
 026360  017716  167020                          MOV     @ML.REG,(SP)                   ;              4442
 026364  016746  167014                          MOV     ML.REG,-(SP)
 026370  012746  012500                          MOV     #REG.1,-(SP)
 026374  012746  010142                          MOV     #FMT.24,-(SP)
 026400  012746  000004                          MOV     #4,-(SP)
 026404  010600                                  MOV     SP,R0                          ; SP,*
 026406  104414                                  TRAP    14
 026410  017716  167000                          MOV     @ML.REG+10,(SP)                ;              4443
 026414  016746  166774                          MOV     ML.REG+10,-(SP)
 026420  012746  012652                          MOV     #REG.18,-(SP)
 026424  012746  010142                          MOV     #FMT.24,-(SP)
 026430  012746  000004                          MOV     #4,-(SP)
 026434  010600                                  MOV     SP,R0                          ; SP,*
 026436  104414                                  TRAP    14
 026440  017716  166760                          MOV     @ML.REG+20,(SP)                ;              4444
 026444  016746  166754                          MOV     ML.REG+20,-(SP)
 026450  012746  012660                          MOV     #REG.19,-(SP)
 026454  012746  010142                          MOV     #FMT.24,-(SP)
 026460  012746  000004                          MOV     #4,-(SP)
 026464  010600                                  MOV     SP,R0                          ; SP,*
 026466  104414                                  TRAP    14
 026470  017716  166740                          MOV     @ML.REG+30,(SP)                ;              4445
 026474  016746  166734                          MOV     ML.REG+30,-(SP)
```

```
                             ;ML4AD                                                        29-Mar-1982 16:23:04   TOPS
                             ;            ROUTINE DECLARATION SECTION                      29-Mar-1982 16:21:03   PA:<
026500 012746 012540                  MOV     #REG.6,-(SP)
026504 012746 010142                  MOV     #FMT.24,-(SP)
026510 012746 000004                  MOV     #4,-(SP)
026514 010600                         MOV     SP,R0                       ; SP,*
026516 104414                         TRAP    14
026520 017716 166720                  MOV     @ML.REG+40,(SP)             ;                         4446
026524 016746 166714                  MOV     ML.REG+40,-(SP)
026530 012746 012642                  MOV     #REG.17,-(SP)
026534 012746 010142                  MOV     #FMT.24,-(SP)
026540 012746 000004                  MOV     #4,-(SP)
026544 010600                         MOV     SP,R0                       ; SP,*
026546 104414                         TRAP    14
026550 017716 166700                  MOV     @ML.REG+50,(SP)             ;                         4447
026554 016746 166674                  MOV     ML.REG+50,-(SP)
026560 012746 012510                  MOV     #REG.2,-(SP)
026564 012746 010142                  MOV     #FMT.24,-(SP)
026570 012746 000004                  MOV     #4,-(SP)
026574 010600                         MOV     SP,R0                       ; SP,*
026576 104414                         TRAP    14
026600 017716 166660                  MOV     @ML.REG+60,(SP)             ;                         4448
026604 016746 166654                  MOV     ML.REG+60,-(SP)
026610 012746 012516                  MOV     #REG.3,-(SP)
026614 012746 010142                  MOV     #FMT.24,-(SP)
026620 012746 000004                  MOV     #4,-(SP)
026624 010600                         MOV     SP,R0                       ; SP,*
026626 104414                         TRAP    14
026630 017716 166640                  MOV     @ML.REG+70,(SP)             ;                         4449
026634 016746 166634                  MOV     ML.REG+70,-(SP)
026640 012746 012532                  MOV     #REG.5,-(SP)
026644 012746 010142                  MOV     #FMT.24,-(SP)
026650 012746 000004                  MOV     #4,-(SP)
026654 010600                         MOV     SP,R0                       ; SP,*
026656 104414                         TRAP    14
026660 017716 166640                  MOV     @ML.REG+120,(SP)            ;                         4450
026664 016746 166634                  MOV     ML.REG+120,-(SP)
026670 012746 012524                  MOV     #REG.4,-(SP)
026674 012746 010142                  MOV     #FMT.24,-(SP)
026700 012746 000004                  MOV     #4,-(SP)
026704 010600                         MOV     SP,R0                       ; SP,*
026706 104414                         TRAP    14
026710 017716 166620                  MOV     @ML.REG+130,(SP)            ;                         4451
026714 016746 166614                  MOV     ML.REG+130,-(SP)
026720 012746 012546                  MOV     #REG.7,-(SP)
026724 012746 010142                  MOV     #FMT.24,-(SP)
026730 012746 000004                  MOV     #4,-(SP)
026734 010600                         MOV     SP,R0                       ; SP,*
026736 104414                         TRAP    14
026740 017716 166600                  MOV     @ML.REG+140,(SP)            ;                         4452
026744 016746 166574                  MOV     ML.REG+140,-(SP)
026750 012746 012562                  MOV     #REG.9,-(SP)
026754 012746 010142                  MOV     #FMT.24,-(SP)
026760 012746 000004                  MOV     #4,-(SP)
```

```
                                      ;ML4AD                                                            29-Mar-1982 16:23:04   TOPS
                                      ;              ROUTINE DECLARATION SECTION                        29-Mar-1982 16:21:03   PA:<
026764  010600                                MOV     SP,R0                        ; SP,*
026766  104414                                TRAP    14
026770  017716  166620                        MOV     @ML.REG+210,(SP)             ;                                        4453
026774  016746  166614                        MOV     ML.REG+210,-(SP)
027000  012746  012620                        MOV     #REG.14,-(SP)
027004  012746  010142                        MOV     #FMT.24,-(SP)
027010  012746  000004                        MOV     #4,-(SP)
027014  010600                                MOV     SP,R0                        ; SP,*
027016  104414                                TRAP    14
027020  062706  000146                        ADD     #146,SP
027024  017716  166574                        MOV     @ML.REG+220,(SP)             ;                                        4454
027030  016746  166570                        MOV     ML.REG+220,-(SP)
027034  012746  012626                        MOV     #REG.15,-(SP)
027040  012746  010142                        MOV     #FMT.24,-(SP)
027044  012746  000004                        MOV     #4,-(SP)
027050  010600                                MOV     SP,R0                        ; SP,*
027052  104414                                TRAP    14
027054  026727  166276  000025                CMP     LST.DUT.REG,#25              ;                                        4456
027062  001032                                BNE     2$
027064  017746  166554                        MOV     @ML.REG+240,-(SP)            ;                                        4459
027070  016746  166550                        MOV     ML.REG+240,-(SP)
027074  012746  012666                        MOV     #REG.20,-(SP)
027100  012746  010142                        MOV     #FMT.24,-(SP)
027104  012746  000004                        MOV     #4,-(SP)
027110  010600                                MOV     SP,R0                        ; SP,*
027112  104414                                TRAP    14
027114  017716  166534                        MOV     @ML.REG+250,(SP)             ;                                        4460
027120  016746  166530                        MOV     ML.REG+250,-(SP)
027124  012746  012676                        MOV     #REG.21,-(SP)
027130  012746  010142                        MOV     #FMT.24,-(SP)
027134  012746  000004                        MOV     #4,-(SP)
027140  010600                                MOV     SP,R0                        ; SP,*
027142  104414                                TRAP    14
027144  062706  000022                        ADD     #22,SP                       ;                                        4458
027150  062706  000012                2$:     ADD     #12,SP                       ;                                        4439
027154  000207                                RTS     PC                           ;                                        4428

                                      ; Routine Size:  210 words
                                      ; Maximum stack depth per invocation:  52 words
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                   ROUTINE DECLARATION SECTION         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (49)

;       routine WRT_CHK_TRANSFER (SIZE, DST, SRC) : novalue =
;           begin
;
;       !++
;       !  FUNCTIONAL DESCRIPTION:
;       !       THIS ROUTINE WHEN CALLED WILL PERFORM
;       !       A MASS BUS WRITE CHECK TRANSFER TO THE REQUESTED
;       !       DESTINATION AND SOURCE ADDRESS OF LENGTH
;       !       'SIZE'.
;       !
;       !  FORMAL PARAMETERS:
;       !       SIZE:   DETERMINES THE NUMBER OF WORDS TO
;       !               TRANSFER TO THE DESTINATION ADRS.
;       !
;       !       DST:    DETERMINES THE DESTINATION ADRS OF
;       !               TRANSFER.
;       !
;       !       SRC:    DETERMINES THE SOURCE ADRS OF THE
;       !               TRANSFER.
;       !
;       !--
;
;           CLR_MBUS;                                   !CLEAR THE MASS BUS BEFORE WE START
;           ECC_DIS = ONE;                              !DISABLE ERROR CORRECTION
;           BAI = ONE;                                  !MAKE THE TRANSFER STAY ON ONE BUS ADRS
;           MLWC = .SIZE;                               !LOAD THE SIZE OF THE TRANSFER
;           MLDA = .DST;                                !LOAD THE DESTINATION ADRS OF THE TRANSFER
;           MLBA = .SRC;                                !LOAD THE SOURCE ADRS OF THE TRANSFER
;           MLCS1 = WRT_CHK;                            !LOAD THE WRITE CHECK FUNCTION INTO CS1
;
;           if (.SC) and ( not .WCE)                    !DID LOADING THE FUNCTION CAUSE A SC ERROR
;           then
;               begin
;               ERRDF (148, INTER, DUMPER);             !REPORT THE ERROR TO OPERATOR
;               PRINTB (ONE_FMT, WC_ERR);               !TELL WHAT THE ERROR IS
;               DODU (.ML_LUN);                         !DROP THE UNIT
;               DOCLN;                                  !EXIT THE PROG
;               end;
;
;           do                                          !DO NOTHING
;               0                                       !
;           until .DRY;                                 !UNTIL THE DRIVE IS READY
;
;           if (.SC) and ( not .WCE)                    !DID THE SC BIT SET DURING THE XFER
;           then
;               begin
;               ERRDF (148, INTER, DUMPER);             !REPORT THE ERROR TO OPERATOR
;               PRINTB (ONE_FMT, WC_ERR);               !TELL WHAT THE ERROR IS
;               DODU (.ML_LUN);                         !DROP THE UNIT
;               DOCLN;                                  !EXIT THE PROGRAM
;               end;
;
```

```
;ML4AD                                                               29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                      ROUTINE DECLARATION SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (49)

;              4518       end;


                                                  .SBTTL  WRT.CHK.TRANSFE ROUTINE DECLARATION SECTION
027156                                    WRT.CHK.TRANSFE:
027156  152777  000040  166260                    BISB    #40,@ML.REG+40                   ;                        4467
027164  016700  166642                            MOV     ML.DUT,R0
027170  042700  177770                            BIC     #177770,R0
027174  142777  000007  166242                    BICB    #7,@ML.REG+40
027202  150077  166236                            BISB    R0,@ML.REG+40
027206  152777  000002  166310                    BISB    #2,@ML.REG+120                   ;                        4489
027214  152777  000010  166222                    BISB    #10,@ML.REG+40                   ;                        4490
027222  016677  000006  166164                    MOV     6(SP),@ML.REG+10                 ; SIZE,*                 4491
027230  016677  000004  166176                    MOV     4(SP),@ML.REG+30                 ; DST,*                  4492
027236  016677  000002  166160                    MOV     2(SP),@ML.REG+20                 ; SRC,*                  4493
027244  012777  000051  166132                    MOV     #51,@ML.REG                      ;                        4494
027252  005777  166126                            TST     @ML.REG                          ;                        4496
027256  100026                                    BPL     1$                               ;
027260  032777  040000  166156                    BIT     #40000,@ML.REG+40
027266  001022                                    BNE     1$
027270  104455                                    TRAP    55
027272  000224                                    .WORD   224                              ;                        4499
027274  013114                                    .WORD   INTER
027276  026302                                    .WORD   DUMPER
027300  012746  005652                            MOV     #WC.ERR,-(SP)
027304  012746  010240                            MOV     #ONE.FMT,-(SP)                   ;                        4500
027310  012746  000002                            MOV     #2,-(SP)
027314  010600                                    MOV     SP,R0                            ; SP,*
027316  104414                                    TRAP    14
027320  016700  166504                            MOV     ML.LUN,R0
027324  104451                                    TRAP    51                               ;                        4501
027326  104444                                    TRAP    44
027330  062706  000006                            ADD     #6,SP                            ;                        4498
027334  105777  166114                    1$:     TSTB    @ML.REG+50                       ;                        4507
027340  100375                                    BPL     1$
027342  005777  166036                            TST     @ML.REG                          ;                        4509
027346  100026                                    BPL     2$
027350  032777  040000  166066                    BIT     #40000,@ML.REG+40
027356  001022                                    BNE     2$
027360  104455                                    TRAP    55
027362  000224                                    .WORD   224                              ;                        4512
027364  013114                                    .WORD   INTER
027366  026302                                    .WORD   DUMPER
027370  012746  005652                            MOV     #WC.ERR,-(SP)
027374  012746  010240                            MOV     #ONE.FMT,-(SP)                   ;                        4513
027400  012746  000002                            MOV     #2,-(SP)
027404  010600                                    MOV     SP,R0                            ; SP,*
```

```
                                  ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                  ;                  ROUTINE DECLARATION SECTION                  29-Mar-1982 16:21:03   PA:<

027406  104414                          TRAP    14
027410  016700  166414                  MOV     ML.LUN,R0                  ;                                             4514
027414  104451                          TRAP    51
027416  104444                          TRAP    44
027420  062706  000006                  ADD     #6,SP                      ;                                             4511
027424  000207                  2$:     RTS     PC                         ;                                             4466

                                  ; Routine Size:  84 words
                                  ; Maximum stack depth per invocation:  3 words
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;           ROUTINE DECLARATION SECTION                             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (50)
;
;           routine WRT_TRANSFER (SIZE, DST, SRC) : novalue =
;               begin
;
;           !++
;           !  FUNCTIONAL DESCRIPTION
;           !       THIS ROUTINE WHEN CALLED WILL PERFORM
;           !       A WRITE TRANSFER TO THE REQUESTED
;           !       DESTINATION AND SOURCE ADDRESSES OF
;           !       LENGTH 'SIZE'.
;           !
;           !  FORMAL PARAMETERS:
;           !       SIZE:   DETERMINES THE NUMBER OF WORDS
;           !               TO TRANSFER.
;           !       DST:    DETERMINES THE DESTINATION ADRS
;           !               OF THE TRANSFER.
;           !       SRC:    DETERMINES THE SOURCE ADRS OF THE
;           !               TRANSFER.
;           !--
;
;               CLR_MBUS;                                   !CLEAR THE MASS BUS BEFORE WE START
;               BAI = ONE;                                  !FORCE THE TRANSFER TO STAY ON ONE BUS ADRS
;               MLWC = .SIZE;                               !LOAD THE WORD COUNT SIZE
;               MLDA = .DST;                                !LOAD THE DESTINATION ADRS
;               MLBA = .SRC;                                !LOAD THE SOURCE ADRS
;               MLCS1 = write;                              !LOAD THE FUNCTION INTO CS1
;
;               if .SC                                      !DID LOADING THE FUNCTION CAUSE AN SC ERROR
;               then
;                   begin
;                   ERRDF (148, INTER, DUMPER);             !REPORT THE ERROR
;                   PRINTB (ONE_FMT, W_ERR);                !TELL WHAT THE ERROR IS
;                   DODU (.ML_LUN);                         !DROP THE UNIT
;                   DOCLN;                                  !EXIT THE PROGRAM
;                   end;
;
;               do                                          !DO NOTHING
;                   0                                       !
;               until .DRY;                                 !UNTIL THE DRIVE IS READY
;
;               if .SC                                      !DID SC ERROR SET DURING THE TRANSFER
;               then
;                   begin
;                   ERRDF (148, INTER, DUMPER);             !REPORT THE ERORR
;                   PRINTB (ONE_FMT, W_ERR);                !TELL WHAT THE ERROR IS
;                   DODU (.ML_LUN);                         !DROP THE UNIT
;                   DOCLN;                                  !EXIT THE PROGRAM
;                   end;
;
;               end;
```

```
                                      ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                      ;              ROUTINE DECLARATION SECTION              29-Mar-1982 16:21:03   PA:<


                                             .SBTTL  WRT.TRANSFER ROUTINE DECLARATION SECTION
     027426                           WRT.TRANSFER:
     027426  152777  000040  166010          BISB    #40,@ML.REG+40
     027434  016700  166372                  MOV     ML.DUT,R0                  ;                       4520
     027440  042700  177770                  BIC     #177770,R0
     027444  142777  000007  165772          BICB    #7,@ML.REG+40
     027452  150077  165766                  BISB    R0,@ML.REG+40
     027456  152777  000010  165760          BISB    #10,@ML.REG+40
     027464  016677  000006  165722          MOV     6(SP),@ML.REG+10           ;                       4539
     027472  016677  000004  165734          MOV     4(SP),@ML.REG+30           ; SIZE,*                4540
     027500  016677  000002  165716          MOV     2(SP),@ML.REG+20           ; DST,*                 4541
     027506  012777  000061  165670          MOV     #61,@ML.REG                ; SRC,*                 4542
     027514  005777  165664                  TST     @ML.REG                    ;                       4543
     027520  100022                          BPL     1$                         ;                       4545
     027522  104455                          TRAP    55
     027524  000224                          .WORD   224                        ;                       4548
     027526  013114                          .WORD   INTER
     027530  026302                          .WORD   DUMPER
     027532  012746  005722                  MOV     #W.ERR,-(SP)
     027536  012746  010240                  MOV     #ONE.FMT,-(SP)             ;                       4549
     027542  012746  000002                  MOV     #2,-(SP)
     027546  010600                          MOV     SP,R0
     027550  104414                          TRAP    14                         ; SP,*
     027552  016700  166252                  MOV     ML.LUN,R0
     027556  104451                          TRAP    51                         ;                       4550
     027560  104444                          TRAP    44
     027562  062706  000006                  ADD     #6,SP
     027566  105777  165662           1$:    TSTB    @ML.REG+50                 ;                       4547
     027572  100375                          BPL     1$                         ;                       4556
     027574  005777  165604                  TST     @ML.REG
     027600  100022                          BPL     2$                         ;                       4558
     027602  104455                          TRAP    55
     027604  000224                          .WORD   224                        ;                       4561
     027606  013114                          .WORD   INTER
     027610  026302                          .WORD   DUMPER
     027612  012746  005722                  MOV     #W.ERR,-(SP)
     027616  012746  010240                  MOV     #ONE.FMT,-(SP)             ;                       4562
     027622  012746  000002                  MOV     #2,-(SP)
     027626  010600                          MOV     SP,R0
     027630  104414                          TRAP    14                         ; SP,*
     027632  016700  166172                  MOV     ML.LUN,R0
     027636  104451                          TRAP    51                         ;                       4563
     027640  104444                          TRAP    44
     027642  062706  000006                  ADD     #6,SP
     027646  000207                   2$:    RTS     PC                         ;                       4560
                                                                                ;                       4519

                                      ; Routine Size:  73 words
                                      ; Maximum stack depth per invocation:  3 words
```

```
                              ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                              ;               ROUTINE DECLARATION SECTION                    29-Mar-1982 16:21:03   PA:<



;          4568  !<BLF/PAGE>
```

```
;ML4AD                                                     29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;               INITIALIZATION CODE SECTION                29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (52)

;       %sbttl 'INITIALIZATION CODE SECTION'
;       !
;       !
;       BGNINIT;
;       !       INITIALIZATION CODE IS EXECUTED AT THE BEGINNING OF EACH
;       !       PASS, WHEN POWER DOWN/POWER UP HAS OCCURRED, OR WHEN THE
;       !       OPERATOR HAS ISSUED A START, RESTART OR CONTINUE COMMAND.
;       !       DURING INITIALIZATION, THE 'GPHARD' MACRO IS USED TO GET
;       !       P-TABLE INFORMATION FOR THE LOGICAL UNIT UNDER TEST. THE
;       !       NUMBER OF UNITS  AVAILABLE FOR TESTING IS CONTAINED IN A
;       !       HEADER LOCATION ('L$UNIT').
;
;       local
;           OFFSET;
;
;       external
;           L$UNIT;
;
;       if not READEF (EF_CONTINUE)                      !SKIP INIT CODE IF CONTINUE
;       then
;           begin                                        !START GPHARDS AT LUN 0 AND LOAD 'ML_REG'
;
;           if READEF (EF_START)                         !SEE IF THIS IS THE VERY FIRST PASS
;           then
;               begin                                    !THIS IS CATEGORY 1 CODE
;               ML_LUN = -1;
;               DROP_CNT = ZERO;                         !CLEAR THE PASS COUNTER
;
;               do
;                   begin
;                   ML_LUN = .ML_LUN + 1;                !INCREMENT LOGICAL UNIT NUMBER
;
;                   if .ML_LUN geq .L$UNIT then DOCLN;   !START OVER IF ALL UNITS HAVE BEEN TESTED
;
;                   end
;               until (GPHARD (.ML_LUN, PTBL_PTR)) neq 0;        !REPEAT THE GPHARD UNTIL A 0 IS RETURNED
;
;               RH_ADD = .((.PTBL_PTR) + 0);             !GET BASE RH ADDRESS FOR THIS UNIT
;               RH_TYP = .((.PTBL_PTR) + 2);             !GET RH TYPE FOR THIS UNIT
;               RH_VEC = .((.PTBL_PTR) + 4);             !GET RH VECTOR FOR THIS UNIT
;               OFFSET = 0;                              !INIT OFF SET COUNT
;
;               incr COUNT from 0 to 21 do               !LOAD THE REGISTER ADDRESS FOR THIS UNIT INTO ML_REG
;                   begin
;                   ML_REG [.COUNT, REGISTER_ADD] = .RH_ADD + .OFFSET;
;                   OFFSET = .OFFSET + 2;
;                   end;
;
;               end
;           else                                         !IS THIS A NEW PASS
;               begin
;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    INITIALIZATION CODE SECTION                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (52)

                if READEF (EF_RESTART) then DROP_CNT = -1;          !RESET THE PASS COUNTER

                if READEF (EF_NEW)                          !IS THIS A NEW PASS
                then
                    begin                                   !THIS IS A NEW PASS
                    DROP_CNT = .DROP_CNT + 1;               !INCREMENT THE PASS COUNT

                    if (.ONEPAS) and (.DROP_CNT eql 1)      !HAVE WE DONE ONE PASS YET
                    then
                        begin                               !DROP THE UNIT ON THE SECOND PASS
                        DODU (.ML_LUN);                     !DROP THE UNIT
                        DOCLN;                              !JUMP TO THE CLEAN UP CODE
                        end
                    else                                    !THE FIRST PASS IS NOT COMPLETED YET
                        ML_LUN = -1;                        !RESET THE LUN POINTER

                    end;

                do
                    begin
                    ML_LUN = .ML_LUN + 1;                   !IF NOT GET NEXT LUN PTABLE

                    if .ML_LUN geq .L$UNIT then DOCLN;      !START OVER IF ALL UNITS ARE TESTED

                    end
                until (GPHARD (.ML_LUN, PTBL_PTR)) neq 0;           !REPEAT UNTIL A 0 IS RETURNED

                end;

            PAR_DIS = .((.PTBL_PTR) + 12);                  !GET PARITY DISABLE FLAG
            ML_DUT = .((.PTBL_PTR) + 10);                   !GET DRIVE NUMBER
            OP_NUM_ARR = .((.PTBL_PTR) + 6) - 1;            !GET OPERATOR NUMBER OF ARRAYS
            GOOD_BLK = ZEROES;                              !INIT GOOD BLOCK TO BLOCK ZERO
            ARR_T6 = ZEROES;                                !INIT ARRAY 16 TO ZERO
            LST_ARR = ZEROES;                               !INIT LAST ARRAY TO ZERO
            LST_BLK = ZEROES;                               !INIT LAST BLOCK TO ZERO
        !
        ! DEFINE ERROR PRINTING THRESHOLD LIMIT
        !

            if .ERRTHR then LIMIT = 10 else LIMIT = %o'077777';

        !
        ! CALCULATE THE MOS RAM SIZE RUN TIME
        ! PARAMETERS. "EITHER 16K OR 64K"
        !

            if .((.PTBL_PTR) + 8) IS_SET                    !CALCULATE ML11 16K MOS RAM PARAMETERS
            then
                begin
                DRIVE_TYPE = %o'000110';                    !EXPECTED DRIVE TYPE VALUE
                W_C_SIZE = %o'140000';                      !WORD COUNT SIZE FOR 16K WORD XFER
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       INITIALIZATION CODE SECTION             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (52)
;
;          4673              RAS_INC = %o'200';                 !RAS INCREMENT FOR 16K RAMS
;          4674              CHIP_SIZ = 16;                     !CHIP SIZE
;          4675              ARR_INC = %o'1000';                !ARRAY INCREMENT
;          4676              ARR_16<9, 4> = %o'17';             !ARRAY 16
;          4677              LST_ARR<9, 4> = .OP_NUM_ARR;       !LAST ARRAY
;          4678              LST_BLK<9, 4> = .OP_NUM_ARR;       !LAST BLOCK
;          4679              LST_BLK = .LST_BLK or %o'777';
;          4680              end
;          4681          else                                   !CALCULATE ML11 64K MOS RAM PARAMETERS
;          4682              begin
;          4683              DRIVE_TYPE = %o'000111';           !EXPECTED DRIVE TYPE VALUE
;          4684              W_C_SIZE = %o'000000';             !WORD COUNT SIZE FOR 64K WORD XFER
;          4685              RAS_INC = %o'1000';                !RAS INCREMENT FOR 64K RAMS
;          4686              CHIP_SIZ = 64;                     !CHIP SIZE
;          4687              ARR_INC = %o'4000';                !ARRAY INCREMENT
;          4688  !
;          4689  ! VERSION CZMLAD CHANGED %O'37' TO %O'17'
;          4690  !
;          4691              ARR_16<11, 4> = %o'17';            !ARRAY 16
;          4692              LST_ARR<11, 4> = .OP_NUM_ARR;      !LAST ARRAY
;          4693              LST_BLK<11, 4> = .OP_NUM_ARR;      !LAST BLOCK
;          4694              LST_BLK = .LST_BLK or %o'3777';
;          4695              end;
;          4696
;          4697          if .((.PTBL_PTR) + 2) eql %o'70' then LST_DUT_REG = 21 else LST_DUT_REG = 19;
;          4698
;          4699          PRINTB (FMT_17, .ML_LUN);              !TELL OPERATOR WHICH UNIT IS BEING TESTED
;          4700          CLR_MBUS;                              !CLEAR MASS BUS
;          4701          end;
;          4702
;          4703      ENDINIT;

                                        .GLOBL  L$UNIT



                                        .SBTTL  LINIT INITIALIZATION CODE SECTION
 027650  004167  154700         LINIT:  JSR     R1,$SAVE3
 027654  012700  000036                 MOV     #36,R0                  ;                       4567
 027660  104447                         TRAP    47                      ;                       4587
 027662  103001                         BHIS    1$
 027664  000207                         RTS     PC
 027666  012700  000040         1$:     MOV     #40,R0                  ;                       4591
 027672  104447                         TRAP    47
 027674  103063                         BHIS    5$
 027676  012767  177777  166124         MOV     #-1,ML.LUN              ;                       4594
 027704  005067  165472                 CLR     DROP.CNT                ;                       4595
```

```
7938                                      ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
7939                                      ;              INITIALIZATION CODE SECTION                 29-Mar-1982 16:21:03   PA:<
7940
7941 027710 005267 166114          2$:    INC    ML.LUN                           ;                 4599
7942 027714 026767 166110 152070          CMP    ML.LUN,L$UNIT                    ;                 4601
7943 027722 002401                        BLT    3$
7944 027724 104444                        TRAP   44
7945 027726 016700 166076          3$:    MOV    ML.LUN,R0                        ;                 4604
7946 027732 104442                        TRAP   42
7947 027734 010067 164040                 MOV    R0,PTBL.PTR
7948 027740 005767 164034                 TST    PTBL.PTR
7949 027744 001761                        BEQ    2$
7950 027746 017767 164026 166046          MOV    @PTBL.PTR,RH.ADD                 ;                 4606
7951 027754 016701 164020                 MOV    PTBL.PTR,R1                      ;                 4607
7952 027760 016167 000002 166036          MOV    2(R1),RH.TYP
7953 027766 016701 164006                 MOV    PTBL.PTR,R1                      ;                 4608
7954 027772 016167 000004 166026          MOV    4(R1),RH.VEC
7955 030000 005002                        CLR    R2                               ; OFFSET          4609
7956 030002 005001                        CLR    R1                               ; COUNT           4611
7957 030004 010100                 4$:    MOV    R1,R0                            ; COUNT,*         4613
7958 030006 006300                        ASL    R0
7959 030010 006300                        ASL    R0
7960 030012 006300                        ASL    R0
7961 030014 016703 166002                 MOV    RH.ADD,R3
7962 030020 060203                        ADD    R2,R3                            ; OFFSET,*
7963 030022 010360 015404                 MOV    R3,ML.REG(R0)
7964 030026 062702 000002                 ADD    #2,R2                            ; *,OFFSET        4614
7965 030032 005201                        INC    R1                               ; COUNT           4611
7966 030034 020127 000025                 CMP    R1,#25                           ; COUNT,*
7967 030040 003761                        BLE    4$
7968 030042 000454                        BR     10$                              ;                 4591
7969 030044 012700 000037          5$:    MOV    #37,R0                           ;                 4621
7970 030050 104447                        TRAP   47
7971 030052 103003                        BHIS   6$
7972 030054 012767 177777 165320          MOV    #-1,DROP.CNT
7973 030062 012700 000035          6$:    MOV    #35,R0                           ;                 4623
7974 030066 104447                        TRAP   47
7975 030070 103022                        BHIS   8$
7976 030072 005267 165304                 INC    DROP.CNT                         ;                 4626
7977 030076 032767 000001 152302          BIT    #1,ONEPAS                        ;                 4628
7978 030104 001411                        BEQ    7$
7979 030106 026727 165270 000001          CMP    DROP.CNT,#1
7980 030114 001005                        BNE    7$
7981 030116 016700 165706                 MOV    ML.LUN,R0                        ;                 4631
7982 030122 104451                        TRAP   51
7983 030124 104444                        TRAP   44
7984 030126 000403                        BR     8$
7985 030130 012767 177777 165672   7$:    MOV    #-1,ML.LUN                       ;                 4628
7986 030136 005267 165666          8$:    INC    ML.LUN                           ;                 4635
7987 030142 026767 165662 151642          CMP    ML.LUN,L$UNIT                    ;                 4641
7988 030150 002401                        BLT    9$                               ;                 4643
7989 030152 104444                        TRAP   44
7990 030154 016700 165650          9$:    MOV    ML.LUN,R0                        ;                 4646
7991 030160 104442                        TRAP   42
7992 030162 010067 163612                 MOV    R0,PTBL.PTR
```

```
                                   ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                   ;          INITIALIZATION CODE SECTION                      29-Mar-1982 16:21:03   PA:<

030166  005767  163606                    TST     PTBL.PTR
030172  001761                            BEQ     8$
030174  016701  163600            10$:    MOV     PTBL.PTR,R1
030200  016167  000014  163602            MOV     14(R1),PAR.DIS               ;          4650
030206  016701  163566                    MOV     PTBL.PTR,R1
030212  016167  000012  165612            MOV     12(R1),ML.DUT                ;          4651
030220  016701  163554                    MOV     PTBL.PTR,R1
030224  016103  000006                    MOV     6(R1),R3                     ;          4652
030230  005303                            DEC     R3
030232  010367  163544                    MOV     R3,OP.NUM.ARR
030236  005067  163544                    CLR     GOOD.BLK
030242  005067  163550                    CLR     ARR.16                       ;          4653
030246  005067  163546                    CLR     LST.ARR                      ;          4654
030252  005067  163536                    CLR     LST.BLK                      ;          4655
030256  032767  000001  152116            BIT     #1,ERRTHR                    ;          4656
030264  001404                            BEQ     11$                          ;          4661
030266  012767  000012  165104            MOV     #12,LIMIT
030274  000403                            BR      12$
030276  012767  077777  165074    11$:    MOV     #77777,LIMIT
030304  016701  163470            12$:    MOV     PTBL.PTR,R1
030310  026127  000010  000001            CMP     10(R1),#1                    ;          4668
030316  001054                            BNE     13$
030320  012767  000110  165026            MOV     #110,DRIVE.TYPE
030326  012767  140000  165010            MOV     #-40000,W.C.SIZE             ;          4671
030334  012767  000200  165004            MOV     #200,RAS.INC                 ;          4672
030342  012767  000020  163442            MOV     #20,CHIP.SIZ                 ;          4673
030350  012767  001000  163426            MOV     #1000,ARR.INC                ;          4674
030356  052767  017000  163432            BIS     #17000,ARR.16                ;          4675
030364  016703  163412                    MOV     OP.NUM.ARR,R3                ;          4676
030370  000303                            SWAB    R3                           ;          4677
030372  006303                            ASL     R3
030374  042703  160777                    BIC     #160777,R3
030400  042767  017000  163412            BIC     #17000,LST.ARR
030406  050367  163406                    BIS     R3,LST.ARR
030412  016703  163364                    MOV     OP.NUM.ARR,R3
030416  000303                            SWAB    R3                           ;          4678
030420  006303                            ASL     R3
030422  042703  160777                    BIC     #160777,R3
030426  042767  017000  163360            BIC     #17000,LST.BLK
030434  050367  163354                    BIS     R3,LST.BLK
030440  052767  000777  163346            BIS     #777,LST.BLK
030446  000456                            BR      14$                          ;          4679
030450  012767  000111  164676    13$:    MOV     #111,DRIVE.TYPE              ;          4668
030456  005067  164662                    CLR     W.C.SIZE                     ;          4683
030462  012767  001000  164656            MOV     #1000,RAS.INC                ;          4684
030470  012767  000100  163314            MOV     #100,CHIP.SIZ                ;          4685
030476  012767  004000  163300            MOV     #4000,ARR.INC                ;          4686
030504  052767  074000  163304            BIS     #74000,ARR.16                ;          4687
030512  016703  163264                    MOV     OP.NUM.ARR,R3                ;          4691
030516  000303                            SWAB    R3                           ;          4692
030520  006303                            ASL     R3
030522  006303                            ASL     R3
```

```
                                        ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                        ;              INITIALIZATION CODE SECTION                      29-Mar-1982 16:21:03   PA:<

030524  006303                                  ASL     R3
030526  042703  103777                          BIC     #103777,R3
030532  042767  074000  163260                  BIC     #74000,LST.ARR
030540  050367  163254                          BIS     R3,LST.ARR
030544  016703  163232                          MOV     OP.NUM.ARR,R3                   ;                       4693
030550  000303                                  SWAB    R3
030552  006303                                  ASL     R3
030554  006303                                  ASL     R3
030556  006303                                  ASL     R3
030560  042703  103777                          BIC     #103777,R3
030564  042767  074000  163222                  BIC     #74000,LST.BLK
030572  050367  163216                          BIS     R3,LST.BLK
030576  052767  003777  163210                  BIS     #3777,LST.BLK
030604  016701  163170          14$:            MOV     PTBL.PTR,R1                     ;                       4694
030610  026127  000002  000070                  CMP     2(R1),#70                       ;                       4697
030616  001004                                  BNE     15$
030620  012767  000025  164530                  MOV     #25,LST.DUT.REG
030626  000403                                  BR      16$
030630  012767  000023  164520  15$:            MOV     #23,LST.DUT.REG
030636  016746  165166          16$:            MOV     ML.LUN,-(SP)                    ;                       4699
030642  012746  007526                          MOV     #FMT.17,-(SP)
030646  012746  000002                          MOV     #2,-(SP)
030652  010600                                  MOV     SP,R0                           ; SP,*
030654  104414                                  TRAP    14
030656  152777  000040  164560                  BISB    #40,@ML.REG+40
030664  016703  165142                          MOV     ML.DUT,R3
030670  042703  177770                          BIC     #177770,R3
030674  142777  000007  164542                  BICB    #7,@ML.REG+40
030702  150377  164536                          BISB    R3,@ML.REG+40
030706  062706  000006                          ADD     #6,SP                           ;                       4589
030712  000207                                  RTS     PC                              ;                       4567

                                        ; Routine Size:  274 words
                                        ; Maximum stack depth per invocation:  7 words




                                                .SBTTL  L$INIT INITIALIZATION CODE SECTION
030714  004767  176730          L$INIT::JSR     PC,LINIT                        ;                       4701
030720  104411                                  TRAP    11
030722  000207                                  RTS     PC
```

29-Mar-1982 16:23:04 TOPS
29-Mar-1982 16:21:03 PA:<

```
                                        ;ML4AD
                                        ;               INITIALIZATION CODE SECTION

                                        ; Routine Size:  4 words
                                        ; Maximum stack depth per invocation:  0 words

;          4704   !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;          TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (53)

;          %SBTTL 'TEST CODE SECTION'
;
;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 1
;          !
;          ! TEST NAME:            MASS BUS READY TEST
;          !
;          ! TEST DESCRIPTION:
;          !       TEST THE RH CONTROLLER FOR EXISTANCE
;          !       BY:
;          !
;          !       1.  WRITTING ONES TO THE RH CS2 REGISTER
;          !           RESULTING IN A MASS BUS CLEAR
;          !
;          !       2.  THEN READ THE CS2 REGISTER FOR CLEAR DATA
;          !
;          !--
;
;          local
;              DODU_FLG;                                  !DROP UNIT FLAG
;
;          DODU_FLG = ZERO;                               !CLEAR THE DROP UNIT FLAG
;          BGNSUB;
;          CLR_MBUS;
;          MLCS1 = ZEROES;                                !CLEAR OUT CS1
;          MLCS2 = %o'177770';                            !LOAD CS2 WITH ONES  AND FORCE A MBUS CLEAR
;          DELAY (ONE_US);
;
;          if ((.MLCS2) and (%o'177670')) neq ZERO        !SEE IF CS2 GOT CLEARED
;          then
;              begin                                      !REPORT ERROR IF NOT CLEARED
;              ERRDF (119, RH_ERROR, DUMPER);
;              PRINTB (THR_FMT, REG_17, FNC_23, PHR_4);
;              DODU_FLG = ONE;
;              end;
;
;          ENDSUB;
;
;          if .DODU_FLG IS_SET                            !DROP THE UNIT IF DODU_FLG IS SET
;          then
;              begin
;              DODU (.ML_LUN);
;              DOCLN;
;              end;
;
;          ENDTST;
```

```
                                   ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
                                   ;                 TEST CODE SECTION                             29-Mar-1982 16:21:03    PA:<

                                           .SBTTL   $T1 TEST CODE SECTION
030724  004167  153610             $T1:    JSR      R1,$SAVE2
030730  005746                             TST      -(SP)                    ;                              4703
030732  005002                             CLR      R2                       ; DODU.FLG                     4729
030734  104402                     1$:     TRAP     2
030736  152777  000040  164500             BISB     #40,@ML.REG+40           ;                              4730
030744  016701  165062                     MOV      ML.DUT,R1
030750  042701  177770                     BIC      #177770,R1
030754  142777  000007  164462             BICB     #7,@ML.REG+40
030762  150177  164456                     BISB     R1,@ML.REG+40
030766  005077  164412                     CLR      @ML.REG                  ;                              4732
030772  012777  177770  164444             MOV      #-10,@ML.REG+40          ;                              4733
031000  012700  000001                     MOV      #1,R0                    ; *,$STMP2                     4734
031004  001410                     2$:     BEQ      5$
031006  016701  151104                     MOV      L$DLY,R1                 ; *,$STMP1
031012  001403                             BEQ      4$
031014  005016                     3$:     CLR      (SP)                     ; $STMP
031016  005301                             DEC      R1                       ; $STMP1
031020  001375                             BNE      3$
031022  005300                     4$:     DEC      R0                       ; $STMP2
031024  000767                             BR       2$
031026  032777  177670  164410     5$:     BIT      #-110,@ML.REG+40         ;                              4736
031034  001424                             BEQ      6$
031036  104455                             TRAP     55                       ;                              4739
031040  000167                             .WORD    167
031042  013302                             .WORD    RH.ERROR
031044  026302                             .WORD    DUMPER
031046  012746  011676                     MOV      #PHR.4,-(SP)             ;                              4740
031052  012746  012464                     MOV      #FNC.23,-(SP)
031056  012746  012642                     MOV      #REG.17,-(SP)
031062  012746  010256                     MOV      #THR.FMT,-(SP)
031066  012746  000004                     MOV      #4,-(SP)
031072  010600                             MOV      SP,R0                    ; SP,*
031074  104414                             TRAP     14
031076  012702  000001                     MOV      #1,R2                    ; *,DODU.FLG                   4741
031102  062706  000012                     ADD      #12,SP                   ;                              4738
031106  104467                     6$:     TRAP     67                       ;                              4742
031110  006000                             ROR      R0
031112  103710                             BLO      1$
031114  005302                             DEC      R2                       ; DODU.FLG                     4746
031116  001004                             BNE      7$
031120  016700  164704                     MOV      ML.LUN,R0                ;                              4749
031124  104451                             TRAP     51
031126  104444                             TRAP     44
031130  005726                     7$:     TST      (SP)+                    ;                              4703
031132  000207                             RTS      PC

                                   ; Routine Size:  68 words
```

```
                                 ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
                                 ;              TEST CODE SECTION                                29-Mar-1982 16:21:03    PA:<

                                 ; Maximum stack depth per invocation:  9 words




                                        .SBTTL  T1 TEST CODE SECTION
 031134                          T1::
 031134   004767  177564         1$:    JSR     PC,$T1                  ;                                        4751
 031140   104466                        TRAP    66
 031142   006000                        ROR     R0
 031144   103773                        BLO     1$
 031146   000207                        RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words


 ;          4754   !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (54)
;
;                  !
;                  BGNTST;
;
;                  !++
;                  ! TEST NUMBER:  TST 2
;                  !
;                  ! TEST NAME:    MASS BUS HANDSHAKE TEST
;                  !
;                  ! TEST DESCRIPTION:
;                  !       TEST MASS BUS TO UNIBUS COMMUMICATIONS
;                  !       VIA THE CONTROL BUS BY:
;                  !
;                  !       1.  READING RH AND DRIVE REGISTERS AND
;                  !           TEST THE NON EXISTANT DRIVE 'NED'
;                  !           BIT
;                  !
;                  !--
;
;                  local
;                      SAVE,                                        !TEMPORARY SAVE LOCATION
;                      DODU_FLG;                                    !DROP UNIT FLAG
;
;                  CLR_THRESHOLD;                                   !CLEAR ERROR PRINT THRESHOLD
;                  DODU_FLG = ZERO;
;
;                  incr REG_SEL from 0 to .LST_DUT_REG do           !TEST ALL PRESENT RH REGISTERS
;                      begin
;                      BGNSUB;                                      !START OF SCOPE LOOP
;                      CLR_MBUS;
;                      SAVE = ..ML_REG [.REG_SEL, REGISTER_ADD];    !READ THE REGISTER
;                      DELAY (ONE_US);                              !DELAY ONE MICRO SECOND
;
;                      if .NED IS_SET                               !DID READ CAUSE THE NED BIT TO SET
;                      then
;                          begin                                    !REPORT AN ERROR IF SET
;                          CMP_THRESHOLD;                           !COMPARE ERROR PRINT THRESHOLD
;                          ERRDF (120, RH_ERROR, DUMPER);
;                          PRINTB (FIV_FMT, WRD_62, PHR_5, WRD_12, WRD_52, FNC_6);
;                          PRINTB (FMT_11, .ML_REG [.REG_SEL, REGISTER_ADD]);
;                          DODU_FLG = ONE;
;                          end;
;
;                      ENDSUB;                                      !END OF SCOPE LOOP
;                      end;
;
;                  if .DODU_FLG IS_SET
;                  then
;                      begin
;                      DODU (.ML_LUN);
;                      DOCLN;
;                      end;
;
```

```
;ML4AD                                                 29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (54)

;               4807    ENDTST;


                                            .SBTTL  $T2 TEST CODE SECTION
031150  004167  153436              $T2:    JSR     R1,$SAVE5
031154  024646                              CMP     -(SP),-(SP)                      ;                        4753
031156  005067  164214                      CLR     P.CNT                            ;                        4775
031162  005001                              CLR     R1                               ; DODU.FLG               4778
031164  016746  164166                      MOV     LST.DUT.REG,-(SP)                ;                        4780
031170  005002                              CLR     R2                               ; REG.SEL
031172  000517                              BR      9$
031174  010200                      1$:     MOV     R2,R0                            ; REG.SEL,*              4784
031176  006300                              ASL     R0
031200  006300                              ASL     R0
031202  006300                              ASL     R0
031204  010003                              MOV     R0,R3
031206  104402                      2$:     TRAP    2
031210  152777  000040  164226              BISB    #40,@ML.REG+40                   ;                        4781
031216  016705  164610                      MOV     ML.DUT,R5                        ;                        4782
031222  042705  177770                      BIC     #177770,R5
031226  142777  000007  164210              BICB    #7,@ML.REG+40
031234  150577  164204                      BISB    R5,@ML.REG+40
031240  017366  015404  000002              MOV     @ML.REG(R3),2(SP)                ; *,SAVE                 4784
031246  012704  000001                      MOV     #1,R4                            ; *,$$TMP2               4785
031252  001411                      3$:     BEQ     6$
031254  016705  150636                      MOV     L$DLY,R5                         ; *,$$TMP1
031260  001404                              BEQ     5$
031262  005066  000004              4$:     CLR     4(SP)                            ; $$TMP
031266  005305                              DEC     R5                               ; $$TMP1
031270  001374                              BNE     4$
031272  005304                      5$:     DEC     R4                               ; $$TMP2
031274  000766                              BR      3$
031276  032777  010000  164140      6$:     BIT     #10000,@ML.REG+40                ;                        4787
031304  001446                              BEQ     7$
031306  005267  164064                      INC     P.CNT                            ;                        4789
031312  026767  164060  164060              CMP     P.CNT,LIMIT
031320  003043                              BGT     8$
031322  104455                              TRAP    55                               ;                        4791
031324  000170                              .WORD   170
031326  013302                              .WORD   RH.ERROR
031330  026302                              .WORD   DUMPER
031332  012746  012226                      MOV     #FNC.6,-(SP)                     ;                        4792
031336  012746  011310                      MOV     #WRD.52,-(SP)
031342  012746  010650                      MOV     #WRD.12,-(SP)
031346  012746  011714                      MOV     #PHR.5,-(SP)
031352  012746  011432                      MOV     #WRD.62,-(SP)
031356  012746  010304                      MOV     #FIV.FMT,-(SP)
```

```
                                ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION                          29-Mar-1982 16:21:03   PA:<
031362  012746  000006                  MOV     #6,-(SP)
031366  010600                          MOV     SP,R0                   ; SP,*
031370  104414                          TRAP    14
031372  016316  015404                  MOV     ML.REG(R3),(SP)         ;                                         4793
031376  012746  007170                  MOV     #FMT.11,-(SP)
031402  012746  000002                  MOV     #2,-(SP)
031406  010600                          MOV     SP,R0                   ; SP,*
031410  104414                          TRAP    14
031412  012701  000001                  MOV     #1,R1                   ; *,DODU.FLG                              4794
031416  062706  000022                  ADD     #22,SP                  ;                                         4789
031422  104467                  7$:     TRAP    67                      ;                                         4795
031424  006000                          ROR     R0
031426  103667                          BLO     2$
031430  005202                  8$:     INC     R2                      ; REG.SEL                                 4780
031432  020216                  9$:     CMP     R2,(SP)                 ; REG.SEL,*
031434  003657                          BLE     1$
031436  005301                          DEC     R1                      ; DODU.FLG                                4800
031440  001004                          BNE     10$
031442  016700  164362                  MOV     ML.LUN,R0               ;                                         4803
031446  104451                          TRAP    51
031450  104444                          TRAP    44
031452  062706  000006          10$:    ADD     #6,SP                   ;                                         4753
031456  000207                          RTS     PC

                                ; Routine Size:  100 words
                                ; Maximum stack depth per invocation:  18 words




                                        .SBTTL  T2 TEST CODE SECTION
031460                          T2::
031460  004767  177464          1$:     JSR     PC,$T2                  ;                                         4805
031464  104466                          TRAP    66
031466  006000                          ROR     R0
031470  103773                          BLO     1$
031472  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;               4808  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;              TEST CODE SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (55)

;                                                          !
;              BGNTST;
;
;              !++
;              ! TEST NUMBER:  TST 3
;              !
;              ! TEST NAME:    DRIVE PRESENT TEST
;              !
;              ! TEST DESCRIPTION:
;              !        THIS TEST READS THE DESIRED SECTOR
;              !        ADDRESS REGISTER OF THE DRIVE UNDER
;              !        TEST, DELAYS 100 US, THEN
;              !        READS THE  NED BIT OF MLCS2
;              !
;              !        IF SET, AN ERROR MESSAGE IS
;              !        PRINTED AND THE UNIT IS DROPPED
;              !
;              !--
;
;              local
;                  DODU_FLG,                              !DROP UNIT FLAG
;                  SAVE;                                  !TEMP STORAGE LOCATION
;
;              DODU_FLG = ZERO;
;              BGNSUB;
;              CLR_MBUS;
;              SAVE = .MLDA;                              !READ A DRIVE REGISTER
;              DELAY (ONE_US);                            !DELAY 1 US
;
;              if .NED IS_SET                             !TEST THE NED BIT
;              then
;                  begin
;                  ERRDF (1, ASYNC, DUMPER);              !IF SET THEN REPORT ERROR AND SET DODU_FLG
;                  PRINTB (ONE_FMT, PHR_3);
;                  DODU_FLG = ONE;
;                  end;
;
;              ENDSUB;
;
;              if .DODU_FLG IS_SET                        !DROP THIS UNIT IF DODU IS_SET
;              then
;                  begin
;                  DODU (.ML_LUN);
;                  DOCLN;
;                  end;
;
;              ENDTST;


                              .SBTTL  $T3 TEST CODE SECTION
```

```
                                  ;ML4AD                                                 29-Mar-1982 16:23:04  TOPS
                                  ;                 TEST CODE SECTION                    29-Mar-1982 16:21:03  PA:<
031474  004167  153072            $T3:    JSR     R1,$SAVE4
031500  005746                            TST     -(SP)                    ;                                   4807
031502  005003                            CLR     R3                       ; DODU.FLG                          4832
031504  104402                    1$:     TRAP    2
031506  152777  000040  163730            BISB    #40,@ML.REG+40           ;                                   4833
031514  016702  164312                    MOV     ML.DUT,R2
031520  042702  177770                    BIC     #177770,R2
031524  142777  000007  163712            BICB    #7,@ML.REG+40
031532  150277  163706                    BISB    R2,@ML.REG+40
031536  017704  163672                    MOV     @ML.REG+30,R4            ; *,SAVE                            4835
031542  012701  000001                    MOV     #1,R1                    ; *,$$TMP2                          4836
031546  001410                    2$:     BEQ     5$
031550  016702  150342                    MOV     L$DLY,R2                 ; *,$$TMP1
031554  001403                            BEQ     4$
031556  005016                    3$:     CLR     (SP)                     ; $$TMP
031560  005302                            DEC     R2                       ; $$TMP1
031562  001375                            BNE     3$
031564  005301                    4$:     DEC     R1                       ; $$TMP2
031566  000767                            BR      2$
031570  032777  010000  163646    5$:     BIT     #10000,@ML.REG+40        ;                                   4838
031576  001420                            BEQ     6$
031600  104455                            TRAP    55                       ;                                   4841
031602  000001                            .WORD   1
031604  012706                            .WORD   ASYNC
031606  026302                            .WORD   DUMPER
031610  012746  011644                    MOV     #PHR.3,-(SP)             ;                                   4842
031614  012746  010240                    MOV     #ONE.FMT,-(SP)
031620  012746  000002                    MOV     #2,-(SP)
031624  010600                            MOV     SP,R0                    ; SP,*
031626  104414                            TRAP    14
031630  012703  000001                    MOV     #1,R3                    ; *,DODU.FLG                        4843
031634  062706  000006                    ADD     #6,SP                    ;                                   4840
031640  104467                    6$:     TRAP    67                       ;                                   4844
031642  006000                            ROR     R0                       ;
031644  103717                            BLO     1$
031646  005303                            DEC     R3                       ; DODU.FLG                          4848
031650  001004                            BNE     7$
031652  016700  164152                    MOV     ML.LUN,R0                ;                                   4851
031656  104451                            TRAP    51
031660  104444                            TRAP    44
031662  005726                    7$:     TST     (SP)+                    ;                                   4807
031664  000207                            RTS     PC

                                  ; Routine Size:  61 words
                                  ; Maximum stack depth per invocation:  9 words
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       TEST CODE SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (55)



                                        .SBTTL  T3 TEST CODE SECTION
 031666                          T3::
 031666  004767  177602          1$:    JSR     PC,$T3                          ;                       4853
 031672  104466                         TRAP    66
 031674  006000                         ROR     R0
 031676  103773                         BLO     1$
 031700  000207                         RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words


;            4856  !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (56)

;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 4
;       !
;       ! TEST NAME:    DRIVE SELECTION TEST
;       !
;       ! TEST DESCRIPTION:
;       !       THIS TEST TESTS FOR UNIQUE DRIVE SELECTION BY WRITING THE DRIVE
;       !       UNDER TEST (DUT) DRIVE NUMBER INTO ITS DSA REG.  THEN WRITING THE DRIVE
;       !       NUMBERS OF OTHER DRIVES INTO THEIR RESPECTIVE DSA REGISTERS
;       !       AND READING THE DUT DSA FOR ITS DRIVE NUMBER.
;       !
;       ! IMPLICIT INPUTS:
;       !       ML_DUT
;       !       LOADED DURING THE INITIALIZATION CODE AND CONTAINS THE DRIVE
;       !       NUMBER OF THE DRIVE PRESENTLY BEING TESTED.
;       !--
;
;       local
;           SAVE;                                           !TEMPORARY SAVE LOCATION
;
;       BGNSUB;
;       CLR_MBUS;
;       MLDA = .ML_DUT;                                     !LOAD THIS DRIVES DRIVE NO. INTO ITS DSA REG
;       SAVE = .MLDA;                                       !READ THE REGISTER BACK
;
;       if .SAVE neq .ML_DUT                                !SEE IF DSA HAS DRIVE NUMBER
;       then
;           begin
;           ERRDF (2, INTER, DUMPER);                       !ERROR AND EXIT TEST IF DSA NEQ DRIVE NUM
;           PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_3, WRD_37, WRD_13, REG_6);
;           PRINTB (FMT_2, .ML_DUT, .SAVE, (.ML_DUT xor .SAVE));
;           EXIT_TST;
;           end;
;
;       incr DRV_SEL from 0 to 7 do                         !WRITE DRV NO OF OTHER DRIVES INTO THEIR RESPECTIVE DSA REG.
;
;           if .DRV_SEL neq .ML_DUT                         !SKIP IF .DRV_SEL EQL TO THE DRIVE UNDER TEST (DUT)
;           then
;               begin
;               DRV_NUM = .DRV_SEL;                         !SELECT DRIVE TO BE WRITTEN TO
;               MLDA = .DRV_SEL;                            !WRITE DRIVE SEL NO. INTO ITS DSA REG
;               DELAY (ONE_US);                             !DELAY 1 US
;               end;
;
;       DRV_NUM = .ML_DUT;                                  !SELECT THE DUT
;       SAVE = .MLDA;                                       !READ ITS DSA REG
;
;       if .SAVE neq .ML_DUT                                !SEE IF WRITTING TO OTHER DRIVES CHANGE ITS VALUE
;       then
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                   TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (56)

;          4909         begin
;          4910         ERRDF (3, ASYNC, DUMPER);                     !ERROR AND SET DODU_FLG IF CHANGED
;          4911         PRINTB (THR_FMT, FNC_3, WRD_37, WRD_14);
;          4912         PRINTB (FMT_1, .ML_DUT, .SAVE);
;          4913         end;
;          4914
;          4915     ENDSUB;
;          4916     ENDTST;


                                              .SBTTL  $T4 TEST CODE SECTION
031702  004167  152646            $T4:        JSR     R1,$SAVE3
031706  005746                                TST     -(SP)                      ;                  4855
031710  104402                    1$:         TRAP    2
031712  152777  000040  163524                BISB    #40,@ML.REG+40             ;                  4878
031720  016702  164106                        MOV     ML.DUT,R2                  ;                  4880
031724  042702  177770                        BIC     #177770,R2
031730  142777  000007  163506                BICB    #7,@ML.REG+40
031736  150277  163502                        BISB    R2,@ML.REG+40
031742  016777  164064  163464                MOV     ML.DUT,@ML.REG+30
031750  017703  163460                        MOV     @ML.REG+30,R3              ;                  4882
031754  020367  164052                        CMP     R3,ML.DUT                  ; *,SAVE           4883
031760  001451                                BEQ     2$                         ; SAVE,*           4885
031762  104455                                TRAP    55
031764  000002                                .WORD   2                          ;                  4888
031766  013114                                .WORD   INTER
031770  026302                                .WORD   DUMPER
031772  012746  012540                        MOV     #REG.6,-(SP)
031776  012746  010660                        MOV     #WRD.13,-(SP)              ;                  4889
032002  012746  011122                        MOV     #WRD.37,-(SP)
032006  012746  012172                        MOV     #FNC.3,-(SP)
032012  012746  010650                        MOV     #WRD.12,-(SP)
032016  012746  011676                        MOV     #PHR.4,-(SP)
032022  012746  010322                        MOV     #SIX.FMT,-(SP)
032026  012746  000007                        MOV     #7,-(SP)
032032  010600                                MOV     SP,R0                      ; SP,*
032034  104414                                TRAP    14
032036  016716  163770                        MOV     ML.DUT,(SP)                ;                  4890
032042  010302                                MOV     R3,R2                      ; SAVE,*
032044  041602                                BIC     (SP),R2
032046  040316                                BIC     R3,(SP)                    ; SAVE,*
032050  050216                                BIS     R2,(SP)
032052  010346                                MOV     R3,-(SP)                   ; SAVE,*
032054  016746  163752                        MOV     ML.DUT,-(SP)
032060  012746  006506                        MOV     #FMT.2,-(SP)
032064  012746  000004                        MOV     #4,-(SP)
032070  010600                                MOV     SP,R0                      ; SP,*
```

```
                                          ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
                                          ;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<
032072  104414                                  TRAP    14
032074  104463                                  TRAP    63
032076  062706  000030                          ADD     #30,SP                          ;                               4885
032102  000513                                  BR      9$                              ;                               4887
032104  005002                          2$:     CLR     R2                              ; DRV.SEL                       4894
032106  020267  163720                  3$:     CMP     R2,ML.DUT                       ; DRV.SEL,*                     4896
032112  001425                                  BEQ     7$
032114  010201                                  MOV     R2,R1                           ; DRV.SEL,*                     4899
032116  042701  177770                          BIC     #177770,R1
032122  142777  000007  163314                  BICB    #7,@ML.REG+40
032130  150177  163310                          BISB    R1,@ML.REG+40
032134  010277  163274                          MOV     R2,@ML.REG+30                   ; DRV.SEL,*                     4900
032140  012700  000001                          MOV     #1,R0                           ; *,$STMP2                      4901
032144  001410                          4$:     BEQ     7$
032146  016701  147744                          MOV     L$DLY,R1                        ; *,$STMP1
032152  001403                                  BEQ     6$
032154  005016                          5$:     CLR     (SP)                            ; $STMP
032156  005301                                  DEC     R1                              ; $STMP1
032160  001375                                  BNE     5$
032162  005300                          6$:     DEC     R0                              ; $STMP2
032164  000767                                  BR      4$
032166  005202                          7$:     INC     R2                              ; DRV.SEL                       4894
032170  020227  000007                          CMP     R2,#7                           ; DRV.SEL,*
032174  003744                                  BLE     3$
032176  016702  163630                          MOV     ML.DUT,R2                       ;                               4904
032202  042702  177770                          BIC     #177770,R2
032206  142777  000007  163230                  BICB    #7,@ML.REG+40
032214  150277  163224                          BISB    R2,@ML.REG+40
032220  017703  163210                          MOV     @ML.REG+30,R3                   ; *,SAVE                        4905
032224  020367  163602                          CMP     R3,ML.DUT                       ; SAVE,*                        4907
032230  001433                                  BEQ     8$
032232  104455                                  TRAP    55                              ;                               4910
032234  000003                                  .WORD   3
032236  012706                                  .WORD   ASYNC
032240  026302                                  .WORD   DUMPER
032242  012746  010664                          MOV     #WRD.14,-(SP)                   ;                               4911
032246  012746  011122                          MOV     #WRD.37,-(SP)
032252  012746  012172                          MOV     #FNC.3,-(SP)
032256  012746  010256                          MOV     #THR.FMT,-(SP)
032262  012746  000004                          MOV     #4,-(SP)
032266  010600                                  MOV     SP,R0                           ; SP,*
032270  104414                                  TRAP    14
032272  010316                                  MOV     R3,(SP)                         ; SAVE,*                        4912
032274  016746  163532                          MOV     ML.DUT,-(SP)
032300  012746  006442                          MOV     #FMT.1,-(SP)
032304  012746  000003                          MOV     #3,-(SP)
032310  010600                                  MOV     SP,R0                           ; SP,*
032312  104414                                  TRAP    14
032314  062706  000020                          ADD     #20,SP                          ;                               4909
032320  104467                          8$:     TRAP    67                              ;                               4913
032322  006000                                  ROR     R0
032324  103002                                  BHIS    9$
```

```
                                    ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                    ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
     032326  000167  177356                 JMP     1$
     032332  005726                 9$:     TST     (SP)+
     032334  000207                         RTS     PC                          ;                                    4855

                                    ; Routine Size:  142 words
                                    ; Maximum stack depth per invocation:  17 words



                                            .SBTTL  T4 TEST CODE SECTION
     032336                         T4::
     032336  004767  177340         1$:     JSR     PC,$T4                      ;                                    4915
     032342  104466                         TRAP    66
     032344  006000                         ROR     R0
     032346  103773                         BLO     1$
     032350  000207                         RTS     PC

                                    ; Routine Size:  6 words
                                    ; Maximum stack depth per invocation:  0 words


     ;          4917  !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
        TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (57)

!
BGNTST;

!++
! TEST NUMBER:  TST 5
!
! TEST NAME:    READ WRITE REG ONES/ZEROES TEST
!
! TEST DESCRIPTION:
!       THIS TEST WRITES AND READS A DATA PATTERN OF ALL ONES AND ZEROES TO ALL
!       OF THE ML11'S READ / WRITE REGISTERS.
!
!       ROUTINES WRT_REG AND RD_REG ACCEPT ARGUMENTS TO FURTHER SELECT ROUTINES
!       WHICH ACTUALLY PERFORMS THE READING AND WRITING OF THE REGISTERS.
!
!       THE UNIT IS DROPPED ON DETECTED ERRORS.
!
! IMPLICIT INPUTS:
!       WT_DATA
!       LOADED BY READ REGISTER ROUTINES AND CONTAINS THE DATA PATTERN WRITTEN
!       TO THE REGISTERS (REPRESENTS GOOD DATA).
!
!       RD_DATA
!       LOADED BY THE READ REGISTER ROUTINES AND CONTAINS THE DATA PATTERN
!       READ FROM THE REGISTER (REPRESENTS BAD DATA).
!--

local
    ERR_FLG,                                        !ERROR FLAG PASSED TO ROUTINES
    TST_PAT,                                        !TEST PATTERN
    index,                                          !POINTS TO REGISTER PRESENTLY BEING TESTED
    DODU_FLG;                                       !DROP UNIT FLAG

CLR_THRESHOLD;                                      !CLEAR ERROR PRINT THRESHOLD
DODU_FLG = ZERO;
TST_PAT = ONES;                                     !LOAD TEST PAT WITH ONES

incr TWICE from 0 to 1 do                           !REPEAT LOOP TWICE
    begin

    incr REG_SEL from 0 to 7 do                     !TEST ELEVEN WRITE/READ REGISTERS
        begin
        BGNSUB;
        CLR_MBUS;
        WRT_REG (.TST_PAT, .REG_SEL, index);        !WRITE TO THE REGISTER
        RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);       !READ THE REGISTER

        if .ERR_FLG IS_SET                          !SEE IF READ FOUND AN ERROR
        then
            begin                                   !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
            CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
```

```
8846 ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
8847 ;              TEST CODE SECTION                          29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (57)
8848
8849 ;       4970                selectone .REG_SEL of          !SELECT WHICH MODULE FAILED
8850 ;       4971                    set
8851 ;       4972
8852 ;       4973                    [0 to 3] :
8853 ;       4974                        ERRDF (4, ASYNC, DUMPER);    !ASYNC MODULE FAILURE
8854 ;       4975
8855 ;       4976                    [4 to 5] :
8856 ;       4977                        ERRDF (4, SYNC, DUMPER);     !SYNC MODULE FAILURE
8857 ;       4978
8858 ;       4979                    [6 to 7] :
8859 ;       4980                        ERRDF (4, ARR_DAT, DUMPER); !ARRAY DATA MODULE FAILURE
8860 ;       4981                    tes;
8861 ;       4982
8862 ;       4983                PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
8863 ;       4984                PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
8864 ;       4985                DODU_FLG = ONE;
8865 ;       4986                end;
8866 ;       4987
8867 ;       4988            ENDSUB;
8868 ;       4989            end;
8869 ;       4990
8870 ;       4991        TST_PAT = not .TST_PAT;                    !REPEAT AGAIN WITH COMPLIMENT DATA
8871 ;       4992        end;
8872 ;       4993
8873 ;       4994    if .DODU_FLG IS_SET                            !DROP THIS UNIT IF THE DODU_FLG IS_SET
8874 ;       4995    then
8875 ;       4996        begin
8876 ;       4997        DODU (.ML_LUN);
8877 ;       4998        DOCLN;
8878 ;       4999        end;
8879 ;       5000
8880 ;       5001    ENDTST;
8884
8885
8889 032352  004167  152214              .SBTTL  $T5 TEST CODE SECTION
                                  $T5:  JSR     R1,$SAVE4                   ;                  4916
8890 032356  024646                     CMP     -(SP),-(SP)                 ;
8891 032360  005067  163012             CLR     P.CNT                       ;                  4949
8892 032364  005004                     CLR     R4                          ; DODU.FLG         4952
8893 032366  012702  177777             MOV     #-1,R2                      ; *,TST.PAT        4953
8894 032372  005001                     CLR     R1                          ; TWICE            4955
8895 032374  005003              1$:    CLR     R3                          ; REG.SEL          4958
8896 032376  104402              2$:    TRAP    2                           ;                  4959
8897 032400  152777  000040  163036     BISB    #40,@ML.REG+40              ;                  4960
8898 032406  016700  163420             MOV     ML.DUT,R0
8899 032412  042700  177770             BIC     #177770,R0
8900 032416  142777  000007  163020     BICB    #7,@ML.REG+40
```

```
                                 ;ML4AD                                                         29-Mar-1982 16:23:04   TOPS
                                 ;                TEST CODE SECTION                             29-Mar-1982 16:21:03   PA:<

032424  150077  163014                    BISB    R0,@ML.REG+40
032430  010246                            MOV     R2,-(SP)                    ; TST.PAT,*                    4962
032432  010346                            MOV     R3,-(SP)                    ; REG.SEL,*
032434  012746  000010                    MOV     #10,-(SP)
032440  060616                            ADD     SP,(SP)                     ; INDEX,*
032442  004767  172656                    JSR     PC,WRT.REG
032446  010216                            MOV     R2,(SP)                     ; TST.PAT,*                    4963
032450  010346                            MOV     R3,-(SP)                    ; REG.SEL,*
032452  012746  000012                    MOV     #12,-(SP)
032456  060616                            ADD     SP,(SP)                     ; ERR.FLG,*
032460  004767  173226                    JSR     PC,RD.REG
032464  026627  000012  000001            CMP     12(SP),#1                   ; ERR.FLG,*                    4965
032472  001117                            BNE     7$
032474  005267  162676                    INC     P.CNT                       ;                              4967
032500  026767  162672  162672            CMP     P.CNT,LIMIT
032506  003403                            BLE     3$
032510  062706  000012                    ADD     #12,SP
032514  000513                            BR      8$
032516  005703                    3$:     TST     R3                          ; REG.SEL                      4970
032520  002410                            BLT     4$
032522  020327  000003                    CMP     R3,#3                       ; REG.SEL,*
032526  003005                            BGT     4$
032530  104455                            TRAP    55                          ;                              4974
032532  000004                            .WORD   4
032534  012706                            .WORD   ASYNC
032536  026302                            .WORD   DUMPER
032540  000425                            BR      6$                          ;                              4970
032542  020327  000004            4$:     CMP     R3,#4                       ; REG.SEL,*
032546  002410                            BLT     5$
032550  020327  000005                    CMP     R3,#5                       ; REG.SEL,*
032554  003005                            BGT     5$
032556  104455                            TRAP    55                          ;                              4977
032560  000004                            .WORD   4
032562  012750                            .WORD   SYNC
032564  026302                            .WORD   DUMPER
032566  000412                            BR      6$                          ;                              4970
032570  020327  000006            5$:     CMP     R3,#6                       ; REG.SEL,*
032574  002407                            BLT     6$
032576  020327  000007                    CMP     R3,#7                       ; REG.SEL,*
032602  003004                            BGT     6$
032604  104455                            TRAP    55                          ;                              4980
032606  000004                            .WORD   4
032610  013012                            .WORD   ARR.DAT
032612  026302                            .WORD   DUMPER
032614  012746  011344            6$:     MOV     #WRD.56,-(SP)               ;                              4983
032620  012746  011310                    MOV     #WRD.52,-(SP)
032624  012746  012226                    MOV     #FNC.6,-(SP)
032630  012746  012216                    MOV     #FNC.5,-(SP)
032634  012746  010650                    MOV     #WRD.12,-(SP)
032640  012746  011676                    MOV     #PHR.4,-(SP)
032644  012746  010322                    MOV     #SIX.FMT,-(SP)
032650  012746  000007                    MOV     #7,-(SP)
```

```
                                 ;ML4AD                                                   29-Mar-1982 16:23:04   TOPS
                                 ;            TEST CODE SECTION                           29-Mar-1982 16:21:03   PA:<
032654  010600                          MOV     SP,R0                   ; SP,*
032656  104414                          TRAP    14
032660  016716  162466                  MOV     RD.DATA,(SP)            ;                                        4984
032664  016746  162460                  MOV     WT.DATA,-(SP)
032670  016600  000036                  MOV     36(SP),R0               ; INDEX,*
032674  006300                          ASL     R0
032676  006300                          ASL     R0
032700  006300                          ASL     R0
032702  016046  015404                  MOV     ML.REG(R0),-(SP)
032706  012746  007436                  MOV     #FMT.16,-(SP)
032712  012746  000004                  MOV     #4,-(SP)
032716  010600                          MOV     SP,R0                   ; SP,*
032720  104414                          TRAP    14
032722  012704  000001                  MOV     #1,R4                   ; *,DODU.FLG                             4985
032726  062706  000030                  ADD     #30,SP                  ;                                        4967
032732  062706  000012          7$:     ADD     #12,SP                  ;                                        4959
032736  104467                          TRAP    67                      ;                                        4986
032740  006000                          ROR     R0
032742  103615                          BLO     2$
032744  005203                  8$:     INC     R3                      ; REG.SEL                                4958
032746  020327  000007                  CMP     R3,#7                   ; REG.SEL,*
032752  003611                          BLE     2$
032754  005102                          COM     R2                      ; TST.PAT                                4991
032756  005201                          INC     R1                      ; TWICE                                  4955
032760  020127  000001                  CMP     R1,#1                   ; TWICE,*
032764  003603                          BLE     1$
032766  005304                          DEC     R4                      ; DODU.FLG                               4994
032770  001004                          BNE     9$
032772  016700  163032                  MOV     ML.LUN,R0               ;                                        4997
032776  104451                          TRAP    51
033000  104444                          TRAP    44
033002  022626                  9$:     CMP     (SP)+,(SP)+             ;                                        4916
033004  000207                          RTS     PC

                                ; Routine Size:  142 words
                                ; Maximum stack depth per invocation:  24 words



                                        .SBTTL  T5 TEST CODE SECTION
033006                          T5::
033006  004767  177340          1$:     JSR     PC,$T5                  ;                                        4999
```

```
                                 ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                 ;               TEST CODE SECTION               29-Mar-1982 16:21:03   PA:<

033012  104466                           TRAP    66
033014  006000                           ROR     R0
033016  103773                           BLO     1$
033020  000207                           RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words


;            5002  !<BLF/PAGE>
```

```
;ML4AD                                                           29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                                29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (58)

;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 6
;               !
;               ! TEST NAME:    READ WRITE REG SHIFTING ONES/ZEROES TEST
;               !
;               ! TEST DESCRIPTION:
;               !       THIS TEST WRITES AND READS A
;               !       SHIFTING ONE'S AND SHIFTING ZEROE'S
;               !       PATTERN TO ALL THE ML11'S
;               !       READ/WRITE REGISTERS
;               !
;               !       ROUTINES WRT_REG AND RD_REG
;               !       ACCEPT ARGUMENTS TO FURTHER
;               !       SELECT ROUTINES WHICH ACTUALLY
;               !       PERFORMS THE READING AND
;               !       WRITING OF THE REGISTERS.
;               !
;               !       THE DRIVE IS DROPPED ON DETECTED
;               !       ERRORS.
;               !
;               ! IMPLICIT INPUTS:
;               !       WT_DATA
;               !         LOADED BY READ REGISTER ROUTINES AND
;               !         CONTAINS THE DATA PATTERN WRITTEN TO THE
;               !         REGISTERS (REPRESENTS GOOD DATA).
;               !
;               !       RD_DATA
;               !         LOADED BY THE READ REGISTER ROUTINES AND
;               !         CONTAINS THE DATA PATTERN READ FROM THE
;               !         REGISTER (REPRESENTS BAD DATA).
;               !
;               !
;               !--
;
;               local
;                   ERR_FLG,                              !ERROR FLAG PASSED TO ROUTINE
;                   TST_PAT,                              !TEST PATTERN
;                   index,                                !POINTS TO REG PRESENTLY BEING TESTED
;                   DODU_FLG;                             !DROP UNIT FLAG
;
;               CLR_THRESHOLD;                            !CLEAR ERROR PRINT THRESHOLD
;               DODU_FLG = ZERO;
;               TST_PAT = ONE;                            !LOAD TST_PAT WITH A 1 IN A FILED OF 0'S
;
;               incr SHIFT from 0 to 15 do                !DO SHIFT 16 TIMES
;                   begin
;
;                   incr TWICE from 0 to 1 do             !REPEAT LOOP TWICE
;                       begin
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (58)

;
;                 incr REG_SEL from 0 to 7 do             !TEST ELEVEN READ/WRITE REGISTERS
;                     begin
;                     BGNSUB;
;                     CLR_MBUS;
;                     WRT_REG (.TST_PAT, .REG_SEL, index);         !WRITE TO THE REGISTER
;                     RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);        !READ THE REGISTER
;
;                     if .ERR_FLG IS_SET                  !SEE IF THE READ FOUND AN ERROR
;                     then
;                         begin                           !IF THE ERROR FLAG IS SET THEN ERROR
;                         CMP_THRESHOLD;                  !COMPARE ERROR PRINT THRESHOLD
;
;                         selectone .REG_SEL of           !FIND WHICH MODULE FAILED
;                             set
;
;                             [0 to 3] :
;                                 ERRDF (5, ASYNC, DUMPER);        !ASYNC MODULE FAILURE
;
;                             [4 to 5] :
;                                 ERRDF (5, SYNC, DUMPER);         !SYNC MODULE FAILURE
;
;                             [6 to 7] :
;                                 ERRDF (5, ARR_DAT, DUMPER);      !ARRAY DATA MODULE FAILURE
;                             tes;
;
;                         PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
;                         PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
;                         DODU_FLG = ONE;
;                         end;
;
;                     ENDSUB;
;                     end;
;
;                 TST_PAT = not .TST_PAT;                 !REPEAT WITH A 0 IN A FIELD OF 1'S
;                 end;
;
;             TST_PAT = .TST_PAT^ONE;                     !SHIFT THE 1 IN THE FIELD OF 0'S
;             end;
;
;         if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG IS SET
;         then
;             begin
;             DODU (.ML_LUN);
;             DOCLN;
;             end;
;
;         ENDTST;
```

```
                                  ;ML4AD                                                   29-Mar-1982 16:23:04   TGPS
                                  ;              TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<

                                          .SBTTL  $T6 TEST CODE SECTION
033022  004167  151564           $T6:     JSR     R1,$SAVE5              ;
033026  024646                            CMP     -(SP),-(SP)                                 5001
033030  005067  162342                    CLR     P.CNT                  ;
033034  005005                            CLR     R5                     ; DODU.FLG           5044
033036  012703  000001                    MOV     #1,R3                  ; *,TST.PAT          5047
033042  005001                            CLR     R1                     ; SHIFT              5048
033044  005002                   1$:      CLR     R2                     ; TWICE              5050
033046  005004                   2$:      CLR     R4                     ; REG.SEL            5053
033050  104402                   3$:      TRAP    2                      ;                    5056
033052  152777  000040  162364            BISB    #40,@ML.REG+40         ;                    5057
033060  016700  162746                    MOV     ML.DUT,R0                                   5058
033064  042700  177770                    BIC     #177770,R0
033070  142777  000007  162346            BICB    #7,@ML.REG+40
033076  150077  162342                    BISB    R0,@ML.REG+40
033102  010346                            MOV     R3,-(SP)               ; TST.PAT,*          5060
033104  010446                            MOV     R4,-(SP)               ; REG.SEL,*
033106  012746  000010                    MOV     #10,-(SP)
033112  060616                            ADD     SP,(SP)                ; INDEX,*
033114  004767  172204                    JSR     PC,WRT.REG
033120  010316                            MOV     R3,(SP)                ; TST.PAT,*          5061
033122  010446                            MOV     R4,-(SP)               ; REG.SEL,*
033124  012746  000012                    MOV     #12,-(SP)
033130  060616                            ADD     SP,(SP)                ; ERR.FLG,*
033132  004767  172554                    JSR     PC,RD.REG
033136  026627  000012  000001            CMP     12(SP),#1              ; ERR.FLG,*          5063
033144  001117                            BNE     8$
033146  005267  162224                    INC     P.CNT                  ;                    5065
033152  026767  162220  162220            CMP     P.CNT,LIMIT
033160  003403                            BLE     4$
033162  062706  000012                    ADD     #12,SP
033166  000513                            BR      9$
033170  005704                   4$:      TST     R4                     ; REG.SEL            5068
033172  002410                            BLT     5$
033174  020427  000003                    CMP     R4,#3                  ; REG.SEL,*
033200  003005                            BGT     5$
033202  104455                            TRAP    55                     ;                    5072
033204  000005                            .WORD   5
033206  012706                            .WORD   ASYNC
033210  026302                            .WORD   DUMPER
033212  000425                            BR      7$                     ;                    5068
033214  020427  000004           5$:      CMP     R4,#4                  ; REG.SEL,*
033220  002410                            BLT     6$
033222  020427  000005                    CMP     R4,#5                  ; REG.SEL,*
033226  003005                            BGT     6$
033230  104455                            TRAP    55                     ;                    5075
033232  000005                            .WORD   5
033234  012750                            .WORD   SYNC
033236  026302                            .WORD   DUMPER
```

```
                                  ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
                                  ;               TEST CODE SECTION                          29-Mar-1982 16:21:03   PA:<

033240  000412                            BR      7$                      ;                                  5068
033242  020427  000006           6$:      CMP     R4,#6                   ; REG.SEL,*
033246  002407                            BLT     7$
033250  020427  000007                    CMP     R4,#7                   ; REG.SEL,*
033254  003004                            BGT     7$
033256  104455                            TRAP    55                      ;                                  5078
033260  000005                            .WORD   5
033262  013012                            .WORD   ARR.DAT
033264  026302                            .WORD   DUMPER
033266  012746  011344           7$:      MOV     #WRD.56,-(SP)           ;                                  5081
033272  012746  011310                    MOV     #WRD.52,-(SP)
033276  012746  012226                    MOV     #FNC.6,-(SP)
033302  012746  012216                    MOV     #FNC.5,-(SP)
033306  012746  010650                    MOV     #WRD.12,-(SP)
033312  012746  011676                    MOV     #PHR.4,-(SP)
033316  012746  010322                    MOV     #SIX.FMT,-(SP)
033322  012746  000007                    MOV     #7,-(SP)
033326  010600                            MOV     SP,R0                   ; SP,*
033330  104414                            TRAP    14
033332  016716  162014                    MOV     RD.DATA,(SP)            ;                                  5082
033336  016746  162006                    MOV     WT.DATA,-(SP)
033342  016600  000036                    MOV     36(SP),R0               ; INDEX,*
033346  006300                            ASL     R0
033350  006300                            ASL     R0
033352  006300                            ASL     R0
033354  016046  015404                    MOV     ML.REG(R0),-(SP)
033360  012746  007436                    MOV     #FMT.16,-(SP)
033364  012746  000004                    MOV     #4,-(SP)
033370  010600                            MOV     SP,R0                   ; SP,*
033372  104414                            TRAP    14
033374  012705  000001                    MOV     #1,R5                   ; *,DODU.FLG                       5083
033400  062706  000030                    ADD     #30,SP                  ;                                  5065
033404  062706  000012           8$:      ADD     #12,SP                  ;                                  5057
033410  104467                            TRAP    67                      ;                                  5084
033412  006000                            ROR     R0
033414  103615                            BLO     3$
033416  005204                   9$:      INC     R4                      ; REG.SEL                          5056
033420  020427  000007                    CMP     R4,#7                   ; REG.SEL,*
033424  003611                            BLE     3$
033426  005103                            COM     R3                      ; TST.PAT                          5089
033430  005202                            INC     R2                      ; TWICE                            5053
033432  020227  000001                    CMP     R2,#1                   ; TWICE,*
033436  003603                            BLE     2$
033440  006303                            ASL     R3                      ; TST.PAT                          5092
033442  005201                            INC     R1                      ; SHIFT                            5050
033444  020127  000017                    CMP     R1,#17                  ; SHIFT,*
033450  003002                            BGT     10$
033452  000167  177366                    JMP     1$
033456  005305                   10$:     DEC     R5                      ; DODU.FLG                         5095
033460  001004                            BNE     11$
033462  016700  162342                    MOV     ML.LUN,R0               ;                                  5098
033466  104451                            TRAP    51
```

```
9256                                  ;ML4AD                                                   29-Mar-1982 16:23:04   TOPS
9257                                  ;              TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
9258
9259 033470  104444                           TRAP    44
9260 033472  022626                   11$:    CMP     (SP)+,(SP)+                    ;                              5001
9261 033474  000207                           RTS     PC
9262
9263                                  ; Routine Size:  150 words
9264                                  ; Maximum stack depth per invocation:  25 words
9269
9270
9274
9275                                          .SBTTL  T6 TEST CODE SECTION
9279 033476                           T6::
9280 033476  004767  177320           1$:     JSR     PC,$T6                         ;                              5100
9281 033502  104466                           TRAP    66
9282 033504  006000                           ROR     R0
9283 033506  103773                           BLO     1$
9284 033510  000207                           RTS     PC
9285
9286                                  ; Routine Size:  6 words
9287                                  ; Maximum stack depth per invocation:  0 words
9292
9293
9294 ;             5103  !
9295 ;             5104  !<BLF/PAGE>
```

```
;ML4AD                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (59)
;
;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 7
;               !
;               ! TEST NAME:    REGISTER INITIALIZATION TEST
;               !
;               ! TEST DESCRIPTION:
;               !       THIS TEST TESTS THE ABILITY OF
;               !       ALL ACCESSIBLE ML11 REGISTERS
;               !       TO CLEAR OUT REGISTER DATA OF
;               !       ONE'S AND ZEROES PATTERN.
;               !
;               !       ROUTINE WRT_REG WRITES A
;               !       PATTERN TO THE SELECTED REGISTER.
;               !
;               !       A MASS BUS CLEAR IS DONE.
;               !
;               !       THEN ROUTINE RD_REG READS THE
;               !       SELECTED REGISTER FOR CLEARED DATA
;               !       THE DRIVE IS DROPPED ON DETECTED ERRORS.
;               !
;               !       THIS TEST WILL ALSO READ THE
;               !       DRIVE TYPE REGISTER FOR ITS
;               !       INITIAL REGISTER VALUE.
;               !
;               ! IMPLICIT INPUTS:
;               !       THIS FLAG IS NEEDED DUE TO THE UNIQUE
;               !       MANNER IN WHICH THESE REGISTERS
;               !       MUST BE READ.
;               !
;               !       RD_DATA
;               !       LOADED BY THE READ REGISTER ROUTINE
;               !       AND CONTAINS THE DATA PATTERN READ FROM
;               !       THE REGISTER (REPRESENTS BAD DATA).
;               !
;               !       DRIVE TYPE
;               !       LOADED DURING THE INITIALIZATION CODE AND
;               !       STORES THE EXPECTED CONTENTS OF THE DRIVE
;               !       TYPE REGISTER.
;               !--
;
;               local
;                   TST_PAT,                        !TEST PATTERN
;                   ERR_FLG,                        !ERROR FLAG PASSED TO ROUTINE
;                   index,                          !POINTS TO REG PRESENTLY BEING TESTED
;                   CLR_DATA,                       !STORES CALCULATED REGISTER CLEAR DATA
;                   SAVE,                           !TEMPORARY STORAGE LOCATION
;                   DODU_FLG;                       !DROP UNIT FLAG
;
;               CLR_THRESHOLD;                      !CLEAR ERROR PRINT THRESHOLD
```

```
;ML4AD                                                       29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;         TEST CODE SECTION                                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (59)

ML_REG [19, FORCE_HI] = %o'177777';                 !CLR DATA FOR MLPD IS ONES
DODU_FLG = ZERO;
TST_PAT = ONES;                                     !BACKGROUND PATTERN

incr TWICE from 0 to 1 do                           !REPEAT LOOP TWICE
    begin

    incr REG_SEL from 0 to 10 do                    !TEST THIRTEEN REGISTERS
        begin
        BGNSUB;
        CLR_MBUS;
        WRT_REG (.TST_PAT, .REG_SEL, index);        !WRITE REGISTER WITH BACKGROUND
        CLR_DATA = (.HI) or (.IGNORE);              !CALCULATE THE CLEARED DATA PATTERN
        CLR_MBUS;                                   !CLEAR THE REGISTER
        RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG);      !READ THE REGISTER FOR THE CLEARED DATA PAT

        if .ERR_FLG IS_SET                          !SEE IF READ FOUND AN ERROR
        then
            begin                                   !IF ERROR FLAG IS SET THEN ERROR AND SET DODU_FLG
            CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD

            selectone .REG_SEL of                   !FIND WHICH MODULE FAILED
                set

                [0, 1, 2, 3, 9, 10] :
                    ERRDF (6, ASYNC, DUMPER);       !ASYNC MODULE FAILURE

                [4, 5, 8] :
                    ERRDF (6, SYNC, DUMPER);        !SYNC MODULE FAILURE

                [6 to 7] :
                    ERRDF (6, ARR_DAT, DUMPER);     !ARRAY DATA MODULE
                tes;

            PRINTB (FIV_FMT, PHR_4, WRD_12, WRD_52, FNC_23, WRD_56);
            PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
            DODU_FLG = ONE;
            end;

        ENDSUB;
        end;

    TST_PAT = not .TST_PAT;                         !REPEAT WITH COMPLIMENT BACKGROUND PAT
    end;

ML_REG [19, FORCE_HI] = ZEROES;                     !RESTORE MLPD FORCED_HI
!
!
!   NOW TEST THE DRIVE TYPE REGISTER
!
!
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (59)

;       5209    if .MLDT neq .DRIVE_TYPE                        !COMPARE REG CONTENTS TO CALCULATED VALUE
;       5210    then
;       5211        begin
;       5212        ERRDF (113, ASYNC, DUMPER);
;       5213        PRINTB (TWO_FMT, REG_7, PHR_4);
;       5214        PRINTB (FMT_2, .DRIVE_TYPE, .SAVE);
;       5215        end;
;       5216
;       5217    if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG IS_SET
;       5218    then
;       5219        begin
;       5220        DODU (.ML_LUN);
;       5221        DOCLN;
;       5222        end;
;       5223
;       5224    ENDTST;


                                        .SBTTL  $T7 TEST CODE SECTION
033512  004167  151074          $T7:    JSR     R1,$SAVE5                       ;                       5102
033516  162706  000006                  SUB     #6,SP
033522  005067  161650                  CLR     P.CNT                           ;                       5154
033526  012767  177777  162102          MOV     #-1,ML.REG+232                  ;                       5157
033534  005005                          CLR     R5                              ; DODU.FLG              5158
033536  012702  177777                  MOV     #-1,R2                          ; *,TST.PAT             5159
033542  005001                          CLR     R1                              ; TWICE                 5161
033544  005004                  1$:     CLR     R4                              ; REG.SEL               5164
033546  104402                  2$:     TRAP    2                               ;                       5165
033550  152777  000040  161666          BISB    #40,@ML.REG+40                  ;                       5166
033556  016703  162250                  MOV     ML.DUT,R3
033562  042703  177770                  BIC     #177770,R3
033566  142777  000007  161650          BICB    #7,@ML.REG+40
033574  150377  161644                  BISB    R3,@ML.REG+40
033600  010246                          MOV     R2,-(SP)                        ; TST.PAT,*             5168
033602  010446                          MOV     R4,-(SP)                        ; REG.SEL,*
033604  012746  000012                  MOV     #12,-(SP)
033610  060616                          ADD     SP,(SP)                         ; INDEX,*
033612  004767  171506                  JSR     PC,WRT.REG
033616  016600  000012                  MOV     12(SP),R0                       ; INDEX,*               5169
033622  006300                          ASL     R0
033624  006300                          ASL     R0
033626  006300                          ASL     R0
033630  010003                          MOV     R0,R3
033632  016300  015406                  MOV     ML.REG+2(R3),R0
033636  056300  015412                  BIS     ML.REG+6(R3),R0
033642  010066  000006                  MOV     R0,6(SP)                        ; *,CLR.DATA
033646  152777  000040  161570          BISB    #40,@ML.REG+40
```

```
                                      ;ML4AD                          29-Mar-1982 16:23:04  TOPS
                                      ;          TEST CODE SECTION    29-Mar-1982 16:21:03  PA:<

033654 016700 162152                        MOV     ML.DUT,R0
033660 042700 177770                        BIC     #177770,R0
033664 142777 000007 161552                 BICB    #7,@ML.REG+40
033672 150077 161546                        BISB    R0,@ML.REG+40
033676 016616 000006                        MOV     6(SP),(SP)
033702 010446                               MOV     R4,-(SP)          ; CLR.DATA,*     5171
033704 012746 000014                        MOV     #14,-(SP)         ; REG.SEL,*
033710 060616                               ADD     SP,(SP)
033712 004767 171774                        JSR     PC,RD.REG         ; ERR.FLG,*
033716 026627 000014 000001                 CMP     14(SP),#1
033724 001121                               BNE     11$               ; ERR.FLG,*      5173
033726 005267 161444                        INC     P.CNT
033732 026767 161440 161440                 CMP     P.CNT,LIMIT       ;                5175
033740 003403                               BLE     3$
033742 062706 000012                        ADD     #12,SP
033746 000517                               BR      13$
033750 005704                       3$:     TST     R4                ; REG.SEL        5178
033752 002403                               BLT     4$
033754 020427 000003                        CMP     R4,#3             ; REG.SEL,*
033760 003406                               BLE     5$
033762 020427 000011                4$:     CMP     R4,#11            ; REG.SEL,*
033766 002410                               BLT     6$
033770 020427 000012                        CMP     R4,#12            ; REG.SEL,*
033774 003005                               BGT     6$
033776 104455                       5$:     TRAP    55                ;                5182
034000 000006                               .WORD   6
034002 012706                               .WORD   ASYNC
034004 026302                               .WORD   DUMPER
034006 000430                               BR      10$               ;                5178
034010 020427 000004                6$:     CMP     R4,#4             ; REG.SEL,*
034014 002403                               BLT     7$
034016 020427 000005                        CMP     R4,#5             ; REG.SEL,*
034022 003403                               BLE     8$
034024 020427 000010                7$:     CMP     R4,#10            ; REG.SEL,*
034030 001005                               BNE     9$
034032 104455                       8$:     TRAP    55                ;                5185
034034 000006                               .WORD   6
034036 012750                               .WORD   SYNC
034040 026302                               .WORD   DUMPER
034042 000412                               BR      10$               ;                5178
034044 020427 000006                9$:     CMP     R4,#6             ; REG.SEL,*
034050 002407                               BLT     10$
034052 020427 000007                        CMP     R4,#7             ; REG.SEL,*
034056 003004                               BGT     10$
034060 104455                               TRAP    55                ;                5188
034062 000006                               .WORD   6
034064 013012                               .WORD   ARR.DAT
034066 026302                               .WORD   DUMPER
034070 012746 011344                10$:    MOV     #WRD.56,-(SP)     ;                5191
034074 012746 012464                        MOV     #FNC.23,-(SP)
034100 012746 011310                        MOV     #WRD.52,-(SP)
034104 012746 010650                        MOV     #WRD.12,-(SP)
```

```
                                  ;ML4AD
                                  ;               TEST CODE SECTION                       29-Mar-1982 16:23:04   TOPS
                                                                                          29-Mar-1982 16:21:03   PA:<
034110  012746  011676                    MOV     #PHR.4,-(SP)
034114  012746  010304                    MOV     #FIV.FMT,-(SP)
034120  012746  000006                    MOV     #6,-(SP)
034124  010600                            MOV     SP,R0                     ; SP,*
034126  104414                            TRAP    14
034130  016716  161216                    MOV     RD.DATA,(SP)              ;
034134  016646  000030                    MOV     30(SP),-(SP)              ; CLR.DATA,*                      5192
034140  016346  015404                    MOV     ML.REG(R3),-(SP)
034144  012746  007436                    MOV     #FMT.16,-(SP)
034150  012746  000004                    MOV     #4,-(SP)
034154  010600                            MOV     SP,R0                     ; SP,*
034156  104414                            TRAP    14
034160  012705  000001                    MOV     #1,R5                     ; *,DODU.FLG
034164  062706  000026                    ADD     #26,SP                    ;                                 5193
034170  062706  000012            11$:    ADD     #12,SP                    ;                                 5175
034174  104467                            TRAP    67                        ;                                 5165
034176  006000                            ROR     R0                        ;                                 5194
034200  103002                            BHIS    13$
034202  000167  177340            12$:    JMP     2$
034206  005204                    13$:    INC     R4                        ; REG.SEL                         5164
034210  020427  000012                    CMP     R4,#12                    ; REG.SEL,*
034214  003772                            BLE     12$
034216  005102                            COM     R2                        ; TST.PAT                         5199
034220  005201                            INC     R1                        ; TWICE                           5161
034222  020127  000001                    CMP     R1,#1                     ; TWICE,*
034226  003002                            BGT     14$
034230  000167  177310                    JMP     1$
034234  005067  161376            14$:    CLR     ML.REG+232                ;                                 5202
034240  027767  161270  161106            CMP     @ML.REG+130,DRIVE.TYPE    ;                                 5209
034246  001431                            BEQ     15$
034250  104455                            TRAP    55                        ;                                 5212
034252  000161                            .WORD   161
034254  012706                            .WORD   ASYNC
034256  026302                            .WORD   DUMPER
034260  012746  011676                    MOV     #PHR.4,-(SP)              ;                                 5213
034264  012746  012546                    MOV     #REG.7,-(SP)
034270  012746  010246                    MOV     #TWO.FMT,-(SP)
034274  012746  000003                    MOV     #3,-(SP)
034300  010600                            MOV     SP,R0                     ; SP,*
034302  104414                            TRAP    14
034304  010416                            MOV     R4,(SP)                   ; SAVE,*                          5214
034306  016746  161042                    MOV     DRIVE.TYPE,-(SP)
034312  012746  006506                    MOV     #FMT.2,-(SP)
034316  012746  000003                    MOV     #3,-(SP)
034322  010600                            MOV     SP,R0                     ; SP,*
034324  104414                            TRAP    14
034326  062706  000016                    ADD     #16,SP                    ;                                 5211
034332  005305                    15$:    DEC     R5                        ; DODU.FLG                        5217
034334  001004                            BNE     16$
034336  016700  161466                    MOV     ML.LUN,R0                 ;                                 5220
034342  104451                            TRAP    51
034344  104444                            TRAP    44
```

```
                                ;ML4AD                                                        29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION                             29-Mar-1982 16:21:03   PA:<
     034346  062706  000006     16$:    ADD     #6,SP
     034352  000207                     RTS     PC                          ;                                        5102

                                ; Routine Size:  209 words
                                ; Maximum stack depth per invocation:  25 words



                                        .SBTTL  T7 TEST CODE SECTION
     034354                     T7::
     034354  004767  177132     1$:     JSR     PC,$T7                      ;                                        5222
     034360  104466                     TRAP    66
     034362  006000                     ROR     R0
     034364  103773                     BLO     1$
     034366  000207                     RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


     ;           5225  !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;          TEST CODE SECTION                                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (60)

;          !
;          !
;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 8
;          !
;          ! TEST NAME:    REGISTER SELECTION TEST
;          !
;          ! TEST DESCRIPTION:
;          !       THIS TEST TESTS FOR UNIQUE REGISTER
;          !       SELECTION BY FIRST WRITING A BACKGROUND
;          !       PATTERN INTO ALL READ/WRITE REGISTERS
;          !
;          !       IT THEN WRITES A COMPLIMENT
;          !       BACKGROUND PATTERN INTO ONE REGISTER
;          !       AND READS THE REMAINING UNWRITTEN
;          !       REGISTERS FOR AN UNCHANGED BACKGROUND
;          !       PAT
;          !
;          !       THIS PROCEDURE IS REPEATED UNTIL ALL
;          !       REGISTERS HAVE BEEN WRITTEN WITH A
;          !       COMPLIMENT BACKGROUND PATTERN.
;          !
;          !--
;
;          local
;              DODU_FLG,                                     !DROP UNIT FLAG
;              TST_PAT,                                      !TEST PATTERN
;              ERR_FLG,                                      !ERROR FLAG PASSED TO ROUTINE;
;              index;                                        !POINTS TO REGISTER PRESENTLY BEING TESTED.
;
;          CLR_THRESHOLD;                                    !CLEAR ERROR PRINT THRESHOLD
;          BGNSUB;
;          CLR_MBUS;
;          DODU_FLG = ZERO;
;          TST_PAT = %o'125252';                             !LOAD TST_PAT WITH ALTERNATE 1'S & 0'S
;          WRT_CS1 (.TST_PAT, 0);                            !WRITE A BACKGROUND INTO ALL THE DIRECTLY
;          WRT_ER (.TST_PAT, 6);                             !ACCESSABLE READ WRITE REGISTERS
;          WRT_DA (.TST_PAT, 3);
;          WRT_PA (.TST_PAT, 8);
;          WRT_E1 (.TST_PAT, 13);
;          WRT_E2 (.TST_PAT, 14);
;
;          incr CNT_1 from 0 to 4 do                         !WRITE A COMPLIMENT PATTERN INTO ONE REGISTER
;              begin
;              TST_PAT = not .TST_PAT;                       !GENERATE THE COMPLIMENT PAT
;
;              case .CNT_1 from 0 to 4 of                    !SELECT THE REGISTER TO WRITE INTO
;                  set
;
```

```
;ML4AD                                                         29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (60)
;
;                    [0] :
;                        WRT_CS1 (.TST_PAT, 0);                      !FIRST PASS WRITE COMP PAT TO MLCS1
;
;                    [1] :
;                        WRT_ER (.TST_PAT, 6);                       !SECOND PASS WRITE COMP PAT TO MLER
;
;                    [2] :
;                        WRT_DA (.TST_PAT, 3);                       !THIRD PASS WRITE COMP PAT TO MLDA
;
;                    [3] :
;                        WRT_PA (.TST_PAT, 8);                       !FORTH PASS WRITE COMP PAT TO MLPA
;
;                    [4] :
;                        WRT_E1 (.TST_PAT, 13);                      !FIFTH PASS WRITE COMP PAT TO MLE1
;                    tes;
;
;                TST_PAT = not .TST_PAT;                             !COMPLIMENT TST_PAT BACK TO BACKGROUND
;
;                incr CNT_2 from .CNT_1 + 1 to 5 do                  !NOW READ THE REMAINING UNWRITTEN REGISTERS FOR AN
;                    begin                                           !UNCHANGED BACKGROUND
;
;                    case .CNT_2 from 0 to 5 of                      !SELECT THE REGISTER TO READ
;                        set
;
;                        [0] :
;                            RD_CS1 (.TST_PAT, index = 0, ERR_FLG);  !READ MLCS1
;
;                        [1] :
;                            RD_ER (.TST_PAT, index = 6, ERR_FLG);   !READ MLER
;
;                        [2] :
;                            RD_DA (.TST_PAT, index = 3, ERR_FLG);   !READ MLDA
;
;                        [3] :
;                            RD_PA (.TST_PAT, index = 8, ERR_FLG);   !READ MLPA
;
;                        [4] :
;                            RD_E1 (.TST_PAT, index = 13, ERR_FLG);  !READ MLE1
;
;                        [5] :
;                            RD_E2 (.TST_PAT, index = 14, ERR_FLG);  !READ MLE2
;                        tes;
;
;                    if .ERR_FLG IS_SET                              !SEE IF READ FOUND AN ERROR
;                    then
;                        begin
;                        CMP_THRESHOLD;                              !COMPARE ERROR PRINT THRESHOLD
;
;                        selectone .CNT_2 of
;                            set
;
;                            [0 to 2] :
```

```
;ML4AD                                                          29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
;                      TEST CODE SECTION                        29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (60)

;            5330                      ERRDF (110, ASYNC, DUMPER); !ASYNC MODULE FAILURE
;            5331
;            5332                  [3 to 5] :
;            5333                      ERRDF (110, ARR_DAT, DUMPER);        !ARRAY DATA MODULE FAILURE
;            5334                  tes;
;            5335
;            5336              PRINTB (THR_FMT, WRD_38, WRD_37, WRD_10);
;            5337              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
;            5338              DODU_FLG = ONE;
;            5339              end;
;            5340
;            5341          end;
;            5342
;            5343      end;
;            5344
;            5345  ENDSUB;
;            5346
;            5347  if .DODU_FLG IS_SET                               !DROP THIS UNIT IF DODU_FLG IS_SET
;            5348  then
;            5349      begin
;            5350      DODU (.ML_LUN);
;            5351      DOCLN;
;            5352      end;
;            5353
;            5354  ENDTST;


                                          .SBTTL  $T8 TEST CODE SECTION
034370  004167  150216           $T8:     JSR     R1,$SAVE5
034374  005746                            TST     -(SP)                  ;                      5224
034376  005067  160774                    CLR     P.CNT
034402  104402                   1$:      TRAP    2                      ;                      5257
034404  152777  000040  161032            BISB    #40,@ML.REG+40         ;                      5259
034412  016703  161414                    MOV     ML.DUT,R3              ;                      5260
034416  042703  177770                    BIC     #177770,R3
034422  142777  000007  161014            BICB    #7,@ML.REG+40
034430  150377  161010                    BISB    R3,@ML.REG+40
034434  005005                            CLR     R5                     ; DODU.FLG             5262
034436  012704  125252                    MOV     #-52526,R4             ; *,TST.PAT            5263
034442  010446                            MOV     R4,-(SP)               ; TST.PAT,*            5264
034444  005046                            CLR     -(SP)
034446  004767  165240                    JSR     PC,WRT.CS1
034452  010416                            MOV     R4,(SP)                ; TST.PAT,*            5265
034454  012746  000006                    MOV     #6,-(SP)
034460  004767  165404                    JSR     PC,WRT.ER
034464  010416                            MOV     R4,(SP)                ; TST.PAT,*            5266
034466  012746  000003                    MOV     #3,-(SP)
```

```
                                    ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                                    ;              TEST CODE SECTION                          29-Mar-1982 16:21:03   PA:<
034472  004767  165550                     JSR     PC,WRT.DA
034476  010416                             MOV     R4,(SP)                 ; TST.PAT,*                               5267
034500  012746  000010                     MOV     #10,-(SP)
034504  004767  166072                     JSR     PC,WRT.PA
034510  010416                             MOV     R4,(SP)                 ; TST.PAT,*                               5268
034512  012746  000015                     MOV     #15,-(SP)
034516  004767  166266                     JSR     PC,WRT.E1
034522  010416                             MOV     R4,(SP)                 ; TST.PAT,*                               5269
034524  012746  000016                     MOV     #16,-(SP)
034530  004767  166462                     JSR     PC,WRT.E2
034534  005001                             CLR     R1                      ; CNT.1                                   5271
034536  005104                     2$:     COM     R4                      ; TST.PAT                                 5273
034540  010103                             MOV     R1,R3                   ; CNT.1,*                                 5275
034542  006303                             ASL     R3
034544  066307  034550                     ADD     3$(R3),PC
034550  000012                     3$:     .WORD   4$-3$
034552  000024                             .WORD   5$-3$
034554  000040                             .WORD   6$-3$
034556  000054                             .WORD   7$-3$
034560  000070                             .WORD   8$-3$
034562  010446                     4$:     MOV     R4,-(SP)                ; TST.PAT,*                               5279
034564  005046                             CLR     -(SP)
034566  004767  165120                     JSR     PC,WRT.CS1
034572  000427                             BR      9$
034574  010446                     5$:     MOV     R4,-(SP)                ;                                         5275
034576  012746  000006                     MOV     #6,-(SP)                ; TST.PAT,*                               5282
034602  004767  165262                     JSR     PC,WRT.ER
034606  000421                             BR      9$
034610  010446                     6$:     MOV     R4,-(SP)                ;                                         5275
034612  012746  000003                     MOV     #3,-(SP)                ; TST.PAT,*                               5285
034616  004767  165424                     JSR     PC,WRT.DA
034622  000413                             BR      9$
034624  010446                     7$:     MOV     R4,-(SP)                ;                                         5275
034626  012746  000010                     MOV     #10,-(SP)               ; TST.PAT,*                               5288
034632  004767  165744                     JSR     PC,WRT.PA
034636  000405                             BR      9$
034640  010446                     8$:     MOV     R4,-(SP)                ;                                         5275
034642  012746  000015                     MOV     #15,-(SP)               ; TST.PAT,*                               5291
034646  004767  166136                     JSR     PC,WRT.E1
034652  005104                     9$:     COM     R4                      ; TST.PAT                                 5294
034654  010103                             MOV     R1,R3                   ; CNT.1,CNT.2                             5296
034656  000167  000416                     JMP     23$
034662  010300                     10$:    MOV     R3,R0                   ; CNT.2,*                                 5299
034664  006300                             ASL     R0
034666  066007  034672                     ADD     11$(R0),PC
034672  000014                     11$:    .WORD   12$-11$
034674  000036                             .WORD   13$-11$
034676  000062                             .WORD   14$-11$
034700  000106                             .WORD   15$-11$
034702  000132                             .WORD   16$-11$
034704  000156                             .WORD   17$-11$
034706  010446                     12$:    MOV     R4,-(SP)                ; TST.PAT,*                               5303
```

```
                                :ML4AD
                                ;               TEST CODE SECTION                                  29-Mar-1982 16:23:04  TOPS
                                                                                                   29-Mar-1982 16:21:03  PA:<
034710 005002                          CLR     R2                              ; INDEX
034712 005046                          CLR     -(SP)
034714 012746 000030                   MOV     #30,-(SP)
034720 060616                          ADD     SP,(SP)                         ; ERR.FLG,*
034722 004767 165034                   JSR     PC,RD.CS1
034726 000461                          BR      18$                             ;
034730 010446                  13$:    MOV     R4,-(SP)                        ; TST.PAT,*            5299
034732 012702 000006                   MOV     #6,R2                           ; *,INDEX              5306
034736 010246                          MOV     R2,-(SP)                        ; INDEX,*
034740 012746 000030                   MOV     #30,-(SP)
034744 060616                          ADD     SP,(SP)                         ; ERR.FLG,*
034746 004767 165166                   JSR     PC,RD.ER
034752 000447                          BR      18$                             ;
034754 010446                  14$:    MOV     R4,-(SP)                        ; TST.PAT,*            5299
034756 012702 000003                   MOV     #3,R2                           ; *,INDEX              5309
034762 010246                          MOV     R2,-(SP)                        ; INDEX,*
034764 012746 000030                   MOV     #30,-(SP)
034770 060616                          ADD     SP,(SP)                         ; ERR.FLG,*
034772 004767 165320                   JSR     PC,RD.DA
034776 000435                          BR      18$                             ;
035000 010446                  15$:    MOV     R4,-(SP)                        ; TST.PAT,*            5299
035002 012702 000010                   MOV     #10,R2                          ; *,INDEX              5312
035006 010246                          MOV     R2,-(SP)                        ; INDEX,*
035010 012746 000030                   MOV     #30,-(SP)
035014 060616                          ADD     SP,(SP)                         ; ERR.FLG,*
035016 004767 165644                   JSR     PC,RD.PA
035022 000423                          BR      18$                             ;
035024 010446                  16$:    MOV     R4,-(SP)                        ; TST.PAT,*            5299
035026 012702 000015                   MOV     #15,R2                          ; *,INDEX              5315
035032 010246                          MOV     R2,-(SP)                        ; INDEX,*
035034 012746 000030                   MOV     #30,-(SP)
035040 060616                          ADD     SP,(SP)                         ; ERR.FLG,*
035042 004767 166026                   JSR     PC,RD.E1
035046 000411                          BR      18$                             ;
035050 010446                  17$:    MOV     R4,-(SP)                        ; TST.PAT,*            5299
035052 012702 000016                   MOV     #16,R2                          ; *,INDEX              5318
035056 010246                          MOV     R2,-(SP)                        ; INDEX,*
035060 012746 000030                   MOV     #30,-(SP)
035064 060616                          ADD     SP,(SP)                         ; ERR.FLG,*
035066 004767 166222                   JSR     PC,RD.E2
035072 026627 000030 000001    18$:    CMP     30(SP),#1                       ; ERR.FLG,*            5321
035100 001075                          BNE     22$
035102 005267 160270                   INC     P.CNT                           ;                      5323
035106 026767 160264 160264            CMP     P.CNT,LIMIT
035114 003403                          BLE     19$
035116 062706 000006                   ADD     #6,SP
035122 000474                          BR      24$
035124 005703                  19$:    TST     R3                              ; CNT.2                5326
035126 002410                          BLT     20$
035130 020327 000002                   CMP     R3,#2                           ; CNT.2,*
035134 003005                          BGT     20$
035136 104455                          TRAP    55                              ;                      5330
```

```
                                 ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                 ;              TEST CODE SECTION                        29-Mar-1982 16:21:03   PA:<
035140 000156                            .WORD  156
035142 012706                            .WORD  ASYNC
035144 026302                            .WORD  DUMPER
035146 000412                            BR     21$
035150 020327 000003             20$:    CMP    R3,#3                      ;                           5326
035154 002407                            BLT    21$                        ; CNT.2,*
035156 020327 000005                     CMP    R3,#5
035162 003004                            BGT    21$                        ; CNT.2,*
035164 104455                            TRAP   55
035166 000156                            .WORD  156                        ;                           5333
035170 013012                            .WORD  ARR.DAT
035172 026302                            .WORD  DUMPER
035174 012746 010630             21$:    MOV    #WRD.10,-(SP)
035200 012746 011122                     MOV    #WRD.37,-(SP)              ;                           5336
035204 012746 011132                     MOV    #WRD.38,-(SP)
035210 012746 010256                     MOV    #THR.FMT,-(SP)
035214 012746 000004                     MOV    #4,-(SP)
035220 010600                            MOV    SP,R0
035222 104414                            TRAP   14                         ; SP,*
035224 016716 160122                     MOV    RD.DATA,(SP)
035230 016746 160114                     MOV    WT.DATA,-(SP)              ;                           5337
035234 010200                            MOV    R2,R0
035236 006300                            ASL    R0                         ; INDEX,*
035240 006300                            ASL    R0
035242 006300                            ASL    R0
035244 016046 015404                     MOV    ML.REG(R0),-(SP)
035250 012746 007436                     MOV    #FMT.16,-(SP)
035254 012746 000004                     MOV    #4,-(SP)
035260 010600                            MOV    SP,R0
035262 104414                            TRAP   14                         ; SP,*
035264 012705 000001                     MOV    #1,R5
035270 062706 000022                     ADD    #22,SP                     ; *,DODU.FLG                5338
035274 062706 000006             22$:    ADD    #6,SP                      ;                           5323
035300 005203                    23$:    INC    R3                         ;                           5297
035302 020327 000005                     CMP    R3,#5                      ; CNT.2                     5296
035306 003002                            BGT    24$                        ; CNT.2,*
035310 000167 177346                     JMP    10$
035314 022626                    24$:    CMP    (SP)+,(SP)+
035316 005201                            INC    R1                         ;                           5272
035320 020127 000004                     CMP    R1,#4                      ; CNT.1                     5271
035324 003002                            BGT    25$                        ; CNT.1,*
035326 000167 177204                     JMP    2$
035332 062706 000016             25$:    ADD    #16,SP
035336 104467                            TRAP   67                         ;                           5259
035340 006000                            ROR    R0                         ;                           5343
035342 103002                            BHIS   26$
035344 000167 177032                     JMP    1$
035350 005305                    26$:    DEC    R5
035352 001004                            BNE    27$                        ; DODU.FLG                  5347
035354 016700 160450                     MOV    ML.LUN,R0
035360 104451                            TRAP   51                         ;                           5350
035362 104444                            TRAP   44
```

```
9952                                     ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
9953                                     ;              TEST CODE SECTION                           29-Mar-1982 16:21:03   PA:<
9954
9955 035364  005726                      27$:    TST     (SP)+
9956 035366  000207                              RTS     PC                               ;                                5224
9957
9958                                     ; Routine Size:  256 words
9959                                     ; Maximum stack depth per invocation:  28 words
9964
9965
9969
9970                                             .SBTTL  T8 TEST CODE SECTION
9974 035370                              T8::
9975 035370  004767  176774              1$:     JSR     PC,$T8                           ;                                5352
9976 035374  104466                              TRAP    66
9977 035376  006000                              ROR     R0
9978 035400  103773                              BLO     1$
9979 035402  000207                              RTS     PC
9980
9981                                     ; Routine Size:  6 words
9982                                     ; Maximum stack depth per invocation:  0 words
9987
9988
9989 ;          5355  !<BLF/PAGE>
```

```
 9991 ;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 9992 ;                         TEST CODE SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (61)
 9993
 9994 ;              5356   !
 9995 ;              5357   !
 9996 ;              5358   BGNTST;
 9997 ;              5359
 9998 ;              5360   !++
 9999 ;              5361   ! TEST NUMBER:  TST 9
10000 ;              5362   !
10001 ;              5363   ! TEST NAME:    PRINT SERIAL NUMBER
10002 ;              5364   !
10003 ;              5365   ! TEST DESCRIPTION:
10004 ;              5366   !       UPON A YES RESPONSE TO THE
10005 ;              5367   !       SOFTWARE QUESTION 'PRINT SERIAL NO?
10006 ;              5368   !       PRINT OUT THE DRIVE UNDER TEST
10007 ;              5369   !       SERIAL NUMBER.
10008 ;              5370   !
10009 ;              5371   !--
10010 ;              5372
10011 ;              5373   local
10012 ;              5374       D3,                                     !STORES DIGIT 3 OF SERIAL NUMBER
10013 ;              5375       D2,                                     !STORES DIGIT 2 OF SERIAL NUMBER
10014 ;              5376       D1,                                     !STORES DIGIT 1 OF SERIAL NUMBER
10015 ;              5377       D0;                                     !STORES DIGIT 0 OF SERIAL NUMBER
10016 ;              5378
10017 ;              5379   if .PRSN IS_SET                             !SEE IF WE PRINT THE SERIAL NUMBER
10018 ;              5380   then
10019 ;              5381       begin                                   !PRINT THE SERIAL NUMBER IF THE REPLY WAS YES
10020 ;              5382       D3 = .SN3;                              !LOAD DIGIT 3 OF SN INTO D3
10021 ;              5383       D2 = .SN2;                              !LOAD DIGIT 2 OF SN INTO D2
10022 ;              5384       D1 = .SN1;                              !LOAD DIGIT 1 OF SN INTO D1
10023 ;              5385       D0 = .SN0;                              !LOAD DIGIT 0 OF SN INTO D0
10024 ;              5386
10025 ;              5387       if ((.D3 gtr 9) or (.D2 gtr 9) or (.D1 gtr 9) or (.D0 gtr 9))
10026 ;              5388                                               !SEE IF DIGITS ARE TO BIG FOR COVERSION
10027 ;              5389       then
10028 ;              5390           PRINTB (FMT_25, PHR_15, .MLSN)      !PRINT OCTAL SN IF TO BIG
10029 ;              5391       else
10030 ;              5392           PRINTB (FMT_26, PHR_15, .D3, .D2, .D1, .D0);    !ELSE PRINT DECIMAL SERIAL NUMBER
10031 ;              5393
10032 ;              5394       end;
10033 ;              5395
10034 ;              5396   ENDTST;
10038
10039                                             .SBTTL  $T9 TEST CODE SECTION
10043 035404  004167  147144              $T9:   JSR     R1,$SAVE3                                 ;     5354
10044 035410  026727  144764  000001             CMP     PRSN,#1                                   ;     5379
10045 035416  001101                             BNE     4$
```

```
                              ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                              ;              TEST CODE SECTION                            29-Mar-1982 16:21:03   PA:<
035420  017703  160120                  MOV     @ML.REG+140,R3                  ; *,D3
035424  006203                          ASR     R3                              ; D3                            5382
035426  006203                          ASR     R3                              ; D3
035430  006203                          ASR     R3                              ; D3
035432  006203                          ASR     R3                              ; D3
035434  000303                          SWAB    R3                              ; D3
035436  042703  177760                  BIC     #177760,R3                      ; *,D3
035442  017700  160076                  MOV     @ML.REG+140,R0                  ; *,D2
035446  000300                          SWAB    R0                              ; D2                            5383
035450  042700  177760                  BIC     #177760,R0                      ; *,D2
035454  117701  160064                  MOVB    @ML.REG+140,R1                  ; *,D1
035460  006201                          ASR     R1                              ; D1                            5384
035462  006201                          ASR     R1                              ; D1
035464  006201                          ASR     R1                              ; D1
035466  006201                          ASR     R1                              ; D1
035470  042701  177760                  BIC     #177760,R1                      ; *,D1
035474  117702  160044                  MOVB    @ML.REG+140,R2                  ; *,D0
035500  042702  177760                  BIC     #177760,R2                      ; *,D0                          5385
035504  020327  000011                  CMP     R3,#11                          ; D3,*
035510  003011                          BGT     1$                                                              5387
035512  020027  000011                  CMP     R0,#11                          ; D2,*
035516  003006                          BGT     1$
035520  020127  000011                  CMP     R1,#11                          ; D1,*
035524  003003                          BGT     1$
035526  020227  000011                  CMP     R2,#11                          ; D0,*
035532  003413                          BLE     2$
035534  017746  160004          1$:     MOV     @ML.REG+140,-(SP)               ;
035540  012746  012136                  MOV     #PHR.15,-(SP)                                                   5390
035544  012746  010166                  MOV     #FMT.25,-(SP)
035550  012746  000003                  MOV     #3,-(SP)
035554  010600                          MOV     SP,R0                           ; SP,*
035556  104414                          TRAP    14
035560  000416                          BR      3$                              ;
035562  010246                  2$:     MOV     R2,-(SP)                        ; D0,*                          5387
035564  010146                          MOV     R1,-(SP)                        ; D1,*                          5392
035566  010046                          MOV     R0,-(SP)                        ; D2,*
035570  010346                          MOV     R3,-(SP)                        ; D3,*
035572  012746  012136                  MOV     #PHR.15,-(SP)
035576  012746  010206                  MOV     #FMT.26,-(SP)
035602  012746  000006                  MOV     #6,-(SP)
035606  010600                          MOV     SP,R0                           ; SP,*
035610  104414                          TRAP    14
035612  062706  000006                  ADD     #6,SP
035616  062706  000010          3$:     ADD     #10,SP                          ;
035622  000207                  4$:     RTS     PC                              ;                               5381
                                                                                                                5354

                              ; Routine Size:  72 words
                              ; Maximum stack depth per invocation:  11 words
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                     TEST CODE SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (61)


                                        .SBTTL  T9 TEST CODE SECTION
 035624                           T9::
 035624  004767  177554           1$:   JSR     PC,$T9                              ;                     5394
 035630  104466                         TRAP    66
 035632  006000                         ROR     R0
 035634  103773                         BLO     1$
 035636  000207                         RTS     PC

                                  ; Routine Size:  6 words
                                  ; Maximum stack depth per invocation:  0 words


;          5397  !<BLF/PAGE>
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (62)

;               !
;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 10
;               !
;               ! TEST NAME:    C-BUS PARITY TEST
;               !
;               ! TEST DESCRIPTION:
;               !       TEST THE CONTROL BUS PARITY
;               !       DETECTION AND GENERATING BY:
;               !
;               !       1.  WRITING BAD PARITY TO DEVICE
;               !           AND TEST CPAR SET.
;               !
;               !       2.  WRITING GOOD PARITY TO DEVICE
;               !           AND TEST CPAR CLR.
;               !
;               !       3.  READING DEVICE AND TEST GOOD
;               !           PARITY GENERATION BY READING
;               !           MCPE CLR.
;               !
;               !--
;
;               local
;                   SAVE,                                  !TEMPORARY SAVE LOCATION
;                   TST_PAT;                               !TEST PATTERN
;
;               if .PAR_DIS IS_NOT_SET                     !SEE IF PARITY IS DISABLED
;               then
;                   begin                                  !BEGIN IF PARITY IS ENABLE
;                   TST_PAT = %o'125252';                  !ALTERNATING 1, 0 PATTERN
;
;                   incr TWICE from 1 to 2 do              !REPEAT LOOP TWICE
;                       begin
;                       CLR_MBUS;
;                       PAT = ONE;                         !GENERATE EVEN PARITY BY SETTING THE PAT BIT
;                       MLDA = .TST_PAT;                   !WRITE BAD PARITY ON CONTROL BUS
;
;                       if .CPAR IS_NOT_SET                !READ CPAR BIT SET
;                       then
;                           begin
;                           ERRDF (7, ASYNC, DUMPER);      !ERROR IF NOT SET
;                           PRINTB (THR_FMT, WRD_5, WRD_7, WRD_9);
;                           end;
;
;                       CLR_MBUS;                          !CLEAR OUT PAT BIT
;                       MLDA = .TST_PAT;                   !WRITE ODD PARITY CONTROL BUS
;
;                       if .CPAR IS_SET                    !READ CPAR BIT CLEARED
;                       then
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                      TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (62)

;              5450                   begin
;              5451                   ERRDF (8, ASYNC, DUMPER);            !ERROR IF SET
;              5452                   PRINTB (THR_FMT, WRD_6, WRD_7, WRD_9);
;              5453                   end;
;              5454
;              5455               CLR_MBUS;
;              5456               SAVE = .MLDA;                            !READ A REGISTER FROM DUT
;              5457
;              5458               if .MCPE IS_SET                          !SEE IF GENERATED GOOD PARITY
;              5459               then
;              5460                   begin
;              5461                   ERRDF (9, ASYNC, DUMPER);            !ERROR IF MCPE IS_SET
;              5462                   PRINTB (THR_FMT, WRD_6, WRD_7, WRD_8);
;              5463                   end;
;              5464
;              5465               TST_PAT = .TST_PAT^ONE;                  !REPEAT WITH SHIFTED DATA
;              5466               end;
;              5467
;              5468           end
;              5469       else
;              5470           PRINTB (TWO_FMT, WRD_7, WRD_53);             !JUST PRINT MESSAGE IF PARITY IS DISABLED
;              5471
;              5472       ENDTST;


                                                .SBTTL  $T10 TEST CODE SECTION
 035640  004167  146710            $T10:        JSR     R1,$SAVE3                          ;                    5396
 035644  005767  156140                         TST     PAR.DIS                            ;                    5427
 035650  001171                                 BNE     5$
 035652  012701  125252                         MOV     #-52526,R1                         ; *,TST.PAT          5430
 035656  012702  000001                         MOV     #1,R2                              ; *,TWICE            5432
 035662  152777  000040  157554    1$:          BISB    #40,@ML.REG+40                     ;                    5433
 035670  016700  160136                         MOV     ML.DUT,R0
 035674  042700  177770                         BIC     #177770,R0
 035700  142777  000007  157536                 BICB    #7,@ML.REG+40
 035706  150077  157532                         BISB    R0,@ML.REG+40
 035712  152777  000020  157524                 BISB    #20,@ML.REG+40
 035720  010177  157510                         MOV     R1,@ML.REG+30                      ;                    5435
 035724  132777  000010  157532                 BITB    #10,@ML.REG+60                     ; TST.PAT,*          5436
 035732  001022                                 BNE     2$                                 ;                    5438
 035734  104455                                 TRAP    55
 035736  000007                                 .WORD   7                                  ;                    5441
 035740  012706                                 .WORD   ASYNC
 035742  026302                                 .WORD   DUMPER
 035744  012746  010616                         MOV     #WRD.9,-(SP)
 035750  012746  010566                         MOV     #WRD.7,-(SP)                       ;                    5442
 035754  012746  010552                         MOV     #WRD.5,-(SP)
```

```
                                           ;ML4AD
                                           ;        TEST CODE SECTION                              29-Mar-1982 16:23:04  TOPS
                                           ;                                                       29-Mar-1982 16:21:03  PA:<
035760  012746  010256                        MOV     #THR.FMT,-(SP)
035764  012746  000004                        MOV     #4,-(SP)
035770  010600                                MOV     SP,R0                     ; SP,*
035772  104414                                TRAP    14
035774  062706  000012                        ADD     #12,SP                    ;
036000  152777  000040  157436   2$:          BISB    #40,@ML.REG+40            ;                          5440
036006  016700  160020                        MOV     ML.DUT,R0                 ;                          5443
036012  042700  177770                        BIC     #177770,R0
036016  142777  000007  157420                BICB    #7,@ML.REG+40
036024  150077  157414                        BISB    R0,@ML.REG+40
036030  010177  157400                        MOV     R1,@ML.REG+30             ; TST.PAT,*
036034  132777  000010  157422                BITB    #10,@ML.REG+60            ;                          5446
036042  001422                                BEQ     3$                        ;                          5448
036044  104455                                TRAP    55
036046  000010                                .WORD   10                        ;                          5451
036050  012706                                .WORD   ASYNC
036052  026302                                .WORD   DUMPER
036054  012746  010616                        MOV     #WRD.9,-(SP)
036060  012746  010566                        MOV     #WRD.7,-(SP)              ;                          5452
036064  012746  010560                        MOV     #WRD.6,-(SP)
036070  012746  010256                        MOV     #THR.FMT,-(SP)
036074  012746  000004                        MOV     #4,-(SP)
036100  010600                                MOV     SP,R0
036102  104414                                TRAP    14                        ; SP,*
036104  062706  000012                        ADD     #12,SP
036110  152777  000040  157326   3$:          BISB    #40,@ML.REG+40            ;                          5450
036116  016700  157710                        MOV     ML.DUT,R0                 ;                          5453
036122  042700  177770                        BIC     #177770,R0
036126  142777  000007  157310                BICB    #7,@ML.REG+40
036134  150077  157304                        BISB    R0,@ML.REG+40
036140  017703  157270                        MOV     @ML.REG+30,R3
036144  032777  020000  157232                BIT     #20000,@ML.REG            ; *,SAVE                   5456
036152  001422                                BEQ     4$                        ;                          5458
036154  104455                                TRAP    55
036156  000011                                .WORD   11                        ;                          5461
036160  012706                                .WORD   ASYNC
036162  026302                                .WORD   DUMPER
036164  012746  010602                        MOV     #WRD.8,-(SP)
036170  012746  010566                        MOV     #WRD.7,-(SP)              ;                          5462
036174  012746  010560                        MOV     #WRD.6,-(SP)
036200  012746  010256                        MOV     #THR.FMT,-(SP)
036204  012746  000004                        MOV     #4,-(SP)
036210  010600                                MOV     SP,R0
036212  104414                                TRAP    14                        ; SP,*
036214  062706  000012                        ADD     #12,SP
036220  006301                       4$:      ASL     R1                        ;                          5460
036222  005202                                INC     R2                        ; TST.PAT                  5465
036224  020227  000002                        CMP     R2,#2                     ; TWICE                    5432
036230  003614                                BLE     1$                        ; TWICE,*
036232  000207                                RTS     PC
036234  012746  011316           5$:          MOV     #WRD.53,-(SP)             ;                          5427
036240  012746  010566                        MOV     #WRD.7,-(SP)              ;                          5470
```

```
                                  ;ML4AD                                                           29-Mar-1982 16:23:04   TOPS
                                  ;              TEST CODE SECTION                                 29-Mar-1982 16:21:03   PA:<
      036244  012746  010246              MOV     #TWO.FMT,-(SP)
      036250  012746  000003              MOV     #3,-(SP)
      036254  010600                      MOV     SP,R0                    ; SP,*
      036256  104414                      TRAP    14
      036260  062706  000010              ADD     #10,SP
      036264  000207                      RTS     PC
                                                                           ;                            5396

                                  ; Routine Size:  139 words
                                  ; Maximum stack depth per invocation:  9 words



                                          .SBTTL  T10 TEST CODE SECTION
      036266                      T10::
      036266  004767  177346      1$:     JSR     PC,$T10                  ;                            5470
      036272  104466                      TRAP    66
      036274  006000                      ROR     R0
      036276  103773                      BLO     1$
      036300  000207                      RTS     PC

                                  ; Routine Size:  6 words
                                  ; Maximum stack depth per invocation:  0 words


;          5473   !<BLF/PAGE>
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  TEST CODE SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (63)

;          5474  !
;          5475  !
;          5476  BGNTST;
;          5477
;          5478  !++
;          5479  ! TEST NUMBER:  TST 11
;          5480  !
;          5481  ! TEST NAME:    MEMORY SIZING TEST
;          5482  !
;          5483  ! TEST DESCRIPTION:
;          5484  !
;          5485  !       THIS TESTS THE ML11'S SIZING
;          5486  !       LOGIC BY COMPARING THE
;          5487  !       OPERATORS INPUTED NUMBER OF ARRAYS
;          5488  !       PRESENT TO THE ML11 SIZING
;          5489  !       NUMBER OF ARRAYS PRESENT
;          5490  !       THE DRIVE IS DROPPED ON DETECTED ERRORS.
;          5491  ! IMPLICIT INPUTS:
;          5492  !
;          5493  !       OP_NUM_ARR:
;          5494  !       LOADED DURING INIT CODE AND
;          5495  !       STORES OPERATORS INPUT TO THE
;          5496  !       SOFTWARE QUESTION:
;          5497  !       NUMBER OF ARRAYS PRESENT?
;          5498  !
;          5499  !
;          5500  !--
;          5501
;          5502  BGNSUB;
;          5503  CLR_MBUS;
;          5504
;          5505  if (.OP_NUM_ARR + 1) neq .ML_NUM_ARR          !SEE IF DRIVE SIZED SAME NO. OF ARRAYS AS OP INPUTED
;          5506  then
;          5507      begin
;          5508      ERRDF (10, ASYNC, DUMPER);                 !IF NOT EQL THEN ERROR AND SET DODU_FLG
;          5509      PRINTB (TWO_FMT, FNC_1, WRD_14);
;          5510      PRINTB (FMT_2, (.OP_NUM_ARR + 1), .ML_NUM_ARR);
;          5511      end;
;          5512
;          5513  ENDSUB;
;          5514  ENDTST;


                                         .SBTTL  $T11 TEST CODE SECTION
036302  004167  146232          $T11:   JSR     R1,$SAVE2                    ;     5472
036306  104402                  1$:     TRAP    2                            ;     5476
036310  152777  000040  157126          BISB    #40,@ML.REG+40               ;     5502
```

```
                                   ;ML4AD                                                       29-Mar-1982 16:23:04   TOPS
                                   ;             TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<
036316  016700  157510                   MOV     ML.DUT,R0
036322  042700  177770                   BIC     #177770,R0
036326  142777  000007  157110           BICB    #7,@ML.REG+40
036334  150077  157104                   BISB    R0,@ML.REG+40
036340  016700  155436                   MOV     OP.NUM.ARR,R0
036344  005200                           INC     R0                        ;            5505
036346  017702  157152                   MOV     @ML.REG+120,R2
036352  006202                           ASR     R2
036354  006202                           ASR     R2
036356  006202                           ASR     R2
036360  000302                           SWAB    R2
036362  042702  177740                   BIC     #177740,R2
036366  010001                           MOV     R0,R1
036370  020102                           CMP     R1,R2
036372  001442                           BEQ     2$
036374  104455                           TRAP    55
036376  000012                           .WORD   12                        ;            5508
036400  012706                           .WORD   ASYNC
036402  026302                           .WORD   DUMPER
036404  012746  010664                   MOV     #WRD.14,-(SP)             ;            5509
036410  012746  012150                   MOV     #FNC.1,-(SP)
036414  012746  010246                   MOV     #TWO.FMT,-(SP)
036420  012746  000003                   MOV     #3,-(SP)
036424  010600                           MOV     SP,R0
036426  104414                           TRAP    14                        ; SP,*
036430  017702  157070                   MOV     @ML.REG+120,R2            ;            5510
036434  006202                           ASR     R2
036436  006202                           ASR     R2
036440  006202                           ASR     R2
036442  000302                           SWAB    R2
036444  042702  177740                   BIC     #177740,R2
036450  010216                           MOV     R2,(SP)
036452  016746  155324                   MOV     OP.NUM.ARR,-(SP)
036456  005216                           INC     (SP)
036460  012746  006506                   MOV     #FMT.2,-(SP)
036464  012746  000003                   MOV     #3,-(SP)
036470  010600                           MOV     SP,R0
036472  104414                           TRAP    14                        ; SP,*
036474  062706  000016                   ADD     #16,SP
036500  104467                   2$:     TRAP    67                        ;            5507
036502  006000                           ROR     R0                        ;            5511
036504  103700                           BLO     1$
036506  000207                           RTS     PC                        ;            5472

                                   ; Routine Size:  67 words
                                   ; Maximum stack depth per invocation:  10 words
```

```
                                          .SBTTL  T11 TEST CODE SECTION
      036510                        T11::
      036510   004767  177566       1$:   JSR     PC,$T11                        ;            5513
      036514   104466                     TRAP    66
      036516   006000                     ROR     R0
      036520   103773                     BLO     1$
      036522   000207                     RTS     PC

                                    ; Routine Size:  6 words
                                    ; Maximum stack depth per invocation:  0 words


;          5515  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (64)
;
;           !
;           !
;           BGNTST;
;
;           !++
;           ! TEST NUMBER:  TST 12
;           !
;           ! TEST NAME:    NO-OP FUNCTION TEST
;           !
;           ! TEST DESCRIPTION:
;           !
;           !       TEST IF THE DRIVE CAN PERFORM
;           !       A NO_OP FUNCTION WITH OUT
;           !       HANGING THE DRIVE.
;           !
;           !       A NO_OP FUNCTION IS WRITTEN
;           !       INTO MLCS1.
;           !       THEN GO AND ERROR BITS ARE
;           !       CHECKED FOR CORRECT STATES.
;           !
;           !       THIS UNIT IS DROPPED ON DETECTED
;           !       ERRORS.
;           !
;           ! IMPLICIT INPUTS:      NONE
;           !
;           !
;           !--
;
;           BGNSUB;
;           CLR_MBUS;
;           MLCS1 = NOOP;                                 !DO A NOOP FUNCTION
;           DELAY (ONE_US);                               !DELAY 1 US
;
;           if .GO IS_SET                                 !SEE IF GO STILL SET
;           then
;               begin
;               ERRDF (11, ASYNC, DUMPER);                !ERROR AND SET DODU_FLG IF STILL SET
;               PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_2, WRD_19);
;               end;
;
;           if .ILF IS_SET                                !SEE ILF SET
;           then
;               begin
;               ERRDF (12, ASYNC, DUMPER);                !ERROR AND SET DODU_FLG IF SET
;               PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_2, WRD_19);
;               end;
;
;           if .OPI IS_SET                                !SEE IF CPI SET
;           then
;               begin
;               ERRDF (13, ASYNC, DUMPER);                !ERROR AND SET DODU_FLG IF SET
;               PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_11, FNC_2, WRD_19);
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    TEST CODE SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (64)

;            5568         end;
;            5569
;            5570    ENDSUB;
;            5571    ENDTST;


                                            .SBTTL  $T12 TEST CODE SECTION
036524  010146                      $T12:   MOV     R1,-(SP)                ;                     5514
036526  005746                              TST     -(SP)
036530  104402                      1$:     TRAP    2                       ;                     5518
036532  152777  000040  156704              BISB    #40,@ML.REG+40          ;                     5544
036540  016701  157266                      MOV     ML.DUT,R1
036544  042701  177770                      BIC     #177770,R1
036550  142777  000007  156666              BICB    #7,@ML.REG+40
036556  150177  156662                      BISB    R1,@ML.REG+40
036562  012777  000001  156614              MOV     #1,@ML.REG
036570  012700  000001                      MOV     #1,R0                   ;                     5546
036574  001410                      2$:     BEQ     5$                      ; *,$$TMP2            5547
036576  016701  143314                      MOV     L$DLY,R1
036602  001403                              BEQ     4$                      ; *,$$TMP1
036604  005016                      3$:     CLR     (SP)                    ; $$TMP
036606  005301                              DEC     R1                      ; $$TMP1
036610  001375                              BNE     3$
036612  005300                      4$:     DEC     R0                      ; $$TMP2
036614  000767                              BR      2$
036616  132777  000001  156560      5$:     BITB    #1,@ML.REG              ;                     5549
036624  001426                              BEQ     6$
036626  104455                              TRAP    55                      ;                     5552
036630  000013                              .WORD   13
036632  012706                              .WORD   ASYNC
036634  026302                              .WORD   DUMPER
036636  012746  010730                      MOV     #WRD.19,-(SP)           ;                     5553
036642  012746  012164                      MOV     #FNC.2,-(SP)
036646  012746  010640                      MOV     #WRD.11,-(SP)
036652  012746  011626                      MOV     #PHR.2,-(SP)
036656  012746  010520                      MOV     #WRD.1,-(SP)
036662  012746  010304                      MOV     #FIV.FMT,-(SP)
036666  012746  000006                      MOV     #6,-(SP)
036672  010600                              MOV     SP,R0                   ; SP,*
036674  104414                              TRAP    14
036676  062706  000016                      ADD     #16,SP                  ;                     5551
036702  132777  000001  156554      6$:     BITB    #1,@ML.REG+60           ;                     5556
036710  001426                              BEQ     7$
036712  104455                              TRAP    55                      ;                     5559
036714  000014                              .WORD   14
036716  012706                              .WORD   ASYNC
036720  026302                              .WORD   DUMPER
```

```
                                  ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                  ;             TEST CODE SECTION                                 29-Mar-1982 16:21:03   PA:<
036722  012746  010730                  MOV     #WRD.19,-(SP)                   ;                                       5560
036726  012746  012164                  MOV     #FNC.2,-(SP)
036732  012746  010640                  MOV     #WRD.11,-(SP)
036736  012746  011714                  MOV     #PHR.5,-(SP)
036742  012746  010536                  MOV     #WRD.3,-(SP)
036746  012746  010304                  MOV     #FIV.FMT,-(SP)
036752  012746  000006                  MOV     #6,-(SP)
036756  010600                          MOV     SP,R0                           ; SP,*
036760  104414                          TRAP    14
036762  062706  000016                  ADD     #16,SP                          ;                                       5558
036766  032777  020000  156470  7$:     BIT     #20000,@ML.REG+60               ;                                       5563
036774  001426                          BEQ     8$
036776  104455                          TRAP    55                              ;                                       5566
037000  000015                          .WORD   15
037002  012706                          .WORD   ASYNC
037004  026302                          .WORD   DUMPER
037006  012746  010730                  MOV     #WRD.19,-(SP)                   ;                                       5567
037012  012746  012164                  MOV     #FNC.2,-(SP)
037016  012746  010640                  MOV     #WRD.11,-(SP)
037022  012746  011714                  MOV     #PHR.5,-(SP)
037026  012746  010544                  MOV     #WRD.4,-(SP)
037032  012746  010304                  MOV     #FIV.FMT,-(SP)
037036  012746  000006                  MOV     #6,-(SP)
037042  010600                          MOV     SP,R0                           ; SP,*
037044  104414                          TRAP    14
037046  062706  000016                  ADD     #16,SP                          ;                                       5565
037052  104467                  8$:     TRAP    67                              ;                                       5568
037054  006000                          ROR     R0
037056  103624                          BLO     1$
037060  005726                          TST     (SP)+                           ;                                       5514
037062  012601                          MOV     (SP)+,R1
037064  000207                          RTS     PC

                                ; Routine Size:  113 words
                                ; Maximum stack depth per invocation:  9 words



                                        .SBTTL  T12 TEST CODE SECTION
037066                          T12::
037066  004767  177432          1$:     JSR     PC,$T12                         ;                                       5570
037072  104466                          TRAP    66
```

```
                         ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                         ;                     TEST CODE SECTION                 29-Mar-1982 16:21:03   PA:<
037074  006000                    ROR     R0
037076  103773                    BLO     1$
037100  000207                    RTS     PC

                         ; Routine Size:  6 words
                         ; Maximum stack depth per invocation:  0 words


;          5572  !<BLF/PAGE>
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (65)

;        !
;        !
;        BGNTST;
;
;        !++
;        ! TEST NUMBER:  TST 13
;        !
;        ! TEST NAME:    WRITE CHECK FUNCTION TEST
;        !
;        ! TEST DESCRIPTION:
;        !
;        !       TEST IF THE DRIVE CAN PERFORM
;        !       A WRITE CHECK FUNCTION WITHOUT
;        !       HANGING THE DRIVE.
;        !
;        !       A WRITE CHECK FUNCTION IS WRITTEN
;        !       INTO MLCS1.
;        !       THEN GO AND ERROR BITS ARE
;        !       CHECKED FOR CORRECT STATES
;        !
;        !--
;
;        local
;            DODU_FLG;                                       !DROP UNIT FLAG
;
;        BGNSUB;
;        CLR_MBUS;
;        DODU_FLG = ZERO;
;        FIRST_BLK_XFER ();                                  !SET UP A FIRST BLK XFERR
;        MLCS1 = WRT_CHK;                                    !DO A WRITE CHECK FUNCTION
;
;        if .GO IS_NOT_SET                                   !SEE IF THE GO BIT GOT SET
;        then
;            begin
;            ERRDF (14, ASYNC, DUMPER);                      !ERROR IF NOT SET
;            PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_4, WRD_19);
;
;            if .DRY IS_NOT_SET                              !SEE IF THE DRY IS SET WHILE GO IS CLEARED
;            then
;                begin
;                ERRDF (15, ASYNC, DUMPER);                  !ERROR IF CLEARED
;                PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
;                end;
;
;            DODU_FLG = ONE;                                 !SET DODU_FLG
;            end
;        else
;
;            if .DRY IS_SET                                  !THE GO IS SET SO SEE IF DRY IS CLEARED
;            then
;                begin
;                ERRDF (16, ASYNC, DUMPER);                  !ERROR IF DRY IS SET
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;       TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (65)

;                       PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
;                       DODU_FLG = ONE;
;                       end;
;
;               if .ILF IS_SET                                  !SEE IF ILF IS SET
;               then
;                   begin
;                   ERRDF (17, ASYNC, DUMPER);                  !ERROR IF SET
;                   PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_4, WRD_19);
;                   end;
;
;               if .OPI IS_SET                                  !SEE IF OPI IS SET
;               then
;                   begin
;                   ERRDF (18, ASYNC, DUMPER);                  !ERROR IF SET
;                   PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_4, WRD_19);
;                   end;
;
;               DELAY (FRTY_US);                                !WAIT FO XFERR TO COMPLTE
;
;               if .DRY IS_NOT_SET                              !SEE IF DRY IS SETS AFTER XFERR
;               then
;                   begin
;
;                   if .GO IS_SET                               !IF DRY IS NOT SET THEN SEE IF GO IS SET
;                   then
;                       begin
;                       CLR_MBUS;                               !IF THE GO IS SET THEN TRY TO CLR GO
;
;                       if .GO IS_SET then ERRDF (19, ASYNC, DUMPER) else ERRDF (20, SYNC, DUMPER);
;
;                                                               !IF GO IS STILL SET THEN ASYNC FAILURE
;                       PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_4, WRD_19);  !ELSE SYNC MODLE FAILURE
;                       end
;                   else
;                       begin
;                       ERRDF (21, ASYNC, DUMPER);              !ERROR GO AND DRY BOTH CLEARED
;                       PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_4, WRD_19);
;                       end;
;
;                   DODU_FLG = ONE;                             !SET THE DODU_FLG
;                   end;
;
;               if .GO IS_SET                                   !SEE IF THE GO IS STILL SET
;               then
;                   begin
;                   CLR_MBUS;                                   !TRY TO CLR GO IF STILL SET
;
;                   if .GO IS_SET then ERRDF (22, ASYNC, DUMPER) else ERRDF (23, SYNC, DUMPER);
;
;                                                               !IF GO IS STILL SET THE ASYNC FAILURE
;                   PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_4, WRD_19);      !ELSE SYNC MODULE FAILURE
```

```
;ML4AD
;                        TEST CODE SECTION                           29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (65)
;             5677          DODU_FLG = ONE;
;             5678          end;
;             5679
;             5680      ENDSUB;
;             5681
;             5682      if .DODU_FLG IS_SET                            !DROP THIS UNIT IF DODU_FLG IS_SET
;             5683      then
;             5684          begin
;             5685          DODU (.ML_LUN);
;             5686          DOCLN;
;             5687          end;
;             5688
;             5689      ENDTST;


                                                .SBTTL  $T13 TEST CODE SECTION
037102  004167  145432                $T13:     JSR     R1,$SAVE2                       ;                 5571
037106  005746                                  TST     -(SP)
037110  104402                        1$:       TRAP    2
037112  152777  000040  156324                  BISB    #40,@ML.REG+40                  ;                 5596
037120  016701  156706                          MOV     ML.DUT,R1                       ;                 5598
037124  042701  177770                          BIC     #177770,R1
037130  142777  000007  156306                  BICB    #7,@ML.REG+40
037136  150177  156302                          BISB    R1,@ML.REG+40
037142  005002                                  CLR     R2                              ; DODU.FLG
037144  004767  161112                          JSR     PC,FIRST.BLK.XFER               ;                 5600
037150  012777  000051  156226                  MOV     #51,@ML.REG                     ;                 5601
037156  132777  000001  156220                  BITB    #1,@ML.REG                      ;                 5602
037164  001057                                  BNE     2$                              ;                 5604
037166  104455                                  TRAP    55
037170  000016                                  .WORD   16                              ;                 5607
037172  012706                                  .WORD   ASYNC
037174  026302                                  .WORD   DUMPER
037176  012746  010730                          MOV     #WRD.19,-(SP)
037202  012746  012200                          MOV     #FNC.4,-(SP)                    ;                 5608
037206  012746  010650                          MOV     #WRD.12,-(SP)
037212  012746  011610                          MOV     #PHR.1,-(SP)
037216  012746  010520                          MOV     #WRD.1,-(SP)
037222  012746  010304                          MOV     #FIV.FMT,-(SP)
037226  012746  000006                          MOV     #6,-(SP)
037232  010600                                  MOV     SP,R0                           ; SP,*
037234  104414                                  TRAP    14
037236  132777  000200  156210                  BITB    #200,@ML.REG+50                 ;                 5610
037244  001056                                  BNE     3$
037246  104455                                  TRAP    55                              ;                 5613
037250  000017                                  .WORD   17
037252  012706                                  .WORD   ASYNC
```

```
                                  ;ML4AD                                                  29-Mar-1982 16:23:04  TOPS
                                  ;               TEST CODE SECTION                       29-Mar-1982 16:21:03  PA:<
037254  026302                          .WORD   DUMPER
037256  012746  011726                  MOV     #PHR.6,-(SP)
037262  012746  010520                  MOV     #WRD.1,-(SP)              ;                               5614
037266  012746  011176                  MOV     #WRD.43,-(SP)
037272  012746  011610                  MOV     #PHR.1,-(SP)
037276  012746  010524                  MOV     #WRD.2,-(SP)
037302  012746  010304                  MOV     #FIV.FMT,-(SP)
037306  012746  000006                  MOV     #6,-(SP)
037312  010600                          MOV     SP,R0
037314  104414                          TRAP    14                        ; SP,*
037316  062706  000016                  ADD     #16,SP
037322  000427                          BR      3$                        ;                               5612
037324  105777  156124          2$:     TSTB    @ML.REG+50                ;                               5617
037330  100030                          BPL     4$                        ;                               5621
037332  104455                          TRAP    55
037334  000020                          .WORD   20                        ;                               5624
037336  012706                          .WORD   ASYNC
037340  026302                          .WORD   DUMPER
037342  012746  011714                  MOV     #PHR.5,-(SP)
037346  012746  010520                  MOV     #WRD.1,-(SP)              ;                               5625
037352  012746  011176                  MOV     #WRD.43,-(SP)
037356  012746  011626                  MOV     #PHR.2,-(SP)
037362  012746  010524                  MOV     #WRD.2,-(SP)
037366  012746  010304                  MOV     #FIV.FMT,-(SP)
037372  012746  000006                  MOV     #6,-(SP)
037376  010600                          MOV     SP,R0
037400  104414                          TRAP    14                        ; SP,*
037402  012702  000001          3$:     MOV     #1,R2                     ; *,DODU.FLG
037406  062706  000016                  ADD     #16,SP                    ;                               5626
037412  132777  000001  156044  4$:     BITB    #1,@ML.REG+60             ;                               5623
037420  001426                          BEQ     5$                        ;                               5629
037422  104455                          TRAP    55
037424  000021                          .WORD   21                        ;                               5632
037426  012706                          .WORD   ASYNC
037430  026302                          .WORD   DUMPER
037432  012746  010730                  MOV     #WRD.19,-(SP)
037436  012746  012200                  MOV     #FNC.4,-(SP)              ;                               5633
037442  012746  010650                  MOV     #WRD.12,-(SP)
037446  012746  011714                  MOV     #PHR.5,-(SP)
037452  012746  010536                  MOV     #WRD.3,-(SP)
037456  012746  010304                  MOV     #FIV.FMT,-(SP)
037462  012746  000006                  MOV     #6,-(SP)
037466  010600                          MOV     SP,R0
037470  104414                          TRAP    14                        ; SP,*
037472  062706  000016                  ADD     #16,SP                    ;                               5631
037476  032777  020000  155760  5$:     BIT     #20000,@ML.REG+60         ;                               5636
037504  001426                          BEQ     6$
037506  104455                          TRAP    55
037510  000022                          .WORD   22                        ;                               5639
037512  012706                          .WORD   ASYNC
037514  026302                          .WORD   DUMPER
037516  012746  010730                  MOV     #WRD.19,-(SP)             ;                               5640
```

```
                                     ;ML4AD
                                     ;        TEST CODE SECTION                              29-Mar-1982 16:23:04   TOPS
                                                                                             29-Mar-1982 16:21:03   PA:<
037522  012746  012200                    MOV    #FNC.4,-(SP)
037526  012746  010650                    MOV    #WRD.12,-(SP)
037532  012746  011714                    MOV    #PHR.5,-(SP)
037536  012746  010544                    MOV    #WRD.4,-(SP)
037542  012746  010304                    MOV    #FIV.FMT,-(SP)
037546  012746  000006                    MOV    #6,-(SP)
037552  010600                            MOV    SP,R0                     ; SP,*
037554  104414                            TRAP   14
037556  062706  000016                    ADD    #16,SP                    ;
037562  012700  000050           6$:      MOV    #50,R0                    ;                     5638
037566  001410                   7$:      BEQ    10$                       ; *,$$TMP2            5643
037570  016701  142322                    MOV    L$DLY,R1                  ; *,$$TMP1
037574  001403                            BEQ    9$
037576  005016                   8$:      CLR    (SP)                      ; $$TMP
037600  005301                            DEC    R1                        ; $$TMP1
037602  001375                            BNE    8$
037604  005300                   9$:      DEC    R0                        ; $$TMP2
037606  000767                            BR     7$
037610  132777  000200  155636  10$:      BITB   #200,@ML.REG+50           ;                     5645
037616  001106                            BNE    15$
037620  132777  000001  155556            BITB   #1,@ML.REG                ;                     5649
037626  001452                            BEQ    13$
037630  152777  000040  155606            BISB   #40,@ML.REG+40            ;                     5651
037636  016701  156170                    MOV    ML.DUT,R1
037642  042701  177770                    BIC    #177770,R1
037646  142777  000007  155570            BICB   #7,@ML.REG+40
037654  150177  155564                    BISB   R1,@ML.REG+40
037660  132777  000001  155516            BITB   #1,@ML.REG                ;                     5654
037666  001405                            BEQ    11$
037670  104455                            TRAP   55
037672  000023                            .WORD  23
037674  012706                            .WORD  ASYNC
037676  026302                            .WORD  DUMPER
037700  000404                            BR     12$
037702  104455                   11$:     TRAP   55
037704  000024                            .WORD  24
037706  012750                            .WORD  SYNC
037710  026302                            .WORD  DUMPER
037712  012746  010730           12$:     MOV    #WRD.19,-(SP)             ;                     5657
037716  012746  012200                    MOV    #FNC.4,-(SP)
037722  012746  010640                    MOV    #WRD.11,-(SP)
037726  012746  011626                    MOV    #PHR.2,-(SP)
037732  012746  010520                    MOV    #WRD.1,-(SP)
037736  012746  010304                    MOV    #FIV.FMT,-(SP)
037742  012746  000006                    MOV    #6,-(SP)
037746  010600                            MOV    SP,R0                     ; SP,*
037750  104414                            TRAP   14
037752  000424                            BR     14$                       ;                     5649
037754  104455                   13$:     TRAP   55                        ;                     5661
037756  000025                            .WORD  25
037760  012706                            .WORD  ASYNC
037762  026302                            .WORD  DUMPER
```

```
                                  ;ML4AD                                                29-Mar-1982 16:23:04  TOPS
                                  ;            TEST CODE SECTION                        29-Mar-1982 16:21:03  PA:<
037764 012746 010730                     MOV     #WRD.19,-(SP)              ;                                  5662
037770 012746 012200                     MOV     #FNC.4,-(SP)
037774 012746 010640                     MOV     #WRD.11,-(SP)
040000 012746 011610                     MOV     #PHR.1,-(SP)
040004 012746 010524                     MOV     #WRD.2,-(SP)
040010 012746 010304                     MOV     #FIV.FMT,-(SP)
040014 012746 000006                     MOV     #6,-(SP)
040020 010600                            MOV     SP,R0                      ; SP,*
040022 104414                            TRAP    14
040024 012702 000001              14$:   MOV     #1,R2                      ; *,DODU.FLG
040030 062706 000016                     ADD     #16,SP                     ;                                  5665
040034 132777 000001 155342       15$:   BITB    #1,@ML.REG                 ;                                  5647
040042 001455                            BEQ     18$                        ;                                  5668
040044 152777 000040 155372              BISB    #40,@ML.REG+40             ;                                  5670
040052 016701 155754                     MOV     ML.DUT,R1
040056 042701 177770                     BIC     #177770,R1
040062 142777 000007 155354              BICB    #7,@ML.REG+40
040070 150177 155350                     BISB    R1,@ML.REG+40
040074 132777 000001 155302              BITB    #1,@ML.REG                 ;                                  5673
040102 001405                            BEQ     16$
040104 104455                            TRAP    55
040106 000026                            .WORD   26
040110 012706                            .WORD   ASYNC
040112 026302                            .WORD   DUMPER
040114 000404                            BR      17$
040116 104455                     16$:   TRAP    55
040120 000027                            .WORD   27
040122 012750                            .WORD   SYNC
040124 026302                            .WORD   DUMPER
040126 012746 010730              17$:   MOV     #WRD.19,-(SP)              ;                                  5676
040132 012746 012200                     MOV     #FNC.4,-(SP)
040136 012746 010640                     MOV     #WRD.11,-(SP)
040142 012746 011626                     MOV     #PHR.2,-(SP)
040146 012746 010520                     MOV     #WRD.1,-(SP)
040152 012746 010304                     MOV     #FIV.FMT,-(SP)
040156 012746 000006                     MOV     #6,-(SP)
040162 010600                            MOV     SP,R0                      ; SP,*
040164 104414                            TRAP    14
040166 012702 000001                     MOV     #1,R2                      ; *,DODU.FLG                       5677
040172 062706 000016                     ADD     #16,SP                     ;                                  5670
040176 104467                     18$:   TRAP    67                         ;                                  5678
040200 006000                            ROR     R0
040202 103002                            BHIS    19$
040204 000167 176700                     JMP     1$
040210 005302                     19$:   DEC     R2                         ; DODU.FLG                         5682
040212 001004                            BNE     20$
040214 016700 155610                     MOV     ML.LUN,R0                  ;                                  5685
040220 104451                            TRAP    51
040222 104444                            TRAP    44
040224 005726                     20$:   TST     (SP)+                      ;                                  5571
040226 000207                            RTS     PC
```

```
11002                                   ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
11003                                   ;               TEST CODE SECTION                       29-Mar-1982 16:21:03   PA:<
11004
11005                                   ; Routine Size:  299 words
11006                                   ; Maximum stack depth per invocation:  18 words
11011
11012
11016
11017                                           .SBTTL  T13 TEST CODE SECTION
11021 040230                            T13::
11022 040230  004767  176646            1$:     JSR     PC,$T13                 ;                                       5687
11023 040234  104466                            TRAP    66
11024 040236  006000                            ROR     R0
11025 040240  103773                            BLO     1$
11026 040242  000207                            RTS     PC
11027
11028                                   ; Routine Size:  6 words
11029                                   ; Maximum stack depth per invocation:  0 words
11034
11035
11036 ;         5690    !<BLF/PAGE>
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (66)
;
;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 14
;       !
;       ! TEST NAME:    WRITE FUNCTION TEST
;       !
;       ! TEST DESCRIPTION:
;       !       TEST IF THE DRIVE CAN PERFORM A WRITE FUNCTION WITHOUT
;       !       HANGING THE DRIVE.
;       !
;       !       A WRITE FUNCTION IS WRITTEN INTO MLCS1.  THEN GO AND ERROR BITS ARE
;       !       CHECKED FOR CORRECT STATUS.  THIS UNIT IS DROPPED ON DETECTED ERRORS.
;       !--
;
;       local
;           DODU_FLG;                                       !DROP UNIT FLAG
;
;       BGNSUB;
;       CLR_MBUS;
;       DODU_FLG = ZERO;
;       FIRST_BLK_XFER ();                                  !SET UP A FIRST BLOCK XFERR
;       MLCS1 = write;                                      !DO A WRITE FUNCTION
;
;       if .GO IS_NOT_SET                                   !SEE IF THE GO IS SET
;       then
;           begin                                           !ERROR IF NOT SET
;           ERRDF (24, ASYNC, DUMPER);
;           PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_5, WRD_19);
;
;           if .DRY IS_NOT_SET                              !SEE IF DRY SET WITH GO CLEAR
;           then
;               begin
;               ERRDF (25, ASYNC, DUMPER);
;               PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
;               end;
;
;           DODU_FLG = ONE;                                 !SET DODU_FLG
;           end
;       else                                                !GO IS SET DURING FUNCTION
;
;           if .DRY IS_SET                                  !SEE IF DRY CLEAR WITH GO SET
;           then
;               begin                                       !ERROR IF SET
;               ERRDF (26, ASYNC, DUMPER);
;               PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_5);
;               DODU_FLG = ONE;
;               end;
;
;       if .ILF IS_SET                                      !DID FUNCTION CAUSE ILF
;       then
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (66)
;
;                   begin                                 !ERROR IF YES
;                   ERRDF (27, ASYNC, DUMPER);
;                   PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_5, WRD_19);
;                   end;
;
;               if .OPI IS_SET                            !DID FUNCTION CAUSE OPI
;               then
;                   begin                                 !ERROR IF YES
;                   ERRDF (28, ASYNC, DUMPER);
;                   PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_5, WRD_19);
;                   end;
;
;               DELAY (FRTY_US);                          !WAIT FOR XFERR TO COMPLETE
;
;               if .DRY IS_NOT_SET                        !SEE IF DRY CLEARED AFTER XFERR
;               then
;                   begin
;
;                   if .GO IS_SET                         !TST GO CLR IF DRY NOT SET
;                   then
;                       begin
;                       CLR_MBUS;                         !CLEAR GO IF STILL SET
;
;                       if .GO IS_SET then ERRDF (29, ASYNC, DUMPER) else ERRDF (30, SYNC, DUMPER);
;
;                                                         !TST GO TO DETERMINE FAILING MOD
;                       PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
;                       end
;                   else                                  !DRY NOT SET AND GO CLEARED
;                       begin                             !REPORT ERROR
;                       ERRDF (31, ASYNC, DUMPER);
;                       PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_5, WRD_19);
;                       end;
;
;                   DODU_FLG = ONE;                       !SET DODU_FLG
;                   end;
;
;               if .GO IS_SET                             !SEE IF GO CLEARED AFTER XFERR.
;               then
;                   begin
;                   CLR_MBUS;                             !CLEAR GO IF STILL SET
;
;                   if .GO IS_SET then ERRDF (32, ASYNC, DUMPER) else ERRDF (33, SYNC, DUMPER);
;
;                                                         !TST GO TO DETERMINE FAILING MOD
;                   PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_5, WRD_19);
;                   DODU_FLG = ONE;
;                   end;
;
;               ENDSUB;
;
;               if .TRE IS_SET                            !SEE IF XFERR CAUSED A TRANSFER ERROR
```

```
 ;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
 ;                     TEST CODE SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (66)

 ;              5795   then
 ;              5796       begin                            !REPORT ERROR IF SET AND CONTINUE TESTING
 ;              5797       ERRDF (115, INTER, DUMPER);
 ;              5798       PRINTB (SIX_FMT, WRD_61, WRD_20, PHR_5, WRD_12, FNC_5, WRD_19);
 ;              5799       end;
 ;              5800
 ;              5801   if .DODU_FLG IS_SET                  !DROP THIS UNIT IF DODU_FLG SET
 ;              5802   then
 ;              5803       begin
 ;              5804       DODU (.ML_LUN);
 ;              5805       DOCLN;
 ;              5806       end;
 ;              5807
 ;              5808   ENDTST;


                                              .SBTTL  $T14 TEST CODE SECTION
 040244  004167  144270              $T14:    JSR     R1,$SAVE2
 040250  005746                               TST     -(SP)                   ;                5689
 040252  104402                      1$:      TRAP    2
 040254  152777  000040  155162               BISB    #40,@ML.REG+40          ;                5708
 040262  016701  155544                       MOV     ML.DUT,R1               ;                5710
 040266  042701  177770                       BIC     #177770,R1
 040272  142777  000007  155144               BICB    #7,@ML.REG+40
 040300  150177  155140                       BISB    R1,@ML.REG+40
 040304  005002                               CLR     R2
 040306  004767  157750                       JSR     PC,FIRST.BLK.XFER       ; DODU.FLG       5712
 040312  012777  000061  155064               MOV     #61,@ML.REG             ;                5713
 040320  132777  000001  155056               BITB    #1,@ML.REG              ;                5714
 040326  001057                               BNE     2$                      ;                5716
 040330  104455                               TRAP    55
 040332  000030                               .WORD   30                      ;                5719
 040334  012706                               .WORD   ASYNC
 040336  026302                               .WORD   DUMPER
 040340  012746  010730                       MOV     #WRD.19,-(SP)           ;                5720
 040344  012746  012216                       MOV     #FNC.5,-(SP)
 040350  012746  010650                       MOV     #WRD.12,-(SP)
 040354  012746  011610                       MOV     #PHR.1,-(SP)
 040360  012746  010520                       MOV     #WRD.1,-(SP)
 040364  012746  010304                       MOV     #FIV.FMT,-(SP)
 040370  012746  000006                       MOV     #6,-(SP)
 040374  010600                               MOV     SP,R0                   ; SP,*
 040376  104414                               TRAP    14
 040400  132777  000200  155046               BITB    #200,@ML.REG+50         ;                5722
 040406  001056                               BNE     3$
 040410  104455                               TRAP    55                      ;                5725
 040412  000031                               .WORD   31
```

```
                                    ;ML4AD                                                29-Mar-1982 16:23:04    TOPS
                                    ;                TEST CODE SECTION                    29-Mar-1982 16:21:03    PA:<
040414  012706                            .WORD   ASYNC
040416  026302                            .WORD   DUMPER
040420  012746  011726                    MOV     #PHR.6,-(SP)
040424  012746  010520                    MOV     #WRD.1,-(SP)          ;                             5726
040430  012746  011176                    MOV     #WRD.43,-(SP)
040434  012746  011610                    MOV     #PHR.1,-(SP)
040440  012746  010524                    MOV     #WRD.2,-(SP)
040444  012746  010304                    MOV     #FIV.FMT,-(SP)
040450  012746  000006                    MOV     #6,-(SP)
040454  010600                            MOV     SP,R0
040456  104414                            TRAP    14                    ; SP,*
040460  062706  000016                    ADD     #16,SP
040464  000427                            BR      3$                    ;                             5724
040466  105777  154762            2$:     TSTB    @ML.REG+50            ;                             5729
040472  100030                            BPL     4$                    ;                             5733
040474  104455                            TRAP    55
040476  000032                            .WORD   32                    ;                             5736
040500  012706                            .WORD   ASYNC
040502  026302                            .WORD   DUMPER
040504  012746  011714                    MOV     #PHR.5,-(SP)
040510  012746  010520                    MOV     #WRD.1,-(SP)          ;                             5737
040514  012746  011176                    MOV     #WRD.43,-(SP)
040520  012746  011626                    MOV     #PHR.2,-(SP)
040524  012746  010524                    MOV     #WRD.2,-(SP)
040530  012746  010304                    MOV     #FIV.FMT,-(SP)
040534  012746  000006                    MOV     #6,-(SP)
040540  010600                            MOV     SP,R0
040542  104414                            TRAP    14                    ; SP,*
040544  012702  000001            3$:     MOV     #1,R2                 ; *,DODU.FLG
040550  062706  000016                    ADD     #16,SP                ;                             5738
040554  132777  000001  154702    4$:     BITB    #1,@ML.REG+60         ;                             5735
040562  001426                            BEQ     5$                    ;                             5741
040564  104455                            TRAP    55
040566  000033                            .WORD   33                    ;                             5744
040570  012706                            .WORD   ASYNC
040572  026302                            .WORD   DUMPER
040574  012746  010730                    MOV     #WRD.19,-(SP)
040600  012746  012216                    MOV     #FNC.5,-(SP)          ;                             5745
040604  012746  010650                    MOV     #WRD.12,-(SP)
040610  012746  011714                    MOV     #PHR.5,-(SP)
040614  012746  010536                    MOV     #WRD.3,-(SP)
040620  012746  010304                    MOV     #FIV.FMT,-(SP)
040624  012746  000006                    MOV     #6,-(SP)
040630  010600                            MOV     SP,R0
040632  104414                            TRAP    14                    ; SP,*
040634  062706  000016                    ADD     #16,SP
040640  032777  020000  154616    5$:     BIT     #20000,@ML.REG+60     ;                             5743
040646  001426                            BEQ     6$                    ;                             5748
040650  104455                            TRAP    55
040652  000034                            .WORD   34                    ;                             5751
040654  012706                            .WORD   ASYNC
040656  026302                            .WORD   DUMPER
```

```
                                ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                ;                TEST CODE SECTION                              29-Mar-1982 16:21:03   PA:<
040660  012746  010730                  MOV     #WRD.19,-(SP)           ;                                      5752
040664  012746  012216                  MOV     #FNC.5,-(SP)
040670  012746  010650                  MOV     #WRD.12,-(SP)
040674  012746  011714                  MOV     #PHR.5,-(SP)
040700  012746  010544                  MOV     #WRD.4,-(SP)
040704  012746  010304                  MOV     #FIV.FMT,-(SP)
040710  012746  000006                  MOV     #6,-(SP)
040714  010600                          MOV     SP,R0                   ; SP,*
040716  104414                          TRAP    14
040720  062706  000016                  ADD     #16,SP                  ;
040724  012700  000050          6$:     MOV     #50,R0                  ;                                      5750
040730  001410                  7$:     BEQ     10$                     ; *,$$TMP2                             5755
040732  016701  141160                  MOV     L$DLY,R1
040736  001403                          BEQ     9$                      ; *,$$TMP1
040740  005016                  8$:     CLR     (SP)
040742  005301                          DEC     R1                      ; $$TMP
040744  001375                          BNE     8$                      ; $$TMP1
040746  005300                  9$:     DEC     R0
040750  000767                          BR      7$                      ; $$TMP2
040752  132777  000200  154474  10$:    BITB    #200,@ML.REG+50
040760  001106                          BNE     15$                     ;                                      5757
040762  132777  000001  154414          BITB    #1,@ML.REG
040770  001452                          BEQ     13$                     ;                                      5761
040772  152777  000040  154444          BISB    #40,@ML.REG+40
041000  016701  155026                  MOV     ML.DUT,R1               ;                                      5763
041004  042701  177770                  BIC     #177770,R1
041010  142777  000007  154426          BICB    #7,@ML.REG+40
041016  150177  154422                  BISB    R1,@ML.REG+40
041022  132777  000001  154354          BITB    #1,@ML.REG
041030  001405                          BEQ     11$                     ;                                      5766
041032  104455                          TRAP    55
041034  000035                          .WORD   35
041036  012706                          .WORD   ASYNC
041040  026302                          .WORD   DUMPER
041042  000404                          BR      12$
041044  104455                  11$:    TRAP    55
041046  000036                          .WORD   36
041050  012750                          .WORD   SYNC
041052  026302                          .WORD   DUMPER
041054  012746  010730          12$:    MOV     #WRD.19,-(SP)           ;                                      5769
041060  012746  012216                  MOV     #FNC.5,-(SP)
041064  012746  010640                  MOV     #WRD.11,-(SP)
041070  012746  011626                  MOV     #PHR.2,-(SP)
041074  012746  010520                  MOV     #WRD.1,-(SP)
041100  012746  010304                  MOV     #FIV.FMT,-(SP)
041104  012746  000006                  MOV     #6,-(SP)
041110  010600                          MOV     SP,R0                   ; SP,*
041112  104414                          TRAP    14
041114  000424                          BR      14$                     ;                                      5761
041116  104455                  13$:    TRAP    55                      ;                                      5773
041120  000037                          .WORD   37
041122  012706                          .WORD   ASYNC
```

```
                                :ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION               29-Mar-1982 16:21:03   PA:<

041124  026302                          .WORD   DUMPER
041126  012746  010730                  MOV     #WRD.19,-(SP)           ;                       5774
041132  012746  012216                  MOV     #FNC.5,-(SP)
041136  012746  010640                  MOV     #WRD.11,-(SP)
041142  012746  011610                  MOV     #PHR.1,-(SP)
041146  012746  010524                  MOV     #WRD.2,-(SP)
041152  012746  010304                  MOV     #FIV.FMT,-(SP)
041156  012746  000006                  MOV     #6,-(SP)
041162  010600                          MOV     SP,R0
041164  104414                          TRAP    14                      ; SP,*
041166  012702  000001          14$:    MOV     #1,R2
041172  062706  000016                  ADD     #16,SP                  ; *,DODU.FLG            5777
041176  132777  000001  154200  15$:    BITB    #1,@ML.REG              ;                       5759
041204  001455                          BEQ     18$                     ;                       5780
041206  152777  000040  154230          BISB    #40,@ML.REG+40          ;                       5782
041214  016701  154612                  MOV     ML.DUT,R1
041220  042701  177770                  BIC     #177770,R1
041224  142777  000007  154212          BICB    #7,@ML.REG+40
041232  150177  154206                  BISB    R1,@ML.REG+40
041236  132777  000001  154140          BITB    #1,@ML.REG              ;                       5785
041244  001405                          BEQ     16$
041246  104455                          TRAP    55
041250  000040                          .WORD   40
041252  012706                          .WORD   ASYNC
041254  026302                          .WORD   DUMPER
041256  000404                          BR      17$
041260  104455                  16$:    TRAP    55
041262  000041                          .WORD   41
041264  012750                          .WORD   SYNC
041266  026302                          .WORD   DUMPER
041270  012746  010730          17$:    MOV     #WRD.19,-(SP)           ;                       5788
041274  012746  012216                  MOV     #FNC.5,-(SP)
041300  012746  010640                  MOV     #WRD.11,-(SP)
041304  012746  011626                  MOV     #PHR.2,-(SP)
041310  012746  010520                  MOV     #WRD.1,-(SP)
041314  012746  010304                  MOV     #FIV.FMT,-(SP)
041320  012746  000006                  MOV     #6,-(SP)
041324  010600                          MOV     SP,R0
041326  104414                          TRAP    14                      ; SP,*
041330  012702  000001                  MOV     #1,R2
041334  062706  000016                  ADD     #16,SP                  ; *,DODU.FLG            5789
041340  104467                  18$:    TRAP    67                      ;                       5782
041342  006000                          ROR     R0                      ;                       5790
041344  103002                          BHIS    19$
041346  000167  176700                  JMP     1$
041352  032777  040000  154024  19$:    BIT     #40000,@ML.REG          ;                       5794
041360  001430                          BEQ     20$
041362  104455                          TRAP    55                      ;                       5797
041364  000163                          .WORD   163
041366  013114                          .WORD   INTER
041370  026302                          .WORD   DUMPER
041372  012746  010730                  MOV     #WRD.19,-(SP)           ;                       5798
```

```
                                :ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                ;                  TEST CODE SECTION                            29-Mar-1982 16:21:03   PA:<
041376  012746  012216                  MOV     #FNC.5,-(SP)
041402  012746  010650                  MOV     #WRD.12,-(SP)
041406  012746  011714                  MOV     #PHR.5,-(SP)
041412  012746  010736                  MOV     #WRD.20,-(SP)
041416  012746  011416                  MOV     #WRD.61,-(SP)
041422  012746  010322                  MOV     #SIX.FMT,-(SP)
041426  012746  000007                  MOV     #7,-(SP)
041432  010600                          MOV     SP,R0                   ; SP,*
041434  104414                          TRAP    14
041436  062706  000020                  ADD     #20,SP                  ;                       5796
041442  005302                 20$:     DEC     R2                      ; DODU.FLG              5801
041444  001004                          BNE     21$
041446  016700  154356                  MOV     ML.LUN,R0               ;                       5804
041452  104451                          TRAP    51
041454  104444                          TRAP    44
041456  005726                 21$:     TST     (SP)+                   ;                       5689
041460  000207                          RTS     PC

                                ; Routine Size:  327 words
                                ; Maximum stack depth per invocation:  18 words



                                        .SBTTL  T14 TEST CODE SECTION
041462                          T14::
041462  004767  176556          1$:     JSR     PC,$T14                 ;                       5806
041466  104466                          TRAP    66
041470  006000                          ROR     R0
041472  103773                          BLO     1$
041474  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;               5809    !<BLF/PAGE>
```

```
;ML4AD
;                          TEST CODE SECTION                         29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (67)

!
!
BGNTST;

!++
! TEST NUMBER:  TST 15
!
! TEST NAME:    READ FUNCTION TEST
!
! TEST DESCRIPTION:
!
!         TEST IF THE DRIVE CAN PERFORM
!         A READ FUNCTION WITHOUT
!         HANGING THE DRIVE.
!
!         A READ FUNCTION IS WRITTEN
!         INTO MLCS1
!
!         THEN GO AND ERROR BITS ARE
!         CHECKED FOR CORRECT STATES.
!
!--

local
    DODU_FLG;                                               !DROP UNIT FLAG

BGNSUB;
CLR_MBUS;
DODU_FLG = ZERO;
FIRST_BLK_XFER ();                                          !SET UP A FIRST BLK XFERR
MLCS1 = read;                                               !DO A READ FUNCTION

if .GO IS_NOT_SET                                           !SEE IF GO GOT SET
then
    begin                                                   !ERROR IF CLEAR
    ERRDF (34, ASYNC, DUMPER);
    PRINTB (FIV_FMT, WRD_1, PHR_1, WRD_12, FNC_6, WRD_19);

    if .DRY IS_NOT_SET                                      !TST DRY SET WITH GO CLEAR
    then
        begin                                               !ERROR IF NOT SET
        ERRDF (35, ASYNC, DUMPER);
        PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
        end;

    DODU_FLG = ONE;                                         !SET DODU_FLG
    end
else                                                        !GO BIT GOT SET

    if .DRY IS_SET                                          !SEE IF DRY IS CLEAR
    then
        begin                                               !ERROR IF SET
```

```
;ML4AD                                                         29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (67)
;
;                       ERRDF (36, ASYNC, DUMPER);
;                       PRINTB (FIV_FMT, WRD_2, PHR_2, WRD_43, WRD_1, PHR_6);
;                       DODU_FLG = ONE;
;                       end;
;
;               if .ILF IS_SET                                  !DID FUNCTION CAUSE ILF
;               then
;                   begin                                       !ERROR IF YES
;                   ERRDF (37, ASYNC, DUMPER);
;                   PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_6, WRD_19);
;                   end;
;
;               if .OPI IS_SET                                  !DID FUNCTION CAUSE OPI
;               then
;                   begin                                       !ERROR IF YES
;                   ERRDF (38, ASYNC, DUMPER);
;                   PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_6, WRD_19);
;                   end;
;
;               DELAY (FRTY_US);                                !WAIT FOR XFERR TO COMPLETE
;
;               if .DRY IS_NOT_SET                              !IS DRY SET AFTER XFERR
;               then
;                   begin
;
;                   if .GO IS_SET                               !TEST GO CLEAR WITH DRY NOT SET
;                   then
;                       begin
;                       CLR_MBUS;                               !CLEAR GO
;
;                       if .GO IS_SET then ERRDF (39, ASYNC, DUMPER) else ERRDF (40, SYNC, DUMPER);
;                                                               !TST GO TO DETERMINE FAILING MOD
;                       PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_6, WRD_19);
;                       end
;                   else                                        !GO BIT CLEAR WITH DRY NOT SET
;                       begin                                   !REPORT ERROR
;                       ERRDF (41, ASYNC, DUMPER);
;                       PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_11, FNC_6, WRD_19);
;                       end;
;
;                   DODU_FLG = ONE;                             !SET DODU_FLG
;                   end;
;
;               if .GO IS_SET                                   !SEE IF GO CLEAR AFTER XFERR
;               then
;                   begin
;                   CLR_MBUS;                                   !CLEAR GO IF STILL SET
;
;                   if .GO IS_SET then ERRDF (42, ASYNC, DUMPER) else ERRDF (43, SYNC, DUMPER);
;                                                               !TST GO TO DETERMINE FAILING MOD
```

```
;ML4AD
;                       TEST CODE SECTION                               29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                                                                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (67)
;
;               5914        PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_6, WRD_19);
;               5915        DODU_FLG = ONE;
;               5916        end;
;               5917
;               5918    ENDSUB;
;               5919
;               5920    if .TRE IS_SET                                  !SEE IF XFERR CAUSED A TRANSFER ERROR
;               5921    then
;               5922        begin                                       !REPORT ERROR IF SET AND CONTINUE TESTING
;               5923        ERRDF (116, INTER, DUMPER);
;               5924        PRINTB (SIX_FMT, WRD_61, WRD_20, PHR_5, WRD_12, FNC_6, WRD_19);
;               5925        end;
;               5926
;               5927    if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG SET
;               5928    then
;               5929        begin
;               5930        DODU (.ML_LUN);
;               5931        DOCLN;
;               5932        end;
;               5933
;               5934    ENDTST;


                                                .SBTTL  $T15 TEST CODE SECTION
041476  004167  143036                  $T15:   JSR     R1,$SAVE2                       ;                       5808
041502  005746                                  TST     -(SP)
041504  104402                          1$:     TRAP    2
041506  152777  000040  153730                  BISB    #40,@ML.REG+40                  ;                       5834
041514  016701  154312                          MOV     ML.DUT,R1                       ;                       5836
041520  042701  177770                          BIC     #177770,R1
041524  142777  000007  153712                  BICB    #7,@ML.REG+40
041532  150177  153706                          BISB    R1,@ML.REG+40
041536  005002                                  CLR     R2                              ; DODU.FLG              5838
041540  004767  156516                          JSR     PC,FIRST.BLK.XFER               ;                       5839
041544  012777  000071  153632                  MOV     #71,@ML.REG                     ;                       5840
041552  132777  000001  153624                  BITB    #1,@ML.REG                      ;                       5842
041560  001057                                  BNE     2$
041562  104455                                  TRAP    55                              ;                       5845
041564  000042                                  .WORD   42
041566  012706                                  .WORD   ASYNC
041570  026302                                  .WORD   DUMPER
041572  012746  010730                          MOV     #WRD.19,-(SP)                   ;                       5846
041576  012746  012226                          MOV     #FNC.6,-(SP)
041602  012746  010650                          MOV     #WRD.12,-(SP)
041606  012746  011610                          MOV     #PHR.1,-(SP)
041612  012746  010520                          MOV     #WRD.1,-(SP)
041616  012746  010304                          MOV     #FIV.FMT,-(SP)
```

```
11596                                   ;ML4AD                                                              29-Mar-1982 16:23:04   TOPS
11597                                   ;              TEST CODE SECTION                                    29-Mar-1982 16:21:03   PA:<
11598
11599 041622  012746  000006                    MOV     #6,-(SP)
11600 041626  010600                            MOV     SP,R0                   ; SP,*
11601 041630  104414                            TRAP    14
11602 041632  132777  000200  153614            BITB    #200,@ML.REG+50         ;                       5848
11603 041640  001056                            BNE     3$
11604 041642  104455                            TRAP    55                      ;                       5851
11605 041644  000043                            .WORD   43
11606 041646  012706                            .WORD   ASYNC
11607 041650  026302                            .WORD   DUMPER
11608 041652  012746  011726                    MOV     #PHR.6,-(SP)            ;                       5852
11609 041656  012746  010520                    MOV     #WRD.1,-(SP)
11610 041662  012746  011176                    MOV     #WRD.43,-(SP)
11611 041666  012746  011610                    MOV     #PHR.1,-(SP)
11612 041672  012746  010524                    MOV     #WRD.2,-(SP)
11613 041676  012746  010304                    MOV     #FIV.FMT,-(SP)
11614 041702  012746  000006                    MOV     #6,-(SP)
11615 041706  010600                            MOV     SP,R0                   ; SP,*
11616 041710  104414                            TRAP    14
11617 041712  062706  000016                    ADD     #16,SP                  ;                       5850
11618 041716  000427                            BR      3$                      ;                       5855
11619 041720  105777  153530          2$:       TSTB    @ML.REG+50              ;                       5859
11620 041724  100030                            BPL     4$
11621 041726  104455                            TRAP    55                      ;                       5862
11622 041730  000044                            .WORD   44
11623 041732  012706                            .WORD   ASYNC
11624 041734  026302                            .WORD   DUMPER
11625 041736  012746  011726                    MOV     #PHR.6,-(SP)            ;                       5863
11626 041742  012746  010520                    MOV     #WRD.1,-(SP)
11627 041746  012746  011176                    MOV     #WRD.43,-(SP)
11628 041752  012746  011626                    MOV     #PHR.2,-(SP)
11629 041756  012746  010524                    MOV     #WRD.2,-(SP)
11630 041762  012746  010304                    MOV     #FIV.FMT,-(SP)
11631 041766  012746  000006                    MOV     #6,-(SP)
11632 041772  010600                            MOV     SP,R0                   ; SP,*
11633 041774  104414                            TRAP    14
11634 041776  012702  000001          3$:       MOV     #1,R2                   ; *,DODU.FLG            5864
11635 042002  062706  000016                    ADD     #16,SP                  ;                       5861
11636 042006  132777  000001  153450  4$:       BITB    #1,@ML.REG+60           ;                       5867
11637 042014  001426                            BEQ     5$
11638 042016  104455                            TRAP    55                      ;                       5870
11639 042020  000045                            .WORD   45
11640 042022  012706                            .WORD   ASYNC
11641 042024  026302                            .WORD   DUMPER
11642 042026  012746  010730                    MOV     #WRD.19,-(SP)           ;                       5871
11643 042032  012746  012226                    MOV     #FNC.6,-(SP)
11644 042036  012746  010650                    MOV     #WRD.12,-(SP)
11645 042042  012746  011714                    MOV     #PHR.5,-(SP)
11646 042046  012746  010536                    MOV     #WRD.3,-(SP)
11647 042052  012746  010304                    MOV     #FIV.FMT,-(SP)
11648 042056  012746  000006                    MOV     #6,-(SP)
11649 042062  010600                            MOV     SP,R0                   ; SP,*
11650 042064  104414                            TRAP    14
```

```
11652                                   ;ML4AD                                          29-Mar-1982 16:23:04  TOPS
11653                                   ;          TEST CODE SECTION                    29-Mar-1982 16:21:03  PA:<
11654
11655 042066 062706 000016                      ADD     #16,SP
11656 042072 032777 020000 153364  5$:          BIT     #20000,@ML.REG+60       ;                      5869
11657 042100 001426                             BEQ     6$                      ;                      5874
11658 042102 104455                             TRAP    55
11659 042104 000046                             .WORD   46                      ;                      5877
11660 042106 012706                             .WORD   ASYNC
11661 042110 026302                             .WORD   DUMPER
11662 042112 012746 010730                      MOV     #WRD.19,-(SP)
11663 042116 012746 012226                      MOV     #FNC.6,-(SP)            ;                      5878
11664 042122 012746 010650                      MOV     #WRD.12,-(SP)
11665 042126 012746 011714                      MOV     #PHR.5,-(SP)
11666 042132 012746 010544                      MOV     #WRD.4,-(SP)
11667 042136 012746 010304                      MOV     #FIV.FMT,-(SP)
11668 042142 012746 000006                      MOV     #6,-(SP)
11669 042146 010600                             MOV     SP,R0
11670 042150 104414                             TRAP    14                      ; SP,*
11671 042152 062706 000016                      ADD     #16,SP
11672 042156 012700 000050              6$:     MOV     #50,R0                  ;                      5876
11673 042162 001410                     7$:     BEQ     10$                     ; *,$$TMP2             5881
11674 042164 016701 137726                      MOV     L$DLY,R1
11675 042170 001403                             BEQ     9$                      ; *,$$TMP1
11676 042172 005016                     8$:     CLR     (SP)
11677 042174 005301                             DEC     R1                      ; $$TMP
11678 042176 001375                             BNE     8$                      ; $$TMP1
11679 042200 005300                     9$:     DEC     R0
11680 042202 000767                             BR      7$                      ; $$TMP2
11681 042204 132777 000200 153242  10$:         BITB    #200,@ML.REG+50
11682 042212 001106                             BNE     15$                     ;                      5883
11683 042214 132777 000001 153162               BITB    #1,@ML.REG
11684 042222 001452                             BEQ     13$                     ;                      5887
11685 042224 152777 000040 153212               BISB    #40,@ML.REG+40
11686 042232 016701 153574                      MOV     ML.DUT,R1               ;                      5889
11687 042236 042701 177770                      BIC     #177770,R1
11688 042242 142777 000007 153174               BICB    #7,@ML.REG+40
11689 042250 150177 153170                      BISB    R1,@ML.REG+40
11690 042254 132777 000001 153122               BITB    #1,@ML.REG
11691 042262 001405                             BEQ     11$                     ;                      5892
11692 042264 104455                             TRAP    55
11693 042266 000047                             .WORD   47
11694 042270 012706                             .WORD   ASYNC
11695 042272 026302                             .WORD   DUMPER
11696 042274 000404                             BR      12$
11697 042276 104455                     11$:    TRAP    55
11698 042300 000050                             .WORD   50
11699 042302 012750                             .WORD   SYNC
11700 042304 026302                             .WORD   DUMPER
11701 042306 012746 010730              12$:    MOV     #WRD.19,-(SP)           ;                      5895
11702 042312 012746 012226                      MOV     #FNC.6,-(SP)
11703 042316 012746 010640                      MOV     #WRD.11,-(SP)
11704 042322 012746 011626                      MOV     #PHR.2,-(SP)
11705 042326 012746 010520                      MOV     #WRD.1,-(SP)
11706 042332 012746 010304                      MOV     #FIV.FMT,-(SP)
```

```
                                        ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                        ;               TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<
042336  012746  000006                          MOV     #6,-(SP)
042342  010600                                  MOV     SP,R0                   ; SP,*
042344  104414                                  TRAP    14
042346  000424                                  BR      14$                     ;
042350  104455                          13$:    TRAP    55                      ;                                        5887
042352  000051                                  .WORD   51                      ;                                        5899
042354  012706                                  .WORD   ASYNC
042356  026302                                  .WORD   DUMPER
042360  012746  010730                          MOV     #WRD.19,-(SP)
042364  012746  012226                          MOV     #FNC.6,-(SP)            ;                                        5900
042370  012746  010640                          MOV     #WRD.11,-(SP)
042374  012746  011610                          MOV     #PHR.1,-(SP)
042400  012746  010524                          MOV     #WRD.2,-(SP)
042404  012746  010304                          MOV     #FIV.FMT,-(SP)
042410  012746  000006                          MOV     #6,-(SP)
042414  010600                                  MOV     SP,R0
042416  104414                                  TRAP    14                      ; SP,*
042420  012702  000001                  14$:    MOV     #1,R2                   ; *,DODU.FLG
042424  062706  000016                          ADD     #16,SP                  ;                                        5903
042430  132777  000001  152746          15$:    BITB    #1,@ML.REG              ;                                        5885
042436  001455                                  BEQ     18$                     ;                                        5906
042440  152777  000040  152776                  BISB    #40,@ML.REG+40
042446  016701  153360                          MOV     ML.DUT,R1               ;                                        5908
042452  042701  177770                          BIC     #177770,R1
042456  142777  000007  152760                  BICB    #7,@ML.REG+40
042464  150177  152754                          BISB    R1,@ML.REG+40
042470  132777  000001  152706                  BITB    #1,@ML.REG
042476  001405                                  BEQ     16$                     ;                                        5911
042500  104455                                  TRAP    55
042502  000052                                  .WORD   52
042504  012706                                  .WORD   ASYNC
042506  026302                                  .WORD   DUMPER
042510  000404                                  BR      17$
042512  104455                          16$:    TRAP    55
042514  000053                                  .WORD   53
042516  012750                                  .WORD   SYNC
042520  026302                                  .WORD   DUMPER
042522  012746  010730                  17$:    MOV     #WRD.19,-(SP)
042526  012746  012226                          MOV     #FNC.6,-(SP)            ;                                        5914
042532  012746  010640                          MOV     #WRD.11,-(SP)
042536  012746  011626                          MOV     #PHR.2,-(SP)
042542  012746  010520                          MOV     #WRD.1,-(SP)
042546  012746  010304                          MOV     #FIV.FMT,-(SP)
042552  012746  000006                          MOV     #6,-(SP)
042556  010600                                  MOV     SP,R0
042560  104414                                  TRAP    14                      ; SP,*
042562  012702  000001                          MOV     #1,R2
042566  062706  000016                          ADD     #16,SP                  ; *,DODU.FLG                             5915
042572  104467                          18$:    TRAP    67                      ;                                        5908
042574  006000                                  ROR     R0                      ;                                        5916
042576  103002                                  BHIS    19$
042600  000167  176700                          JMP     1$
```

```
                                ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION                       29-Mar-1982 16:21:03   PA:<
042604  032777  040000  152572  19$:    BIT     #40000,@ML.REG          ;                               5920
042612  001430                          BEQ     20$
042614  104455                          TRAP    55                      ;                               5923
042616  000164                          .WORD   164
042620  013114                          .WORD   INTER
042622  026302                          .WORD   DUMPER
042624  012746  010730                  MOV     #WRD.19,-(SP)           ;                               5924
042630  012746  012226                  MOV     #FNC.6,-(SP)
042634  012746  010650                  MOV     #WRD.12,-(SP)
042640  012746  011714                  MOV     #PHR.5,-(SP)
042644  012746  010736                  MOV     #WRD.20,-(SP)
042650  012746  011416                  MOV     #WRD.61,-(SP)
042654  012746  010322                  MOV     #SIX.FMT,-(SP)
042660  012746  000007                  MOV     #7,-(SP)
042664  010600                          MOV     SP,R0                   ; SP,*
042666  104414                          TRAP    14
042670  062706  000020                  ADD     #20,SP                  ;                               5922
042674  005302                 20$:     DEC     R2                      ; DODU.FLG                      5927
042676  001004                          BNE     21$
042700  016700  153124                  MOV     ML.LUN,R0               ;                               5930
042704  104451                          TRAP    51
042706  104444                          TRAP    44
042710  005726                 21$:     TST     (SP)+                   ;                               5808
042712  000207                          RTS     PC

                                ; Routine Size:  327 words
                                ; Maximum stack depth per invocation:  18 words



                                        .SBTTL  T15 TEST CODE SECTION
042714                          T15::
042714  004767  176556          1$:     JSR     PC,$T15                 ;                               5932
042720  104466                          TRAP    66
042722  006000                          ROR     R0
042724  103773                          BLO     1$
042726  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;               5935  !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (68)
;
;       !
;       BGNTS ;
;
;       !++
;       ! TEST NUMBER:  TST 16
;       !
;       ! TEST NAME:    CLEAR FUNCTION TEST
;       !
;       ! TEST DESCRIPTION:
;       !       TEST IF THE DRIVE CAN PERFORM A CLEAR FUNCTION WITHOUT HANGING THE DRIVE.
;       !
;       !       A CLEAR FUNCTION IS WRITTEN INTO MLCS1.
;       !
;       !       THEN GO AND ERROR BITS ARE CHECKED FOR CORRECT STATUS.
;       !       THIS DRIVE IS DROPPED ON DETECTED ERRORS.
;       !
;       !--
;
;       BGNSUB;
;       CLR_MBUS;
;       MLER = ONES;                                    !SET BITS IN ERROR REGISTER
;       MLCS1 = DRV_CLR;                                !DO A CLEAR FUNCTION
;       DELAY (ONE_US);                                 !DELAY
;
;       if .GO IS_SET                                   !SEE IF GO CLEARED AFTER FUNCTION
;       then
;           begin                                       !ERROR IF SET
;           ERRDF (44, ASYNC, DUMPER);
;           PRINTB (FIV_FMT, WRD_1, PHR_5, WRD_11, FNC_3, FNC_7, WRD_19);
;
;           if .DRY IS_SET                              !TST DRY CLEAR WITH GO SET
;           then
;               begin                                   !ERROR IF SET
;               ERRDF (45, ASYNC, DUMPER);
;               PRINTB (FIV_FMT, WRD_2, PHR_5, WRD_43, WRD_1, PHR_5);
;               end;
;
;           end
;       else                                            !GO CLEARED AFTER FUNCTION
;
;           if .DRY IS_NOT_SET                          !TST DRY SET WITH GO CLEAR
;           then
;               begin                                   !ERROR IF NOT SET
;               ERRDF (46, ASYNC, DUMPER);
;               PRINTB (FIV_FMT, WRD_2, PHR_1, WRD_43, WRD_1, PHR_6);
;               end;
;
;       if .ILF IS_SET                                  !DID FUNCTION CAUSE ILF
;       then
;           begin                                       !ERROR IF YES
;           ERRDF (47, ASYNC, DUMPER);
;           PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_12, FNC_3, FNC_7, WRD_19);
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       TEST CODE SECTION                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (68)

;            5988        end;
;            5989
;            5990   if .OPI IS_SET                             !DID FUNCTION CAUSE OPI
;            5991   then
;            5992       begin                                  !ERROR IF YES
;            5993       ERRDF (48, ASYNC, DUMPER);
;            5994       PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_3, FNC_7, WRD_19);
;            5995       end;
;            5996
;            5997   if .MLER neq ZERO                          !TEST ERROR REGISTER FOR CLEAR
;            5998   then
;            5999       begin                                  !ERROR IF NOT CLEAR
;            6000       ERRDF (49, ASYNC, DUMPER);
;            6001       PRINTB (SIX_FMT, FNC_3, FNC_7, WRD_19, WRD_14, WRD_13, REG_3);
;            6002       end;
;            6003
;            6004   ENDSUB;
;            6005   ENDTST;


                                          .SBTTL  $T16 TEST CODE SECTION
042730  010146                    $T16:   MOV     R1,-(SP)                     ;
042732  005746                            TST     -(SP)                                         5934
042734  104402                    1$:     TRAP    2                            ;
042736  152777  000040  152500            BISB    #40,@ML.REG+40               ;                5937
042744  016701  153062                    MOV     ML.DUT,R1                    ;                5954
042750  042701  177770                    BIC     #177770,R1
042754  142777  000007  152462            BICB    #7,@ML.REG+40
042762  150177  152456                    BISB    R1,@ML.REG+40
042766  012777  177777  152470            MOV     #-1,@ML.REG+60               ;                5956
042774  012777  000011  152402            MOV     #11,@ML.REG                  ;                5957
043002  012700  000001                    MOV     #1,R0                        ; *,$$TMP2       5958
043006  001410                    2$:     BEQ     5$
043010  016701  137102                    MOV     L$DLY,R1                     ; *,$$TMP1
043014  001403                            BEQ     4$
043016  005016                    3$:     CLR     (SP)                         ; $$TMP
043020  005301                            DEC     R1                           ; $$TMP1
043022  001375                            BNE     3$
043024  005300                    4$:     DEC     R0                           ; $$TMP2
043026  000767                            BR      2$
043030  132777  000001  152346    5$:     BITB    #1,@ML.REG                   ;                5960
043036  001462                            BEQ     7$
043040  104455                            TRAP    55                           ;                5963
043042  000054                            .WORD   54
043044  012706                            .WORD   ASYNC
043046  026302                            .WORD   DUMPER
043050  012746  010730                    MOV     #WRD.19,-(SP)                ;                5964
```

```
                                      ;ML4AD                                                 29-Mar-1982 16:23:04   TOPS
                                      ;                TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<
043054  012746  012234                        MOV     #FNC.7,-(SP)
043060  012746  012172                        MOV     #FNC.3,-(SP)
043064  012746  010640                        MOV     #WRD.11,-(SP)
043070  012746  011714                        MOV     #PHR.5,-(SP)
043074  012746  010520                        MOV     #WRD.1,-(SP)
043100  012746  010304                        MOV     #FIV.FMT,-(SP)
043104  012746  000007                        MOV     #7,-(SP)
043110  010600                                MOV     SP,R0                  ; SP,*
043112  104414                                TRAP    14
043114  105777  152334                        TSTB    @ML.REG+50             ;                        5966
043120  100026                                BPL     6$
043122  104455                                TRAP    55                     ;                        5969
043124  000055                                .WORD   55
043126  012706                                .WORD   ASYNC
043130  026302                                .WORD   DUMPER
043132  012746  011714                        MOV     #PHR.5,-(SP)           ;                        5970
043136  012746  010520                        MOV     #WRD.1,-(SP)
043142  012746  011176                        MOV     #WRD.43,-(SP)
043146  012746  011714                        MOV     #PHR.5,-(SP)
043152  012746  010524                        MOV     #WRD.2,-(SP)
043156  012746  010304                        MOV     #FIV.FMT,-(SP)
043162  012746  000006                        MOV     #6,-(SP)
043166  010600                                MOV     SP,R0                  ; SP,*
043170  104414                                TRAP    14
043172  062706  000016                        ADD     #16,SP                 ;                        5968
043176  062706  000020                6$:     ADD     #20,SP                 ;                        5962
043202  000432                                BR      8$                     ;                        5960
043204  132777  000200  152242        7$:     BITB    #200,@ML.REG+50        ;                        5976
043212  001026                                BNE     8$
043214  104455                                TRAP    55                     ;                        5979
043216  000056                                .WORD   56
043220  012706                                .WORD   ASYNC
043222  026302                                .WORD   DUMPER
043224  012746  011726                        MOV     #PHR.6,-(SP)           ;                        5980
043230  012746  010520                        MOV     #WRD.1,-(SP)
043234  012746  011176                        MOV     #WRD.43,-(SP)
043240  012746  011610                        MOV     #PHR.1,-(SP)
043244  012746  010524                        MOV     #WRD.2,-(SP)
043250  012746  010304                        MOV     #FIV.FMT,-(SP)
043254  012746  000006                        MOV     #6,-(SP)
043260  010600                                MOV     SP,R0                  ; SP,*
043262  104414                                TRAP    14
043264  062706  000016                        ADD     #16,SP                 ;                        5978
043270  132777  000001  152166        8$:     BITB    #1,@ML.REG+60          ;                        5983
043276  001430                                BEQ     9$
043300  104455                                TRAP    55                     ;                        5986
043302  000057                                .WORD   57
043304  012706                                .WORD   ASYNC
043306  026302                                .WORD   DUMPER
043310  012746  010730                        MOV     #WRD.19,-(SP)          ;                        5987
043314  012746  012234                        MOV     #FNC.7,-(SP)
043320  012746  012172                        MOV     #FNC.3,-(SP)
```

```
                                    ;ML4AD                                              29-Mar-1982 16:23:04    TOPS
                                    ;           TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
043324  012746  010650                      MOV     #WRD.12,-(SP)
043330  012746  011714                      MOV     #PHR.5,-(SP)
043334  012746  010536                      MOV     #WRD.3,-(SP)
043340  012746  010304                      MOV     #FIV.FMT,-(SP)
043344  012746  000007                      MOV     #7,-(SP)
043350  010600                              MOV     SP,R0                   ; SP,*
043352  104414                              TRAP    14
043354  062706  000020                      ADD     #20,SP                  ;                               5985
043360  032777  020000  152076  9$:         BIT     #20000,@ML.REG+60       ;                               5990
043366  001430                              BEQ     10$
043370  104455                              TRAP    55                      ;                               5993
043372  000060                              .WORD   60
043374  012706                              .WORD   ASYNC
043376  026302                              .WORD   DUMPER
043400  012746  010730                      MOV     #WRD.19,-(SP)           ;                               5994
043404  012746  012234                      MOV     #FNC.7,-(SP)
043410  012746  012172                      MOV     #FNC.3,-(SP)
043414  012746  010650                      MOV     #WRD.12,-(SP)
043420  012746  011714                      MOV     #PHR.5,-(SP)
043424  012746  010544                      MOV     #WRD.4,-(SP)
043430  012746  010304                      MOV     #FIV.FMT,-(SP)
043434  012746  000007                      MOV     #7,-(SP)
043440  010600                              MOV     SP,R0                   ; SP,*
043442  104414                              TRAP    14
043444  062706  000020                      ADD     #20,SP                  ;                               5992
043450  005777  152010          10$:        TST     @ML.REG+60              ;                               5997
043454  001430                              BEQ     11$
043456  104455                              TRAP    55                      ;                               6000
043460  000061                              .WORD   61
043462  012706                              .WORD   ASYNC
043464  026302                              .WORD   DUMPER
043466  012746  012516                      MOV     #REG.3,-(SP)            ;                               6001
043472  012746  010660                      MOV     #WRD.13,-(SP)
043476  012746  010664                      MOV     #WRD.14,-(SP)
043502  012746  010730                      MOV     #WRD.19,-(SP)
043506  012746  012234                      MOV     #FNC.7,-(SP)
043512  012746  012172                      MOV     #FNC.3,-(SP)
043516  012746  010322                      MOV     #SIX.FMT,-(SP)
043522  012746  000007                      MOV     #7,-(SP)
043526  010600                              MOV     SP,R0                   ; SP,*
043530  104414                              TRAP    14
043532  062706  000020                      ADD     #20,SP                  ;                               5999
043536  104467                  11$:        TRAP    67                      ;                               6002
043540  006000                              ROR     R0
043542  103002                              BHIS    12$
043544  000167  177164                      JMP     1$
043550  005726                  12$:        TST     (SP)+                   ;                               5934
043552  012601                              MOV     (SP)+,R1
043554  000207                              RTS     PC

                                    ; Routine Size:  203 words
                                    ; Maximum stack depth per invocation:  17 words
```

```
12053                                 ;ML4AD
12054                                 ;              TEST CODE SECTION                              29-Mar-1982 16:23:04    TOPS
12055                                                                                             29-Mar-1982 16:21:03    PA:<
12060
12061
12065
12066
12070 043556                                .SBTTL  T16 TEST CODE SECTION
12071 043556  004767  177146        T16::
                                    1$:     JSR     PC,$T16                         ;                          6004
12072 043562  104466                        TRAP    66
12073 043564  006000                        ROR     R0
12074 043566  103773                        BLO     1$
12075 043570  000207                        RTS     PC
12076
12077                               ; Routine Size:  6 words
12078                               ; Maximum stack depth per invocation:  0 words
12083
12084
12085 ;          6006   !<BLF/PAGE>
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (69)
;
;                 !
;                 BGNTST;
;
;                 !++
;                 ! TEST NUMBER:  TST 17
;                 !
;                 ! TEST NAME: DIAGNOSTIC REGISTER TESTS
;                 !
;                 ! TEST DESCRIPTION:
;                 !       TEST THE DATA DIAG REGISTERS MLD1, MLD2, MLE2
;                 !       FOR 1'S/0'S, SHIFTING 1'S/0'S AND INITIALIZATION
;                 !
;                 !--
;
;                 local
;                     CLR_DATA,                             !CLEAR DATA FOR INIT TEST
;                     SAVE,                                 !TEMPORARY SAVE LOCATION
;                     ERR_FLG,                              !ERROR FLAG
;                     TST_PAT,                              !TEST PATTERN
;                     index,                                !POINTS TO REGISTER PRESENTLY BEING TESTED
;                     DODU_FLG;                             !DROP UNIT FLAG
;
;                 DODU_FLG = ZERO;
;                 !
;                 !
;                 !       FIRST TEST THE REGISTERS FOR ONES AND ZEROES
;                 !
;                 !
;                 TST_PAT = ONES;                           !LOAD TEST PAT WITH ONES
;                 CLR_THRESHOLD;                            !CLEAR ERROR PRINT THRESHOLD
;
;                 incr TWICE from 0 to 1 do                 !REPEAT LOOP TWICE
;                     begin
;
;                     incr REG_SEL from 11 to 13 do         !TEST ELEVEN WRITE/READ REGISTERS
;                         begin
;                         BGNSUB;
;                         CLR_MBUS;
;                         WRT_REG (.TST_PAT, .REG_SEL, index);    !WRITE TO THE REGISTER
;                         RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);   !READ THE REGISTER
;
;                         if .ERR_FLG IS_SET                !SEE IF READ FOUND AN ERROR
;                         then
;                             begin                         !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
;                             CMP_THRESHOLD;                !COMPARE ERROR PRINT THRESHOLD
;                             ERRDF (121, ARR_DAT, DUMPER); !ARRAY DATA MODULE FAILURE
;                             PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
;                             PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
;                             DODU_FLG = ONE;
;                             end;
;
;                         ENDSUB;
```

```
;ML4AD
;                       TEST CODE SECTION                           29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
                                                                    29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (69)
;                           end;
;
;                       TST_PAT = not .TST_PAT;                     !REPEAT AGAIN WITH COMPLIMENT DATA
;                       end;
;
;               !
;               !
;               !           TEST THE REGISTERS FOR SHIFTING ONES AND ZEROES
;               !
;               !
;               TST_PAT = ONE;                                      !LOAD TST_PAT WITH A 1 IN A FILED OF O'S
;
;               incr SHIFT from 0 to 15 do                          !DO SHIFT 16 TIMES
;                   begin
;
;                   incr TWICE from 0 to 1 do                       !REPEAT LOOP TWICE
;                       begin
;
;                       incr REG_SEL from 11 to 13 do               !TEST ELEVEN READ/WRITE REGISTERS
;                           begin
;                           BGNSUB;
;                           CLR_MBUS;
;                           WRT_REG (.TST_PAT, .REG_SEL, index);          !WRITE TO THE REGISTER
;                           RD_REG (.TST_PAT, .REG_SEL, ERR_FLG);         !READ THE REGISTER
;
;                           if .ERR_FLG IS_SET                      !SEE IF THE READ FOUND AN ERROR
;                           then
;                               begin                               !IF THE ERROR FLAG IS SET THEN ERROR
;                               CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
;                               ERRDF (122, ARR_DAT, DUMPER);       !ARRAY DATA MODULE FAILURE
;                               PRINTB (SIX_FMT, PHR_4, WRD_12, FNC_5, FNC_6, WRD_52, WRD_56);
;                               PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .WT_DATA, .RD_DATA);
;                               DODU_FLG = ONE;
;                               end;
;
;                           ENDSUB;
;                           end;
;
;                       TST_PAT = not .TST_PAT;                     !REPEAT WITH A 0 IN A FIELD OF 1'S
;                       end;
;
;                   TST_PAT = .TST_PAT^ONE;                         !SHIFT THE 1 IN THE FIELD OF O'S
;                   end;
;
;               !
;               !
;               !           NOW TEST THE REGISTERS FOR INITIALIZATION
;               !
;               !
;               REG_INIT_FLG = ONE;
;               TST_PAT = ONES;                                     !BACKGROUND PATTERN
;
```

```
;ML4AD
;                 TEST CODE SECTION                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (69)
;          6111  incr TWICE from 0 to 1 do                  !REPEAT LOOP TWICE
;          6112      begin
;          6113
;          6114      incr REG_SEL from 11 to 13 do          !TEST THIRTEEN REGISTERS
;          6115          begin
;          6116          BGNSUB;
;          6117          CLR_MBUS;
;          6118          WRT_REG (.TST_PAT, .REG_SEL, index);   !WRITE REGISTER WITH BACKGROUND
;          6119          CLR_DATA = (.RI) or (.IGNORE);         !CALCULATE THE CLEARED DATA PATTERN
;          6120          REG_INIT_FLG = ONE;
;          6121          RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG); !READ THE REGISTER FOR THE CLEARED DATA PAT
;          6122
;          6123          if .ERR_FLG IS_SET                     !SEE IF READ FOUND AN ERROR
;          6124          then
;          6125              begin                              !IF ERROR FLAG IS_SET THEN ERROR AND SET DODU_FLG
;          6126              CMP_THRESHOLD;                     !COMPARE ERROR PRINT THRESHOLD
;          6127              ERRDF (118, ARR_DAT, DUMPER);      !ARRAY DATA MODULE
;          6128              PRINTB (FIV_FMT, PHR_4, WRD_12, WRD_52, FNC_23, WRD_56);
;          6129              PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
;          6130              DODU_FLG = ONE;
;          6131              end;
;          6132
;          6133          ENDSUB;
;          6134          end;
;          6135
;          6136      TST_PAT = not .TST_PAT;                !REPEAT WITH COMPLIMENT BACKGROUND PAT
;          6137      end;
;          6138
;          6139  REG_INIT_FLG = ZERO;                       !CLEAR THE FLAG
;          6140
;          6141  if .DODU_FLG IS_SET                        !DROP THIS UNIT IF DODU_FLG SET
;          6142  then
;          6143      begin
;          6144      DODU (.ML_LUN);
;          6145      DOCLN;
;          6146      end;
;          6147
;          6148  ENDTST;


                                        .SBTTL  $T17 TEST CODE SECTION
 043572  004167  141014      $T17:      JSR     R1,$SAVE5                        ;                 6005
 043576  024646                         CMP     -(SP),-(SP)
 043600  005046                         CLR     -(SP)                            ; DODU.FLG        6029
 043602  012702  177777                 MOV     #-1,R2                           ; *,TST.PAT       6035
 043606  005067  151564                 CLR     P.CNT
 043612  005004                         CLR     R4                               ; TWICE           6038
```

```
                                  ;ML4AD                                                           29-Mar-1982 16:23:04   TOPS
                                  ;               TEST CODE SECTION                                29-Mar-1982 16:21:03   PA:<
043614  012701  000013            1$:     MOV     #13,R1                        ; *,REG.SEL                              6041
043620  104402                    2$:     TRAP    2                             ;                                        6042
043622  152777  000040  151614            BISB    #40,@ML.REG+40                ;                                        6043
043630  016705  152176                    MOV     ML.DUT,R5
043634  042705  177770                    BIC     #177770,R5
043640  142777  000007  151576            BICB    #7,@ML.REG+40
043646  150577  151572                    BISB    R5,@ML.REG+40
043652  010246                            MOV     R2,-(SP)                      ; TST.PAT,*                              6045
043654  010146                            MOV     R1,-(SP)                      ; REG.SEL,*
043656  012746  000012                    MOV     #12,-(SP)
043662  060616                            ADD     SP,(SP)                       ; INDEX,*
043664  004767  161434                    JSR     PC,WRT.REG
043670  010216                            MOV     R2,(SP)                       ; TST.PAT,*                              6046
043672  010146                            MOV     R1,-(SP)                      ; REG.SEL,*
043674  012746  000014                    MOV     #14,-(SP)
043700  060616                            ADD     SP,(SP)                       ; ERR.FLG,*
043702  004767  162004                    JSR     PC,RD.REG
043706  026627  000014  000001            CMP     14(SP),#1                     ; ERR.FLG,*                              6048
043714  001065                            BNE     4$
043716  005267  151454                    INC     P.CNT                         ;                                        6050
043722  026767  151450  151450            CMP     P.CNT,LIMIT
043730  003403                            BLE     3$
043732  062706  000012                    ADD     #12,SP
043736  000461                            BR      5$
043740  104455                    3$:     TRAP    55                            ;                                        6052
043742  000171                            .WORD   171
043744  013012                            .WORD   ARR.DAT
043746  026302                            .WORD   DUMPER
043750  012746  011344                    MOV     #WRD.56,-(SP)                 ;                                        6053
043754  012746  011310                    MOV     #WRD.52,-(SP)
043760  012746  012226                    MOV     #FNC.6,-(SP)
043764  012746  012216                    MOV     #FNC.5,-(SP)
043770  012746  010650                    MOV     #WRD.12,-(SP)
043774  012746  011676                    MOV     #PHR.4,-(SP)
044000  012746  010322                    MOV     #SIX.FMT,-(SP)
044004  012746  000007                    MOV     #7,-(SP)
044010  010600                            MOV     SP,R0                         ; SP,*
044012  104414                            TRAP    14
044014  016716  151332                    MOV     RD.DATA,(SP)                  ;                                        6054
044020  016746  151324                    MOV     WT.DATA,-(SP)
044024  016600  000040                    MOV     40(SP),R0                     ; INDEX,*
044030  006300                            ASL     R0
044032  006300                            ASL     R0
044034  006300                            ASL     R0
044036  016046  015404                    MOV     ML.REG(R0),-(SP)
044042  012746  007436                    MOV     #FMT.16,-(SP)
044046  012746  000004                    MOV     #4,-(SP)
044052  010600                            MOV     SP,R0                         ; SP,*
044054  104414                            TRAP    14
044056  012766  000001  000042            MOV     #1,42(SP)                     ; *,DODU.FLG                             6055
044064  062706  000030                    ADD     #30,SP                        ;                                        6050
044070  062706  000012            4$:     ADD     #12,SP                        ;                                        6042
```

```
                                        ;ML4AD                                                        29-Mar-1982 16:23:04   TOPS
                                        ;                        TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<
044074  104467                                  TRAP    67
044076  006000                                  ROR     R0                                  ;                                6056
044100  103647                                  BLO     2$
044102  005201                          5$:     INC     R1                                  ; REG.SEL
044104  020127  000015                          CMP     R1,#15                              ; REG.SEL,*                      6041
044110  003643                                  BLE     2$
044112  005102                                  COM     R2                                  ; TST.PAT
044114  005204                                  INC     R4                                  ; TWICE                          6061
044116  020427  000001                          CMP     R4,#1                               ; TWICE,*                        6038
044122  003634                                  BLE     1$
044124  012702  000001                          MOV     #1,R2                               ; *,TST.PAT
044130  005003                                  CLR     R3                                  ; SHIFT                          6069
044132  005004                          6$:     CLR     R4                                  ; TWICE                          6071
044134  012701  000013                  7$:     MOV     #13,R1                              ; *,REG.SEL                      6074
044140  104402                          8$:     TRAP    2                                   ;                                6077
044142  152777  000040  151274                  BISB    #40,@ML.REG+40                      ;                                6078
044150  016705  151656                          MOV     ML.DUT,R5                           ;                                6079
044154  042705  177770                          BIC     #177770,R5
044160  142777  000007  151256                  BICB    #7,@ML.REG+40
044166  150577  151252                          BISB    R5,@ML.REG+40
044172  010246                                  MOV     R2,-(SP)                            ; TST.PAT,*
044174  010146                                  MOV     R1,-(SP)                            ; REG.SEL,*                      6081
044176  012746  000012                          MOV     #12,-(SP)
044202  060616                                  ADD     SP,(SP)                             ; INDEX,*
044204  004767  161114                          JSR     PC,WRT.REG
044210  010216                                  MOV     R2,(SP)                             ; TST.PAT,*
044212  010146                                  MOV     R1,-(SP)                            ; REG.SEL,*                      6082
044214  012746  000014                          MOV     #14,-(SP)
044220  060616                                  ADD     SP,(SP)                             ; ERR.FLG,*
044222  004767  161464                          JSR     PC,RD.REG
044226  026627  000014  000001                  CMP     14(SP),#1                           ; ERR.FLG,*
044234  001065                                  BNE     10$                                                                  6084
044236  005267  151134                          INC     P.CNT                               ;
044242  026767  151130  151130                  CMP     P.CNT,LIMIT                                                          6086
044250  003403                                  BLE     9$
044252  062706  000012                          ADD     #12,SP
044256  000461                                  BR      11$
044260  104455                          9$:     TRAP    55                                  ;                                6088
044262  000172                                  .WORD   172
044264  013012                                  .WORD   ARR.DAT
044266  026302                                  .WORD   DUMPER
044270  012746  011344                          MOV     #WRD.56,-(SP)                       ;                                6089
044274  012746  011310                          MOV     #WRD.52,-(SP)
044300  012746  012226                          MOV     #FNC.6,-(SP)
044304  012746  012216                          MOV     #FNC.5,-(SP)
044310  012746  010650                          MOV     #WRD.12,-(SP)
044314  012746  011676                          MOV     #PHR.4,-(SP)
044320  012746  010322                          MOV     #SIX.FMT,-(SP)
044324  012746  000007                          MOV     #7,-(SP)
044330  010600                                  MOV     SP,R0                               ; SP,*
044332  104414                                  TRAP    14
044334  016716  151012                          MOV     RD.DATA,(SP)                        ;                                6090
```

```
                                                                                        29-Mar-1982 16:23:04   TOPS
                                   ;ML4AD                                               29-Mar-1982 16:21:03   PA:<
                                   ;                TEST CODE SECTION
044340  016746  151004                     MOV     WT.DATA,-(SP)
044344  016600  000040                     MOV     40(SP),R0                   ; INDEX,*
044350  006300                             ASL     R0
044352  006300                             ASL     R0
044354  006300                             ASL     R0
044356  016046  015404                     MOV     ML.REG(R0),-(SP)
044362  012746  007436                     MOV     #FMT.16,-(SP)
044366  012746  000004                     MOV     #4,-(SP)
044372  010600                             MOV     SP,R0                       ; SP,*
044374  104414                             TRAP    14
044376  012766  000001  000042             MOV     #1,42(SP)                   ; *,DODU.FLG                6091
044404  062706  000030                     ADD     #30,SP                      ;                           6086
044410  062706  000012             10$:    ADD     #12,SP                      ;                           6078
044414  104467                             TRAP    67                          ;                           6092
044416  006000                             ROR     R0
044420  103647                             BLO     8$
044422  005201                     11$:    INC     R1                          ; REG.SEL                   6077
044424  020127  000015                     CMP     R1,#15                      ; REG.SEL,*
044430  003643                             BLE     8$
044432  005102                             COM     R2                          ; TST.PAT                   6097
044434  005204                             INC     R4                          ; TWICE                     6074
044436  020427  000001                     CMP     R4,#1                       ; TWICE,*
044442  003634                             BLE     7$
044444  006302                             ASL     R2                          ; TST.PAT                   6100
044446  005203                             INC     R3                          ; SHIFT                     6071
044450  020327  000017                     CMP     R3,#17                      ; SHIFT,*
044454  003626                             BLE     6$
044456  012767  000001  150674             MOV     #1,REG.INIT.FLG             ;                           6108
044464  012702  177777                     MOV     #-1,R2                      ; *,TST.PAT                 6109
044470  005004                             CLR     R4                          ; TWICE                     6111
044472  012703  000013             12$:    MOV     #13,R3                      ; *,REG.SEL                 6114
044476  104402                     13$:    TRAP    2                           ;                           6115
044500  152777  000040  150736             BISB    #40,@ML.REG+40              ;                           6116
044506  016701  151320                     MOV     ML.DUT,R1
044512  042701  177770                     BIC     #177770,R1
044516  142777  000007  150720             BICB    #7,@ML.REG+40
044524  150177  150714                     BISB    R1,@ML.REG+40
044530  010246                             MOV     R2,-(SP)                    ; TST.PAT,*                 6118
044532  010346                             MOV     R3,-(SP)                    ; REG.SEL,*
044534  012746  000012                     MOV     #12,-(SP)
044540  060616                             ADD     SP,(SP)                     ; INDEX,*
044542  004767  160556                     JSR     PC,WRT.REG
044546  016600  000012                     MOV     12(SP),R0                   ; INDEX,*                   6119
044552  006300                             ASL     R0
044554  006300                             ASL     R0
044556  006300                             ASL     R0
044560  010001                             MOV     R0,R1
044562  016105  015406                     MOV     ML.REG+2(R1),R5             ; *,CLR.DATA
044566  056105  015412                     BIS     ML.REG+6(R1),R5             ; *,CLR.DATA
044572  012767  000001  150560             MOV     #1,REG.INIT.FLG             ;                           6120
044600  010516                             MOV     R5,(SP)                     ; CLR.DATA,*                6121
044602  010346                             MOV     R3,-(SP)                    ; REG.SEL,*
```

```
                                      ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                      ;                TEST CODE SECTION                          29-Mar-1982 16:21:03   PA:<
044604  012746  000014                        MOV     #14,-(SP)
044610  060616                                ADD     SP,(SP)
044612  004767  161074                        JSR     PC,RD.REG                   ; ERR.FLG,*
044616  026627  000014  000001                CMP     14(SP),#1
044624  001055                                BNE     15$                         ; ERR.FLG,*              6123
044626  005267  150544                        INC     P.CNT
044632  026767  150540  150540                CMP     P.CNT,LIMIT                 ;                        6125
044640  003403                                BLE     14$
044642  062706  000012                        ADD     #12,SP
044646  000451                                BR      16$
044650  104455                        14$:    TRAP    55
044652  000166                                .WORD   166                         ;                        6127
044654  013012                                .WORD   ARR.DAT
044656  026302                                .WORD   DUMPER
044660  012746  011344                        MOV     #WRD.56,-(SP)
044664  012746  012464                        MOV     #FNC.23,-(SP)               ;                        6128
044670  012746  011310                        MOV     #WRD.52,-(SP)
044674  012746  010650                        MOV     #WRD.12,-(SP)
044700  012746  011676                        MOV     #PHR.4,-(SP)
044704  012746  010304                        MOV     #FIV.FMT,-(SP)
044710  012746  000006                        MOV     #6,-(SP)
044714  010600                                MOV     SP,R0
044716  104414                                TRAP    14                          ; SP,*
044720  016716  150426                        MOV     RD.DATA,(SP)
044724  010546                                MOV     R5,-(SP)                    ;                        6129
044726  016146  015404                        MOV     ML.REG(R1),-(SP)            ; CLR.DATA,*
044732  012746  007436                        MOV     #FMT.16,-(SP)
044736  012746  000004                        MOV     #4,-(SP)
044742  010600                                MOV     SP,R0
044744  104414                                TRAP    14                          ; SP,*
044746  012766  000001  000040                MOV     #1,40(SP)                   ; *,DODU.FLG
044754  062706  000026                        ADD     #26,SP                      ;                        6130
044760  062706  000012                15$:    ADD     #12,SP                      ;                        6125
044764  104467                                TRAP    67                          ;                        6115
044766  006000                                ROR     R0                          ;                        6131
044770  103642                                BLO     13$
044772  005203                        16$:    INC     R3                          ; REG.SEL
044774  020327  000015                        CMP     R3,#15                      ; REG.SEL,*              6114
045000  003636                                BLE     13$
045002  005102                                COM     R2                          ; TST.PAT
045004  005204                                INC     R4                          ; TWICE                  6136
045006  020427  000001                        CMP     R4,#1                       ; TWICE,*                6111
045012  003627                                BLE     12$
045014  005067  150340                        CLR     REG.INIT.FLG
045020  021627  000001                        CMP     (SP),#1                     ;                        6139
045024  001004                                BNE     17$                         ; DODU.FLG,*             6141
045026  016700  150776                        MOV     ML.LUN,R0
045032  104451                                TRAP    51                          ;                        6144
045034  104444                                TRAP    44
045036  062706  000006                17$:    ADD     #6,SP
045042  000207                                RTS     PC                          ;                        6005
```

```
                                   ;ML4AD                                               29-Mar-1982 16:23:04    TOPS
                                   ;            TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

                                   ; Routine Size:  341 words
                                   ; Maximum stack depth per invocation:  26 words



                                                .SBTTL  T17 TEST CODE SECTION
      045044                       T17::
      045044  004767  176522       1$:   JSR     PC,$T17                     ;                              6146
      045050  104466                     TRAP    66
      045052  006000                     ROR     R0
      045054  103773                     BLO     1$
      045056  000207                     RTS     PC

                                   ; Routine Size:  6 words
                                   ; Maximum stack depth per invocation:  0 words


;             6149  !<BLF/PAGE>
```

```
;ML4AD                                                 29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;             TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (70)

;     !
;     !
;     BGNTST;
;
;     !++
;     ! TEST NUMBER:  TST 18
;     !
;     ! TEST NAME:    COMPOSIT ERROR TEST
;     !
;     ! TEST DESCRIPTION:
;     !         TEST TO SEE IF SETTING EACH
;     !         BIT IN THE ERROR REGISTER
;     !         CAUSES A COMPOSIT ERROR BY:
;     !
;     !         WRITING A SHIFTING ONE THROUGH
;     !         THE ERROR REGISTER (SKIPPING THE
;     !         READ ONLY BITS) AND TESTING THE
;     !         COMPOSIT ERROR BIT IN MLDS
;     !         FOR BEING SET AFTER EACH
;     !         WRITE.
;     !
;     !--
;
;     local
;         DAT_PAT,                                      !DATA PATTERN
;         SKIP_MASK;                                    !POINTS TO MLER READ ONLY BITS
;
;     CLR_MBUS;
;     SKIP_MASK = %o'163157';                           !LOAD SKIP MASK
;     DAT_PAT = ONE;                                    !DATA PATTERN SET BIT 0 IN MLER
;
;     incr COUNT from 0 to 15 do                        !WRITE AND SHIFT DATA PAT TO MLER 16 TIMES
;         begin
;
;         if (.DAT_PAT and .SKIP_MASK) neq ZERO         !SKIP IF DAT_PAT FALLS ON READ ONLY BIT
;         then
;             begin
;             BGNSUB;
;             MLER = .DAT_PAT;                          !WRITE DATA_PAT TO MLER
;
;             if .COMP_ERR IS_NOT_SET                   !SEE IF DAT_PAT CAUSED A COMP ERROR
;             then
;                 begin
;                 ERRDF (50, ASYNC, DUMPER);            !ERROR IF NO COMP ERROR
;                 PRINTB (FOR_FMT, FNC_8, PHR_1, WRD_12, FNC_8);
;                 PRINTB (FMT_4, .DAT_PAT);
;                 end;
;
;             ENDSUB;
;             end;
;
;         DAT_PAT = .DAT_PAT^ONE;                       !SHIFT DAT_PAT TO NEXT BIT AND REPEAT
```

```
 ;ML4AD                                                              29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
 ;                        TEST CODE SECTION                          29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (70)

 ;               6202        end;
 ;               6203
 ;               6204    ENDTST;


                                               .SBTTL  $T18 TEST CODE SECTION
 045060  004167  137470              $T18:     JSR     R1,$SAVE3
 045064  152777  000040  150352                BISB    #40,@ML.REG+40                 ;                                     6148
 045072  016703  150734                        MOV     ML.DUT,R3                      ;                                     6175
 045076  042703  177770                        BIC     #177770,R3
 045102  142777  000007  150334                BICB    #7,@ML.REG+40
 045110  150377  150330                        BISB    R3,@ML.REG+40
 045114  012703  163157                        MOV     #-14621,R3
 045120  012701  000001                        MOV     #1,R1                          ; *,SKIP.MASK                         6178
 045124  005002                                CLR     R2                             ; *,DAT.PAT                           6179
 045126  030103                      1$:       BIT     R1,R3                          ; COUNT                               6181
 045130  001445                                BEQ     4$                             ; DAT.PAT,SKIP.MASK                   6184
 045132  104402                      2$:       TRAP    2
 045134  010177  150324                        MOV     R1,@ML.REG+60                  ;                                     6186
 045140  032777  040000  150306                BIT     #40000,@ML.REG+50              ; DAT.PAT,*                           6188
 045146  001033                                BNE     3$                             ;                                     6190
 045150  104455                                TRAP    55
 045152  000062                                .WORD   62                             ;                                     6193
 045154  012706                                .WORD   ASYNC
 045156  026302                                .WORD   DUMPER
 045160  012746  012244                        MOV     #FNC.8,-(SP)
 045164  012746  010650                        MOV     #WRD.12,-(SP)                  ;                                     6194
 045170  012746  011610                        MOV     #PHR.1,-(SP)
 045174  012746  012244                        MOV     #FNC.8,-(SP)
 045200  012746  010270                        MOV     #FOR.FMT,-(SP)
 045204  012746  000005                        MOV     #5,-(SP)
 045210  010600                                MOV     SP,R0
 045212  104414                                TRAP    14                             ; SP,*
 045214  010116                                MOV     R1,(SP)
 045216  012746  006620                        MOV     #FMT.4,-(SP)                   ; DAT.PAT,*                           6195
 045222  012746  000002                        MOV     #2,-(SP)
 045226  010600                                MOV     SP,R0
 045230  104414                                TRAP    14                             ; SP,*
 045232  062706  000020                        ADD     #20,SP
 045236  104467                      3$:       TRAP    67                             ;                                     6192
 045240  006000                                ROR     R0                             ;                                     6196
 045242  103733                                BLO     2$
 045244  006301                      4$:       ASL     R1
 045246  005202                                INC     R2                             ; DAT.PAT                             6201
 045250  020227  000017                        CMP     R2,#17                         ; COUNT                               6181
 045254  003724                                BLE     1$                             ; COUNT,*
 045256  000207                                RTS     PC                             ;                                     6148
```

```
                                  ;ML4AD                                                       29-Mar-1982 16:23:04   TOPS
                                  ;               TEST CODE SECTION                            29-Mar-1982 16:21:03   PA:<

                                  ; Routine Size:  64 words
                                  ; Maximum stack depth per invocation:  12 words



                                          .SBTTL  T18 TEST CODE SECTION
 045260                           T18::
 045260   004767  177574          1$:     JSR     PC,$T18                      ;                                  6202
 045264   104466                          TRAP    66
 045266   006000                          ROR     R0
 045270   103773                          BLO     1$
 045272   000207                          RTS     PC

                                  ; Routine Size:  6 words
                                  ; Maximum stack depth per invocation:  0 words


 ;          6205   !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                                29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (71)

;               !
;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 19
;               !
;               ! TEST NAME:    ATA BIT TEST
;               !
;               ! TEST DESCRIPTION:
;               !
;               !       TEST THE ATA BIT FOR SETTING
;               !       BY:
;               !
;               !       1.  SETTING A BIT IN THE ERROR
;               !           REGISTER.
;               !
;               !           TEST THE ATA BIT FOR CLEARING
;               !           AFTER BEING SET BY:
;               !           1.  WRITING A FUNCTION TO MLCS1.
;               !           2.  WRITING A ONE INTO THIS
;               !               UNITS ATA BIT
;               !
;               !       TEST THE ATA BIT FOR NOT CLEARING
;               !       AFTER BEING SET BY:
;               !
;               !       1.  WRITING A ONE INTO THE
;               !           ATA BIT OF THE OTHER
;               !           UNITS.
;               !
;               !--
;
;               local
;                   ATA_SAVE : bitvector [8],           !STORES ALL 8 ATA BITS ON READS AND WRITES
;                   DAT_PAT;                            !DATA PATTERN
;
;               CLR_MBUS;
;               MLER = ONE;                             !SET THE ATA BIT
;               MLER = ZERO;
;               ATA_SAVE = .MLAS;                       !READ THE ATTN REGISTER
;
;               if .ATA_SAVE [.ML_DUT] IS_NOT_SET       !SEE IF THIS DRIVES ATA BIT IS SET
;               then
;                   begin
;                   ERRDF (51, ASYNC, DUMPER);          !ERROR AND EXIT_TST IF NOT SET
;                   PRINTB (FOR_FMT, WRD_15, PHR_1, WRD_11, FNC_8);
;                   EXIT_TST;
;                   end;
;
;               if .ATTN IS_NOT_SET                     !SEE IF THE ATTN BIT IS SET
;               then
;                   begin
```

```
;ML4AD                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;              TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (71)

;           ERRDF (52, ASYNC, DUMPER);                !ERROR AND EXIT_TST IF NOT SET
;           PRINTB (FIV_FMT, REG_2, WRD_16, PHR_1, WRD_11, FNC_8);
;           EXIT_TST;
;           end;
;
;      MLCS1 = NOOP;                                  !TRY TO CLEAR THE ATA BIT WITH NOOP FUNC
;
;      if .ATTN IS_SET                                !SEE IF ATA GOT CLEARED
;      then
;           begin
;           ERRDF (53, ASYNC, DUMPER);                !ERROR AND EXIT_TST IF SET
;           PRINTB (FOR_FMT, WRD_15, PHR_2, WRD_11, FNC_2, WRD_19);
;           EXIT_TST;
;           end;
;
;      ATA_SAVE = .MLAS;                              !READ THE ATTENTION REGISTER
;
;      if .ATA_SAVE [.ML_DUT] IS_SET                  !SEE IF THE ATA REG GOT CLEARED BY NO-OP
;      then
;           begin
;           ERRDF (58, ASYNC, DUMPER);
;           PRINTB (FIV_FMT, WRD_15, PHR_2, WRD_11, FNC_2, WRD_19);
;           end;
;
;      BGNSUB;
;      MLER = ONE;                                    !SET THE ATA BIT
;      MLER = ZERO;
;      ATA_SAVE = ZEROES;                             !CLEAR ATA SAVE
;      ATA_SAVE [.ML_DUT] = ONE;                      !SET ATA_SAVE FOR THIS DRIVE
;      MLAS = .ATA_SAVE;                              !TRY TO CLEAR THE ATA BY WRITING TO IT.
;
;      if .ATTN IS_SET                                !SEE IF THE ATA GOT CLEARED
;      then
;           begin
;           ERRDF (54, ASYNC, DUMPER);                !ERROR IF NOT CLEARED
;           PRINTB (FIV_FMT, WRD_15, PHR_2, WRD_11, WRD_17, REG_5);
;           end;
;
;      ENDSUB;
;      BGNSUB;
;      MLER = ONE;                                    !SET THE ATA BIT
;      MLER = ZERO;
;      DAT_PAT = ONE;                                 !DATA PATTERN OF ONE IN FIELD OF ZEROES
;
;      incr ATA_SEL from 0 to 7 do                    !REPEAT LOOP 8 TIMES
;           begin
;
;           if .ATA_SEL neq .ML_DUT                   !SKIP IF ATA_SEL EQLS THIS DRIVE NO.
;           then
;                begin
;                MLAS = .DAT_PAT;                     !WRITE DAT PAT TO ATA REGISTER
;                ATA_SAVE = .MLAS;                    !READ ATA REG BACK
```

```
12776 ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
12777 ;                 TEST CODE SECTION                             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (71)
12778
12779 ;          6310
12780 ;          6311              if .ATA_SAVE [.ML_DUT] IS_NOT_SET         !SEE IF THIS DRIVE ATA IS CLEARED
12781 ;          6312              then
12782 ;          6313                  begin
12783 ;          6314                  ERRDF (55, ASYNC, DUMPER);             !ERROR AND EXIT LOOP IF CLEARED
12784 ;          6315                  PRINTB (SIX_FMT, WRD_15, PHR_6, WRD_11, WRD_17, REG_5, PHR_7);
12785 ;          6316                  PRINTB (FMT_7, .DAT_PAT);
12786 ;          6317                  exitloop;
12787 ;          6318                  end;
12788 ;          6319
12789 ;          6320              end;
12790 ;          6321
12791 ;          6322          DAT_PAT = .DAT_PAT^ONE;                        !SHIFT DAT_PAT AND REPEAT
12792 ;          6323          end;
12793 ;          6324
12794 ;          6325      ENDSUB;
12795 ;          6326      ENDTST;
12799
12800                                              .SBTTL  $T19 TEST CODE SECTION
12804 045274 004167 137254           $T19:     JSR     R1,$SAVE3
12805 045300 152777 000040 150136              BISB    #40,@ML.REG+40                   ;                    6204
12806 045306 016703 150520                     MOV     ML.DUT,R3                        ;                    6240
12807 045312 042703 177770                     BIC     #177770,R3
12808 045316 142777 000007 150120              BICB    #7,@ML.REG+40
12809 045324 150377 150114                     BISB    R3,@ML.REG+40
12810 045330 012777 000001 150126              MOV     #1,@ML.REG+60
12811 045336 005077 150122                     CLR     @ML.REG+60                       ;                    6243
12812 045342 017746 150126                     MOV     @ML.REG+70,-(SP)                 ;                    6244
12813 045346 016701 150460                     MOV     ML.DUT,R1                        ; *,ATA.SAVE         6245
12814 045352 006201                            ASR     R1                               ;                    6247
12815 045354 006201                            ASR     R1
12816 045356 006201                            ASR     R1
12817 045360 010600                            MOV     SP,R0                            ; ATA.SAVE,*
12818 045362 060001                            ADD     R0,R1
12819 045364 010146                            MOV     R1,-(SP)
12820 045366 016746 150440                     MOV     ML.DUT,-(SP)
12821 045372 042716 177770                     BIC     #177770,(SP)
12822 045376 012746 000001                     MOV     #1,-(SP)
12823 045402 005046                            CLR     -(SP)
12824 045404 004767 136224                     JSR     PC,BL$GT2
12825 045410 062706 000010                     ADD     #10,SP
12826 045414 005700                            TST     R0
12827 045416 001026                            BNE     1$
12828 045420 104455                            TRAP    55                               ;                    6250
12829 045422 000063                            .WORD   63
12830 045424 012706                            .WORD   ASYNC
```

```
                                        ;ML4AD
                                        ;               TEST CODE SECTION
045426  026302                                  .WORD   DUMPER
045430  012746  012244                          MOV     #FNC.8,-(SP)            ;                       6251
045434  012746  010640                          MOV     #WRD.11,-(SP)
045440  012746  011610                          MOV     #PHR.1,-(SP)
045444  012746  010676                          MOV     #WRD.15,-(SP)
045450  012746  010270                          MOV     #FOR.FMT,-(SP)
045454  012746  000005                          MOV     #5,-(SP)
045460  010600                                  MOV     SP,R0                   ; SP,*
045462  104414                                  TRAP    14
045464  104463                                  TRAP    63
045466  062706  000014                          ADD     #14,SP                  ;                       6247
045472  000467                                  BR      4$                      ;                       6249
045474  032777  100000  147752  1$:             BIT     #100000,@ML.REG+50      ;                       6255
045502  001026                                  BNE     2$
045504  104455                                  TRAP    55                      ;                       6258
045506  000064                                  .WORD   64
045510  012706                                  .WORD   ASYNC
045512  026302                                  .WORD   DUMPER
045514  012746  012244                          MOV     #FNC.8,-(SP)            ;                       6259
045520  012746  010640                          MOV     #WRD.11,-(SP)
045524  012746  011610                          MOV     #PHR.1,-(SP)
045530  012746  010704                          MOV     #WRD.16,-(SP)
045534  012746  012510                          MOV     #REG.2,-(SP)
045540  012746  010304                          MOV     #FIV.FMT,-(SP)
045544  012746  000006                          MOV     #6,-(SP)
045550  010600                                  MOV     SP,R0                   ; SP,*
045552  104414                                  TRAP    14
045554  104463                                  TRAP    63
045556  000433                                  BR      3$                      ;                       6255
045560  012777  000001  147616  2$:             MOV     #1,@ML.REG              ;                       6263
045566  005777  147662                          TST     @ML.REG+50              ;                       6265
045572  100031                                  BPL     5$
045574  104455                                  TRAP    55                      ;                       6268
045576  000065                                  .WORD   65
045600  012706                                  .WORD   ASYNC
045602  026302                                  .WORD   DUMPER
045604  012746  010730                          MOV     #WRD.19,-(SP)           ;                       6269
045610  012746  012164                          MOV     #FNC.2,-(SP)
045614  012746  010640                          MOV     #WRD.11,-(SP)
045620  012746  011626                          MOV     #PHR.2,-(SP)
045624  012746  010676                          MOV     #WRD.15,-(SP)
045630  012746  010270                          MOV     #FOR.FMT,-(SP)
045634  012746  000006                          MOV     #6,-(SP)
045640  010600                                  MOV     SP,R0                   ; SP,*
045642  104414                                  TRAP    14
045644  104463                                  TRAP    63
045646  062706  000016          3$:             ADD     #16,SP                  ;                       6265
045652  000167  000546          4$:             JMP     12$                     ;                       6267
045656  017716  147612          5$:             MOV     @ML.REG+70,(SP)         ; *,ATA.SAVE            6273
045662  016701  150144                          MOV     ML.DUT,R1               ;                       6275
045666  006201                                  ASR     R1
045670  006201                                  ASR     R1
```

```
                                  ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                  ;                  TEST CODE SECTION                        29-Mar-1982 16:21:03   PA:<
045672  006201                           ASR     R1
045674  010600                           MOV     SP,R0                         ; ATA.SAVE,*
045676  060001                           ADD     R0,R1
045700  010146                           MOV     R1,-(SP)
045702  016746  150124                   MOV     ML.DUT,-(SP)
045706  042716  177770                   BIC     #177770,(SP)
045712  012746  000001                   MOV     #1,-(SP)
045716  005046                           CLR     -(SP)
045720  004767  135710                   JSR     PC,BL$GT2
045724  062706  000010                   ADD     #10,SP
045730  005300                           DEC     R0
045732  001026                           BNE     6$
045734  104455                           TRAP    55
045736  000072                           .WORD   72                            ;                          6278
045740  012706                           .WORD   ASYNC
045742  026302                           .WORD   DUMPER
045744  012746  010730                   MOV     #WRD.19,-(SP)                 ;                          6279
045750  012746  012164                   MOV     #FNC.2,-(SP)
045754  012746  010640                   MOV     #WRD.11,-(SP)
045760  012746  011626                   MOV     #PHR.2,-(SP)
045764  012746  010676                   MOV     #WRD.15,-(SP)
045770  012746  010304                   MOV     #FIV.FMT,-(SP)
045774  012746  000006                   MOV     #6,-(SP)
046000  010600                           MOV     SP,R0                         ; SP,*
046002  104414                           TRAP    14
046004  062706  000016                   ADD     #16,SP
046010  104402                           TRAP    2                             ;                          6277
046012  012777  000001  147444   6$:     MOV     #1,@ML.REG+60                 ;                          6280
046020  005077  147440                   CLR     @ML.REG+60                    ;                          6283
046024  005016                           CLR     (SP)                          ;                          6284
046026  016701  150000                   MOV     ML.DUT,R1                     ; ATA.SAVE                 6285
046032  006201                           ASR     R1                            ;                          6286
046034  006201                           ASR     R1
046036  006201                           ASR     R1
046040  010600                           MOV     SP,R0                         ; ATA.SAVE,*
046042  060001                           ADD     R0,R1
046044  010146                           MOV     R1,-(SP)
046046  016746  147760                   MOV     ML.DUT,-(SP)
046052  042716  177770                   BIC     #177770,(SP)
046056  012746  000001                   MOV     #1,-(SP)
046062  011646                           MOV     (SP),-(SP)
046064  004767  136002                   JSR     PC,BL$PU2
046070  016677  000010  147376           MOV     10(SP),@ML.REG+70             ; ATA.SAVE,*               6287
046076  005777  147352                   TST     @ML.REG+50                    ;                          6289
046102  100026                           BPL     7$
046104  104455                           TRAP    55                            ;                          6292
046106  000066                           .WORD   66
046110  012706                           .WORD   ASYNC
046112  026302                           .WORD   DUMPER
046114  012746  012532                   MOV     #REG.5,-(SP)                  ;                          6293
046120  012746  010712                   MOV     #WRD.17,-(SP)
046124  012746  010640                   MOV     #WRD.11,-(SP)
```

```
                                     ;ML4AD                                               29-Mar-1982 16:23:04   TOPS
                                     ;                TEST CODE SECTION                   29-Mar-1982 16:21:03   PA:<
 046130  012746  011626                       MOV     #PHR.2,-(SP)
 046134  012746  010676                       MOV     #WRD.15,-(SP)
 046140  012746  010304                       MOV     #FIV.FMT,-(SP)
 046144  012746  000006                       MOV     #6,-(SP)
 046150  010600                               MOV     SP,R0                    ; SP,*
 046152  104414                               TRAP    14
 046154  062706  000016                       ADD     #16,SP                   ;
 046160  062706  000010               7$:     ADD     #10,SP                   ;                          6291
 046164  104467                               TRAP    67                       ;                          6280
 046166  006000                               ROR     R0                       ;                          6294
 046170  103707                               BLO     6$
 046172  104402                       8$:     TRAP    2                        ;
 046174  012777  000001  147262               MOV     #1,@ML.REG+60            ;                          6296
 046202  005077  147256                       CLR     @ML.REG+60               ;                          6298
 046206  012703  000001                       MOV     #1,R3                    ;                          6299
 046212  005002                               CLR     R2                       ; *,DAT.PAT                6300
 046214  020267  147612               9$:     CMP     R2,ML.DUT                ; ATA.SEL                  6302
 046220  001471                               BEQ     10$                      ; ATA.SEL,*                6305
 046222  010377  147246                       MOV     R3,@ML.REG+70
 046226  017716  147242                       MOV     @ML.REG+70,(SP)          ; DAT.PAT,*                6308
 046232  016701  147574                       MOV     ML.DUT,R1                ; *,ATA.SAVE               6309
 046236  006201                               ASR     R1                       ;                          6311
 046240  006201                               ASR     R1
 046242  006201                               ASR     R1
 046244  010600                               MOV     SP,R0
 046246  060001                               ADD     R0,R1                    ; ATA.SAVE,*
 046250  010146                               MOV     R1,-(SP)
 046252  016746  147554                       MOV     ML.DUT,-(SP)
 046256  042716  177770                       BIC     #177770,(SP)
 046262  012746  000001                       MOV     #1,-(SP)
 046266  005046                               CLR     -(SP)
 046270  004767  135340                       JSR     PC,BL$GT2
 046274  062706  000010                       ADD     #10,SP
 046300  005700                               TST     R0
 046302  001040                               BNE     10$
 046304  104455                               TRAP    55
 046306  000067                               .WORD   67                       ;                          6314
 046310  012706                               .WORD   ASYNC
 046312  026302                               .WORD   DUMPER
 046314  012746  011740                       MOV     #PHR.7,-(SP)
 046320  012746  012532                       MOV     #REG.5,-(SP)             ;                          6315
 046324  012746  010712                       MOV     #WRD.17,-(SP)
 046330  012746  010640                       MOV     #WRD.11,-(SP)
 046334  012746  011726                       MOV     #PHR.6,-(SP)
 046340  012746  010676                       MOV     #WRD.15,-(SP)
 046344  012746  010322                       MOV     #SIX.FMT,-(SP)
 046350  012746  000007                       MOV     #7,-(SP)
 046354  010600                               MOV     SP,R0
 046356  104414                               TRAP    14                       ; SP,*
 046360  010316                               MOV     R3,(SP)
 046362  012746  007002                       MOV     #FMT.7,-(SP)             ; DAT.PAT,*                6316
 046366  012746  000002                       MOV     #2,-(SP)
```

```
                                   ;ML4AD                                                        29-Mar-1982 16:23:04   TOPS
                                   ;             TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<
046372  010600                              MOV     SP,R0                   ; SP,*
046374  104414                              TRAP    14
046376  062706  000024                      ADD     #24,SP
046402  000405                              BR      11$                     ;                                      6317
046404  006303                     10$:     ASL     R3                      ; DAT.PAT                              6322
046406  005202                              INC     R2                      ; ATA.SEL                              6302
046410  020227  000007                      CMP     R2,#7                   ; ATA.SEL,*
046414  003677                              BLE     9$
046416  104467                     11$:     TRAP    67                      ;                                      6323
046420  006000                              ROR     R0
046422  103663                              BLO     8$
046424  005726                     12$:     TST     (SP)+
046426  000207                              RTS     PC                      ;                                      6204

                                   ; Routine Size:  302 words
                                   ; Maximum stack depth per invocation:  16 words


                                            .SBTTL  T19 TEST CODE SECTION
046430                             T19::
046430  004767  176640             1$:      JSR     PC,$T19                 ;                                      6325
046434  104466                              TRAP    66
046436  006000                              ROR     R0
046440  103773                              BLO     1$
046442  000207                              RTS     PC

                                   ; Routine Size:  6 words
                                   ; Maximum stack depth per invocation:  0 words


;            6327  !<BLF/PAGE>
```

```
;ML4AD                                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;       TEST CODE SECTION                                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (72)
;
;       !
;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 20
;       !
;       ! TEST NAME:    SEARCH FUNCTION TEST
;       !
;       ! TEST DESCRIPTION:
;       !
;       !       TEST THE SEARCH FUNCTION BY:
;       !
;       !       1.  DOING A SEARCH FUNCTION AT
;       !           ARRAY ZERO AND TEST GO,
;       !           ERROR BITS AND ATTN FOR
;       !           SETTING/NOT SETTING.
;       !
;       !       2.  DOING SEARCH FUNCTIONS AT ALL
;       !           PRESENT ARRAYS' AND TEST ATTN
;       !           SET
;       !
;       !       3.  DOING SEARCH FUNCTIONS AT ALL
;       !           NOT PRESENT ARRAYS' AND TEST
;       !           ATTN CLEARED.
;       !
;       !--
;
;       CLR_MBUS;
;       MLDA = ZEROES;
;       MLCS1 = SEARCH;                                         !DO A SEARCH FUNCTION
;
;       if .GO IS_SET                                           !SEE IF GO IS SET
;       then
;           begin
;           ERRDF (56, ASYNC, DUMPER);                          !ERROR IF NOT SET
;           PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_10, WRD_19);
;           end;
;
;       if .ILF IS_SET                                          !SEE IF ILF IS SET
;       then
;           begin
;           ERRDF (57, ASYNC, DUMPER);                          !ERROR IF SET
;           PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_11, FNC_10, WRD_19);
;           end;
;
;       if .ATTN IS_NOT_SET                                     !SEE IF ATTN IS SET
;       then
;           begin
;           ERRDF (59, ASYNC, DUMPER);                          !ERROR IF NOT SET
;           PRINTB (FIV_FMT, WRD_16, PHR_1, WRD_12, FNC_10, WRD_19);
;           end
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;            TEST CODE SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (72)

;            else
;                begin
;
;                CLR_THRESHOLD;                                       !CLEAR ERROR PRINT THRESHOLD
;
;            !
;            ! VERSION CZMLAD CHANGED INCR TO INCRU
;            !
;                incru ARR_SEL from 0 to .LST_ARR by .ARR_INC do      !DO SEARCH AT ALL PRESENT ARRAYS
;                    begin
;                    BGNSUB;
;                    CLR_MBUS;
;                    MLDA = .ARR_SEL;                             !LOAD DSA REG WITH ARR_SEL
;                    MLCS1 = SEARCH;                              !DO A SEARCH FUNCTION
;
;                    if .OPI IS_SET                               !READ ATTN
;                    then
;                        begin
;                        CMP_THRESHOLD;                           !COMPARE ERROR PRINT THRESHOLD
;                        ERRDF (60, ASYNC, DUMPER);               !ERROR IF NOT SET
;                        PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_10, WRD_19);
;                        PRINTB (FMT_9, .ARR_SEL);
;                        end;
;
;                    ENDSUB;
;                    end;
;
;                CLR_THRESHOLD;                                       !CLEAR ERROR PRINT THRESHOLD
;
;                if .OP_NUM_ARR lss %o'000017'                    !SEE IF LSS 17 ARRAYS ARE PRESENT
;                then
;
;            !
;            ! VERSION CZMLAD CHANGED INCR TO INCRU
;            !
;                    incru ARR_SEL from (.LST_ARR + .ARR_INC) to .ARR_16 by .ARR_INC do
;                                                                 !DO A SEARCH AT ALL NOT PRESENT
;                        begin                                    !ARRAYS IF LSS 17
;                        BGNSUB;
;                        CLR_MBUS;
;                        MLDA = .ARR_SEL;                         !LOAD DSA REG WITH ARR_SEL
;                        MLCS1 = SEARCH;                          !DO A SEARCH FUNCTION
;
;                        if .OPI IS_NOT_SET                       !SEE IF OPI IS SET
;                        then
;                            begin
;                            CMP_THRESHOLD;                       !COMPARE ERROR PRINT THRESHOLD
;                            ERRDF (61, ASYNC, DUMPER);           !ERROR IF NOT SET
;                            PRINTB (FIV_FMT, WRD_4, PHR_1, WRD_12, FNC_10, WRD_19);
;                            PRINTB (FMT_9, .ARR_SEL);
;                            end;
```

```
13162 ;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
13163 ;                TEST CODE SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (72)
13164
13165 ;          6432                 ENDSUB;
13166 ;          6433                 end;
13167 ;          6434
13168 ;          6435           end;
13169 ;          6436
13170 ;          6437 ENDTST;
13174
13175
                                               .SBTTL  $T20 TEST CODE SECTION
13179 046444  004167  136104           $T20:   JSR     R1,$SAVE3
13180 046450  152777  000040  146766           BISB    #40,@ML.REG+40                  ;                6326
13181 046456  016703  147350                   MOV     ML.DUT,R3                       ;                6330
13182 046462  042703  177770                   BIC     #177770,R3
13183 046466  142777  000007  146750           BICB    #7,@ML.REG+40
13184 046474  150377  146744                   BISB    R3,@ML.REG+40
13185 046500  005077  146730                   CLR     @ML.REG+30
13186 046504  012777  000031  146672           MOV     #31,@ML.REG                     ;                6357
13187 046512  132777  000001  146664           BITB    #1,@ML.REG                      ;                6358
13188 046520  001426                           BEQ     1$                              ;                6360
13189 046522  104455                           TRAP    55
13190 046524  000070                           .WORD   70                              ;                6363
13191 046526  012706                           .WORD   ASYNC
13192 046530  026302                           .WORD   DUMPER
13193 046532  012746  010730                   MOV     #WRD.19,-(SP)
13194 046536  012746  012272                   MOV     #FNC.10,-(SP)                   ;                6364
13195 046542  012746  010640                   MOV     #WRD.11,-(SP)
13196 046546  012746  011626                   MOV     #PHR.2,-(SP)
13197 046552  012746  010520                   MOV     #WRD.1,-(SP)
13198 046556  012746  010304                   MOV     #FIV.FMT,-(SP)
13199 046562  012746  000006                   MOV     #6,-(SP)
13200 046566  010600                           MOV     SP,R0
13201 046570  104414                           TRAP    14                              ; SP,*
13202 046572  062706  000016                   ADD     #16,SP
13203 046576  132777  000001  146660  1$:      BITB    #1,@ML.REG+60                   ;                6362
13204 046604  001430                           BEQ     2$                              ;                6367
13205 046606  104455                           TRAP    55
13206 046610  000071                           .WORD   71                              ;                6370
13207 046612  012706                           .WORD   ASYNC
13208 046614  026302                           .WORD   DUMPER
13209 046616  012746  010730                   MOV     #WRD.19,-(SP)
13210 046622  012746  012272                   MOV     #FNC.10,-(SP)                   ;                6371
13211 046626  012746  012302                   MOV     #FNC.11,-(SP)
13212 046632  012746  010640                   MOV     #WRD.11,-(SP)
13213 046636  012746  011714                   MOV     #PHR.5,-(SP)
13214 046642  012746  010536                   MOV     #WRD.3,-(SP)
13215 046646  012746  010304                   MOV     #FIV.FMT,-(SP)
13216 046652  012746  000007                   MOV     #7,-(SP)
```

```
                                        ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                                        ;              TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<
046656  010600                                  MOV     SP,R0                   ; SP,*
046660  104414                                  TRAP    14
046662  062706  000020                          ADD     #20,SP
046666  032777  100000  146560  2$:             BIT     #100000,@ML.REG+50      ;                          6369
046674  001027                                  BNE     3$                      ;                          6374
046676  104455                                  TRAP    55
046700  000073                                  .WORD   73                      ;                          6377
046702  012706                                  .WORD   ASYNC
046704  026302                                  .WORD   DUMPER
046706  012746  010730                          MOV     #WRD.19,-(SP)
046712  012746  012272                          MOV     #FNC.10,-(SP)           ;                          6378
046716  012746  010650                          MOV     #WRD.12,-(SP)
046722  012746  011610                          MOV     #PHR.1,-(SP)
046726  012746  010704                          MOV     #WRD.16,-(SP)
046732  012746  010304                          MOV     #FIV.FMT,-(SP)
046736  012746  000006                          MOV     #6,-(SP)
046742  010600                                  MOV     SP,R0                   ; SP,*
046744  104414                                  TRAP    14
046746  062706  000016                          ADD     #16,SP
046752  000207                                  RTS     PC                      ;                          6376
046754  005067  146416          3$:             CLR     P.CNT                   ;                          6374
046760  016702  145034                          MOV     LST.ARR,R2              ;                          6381
046764  016703  145014                          MOV     ARR.INC,R3              ;                          6388
046770  005001                                  CLR     R1                      ; ARR.SEL
046772  000475                                  BR      7$
046774  104402                  4$:             TRAP    2
046776  152777  000040  146440                  BISB    #40,@ML.REG+40          ;                          6389
047004  016700  147022                          MOV     ML.DUT,R0               ;                          6390
047010  042700  177770                          BIC     #177770,R0
047014  142777  000007  146422                  BICB    #7,@ML.REG+40
047022  150077  146416                          BISB    R0,@ML.REG+40
047026  010177  146402                          MOV     R1,@ML.REG+30           ; ARR.SEL,*
047032  012777  000031  146344                  MOV     #31,@ML.REG             ;                          6392
047040  032777  020000  146416                  BIT     #20000,@ML.REG+60       ;                          6393
047046  001443                                  BEQ     5$                      ;                          6395
047050  005267  146322                          INC     P.CNT
047054  026767  146316  146316                  CMP     P.CNT,LIMIT             ;                          6397
047062  003040                                  BGT     6$
047064  104455                                  TRAP    55
047066  000074                                  .WORD   74                      ;                          6399
047070  012706                                  .WORD   ASYNC
047072  026302                                  .WORD   DUMPER
047074  012746  010730                          MOV     #WRD.19,-(SP)
047100  012746  012272                          MOV     #FNC.10,-(SP)           ;                          6400
047104  012746  010650                          MOV     #WRD.12,-(SP)
047110  012746  011714                          MOV     #PHR.5,-(SP)
047114  012746  010544                          MOV     #WRD.4,-(SP)
047120  012746  010304                          MOV     #FIV.FMT,-(SP)
047124  012746  000006                          MOV     #6,-(SP)
047130  010600                                  MOV     SP,R0                   ; SP,*
047132  104414                                  TRAP    14
047134  010116                                  MOV     R1,(SP)                 ; ARR.SEL,*                6401
```

```
                                  ;ML4AD                                                     29-Mar-1982 16:23:04  TOPS
                                  ;          TEST CODE SECTION                               29-Mar-1982 16:21:03  PA:<
047136 012746 007064                     MOV     #FMT.9,-(SP)
047142 012746 000002                     MOV     #2,-(SP)
047146 010600                            MOV     SP,R0                  ; SP,*
047150 104414                            TRAP    14
047152 062706 000022                     ADD     #22,SP                 ;                                    6397
047156 104467                    5$:     TRAP    67                     ;                                    6402
047160 006000                            ROR     R0
047162 103704                            BLO     4$
047164 060301                    6$:     ADD     R3,R1                  ; *,ARR.SEL                          6388
047166 020102                    7$:     CMP     R1,R2                  ; ARR.SEL,*
047170 101701                            BLOS    4$
047172 005067 146200                     CLR     P.CNT                  ;                                    6405
047176 026727 144600 000017              CMP     OP.NUM.ARR,#17         ;                                    6409
047204 002110                            BGE     12$
047206 016701 144606                     MOV     LST.ARR,R1             ;                                    6415
047212 066701 144566                     ADD     ARR.INC,R1
047216 016703 144574                     MOV     ARR.16,R3
047222 016702 144556                     MOV     ARR.INC,R2
047226 000475                            BR      11$
047230 104402                    8$:     TRAP    2                      ;                                    6417
047232 152777 000040 146204              BISB    #40,@ML.REG+40         ;                                    6418
047240 016700 146566                     MOV     ML.DUT,R0
047244 042700 177770                     BIC     #177770,R0
047250 142777 000007 146166              BICB    #7,@ML.REG+40
047256 150077 146162                     BISB    R0,@ML.REG+40
047262 010177 146146                     MOV     R1,@ML.REG+30          ; ARR.SEL,*                          6420
047266 012777 000031 146110              MOV     #31,@ML.REG            ;                                    6421
047274 032777 020000 146162              BIT     #20000,@ML.REG+60      ;                                    6423
047302 001043                            BNE     9$
047304 005267 146066                     INC     P.CNT                  ;                                    6425
047310 026767 146062 146062              CMP     P.CNT,LIMIT
047316 003040                            BGT     10$
047320 104455                            TRAP    55                     ;                                    6427
047322 000075                            .WORD   75
047324 012706                            .WORD   ASYNC
047326 026302                            .WORD   DUMPER
047330 012746 010730                     MOV     #WRD.19,-(SP)          ;                                    6428
047334 012746 012272                     MOV     #FNC.10,-(SP)
047340 012746 010650                     MOV     #WRD.12,-(SP)
047344 012746 011610                     MOV     #PHR.1,-(SP)
047350 012746 010544                     MOV     #WRD.4,-(SP)
047354 012746 010304                     MOV     #FIV.FMT,-(SP)
047360 012746 000006                     MOV     #6,-(SP)
047364 010600                            MOV     SP,R0                  ; SP,*
047366 104414                            TRAP    14
047370 010116                            MOV     R1,(SP)                ; ARR.SEL,*                          6429
047372 012746 007064                     MOV     #FMT.9,-(SP)
047376 012746 000002                     MOV     #2,-(SP)
047402 010600                            MOV     SP,R0                  ; SP,*
047404 104414                            TRAP    14
047406 062706 000022                     ADD     #22,SP                 ;                                    6425
047412 104467                    9$:     TRAP    67                     ;                                    6430
```

```
13330                                      ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
13331                                      ;               TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<
13332
13333 047414  006000                               ROR     R0
13334 047416  103704                               BLO     8$
13335 047420  060201                       10$:    ADD     R2,R1                           ; *,ARR.SEL
13336 047422  020103                       11$:    CMP     R1,R3                           ; ARR.SEL,*                   6415
13337 047424  101701                               BLOS    8$
13338 047426  000207                       12$:    RTS     PC
13339                                                                                      ;                             6326
13340                                      ; Routine Size:  250 words
13341                                      ; Maximum stack depth per invocation:  13 words
13346
13347
13351
13352
13356 047430                                       .SBTTL  T20 TEST CODE SECTION
13357 047430  004767  177010               T20::
                                           1$:     JSR     PC,$T20
13358 047434  104466                               TRAP    66                              ;                             6435
13359 047436  006000                               ROR     R0
13360 047440  103773                               BLO     1$
13361 047442  000207                               RTS     PC
13362
13363                                      ; Routine Size:  6 words
13364                                      ; Maximum stack depth per invocation:  0 words
13369
13370
13371 ;          6438   !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
;              TEST CODE SECTION                                29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (73)

;                  !
;                  BGNTST;
;
;                  !++
;                  ! TEST NUMBER:  TST 21
;                  !
;                  ! TEST NAME:    POWER FAIL TEST
;                  !
;                  ! TEST DESCRIPTION:
;                  !       THIS TEST IS PART OF THE MANUAL INTERVENTION
;                  !       TEST SECTION.  DRIVE CONDITIONS REVOLVING
;                  !       AROUND POWER FAIL SITUATION ARE TEST FOR.
;                  !       FUNCTION TESTED FOR ARE AS FOLLOWS:
;                  !
;                  !               1.  VV BIT SETTING AND CLEARING
;                  !
;                  !               2.  READ-IN-PRESET FUNCTION SETTING
;                  !                   THE VV BIT.
;                  !
;                  !               3.  ECC INITIALIZE CLEARING OUT MEMORY
;                  !                   WITH BAD BATTERY BACK-UP.
;                  !
;                  !               4.  DRIVE REGISTERS BEING CLEARED BY
;                  !                   DC LO via 'MB_DIS LO'.
;                  !
;                  !               5.  UNSAFE BIT 'UNS' SETTING DURING AC
;                  !                   POWER LOSS.
;                  !--
;
;                  local
;                      SIZE,                                    !STORES THE SIZE OF MASS BUS TRANSFERS
;                      DST,                                     !STORES THE DESTINATION ADRS OF MASS BUS TRANSFERS
;                      SRC,                                     !STORES THE SOURCE ADRS OF MASS BUS TRANSFERS
;                      DSA_CNT,                                 !COUNTS THE NUMBER OF BLOCK TRANSFERS DONE
;                      ERR_FLG,                                 !ERROR FLAG
;                      CLR_DATA,                                !STORES THE EXPECTED CLEARED DATA FROM THE REGISTERS
;                      index,                               !INDEX VALUE INTO ML_REG STRUCTURE TO ACCESS THE REGISTERS ADRS
;                      WCE_CNT;                                 !COUNT THE NUMBER OF WRITE CHECK ERROR DETECTED
;
;                  !+
;                  ! PERFORM THIS TEST ONLY IF THE OPERATOR HAS
;                  ! ENABLED MANUAL INTERVENTION TEST VIA THE S/W
;                  ! QUESTIONS.
;                  !-
;
;                  if .INTERVEN                                 !DO THIS TEST IF INTERVEN IS SET
;                  then
;                      begin
;                  !
;                  !
;                  ! PRINT WHICH TEST THIS IS
;                  !
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (73)
;
;       !
;           PRINTB (ONE_FMT, T_21);                         !PRINT T_21 MESSAGE
;           BGNSUB;                                         !START SCOOP LOOP
;       !
;       !
;       ! FIRST TEST THE VV BIT FOR SETTING.
;       ! TO DO THIS FIRST SEE IF THE BIT IS
;       ! ALREADY SET.  IF ALREADY SET THEN
;       ! SEE IF THE READ-IN-PRESET FUNCTION
;       ! CLEARS THE BIT.  IF NOT ALREADY SET
;       ! THEN SEE IF THE READ-IN-PRESET FUNC
;       ! SETS THE BIT.
;       !
;       !
;           CLR_MBUS;                                       !CLEAR THE MASS BUS
;
;           if .VV                                          !IS THE VV BIT INITIALLY SET
;           then                                            !THE VV BIT IS SET
;               begin                                       !SEE IF THE READ-IN-PRESET FUNC CLEARS IT
;               MLCS1 = RD_IN_PRE;                          !DO A READ IN PRESET FUNCTION
;
;               if not (.VV)                                !DID THE VV GET CLEARED
;               then
;                   begin                                   !THE VV GOT CLEARED
;                   ERRDF (149, ASYNC, DUMPER);             !REPORT THE ERROR TO THE OPERATOR
;                   PRINTB (ONE_FMT, VV_CLEAR);             !TELL WHAT THE ERROR IS
;                   end
;
;               end
;           else                                            !THE VV BIT IS INITIALLY CLEARED
;               begin                                       !SEE IF A READ-IN-PRESET FUNC SETS THE VV BIT
;               MLCS1 = RD_IN_PRE;                          !DO A READ-IN-PRESET FUNCTION
;
;               if not (.VV)                                !DID THE VV BIT GET SET
;               then
;                   begin                                   !THE VV BIT DID NOT SET
;                   ERRDF (150, ASYNC, DUMPER);             !REPORT THE ERROR TO OPERATOR
;                   PRINTB (TWO_FMT, VV_NOT_SET, FNC_11);           !TELL WHAT THE ERROR IS
;                   end;
;
;               end;
;
;       !
;       !
;       ! NOW TEST DRIVE ERROR CONDITIONS TO SEE
;       ! IF DOING A READ-IN-PRESET FUNCTION CAUSED
;       ! ANY UNEXPECTED DRIVE ERRORS.
;       !
;       !
;
;           if .GO IS_SET                                   !DID THE RD-IN-PRE FUNC HANG THE GO BIT
;           then
```

```
;ML4AD                                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (73)

;                           begin                                          !THE GO BIT IS HUNG
;                           ERRDF (62, ASYNC, DUMPER);                     !REPORT THE ERROR TO THE OPERATOR
;                           PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_11, WRD_19); !TELL WHAT THE ERROR IS
;                           end;
;
;                       if .ILF IS_SET                                     !DID THE RD-IN-PRE FUNC CAUSE A ILLEGAL FUNC ERROR
;                       then
;                           begin                                          !THE ILF BIT IS SET
;                           ERRDF (63, ASYNC, DUMPER);                     !REPORT THE ERROR TO THE OPERATOR
;                           PRINTB (FIV_FMT, WRD_3, PHR_5, WRD_11, FNC_11, WRD_19); !TELL WHAT THE ERROR IS
;                           end;
;
;                       if .OPI IS_SET                                     !DID THE RD-IN-PRE CAUSE A OPERATION INCOMPLETE ERROR
;                       then
;                           begin                                          !THE OPI BIT IS SET
;                           ERRDF (64, ASYNC, DUMPER);                     !REPORT THE ERROR TO THE OPERATOR
;                           PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_11, FNC_11, WRD_19); !TELL WHAT THE ERROR
;                           end;
;
;                       ENDSUB;                                            !END SCOOP LOOP
;                   !
;                   !
;                   ! NOW WE'LL TEST THE VV BIT FOR CLEARING
;                   ! AFTER POWER UP WITH BAD BATTERY BACK-UP,
;                   ! ECC INITIALIZE CLEARING MEMORY TO ZEROES
;                   ! AND DC LO CREATING 'MB_DIS_LO' AND CLEARING
;                   ! OUT DRIVE REGISTERS.
;                   !
;                   !
;                       BGNSUB;                                            !START SCOOP LOOP
;                       IO_BUF = ONES;                                     !LOAD THE FIRST IO_BUF WORD WITH ONES DATA
;                       DSA_CNT = -1;                                      !RESET THE DSA COUNTER
;                   !
;                   !
;                   ! WRITE A BACK GROUND OF ALL ONES TO
;                   ! ALL OF MEMORY.  THIS WILL PROVE IF
;                   ! ECC INIT TOOK PLACE AFTER POWER UP
;                   ! WITH BAD BATTERY BACK-UP.
;                   !
;                   !
;
;                       do                                                 !LOAD ALL OF MEMORY WITH ONES DATA
;                           begin
;                           BREAK;                                         !LOOK FOR A CONTROL C
;                           DSA_CNT = .DSA_CNT + 1;                        !UP THE DSA COUNTER
;                           WRT_TRANSFER (SIZE = -256, DST = .DSA_CNT, SRC = IO_BUF);      !DO A BLOCK WRITE TRANSFER
;                           end
;                   !
;                   !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
;                   !
;                       until .DSA_CNT eqlU .LST_BLK;                      !REPEAT WRITING UNTIL THE LAST BLOCK IS WRITTEN
;
```

```
;        ERR_FLG = ONE;                                 !CLEAR THE ERROR FLAG
;        CLR_MBUS;                                      !CLEAR THE MASS BUS
;     !
;     !
;     ! TELL THE OPERATOR THE SHUT OFF BOX
;     ! POWER AND AS THE AC POWER IS GOING
;     ! DOWN TEST 'UNS BIT' FOR SETTING.
;     !
;     !
;        PRINTB (ONE_FMT, PWR_OFF);                     !TELL THE OPERATOR TO TURN BOX POWER OFF
;
;        do                                             !SAMPLE THE UNS BIT UNTIL THE DRIVE TIMES OUT
;            begin
;            BREAK;                                     !LOOK FOR A CONTROL C
;
;            if .UNS                                    !IS THE UNS BIT SET YET
;            then
;                begin                                  !IT'S SET
;                ERR_FLG = ZERO;                        !THE BIT IS NOT IN ERROR SO CLEAR THE ERROR FLAG
;                exitloop;                              !EXIT THE LOOP
;                end;
;
;            end
;        until .NED;                                    !REPEAT SAMPLING UNS UNTIL NED IS SET
;
;        if .ERR_FLG                                    !IS THE UNS BIT IN ERROR
;        then
;            begin                                      !THE BIT IS IN ERROR
;            ERRDF (151, ASYNC, DUMPER);                !REPORT THE ERROR TO THE OPERATOR
;            PRINTB (ONE_FMT, UNS_ERR);                 !TELL WHAT THE ERROR IS
;            end;
;
;     !
;     !
;     ! NOW TELL THE OPERATOR TO TURN
;     ! THE BOX POWER BACK ON.  ONCE THE
;     ! DRIVE IS READY TEST THE VV BIT AND
;     ! SEE IF THE POWER UP WITH BAD BATTERY
;     ! BACK-UP CLEAR THE VV BIT, CLEARED
;     ! MEMORY AND CLEARED THE DRIVE REGISTERS.
;     !
;     !
;        PRINTB (ONE_FMT, PWR_ON);                      !TELL THE OPERATOR TO TURN BOX POWER BACK ON
;
;        do                                             !DO NOTHING
;            begin
;            BREAK;                                     !LOOK FOR CONTROL C
;            end
;        until .DRY;                                    !UNTIL THE DRIVE IS READY
;
;        if .VV                                         !DID THE POWER FAIL WITH BAD BAT BACK-UP CLEAR THE VV BIT
;        then
```

```
;ML4AD                                                            29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;              TEST CODE SECTION                                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (73)
;
;                  begin                                          !THE VV BIT DIDN'T GET CLEARED
;                  ERRDF (152, ASYNC, DUMPER);                    !REPORT THE ERROR TO THE OPERATOR
;                  PRINTB (ONE_FMT, VV_SET);                      !TELL WHAT THE ERROR IS
;                  end;
;
;              incr REG_SEL from 0 to 6 do                        !SEE IF DC LO ON POWER UP CLEARED THE REGISTERS
;                  begin
;
;                  selectone .REG_SEL of                          !SELECT THIS REGISTERS INDEX VALUE
;                      set
;
;                      [0] :
;                          index = 0;                             !TEST MLCS1
;
;                      [1] :
;                          index = 6;                             !TEST MLER
;
;                      [2] :
;                          index = 3;                             !TEST MLDA
;
;                      [3] :
;                          index = 10;                            !TEST MLMR
;
;                      [4] :
;                          index = 13;                            !TEST MLE1
;
;                      [5] :
;                          index = 14;                            !TEST MLE2
;
;                      [6] :
;                          index = 8;                             !TEST MLPA
;                      tes;
;
;                  CLR_DATA = (.HI) or (.IGNORE);                 !GENERATE THIS REGISTERS CLEARED DATA
;                  RD_REG (.CLR_DATA, .REG_SEL, ERR_FLG);         !READ THE REG FOR ITS CLEARD DATA
;
;                  if .ERR_FLG                                    !DID THE REGISTER GET CLEARED ON POWER UP
;                  then
;                      begin                                      !THE REGISTER'S NOT CLEARED
;                      ERRDF (153, ASYNC, DUMPER);                !REPORT THE ERROR TO THE OPERATOR
;                      PRINTB (ONE_FMT, MB_DIS_ERR);              !TELL WHAT THE ERROR IS
;                      PRINTB (FMT_16, .ML_REG [.index, REGISTER_ADD], .CLR_DATA, .RD_DATA);
;                      exitloop;                                  !EXIT THE LOOP
;                      end;
;
;                  end;
;
;              WCE_CNT = ZERO;                                    !CLEAR THE WRITE CHECK ERROR COUNTER
;              DSA_CNT = -1;                                      !RESET THE DSA COUNTER
;              IO_BUF = ZEROES;                                   !LOAD THE FIRST IO_BUF WORD WITH ZEROES DATA
;
;              do                                                 !SEARCH ALL OF MEMORY FOR INIT'ED DATA
```

```
13653 ;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
13654 ;                   TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (73)
13655
13656 ;            6699              begin
13657 ;            6700              BREAK;                                     !LOOK FOR CONTROL C
13658 ;            6701              DSA_CNT = .DSA_CNT + 1;                    !UP THE DSA COUNT
13659 ;            6702              WRT_CHK_TRANSFER (SIZE = -256, DST = .DSA_CNT, SRC = IO_BUF);   !WRITE CHECK THIS BLOCK
13660 ;            6703
13661 ;            6704              if .WCE then WCE_CNT = .WCE_CNT + 1;       !IS THIS BLOCK INIT'ED UP COUNT IF NOT
13662 ;            6705
13663 ;            6706              end
13664 ;            6707    !
13665 ;            6708    !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
13666 ;            6709    !
13667 ;            6710          until .DSA_CNT eqlU .LST_BLK;                  !CONTINUE WRITE CHECKING UNTIL THE LAST BLOCK IS DONE
13668 ;            6711
13669 ;            6712          if .WCE_CNT gtr 127                            !WAS THERE MORE THAN 127 SECTORS IN ERROR
13670 ;            6713          then
13671 ;            6714              begin                                      !MORE THAN 127 SECTORS IN ERROR THERE FOR INIT ERROR
13672 ;            6715              ERRDF (65, ASYNC, DUMPER);                 !REPORT THE ERROR TO THE OPERATOR
13673 ;            6716              PRINTB (ONE_FMT, NO_INIT);                 !TELL WHAT THE ERROR IS
13674 ;            6717              end;
13675 ;            6718
13676 ;            6719          ENDSUB;                                        !END SCOOP LOOP
13677 ;            6720          end;
13678 ;            6721
13679 ;            6722    ENDTST;                                            !END THE TEST
13683
13684
                                                   .SBTTL  $T21 TEST CODE SECTION
13688 047444  004167  135142            $T21:    JSR     R1,$SAVE5
13689 047450  162706  000012                     SUB     #12,SP                          ;                    6437
13690 047454  032767  000001  132726             BIT     #1,INTERVEN
13691 047462  001002                             BNE     1$                              ;                    6484
13692 047464  000167  001500                     JMP     30$
13693 047470  012746  004716            1$:      MOV     #T.21,-(SP)
13694 047474  012746  010240                     MOV     #ONE.FMT,-(SP)                  ;                    6492
13695 047500  012746  000002                     MOV     #2,-(SP)
13696 047504  010600                             MOV     SP,R0
13697 047506  104414                             TRAP    14                              ; SP,*
13698 047510  104402                    2$:      TRAP    2
13699 047512  152777  000040  145724             BISB    #40,@ML.REG+40
13700 047520  016705  146306                     MOV     ML.DUT,R5                       ;                    6493
13701 047524  042705  177770                     BIC     #177770,R5
13702 047530  142777  000007  145706             BICB    #7,@ML.REG+40
13703 047536  150577  145702                     BISB    R5,@ML.REG+40
13704 047542  132777  000100  145704             BITB    #100,@ML.REG+50
13705 047550  001426                             BEQ     3$                              ;                    6507
13706 047552  012777  000021  145624             MOV     #21,@ML.REG                     ;                    6510
13707 047560  132777  000100  145666             BITB    #100,@ML.REG+50                 ;                    6512
```

```
                                      ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                      ;               TEST CODE SECTION                           29-Mar-1982 16:21:03   PA:<
047566  001046                               BNE     4$
047570  104455                               TRAP    55
047572  000225                               .WORD   225                              ;                               6515
047574  012706                               .WORD   ASYNC
047576  026302                               .WORD   DUMPER
047600  012746  005414                       MOV     #VV.CLEAR,-(SP)                  ;                               6516
047604  012746  010240                       MOV     #ONE.FMT,-(SP)
047610  012746  000002                       MOV     #2,-(SP)
047614  010600                               MOV     SP,R0                            ; SP,*
047616  104414                               TRAP    14
047620  062706  000006                       ADD     #6,SP                            ;                               6514
047624  000427                               BR      4$                               ;                               6507
047626  012777  000021  145550  3$:          MOV     #21,@ML.REG                      ;                               6522
047634  132777  000100  145612               BITB    #100,@ML.REG+50                  ;                               6524
047642  001020                               BNE     4$
047644  104455                               TRAP    55
047646  000226                               .WORD   226                              ;                               6527
047650  012706                               .WORD   ASYNC
047652  026302                               .WORD   DUMPER
047654  012746  012302                       MOV     #FNC.11,-(SP)                    ;                               6528
047660  012746  005340                       MOV     #VV.NOT.SET,-(SP)
047664  012746  010246                       MOV     #TWO.FMT,-(SP)
047670  012746  000003                       MOV     #3,-(SP)
047674  010600                               MOV     SP,R0                            ; SP,*
047676  104414                               TRAP    14
047700  062706  000010                       ADD     #10,SP                           ;                               6526
047704  132777  000001  145472  4$:          BITB    #1,@ML.REG                       ;                               6541
047712  001426                               BEQ     5$
047714  104455                               TRAP    55
047716  000076                               .WORD   76                               ;                               6544
047720  012706                               .WORD   ASYNC
047722  026302                               .WORD   DUMPER
047724  012746  010730                       MOV     #WRD.19,-(SP)                    ;                               6545
047730  012746  012302                       MOV     #FNC.11,-(SP)
047734  012746  010640                       MOV     #WRD.11,-(SP)
047740  012746  011626                       MOV     #PHR.2,-(SP)
047744  012746  010520                       MOV     #WRD.1,-(SP)
047750  012746  010304                       MOV     #FIV.FMT,-(SP)
047754  012746  000006                       MOV     #6,-(SP)
047760  010600                               MOV     SP,R0                            ; SP,*
047762  104414                               TRAP    14
047764  062706  000016                       ADD     #16,SP                           ;                               6543
047770  132777  000001  145466  5$:          BITB    #1,@ML.REG+60                    ;                               6548
047776  001426                               BEQ     6$
050000  104455                               TRAP    55
050002  000077                               .WORD   77                               ;                               6551
050004  012706                               .WORD   ASYNC
050006  026302                               .WORD   DUMPER
050010  012746  010730                       MOV     #WRD.19,-(SP)                    ;                               6552
050014  012746  012302                       MOV     #FNC.11,-(SP)
050020  012746  010640                       MOV     #WRD.11,-(SP)
050024  012746  011714                       MOV     #PHR.5,-(SP)
```

```
                                          ;ML4AD                                           29-Mar-1982 16:23:04   TOPS
                                          ;          TEST CODE SECTION                     29-Mar-1982 16:21:03   PA:<
       050030  012746  010536                    MOV     #WRD.3,-(SP)
       050034  012746  010304                    MOV     #FIV.FMT,-(SP)
       050040  012746  000006                    MOV     #6,-(SP)
       050044  010600                            MOV     SP,R0                  ; SP,*
       050046  104414                            TRAP    14
       050050  062706  000016                    ADD     #16,SP                 ;                        6550
       050054  032777  020000  145402    6$:     BIT     #20000,@ML.REG+60      ;                        6555
       050062  001426                            BEQ     7$
       050064  104455                            TRAP    55                     ;                        6558
       050066  000100                            .WORD   100
       050070  012706                            .WORD   ASYNC
       050072  026302                            .WORD   DUMPER
       050074  012746  010730                    MOV     #WRD.19,-(SP)          ;                        6559
       050100  012746  012302                    MOV     #FNC.11,-(SP)
       050104  012746  010640                    MOV     #WRD.11,-(SP)
       050110  012746  011714                    MOV     #PHR.5,-(SP)
       050114  012746  010544                    MOV     #WRD.4,-(SP)
       050120  012746  010304                    MOV     #FIV.FMT,-(SP)
       050124  012746  000006                    MOV     #6,-(SP)
       050130  010600                            MOV     SP,R0                  ; SP,*
       050132  104414                            TRAP    14
       050134  062706  000016                    ADD     #16,SP                 ;                        6557
       050140  104467                    7$:     TRAP    67                     ;                        6560
       050142  006000                            ROR     R0
       050144  103002                            BHIS    8$
       050146  000167  177336                    JMP     2$
       050152  104402                    8$:     TRAP    2                      ;                        6562
       050154  012767  177777  143640            MOV     #-1,IO.BUF             ;                        6573
       050162  012703  177777                    MOV     #-1,R3                 ; *,DSA.CNT              6574
       050166  104422                    9$:     TRAP    22                     ;                        6585
       050170  005203                            INC     R3                     ; DSA.CNT                6587
       050172  012766  177400  000006            MOV     #-400,6(SP)            ; *,SIZE                 6588
       050200  012746  177400                    MOV     #-400,-(SP)
       050204  010366  000016                    MOV     R3,16(SP)              ; DSA.CNT,DST
       050210  010346                            MOV     R3,-(SP)               ; DSA.CNT,*
       050212  012701  014022                    MOV     #IO.BUF,R1             ; *,SRC
       050216  010146                            MOV     R1,-(SP)               ; SRC,*
       050220  004767  157202                    JSR     PC,WRT.TRANSFER
       050224  062706  000006                    ADD     #6,SP                  ;                        6585
       050230  020367  143560                    CMP     R3,LST.BLK             ; DSA.CNT,*              6593
       050234  001354                            BNE     9$
       050236  012766  000001  000016            MOV     #1,16(SP)              ; *,ERR.FLG              6595
       050244  152777  000040  145172            BISB    #40,@ML.REG+40
       050252  016705  145554                    MOV     ML.DUT,R5
       050256  042705  177770                    BIC     #177770,R5
       050262  142777  000007  145154            BICB    #7,@ML.REG+40
       050270  150577  145150                    BISB    R5,@ML.REG+40
       050274  012746  005112                    MOV     #PWR.OFF,-(SP)         ;                        6604
       050300  012746  010240                    MOV     #ONE.FMT,-(SP)
       050304  012746  000002                    MOV     #2,-(SP)
       050310  010600                            MOV     SP,R0                  ; SP,*
       050312  104414                            TRAP    14
```

```
                                    ;ML4AD
                                    ;               TEST CODE SECTION
050314  104422                      10$:    TRAP    22                              ;               6607
050316  032777  040000  145140              BIT     #40000,@ML.REG+60               ;               6610
050324  001403                              BEQ     11$
050326  005066  000024                      CLR     24(SP)                          ; ERR.FLG       6613
050332  000404                              BR      12$                             ;               6614
050334  032777  010000  145102      11$:    BIT     #10000,@ML.REG+40               ;               6618
050342  001764                              BEQ     10$
050344  032766  000001  000024      12$:    BIT     #1,24(SP)                       ; *,ERR.FLG     6620
050352  001416                              BEQ     13$
050354  104455                              TRAP    55                              ;               6623
050356  000227                              .WORD   227
050360  012706                              .WORD   ASYNC
050362  026302                              .WORD   DUMPER
050364  012746  005272                      MOV     #UNS.ERR,-(SP)                  ;               6624
050370  012746  010240                      MOV     #ONE.FMT,-(SP)
050374  012746  000002                      MOV     #2,-(SP)
050400  010600                              MOV     SP,R0                           ; SP,*
050402  104414                              TRAP    14
050404  062706  000006                      ADD     #6,SP                           ;               6622
050410  012716  005202              13$:    MOV     #PWR.ON,(SP)                    ;               6637
050414  012746  010240                      MOV     #ONE.FMT,-(SP)
050420  012746  000002                      MOV     #2,-(SP)
050424  010600                              MOV     SP,R0                           ; SP,*
050426  104414                              TRAP    14
050430  104422                      14$:    TRAP    22                              ;               6640
050432  105777  145016                      TSTB    @ML.REG+50                      ;               6643
050436  100374                              BPL     14$
050440  132777  000100  145006              BITB    #100,@ML.REG+50                 ;               6645
050446  001416                              BEQ     15$
050450  104455                              TRAP    55                              ;               6648
050452  000230                              .WORD   230
050454  012706                              .WORD   ASYNC
050456  026302                              .WORD   DUMPER
050460  012746  005764                      MOV     #VV.SET,-(SP)                   ;               6649
050464  012746  010240                      MOV     #ONE.FMT,-(SP)
050470  012746  000002                      MOV     #2,-(SP)
050474  010600                              MOV     SP,R0                           ; SP,*
050476  104414                              TRAP    14
050500  062706  000006                      ADD     #6,SP                           ;               6647
050504  005005                      15$:    CLR     R5                              ; REG.SEL       6652
050506  005705                      16$:    TST     R5                              ; REG.SEL       6655
050510  001002                              BNE     17$
050512  005002                              CLR     R2                              ; INDEX         6659
050514  000443                              BR      23$                             ;               6655
050516  020527  000001              17$:    CMP     R5,#1                           ; REG.SEL,*
050522  001003                              BNE     18$
050524  012702  000006                      MOV     #6,R2                           ; *,INDEX       6662
050530  000435                              BR      23$                             ;               6655
050532  020527  000002              18$:    CMP     R5,#2                           ; REG.SEL,*
050536  001003                              BNE     19$
050540  012702  000003                      MOV     #3,R2                           ; *,INDEX       6665
050544  000427                              BR      23$                             ;               6655
```

```
                                ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
                                ;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<

050546  020527  000003          19$:    CMP     R5,#3                   ; REG.SEL,*
050552  001003                          BNE     20$
050554  012702  000012                  MOV     #12,R2                  ; *,INDEX               6668
050560  000421                          BR      23$                     ;                       6655
050562  020527  000004          20$:    CMP     R5,#4                   ; REG.SEL,*
050566  001003                          BNE     21$
050570  012702  000015                  MOV     #15,R2                  ; *,INDEX               6671
050574  000413                          BR      23$                     ;                       6655
050576  020527  000005          21$:    CMP     R5,#5                   ; REG.SEL,*
050602  001003                          BNE     22$
050604  012702  000016                  MOV     #16,R2                  ; *,INDEX               6674
050610  000405                          BR      23$                     ;                       6655
050612  020527  000006          22$:    CMP     R5,#6                   ; REG.SEL,*
050616  001002                          BNE     23$
050620  012702  000010                  MOV     #10,R2                  ; *,INDEX               6677
050624  010200                  23$:    MOV     R2,R0                   ; INDEX,*               6680
050626  006300                          ASL     R0
050630  006300                          ASL     R0
050632  006300                          ASL     R0
050634  010004                          MOV     R0,R4
050636  016400  015406                  MOV     ML.REG+2(R4),R0
050642  056400  015412                  BIS     ML.REG+6(R4),R0
050646  010066  000024                  MOV     R0,24(SP)               ; *,CLR.DATA
050652  010046                          MOV     R0,-(SP)                ; CLR.DATA,*            6681
050654  010546                          MOV     R5,-(SP)                ; REG.SEL,*
050656  012746  000036                  MOV     #36,-(SP)
050662  060616                          ADD     SP,(SP)                 ; ERR.FLG,*
050664  004767  155022                  JSR     PC,RD.REG
050670  032766  000001  000036          BIT     #1,36(SP)               ; *,ERR.FLG             6683
050676  001433                          BEQ     24$
050700  104455                          TRAP    55                      ;                       6686
050702  000231                          .WORD   231
050704  012706                          .WORD   ASYNC
050706  026302                          .WORD   DUMPER
050710  012746  005570                  MOV     #MB.DIS.ERR,-(SP)       ;                       6687
050714  012746  010240                  MOV     #ONE.FMT,-(SP)
050720  012746  000002                  MOV     #2,-(SP)
050724  010600                          MOV     SP,R0                   ; SP,*
050726  104414                          TRAP    14
050730  016716  144416                  MOV     RD.DATA,(SP)            ;                       6688
050734  016646  000040                  MOV     40(SP),-(SP)            ; CLR.DATA,*
050740  016446  015404                  MOV     ML.REG(R4),-(SP)
050744  012746  007436                  MOV     #FMT.16,-(SP)
050750  012746  000004                  MOV     #4,-(SP)
050754  010600                          MOV     SP,R0                   ; SP,*
050756  104414                          TRAP    14
050760  062706  000024                  ADD     #24,SP                  ;                       6689
050764  000406                          BR      25$
050766  062706  000006          24$:    ADD     #6,SP                   ;                       6653
050772  005205                          INC     R5                      ; REG.SEL               6652
050774  020527  000006                  CMP     R5,#6                   ; REG.SEL,*
051000  003642                          BLE     16$
```

```
                                    ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                    ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
051002  005066  000022              25$:    CLR     22(SP)                  ; WCE.CNT                               6694
051006  012703  177777                      MOV     #-1,R3                  ; *,DSA.CNT                             6695
051012  005067  143004                      CLR     IO.BUF                  ;                                       6696
051016  104422                      26$:    TRAP    22                      ;                                       6699
051020  005203                              INC     R3                      ; DSA.CNT                               6701
051022  012766  177400  000020              MOV     #-400,20(SP)            ; *,SIZE                                6702
051030  012746  177400                      MOV     #-400,-(SP)
051034  010366  000030                      MOV     R3,30(SP)               ; DSA.CNT,DST
051040  010346                              MOV     R3,-(SP)                ; DSA.CNT,*
051042  012701  014022                      MOV     #IO.BUF,R1              ; *,SRC
051046  010146                              MOV     R1,-(SP)                ; SRC,*
051050  004767  156102                      JSR     PC,WRT.CHK.TRANSFE
051054  032777  040000  144362              BIT     #40000,@ML.REG+40       ;                                       6704
051062  001402                              BEQ     27$
051064  005266  000030                      INC     30(SP)                  ; WCE.CNT
051070  062706  000006              27$:    ADD     #6,SP                   ;                                       6699
051074  020367  142714                      CMP     R3,LST.BLK              ; DSA.CNT,*                             6710
051100  001346                              BNE     26$
051102  026627  000022  000177              CMP     22(SP),#177             ; WCE.CNT,*                             6712
051110  003416                              BLE     28$
051112  104455                              TRAP    55                      ;                                       6715
051114  000101                              .WORD   101
051116  012706                              .WORD   ASYNC
051120  026302                              .WORD   DUMPER
051122  012746  005470                      MOV     #NO.INIT,-(SP)          ;                                       6716
051126  012746  010240                      MOV     #ONE.FMT,-(SP)
051132  012746  000002                      MOV     #2,-(SP)
051136  010600                              MOV     SP,R0                   ; SP,*
051140  104414                              TRAP    14
051142  062706  000006                      ADD     #6,SP                   ;                                       6714
051146  062706  000012              28$:    ADD     #12,SP                  ;                                       6562
051152  104467                              TRAP    67                      ;                                       6717
051154  006000                              ROR     R0
051156  103002                              BHIS    29$
051160  000167  176766                      JMP     8$
051164  062706  000006              29$:    ADD     #6,SP                   ;                                       6486
051170  062706  000012              30$:    ADD     #12,SP                  ;                                       6437
051174  000207                              RTS     PC

                                    ; Routine Size:  429 words
                                    ; Maximum stack depth per invocation:  29 words


                                            .SBTTL  T21 TEST CODE SECTION
```

```
13989                                  ;ML4AD                                                   29-Mar-1982 16:23:04   TOPS
13990                                  ;                TEST CODE SECTION                       29-Mar-1982 16:21:03   PA:<
13991
13995 051176                           T21::
13996 051176  004767  176242           1$:    JSR     PC,$T21                 ;
13997 051202  104466                          TRAP    66                                                            6720
13998 051204  006000                          ROR     R0
13999 051206  103773                          BLO     1$
14000 051210  000207                          RTS     PC
14001
14002                                  ; Routine Size:  6 words
14003                                  ; Maximum stack depth per invocation:  0 words
14008
14009
14010 ;           6723  !<BLF/PAGE>
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (74)
;
;               !
;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 22
;               !
;               ! TEST NAME:    ILLEGAL FUNCTION TEST
;               !
;               ! TEST DESCRIPTION:
;               !
;               !       TEST THE DETECTION OF ILLEGAL
;               !       FUNCTIONS WRITTEN TO MLCS1
;               !       BY:
;               !
;               !       WRITING ALL POSSIBLE ILLEGAL
;               !       FUNCTIONS TO MLCS1.  THEN
;               !       TEST GO AND ERROR BITS CLEARED.
;               !
;               !--
;
;               local
;                   BAD_BITS,                               !STORES A COUNT TO GENERATE BAD FUNCTIONS
;                   BAD_FUNC;                               !STORES GENERATED BAD FUNCTION
;
;               CLR_THRESHOLD;                              !CLEAR ERROR PRINT THRESHOLD
;               BAD_BITS = ZEROES;                          !CLEAR BAD BITS
;
;               incr CNT_1 from 0 to 2 do                   !REPEAT LOOP 3 TIMES
;                   begin
;                   BAD_BITS = .BAD_BITS + %o'2';           !ADD 2 TO BAD_BITS
;
;                   incr CNT_2 from %o'1' to %o'71' by %o'10' do        !REPEAT LOOP GENERATING 'GOOD' FUNCTIONS
;                       begin
;                       BGNSUB;
;                       CLR_MBUS;
;                       BAD_FUNC = .CNT_2 + .BAD_BITS;      !ADD BAD BITS TO CNT_2 GENERATING BAD FUNCTIONS
;                       FIRST_BLK_XFER ();                  !SET UP A FIRST BLOCK XFERR
;                       MLCS1 = .BAD_FUNC;                  !LOAD MLCS1 WITH TWO BAD FUNCTIONS
;
;                       if .ILF IS_SET                      !SEE IF ILF IS SET
;                       then
;                           begin
;
;                           if .GO IS_SET                   !IF ILF IS SET THEN SEE IF GO IS SET
;                           then
;                               begin
;                               CMP_THRESHOLD;              !COMPARE ERROR PRINT THRESHOLD
;                               ERRDF (66, ASYNC, DUMPER);  !ERROR IF GO SET WITH BAD FUNCTION
;                               PRINTB (FIV_FMT, WRD_1, PHR_2, WRD_11, FNC_12, WRD_19);
;                               PRINTB (FMT_12, .BAD_FUNC);
;                               end;
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (74)

;           6776
;           6777                        end
;           6778                else
;           6779                        begin
;           6780                        CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;           6781                        ERRDF (67, ASYNC, DUMPER);              !ERROR BAD FUNCTION DON'T CAUSE ILF
;           6782                        PRINTB (FIV_FMT, WRD_3, PHR_1, WRD_11, FNC_12, WRD_19);
;           6783                        PRINTB (FMT_12, .BAD_FUNC);
;           6784                        end;
;           6785
;           6786                if .OPI IS_SET                                  !SEE IF OPI IS SET
;           6787                then
;           6788                        begin
;           6789                        CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;           6790                        ERRDF (68, ASYNC, DUMPER);              !ERROR IF SET
;           6791                        PRINTB (FIV_FMT, WRD_4, PHR_5, WRD_12, FNC_12, WRD_19);
;           6792                        PRINTB (FMT_12, .BAD_FUNC);
;           6793                        end;
;           6794
;           6795                ENDSUB;
;           6796                end;
;           6797
;           6798        end;
;           6799
;           6800    ENDTST;


                                                .SBTTL  $T22 TEST CODE SECTION
 051212  004167  133374                 $T22:   JSR     R1,$SAVE5                       ;                       6722
 051216  005067  144154                         CLR     P.CNT                           ;                       6747
 051222  005004                                 CLR     R4                              ; BAD.BITS              6750
 051224  005001                                 CLR     R1                              ; CNT.1                 6752
 051226  062704  000002                 1$:     ADD     #2,R4                           ; *,BAD.BITS            6754
 051232  012702  000001                         MOV     #1,R2                           ; *,CNT.2               6756
 051236  010405                         2$:     MOV     R4,R5                           ; BAD.BITS,*            6760
 051240  060205                                 ADD     R2,R5                           ; CNT.2,*
 051242  104402                         3$:     TRAP    2                               ;
 051244  152777  000040  144172                 BISB    #40,@ML.REG+40                  ;                       6757
 051252  016700  144554                         MOV     ML.DUT,R0                       ;                       6758
 051256  042700  177770                         BIC     #177770,R0
 051262  142777  000007  144154                 BICB    #7,@ML.REG+40
 051270  150077  144150                         BISB    R0,@ML.REG+40
 051274  010503                                 MOV     R5,R3
 051276  004767  146760                         JSR     PC,FIRST.BLK.XFER               ; *,BAD.FUNC            6760
 051302  010377  144076                         MOV     R3,@ML.REG                      ;                       6761
 051306  132777  000001  144150                 BITB    #1,@ML.REG+60                   ; BAD.FUNC,*            6762
 051314  001446                                 BEQ     4$                              ;                       6764
```

```
                                        ;ML4AD
                                        ;       TEST CODE SECTION                 29-Mar-1982 16:23:04   TOPS
                                                                                  29-Mar-1982 16:21:03   PA:<
051316  132777  000001  144060          BITB    #1,@ML.REG
051324  001505                          BEQ     6$                  ;                                    6768
051326  005267  144044                  INC     P.CNT
051332  026767  144040  144040          CMP     P.CNT,LIMIT         ;                                    6770
051340  003153                          BGT     8$
051342  104455                          TRAP    55
051344  000102                          .WORD   102                 ;                                    6772
051346  012706                          .WORD   ASYNC
051350  026302                          .WORD   DUMPER
051352  012746  010730                  MOV     #WRD.19,-(SP)
051356  012746  012322                  MOV     #FNC.12,-(SP)       ;                                    6773
051362  012746  010640                  MOV     #WRD.11,-(SP)
051366  012746  011626                  MOV     #PHR.2,-(SP)
051372  012746  010520                  MOV     #WRD.1,-(SP)
051376  012746  010304                  MOV     #FIV.FMT,-(SP)
051402  012746  000006                  MOV     #6,-(SP)
051406  010600                          MOV     SP,R0
051410  104414                          TRAP    14                  ; SP,*
051412  010316                          MOV     R3,(SP)
051414  012746  007224                  MOV     #FMT.12,-(SP)       ; BAD.FUNC,*                         6774
051420  012746  000002                  MOV     #2,-(SP)
051424  010600                          MOV     SP,R0
051426  104414                          TRAP    14                  ; SP,*
051430  001441                          BR      5$
051432  005267  143740          4$:     INC     P.CNT               ;                                    6770
051436  026767  143734  143734          CMP     P.CNT,LIMIT         ;                                    6779
051444  003111                          BGT     8$
051446  104455                          TRAP    55
051450  000103                          .WORD   103                 ;                                    6781
051452  012706                          .WORD   ASYNC
051454  026302                          .WORD   DUMPER
051456  012746  010730                  MOV     #WRD.19,-(SP)
051462  012746  012322                  MOV     #FNC.12,-(SP)       ;                                    6782
051466  012746  010640                  MOV     #WRD.11,-(SP)
051472  012746  011610                  MOV     #PHR.1,-(SP)
051476  012746  010536                  MOV     #WRD.3,-(SP)
051502  012746  010304                  MOV     #FIV.FMT,-(SP)
051506  012746  000006                  MOV     #6,-(SP)
051512  010600                          MOV     SP,R0
051514  104414                          TRAP    14                  ; SP,*
051516  010316                          MOV     R3,(SP)
051520  012746  007224                  MOV     #FMT.12,-(SP)       ; BAD.FUNC,*                         6783
051524  012746  000002                  MOV     #2,-(SP)
051530  010600                          MOV     SP,R0
051532  104414                          TRAP    14                  ; SP,*
051534  062706  000022          5$:     ADD     #22,SP
051540  032777  020000  143716  6$:     BIT     #20000,@ML.REG+60   ;                                    6779
051546  001443                          BEQ     7$                  ;                                    6786
051550  005267  143622                  INC     P.CNT
051554  026767  143616  143616          CMP     P.CNT,LIMIT         ;                                    6788
051562  003042                          BGT     8$
051564  104455                          TRAP    55                  ;                                    6790
```

```
14180                                     ;ML4AD                                                   29-Mar-1982 16:23:04  TOPS
14181                                     ;                   TEST CODE SECTION                    29-Mar-1982 16:21:03  PA:<
14182
14183 051566  000104                              .WORD   104
14184 051570  012706                              .WORD   ASYNC
14185 051572  026302                              .WORD   DUMPER
14186 051574  012746  010730                      MOV     #WRD.19,-(SP)
14187 051600  012746  012322                      MOV     #FNC.12,-(SP)              ;                      6791
14188 051604  012746  010650                      MOV     #WRD.12,-(SP)
14189 051610  012746  011714                      MOV     #PHR.5,-(SP)
14190 051614  012746  010544                      MOV     #WRD.4,-(SP)
14191 051620  012746  010304                      MOV     #FIV.FMT,-(SP)
14192 051624  012746  000006                      MOV     #6,-(SP)
14193 051630  010600                              MOV     SP,R0
14194 051632  104414                              TRAP    14                         ; SP,*
14195 051634  010316                              MOV     R3,(SP)
14196 051636  012746  007224                      MOV     #FMT.12,-(SP)              ; BAD.FUNC,*           6792
14197 051642  012746  000002                      MOV     #2,-(SP)
14198 051646  010600                              MOV     SP,R0
14199 051650  104414                              TRAP    14                         ; SP,*
14200 051652  062706  000022                      ADD     #22,SP
14201 051656  104467                      7$:     TRAP    67                         ;                      6788
14202 051660  006000                              ROR     R0                         ;                      6793
14203 051662  103002                              BHIS    8$
14204 051664  000167  177352                      JMP     3$
14205 051670  062702  000010              8$:     ADD     #10,R2
14206 051674  020227  000071                      CMP     R2,#71                     ; *,CNT.2              6756
14207 051700  003002                              BGT     9$                         ; CNT.2,*
14208 051702  000167  177330                      JMP     2$
14209 051706  005201                      9$:     INC     R1
14210 051710  020127  000002                      CMP     R1,#2                      ; CNT.1                6752
14211 051714  003002                              BGT     10$                        ; CNT.1,*
14212 051716  000167  177304                      JMP     1$
14213 051722  000207                      10$:    RTS     PC
14214                                                                                ;                      6722
14215                                     ; Routine Size:  165 words
14216                                     ; Maximum stack depth per invocation:  15 words
14221
14222
14226
14227                                             .SBTTL  T22 TEST CODE SECTION
14231 051724                              T22::
14232 051724  004767  177262              1$:     JSR     PC,$T22                    ;                      6798
14233 051730  104466                              TRAP    66
14234 051732  006000                              ROR     R0
```

```
14236                               ;ML4AD                                                29-Mar-1982 16:23:04   TOPS
14237                               ;               TEST CODE SECTION                     29-Mar-1982 16:21:03   PA:<
14238
14239 051734  103773                        BLO     1$
14240 051736  000207                        RTS     PC
14241
14242                               ; Routine Size:  6 words
14243                               ; Maximum stack depth per invocation:  0 words
14248
14249
14250 ;          6801   !<BLF/PAGE>
```

```
;ML4AD
;                    TEST CODE SECTION                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (75)
;        !
;        !
;        BGNTST;
;
;        !++
;        ! TEST NUMBER:  TST 23
;        !
;        ! TEST NAME:    REGISTER MODIFICATION REFUSED TEST
;        !
;        ! TEST DESCRIPTION:
;        !
;        !       TEST THE DETECTION OF A
;        !       REGISTER MODIFICATION REFUSED
;        !       BY:
;        !
;        !       1.  WRITTING TO MLCS1, MLDA
;        !           AND MLER WHILE THE DRIVE
;        !           IS BUSY AND TEST RMR
;        !           BIT SET.
;        !
;        !       ALSO SEE IF THE DRIVE ASSERTED
;        !       EXCEPTION BY TESTING THE TRE BIT SET.
;        !
;        !--
;
;        incr CNT from 0 to 2 do                          !REPEAT LOOP 3 TIMES
;            begin
;            BGNSUB;
;            CLR_MBUS;
;            MLCS1 = write;                               !DO A WRITE FUNCTION
;
;            case .CNT from 0 to 2 of                     !WRITE TO SELECTED REGISTERS FORCING RMR
;                set
;
;                [0] :
;                    MLCS1 = %o'000000';
;
;                [1] :
;                    MLDA = ONES;
;
;                [2] :
;                    MLER = ONES
;                tes;
;
;            DELAY (FRTY_US);
;
;            if .RMR IS_NOT_SET                           !SEE IF RMR GOT SET
;            then
;                begin
;                ERRDF (69, ASYNC, DUMPER);               !ERROR IF NOT SET
;                PRINTB (FOR_FMT, WRD_21, PHR_1, WRD_11, WRD_21);
;                end;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                            TEST CODE SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (75)

;               6854
;               6855       if .TRE IS_NOT_SET                   !SEE IF DRIVE ASSERTED EXCEPTION BY TESTING TRE
;               6856       then
;               6857           begin
;               6858           ERRDF (117, SYNC, DUMPER);
;               6859           PRINTB (FOR_FMT, WRD_20, PHR_1, WRD_11, WRD_21);
;               6860           end;
;               6861
;               6862       ENDSUB;
;               6863       end;
;               6864
;               6865   ENDTST;


                                                .SBTTL  $T23 TEST CODE SECTION
051740  004167  132574              $T23:       JSR     R1,$SAVE2
051744  005746                                  TST     -(SP)                   ;                       6800
051746  005002                                  CLR     R2                      ; CNT
051750  104402                      1$:         TRAP    2                       ;                       6827
051752  152777  000040  143464                  BISB    #40,@ML.REG+40          ;                       6828
051760  016701  144046                          MOV     ML.DUT,R1               ;                       6829
051764  042701  177770                          BIC     #177770,R1
051770  142777  000007  143446                  BICB    #7,@ML.REG+40
051776  150177  143442                          BISB    R1,@ML.REG+40
052002  012777  000061  143374                  MOV     #61,@ML.REG             ;                       6831
052010  010201                                  MOV     R2,R1                   ; CNT,*                 6833
052012  006301                                  ASL     R1
052014  066107  052020                          ADD     2$(R1),PC
052020  000006                      2$:         .WORD   3$-2$
052022  000014                                  .WORD   4$-2$
052024  000024                                  .WORD   5$-2$
052026  005077  143352              3$:         CLR     @ML.REG                 ;                       6837
052032  000407                                  BR      6$                      ;                       6833
052034  012777  177777  143372      4$:         MOV     #-1,@ML.REG+30          ;                       6840
052042  000403                                  BR      6$                      ;                       6833
052044  012777  177777  143412      5$:         MOV     #-1,@ML.REG+60          ;                       6843
052052  012700  000050              6$:         MOV     #50,R0                  ; *,$$TMP2              6846
052056  001410                      7$:         BEQ     10$
052060  016701  130032                          MOV     L$DLY,R1                ; *,$$TMP1
052064  001403                                  BEQ     9$
052066  005016                      8$:         CLR     (SP)                    ; $$TMP
052070  005301                                  DEC     R1                      ; $$TMP1
052072  001375                                  BNE     8$
052074  005300                      9$:         DEC     R0                      ; $$TMP2
052076  000767                                  BR      7$
052100  132777  000004  143356      10$:        BITB    #4,@ML.REG+60           ;                       6848
052106  001024                                  BNE     11$
```

```
                                      ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                      ;          TEST CODE SECTION                                29-Mar-1982 16:21:03   PA:<
052110  104455                              TRAP    55
052112  000105                              .WORD   105                       ;                                          6851
052114  012706                              .WORD   ASYNC
052116  026302                              .WORD   DUMPER
052120  012746  010744                      MOV     #WRD.21,-(SP)
052124  012746  010640                      MOV     #WRD.11,-(SP)             ;                                          6852
052130  012746  011610                      MOV     #PHR.1,-(SP)
052134  012746  010744                      MOV     #WRD.21,-(SP)
052140  012746  010270                      MOV     #FOR.FMT,-(SP)
052144  012746  000005                      MOV     #5,-(SP)
052150  010600                              MOV     SP,R0
052152  104414                              TRAP    14                        ; SP,*
052154  062706  000014                      ADD     #14,SP
052160  032777  040000  143216      11$:    BIT     #40000,@ML.REG            ;                                          6850
052166  001024                              BNE     12$                       ;                                          6855
052170  104455                              TRAP    55
052172  000165                              .WORD   165                       ;                                          6858
052174  012750                              .WORD   SYNC
052176  026302                              .WORD   DUMPER
052200  012746  010744                      MOV     #WRD.21,-(SP)
052204  012746  010640                      MOV     #WRD.11,-(SP)             ;                                          6859
052210  012746  011610                      MOV     #PHR.1,-(SP)
052214  012746  010736                      MOV     #WRD.20,-(SP)
052220  012746  010270                      MOV     #FOR.FMT,-(SP)
052224  012746  000005                      MOV     #5,-(SP)
052230  010600                              MOV     SP,R0
052232  104414                              TRAP    14                        ; SP,*
052234  062706  000014                      ADD     #14,SP
052240  104467                      12$:    TRAP    67                        ;                                          6857
052242  006000                              ROR     R0                        ;                                          6860
052244  103641                              BLO     1$
052246  005202                              INC     R2                        ; CNT
052250  020227  000002                      CMP     R2,#2                     ; CNT,*                                    6827
052254  003635                              BLE     1$
052256  005726                              TST     (SP)+
052260  000207                              RTS     PC                        ;                                          6800

                                      ; Routine Size:  105 words
                                      ; Maximum stack depth per invocation:  10 words


                                            .SBTTL  T23 TEST CODE SECTION
```

```
052262                           T23::
052262  004767  177452           1$:     JSR     PC,$T23                 ;          6863
052266  104466                           TRAP    66
052270  006000                           ROR     R0
052272  103773                           BLO     1$
052274  000207                           RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words


;          6866   !<BLF/PAGE>
```

```
;ML4AD
;              TEST CODE SECTION                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                                                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (76)
;       !
;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 24
;       !
;       ! TEST NAME : initial PROM TEST
;       !
;       ! TEST DESCRIPTION:
;       !
;       !       TEST THE MEMORY ARRAYS' PROM
;       !       TIMING AND CONTROL LOGIC FOR
;       !       INITIAL PROM READS BY:
;       !
;       !       1.  READING 14 PROM LOCATIONS
;       !           AND TESTING FOR:
;       !
;       !           A. CHECK SUM ERRORS AT
;       !              EACH ROW COLUMN ADRS
;       !
;       !           B. SUM OF EACH PROM BIT SET
;       !              <9,0> GTR 14.
;       !
;       !--
;
;       local
;           OFF_SET_CNT : vector [10, byte],        !COUNTS EACH NIBBLE OFFSET
;           ROW_ORED_COL : bitvector [16],          !SAVES ROW DATA OR'ED WITH COL DATA
;           R_C_SAV : bitvector [16],               !TEMP LOCATION FOR ROW COL DATA
;           PROM_ADRS,                              !PROM ADDRESS
;           CHK_SUM,                                !CHECK SUM DATA
;           CHK_SUM_ERR,                            !CHECK SUM ERROR
;           BAD_NIB_CNT,                            !COUNTS BAD NIBBLES
;           CNT_14_BAD,                             !COUNTS BAD NIBBLE POSITION EQL 14
;           DODU_FLG,                               !DROP UNIT FLAG
;           ERR_FLG;                                !ERROR FLAG
;
;       CLR_THRESHOLD;                              !CLEAR ERROR PRINT THRESHOLD
;       CLR_MBUS;
;       DODU_FLG = ZERO;
;       PROM_DIS = ONE;                             !SET PROM DISABLE MODE
;       CHK_SUM_ERR = ZEROES;
;
;       incr CNT from 0 to 9 do                     !CLEAR OFFSET COUNTS
;           OFF_SET_CNT [.CNT] = ZEROES;
;
;       incr ADRS_CNT from 0 to 14 do               !READ PROM DATA FROM 15 ARRAY WORDS
;           begin
;           ROW_ORED_COL = ZEROES;                  !CLEAR ROW ORED COL SAVE LOCATION
;           PROM_ADRS = .ADRS_CNT;                  !GET COPY OF ADRS_CNT
;
```

```
;ML4AD                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  TEST CODE SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (76)
;
;         incr TWICE from 0 to 1 do                   !READ ROW AND COL DATA FOR THIS ARRAY WORD
;             begin
;             BAD_NIB_CNT = ZEROES;
;             ERR_FLG = ZERO;
;             MLPA = .PROM_ADRS;                      !LOADING MLPA INITIATES PROM READ
;             DELAY (ONE_US);
;             R_C_SAV = .MLPD;                        !GET THE ROW OR COL DATA
;
;             incr BIT_CNT from 0 to 9 do             !COUNT NUMBER BITS SET IN <9:0>
;
;                 if .R_C_SAV [.BIT_CNT] IS_SET then BAD_NIB_CNT = .BAD_NIB_CNT + 1;
;
;             CHK_SUM = .R_C_SAV<10, 3>;              !GET THE CHECK SUM BITS
;
;             if .R_C_SAV [13] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 13
;
;             if .R_C_SAV [14] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 14
;
;             if .R_C_SAV [15] IS_SET then CHK_SUM = .CHK_SUM + 1;    !ADD IN BIT 15
;
;             if .R_C_SAV [15] IS_SET                 !IS BIT 15 SET
;             then
;                 begin
;
;                 if .BAD_NIB_CNT lss .CHK_SUM then ERR_FLG = ONE;    !SET ERROR FLG IF CHECK SUM ERROR
;
;                 end
;             else
;                 begin
;
;                 if .BAD_NIB_CNT neq .CHK_SUM then ERR_FLG = ONE;    !SET ERROR FLG IF CHECK SUM ERROR
;
;                 end;
;
;             if .ERR_FLG IS_SET                      !WAS THERE A CHECK SUM ERROR
;             then
;                 begin                               !REPORT INTERMEDIATE ERROR IF YES
;                 CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
;                 ERRDF (70, INTER, DUMPER);
;                 PRINTB (SIX_FMT, FNC_21, WRD_10, WRD_12, WRD_45, WRD_35, FNC_6);
;                 PRINTB (FMT_10, .CHK_SUM, .R_C_SAV);
;                 DODU_FLG = ONE;
;                 end;
;
;             ROW_ORED_COL = (.ROW_ORED_COL) or (.R_C_SAV);   !OR ROW AND COLUMN DATA
;             PROM_ADRS = (.PROM_ADRS) or (%o'2000'); !GET COLUMN DATA
;             end;
;
;         incr index from 0 to 9 do                   !GET TOTAL OFF SET COUNTS FROM THE 15 ARRAY WORDS
;
;             if .ROW_ORED_COL [.index] IS_SET then OFF_SET_CNT [.index] = .OFF_SET_CNT [.index] + 1;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    TEST CODE SECTION                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (7?)

;                       end;
;
;                   CNT_14_BAD = ZEROES;
;
;                   incr CNT from 0 to 9 do                              !COUNT HOW MANY OFFSET COUNTS GEQ 14
;
;                       if .OFF_SET_CNT [.CNT] geq 14 then CNT_14_BAD = .CNT_14_BAD + 1;
;
;                   if .CNT_14_BAD neq ZERO                              !WAS ANY OFF_SET COUNTS GTR ZERO
;                   then
;                       begin
;                       ERRDF (71, ARR_DAT, DUMPER);                     !ERROR IF YES
;
;                       if .CNT_14_BAD eql 10                            !WERE ALL 10 NIBBLE OFFSETS GEQ 14
;                       then
;                           PRINTB (SIX_FMT, WRD_55, WRD_54, WRD_46, WRD_51, WRD_42, WRD_40)      !ERROR IF YES
;                       else                                             !IF NO THEN PRINT WHICH ONES WERE
;                           begin
;                           PRINTB (FOR_FMT, WRD_46, WRD_47, WRD_42, WRD_40);      !PRINT MESSAGE
;
;                           incr CNT from 0 to 9 do                      !FIND OFFSETS GEQ 14
;
;                               if .OFF_SET_CNT [.CNT] geq 14 then PRINTB (FMT_13, .CNT, (.OFF_SET_CNT [.CNT]));
;
;                                                                        !PRINT NIBBLE POSITION AND COUNT
;                           end;
;
;                       DODU_FLG = ONE;
;                       end;
;
;                   if .DODU_FLG IS_SET                                  !DROP THIS UNIT IF DODU_FLG SET
;                   then
;                       begin
;                       DODU (.ML_LUN);
;                       DOCLN;
;                       end;
;
;                   ENDTST;


                                              .SBTTL  $T24 TEST CODE SECTION
052276  004167  132310               $T24:    JSR     R1,$SAVE5                  ;        6865
052302  162706  000030                        SUB     #30,SP
052306  005067  143064                        CLR     P.CNT
052312  152777  000040  143124                BISB    #40,@ML.REG+40             ;        6903
052320  016705  143506                        MOV     ML.DUT,R5                  ;        6905
052324  042705  177770                        BIC     #177770,R5
```

```
                                        ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                                        ;               TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
052330  142777  000007  143106                  BICB    #7,@ML.REG+40
052336  150577  143102                          BISB    R5,@ML.REG+40
052342  005066  000002                          CLR     2(SP)                   ; DODU.FLG                       6907
052346  152777  000040  143150                  BISB    #40,@ML.REG+120         ;                                6908
052354  005002                                  CLR     R2                      ; CHK.SUM.ERR                    6909
052356  012701  000016                  1$:     MOV     #16,R1                  ;                                6912
052362  060601                                  ADD     SP,R1                   ; OFF.SET.CNT,*
052364  060201                                  ADD     R2,R1                   ; CNT,*
052366  105011                                  CLRB    (R1)
052370  005202                                  INC     R2                      ; CNT                            6911
052372  020227  000011                          CMP     R2,#11                  ; CNT,*
052376  003767                                  BLE     1$
052400  005005                                  CLR     R5                      ; ADRS.CNT                       6914
052402  005066  000010                  2$:     CLR     10(SP)                  ; ROW.ORED.COL                   6916
052406  010566  000006                          MOV     R5,6(SP)                ; ADRS.CNT,PROM.ADRS             6917
052412  005004                                  CLR     R4                      ; TWICE                          6919
052414  005066  000004                  3$:     CLR     4(SP)                   ; BAD.NIB.CNT                    6921
052420  005016                                  CLR     (SP)                    ; ERR.FLG                        6922
052422  016677  000006  143054                  MOV     6(SP),@ML.REG+100       ; PROM.ADRS,*                    6923
052430  012701  000001                          MOV     #1,R1                   ; *,$$TMP2                       6924
052434  001411                          4$:     BEQ     7$
052436  016702  127454                          MOV     L$DLY,R2                ; *,$$TMP1
052442  001404                                  BEQ     6$
052444  005066  000014                  5$:     CLR     14(SP)                  ; $$TMP
052450  005302                                  DEC     R2                      ; $$TMP1
052452  001374                                  BNE     5$
052454  005301                          6$:     DEC     R1                      ; $$TMP2
052456  000766                                  BR      4$
052460  017766  143150  000012          7$:     MOV     @ML.REG+230,12(SP)      ; *,R.C.SAV                      6925
052466  005002                                  CLR     R2                      ; BIT.CNT                        6927
052470  010201                          8$:     MOV     R2,R1                   ; BIT.CNT,*                      6929
052472  006201                                  ASR     R1
052474  006201                                  ASR     R1
052476  006201                                  ASR     R1
052500  012700  000012                          MOV     #12,R0
052504  060600                                  ADD     SP,R0                   ; R.C.SAV,*
052506  060001                                  ADD     R0,R1
052510  010146                                  MOV     R1,-(SP)
052512  010246                                  MOV     R2,-(SP)                ; BIT.CNT,*
052514  042716  177770                          BIC     #177770,(SP)
052520  012746  000001                          MOV     #1,-(SP)
052524  005046                                  CLR     -(SP)
052526  004767  131102                          JSR     PC,BL$GT2
052532  062706  000010                          ADD     #10,SP
052536  005300                                  DEC     R0
052540  001002                                  BNE     9$
052542  005266  000004                          INC     4(SP)                   ; BAD.NIB.CNT
052546  005202                          9$:     INC     R2                      ; BIT.CNT                        6927
052550  020227  000011                          CMP     R2,#11                  ; BIT.CNT,*
052554  003745                                  BLE     8$
052556  016603  000012                          MOV     12(SP),R3               ; R.C.SAV,CHK.SUM                6931
052562  006203                                  ASR     R3                      ; CHK.SUM
```

```
                                    ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                    ;               TEST CODE SECTION                       29-Mar-1982 16:21:03   PA:<
052564  006203                              ASR     R3                              ; CHK.SUM
052566  000303                              SWAB    R3                              ; CHK.SUM
052570  042703  177770                      BIC     #177770,R3                      ; *,CHK.SUM
052574  132766  000040  000013              BITB    #40,13(SP)                      ; *,R.C.SAV+1           6933
052602  001401                              BEQ     10$
052604  005203                              INC     R3                              ; CHK.SUM
052606  132766  000100  000013      10$:    BITB    #100,13(SP)                     ; *,R.C.SAV+1           6935
052614  001401                              BEQ     11$
052616  005203                              INC     R3                              ; CHK.SUM
052620  005002                      11$:    CLR     R2                              ;                       6937
052622  105766  000013                      TSTB    13(SP)                          ; R.C.SAV+1
052626  100002                              BPL     12$
052630  005202                              INC     R2
052632  005203                              INC     R3                              ; CHK.SUM
052634  006002                      12$:    ROR     R2                              ;                       6939
052636  103004                              BCC     13$
052640  026603  000004                      CMP     4(SP),R3                        ; BAD.NIB.CNT,CHK.SUM   6943
052644  002006                              BGE     15$
052646  000403                              BR      14$
052650  026603  000004              13$:    CMP     4(SP),R3                        ; BAD.NIB.CNT,CHK.SUM   6949
052654  001402                              BEQ     15$
052656  012716  000001              14$:    MOV     #1,(SP)                         ; *,ERR.FLG
052662  021627  000001              15$:    CMP     (SP),#1                         ; ERR.FLG,*             6953
052666  001052                              BNE     16$
052670  005267  142502                      INC     P.CNT                           ;                       6955
052674  026767  142476  142476              CMP     P.CNT,LIMIT
052702  003060                              BGT     17$
052704  104455                              TRAP    55                              ;                       6957
052706  000106                              .WORD   106
052710  013114                              .WORD   INTER
052712  026302                              .WORD   DUMPER
052714  012746  012226                      MOV     #FNC.6,-(SP)                    ;                       6958
052720  012746  011110                      MOV     #WRD.35,-(SP)
052724  012746  011214                      MOV     #WRD.45,-(SP)
052730  012746  010650                      MOV     #WRD.12,-(SP)
052734  012746  010630                      MOV     #WRD.10,-(SP)
052740  012746  012440                      MOV     #FNC.21,-(SP)
052744  012746  010322                      MOV     #SIX.FMT,-(SP)
052750  012746  000007                      MOV     #7,-(SP)
052754  010600                              MOV     SP,R0                           ; SP,*
052756  104414                              TRAP    14
052760  016616  000032                      MOV     32(SP),(SP)                     ; R.C.SAV,*             6959
052764  010346                              MOV     R3,-(SP)                        ; CHK.SUM,*
052766  012746  007116                      MOV     #FMT.10,-(SP)
052772  012746  000003                      MOV     #3,-(SP)
052776  010600                              MOV     SP,R0                           ; SP,*
053000  104414                              TRAP    14
053002  012766  000001  000030              MOV     #1,30(SP)                       ; *,DODU.FLG            6960
053010  062706  000026                      ADD     #26,SP                          ;                       6955
053014  056666  000012  000010      16$:    BIS     12(SP),10(SP)                   ; R.C.SAV,ROW.ORED.COL  6963
053022  052766  002000  000006              BIS     #2000,6(SP)                     ; *,PROM.ADRS           6964
053030  005204                              INC     R4                              ; TWICE                 6919
```

```
                                  ;ML4AD
                                  ;                  TEST CODE SECTION                          29-Mar-1982 16:23:04   TOPS
                                                                                                29-Mar-1982 16:21:03   PA:<
       053032  020427  000001                 CMP     R4,#1                   ; TWICE,*
       053036  003002                         BGT     17$
       053040  000167  177350                 JMP     3$
       053044  005002                 17$:    CLR     R2                      ; INDEX                        6967
       053046  010201                 18$:    MOV     R2,R1                   ; INDEX,*                      6969
       053050  006201                         ASR     R1
       053052  006201                         ASR     R1
       053054  006201                         ASR     R1
       053056  012700  000010                 MOV     #10,R0
       053062  060600                         ADD     SP,R0
       053064  060001                         ADD     R0,R1                   ; ROW.ORED.COL,*
       053066  010146                         MOV     R1,-(SP)
       053070  010246                         MOV     R2,-(SP)                ; INDEX,*
       053072  042716  177770                 BIC     #177770,(SP)
       053076  012746  000001                 MOV     #1,-(SP)
       053102  005046                         CLR     -(SP)
       053104  004767  130524                 JSR     PC,BL$GT2
       053110  062706  000010                 ADD     #10,SP
       053114  005300                         DEC     R0
       053116  001005                         BNE     19$
       053120  012701  000016                 MOV     #16,R1
       053124  060601                         ADD     SP,R1                   ; OFF.SET.CNT,*
       053126  060201                         ADD     R2,R1                   ; INDEX,*
       053130  105211                         INCB    (R1)
       053132  005202                 19$:    INC     R2                      ; INDEX                        6967
       053134  020227  000011                 CMP     R2,#11                  ; INDEX,*
       053140  003742                         BLE     18$
       053142  005205                         INC     R5                      ; ADRS.CNT                     6914
       053144  020527  000016                 CMP     R5,#16                  ; ADRS.CNT,*
       053150  003002                         BGT     20$
       053152  000167  177224                 JMP     2$
       053156  005000                 20$:    CLR     R0                      ; CNT.14.BAD                   6973
       053160  005001                         CLR     R1                      ; CNT                          6975
       053162  012702  000016         21$:    MOV     #16,R2                  ;                              6977
       053166  060602                         ADD     SP,R2                   ; OFF.SET.CNT,*
       053170  060102                         ADD     R1,R2                   ; CNT,*
       053172  121227  000016                 CMPB    (R2),#16
       053176  103401                         BLO     22$
       053200  005200                         INC     R0                      ; CNT.14.BAD
       053202  005201                 22$:    INC     R1                      ; CNT                          6975
       053204  020127  000011                 CMP     R1,#11                  ; CNT,*
       053210  003764                         BLE     21$
       053212  005700                         TST     R0                      ; CNT.14.BAD                   6979
       053214  001505                         BEQ     27$
       053216  104455                         TRAP    55                      ;                              6982
       053220  000107                         .WORD   107
       053222  013012                         .WORD   ARR.DAT
       053224  026302                         .WORD   DUMPER
       053226  020027  000012                 CMP     R0,#12                  ; CNT.14.BAD,*                 6984
       053232  001024                         BNE     23$
       053234  012746  011150                 MOV     #WRD.40,-(SP)           ;                              6986
       053240  012746  011170                 MOV     #WRD.42,-(SP)
```

```
                                    ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                    ;               TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<
053244  012746  011276                      MOV     #WRD.51,-(SP)
053250  012746  011226                      MOV     #WRD.46,-(SP)
053254  012746  011326                      MOV     #WRD.54,-(SP)
053260  012746  011336                      MOV     #WRD.55,-(SP)
053264  012746  010322                      MOV     #SIX.FMT,-(SP)
053270  012746  000007                      MOV     #7,-(SP)
053274  010600                              MOV     SP,R0                   ; SP,*
053276  104414                              TRAP    14
053300  022626                              CMP     (SP)+,(SP)+
053302  000445                              BR      26$                     ;
053304  012746  011150              23$:    MOV     #WRD.40,-(SP)           ;                       6984
053310  012746  011170                      MOV     #WRD.42,-(SP)                                   6989
053314  012746  011240                      MOV     #WRD.47,-(SP)
053320  012746  011226                      MOV     #WRD.46,-(SP)
053324  012746  010270                      MOV     #FOR.FMT,-(SP)
053330  012746  000005                      MOV     #5,-(SP)
053334  010600                              MOV     SP,R0                   ; SP,*
053336  104414                              TRAP    14
053340  005002                              CLR     R2                      ; CNT
053342  012701  000032              24$:    MOV     #32,R1                  ;                       6991
053346  060601                              ADD     SP,R1                   ;                       6993
053350  060201                              ADD     R2,R1                   ; OFF.SET.CNT,*
053352  121127  000016                      CMPB    (R1),#16                ; CNT,*
053356  103413                              BLO     25$
053360  005046                              CLR     -(SP)
053362  111116                              MOVB    (R1),(SP)
053364  010246                              MOV     R2,-(SP)                ; CNT,*
053366  012746  007254                      MOV     #FMT.13,-(SP)
053372  012746  000003                      MOV     #3,-(SP)
053376  010600                              MOV     SP,R0                   ; SP,*
053400  104414                              TRAP    14
053402  062706  000010                      ADD     #10,SP
053406  005202                      25$:    INC     R2                      ; CNT
053410  020227  000011                      CMP     R2,#11                  ; CNT,*                 6991
053414  003752                              BLE     24$
053416  012766  000001  000016      26$:    MOV     #1,16(SP)               ; *,DODU.FLG
053424  062706  000014                      ADD     #14,SP                  ;                       6998
053430  026627  000002  000001      27$:    CMP     2(SP),#1                ;                       6981
053436  001004                              BNE     28$                     ; DODU.FLG,*            7001
053440  016700  142364                      MOV     ML.LUN,R0               ;                       7004
053444  104451                              TRAP    51
053446  104444                              TRAP    44
053450  062706  000030              28$:    ADD     #30,SP                  ;                       6865
053454  000207                              RTS     PC

                                    ; Routine Size:  312 words
                                    ; Maximum stack depth per invocation:  29 words
```

```
                                        .SBTTL  T24 TEST CODE SECTION
053456                          T24::
053456  004767  176614          1$:     JSR     PC,$T24                 ;       7006
053462  104466                          TRAP    66
053464  006000                          ROR     R0
053466  103773                          BLO     1$
053470  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;           7009  !<BLF/PAGE>
```

```
;ML4AD                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (77)
;
;       !
;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 25
;       !
;       ! TEST NAME:    PROM OR FUNCTION TEST
;       !
;       ! TEST DESCRIPTION:
;       !
;       !       TEST THE HARDWARE ORING OF
;       !       THE MEMORY ARRAYS' PROM
;       !       ROW COLUMN DATA BY:
;       !
;       !       1.  READING AND STORING 128
;       !           HARDWARE ORED ROW COLUMN
;       !           DATA.
;       !
;       !       2.  THEN IN PROM DISABLE MODE
;       !           AND VIA SOFTWARE CONTROL,
;       !           READ AND OR PROM ROW
;       !           COLUMN DATA AND COMPARE
;       !           AGAINST THE RESPECTIVE
;       !           STORED HARDWARE ORED DATA.
;       !
;       !--
;
;       local
;           R_BITS,                             !PROM ROW DATA
;           C_BITS,                             !PROM COL DATA
;           SW_ORED,                            !SOFTWARE CALCULATED PROM ORED DATA
;           HW_SAVE,                            !SOFTWARE  PROM ORED DATA
;           DODU_FLG;                           !DROP UNIT FLAG
;
;       BGNSUB;
;       CLR_THRESHOLD;                          !CLEAR ERROR PRINT THRESHOLD
;       CLR_MBUS;
;       DODU_FLG = ZERO;
;       DAT_DM = ONE;
;       FIRST_BLK_XFER ();                      !SET UP A FIRST BLOCK XFER
;       ML_FUNC = write;                        !DO A WRITE FUNCTION
;
;       incr PROM_ADRS from 0 to 127 do         !READ AND STORE 128 HARDWARE PROM ORED DATA
;           begin
;           DELAY (ONE_US);
;           HW_OR_TBL [.PROM_ADRS] = .MLPD;     !READ HARDWARE PROM ORED DATA
;           DAT_CLK = ONE;                      !CLOCK NEXT ONE OUT
;           end;
;
;       CLR_MBUS;
;       PROM_DIS = ONE;                         !SET PROM DISABLE MODE
```

```
;ML4AD                                                                 29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    TEST CODE SECTION                                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (77)

;             7062
;             7063   incr PROM_ADRS from 0 to 127 do                  !CALCULATE 128 SW ORED DATA & COMPARE TO HW TABLE
;             7064       begin
;             7065       MLPA = .PROM_ADRS;                           !LOADING MLPA INITIATES A PROM READ
;             7066       DELAY (ONE_US);
;             7067       R_BITS = .MLPD;                              !SAVE ROW DATA
;             7068       MLPA = .PROM_ADRS or %o'2000';               !ENABLE COLUMN DATA ADRS
;             7069       DELAY (ONE_US);
;             7070       C_BITS = .MLPD;                              !SAVE COL DATA
;             7071       SW_ORED = .R_BITS or .C_BITS;                !CALCULATE SOFTWARE ORED
;             7072       HW_SAVE = .HW_OR_TBL [.PROM_ADRS];           !GET RESPECTIVE HARDWARE ORED
;             7073
;             7074       if (.HW_SAVE<0, 9>) neq (.SW_ORED<0, 9>)     !COMPARE SW & HW ORED
;             7075       then
;             7076           begin                                    !IF NEQ THEN ERROR
;             7077           CMP_THRESHOLD;                           !COMPARE ERROR PRINT THRESHOLD
;             7078           ERRDF (76, ARR_DAT, DUMPER);
;             7079           PRINTB (FOR_FMT, WRD_35, WRD_36, WRD_19, PHR_4);
;             7080           PRINTB (FMT_2, .SW_ORED<0, 9>, .HW_SAVE<0, 9>, (.SW_ORED<0, 9> xor .HW_SAVE<0, 9>));
;             7081           DODU_FLG = ONE;
;             7082           end;
;             7083
;             7084       end;
;             7085
;             7086   ENDSUB;
;             7087
;             7088   if .DODU_FLG IS_SET                              !DROP THIS UNIT IF DODU FLG IS_SET
;             7089   then
;             7090       begin
;             7091       DODU (.ML_LUN);
;             7092       DOCLN;
;             7093       end;
;             7094
;             7095   ENDTST;


                                       .SBTTL  $T25 TEST CODE SECTION
053472  004167  131114         $T25:   JSR     R1,$SAVE5                    ;                   7008
053476  162706  000010                 SUB     #10,SP
053502  104402                 1$:     TRAP    2                            ;                   7043
053504  005067  141666                 CLR     P.CNT                        ;                   7045
053510  152777  000040  141726         BISB    #40,@ML.REG+40               ;                   7046
053516  016705  142310                 MOV     ML.DUT,R5                    ;
053522  042705  177770                 BIC     #177770,R5
053526  142777  000007  141710         BICB    #7,@ML.REG+40
053534  150577  141704                 BISB    R5,@ML.REG+40
053540  005016                         CLR     (SP)                         ; DODU.FLG          7048
```

```
                                      ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                                      ;          TEST CODE SECTION                              29-Mar-1982 16:21:03   PA:<
053542  152777  000010  141754              BISB    #10,@ML.REG+120
053550  004767  144506                      JSR     PC,FIRST.BLK.XFER               ;                           7049
053554  142777  000077  141622              BICB    #77,@ML.REG                     ;                           7050
053562  152777  000061  141614              BISB    #61,@ML.REG                     ;                           7051
053570  005004                              CLR     R4                              ; PROM.ADRS                 7053
053572  012703  000001              2$:     MOV     #1,R3                           ; *,$$TMP2                  7055
053576  001411                      3$:     BEQ     6$
053600  016705  126312                      MOV     L$DLY,R5                        ; *,$$TMP1
053604  001404                              BEQ     5$
053606  005066  000006              4$:     CLR     6(SP)                           ; $$TMP
053612  005305                              DEC     R5                              ; $$TMP1
053614  001374                              BNE     4$
053616  005303                      5$:     DEC     R3                              ; $$TMP2
053620  000766                              BR      3$
053622  010405                      6$:     MOV     R4,R5                           ; PROM.ADRS,*               7056
053624  006305                              ASL     R5
053626  017765  142002  013402              MOV     @ML.REG+230,HW.OR.TBL(R5)
053634  152777  000020  141662              BISB    #20,@ML.REG+120                 ;                           7057
053642  005204                              INC     R4                              ; PROM.ADRS                 7053
053644  020427  000177                      CMP     R4,#177                         ; PROM.ADRS,*
053650  003750                              BLE     2$
053652  152777  000040  141564              BISB    #40,@ML.REG+40                  ;                           7058
053660  016705  142146                      MOV     ML.DUT,R5
053664  042705  177770                      BIC     #177770,R5
053670  142777  000007  141546              BICB    #7,@ML.REG+40
053676  150577  141542                      BISB    R5,@ML.REG+40
053702  152777  000040  141614              BISB    #40,@ML.REG+120                 ;                           7061
053710  005003                              CLR     R3                              ; PROM.ADRS                 7063
053712  010377  141566              7$:     MOV     R3,@ML.REG+100                  ; PROM.ADRS,*               7065
053716  012704  000001                      MOV     #1,R4                           ; *,$$TMP2                  7066
053722  001411                      8$:     BEQ     11$
053724  016705  126166                      MOV     L$DLY,R5                        ; *,$$TMP1
053730  001404                              BEQ     10$
053732  005066  000006              9$:     CLR     6(SP)                           ; $$TMP
053736  005305                              DEC     R5                              ; $$TMP1
053740  001374                              BNE     9$
053742  005304                      10$:    DEC     R4                              ; $$TMP2
053744  000766                              BR      8$
053746  017766  141662  000004      11$:    MOV     @ML.REG+230,4(SP)               ; *,R.BITS                  7067
053754  010305                              MOV     R3,R5                           ; PROM.ADRS,*               7068
053756  052705  002000                      BIS     #2000,R5
053762  010577  141516                      MOV     R5,@ML.REG+100
053766  012704  000001                      MOV     #1,R4                           ; *,$$TMP2                  7069
053772  001411                      12$:    BEQ     15$
053774  016705  126116                      MOV     L$DLY,R5                        ; *,$$TMP1
054000  001404                              BEQ     14$
054002  005066  000006              13$:    CLR     6(SP)                           ; $$TMP
054006  005305                              DEC     R5                              ; $$TMP1
054010  001374                              BNE     13$
054012  005304                      14$:    DEC     R4                              ; $$TMP2
054014  000766                              BR      12$
054016  017766  141612  000002      15$:    MOV     @ML.REG+230,2(SP)               ; *,C.BITS                  7070
```

```
                                   ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                   ;            TEST CODE SECTION                              29-Mar-1982 16:21:03   PA:<
054024  016601  000004                     MOV    4(SP),R1                ; R.BITS,SW.ORED                 7071
054030  056601  000002                     BIS    2(SP),R1                ; C.BITS,SW.ORED
054034  010305                             MOV    R3,R5                   ; PROM.ADRS,*                    7072
054036  006305                             ASL    R5
054040  016502  013402                     MOV    HW.OR.TBL(R5),R2        ; *,HW.SAVE
054044  010104                             MOV    R1,R4                   ; SW.ORED,*                      7074
054046  042704  177000                     BIC    #177000,R4
054052  010205                             MOV    R2,R5                   ; HW.SAVE,*
054054  042705  177000                     BIC    #177000,R5
054060  020504                             CMP    R5,R4
054062  001457                             BEQ    16$
054064  005267  141306                     INC    P.CNT                   ;                                7076
054070  026767  141302  141302             CMP    P.CNT,LIMIT
054076  003055                             BGT    17$
054100  104455                             TRAP   55                      ;                                7078
054102  000114                             .WORD  114
054104  013012                             .WORD  ARR.DAT
054106  026302                             .WORD  DUMPER
054110  012746  011676                     MOV    #PHR.4,-(SP)            ;                                7079
054114  012746  010730                     MOV    #WRD.19,-(SP)
054120  012746  011116                     MOV    #WRD.36,-(SP)
054124  012746  011110                     MOV    #WRD.35,-(SP)
054130  012746  010270                     MOV    #FOR.FMT,-(SP)
054134  012746  000005                     MOV    #5,-(SP)
054140  010600                             MOV    SP,R0                   ; SP,*
054142  104414                             TRAP   14
054144  010205                             MOV    R2,R5                   ; HW.SAVE,*                      7080
054146  010116                             MOV    R1,(SP)                 ; SW.ORED,*
054150  010504                             MOV    R5,R4
054152  040104                             BIC    R1,R4
054154  040516                             BIC    R5,(SP)
054156  050416                             BIS    R4,(SP)
054160  010246                             MOV    R2,-(SP)                ; HW.SAVE,*
054162  042716  177000                     BIC    #177000,(SP)
054166  010146                             MOV    R1,-(SP)                ; SW.ORED,*
054170  042716  177000                     BIC    #177000,(SP)
054174  012746  006506                     MOV    #FMT.2,-(SP)
054200  012746  000004                     MOV    #4,-(SP)
054204  010600                             MOV    SP,R0                   ; SP,*
054206  104414                             TRAP   14
054210  012766  000001  000024             MOV    #1,24(SP)               ; *,DODU.FLG                     7081
054216  062706  000024                     ADD    #24,SP                  ;                                7076
054222  005203                     16$:    INC    R3                      ; PROM.ADRS                      7063
054224  020327  000177                     CMP    R3,#177                 ; PROM.ADRS,*
054230  003630                             BLE    7$
054232  104467                     17$:    TRAP   67                      ;                                7084
054234  006000                             ROR    R0
054236  103002                             BHIS   18$
054240  000167  177236                     JMP    1$
054244  021627  000001             18$:    CMP    (SP),#1                 ; DODU.FLG,*                     7088
054250  001004                             BNE    19$
054252  016700  141552                     MOV    ML.LUN,R0               ;                                7091
```

```
                                ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<
054256  104451                          TRAP    51
054260  104444                          TRAP    44
054262  062706  000010          19$:    ADD     #10,SP                          ;                                      7008
054266  000207                          RTS     PC

                                ; Routine Size:  191 words
                                ; Maximum stack depth per invocation:  20 words



                                        .SBTTL  T25 TEST CODE SECTION
054270                          T25::
054270  004767  177176          1$:     JSR     PC,$T25                         ;                                      7093
054274  104466                          TRAP    66
054276  006000                          ROR     R0
054300  103773                          BLO     1$
054302  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


;               7096    !<BLF/PAGE>
```

```
!
!
BGNTST;

!++
! TEST NUMBER:  TST 26
!
! TEST NAME:    UV ADRS ERROR TEST
!
! TEST DESCRIPTION:
!
!        TEST THE DETECTION OF UV ADRS
!        ERRORS BY:
!
!        1.  GENERATING PROM DATA PATTERN
!            FROM 0 TO %O'177777' AND
!            DETERMINE WHETHER RESPECTIVE
!            PATTERN IS GOOD/OR BAD
!            PROM DATA.
!
!        2.  VIA DAT_DM AND PROM R/W
!            MODES PRESENT GENERATED
!            PROM DATA TO THE UV ADRS
!            ERR PROM.
!
!        3.  TEST ERROR CONDITIONS FOR
!            CORRECT RESPONCE TO GOOD/
!            OR BAD PROM DATA.
!
!--

local
    HIGH_CNT,                                   !STORES PROM DATA CHECK SUM BITS
    PROM_DATA : bitvector [16],                 !STORES PROM DATA
    LOW_CNT,                                    !STORES SUM OF PROM DATA BITS <9:0>
    TEMP,                                       !TEMPORARY STORAGE
    ERR_FLG,                                    !ERROR FLAG
    GTR_FLG;                                    !SETS WHEN PROM DATA BIT 15 IS A ONE

CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
PROM_DATA = -1;

do                                              !TEST ALL POSSIBLE PROM DATA COMBINATIONS
    begin
    PROM_DATA = .PROM_DATA + 1;                 !INCREMENT PROM_DATA
    BGNSUB;
    CLR_MBUS;
    ERR_FLG = ZERO;
    LOW_CNT = ZEROES;
    HIGH_CNT = ZEROES;
    GTR_FLG = ZERO;

```

```
;ML4AD
;                       TEST CODE SECTION                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                                                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (78)
;
;       incr BIT_CNT from 0 to 9 do                             !COUNT PROM DATA BITS <9:0>
;
;           if .PROM_DATA [.BIT_CNT] IS_SET then LOW_CNT = .LOW_CNT + 1;
;
;       HIGH_CNT = .PROM_DATA<10, 3>;                           !GET PROM DATA CHECK SUM BITS
;
;       if .PROM_DATA [13] IS_SET then HIGH_CNT = .HIGH_CNT + 1;     !ADD IN BIT 13 IF SET
;
;       if .PROM_DATA [14] IS_SET then HIGH_CNT = .HIGH_CNT + 1;     !ADD IN BIT 14 IF SET
;
;       if .PROM_DATA [15] IS_SET then HIGH_CNT = .HIGH_CNT + 1;     !ADD IN BIT 15 IF SET
;
;       if .PROM_DATA [15] IS_SET then GTR_FLG = ONE;       !SET FLAG IF BIT 15 IS SET
;
;       DAT_DM_XFER ();                                         !SET UP A DATA DIAG MODE XFERR
;       PROM_RW = ONE;                                          !SET PROM READ WRITE
;       MLPD = .PROM_DATA;                                      !LOAD MLPD WITH PROM_DATA
;       MLCS1 = write;                                          !DO A WRITE FUNCTION
;       DAT_CLK = ONE;                                          !CLOCK PROM DATA INTO UV PROM
;
;       if .UNS IS_SET
;       then                                                    !SEE IF PROM DATA CAUSED A UV ERROR
;           begin
;
;           if .GTR_FLG IS_SET                                  !UNS IS_SET. SEE IF GTR FLG IS SET
;           then
;               begin
;               TEMP = .PROM_DATA;                              !LOAD TEMP WITH PROM DATA
;               TEMP = .TEMP and %o'162000';                    !SEE IF THESE BITS ARE SET IN PROM DATA
;
;               if .TEMP eql %o'162000'                         !THESE BITS SET AUTOMATICALLY CAUSE A UNS
;               then
;                   begin
;
;                   if .LOW_CNT geq .HIGH_CNT
;                                       !LOW<9:0> SHOULD BE ISS THAN THE HIGH<15:10> IF GTR FLG IS SET
;                   then
;                       begin                                   !ERROR IF LOW<9:0> IS GEQ HIGH<15:10>
;                       CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;                       ERRDF (72, ARR_DAT, DUMPER);
;                       PRINTB (SIX_FMT, WRD_34, PHR_5, WRD_32, WRD_6, WRD_33, WRD_24);
;                       ERR_FLG = ONE;
;                       end;
;
;                   end;
;
;               end
;           else                                                !GTR FLG IS NOT SET
;               begin
;
;               if .LOW_CNT eql .HIGH_CNT                       !LOW<9:0> SHOULD BE NEQ HIGH<15:10>
;               then
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (78)

;                               begin                                   !ERROR IF EQL
;                               CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;                               ERRDF (73, ARR_DAT, DUMPER);
;                               PRINTB (SIX_FMT, WRD_34, PHR_5, WRD_32, WRD_6, WRD_33, WRD_24);
;                               ERR_FLG = ONE;
;                               end;
;
;                       end
;
;               end
;       else                                                            !UNS WAS NOT SET
;               begin
;
;               if .GTR_FLG IS_SET                                      !SEE IF GTR FLG IS_SET
;               then
;                       begin
;                       TEMP = .PROM_DATA;                              !LOAD TEMP WITH PROM DATA
;                       TEMP = .TEMP and %o'162000';                    !SEE IF THESE BITS ARE SET IN PROM DATA
;
;                       if .TEMP neq %o'162000'                         !IF THESE BITS ARE SET THEN UNS SHOULD BE SET
;                       then
;                               begin                                   !ERROR UNS IS NOT SET
;                               CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;                               ERRDF (74, ARR_DAT, DUMPER);
;                               PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
;                               ERR_FLG = ONE;
;                               end
;                       else                                            !BITS 162000 ARE NOT SET
;                               begin
;
;                               if .LOW_CNT lss .HIGH_CNT               !LOW<9:0> SHOULD BE GEQ HIGH<15:10>
;                               then
;                                       begin                           !ERROR IF LSS
;                                       CMP_THRESHOLD;                  !COMPARE ERROR PRINT THRESHOLD
;                                       ERRDF (75, ARR_DAT, DUMPER);
;                                       PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
;                                       ERR_FLG = ONE;
;                                       end;
;
;                               end
;
;                       end
;               else                                                    !GTR_FLG IS NOT SET
;                       begin
;
;                       if .LOW_CNT neq .HIGH_CNT                       !LOW<9:0> SHOULD EQL HIGH<15:10>
;                       then
;                               begin                                   !ERROR IF NEQ
;                               CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;                               ERRDF (108, ARR_DAT, DUMPER);
;                               PRINTB (SIX_FMT, WRD_34, PHR_1, WRD_32, WRD_5, WRD_33, WRD_24);
;                               ERR_FLG = ONE;
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (78)

;             7253                      end
;             7254
;             7255                  end
;             7256
;             7257              end;
;             7258
;             7259          if .ERR_FLG IS_SET                      !SEE IF ERROR FLG GOT SET
;             7260          then
;             7261              begin                               !PRINT FAILING PROM_DATA AND SET DODU_FLG
;             7262              PRINTB (FMT_7, .PROM_DATA);
;             7263              end;
;             7264
;             7265          ENDSUB;
;             7266          end
;             7267      until .PROM_DATA eql %o'177777';            !TRY ALL BIT COMBINATIONS
;             7268
;             7269      ENDTST;


                                                .SBTTL  $T26 TEST CODE SECTION
 054304  004167  130302         $T26:   JSR     R1,$SAVE5                       ;                       7095
 054310  162706  000010                 SUB     #10,SP
 054314  005067  141056                 CLR     P.CNT                           ;
 054320  012766  177777  000006         MOV     #-1,6(SP)                       ;                       7134
 054326  005266  000006         1$:     INC     6(SP)                           ; *,PROM.DATA           7137
 054332  104402                 2$:     TRAP    2                               ; PROM.DATA             7141
 054334  152777  000040  141102         BISB    #40,@ML.REG+40
 054342  016705  141464                 MOV     ML.DUT,R5                       ;                       7142
 054346  042705  177770                 BIC     #177770,R5
 054352  142777  000007  141064         BICB    #7,@ML.REG+40
 054360  150577  141060                 BISB    R5,@ML.REG+40
 054364  005001                         CLR     R1                              ; ERR.FLG               7144
 054366  005066  000002                 CLR     2(SP)                           ; LOW.CNT               7145
 054372  005002                         CLR     R2                              ; HIGH.CNT              7146
 054374  005066  000004                 CLR     4(SP)                           ; GTR.FLG               7147
 054400  005005                         CLR     R5                              ; BIT.CNT               7149
 054402  010504                 3$:     MOV     R5,R4                           ; BIT.CNT,*             7151
 054404  006204                         ASR     R4
 054406  006204                         ASR     R4
 054410  006204                         ASR     R4
 054412  012703  000006                 MOV     #6,R3
 054416  060603                         ADD     SP,R3                           ; PROM.DATA,*
 054420  060304                         ADD     R3,R4
 054422  010446                         MOV     R4,-(SP)
 054424  010546                         MOV     R5,-(SP)                        ; BIT.CNT,*
 054426  042716  177770                 BIC     #177770,(SP)
 054432  012746  000001                 MOV     #1,-(SP)
```

```
                                   ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                   ;               TEST CODE SECTION                       29-Mar-1982 16:21:03   PA:<

054436  005046                             CLR     -(SP)
054440  004767  127170                     JSR     PC,BL$GT2
054444  062706  000010                     ADD     #10,SP
054450  005300                             DEC     R0
054452  001002                             BNE     4$
054454  005266  000002                     INC     2(SP)                ; LOW.CNT
054460  005205                     4$:     INC     R5                   ; BIT.CNT
054462  020527  000011                     CMP     R5,#11               ; BIT.CNT,*                 7149
054466  003745                             BLE     3$
054470  016602  000006                     MOV     6(SP),R2             ; PROM.DATA,HIGH.CNT        7153
054474  006202                             ASR     R2                   ; HIGH.CNT
054476  006202                             ASR     R2                   ; HIGH.CNT
054500  000302                             SWAB    R2                   ; HIGH.CNT
054502  042702  177770                     BIC     #177770,R2           ; *,HIGH.CNT
054506  132766  000040  000007             BITB    #40,7(SP)            ; *,PROM.DATA+1             7155
054514  001401                             BEQ     5$
054516  005202                             INC     R2                   ; HIGH.CNT
054520  132766  000100  000007     5$:     BITB    #100,7(SP)           ; *,PROM.DATA+1             7157
054526  001401                             BEQ     6$
054530  005202                             INC     R2                   ; HIGH.CNT
054532  005005                     6$:     CLR     R5                   ;                           7159
054534  105766  000007                     TSTB    7(SP)                ; PROM.DATA+1
054540  100002                             BPL     7$
054542  005205                             INC     R5
054544  005202                             INC     R2                   ; HIGH.CNT
054546  006005                     7$:     ROR     R5                   ;                           7161
054550  103003                             BCC     8$
054552  012766  000001  000004             MOV     #1,4(SP)             ; *,GTR.FLG
054560  004767  141626             8$:     JSR     PC,DAT.DM.XFER       ;                           7163
054564  152777  000100  140732             BISB    #100,@ML.REG+120     ;                           7164
054572  016605  000006                     MOV     6(SP),R5             ; PROM.DATA,*               7165
054576  010577  141032                     MOV     R5,@ML.REG+230
054602  012777  000061  140574             MOV     #61,@ML.REG          ;                           7166
054610  152777  000020  140706             BISB    #20,@ML.REG+120      ;                           7167
054616  032777  040000  140640             BIT     #40000,@ML.REG+60    ;                           7169
054624  001514                             BEQ     12$
054626  026627  000004  000001             CMP     4(SP),#1             ; GTR.FLG,*                 7173
054634  001050                             BNE     11$
054636  010516                             MOV     R5,(SP)              ; *,TEMP                    7176
054640  042716  015777                     BIC     #15777,(SP)          ; *,TEMP                    7177
054644  021627  162000                     CMP     (SP),#-16000         ; TEMP,*                    7179
054650  001003                             BNE     9$
054652  026602  000002                     CMP     2(SP),R2             ; LOW.CNT,HIGH.CNT          7183
054656  002002                             BGE     10$
054660  000167  000516             9$:     JMP     19$
054664  005267  140506             10$:    INC     P.CNT                ;                           7186
054670  026767  140502  140502             CMP     P.CNT,LIMIT
054676  003146                             BGT     14$
054700  104455                             TRAP    55                   ;                           7188
054702  000110                             .WORD   110
054704  013012                             .WORD   ARR.DAT
054706  026302                             .WORD   DUMPER
```

```
                                   ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                                   ;                TEST CODE SECTION                  29-Mar-1982 16:21:03   PA:<
054710  012746  010774                     MOV     #WRD.24,-(SP)         ;                                    7189
054714  012746  011076                     MOV     #WRD.33,-(SP)
054720  012746  010560                     MOV     #WRD.6,-(SP)
054724  012746  011070                     MOV     #WRD.32,-(SP)
054730  012746  011714                     MOV     #PHR.5,-(SP)
054734  012746  011102                     MOV     #WRD.34,-(SP)
054740  012746  010322                     MOV     #SIX.FMT,-(SP)
054744  012746  000007                     MOV     #7,-(SP)
054750  010600                             MOV     SP,R0
054752  104414                             TRAP    14                    ; SP,*
054754  000546                             BR      15$
054756  026602  000002            11$:     CMP     2(SP),R2              ;                                    7190
054762  001336                             BNE     9$                    ; LOW.CNT,HIGH.CNT                   7199
054764  005267  140406                     INC     P.CNT
054770  026767  140402  140402             CMP     P.CNT,LIMIT           ;                                    7201
054776  003146                             BGT     17$
055000  104455                             TRAP    55
055002  000111                             .WORD   111                   ;                                    7203
055004  013012                             .WORD   ARR.DAT
055006  026302                             .WORD   DUMPER
055010  012746  010774                     MOV     #WRD.24,-(SP)
055014  012746  011076                     MOV     #WRD.33,-(SP)         ;                                    7204
055020  012746  010560                     MOV     #WRD.6,-(SP)
055024  012746  011070                     MOV     #WRD.32,-(SP)
055030  012746  011714                     MOV     #PHR.5,-(SP)
055034  012746  011102                     MOV     #WRD.34,-(SP)
055040  012746  010322                     MOV     #SIX.FMT,-(SP)
055044  012746  000007                     MOV     #7,-(SP)
055050  010600                             MOV     SP,R0
055052  104414                             TRAP    14                    ; SP,*
055054  000546                             BR      18$
055056  026627  000004  000001    12$:     CMP     4(SP),#1              ;                                    7205
055064  001103                             BNE     16$                   ; GTR.FLG,*                          7214
055066  010516                             MOV     R5,(SP)
055070  042716  015777                     BIC     #15777,(SP)           ; *,TEMP                             7217
055074  021627  162000                     CMP     (SP),#-16000          ; *,TEMP                             7218
055100  001435                             BEQ     13$                   ; TEMP,*                             7220
055102  005267  140270                     INC     P.CNT
055106  026767  140264  140264             CMP     P.CNT,LIMIT           ;                                    7222
055114  003153                             BGT     21$
055116  104455                             TRAP    55
055120  000112                             .WORD   112                   ;                                    7224
055122  013012                             .WORD   ARR.DAT
055124  026302                             .WORD   DUMPER
055126  012746  010774                     MOV     #WRD.24,-(SP)
055132  012746  011076                     MOV     #WRD.33,-(SP)         ;                                    7225
055136  012746  010552                     MOV     #WRD.5,-(SP)
055142  012746  011070                     MOV     #WRD.32,-(SP)
055146  012746  011610                     MOV     #PHR.1,-(SP)
055152  012746  011102                     MOV     #WRD.34,-(SP)
055156  012746  010322                     MOV     #SIX.FMT,-(SP)
055162  012746  000007                     MOV     #7,-(SP)
```

```
                                  ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
                                  ;                   TEST CODE SECTION                      29-Mar-1982 16:21:03   PA:<
055166  010600                             MOV     SP,R0                    ; SP,*
055170  104414                             TRAP    14
055172  000477                             BR      18$                      ;                                       7226
055174  026602  000002            13$:     CMP     2(SP),R2                 ; LOW.CNT,HIGH.CNT                      7231
055200  002100                             BGE     19$
055202  005267  140170                     INC     P.CNT                    ;                                       7233
055206  026767  140164  140164             CMP     P.CNT,LIMIT
055214  003113                    14$:     BGT     21$
055216  104455                             TRAP    55                       ;                                       7235
055220  000113                             .WORD   113
055222  013012                             .WORD   ARR.DAT
055224  026302                             .WORD   DUMPER
055226  012746  010774                     MOV     #WRD.24,-(SP)            ;                                       7236
055232  012746  011076                     MOV     #WRD.33,-(SP)
055236  012746  010552                     MOV     #WRD.5,-(SP)
055242  012746  011070                     MOV     #WRD.32,-(SP)
055246  012746  011610                     MOV     #PHR.1,-(SP)
055252  012746  011102                     MOV     #WRD.34,-(SP)
055256  012746  010322                     MOV     #SIX.FMT,-(SP)
055262  012746  000007                     MOV     #7,-(SP)
055266  010600                             MOV     SP,R0                    ; SP,*
055270  104414                             TRAP    14
055272  000437                    15$:     BR      18$                      ;                                       7237
055274  026602  000002            16$:     CMP     2(SP),R2                 ; LOW.CNT,HIGH.CNT                      7246
055300  001440                             BEQ     19$
055302  005267  140070                     INC     P.CNT                    ;                                       7248
055306  026767  140064  140064             CMP     P.CNT,LIMIT
055314  003053                    17$:     BGT     21$
055316  104455                             TRAP    55                       ;                                       7250
055320  000154                             .WORD   154
055322  013012                             .WORD   ARR.DAT
055324  026302                             .WORD   DUMPER
055326  012746  010774                     MOV     #WRD.24,-(SP)            ;                                       7251
055332  012746  011076                     MOV     #WRD.33,-(SP)
055336  012746  010552                     MOV     #WRD.5,-(SP)
055342  012746  011070                     MOV     #WRD.32,-(SP)
055346  012746  011610                     MOV     #PHR.1,-(SP)
055352  012746  011102                     MOV     #WRD.34,-(SP)
055356  012746  010322                     MOV     #SIX.FMT,-(SP)
055362  012746  000007                     MOV     #7,-(SP)
055366  010600                             MOV     SP,R0                    ; SP,*
055370  104414                             TRAP    14
055372  012701  000001            18$:     MOV     #1,R1                    ; *,ERR.FLG                             7252
055376  062706  000020                     ADD     #20,SP                   ;                                       7248
055402  020127  000001            19$:     CMP     R1,#1                    ; ERR.FLG,*                             7259
055406  001011                             BNE     20$
055410  010546                             MOV     R5,-(SP)                 ;                                       7262
055412  012746  007002                     MOV     #FMT.7,-(SP)
055416  012746  000002                     MOV     #2,-(SP)
055422  010600                             MOV     SP,R0                    ; SP,*
055424  104414                             TRAP    14
055426  062706  000006                     ADD     #6,SP                    ;                                       7261
```

```
                                          ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                          ;                  TEST CODE SECTION            29-Mar-1982 16:21:03   PA:<
055432  104467                            20$:    TRAP    67                        ;                             7263
055434  006000                                    ROR     R0
055436  103002                                    BHIS    21$
055440  000167  176666                            JMP     2$
055444  026627  000006  177777            21$:    CMP     6(SP),#-1                 ; PROM.DATA,*                 7267
055452  001402                                    BEQ     22$
055454  000167  176646                            JMP     1$
055460  062706  000010                    22$:    ADD     #10,SP                    ;                             7095
055464  000207                                    RTS     PC

                                          ; Routine Size:  313 words
                                          ; Maximum stack depth per invocation:  18 words



                                                  .SBTTL  T26 TEST CODE SECTION
055466                                    T26::
055466  004767  176612                    1$:     JSR     PC,$T26                   ;                             7267
055472  104466                                    TRAP    66
055474  006000                                    ROR     R0
055476  103773                                    BLO     1$
055500  000207                                    RTS     PC

                                          ; Routine Size:  6 words
                                          ; Maximum stack depth per invocation:  0 words


;            7270  !<BLF/PAGE>
```

```
;ML4AD
;                       TEST CODE SECTION                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (79)
;       !
;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 27
;       !
;       ! TEST NAME:    INITIAL ARRAY TEST
;       !
;       ! TEST DESCRIPTION:
;       !
;       !         DUE TO THE NATURE OF THE DEVICE
;       !         THERE EXISTS KNOWN BAD ARRAY
;       !         DATA LOCATIONS.
;       !
;       !         THEREFORE TO INITIALLY TEST THE ARRAYS'
;       !         TIMING AND CONTROL LOGIC A BAD
;       !         NIBBLE THRESHOLD OF 36 BAD NIBBLES
;       !         OUT OF 100 NIBBLES TESTED WILL BE
;       !         TOLERATED BEFORE DETERMINING CONTROL
;       !         LOGIC TO BE IN ERROR.
;       !
;       !         THE ARRAYS' ARE INITIALLY TESTED BY:
;       !
;       !         1.  VIA DAT_DM MOD WRITE DATA PATTERNS
;       !             OF 1'S AND 0'S TO 5 ARRAY
;       !             WORDS.
;       !
;       !         2.  TEST EACH NIBBLE (4 BITS) FOR
;       !             1'S AND 0'S AND COUNT EACH BAD
;       !             NIBBLE ENCOUNTERED.
;       !
;       !         3.  IF ACCUMULATED BAD NIBBLES
;       !             EXCEED 36 THEN REPORT AN ERROR.
;       !
;       !--
;
;       local
;           TST_PAT,                                       !TEST PATTERN
;           BAD_NIB_CNT,                                   !NUMBER OF BAD NIBBLES FOUND
;           ERR_FLG;                                       !ERROR FLAG
;
;       TST_PAT = ONES;
;       BAD_NIB_CNT = ZEROES;
;
;       incr TWICE from 0 to 1 do                          !REPEAT LOOP TWICE
;           begin
;           BGNSUB;
;           CLR_MBUS;
;           MLD1 = .TST_PAT;                               !LOAD TEST PATTERN INTO DIAG REGISTERS
;           MLD2 = .TST_PAT;
;           MLE2 = .TST_PAT;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  TEST CODE SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (79)

;          DAT_DM = ONE;                                !SET DATA DIAG MODE
;          FIRST_BLK_XFER ();                           !SET UP A FIRST BLK XFERR
;          MLCS1 = write;                               !DO A MBUS WRITE FUNCTION
;
;          incr CNT from 0 to 4 do                      !CLOCK 5 WORDS INTO MEMORY
;              begin
;              DELAY (ONE_US);
;              DAT_CLK = ONE;
;              end;
;
;          CLR_MBUS;
;          DAT_DM = ONE;                                !SET DATA DIAG MODE
;          FIRST_BLK_XFER ();                           !SET UP A FIRST BLK XFERR
;          MLCS1 = read;                                !DO A READ FUNCTION
;          DELAY (ONE_US);
;
;          incr ARR_WRD from 0 to 4 do                  !READ THE 5 WORD IN MEMORY
;              begin
;              DAT_CLK = ONE;                           !CLOCK OUT A WORD INTO THE DIAG REGS
;              DELAY (ONE_US);
;              RD_LNG_WRD;                              !READ THE DIAG REGISTERS
;
;              incr NIB_PTR from 0 to 9 do              !READ THE 10 NIBBLES IN THE WORD
;                  begin
;                  TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);  !COMPARE TST PAT TO NIBBLE UNDER TEST
;
;                  if .ERR_FLG IS_SET then BAD_NIB_CNT = .BAD_NIB_CNT + 1;
;
;                                                       !INCREMENT BAD_NIBBLE COUNT IFERR_FLG SET
;                  end;
;
;              end;
;
;          TST_PAT = not .TST_PAT;                      !REPEAT WITH COMPLIMENT TST PAT
;          ENDSUB;
;          end;
;
;      if .BAD_NIB_CNT gtr 36                           !SEE IF 36 OUT OF THE 100 XFERRED WHERE BAD
;      then
;          begin                                        !ERROR IF GTR 36
;          ERRDF (77, ASYNC, DUMPER);
;          PRINTB (FIV_FMT, WRD_22, PHR_4, WRD_12, WRD_45, FNC_14);
;          DODU (.ML_LUN);
;          DOCLN;
;          end;
;
;      ENDTST;

                      .SBTTL  $T27 TEST CODE SECTION
```

```
                                        ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                        ;                TEST CODE SECTION                              29-Mar-1982 16:21:03   PA:<
055502  004167  127104          $T27:   JSR     R1,$SAVE5
055506  024646                          CMP     -(SP),-(SP)             ;                                       7269
055510  012701  177777                  MOV     #-1,R1                  ; *,TST.PAT                             7313
055514  005046                          CLR     -(SP)                   ; BAD.NIB.CNT                           7314
055516  005005                          CLR     R5                      ; TWICE                                 7316
055520  104402                  1$:     TRAP    2                       ;                                       7317
055522  152777  000040  137714          BISB    #40,@ML.REG+40          ;                                       7318
055530  016704  140276                  MOV     ML.DUT,R4
055534  042704  177770                  BIC     #177770,R4
055540  142777  000007  137676          BICB    #7,@ML.REG+40
055546  150477  137672                  BISB    R4,@ML.REG+40
055552  010177  140016                  MOV     R1,@ML.REG+170          ; TST.PAT,*                             7320
055556  010177  140022                  MOV     R1,@ML.REG+200          ; TST.PAT,*                             7321
055562  010177  137776                  MOV     R1,@ML.REG+160          ; TST.PAT,*                             7322
055566  152777  000010  137730          BISB    #10,@ML.REG+120         ;                                       7323
055574  004767  142462                  JSR     PC,FIRST.BLK.XFER       ;                                       7324
055600  012777  000061  137576          MOV     #61,@ML.REG             ;                                       7325
055606  005002                          CLR     R2                      ; CNT                                   7327
055610  012703  000001          2$:     MOV     #1,R3                   ; *,$STMP2                              7329
055614  001411                  3$:     BEQ     6$
055616  016704  124274                  MOV     L$DLY,R4                ; *,$STMP1
055622  001404                          BEQ     5$
055624  005066  000004          4$:     CLR     4(SP)                   ; $STMP
055630  005304                          DEC     R4                      ; $STMP1
055632  001374                          BNE     4$
055634  005303                  5$:     DEC     R3                      ; $STMP2
055636  000766                          BR      3$
055640  152777  000020  137656  6$:     BISB    #20,@ML.REG+120         ;                                       7330
055646  005202                          INC     R2                      ; CNT                                   7327
055650  020227  000004                  CMP     R2,#4                   ; CNT,*
055654  003755                          BLE     2$
055656  152777  000040  137560          BISB    #40,@ML.REG+40          ;                                       7331
055664  016704  140142                  MOV     ML.DUT,R4
055670  042704  177770                  BIC     #177770,R4
055674  142777  000007  137542          BICB    #7,@ML.REG+40
055702  150477  137536                  BISB    R4,@ML.REG+40
055706  152777  000010  137610          BISB    #10,@ML.REG+120         ;                                       7334
055714  004767  142342                  JSR     PC,FIRST.BLK.XFER       ;                                       7335
055720  012777  000071  137456          MOV     #71,@ML.REG             ;                                       7336
055726  012703  000001                  MOV     #1,R3                   ; *,$STMP2                              7337
055732  001411                  7$:     BEQ     10$
055734  016704  124156                  MOV     L$DLY,R4                ; *,$STMP1
055740  001404                          BEQ     9$
055742  005066  000004          8$:     CLR     4(SP)                   ; $STMP
055746  005304                          DEC     R4                      ; $STMP1
055750  001374                          BNE     8$
055752  005303                  9$:     DEC     R3                      ; $STMP2
055754  000766                          BR      7$
055756  005002                  10$:    CLR     R2                      ; ARR.WRD                               7339
```

```
                                       ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                       ;         TEST CODE SECTION                                     29-Mar-1982 16:21:03   PA:<
055760  152777  000020  137536  11$:   BISB    #20,@ML.REG+120
055766  012703  000001                 MOV     #1,R3                     ;                              7341
055772  001411                  12$:   BEQ     15$                       ; *,$$TMP2                     7342
055774  016704  124116                 MOV     L$DLY,R4
056000  001404                         BEQ     14$                       ; *,$$TMP1
056002  005066  000004          13$:   CLR     4(SP)
056006  005304                         DEC     R4                        ; $$TMP
056010  001374                         BNE     13$                       ; $$TMP1
056012  005303                  14$:   DEC     R3
056014  000766                         BR      12$                       ; $$TMP2
056016  017767  137552  135350  15$:   MOV     @ML.REG+170,D1.TEMP
056024  017767  137554  135344         MOV     @ML.REG+200,D2.TEMP
056032  017767  137526  135340         MOV     @ML.REG+160,E2.TEMP
056040  005004                         CLR     R4
056042  010446                  16$:   MOV     R4,-(SP)                  ; NIB.PTR                      7345
056044  010146                         MOV     R1,-(SP)                  ; NIB.PTR,*                    7347
056046  012746  000010                 MOV     #10,-(SP)                 ; TST.PAT,*
056052  060616                         ADD     SP,(SP)
056054  004767  142316                 JSR     PC,TST.LNG.WRD            ; ERR.FLG,*
056060  026627  000010  000001         CMP     10(SP),#1
056066  001002                         BNE     17$                       ; ERR.FLG,*                    7349
056070  005266  000006                 INC     6(SP)
056074  062706  000006          17$:   ADD     #6,SP                     ; BAD.NIB.CNT
056100  005204                         INC     R4                        ;                              7346
056102  020427  000011                 CMP     R4,#11                    ; NIB.PTR                      7345
056106  003755                         BLE     16$                       ; NIB.PTR,*
056110  005202                         INC     R2
056112  020227  000004                 CMP     R2,#4                     ; ARR.WRD                      7339
056116  003720                         BLE     11$                       ; ARR.WRD,*
056120  005101                         COM     R1
056122  104467                         TRAP    67                        ; TST.PAT                      7356
056124  006000                         ROR     R0
056126  103002                         BHIS    19$
056130  000167  177364          18$:   JMP     1$
056134  005205                  19$:   INC     R5
056136  020527  000001                 CMP     R5,#1                     ; TWICE                        7316
056142  003772                         BLE     18$                       ; TWICE,*
056144  021627  000044                 CMP     (SP),#44
056150  003432                         BLE     20$                       ; BAD.NIB.CNT,*                7360
056152  104455                         TRAP    55
056154  000115                         .WORD   115                       ;                              7363
056156  012706                         .WORD   ASYNC
056160  026302                         .WORD   DUMPER
056162  012746  012344                 MOV     #FNC.14,-(SP)
056166  012746  011214                 MOV     #WRD.45,-(SP)             ;                              7364
056172  012746  010650                 MOV     #WRD.12,-(SP)
056176  012746  011676                 MOV     #PHR.4,-(SP)
056202  012746  010752                 MOV     #WRD.22,-(SP)
056206  012746  010304                 MOV     #FIV.FMT,-(SP)
056212  012746  000006                 MOV     #6,-(SP)
056216  010600                         MOV     SP,R0
056220  104414                         TRAP    14                        ; SP,*
```

```
                                    ;ML4AD                                                        29-Mar-1982 16:23:04   TOPS
                                    ;               TEST CODE SECTION                             29-Mar-1982 16:21:03   PA:<
056222  016700  137602                      MOV     ML.LUN,R0
056226  104451                              TRAP    51                      ;                                    7365
056230  104444                              TRAP    44
056232  062706  000016                      ADD     #16,SP                  ;                                    7362
056236  062706  000006              20$:    ADD     #6,SP                   ;                                    7269
056242  000207                              RTS     PC

                                    ; Routine Size:  177 words
                                    ; Maximum stack depth per invocation:  16 words



                                            .SBTTL  T27 TEST CODE SECTION
056244                              T27::
056244  004767  177232              1$:     JSR     PC,$T27                 ;                                    7367
056250  104466                              TRAP    66
056252  006000                              ROR     R0
056254  103773                              BLO     1$
056256  000207                              RTS     PC

                                    ; Routine Size:  6 words
                                    ; Maximum stack depth per invocation:  0 words


;          7370  !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTICN                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (80)

;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 28
;       !
;       ! TEST NAME:    PROM SELECTION TEST
;       !
;       ! TEST DESCRIPTION:
;       !       DUE TO THE NATURE OF THE DEVICE
;       !       AND OF THE ARRAY MODULES' UV
;       !       PROMS, ONLY PROM READS ARE
;       !       ALLOWED DURING DIAG TESTING.
;       !
;       !       THEREFORE THE ARRAY MODULE UV PROMS
;       !       ARE TESTED FOR UNIQUE SELECTION BY:
;       !
;       !       1.  AT EACH PRESENT ARRAY MODULE WRITE 127 ARRAY WORDS WITH 1'S/0'S PATTERN.
;       !
;       !       2.  READ THE UV PROMS AT THEIR RESPECTIVE ARRAY WORD LOCATION AND SEE IF
;       !           THE PROMS MASK BAD NIBBLE LOCATIONS (ENCOUNTERED BAD NIBBLES
;       !           INDICATES INCORRECT MASKING).  COUNT EACH BAD NIBBLE ENCOUNTERED AT AN
;       !           ARRAY MODULE.
;       !
;       !       3.  ALLOW A THRESHOLD OF 5 BAD NIBBLES AT ANY ARRAY MODULE.
;       !
;       !       4.  REPORT PROM SEL ERRORS AT RESPECTIVE ARRAY MODULE IF THE
;       !           THRESHOLD IS EXCEEDED.
;       !
;       ! IMPLICIT INPUTS:
;       !       PD_TEMP:
;       !       A BIT VECTOR OF 16 BITS WHERE
;       !       THE READ PROM DATA IS STORED
;       !       AND ACCESSED FROM.
;       !
;       !       IO_BUF
;       !       A VECTOR OF 256 WORDS WHERE
;       !       DATA FOR MBUS READS AND WRITE
;       !       FUNCTION ARE FOUND.
;       !
;       !--
;
;       local
;           DODU_FLG,                                   !DROP UNIT FLG
;           ERR_FLG,                                    !ERROR FLG
;           TST_PAT,                                    !TEST PATTERN
;           ERR_CNT;                                    !ERROR COUNT
;
;       DODU_FLG = ZERO;
;       TST_PAT = ONES;
;
;       !
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;           TEST CODE SECTION                                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (80)

;           !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
;           !
;           incrU ARR_SEL from 0 to .LST_ARR by .ARR_INC do          !TEST ALL PRESENT ARRAYS
;               begin
;               ERR_CNT = ZERO;
;               BGNSUB;
;
;               incr TWICE from 0 to 1 do                         !REPEAT LOOP TWICE
;                   begin
;                   CLR_MBUS;
;                   MLDT = .TST_PAT;                              !LOAD DATA DIAG REGISTERS WITH TST_PAT
;                   MLD2 = .TST_PAT;
;                   MLE2 = .TST_PAT;
;                   DAT_DM = ONE;                                 !SET DATA DIAG MODE
;                   MLWC = not 255;                               !LOAD WORD COUNT
;                   MLBA = IO_BUF;                                !LOAD UBUS ADRS
;                   MLDA = .ARR_SEL;                              !LOAD SECTOR
;                   MLCS1 = write;                                !DO A WRITE FUNCTION
;
;                   incr CNT from 0 to 127 do                     !CLOCK IN 127 WORDS
;                       begin
;                       DELAY (ONE_US);
;                       DAT_CLK = ONE;
;                       end;
;
;                   CLR_MBUS;
;                   DAT_DM = ONE;                                 !SET DATA DIAG MODE
;                   MLWC = not 255;                               !LOAD WORD COUNT
;                   MLBA = IO_BUF;                                !LOAD UBUS ADRS
;                   MLDA = .ARR_SEL;                              !LOAD SECTOR
;                   MLCS1 = read;                                 !DO A READ FUNCTION
;                   DELAY (ONE_US);
;
;                   incr WD_CNT from 0 to 127 do                  !READ THE 10 WORDS
;                       begin
;                       PD_TEMP = .MLPD;                          !GET PROM DATA FOR THIS WORD
;                       DAT_CLK = ONE;                            !CLOCK THIS WORD INTO DIAG REG
;                       DELAY (ONE_US);
;                       RD_LNG_WRD;                               !READ DIAG REG FOR THIS WORD
;
;                       incr NIB_PTR from 0 to 9 do               !LOOK AT ALL 10 NIBBLE
;
;                           if .PD_TEMP [.NIB_PTR] IS_NOT_SET            !FIND GOOD NIBBLES
;                           then
;                               begin
;                               TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);  !COMPARE NIBBLE TO TST_PAT
;
;                               if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1;
;
;                                                         !INCREMENT ERROR COUNT IF ERROR FLG IS SET
;                               end;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (80)

;                               end;

;                       TST_PAT = not .TST_PAT;         !REPEAT WITH COMPLIMENT DATA
;                       end;

;               if .ERR_CNT gtr 5                       !ALLOW 5 ERROR BEFORE ERRORING
;               then
;                   begin                               !ERROR IF GTR 5
;                   ERRDF (78, ARR_DAT, DUMPER);
;                   PRINTB (THR_FMT, WRD_35, WRD_37, WRD_10);
;                   PRINTB (FMT_9, .ARR_SEL);
;                   DODU_FLG = ONE;
;                   end;

;               ENDSUB;

;               if .DODU_FLG IS_SET                     !DROP THIS UNIT IF DODU_FLG IS SET
;               then
;                   begin
;                   DODU (.ML_LUN);
;                   DOCLN;
;                   end;

;               end;

;           ENDTST;


                                        .SBTTL  $T28 TEST CODE SECTION
056260  004167  126326          $T28:   JSR     R1,$SAVE5
056264  162706  000016                  SUB     #16,SP                          ;               7369
056270  005066  000010                  CLR     10(SP)                          ; DODU.FLG      7419
056274  012702  177777                  MOV     #-1,R2                          ; *,TST.PAT     7420
056300  016766  135514  000006          MOV     LST.ARR,6(SP)                   ;               7425
056306  016766  135472  000004          MOV     ARR.INC,4(SP)
056314  005001                          CLR     R1                              ; ARR.SEL
056316  000167  000666                  JMP     25$
056322  005066  000002          1$:     CLR     2(SP)                           ; ERR.CNT       7427
056326  104402                  2$:     TRAP    2
056330  005016                          CLR     (SP)                            ; TWICE         7430
056332  152777  000040  137104  3$:     BISB    #40,@ML.REG+40                  ;               7431
056340  016705  137466                  MOV     ML.DUT,R5
056344  042705  177770                  BIC     #177770,R5
056350  142777  000007  137066          BICB    #7,@ML.REG+40
056356  150577  137062                  BISB    R5,@ML.REG+40
056362  010277  137206                  MOV     R2,@ML.REG+170                  ; TST.PAT,*     7433
056366  010277  137212                  MOV     R2,@ML.REG+200                  ; TST.PAT,*     7434
```

```
                                     ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                                     ;                TEST CODE SECTION                  29-Mar-1982 16:21:03   PA:<
056372  010277  137166                       MOV     R2,@ML.REG+160              ; TST.PAT,*
056376  152777  000010  137120               BISB    #10,@ML.REG+120             ;                          7435
056404  012777  177400  137002               MOV     #-400,@ML.REG+10            ;                          7436
056412  012777  014022  137004               MOV     #IO.BUF,@ML.REG+20          ;                          7437
056420  010177  137010                       MOV     R1,@ML.REG+30               ;                          7438
056424  012777  000061  136752               MOV     #61,@ML.REG                 ; ARR.SEL,*                7439
056432  005003                               CLR     R3                          ;                          7440
056434  012704  000001               4$:     MOV     #1,R4                       ; CNT                      7442
056440  001411                       5$:     BEQ     8$                          ; *,$STMP2                 7444
056442  016705  123450                       MOV     L$DLY,R5                    ; *,$STMP1
056446  001404                               BEQ     7$
056450  005066  000014               6$:     CLR     14(SP)                      ; $STMP
056454  005305                               DEC     R5                          ; $STMP1
056456  001374                               BNE     6$
056460  005304                       7$:     DEC     R4                          ; $STMP2
056462  000766                               BR      5$
056464  152777  000020  137032       8$:     BISB    #20,@ML.REG+120             ;                          7445
056472  005203                               INC     R3                          ; CNT                      7442
056474  020327  000177                       CMP     R3,#177                     ; CNT,*
056500  003755                               BLE     4$
056502  152777  000040  136734               BISB    #40,@ML.REG+40              ;                          7446
056510  016705  137316                       MOV     ML.DUT,R5
056514  042705  177770                       BIC     #177770,R5
056520  142777  000007  136716               BICB    #7,@ML.REG+40
056526  150577  136712                       BISB    R5,@ML.REG+40
056532  152777  000010  136764               BISB    #10,@ML.REG+120             ;                          7449
056540  012777  177400  136646               MOV     #-400,@ML.REG+10            ;                          7450
056546  012777  014022  136650               MOV     #IO.BUF,@ML.REG+20          ;                          7451
056554  010177  136654                       MOV     R1,@ML.REG+30               ;                          7452
056560  012777  000071  136616               MOV     #71,@ML.REG                 ; ARR.SEL,*                7453
056566  012704  000001                       MOV     #1,R4                       ; *,$STMP2                 7454
056572  001411                       9$:     BEQ     12$
056574  016705  123316                       MOV     L$DLY,R5                    ; *,$STMP1
056600  001404                               BEQ     11$
056602  005066  000014               10$:    CLR     14(SP)                      ; $STMP
056606  005305                               DEC     R5                          ; $STMP1
056610  001374                               BNE     10$
056612  005304                       11$:    DEC     R4                          ; $STMP2
056614  000766                               BR      9$
056616  005003                       12$:    CLR     R3                          ; WD.CNT                   7456
056620  017767  137010  136514       13$:    MOV     @ML.REG+230,PD.TEMP         ;                          7458
056626  152777  000020  136670               BISB    #20,@ML.REG+120             ;                          7459
056634  012704  000001                       MOV     #1,R4                       ; *,$STMP2                 7460
056640  001411                       14$:    BEQ     17$
056642  016705  123250                       MOV     L$DLY,R5                    ; *,$STMP1
056646  001404                               BEQ     16$
056650  005066  000014               15$:    CLR     14(SP)                      ; $STMP
056654  005305                               DEC     R5                          ; $STMP1
056656  001374                               BNE     15$
056660  005304                       16$:    DEC     R4                          ; $STMP2
056662  000766                               BR      14$
056664  017767  136704  134502       17$:    MOV     @ML.REG+170,D1.TEMP
```

```
                                        ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                        ;               TEST CODE SECTION               29-Mar-1982 16:21:03   PA:<

056672  017767  136706  134476                  MOV     @ML.REG+200,D2.TEMP
056700  017767  136660  134472                  MOV     @ML.REG+160,E2.TEMP
056706  005004                                  CLR     R4                      ; NIB.PTR              7463
056710  010405                          18$:    MOV     R4,R5                   ; NIB.PTR,*            7465
056712  006205                                  ASR     R5
056714  006205                                  ASR     R5
056716  006205                                  ASR     R5
056720  062705  015342                          ADD     #PD.TEMP,R5
056724  010546                                  MOV     R5,-(SP)
056726  010446                                  MOV     R4,-(SP)                ; NIB.PTR,*
056730  042716  177770                          BIC     #177770,(SP)
056734  012746  000001                          MOV     #1,-(SP)
056740  005046                                  CLR     -(SP)
056742  004767  124666                          JSR     PC,BL$GT2
056746  062706  000010                          ADD     #10,SP
056752  005700                                  TST     R0
056754  001017                                  BNE     20$
056756  010446                                  MOV     R4,-(SP)                ; NIB.PTR,*            7468
056760  010246                                  MOV     R2,-(SP)                ; TST.PAT,*
056762  012746  000020                          MOV     #20,-(SP)
056766  060616                                  ADD     SP,(SP)                 ; ERR.FLG,*
056770  004767  141402                          JSR     PC,TST.LNG.WRD
056774  026627  000020  000001                  CMP     20(SP),#1               ; ERR.FLG,*            7470
057002  001002                                  BNE     19$
057004  005266  000010                          INC     10(SP)                  ; ERR.CNT
057010  062706  000006                  19$:    ADD     #6,SP                   ;
057014  005204                          20$:    INC     R4                      ;                      7467
057016  020427  000011                          CMP     R4,#11                  ; NIB.PTR              7463
057022  003732                                  BLE     18$                     ; NIB.PTR,*
057024  005203                                  INC     R3                      ; WD.CNT               7456
057026  020327  000177                          CMP     R3,#177                 ; WD.CNT,*
057032  003672                                  BLE     13$
057034  005102                                  COM     R2                      ; TST.PAT              7477
057036  005216                                  INC     (SP)                    ; TWICE                7430
057040  021627  000001                          CMP     (SP),#1                 ; TWICE,*
057044  003002                                  BGT     21$
057046  000167  177260                          JMP     3$
057052  026627  000002  000005          21$:    CMP     2(SP),#5                ; ERR.CNT,*            7480
057060  003434                                  BLE     22$
057062  104455                                  TRAP    55                      ;                      7483
057064  000116                                  .WORD   116
057066  013012                                  .WORD   ARR.DAT
057070  026302                                  .WORD   DUMPER
057072  012746  010630                          MOV     #WRD.10,-(SP)           ;                      7484
057076  012746  011122                          MOV     #WRD.37,-(SP)
057102  012746  011110                          MOV     #WRD.35,-(SP)
057106  012746  010256                          MOV     #THR.FMT,-(SP)
057112  012746  000004                          MOV     #4,-(SP)
057116  010600                                  MOV     SP,R0                   ; SP,*
057120  104414                                  TRAP    14
057122  010116                                  MOV     R1,(SP)                 ; ARR.SEL,*            7485
057124  012746  007064                          MOV     #FMT.9,-(SP)
```

```
16110                                    ;ML4AD
16111                                    ;               TEST CODE SECTION                          29-Mar-1982 16:23:04    TOPS
16112                                                                                               29-Mar-1982 16:21:03    PA:<
16113 057130  012746  000002                    MOV     #2,-(SP)
16114 057134  010600                            MOV     SP,R0                        ; SP,*
16115 057136  104414                            TRAP    14
16116 057140  012766  000001  000026            MOV     #1,26(SP)                    ; *,DODU.FLG                       7486
16117 057146  062706  000016                    ADD     #16,SP                       ;                                  7482
16118 057152  104467                    22$:    TRAP    67                           ;                                  7487
16119 057154  006000                            ROR     R0
16120 057156  103002                            BHIS    23$
16121 057160  000167  177142                    JMP     2$
16122 057164  026627  000010  000001    23$:    CMP     10(SP),#1                    ; DODU.FLG,*                       7491
16123 057172  001004                            BNE     24$
16124 057174  016700  136630                    MOV     ML.LUN,R0                    ;                                  7494
16125 057200  104451                            TRAP    51
16126 057202  104444                            TRAP    44
16127 057204  066601  000004            24$:    ADD     4(SP),R1                     ; *,ARR.SEL                        7425
16128 057210  020166  000006            25$:    CMP     R1,6(SP)                     ; ARR.SEL,*
16129 057214  101002                            BHI     26$
16130 057216  000167  177100                    JMP     1$
16131 057222  062706  000016            26$:    ADD     #16,SP                       ;                                  7369
16132 057226  000207                            RTS     PC
16133
16134                                    ; Routine Size:  244 words
16135                                    ; Maximum stack depth per invocation:  20 words
16140
16141
16145
16146                                            .SBTTL  T28 TEST CODE SECTION
16150 057230                            T28::
16151 057230  004767  177024            1$:     JSR     PC,$T28                      ;                                  7498
16152 057234  104466                            TRAP    66
16153 057236  006000                            ROR     R0
16154 057240  103773                            BLO     1$
16155 057242  000207                            RTS     PC
16156
16157                                    ; Routine Size:  6 words
16158                                    ; Maximum stack depth per invocation:  0 words
16163
16164 ;           7501    !<BLF/PAGE>
```

```
;ML4AD
;                               TEST CODE SECTION                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                                                                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (81)
;
;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 29
;       !
;       ! TEST NAME:    READ WRITE ARRAYS WITH PROM DATA
;       !
;       ! TEST DESCRIPTION:
;       !           COMBINE THE READING OF ARRAY
;       !           MODULE DATA WITH ARRAY MODULE UV PROM DATA AND
;       !           FIND A GOOD BLOCK WHERE FURTHER
;       !           TESTING WILL BE PERFORMED BY:
;       !
;       !           1.  STARTING AT BLOCK 0 WRITE THE BLOCK WITH SELECTED DATA PATTERNS
;       !               AND READ THE BLOCK AVOIDING ANY BAD NIBBLES POINTED TO BY THE
;       !               PROM DATA.
;       !
;       !               SET ERROR FLAG IF ANY BAD NIBBLES ARE ENCOUNTERED IN BLOCK.
;       !
;       !           2.  REPEAT WRITING/READING THIS BLOCK UNTIL ALL PATTERNS ARE TESTED
;       !               OR THE ERROR FLAG IS SET.
;       !
;       !           3.  IF ALL PATTERN HAVE BEEN TESTED AND THE ERROR FLAG IS NOT SET
;       !               THEN SAVE THIS BLOCK ADDRESS AS THE GOOD BLOCK ADRS AND EXIT TEST.
;       !
;       !           4.  ELSE IF THE ERROR FLG HAS SET THEN REPEAT TEST AT THE NEXT ROW.
;       !               REPEAT UNTIL A GOOD BLOCK IS FOUND OR LAST ROW IS REACHED.
;       !
;       !           5.  IF NO GOOD BLOCK IS FOUND BY LAST ROW THEN REPORT ERROR AND
;       !               EXIT TEST.
;       !
;       ! IMPLICIT INPUTS:
;       !          RAS_INC
;       !          LOADED DURING THE INITIALIZATION CODE AND CONTAINS THE ROW ADDRESS
;       !          INCREMENT VALUE FOR THIS DRIVE.
;       !
;       !
;       !          PD_TEMP:
;       !          A BITVECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND
;       !          ACCESSED FROM.
;       !
;       !          IO_BUF:
;       !          A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTION
;       !          ARE FOUND.
;       !
;       !
;       !--
;
;       local
;           WRD_CNT,                                      !WORD COUNT
;           NIB_PTR,                                      !NIBBLE POINTER
```

```
;ML4AD                                                 29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;             TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (81)
;
;                     PASS_CNT,                        !PASS COUNT
;                     NIB_PAT,                         !NIBBLE PATTERN
;                     DONE_FLG,                        !DONE FLAG
;                     ERR_FLG,                         !ERROR FLAG
;                     SECTOR_NO;                       !SECTOR NUMBER
;
;             BGNSUB;
;             PASS_CNT = -1;
;             SECTOR_NO = ZEROES;
;             DONE_FLG = ZERO;
;
;             do                                       !THIS LOOP DETERMINES WHEN TO STOP
;                 begin
;
;                 do                                   !THIS LOOP RUNS THE PATTERNS
;                     begin
;                     PASS_CNT = .PASS_CNT + 1;        !INCREMENT THE PASS COUNT
;                     CLR_MBUS;
;                     DAT_DM = ONE;                    !SET DATA DIAG MODE
;                     MLDA = .SECTOR_NO;               !LOAD SECTOR NUMBER IN DSA
;                     MLWC = not 255;                  !LOAD WORD COUNT
;                     MLBA = IO_BUF;                   !LOAD UBUS ADRS
;
;                     case .PASS_CNT from 0 to 3 of    !SELECT A NIBBLE PATTERN
;                         set
;
;                         [0] :
;                             NIB_PAT = %o'000000';    !ZEROES
;
;                         [1] :
;                             NIB_PAT = %o'17';        !ONES
;
;                         [2] :
;                             NIB_PAT = %o'12';        !ALTERNATING ONE'S, ZEROES
;
;                         [3] :
;                             NIB_PAT = %o'15'         !COMPLIMENT ONE'S, ZEROES
;                         tes;
;
;                     incr LD_CNT from 0 to 9 do       !LOAD NIBBLE PATTERN INTO NIBBLE SAVE
;                         LD_LNG_WRD (.LD_CNT, .NIB_PAT);
;
;                     WRT_LNG_WRD;                     !LOAD THE DATA DIAG REGISTERS WITH NIBBLE SAVE
;                     MLCS1 = write;                   !DO A WRITE FUNCTION
;
;                     incr WRT_CNT from 0 to 127 do    !WRITE PATTERN INTO THIS BLOCK
;                         begin
;                         DELAY (ONE_US);
;                         DAT_CLK = ONE;
;                         end;
;
;                     CLR_MBUS;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (81)

;                       DAT_DM = ONE;                           !SET DATA DIAG MODE
;                       MLDA = .SECTOR_NO;                      !LOAD SECTOR NUMBER
;                       MLWC = not 255;                         !LOAD WORD COUNT
;                       MLBA = IO_BUF;                          !LOAD UBUS ADRS
;                       MLCS1 = read;                           !DO A READ FUNCTION
;                       DELAY (ONE_US);
;                       WRD_CNT = -1;                           !RESET THE WORD COUNT
;
;                       do
;                           begin                               !TEST ONE BLOCK FOR NIBBLE PATTERN
;                           WRD_CNT = .WRD_CNT + 1;
;                           PD_TEMP = .MLPD;                    !GET PROM DATA
;                           DAT_CLK = ONE;                      !CLOCK DATA WORD INTO DIAG REG
;                           DELAY (ONE_US);                     !
;                           RD_LNG_WRD;                         !READ DIAG REGISTERS
;                           NIB_PTR = -1;                       !RESET THE NIBBLE POINTER
;
;                           do
;                               begin                           !SEARCH FOR GOOD NIBBLES
;                               NIB_PTR = .NIB_PTR + 1;         !INCREMENT NIBBLE POINTER
;
;                               if .PD_TEMP [.NIB_PTR] IS_NOT_SET       !TEST THIS NIB IF PROM FLAG NOT SET
;                               then
;                                   TST_LNG_WRD (.NIB_PTR, .NIB_PAT, ERR_FLG);
;
;                               end
;                           until (.ERR_FLG) or (.NIB_PTR eql 9);
;
;                           end
;                       until (.ERR_FLG) or (.WRD_CNT eql 127);
;
;                   end
;               until (.PASS_CNT eql 3) or (.ERR_FLG IS_SET );      !REPEAT UNTIL ALL PAT TESTED OR ERROR FLG GETS SET
;
;               if (.PASS_CNT eql 3) and (.ERR_FLG IS_NOT_SET )     !WAS THIS A GOOD BLOCK?
;               then
;                   begin                                       !YES
;                   DONE_FLG = ONE;                             !SET DONE FLAG
;                   GOOD_BLK = .SECTOR_NO;                      !GOOD BLOCK GETS THIS SECTOR NO
;                   end
;               else
;                   begin                                       !NO
;                   SECTOR_NO = .SECTOR_NO + .RAS_INC;          !INCREMENT ROW NO
;                   PASS_CNT = -1;                              !RESET PASS COUNT
;                   end;
;
;               end
;           !
;           !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
;           !
;           until (.DONE_FLG IS_SET ) or (.SECTOR_NO eqlU .LST_ARR + .ARR_INC);
;
```

```
16334 ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
16335 ;                      TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (81)
16336
16337 ;              7658
16338 ;              7659  ENDSUB;                                    !REPEAT UNTIL GOOD BLK FOUND OR AT LST ROW
16339 ;              7660
16340 ;              7661  !
16341 ;              7662  !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
16342 ;              7663  !
16343 ;              7664  if .SECTOR_NO eqlU .LST_ARR + .ARR_INC     !SEE IF WE'RE AT THE LAST BLOCK
16344 ;              7665  then
16345 ;              7666      begin                                  !A GOOD BLK NOT FOUND BEFORE LAST BLK
16346 ;              7667      ERRDF (79, INTER, DUMPER);             !ERROR AND DROP UNIT
16347 ;              7668      PRINTB (THR_FMT, WRD_14, PHR_10, FNC_15);
16348 ;              7669      DODU (.ML_LUN);
16349 ;              7670      DOCLN;
16350 ;              7671      end;
16351 ;              7672
16352 ;              7673  ENDTST;
16356
16357                                          .SBTTL  $T29 TEST CODE SECTION
16361 057244  004167  125342          $T29:    JSR     R1,$SAVE5
16362 057250  162706  000014                   SUB     #14,SP                          ;                       7500
16363 057254  104402                  1$:      TRAP    2                               ;                       7558
16364 057256  012766  177777  000002           MOV     #-1,2(SP)                       ; *,PASS.CNT            7561
16365 057264  005002                           CLR     R2                              ; SECTOR.NO             7562
16366 057266  005066  000004                   CLR     4(SP)                           ; DONE.FLG              7563
16367 057272  005266  000002          2$:      INC     2(SP)                           ; PASS.CNT              7570
16368 057276  152777  000040  136140           BISB    #40,@ML.REG+40
16369 057304  016705  136522                   MOV     ML.DUT,R5
16370 057310  042705  177770                   BIC     #177770,R5
16371 057314  142777  000007  136122           BICB    #7,@ML.REG+40
16372 057322  150577  136116                   BISB    R5,@ML.REG+40
16373 057326  152777  000010  136170           BISB    #10,@ML.REG+120                 ;                       7572
16374 057334  010277  136074                   MOV     R2,@ML.REG+30                   ; SECTOR.NO,*           7573
16375 057340  012777  177400  136046           MOV     #-400,@ML.REG+10                ;                       7574
16376 057346  012777  014022  136050           MOV     #IO.BUF,@ML.REG+20              ;                       7575
16377 057354  016605  000002                   MOV     2(SP),R5                        ; PASS.CNT,*            7577
16378 057360  006305                           ASL     R5
16379 057362  066507  057366                   ADD     3$(R5),PC
16380 057366  000010                  3$:      .WORD   4$-3$
16381 057370  000014                           .WORD   5$-3$
16382 057372  000022                           .WORD   6$-3$
16383 057374  000030                           .WORD   7$-3$
16384 057376  005001                  4$:      CLR     R1                              ; NIB.PAT               7581
16385 057400  000410                           BR      8$                              ;                       7577
16386 057402  012701  000017          5$:      MOV     #17,R1                          ; *,NIB.PAT             7584
16387 057406  000405                           BR      8$                              ;                       7577
16388 057410  012701  000012          6$:      MOV     #12,R1                          ; *,NIB.PAT             7587
```

```
                                    ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                                    ;               TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
057414  000402                              BR      8$
057416  012701  000015              7$:     MOV     #15,R1                  ;                                     7577
057422  005005                      8$:     CLR     R5                      ; *,NIB.PAT                           7590
057424  010546                      9$:     MOV     R5,-(SP)                ; LD.CNT                              7593
057426  010146                              MOV     R1,-(SP)                ; LD.CNT,*                            7594
057430  004767  141720                      JSR     PC,LD.LNG.WRD           ; NIB.PAT,*
057434  022626                              CMP     (SP)+,(SP)+
057436  005205                              INC     R5                      ; LD.CNT
057440  020527  000011                      CMP     R5,#11                  ; LD.CNT,*                            7593
057444  003767                              BLE     9$
057446  016777  133722  136120              MOV     D1.TEMP,@ML.REG+170     ;                                     7594
057454  016777  133716  136122              MOV     D2.TEMP,@ML.REG+200
057462  016777  133712  136074              MOV     E2.TEMP,@ML.REG+160
057470  012777  000061  135706              MOV     #61,@ML.REG
057476  005003                              CLR     R3                      ;                                     7597
057500  012704  000001              10$:    MOV     #1,R4                   ; WRT.CNT                             7599
057504  001411                      11$:    BEQ     14$                     ; *,$$TMP2                            7601
057506  016705  122404                      MOV     L$DLY,R5
057512  001404                              BEQ     13$                     ; *,$$TMP1
057514  005066  000012              12$:    CLR     12(SP)
057520  005305                              DEC     R5                      ; $$TMP
057522  001374                              BNE     12$                     ; $$TMP1
057524  005304                      13$:    DEC     R4
057526  000766                              BR      11$                     ; $$TMP2
057530  152777  000020  135766      14$:    BISB    #20,@ML.REG+120
057536  005203                              INC     R3                      ;                                     7602
057540  020327  000177                      CMP     R3,#177                 ; WRT.CNT                             7599
057544  003755                              BLE     10$                     ; WRT.CNT,*
057546  152777  000040  135670              BISB    #40,@ML.REG+40          ;                                     7603
057554  016705  136252                      MOV     ML.DUT,R5
057560  042705  177770                      BIC     #177770,R5
057564  142777  000007  135652              BICB    #7,@ML.REG+40
057572  150577  135646                      BISB    R5,@ML.REG+40
057576  152777  000010  135720              BISB    #10,@ML.REG+120
057604  010277  135624                      MOV     R2,@ML.REG+30           ;                                     7606
057610  012777  177400  135576              MOV     #-400,@ML.REG+10        ; SECTOR.NO,*                         7607
057616  012777  014022  135600              MOV     #IO.BUF,@ML.REG+20      ;                                     7608
057624  012777  000071  135552              MOV     #71,@ML.REG             ;                                     7609
057632  012704  000001                      MOV     #1,R4                   ;                                     7610
057636  001411                      15$:    BEQ     18$                     ; *,$$TMP2                            7611
057640  016705  122252                      MOV     L$DLY,R5
057644  001404                              BEQ     17$                     ; *,$$TMP1
057646  005066  000012              16$:    CLR     12(SP)
057652  005305                              DEC     R5                      ; $$TMP
057654  001374                              BNE     16$                     ; $$TMP1
057656  005304                      17$:    DEC     R4
057660  000766                              BR      15$                     ; $$TMP2
057662  012766  177777  000006      18$:    MOV     #-1,6(SP)
057670  005266  000006              19$:    INC     6(SP)                   ; *,WRD.CNT                           7612
057674  017767  135734  135440              MOV     @ML.REG+230,PD.TEMP     ; WRD.CNT                             7616
057702  152777  000020  135614              BISB    #20,@ML.REG+120         ;                                     7617
057710  012704  000001                      MOV     #1,R4                   ;                                     7618
                                                                            ; *,$$TMP2                            7619
```

```
                                    ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                                    ;           TEST CODE SECTION                             29-Mar-1982 16:21:03   PA:<
057714  001411                      20$:    BEQ     23$
057716  016705  122174                      MOV     L$DLY,R5                    ; *,$$TMP1
057722  001404                              BEQ     22$
057724  005066  000012              21$:    CLR     12(SP)                      ; $$TMP
057730  005305                              DEC     R5                          ; $$TMP1
057732  001374                              BNE     21$
057734  005304                      22$:    DEC     R4                          ; $$TMP2
057736  000766                              BR      20$
057740  017767  135630  133426      23$:    MOV     @ML.REG+170,D1.TEMP
057746  017767  135632  133422              MOV     @ML.REG+200,D2.TEMP
057754  017767  135604  133416              MOV     @ML.REG+160,E2.TEMP
057762  012716  177777                      MOV     #-1,(SP)                    ; *,NIB.PTR                 7621
057766  005216                      24$:    INC     (SP)                        ; NIB.PTR                   7625
057770  011605                              MOV     (SP),R5                     ; NIB.PTR,*                 7627
057772  006205                              ASR     R5
057774  006205                              ASR     R5
057776  006205                              ASR     R5
060000  062705  015342                      ADD     #PD.TEMP,R5
060004  010546                              MOV     R5,-(SP)
060006  016646  000002                      MOV     2(SP),-(SP)                 ; NIB.PTR,*
060012  042716  177770                      BIC     #177770,(SP)
060016  012746  000001                      MOV     #1,-(SP)
060022  005046                              CLR     -(SP)
060024  004767  123604                      JSR     PC,BL$GT2
060030  062706  000010                      ADD     #10,SP
060034  005700                              TST     R0
060036  001011                              BNE     25$
060040  011646                              MOV     (SP),-(SP)                  ; NIB.PTR,*                 7629
060042  010146                              MOV     R1,-(SP)                    ; NIB.PAT,*
060044  012746  000016                      MOV     #16,-(SP)
060050  060616                              ADD     SP,(SP)                     ; ERR.FLG,*
060052  004767  140320                      JSR     PC,TST.LNG.WRD
060056  062706  000006                      ADD     #6,SP
060062  016605  000010              25$:    MOV     10(SP),R5                   ; ERR.FLG,*                 7632
060066  032705  000001                      BIT     #1,R5
060072  001012                              BNE     26$
060074  021627  000011                      CMP     (SP),#11                    ; NIB.PTR,*
060100  001332                              BNE     24$
060102  032705  000001                      BIT     #1,R5                       ;                           7635
060106  001004                              BNE     26$
060110  026627  000006  000177              CMP     6(SP),#177                  ; WRD.CNT,*
060116  001264                              BNE     19$
060120  005004                      26$:    CLR     R4                          ;                           7638
060122  026627  000002  000003              CMP     2(SP),#3                    ; PASS.CNT,*
060130  001002                              BNE     27$
060132  005204                              INC     R4
060134  000403                              BR      28$
060136  020527  000001              27$:    CMP     R5,#1
060142  001030                              BNE     31$
060144  006004                      28$:    ROR     R4                          ;                           7640
060146  103010                              BCC     29$
060150  005705                              TST     R5
```

```
                                      ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
                                      ;              TEST CODE SECTION                                29-Mar-1982 16:21:03    PA:<
060152  001006                                BNE     29$
060154  012766  000001  000004                MOV     #1,4(SP)                  ; *,DONE.FLG                 7643
060162  010267  133620                        MOV     R2,GOOD.BLK               ; SECTOR.NO,*                7644
060166  000405                                BR      30$                       ;                            7640
060170  066702  135152          29$:          ADD     RAS.INC,R2                ; *,SECTOR.NO                7648
060174  012766  177777  000002                MOV     #-1,2(SP)                 ; *,PASS.CNT                 7649
060202  026627  000004  000001  30$:          CMP     4(SP),#1                  ; DONE.FLG,*                 7656
060210  001410                                BEQ     32$
060212  016705  133602                        MOV     LST.ARR,R5
060216  066705  133562                        ADD     ARR.INC,R5
060222  020205                                CMP     R2,R5                     ; SECTOR.NO,*
060224  001402                  31$:          BEQ     32$
060226  000167  177040                        JMP     2$
060232  104467                  32$:          TRAP    67
060234  006000                                ROR     R0
060236  103002                                BHIS    33$
060240  000167  177010                        JMP     1$
060244  016705  133550          33$:          MOV     LST.ARR,R5
060250  066705  133530                        ADD     ARR.INC,R5                ;                            7664
060254  020205                                CMP     R2,R5                     ; SECTOR.NO,*
060256  001026                                BNE     34$
060260  104455                                TRAP    55
060262  000117                                .WORD   117                       ;                            7667
060264  013114                                .WORD   INTER
060266  026302                                .WORD   DUMPER
060270  012746  012360                        MOV     #FNC.15,-(SP)
060274  012746  012006                        MOV     #PHR.10,-(SP)             ;                            7668
060300  012746  010664                        MOV     #WRD.14,-(SP)
060304  012746  010256                        MOV     #THR.FMT,-(SP)
060310  012746  000004                        MOV     #4,-(SP)
060314  010600                                MOV     SP,R0                     ; SP,*
060316  104414                                TRAP    14
060320  016700  135504                        MOV     ML.LUN,R0                 ;                            7669
060324  104451                                TRAP    51
060326  104444                                TRAP    44
060330  062706  000012                        ADD     #12,SP                    ;                            7666
060334  062706  000014          34$:          ADD     #14,SP                    ;                            7500
060340  000207                                RTS     PC                        ;

                                ; Routine Size:  287 words
                                ; Maximum stack depth per invocation:  17 words



                                              .SBTTL  T29 TEST CODE SECTION
```

```
16558                                  ;ML4AD                                                     29-Mar-1982 16:23:04    TOPS
16559                                  ;              TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<
16560
16564 060342                           T29::
16565 060342  004767  176676           1$:     JSR     PC,$T29                 ;                                   7671
16566 060346  104466                           TRAP    66
16567 060350  006000                           ROR     R0
16568 060352  103773                           BLO     1$
16569 060354  000207                           RTS     PC
16570
16571                                  ; Routine Size:  6 words
16572                                  ; Maximum stack depth per invocation:  0 words
16577
16578
16579 ;          7674  !<BLF/PAGE>
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (82)

;               !
;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 30
;               !
;               ! TEST NAME:    REFRESH TIMING TEST
;               !
;               ! TEST DESCRIPTION:
;               !
;               !       TEST THE MEMORY ARRAY MODULES
;               !       REFRESH TIMING AND CONTROL LOGIC
;               !       REG BY:
;               !
;               !       1.  WRITING ALL ONES INTO THE
;               !           GOOD BLOCK.
;               !
;               !       2.  DELAY FOR 2 MS
;               !
;               !       3.  READ THE GOOD BLOCK FOR ONES.
;               !           KEEP COUNT OF BAD NIBBLES
;               !           ENCOUNTERED
;               !
;               !       4.  ALLOW A BAD NIBBLE THRESHOLD
;               !           OF 20 BAD NIBBLES OUT OF THE
;               !           1280 NIBBLES TESTED.
;               !
;               !       5.  IF THRESHOLD IS EXCEEDED THEN
;               !           REPORT ERROR AND DROP THE UNIT.
;               !
;               ! IMPLICIT INPUTS:
;               !
;               !       PD_TEMP:
;               !       A BIT VECTOR OF 16 BITS WHERE
;               !       THE READ PROM DATA IS STORED
;               !       AND ACCESSED FROM.
;               !
;               !--
;
;               local
;                   TST_PAT,                             !TEST PATTERN
;                   ERR_CNT,                             !ERROR COUNT
;                   ERR_FLG;                             !ERROR FLAG
;
;               BGNSUB;
;               CLR_MBUS;
;               ERR_CNT = ZERO;
;               TST_PAT = ONES;
;               MLDT = .TST_PAT;                         !LOAD DATA DIAG REGS WITH TST PAT
;               MLD2 = .TST_PAT;
;               MLE2 = .TST_PAT;
```

```
;ML4AD                                                       29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (82)

;               DAT_DM_XFER ();                              !SET UP A DATA DIAG MODE XFERR
;               MLCS1 = write;                               !DO A WRITE FUNCTION
;
;               incr WRD_CNT from 0 to 127 do                !WRITE BLOCK WITH TST PAT
;                   begin
;                   DELAY (ONE_US);
;                   DAT_CLK = ONE;
;                   end;
;
;               CLR_MBUS;
;               DAT_DM_XFER ();                              !SET UP A DATA DIAG MODE XFERR
;               MLCS1 = read;                                !DO A READ FUNCTION
;               DELAY (TWO_TH_US);                           !DELAY FOR 2 MS
;
;               incr WRD_CNT from 0 to 127 do                !READ THE BLOCK
;                   begin
;                   PD_TEMP = .MLPD;                         !GET THE PROM DATA
;                   DAT_CLK = ONE;                           !CLOCK DATA WORD INTO DIAG REG
;                   DELAY (ONE_US);
;                   RD_LNG_WRD;                              !READ THE DIAG REG
;
;                   incr NIB_PTR from 0 to 9 do              !LOOK AT 10 NIBBLES
;                       begin
;
;                       if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);
;
;                                                            !FIND GOOD NIBBLES AND COMPARE THEM
;
;                       if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1; !INCREMENT ERROR COUNT IF ERR_FLG IS SET
;
;                       end;
;
;                   end;
;
;               ENDSUB;
;
;               if .ERR_CNT gtr 20                           !ALLOW 20 NIBBLES TO FAIL
;               then
;                   begin                                    !ERROR IF GTR 20
;                   ERRDF (80, ASYNC, DUMPER);
;                   PRINTB (FIV_FMT, WRD_22, PHR_4, WRD_12, FNC_16, WRD_48);
;                   DODU (.ML_LUN);
;                   DOCLN;
;                   end;
;
;               ENDTST;


                        .SBTTL  $T30 TEST CODE SECTION
```

```
060356  004167  124230           $T30:   JSR     R1,$SAVE5
060362  024646                           CMP     -(SP),-(SP)              ;                    7673
060364  104402                   1$:     TRAP    2
060366  152777  000040  135050           BISB    #40,@ML.REG+40           ;                    7718
060374  016703  135432                   MOV     ML.DUT,R3                ;                    7720
060400  042703  177770                   BIC     #177770,R3
060404  142777  000007  135032           BICB    #7,@ML.REG+40
060412  150377  135026                   BISB    R3,@ML.REG+40
060416  005005                           CLR     R5                       ; ERR.CNT            7722
060420  012704  177777                   MOV     #-1,R4                   ; *,TST.PAT          7723
060424  010477  135144                   MOV     R4,@ML.REG+170           ; TST.PAT,*          7724
060430  010477  135150                   MOV     R4,@ML.REG+200           ; TST.PAT,*          7725
060434  010477  135124                   MOV     R4,@ML.REG+160           ; TST.PAT,*          7726
060440  004767  135746                   JSR     PC,DAT.DM.XFER           ;                    7727
060444  012777  000061  134732           MOV     #61,@ML.REG              ;                    7728
060452  005001                           CLR     R1                       ; WRD.CNT            7730
060454  012702  000001           2$:     MOV     #1,R2                    ; *,$$TMP2           7732
060460  001411                   3$:     BEQ     6$
060462  016703  121430                   MOV     L$DLY,R3                 ; *,$$TMP1
060466  001404                           BEQ     5$
060470  005066  000002           4$:     CLR     2(SP)                    ; $$TMP
060474  005303                           DEC     R3                       ; $$TMP1
060476  001374                           BNE     4$
060500  005302                   5$:     DEC     R2                       ; $$TMP2
060502  000766                           BR      3$
060504  152777  000020  135012   6$:     BISB    #20,@ML.REG+120          ;                    7733
060512  005201                           INC     R1                       ; WRD.CNT            7730
060514  020127  000177                   CMP     R1,#177                  ; WRD.CNT,*
060520  003755                           BLE     2$
060522  152777  000040  134714           BISB    #40,@ML.REG+40           ;                    7734
060530  016703  135276                   MOV     ML.DUT,R3
060534  042703  177770                   BIC     #177770,R3
060540  142777  000007  134676           BICB    #7,@ML.REG+40
060546  150377  134672                   BISB    R3,@ML.REG+40
060552  004767  135634                   JSR     PC,DAT.DM.XFER           ;                    7737
060556  012777  000071  134620           MOV     #71,@ML.REG              ;                    7738
060564  012702  003720                   MOV     #3720,R2                 ; *,$$TMP2           7739
060570  001411                   7$:     BEQ     10$
060572  016703  121320                   MOV     L$DLY,R3                 ; *,$$TMP1
060576  001404                           BEQ     9$
060600  005066  000002           8$:     CLR     2(SP)                    ; $$TMP
060604  005303                           DEC     R3                       ; $$TMP1
060606  001374                           BNE     8$
060610  005302                   9$:     DEC     R2                       ; $$TMP2
060612  000766                           BR      7$
060614  005001                   10$:    CLR     R1                       ; WRD.CNT            7741
060616  017767  135012  134516   11$:    MOV     @ML.REG+230,PD.TEMP      ;                    7743
060624  152777  000020  134672           BISB    #20,@ML.REG+120          ;                    7744
060632  012702  000001                   MOV     #1,R2                    ; *,$$TMP2           7745
060636  001411                   12$:    BEQ     15$
```

```
                                  ;ML4AD                                           29-Mar-1982 16:23:04   TOPS
                                  ;            TEST CODE SECTION                   29-Mar-1982 16:21:03   PA:<
060640 016703 121252                     MOV    L$DLY,R3                ; *,$$TMP1
060644 001404                            BEQ    14$
060646 005066 000002              13$:   CLR    2(SP)                   ; $$TMP
060652 005303                            DEC    R3                      ; $$TMP1
060654 001374                            BNE    13$
060656 005302                     14$:   DEC    R2                      ; $$TMP2
060660 000766                            BR     12$
060662 017767 134706 132504       15$:   MOV    @ML.REG+170,D1.TEMP
060670 017767 134710 132500              MOV    @ML.REG+200,D2.TEMP
060676 017767 134662 132474              MOV    @ML.REG+160,E2.TEMP
060704 005002                            CLR    R2                      ; NIB.PTR                7748
060706 010203                     16$:   MOV    R2,R3                   ; NIB.PTR,*              7751
060710 006203                            ASR    R3
060712 006203                            ASR    R3
060714 006203                            ASR    R3
060716 062703 015342                     ADD    #PD.TEMP,R3
060722 010346                            MOV    R3,-(SP)
060724 010246                            MOV    R2,-(SP)                ; NIB.PTR,*
060726 042716 177770                     BIC    #177770,(SP)
060732 012746 000001                     MOV    #1,-(SP)
060736 005046                            CLR    -(SP)
060740 004767 122670                     JSR    PC,BL$GT2
060744 062706 000010                     ADD    #10,SP
060750 005700                            TST    R0
060752 001011                            BNE    17$
060754 010246                            MOV    R2,-(SP)                ; NIB.PTR,*
060756 010446                            MOV    R4,-(SP)                ; TST.PAT,*
060760 012746 000006                     MOV    #6,-(SP)
060764 060616                            ADD    SP,(SP)                 ; ERR.FLG,*
060766 004767 137404                     JSR    PC,TST.LNG.WRD
060772 062706 000006                     ADD    #6,SP
060776 021627 000001              17$:   CMP    (SP),#1                 ; ERR.FLG,*              7755
061002 001001                            BNE    18$
061004 005205                            INC    R5                      ; ERR.CNT
061006 005202                     18$:   INC    R2                      ; NIB.PTR
061010 020227 000011                     CMP    R2,#11                  ; NIB.PTR,*              7748
061014 003734                            BLE    16$
061016 005201                            INC    R1                      ; WRD.CNT
061020 020127 000177                     CMP    R1,#177                 ; WRD.CNT,*              7741
061024 003674                            BLE    11$
061026 104467                            TRAP   67                      ;                        7759
061030 006000                            ROR    R0
061032 103002                            BHIS   19$
061034 000167 177324                     JMP    1$
061040 020527 000024              19$:   CMP    R5,#24                  ; ERR.CNT,*              7763
061044 003432                            BLE    20$
061046 104455                            TRAP   55                      ;                        7766
061050 000120                            .WORD  120
061052 012706                            .WORD  ASYNC
061054 026302                            .WORD  DUMPER
061056 012746 011250                     MOV    #WRD.48,-(SP)           ;                        7767
061062 012746 012372                     MOV    #FNC.16,-(SP)
```

```
                                  ;ML4AD                                                 29-Mar-1982 16:23:04    TOPS
                                  ;               TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<
061066  012746  010650                  MOV     #WRD.12,-(SP)
061072  012746  011676                  MOV     #PHR.4,-(SP)
061076  012746  010752                  MOV     #WRD.22,-(SP)
061102  012746  010304                  MOV     #FIV.FMT,-(SP)
061106  012746  000006                  MOV     #6,-(SP)
061112  010600                          MOV     SP,R0                   ; SP,*
061114  104414                          TRAP    14
061116  016700  134706                  MOV     ML.LUN,R0               ;                               7768
061122  104451                          TRAP    51
061124  104444                          TRAP    44
061126  062706  000016                  ADD     #16,SP                  ;                               7765
061132  022626                  20$:    CMP     (SP)+,(SP)+             ;                               7673
061134  000207                          RTS     PC

                                  ; Routine Size:  184 words
                                  ; Maximum stack depth per invocation:  15 words



                                          .SBTTL  T30 TEST CODE SECTION
061136                            T30::
061136  004767  177214            1$:     JSR     PC,$T30                 ;                               7770
061142  104466                          TRAP    66
061144  006000                          ROR     R0
061146  103773                          BLO     1$
061150  000207                          RTS     PC

                                  ; Routine Size:  6 words
                                  ; Maximum stack depth per invocation:  0 words


;               7773    !<BLF/PAGE>
```

```
;ML4AD
;                    TEST CODE SECTION                       29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (83)
;        !
;        BGNTST;
;
;        !++
;        ! TEST NUMBER:  TST 31
;        !
;        ! TEST NAME:    ADDRESS COUNTER TEST
;        !
;        ! TEST DESCRIPTION:
;        !       TEST THE ABILITY OF THE ADDRESS
;        !       COUNTER TO SUCCESSFULLY COUNT
;        !       FROM BLOCK ZERO THROUGH THE
;        !       DEVICES LAST BLOCK BY:
;        !
;        !       1.  WRITING THE LAST BLOCK WITH ONES PATTERN.
;        !
;        !       2.  STARTING AT BLOCK ZERO WRITE ZEROES INTO ALL BLOCK UP TO THE
;        !           LAST BLOCK ADRS MINUS ONE.
;        !
;        !           READ THE LAST BLOCK FOR ONES AND ERROR IF ZEROES.
;        !
;        !       3.  STARTING AT BLOCK ZERO WRITE ZEROES INTO ALL BLOCK THROUGH THE LAST
;        !           BLOCK.
;        !
;        !           READ THE LAST BLOCK FOR ZEROES AND ERROR IF STILL ONES.
;        !
;        ! IMPLICIT INPUTS:
;        !       PD_TEMP:
;        !       A BITVECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND ACCESSED FROM.
;        !--
;
;        local
;            ERR_CNT,                                        !ERROR THRESHOLD COUNT
;            ERR_FLG,                                        !ERROR FLG
;            END_CNT,                                        !ENDING SECTOR NUMBER
;            BG_PAT;                                         !BACKGROUND PATTERN
;
;        BGNSUB;
;        CLR_MBUS;
;        BG_PAT = ONES;                                      !BACKGROUND PAT OF ONES
;        MLD1 = .BG_PAT;                                     !LOAD DATA DIAGS WITH BG PAT
;        MLD2 = .BG_PAT;
;        MLE2 = .BG_PAT;
;        DAT_DM = ONE;                                       !SET DATA DIAG MODE
;        LAST_BLK_XFER ();                                   !SET UP A LAST BLOCK XFERR
;        MLCST = write;                                      !DO A WRITE FUNCTION
;
;        incr WRD_CNT from 0 to 127 do                       !WRITE THE LAST BLOCK WITH THE BG PATTERN
;            begin
;            DELAY (ONE_US);
;            DAT_CLK = ONE;
;            end;
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;          TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (83)

CLR_MBUS;
DAT_DM = ONE;                                 !SET DATA DIAG MODE
LAST_BLK_XFER ();                             !SET UP A LAST BLOCK XFERR
MLCST = read;                                 !DO A READ FUNCTION
DELAY (ONE_US);
ERR_CNT = ZERO;                               !CLEAR ERROR COUNT THRESHOLD

incr WD_CNT from 0 to 127 do                  !READ THE LAST BLOCK FOR BG PATTERN
    begin
    PD_TEMP = .MLPD;                          !GET PROM DATA
    DAT_CLK = ONE;                            !CLOCK OUT THE DATA WORD
    DELAY (ONE_US);
    RD_LNG_WRD;                               !READ THE DATA WORD

    incr NIB_PTR from 0 to 9 do               !LOOK AT 10 NIBBLES
        begin

        if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .BG_PAT, ERR_FLG);

                                              !FIND GOOD NIBBLES AND COMPARE THEM

        if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + 1; !INC ERROR COUNT IF ERROR DETECTED

        end;

    end;

if .ERR_CNT gtr 10                            !IS ERROR THRESHOLD EXCEEDED
then
    begin                                     !ERROR IF EXCEEDED
    ERRDF (81, INTER, DUMPER);
    PRINTB (THR_FMT, PHR_4, WRD_13, FNC_22);
    PRINTB (TWO_FMT, FNC_13, WRD_56);
    EXIT_TST;
    end;

END_CNT = .LST_BLK - 1;                       !END AT LAST BLOCK -1
MLDT = ZEROES;                                !LOAD DATA DIAG REG WITH COMP BG PAT
MLD2 = ZEROES;
MLE2 = ZEROES;

incr TWICE from 0 to 1 do                     !REPEAT LOOP TWICE
    begin
    CLR_MBUS;
    ERR_CNT = ZERO;                           !CLEAR THE ERROR COUNT THRESHOLD
    DAT_DM = ONE;                             !SET DATA DIAG MODE
    FIRST_BLK_XFER ();                        !SET UP A FIRST BLOCK XFERR
    MLCS1 = write;                            !DO A WRITE FUNCTION

!
!VER CZMLAD CHANGED TEST TO UNSIGNED TEST
```

```
;ML4AD
;                TEST CODE SECTION                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (83)
;       !
;          incrU BLK_CNT from 0 to .END_CNT do                              !CLOCK THE ADDRESS COUNTER UP TO END_CNT
;
;             incr ADRS_CNT from 0 to 127 do
;                begin
;                DAT_CLK = ONE;
;                end;
;
;          CLR_MBUS;
;          DAT_DM = ONE;                                                !SET DATA DIAG MODE
;          LAST_BLK_XFER ();                                            !SET UP A LAST BLOCK XFERR
;          MLCST = read;                                                !DO A READ FUNCTION
;          DELAY (ONE_US);
;
;          incr WD_CNT from 0 to 127 do                                 !READ THE LAST BLOCK FOR BG PATTERN
;             begin
;             PD_TEMP = .MLPD;                                          !GET THE PROM DATA
;             DAT_CLK = ONE;                                            !CLOCK OUT DATA WORD
;             DELAY (ONE_US);
;             RD_LNG_WRD;                                               !READ DATA WORD
;
;             incr NIB_PTR from 0 to 9 do                               !LOOK AT 10 NIBBLES
;                begin
;
;                if .PD_TEMP [.NIB_PTR] IS_NOT_SET then TST_LNG_WRD (.NIB_PTR, .BG_PAT, ERR_FLG);
;
;                                                                       !FIND GOOD NIBBLES AND COMPARE THEM
;
;                if .ERR_FLG IS_SET then ERR_CNT = .ERR_CNT + ONE;   !INC ERROR COUNT IF ERROR DECTED
;
;                end;
;
;             end;
;
;          if .ERR_CNT gtr 10                                           !IS ERROR COUNT THRESHOLD EXCEEDED
;          then
;             begin                                                     !ERROR IF EXCEEDED
;             ERRDF (82, ASYNC, DUMPER);
;             PRINTB (THR_FMT, WRD_50, WRD_51, WRD_10);
;             end;
;
;          END_CNT = .END_CNT + 1;                                      !NOW END AT THE LAST BLOCK
;          BG_PAT = not .BG_PAT;                                        !COMPLIMENT THE BG PATTERN AND REPEAT
;          end;
;
;       ENDSUB;
;       ENDTST;

                        .SBTTL  $T31 TEST CODE SECTION
```

```
                                      ;ML4AD                                                        29-Mar-1982 16:23:04   TOPS
                                      ;                TEST CODE SECTION                            29-Mar-1982 16:21:03   PA:<
061152 004167 123434          $T31:   JSR     R1,$SAVE5
061156 162706 000010                  SUB     #10,SP                          ;                                        7772
061162 104402                 1$:     TRAP    2
061164 152777 000040 134252           BISB    #40,@ML.REG+40                  ;                                        7809
061172 016705 134634                  MOV     ML.DUT,R5                       ;                                        7811
061176 042705 177770                  BIC     #177770,R5
061202 142777 000007 134234           BICB    #7,@ML.REG+40
061210 150577 134230                  BISB    R5,@ML.REG+40
061214 012701 177777                  MOV     #-1,R1                          ; *,BG.PAT                               7813
061220 010177 134350                  MOV     R1,@ML.REG+170                  ; BG.PAT,*                               7814
061224 010177 134354                  MOV     R1,@ML.REG+200                  ; BG.PAT,*                               7815
061230 010177 134330                  MOV     R1,@ML.REG+160                  ; BG.PAT,*                               7816
061234 152777 000010 134262           BISB    #10,@ML.REG+120                 ;                                        7817
061242 004767 137076                  JSR     PC,LAST.BLK.XFER                ;                                        7818
061246 012777 000061 134130           MOV     #61,@ML.REG                     ;                                        7819
061254 005002                         CLR     R2                              ; WRD.CNT                                7821
061256 012703 000001          2$:     MOV     #1,R3                           ; *,$STMP2                               7823
061262 001411                 3$:     BEQ     6$
061264 016704 120626                  MOV     L$DLY,R4                        ; *,$STMP1
061270 001404                         BEQ     5$
061272 005066 000006          4$:     CLR     6(SP)                           ; $STMP
061276 005304                         DEC     R4                              ; $STMP1
061300 001374                         BNE     4$
061302 005303                 5$:     DEC     R3                              ; $STMP2
061304 000766                         BR      3$
061306 152777 000020 134210   6$:     BISB    #20,@ML.REG+120                 ;                                        7824
061314 005202                         INC     R2                              ; WRD.CNT                                7821
061316 020227 000177                  CMP     R2,#177                         ; WRD.CNT,*
061322 003755                         BLE     2$
061324 152777 000040 134112           BISB    #40,@ML.REG+40                  ;                                        7825
061332 016705 134474                  MOV     ML.DUT,R5
061336 042705 177770                  BIC     #177770,R5
061342 142777 000007 134074           BICB    #7,@ML.REG+40
061350 150577 134070                  BISB    R5,@ML.REG+40
061354 152777 000010 134142           BISB    #10,@ML.REG+120                 ;                                        7828
061362 004767 136756                  JSR     PC,LAST.BLK.XFER                ;                                        7829
061366 012777 000071 134010           MOV     #71,@ML.REG                     ;                                        7830
061374 012703 000001                  MOV     #1,R3                           ; *,$STMP2                               7831
061400 001411                 7$:     BEQ     10$
061402 016704 120510                  MOV     L$DLY,R4                        ; *,$STMP1
061406 001404                         BEQ     9$
061410 005066 000006          8$:     CLR     6(SP)                           ; $STMP
061414 005304                         DEC     R4                              ; $STMP1
061416 001374                         BNE     8$
061420 005303                 9$:     DEC     R3                              ; $STMP2
061422 000766                         BR      7$
061424 005016                 10$:    CLR     (SP)                            ; ERR.CNT                                7832
061426 005002                         CLR     R2                              ; WD.CNT                                 7834
061430 017767 134200 133704   11$:    MOV     @ML.REG+230,PD.TEMP             ;                                        7836
```

```
17079                                  ;ML4AD                                                            29-Mar-1982 16:23:04   TOPS
17080                                  ;                TEST CODE SECTION                                29-Mar-1982 16:21:03   PA:<
17081
17082 061436 152777 000020 13406C            BISB    #20,@ML.REG+120              ;                                      7837
17083 061444 012703 000001                   MOV     #1,R3                        ; *,$$TMP2                             7838
17084 061450 001411                  12$:    BEQ     15$
17085 061452 016704 120440                   MOV     L$DLY,R4                     ; *,$$TMP1
17086 061456 001404                          BEQ     14$
17087 061460 005066 000006          13$:    CLR     6(SP)                        ; $$TMP
17088 061464 005304                          DEC     R4                           ; $$TMP1
17089 061466 001374                          BNE     13$
17090 061470 005303                  14$:    DEC     R3                           ; $$TMP2
17091 061472 000766                          BR      12$
17092 061474 017767 134074 131672   15$:    MOV     @ML.REG+170,D1.TEMP
17093 061502 017767 134076 131666           MOV     @ML.REG+200,D2.TEMP
17094 061510 017767 134050 131662           MOV     @ML.REG+160,E2.TEMP
17095 061516 005004                          CLR     R4                           ; NIB.PTR                              7841
17096 061520 010403                  16$:    MOV     R4,R3                        ; NIB.PTR,*                            7844
17097 061522 006203                          ASR     R3
17098 061524 006203                          ASR     R3
17099 061526 006203                          ASR     R3
17100 061530 062703 015342                   ADD     #PD.TEMP,R3
17101 061534 010346                          MOV     R3,-(SP)
17102 061536 010446                          MOV     R4,-(SP)                     ; NIB.PTR,*
17103 061540 042716 177770                   BIC     #177770,(SP)
17104 061544 012746 000001                   MOV     #1,-(SP)
17105 061550 005046                          CLR     -(SP)
17106 061552 004767 122056                   JSR     PC,BL$GT2
17107 061556 062706 000010                   ADD     #10,SP
17108 061562 005700                          TST     R0
17109 061564 001011                          BNE     17$
17110 061566 010446                          MOV     R4,-(SP)                     ; NIB.PTR,*
17111 061570 010146                          MOV     R1,-(SP)                     ; BG.PAT,*
17112 061572 012746 000012                   MOV     #12,-(SP)
17113 061576 060616                          ADD     SP,(SP)                      ; ERR.FLG,*
17114 061600 004767 136572                   JSR     PC,TST.LNG.WRD
17115 061604 062706 000006                   ADD     #6,SP
17116 061610 026627 000004 000001   17$:    CMP     4(SP),#1                     ; ERR.FLG,*                            7848
17117 061616 001001                          BNE     18$
17118 061620 005216                          INC     (SP)                         ; ERR.CNT
17119 061622 005204                  18$:    INC     R4                           ; NIB.PTR                              7841
17120 061624 020427 000011                   CMP     R4,#11                       ; NIB.PTR,*
17121 061630 003733                          BLE     16$
17122 061632 005202                          INC     R2                           ; WD.CNT                               7834
17123 061634 020227 000177                   CMP     R2,#177                      ; WD.CNT,*
17124 061640 003673                          BLE     11$
17125 061642 021627 000012                   CMP     (SP),#12                     ; ERR.CNT,*                            7854
17126 061646 003437                          BLE     19$
17127 061650 104455                          TRAP    55                           ;                                      7857
17128 061652 000121                          .WORD   121
17129 061654 013114                          .WORD   INTER
17130 061656 026302                          .WORD   DUMPER
17131 061660 012746 012452                   MOV     #FNC.22,-(SP)                ;                                      7858
17132 061664 012746 010660                   MOV     #WRD.13,-(SP)
17133 061670 012746 011676                   MOV     #PHR.4,-(SP)
```

```
                                        ;ML4AD                                                 29-Mar-1982 16:23:04   TOPS
                                        ;               TEST CODE SECTION                      29-Mar-1982 16:21:03   PA:<
061674 012746 010256                           MOV     #THR.FMT,-(SP)
061700 012746 000004                           MOV     #4,-(SP)
061704 010600                                  MOV     SP,R0
061706 104414                                  TRAP    14                      ; SP,*
061710 012716 011344                           MOV     #WRD.56,(SP)
061714 012746 012334                           MOV     #FNC.13,-(SP)           ;                      7859
061720 012746 010246                           MOV     #TWO.FMT,-(SP)
061724 012746 000003                           MOV     #3,-(SP)
061730 010600                                  MOV     SP,R0
061732 104414                                  TRAP    14                      ; SP,*
061734 104463                                  TRAP    63
061736 062706 000020                           ADD     #20,SP                  ;                      7854
061742 000167 000560                           JMP     38$                     ;                      7856
061746 016766 132042 000002     19$:           MOV     LST.BLK,2(SP)           ; *,END.CNT            7863
061754 005366 000002                           DEC     2(SP)                   ; END.CNT
061760 005077 133610                           CLR     @ML.REG+170             ;
061764 005077 133614                           CLR     @ML.REG+200             ;                      7864
061770 005077 133570                           CLR     @ML.REG+160             ;                      7865
061774 005005                                  CLR     R5                      ;                      7866
061776 152777 000040 133440     20$:           BISB    #40,@ML.REG+40          ; TWICE                7868
062004 016704 134022                           MOV     ML.DUT,R4               ;                      7869
062010 042704 177770                           BIC     #177770,R4
062014 142777 000007 133422                    BICB    #7,@ML.REG+40
062022 150477 133416                           BISB    R4,@ML.REG+40
062026 005016                                  CLR     (SP)                    ; ERR.CNT
062030 152777 000010 133466                    BISB    #10,@ML.REG+120         ;                      7871
062036 004767 136220                           JSR     PC,FIRST.BLK.XFER       ;                      7872
062042 012777 000061 133334                    MOV     #61,@ML.REG             ;                      7873
062050 005003                                  CLR     R3                      ; BLK.CNT              7874
062052 000411                                  BR      23$                     ;                      7879
062054 005004                   21$:           CLR     R4                      ; ADRS.CNT
062056 152777 000020 133440     22$:           BISB    #20,@ML.REG+120         ;                      7881
062064 005204                                  INC     R4                      ; ADRS.CNT             7883
062066 020427 000177                           CMP     R4,#177                 ; ADRS.CNT,*           7881
062072 003771                                  BLE     22$
062074 005203                                  INC     R3                      ; BLK.CNT
062076 020366 000002            23$:           CMP     R3,2(SP)                ; BLK.CNT,END.CNT      7879
062102 101764                                  BLOS    21$
062104 152777 000040 133332                    BISB    #40,@ML.REG+40          ;                      7884
062112 016704 133714                           MOV     ML.DUT,R4
062116 042704 177770                           BIC     #177770,R4
062122 142777 000007 133314                    BICB    #7,@ML.REG+40
062130 150477 133310                           BISB    R4,@ML.REG+40
062134 152777 000010 133362                    BISB    #10,@ML.REG+120         ;                      7887
062142 004767 136176                           JSR     PC,LAST.BLK.XFER        ;                      7888
062146 012777 000071 133230                    MOV     #71,@ML.REG             ;                      7889
062154 012703 000001                           MOV     #1,R3                   ;                      7890
062160 001411                   24$:           BEQ     27$                     ; *,$STMP2
062162 016704 117730                           MOV     L$DLY,R4
062166 001404                                  BEQ     26$                     ; *,$STMP1
062170 005066 000006            25$:           CLR     6(SP)                   ; $STMP
062174 005304                                  DEC     R4                      ; $STMP1
```

```
17191                                           ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS
17192                                           ;              TEST CODE SECTION                          29-Mar-1982 16:21:03    PA:<
17193
17194 062176  001374                                    BNE     25$
17195 062200  005303                            26$:    DEC     R3                              ; $$TMP2
17196 062202  000766                                    BR      24$
17197 062204  005002                            27$:    CLR     R2                              ; WD.CNT
17198 062206  017767  133422  133126            28$:    MOV     @ML.REG+230,PD.TEMP             ;                         7892
17199 062214  152777  000020  133302                    BISB    #20,@ML.REG+120                 ;                         7894
17200 062222  012703  000001                            MOV     #1,R3                           ;                         7895
17201 062226  001411                            29$:    BEQ     32$                             ; *,$$TMP2                7896
17202 062230  016704  117662                            MOV     L$DLY,R4
17203 062234  001404                                    BEQ     31$                             ; *,$$TMP1
17204 062236  005066  000006                    30$:    CLR     6(SP)                           ; $$TMP
17205 062242  005304                                    DEC     R4                              ; $$TMP1
17206 062244  001374                                    BNE     30$
17207 062246  005303                            31$:    DEC     R3                              ; $$TMP2
17208 062250  000766                                    BR      29$
17209 062252  017767  133316  131114            32$:    MOV     @ML.REG+170,D1.TEMP
17210 062260  017767  133320  131110                    MOV     @ML.REG+200,D2.TEMP
17211 062266  017767  133272  131104                    MOV     @ML.REG+160,E2.TEMP
17212 062274  005004                                    CLR     R4                              ; NIB.PTR                 7899
17213 062276  010403                            33$:    MOV     R4,R3                           ; NIB.PTR,*               7902
17214 062300  006203                                    ASR     R3
17215 062302  006203                                    ASR     R3
17216 062304  006203                                    ASR     R3
17217 062306  062703  015342                            ADD     #PD.TEMP,R3
17218 062312  010346                                    MOV     R3,-(SP)
17219 062314  010446                                    MOV     R4,-(SP)                        ; NIB.PTR,*
17220 062316  042716  177770                            BIC     #177770,(SP)
17221 062322  012746  000001                            MOV     #1,-(SP)
17222 062326  005046                                    CLR     -(SP)
17223 062330  004767  121300                            JSR     PC,BL$GT2
17224 062334  062706  000010                            ADD     #10,SP
17225 062340  005700                                    TST     R0
17226 062342  001011                                    BNE     34$
17227 062344  010446                                    MOV     R4,-(SP)                        ; NIB.PTR,*
17228 062346  010146                                    MOV     R1,-(SP)                        ; BG.PAT,*
17229 062350  012746  000012                            MOV     #12,-(SP)
17230 062354  060616                                    ADD     SP,(SP)                         ; ERR.FLG,*
17231 062356  004767  136014                            JSR     PC,TST.LNG.WRD
17232 062362  062706  000006                            ADD     #6,SP
17233 062366  026627  000004  000001            34$:    CMP     4(SP),#1                        ; ERR.FLG,*               7906
17234 062374  001001                                    BNE     35$
17235 062376  005216                                    INC     (SP)                            ; ERR.CNT
17236 062400  005204                            35$:    INC     R4                              ; NIB.PTR
17237 062402  020427  000011                            CMP     R4,#11                          ; NIB.PTR,*               7899
17238 062406  003733                                    BLE     33$
17239 062410  005202                                    INC     R2                              ; WD.CNT
17240 062412  020227  000177                            CMP     R2,#177                         ; WD.CNT,*                7892
17241 062416  003673                                    BLE     28$
17242 062420  021627  000012                            CMP     (SP),#12                        ; ERR.CNT,*
17243 062424  003422                                    BLE     36$                                                       7912
17244 062426  104455                                    TRAP    55                              ;
17245 062430  000122                                    .WORD   122                                                       7915
```

```
17247                                   ;ML4AD
17248                                   ;               TEST CODE SECTION                            29-Mar-1982 16:23:04   TOPS
17249                                                                                                29-Mar-1982 16:21:03   PA:<
17250 062432  012706                            .WORD   ASYNC
17251 062434  026302                            .WORD   DUMPER
17252 062436  012746  010630                    MOV     #WRD.10,-(SP)
17253 062442  012746  011276                    MOV     #WRD.51,-(SP)                   ;                               7916
17254 062446  012746  011270                    MOV     #WRD.50,-(SP)
17255 062452  012746  010256                    MOV     #THR.FMT,-(SP)
17256 062456  012746  000004                    MOV     #4,-(SP)
17257 062462  010600                            MOV     SP,R0                           ; SP,*
17258 062464  104414                            TRAP    14
17259 062466  062706  000012                    ADD     #12,SP                          ;
17260 062472  005266  000002            36$:    INC     2(SP)                           ; END.CNT                       7914
17261 062476  005101                            COM     R1                              ; BG.PAT                        7919
17262 062500  005205                            INC     R5                              ; TWICE                         7920
17263 062502  020527  000001                    CMP     R5,#1                           ; TWICE,*                       7868
17264 062506  003002                            BGT     37$
17265 062510  000167  177262                    JMP     20$
17266 062514  104467                    37$:    TRAP    67                              ;                               7921
17267 062516  006000                            ROR     R0
17268 062520  103002                            BHIS    38$
17269 062522  000167  176434                    JMP     1$
17270 062526  062706  000010            38$:    ADD     #10,SP                          ;                               7772
17271 062532  000207                            RTS     PC
17272
17273                                   ; Routine Size:  377 words
17274                                   ; Maximum stack depth per invocation:  18 words
17279
17280
17284
17285                                           .SBTTL  T31 TEST CODE SECTION
17289 062534                            T31::
17290 062534  004767  176412            1$:     JSR     PC,$T31                         ;                               7923
17291 062540  104466                            TRAP    66
17292 062542  006000                            ROR     R0
17293 062544  103773                            BLO     1$
17294 062546  000207                            RTS     PC
17295
17296                                   ; Routine Size:  6 words
17297                                   ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                 29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (83)

;           7925  !<BLF/PAGE>
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (84)

;         !
;         !
;         BGNTST;
;
;         !++
;         ! TEST NUMBER:  TST 32
;         !
;         ! TEST NAME:    ARRAY MODULE SELECTION TEST
;         !
;         ! TEST DESCRIPTION:
;         !
;         !       TEST FOR UNIQUE ARRAY MODULE
;         !       SELECTION BY:
;         !
;         !       1.  WRITING THE RESPECTIVE ARRAY
;         !           MODULE POSITION NUMBER INTO
;         !           THE FIRST GOOD NIBBLE FOUND
;         !           IN THE ARRAY.  DO FOR ALL
;         !           PRESENT ARRAYS.
;         !
;         !       2.  READ THE ARRAYS FOR THEIR
;         !           RESPECTIVE POSTION NUMBERS.
;         !
;         ! IMPLICIT INPUTS:
;         !       PD_TEMP:
;         !       A BIT VECTOR OF 16 BITS WHERE
;         !       THE READ PROM DATA IS STORED
;         !       AND ACCESSED FROM.
;         !
;         !       IO_BUF :
;         !       A VECTOR OF 256 WORDS WHERE
;         !       DATA FOR MBUS READS AND WRITE
;         !       FUNCTION ARE FOUND.
;         !
;         !--
;
;         local
;             WRDS_TSTED,                                !WORDS TESTED
;             ARR_SEL,                                   !ARRAY SELECT
;             FND_GD_NIB,                                !FOUND GOOD NIBBLE
;             ARR_NUM;                                   !ARRAY NUMBER
;
;         ARR_SEL = ZEROES;
;         ARR_SEL = .ARR_SEL - .ARR_INC;                 !START ARR_SEL BACK ONE ARRAY
;
;         incr ARR_CNT from 0 to .OP_NUM_ARR do          !TEST ALL PRESENT ARRAYS
;             begin
;             CLR_MBUS;
;             FND_GD_NIB = ZERO;
;             WRDS_TSTED = ZERO;
;             DAT_DM = ONE;                              !SET DATA DIAG MODE
;             MLWC = not 255;                            !LOAD WORD COUNT
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (84)

;                       MLBA = IO_BUF;                          !LOAD IO_BUF
;                       ARR_SEL = .ARR_SEL + .ARR_INC;          !LOOK AT NEXT ARRAY
;                       MLDA = .ARR_SEL;                        !LOAD DSA WITH SELECTED ARRAY AT BLOCK ZERO
;                       MLCS1 = write;                          !DO A WRITE FUNCTION
;
;                       do                                      !THIS LOOP WRITES ARRAY NUMBERS TO THE ARRAYS
;                           begin
;                           DELAY (ONE_US);
;                           PD_TEMP = .MLPD;                    !GET THE PROM DATA
;                           WRDS_TSTED = .WRDS_TSTED + 1;       !COUNT WORDS TESTED
;
;                           incr CNT from 0 to 8 do             !LOOK AT 9 NIBBLES
;
;                               if .PD_TEMP [.CNT] IS_NOT_SET   !FIND A GOOD NIBBLE
;                               then
;                                   begin
;
;                                   case .CNT from 0 to 8 of    !SELECT AND LOAD GOOD NIBBLE WITH ARRAY CNT
;                                       set
;
;                                       [0] :
;                                           (MLD1)<0, 4> = .ARR_CNT;        !NIBBLE 0
;
;                                       [1] :
;                                           (MLD1)<4, 4> = .ARR_CNT;        !NIBBLE 1
;
;                                       [2] :
;                                           (MLD1)<8, 4> = .ARR_CNT;        !NIBBLE 2
;
;                                       [3] :
;                                           (MLD1)<12, 4> = .ARR_CNT;       !NIBBLE 3
;
;                                       [4] :
;                                           (MLD2)<0, 4> = .ARR_CNT;        !NIBBLE 4
;
;                                       [5] :
;                                           (MLD2)<4, 4> = .ARR_CNT;        !NIBBLE 5
;
;                                       [6] :
;                                           (MLD2)<8, 4> = .ARR_CNT;        !NIBBLE 6
;
;                                       [7] :
;                                           (MLD2)<12, 4> = .ARR_CNT;       !NIBBLE 7
;
;                                       [8] :
;                                           (MLE2)<8, 4> = .ARR_CNT;        !NIBBLE 8
;                                       tes;
;
;                                   FND_GD_NIB = ONE;           !SET FOUND GOOD NIBBLE FLG
;                                   exitloop;                   !EXIT THE LOOP
;                                   end;
```

```
;ML4AD
;                    TEST CODE SECTION                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (84)

                    DAT_CLK = ONE;                              !CLOCK GOOD NIBBLE INTO MEMORY & GET NXT PROM WRD
                    end
            until (.FND_GD_NIB IS_SET ) or (.WRDS_TSTED eql 14);        !DO UNTIL FOUND GOOD NIBBLE OR 14 WRDS TSTED

            if .WRDS_TSTED eql 14                               !IF 14 WORDS TSTED
            then
                begin                                           !THEN ERROR AND EXIT TESTED
                ERRDF (142, INTER, DUMPER);
                PRINTB (SEV_FMT, WRD_14, PHR_10, FNC_15, WRD_12, FNC_17, WRD_37, WRD_56);
                EXIT_TST;
                end;

            end;

        ARR_SEL = ZEROES;
        ARR_SEL = .ARR_SEL - .ARR_INC;                          !START ARR SEL BACK ONE AGAIN

        incr ARR_CNT from 0 to .OP_NUM_ARR do                   !TEST ALL PRESENT ARRAYS
            begin
            BGNSUB;
            CLR_MBUS;
            FND_GD_NIB = ZERO;
            DAT_DM = ONE;                                       !SET DATA DIAG MODE
            MLWC = not 255;                                     !LOAD WORD COUNT
            MLBA = IO_BUF;                                      !LOAD UBUS ADDRESS
            ARR_SEL = .ARR_SEL + .ARR_INC;                      !LOOK AT NEXT ARRAY
            MLDA = .ARR_SEL;                                    !LOAD DSA WITH ARRAY SELECT
            MLCS1 = read;                                       !DO A READ FUNCTION

            do                                                  !THIS LOOP READS ARRAYS FOR ARRAY NUMBERS
                begin
                DELAY (ONE_US);
                PD_TEMP = .MLPD;                                !GET THE PROM DATA

                incr CNT from 0 to 8 do                         !LOOK AT 9 NIBBLES

                    if .PD_TEMP [.CNT] IS_NOT_SET               !FIND THE GOOD NIBBLES WHERE ARR NUM IS STORED
                    then
                        begin
                        DAT_CLK = ONE;                          !CLOCK ARRAY WORD OUT

                        case .CNT from 0 to 8 of                !SELECT AND READ GOOD NIBBLE
                            set

                            [0] :
                                ARR_NUM = .(MLD1)<0, 4>;            !NIBBLE 0

                            [1] :
                                ARR_NUM = .(MLD1)<4, 4>;            !NIBBLE 1

                            [2] :
                                ARR_NUM = .(MLD1)<8, 4>;            !NIBBLE 2
```

```
;ML4AD                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (84)

;
;                                  [3] :
;                                      ARR_NUM = .(MLD1)<12, 4>;        !NIBBLE 3
;
;                                  [4] :
;                                      ARR_NUM = .(MLD2)<0, 4>;         !NIBBLE 4
;
;                                  [5] :
;                                      ARR_NUM = .(MLD2)<4, 4>;         !NIBBLE 5
;
;                                  [6] :
;                                      ARR_NUM = .(MLD2)<8, 4>;         !NIBBLE 6
;
;                                  [7] :
;                                      ARR_NUM = .(MLD2)<12, 4>;        !NIBBLE 7
;
;                                  [8] :
;                                      ARR_NUM = .(MLE2)<8, 4>;         !NIBBLE 8
;                                  tes;
;
;                              FND_GD_NIB = ONE;                        !SET FND GD NIB FLG
;                              exitloop;                                !EXIT LOOP
;                              end;
;
;                      DAT_CLK = ONE;                                   !CLOCK OUT NEXT PROM LOCATION
;                      end
;                  until .FND_GD_NIB IS_SET;                            !REPEAT UNTIL FOUND THE GOOD NIBBLE
;
;                  if .ARR_CNT neq .ARR_NUM                             !SEE IF ARRAY CONTAINS IT'S ARR NUM
;                  then
;                      begin                                            !ERROR IF NOT THERE
;                      ERRDF (83, ASYNC, DUMPER);
;                      PRINTB (FOR_FMT, WRD_39, FNC_17, WRD_37, WRD_10);
;                      PRINTB (FMT_14, .ARR_CNT, .ARR_NUM);
;                      end;
;
;                  ENDSUB;
;                  end;
;
;              ENDTST;


                                          .SBTTL  $T32 TEST CODE SECTION
062550  004167  122036            $T32:   JSR     R1,$SAVE5                          ;              7924
062554  162706  000006                    SUB     #6,SP
062560  005005                            CLR     R5                                 ; ARR.SEL      7968
062562  166705  131216                    SUB     ARR.INC,R5                         ; *,ARR.SEL    7969
```

```
                                   ;ML4AD                                        29-Mar-1982 16:23:04   TOPS
                                   ;              TEST CODE SECTION              29-Mar-1982 16:21:03   PA:<
062566  016766  131210  000002           MOV     OP.NUM.ARR,2(SP)       ;                               7971
062574  005003                           CLR     R3                     ; ARR.CNT
062576  000167  000702                   JMP     27$
062602  152777  000040  132634  1$:      BISB    #40,@ML.REG+40         ;                               7972
062610  016702  133216                   MOV     ML.DUT,R2
062614  042702  177770                   BIC     #177770,R2
062620  142777  000007  132616           BICB    #7,@ML.REG+40
062626  150277  132612                   BISB    R2,@ML.REG+40
062632  005016                           CLR     (SP)                   ; FND.GD.NIB                    7974
062634  005004                           CLR     R4                     ; WRDS.TSTED                    7975
062636  152777  000010  132660           BISB    #10,@ML.REG+120        ;                               7976
062644  012777  177400  132542           MOV     #-400,@ML.REG+10       ;                               7977
062652  012777  014022  132544           MOV     #IO.BUF,@ML.REG+20     ;                               7978
062660  066705  131120                   ADD     ARR.INC,R5             ; *,ARR.SEL                     7979
062664  010577  132544                   MOV     R5,@ML.REG+30          ; ARR.SEL,*                     7980
062670  012777  000061  132506           MOV     #61,@ML.REG            ;                               7981
062676  012701  000001           2$:     MOV     #1,R1                  ; *,$$TMP2                      7985
062702  001411                   3$:     BEQ     6$
062704  016702  117206                   MOV     L$DLY,R2               ; *,$$TMP1
062710  001404                           BEQ     5$
062712  005066  000004           4$:     CLR     4(SP)                  ; $$TMP
062716  005302                           DEC     R2                     ; $$TMP1
062720  001374                           BNE     4$
062722  005301                   5$:     DEC     R1                     ; $$TMP2
062724  000766                           BR      3$
062726  017767  132702  132406   6$:     MOV     @ML.REG+230,PD.TEMP    ;                               7986
062734  005204                           INC     R4                     ; WRDS.TSTED                    7987
062736  005002                           CLR     R2                     ; CNT                           7989
062740  010201                   7$:     MOV     R2,R1                  ; CNT,*                         7991
062742  006201                           ASR     R1
062744  006201                           ASR     R1
062746  006201                           ASR     R1
062750  062701  015342                   ADD     #PD.TEMP,R1
062754  010146                           MOV     R1,-(SP)
062756  010246                           MOV     R2,-(SP)               ; CNT,*
062760  042716  177770                   BIC     #177770,(SP)
062764  012746  000001                   MOV     #1,-(SP)
062770  005046                           CLR     -(SP)
062772  004767  120636                   JSR     PC,BL$GT2
062776  062706  000010                   ADD     #10,SP
063002  005700                           TST     R0
063004  001155                           BNE     23$
063006  010201                           MOV     R2,R1                  ; CNT,*                         7995
063010  006301                           ASL     R1
063012  066107  063016                   ADD     8$(R1),PC
063016  000022                   8$:     .WORD   9$-8$
063020  000040                           .WORD   10$-8$
063022  000072                           .WORD   12$-8$
063024  000112                           .WORD   13$-8$
063026  000146                           .WORD   15$-8$
063030  000164                           .WORD   16$-8$
063032  000216                           .WORD   18$-8$
```

```
                                  ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                                  ;              TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<

063034  000236                              .WORD   19$-8$
063036  000272                              .WORD   21$-8$
063040  010301                    9$:       MOV     R3,R1                         ; ARR.CNT,*       7999
063042  042701  177760                      BIC     #177760,R1
063046  142777  000017  132520              BICB    #17,@ML.REG+170
063054  000412                              BR      11$
063056  010301                    10$:      MOV     R3,R1                         ; ARR.CNT,*       8002
063060  006301                              ASL     R1
063062  006301                              ASL     R1
063064  006301                              ASL     R1
063066  006301                              ASL     R1
063070  042701  177417                      BIC     #177417,R1
063074  142777  000360  132472              BICB    #360,@ML.REG+170
063102  150177  132466            11$:      BISB    R1,@ML.REG+170
063106  000511                              BR      22$
                                                                                  ;                 7995
063110  010301                    12$:      MOV     R3,R1                         ; ARR.CNT,*       8005
063112  000301                              SWAB    R1
063114  042701  170377                      BIC     #170377,R1
063120  042777  007400  132446              BIC     #7400,@ML.REG+170
063126  000413                              BR      14$
063130  010301                    13$:      MOV     R3,R1                         ; ARR.CNT,*       8008
063132  000301                              SWAB    R1
063134  006301                              ASL     R1
063136  006301                              ASL     R1
063140  006301                              ASL     R1
063142  006301                              ASL     R1
063144  042701  007777                      BIC     #7777,R1
063150  042777  170000  132416              BIC     #170000,@ML.REG+170
063156  050177  132412            14$:      BIS     R1,@ML.REG+170
063162  000463                              BR      22$
                                                                                  ;                 7995
063164  010301                    15$:      MOV     R3,R1                         ; ARR.CNT,*       8011
063166  042701  177760                      BIC     #177760,R1
063172  142777  000017  132404              BICB    #17,@ML.REG+200
063200  000412                              BR      17$
063202  010301                    16$:      MOV     R3,R1                         ; ARR.CNT,*       8014
063204  006301                              ASL     R1
063206  006301                              ASL     R1
063210  006301                              ASL     R1
063212  006301                              ASL     R1
063214  042701  177417                      BIC     #177417,R1
063220  142777  000360  132356              BICB    #360,@ML.REG+200
063226  150177  132352            17$:      BISB    R1,@ML.REG+200
063232  000437                              BR      22$
                                                                                  ;                 7995
063234  010301                    18$:      MOV     R3,R1                         ; ARR.CNT,*       8017
063236  000301                              SWAB    R1
063240  042701  170377                      BIC     #170377,R1
063244  042777  007400  132332              BIC     #7400,@ML.REG+200
063252  000413                              BR      20$
063254  010301                    19$:      MOV     R3,R1                         ; ARR.CNT,*       8020
063256  000301                              SWAB    R1
063260  006301                              ASL     R1
063262  006301                              ASL     R1
```

```
                                ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                ;                TEST CODE SECTION                          29-Mar-1982 16:21:03   PA:<
063264  006301                          ASL     R1
063266  006301                          ASL     R1
063270  042701  007777                  BIC     #7777,R1
063274  042777  170000  132302          BIC     #170000,@ML.REG+200
063302  050177  132276          20$:    BIS     R1,@ML.REG+200
063306  000411                          BR      22$
063310  010301                  21$:    MOV     R3,R1                   ;                       7995
063312  000301                          SWAB    R1                      ; ARR.CNT,*             8023
063314  042701  170377                  BIC     #170377,R1
063320  042777  007400  132236          BIC     #7400,@ML.REG+160
063326  050177  132232                  BIS     R1,@ML.REG+160
063332  012716  000001          22$:    MOV     #1,(SP)                 ; *,FND.GD.NIB
063336  000406                          BR      24$                     ;                       8026
063340  005202                  23$:    INC     R2                      ;                       8027
063342  020227  000010                  CMP     R2,#10                  ; CNT                   7989
063346  003002                          BGT     24$                     ; CNT,*
063350  000167  177364                  JMP     7$
063354  152777  000020  132142  24$:    BISB    #20,@ML.REG+120
063362  021627  000001                  CMP     (SP),#1                 ;                       8030
063366  001405                          BEQ     25$                     ; FND.GD.NIB,*          8032
063370  020427  000016                  CMP     R4,#16                  ; WRDS.TSTED,*
063374  001402                          BEQ     25$
063376  000167  177274                  JMP     2$
063402  020427  000016          25$:    CMP     R4,#16                  ; WRDS.TSTED,*
063406  001035                          BNE     26$                                             8034
063410  104455                          TRAP    55
063412  000216                          .WORD   216                     ;                       8037
063414  013114                          .WORD   INTER
063416  026302                          .WORD   DUMPER
063420  012746  011344                  MOV     #WRD.56,-(SP)
063424  012746  011122                  MOV     #WRD.37,-(SP)           ;                       8038
063430  012746  012404                  MOV     #FNC.17,-(SP)
063434  012746  010650                  MOV     #WRD.12,-(SP)
063440  012746  012360                  MOV     #FNC.15,-(SP)
063444  012746  012006                  MOV     #PHR.10,-(SP)
063450  012746  010664                  MOV     #WRD.14,-(SP)
063454  012746  010342                  MOV     #SEV.FMT,-(SP)
063460  012746  000010                  MOV     #10,-(SP)
063464  010600                          MOV     SP,R0                   ; SP,*
063466  104414                          TRAP    14
063470  104463                          TRAP    63
063472  062706  000022                  ADD     #22,SP                  ;                       8034
063476  000167  000562                  JMP     56$                     ;                       8036
063502  005203                  26$:    INC     R3                      ; ARR.CNT               7971
063504  020366  000002          27$:    CMP     R3,2(SP)                ; ARR.CNT,*
063510  003002                          BGT     28$
063512  000167  177064                  JMP     1$
063516  005005                  28$:    CLR     R5                      ; ARR.SEL               8044
063520  166705  130260                  SUB     ARR.INC,R5              ; *,ARR.SEL             8045
063524  016766  130252  000002          MOV     OP.NUM.ARR,2(SP)        ;                       8047
063532  005004                          CLR     R4                      ; ARR.CNT
063534  000167  000516                  JMP     55$
```

```
                                   ;ML4AD                                                29-Mar-1982 16:23:04   TOPS
                                   ;               TEST CODE SECTION                     29-Mar-1982 16:21:03   PA:<
063540  104402                     29$:    TRAP    2
063542  152777  000040  131674             BISB    #40,@ML.REG+40            ;                                  8048
063550  016702  132256                     MOV     ML.DUT,R2                 ;                                  8049
063554  042702  177770                     BIC     #177770,R2
063560  142777  000007  131656             BICB    #7,@ML.REG+40
063566  150277  131652                     BISB    R2,@ML.REG+40
063572  005016                             CLR     (SP)
063574  152777  000010  131722             BISB    #10,@ML.REG+120           ; FND.GD.NIB                       8051
063602  012777  177400  131604             MOV     #-400,@ML.REG+10          ;                                  8052
063610  012777  014022  131606             MOV     #IO.BUF,@ML.REG+20        ;                                  8053
063616  066705  130162                     ADD     ARR.INC,R5                ;                                  8054
063622  010577  131606                     MOV     R5,@ML.REG+30             ; *,ARR.SEL                        8055
063626  012777  000071  131550             MOV     #71,@ML.REG               ; ARR.SEL,*                        8056
063634  012701  000001             30$:    MOV     #1,R1                     ;                                  8057
063640  001411                     31$:    BEQ     34$                       ; *,$$TMP2                         8061
063642  016702  116250                     MOV     L$DLY,R2                  ; *,$$TMP1
063646  001404                             BEQ     33$
063650  005066  000004             32$:    CLR     4(SP)                     ; $$TMP
063654  005302                             DEC     R2                        ; $$TMP1
063656  001374                             BNE     32$
063660  005301                     33$:    DEC     R1                        ; $$TMP2
063662  000766                             BR      31$
063664  017767  131744  131450     34$:    MOV     @ML.REG+230,PD.TEMP       ;                                  8062
063672  005002                             CLR     R2                        ; CNT                              8064
063674  010201                     35$:    MOV     R2,R1                     ; CNT,*                            8066
063676  006201                             ASR     R1
063700  006201                             ASR     R1
063702  006201                             ASR     R1
063704  062701  015342                     ADD     #PD.TEMP,R1
063710  010146                             MOV     R1,-(SP)
063712  010246                             MOV     R2,-(SP)                  ; CNT,*
063714  042716  177770                     BIC     #177770,(SP)
063720  012746  000001                     MOV     #1,-(SP)
063724  005046                             CLR     -(SP)
063726  004767  117702                     JSR     PC,BL$GT2
063732  062706  000010                     ADD     #10,SP
063736  005700                             TST     R0
063740  001070                             BNE     50$
063742  152777  000020  131554             BISB    #20,@ML.REG+120           ;                                  8069
063750  010201                             MOV     R2,R1                     ; CNT,*                            8071
063752  006301                             ASL     R1
063754  066107  063760                     ADD     36$(R1),PC
063760  000022                     36$:    .WORD   37$-36$
063762  000030                             .WORD   38$-36$
063764  000036                             .WORD   39$-36$
063766  000044                             .WORD   40$-36$
063770  000052                             .WORD   41$-36$
063772  000060                             .WORD   42$-36$
063774  000076                             .WORD   44$-36$
063776  000104                             .WORD   45$-36$
064000  000122                             .WORD   47$-36$
064002  117703  131566             37$:    MOVB    @ML.REG+170,R3            ; *,ARR.NUM                        8075
```

```
                                ;ML4AD                                                   29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
064006  000440                          BR      49$
064010  117703  131560          38$:    MOVB    @ML.REG+170,R3          ; *,ARR.NUM                    8078
064014  000413                          BR      43$
064016  017703  131552          39$:    MOV     @ML.REG+170,R3          ; *,ARR.NUM                    8081
064022  000431                          BR      48$
064024  017703  131544          40$:    MOV     @ML.REG+170,R3          ; *,ARR.NUM                    8084
064030  000417                          BR      46$
064032  117703  131546          41$:    MOVB    @ML.REG+200,R3          ; *,ARR.NUM                    8087
064036  000424                          BR      49$
064040  117703  131540          42$:    MOVB    @ML.REG+200,R3          ; *,ARR.NUM                    8090
064044  006203                  43$:    ASR     R3                      ; ARR.NUM
064046  006203                          ASR     R3                      ; ARR.NUM
064050  006203                          ASR     R3                      ; ARR.NUM
064052  006203                          ASR     R3                      ; ARR.NUM
064054  000415                          BR      49$
064056  017703  131522          44$:    MOV     @ML.REG+200,R3          ; *,ARR.NUM                    8093
064062  000411                          BR      48$
064064  017703  131514          45$:    MOV     @ML.REG+200,R3          ; *,ARR.NUM                    8096
064070  006203                  46$:    ASR     R3                      ; ARR.NUM
064072  006203                          ASR     R3                      ; ARR.NUM
064074  006203                          ASR     R3                      ; ARR.NUM
064076  006203                          ASR     R3                      ; ARR.NUM
064100  000402                          BR      48$
064102  017703  131456          47$:    MOV     @ML.REG+160,R3          ; *,ARR.NUM                    8099
064106  000303                  48$:    SWAB    R3                      ; ARR.NUM
064110  042703  177760          49$:    BIC     #177760,R3              ; *,ARR.NUM
064114  012716  000001                  MOV     #1,(SP)                 ; *,FND.GD.NIB                 8102
064120  000404                          BR      51$                                                    8103
064122  005202                  50$:    INC     R2                      ; CNT                          8064
064124  020227  000010                  CMP     R2,#10                  ; CNT,*
064130  003661                          BLE     35$
064132  152777  000020  131364  51$:    BISB    #20,@ML.REG+120         ;                              8106
064140  021627  000001                  CMP     (SP),#1                 ; FND.GD.NIB,*                 8108
064144  001233                          BNE     30$
064146  020403                          CMP     R4,R3                   ; ARR.CNT,ARR.NUM              8110
064150  001434                          BEQ     52$
064152  104455                          TRAP    55                      ;                              8113
064154  000123                          .WORD   123
064156  012706                          .WORD   ASYNC
064160  026302                          .WORD   DUMPER
064162  012746  010630                  MOV     #WRD.10,-(SP)           ;                              8114
064166  012746  011122                  MOV     #WRD.37,-(SP)
064172  012746  012404                  MOV     #FNC.17,-(SP)
064176  012746  011140                  MOV     #WRD.39,-(SP)
064202  012746  010270                  MOV     #FOR.FMT,-(SP)
064206  012746  000005                  MOV     #5,-(SP)
064212  010600                          MOV     SP,R0                   ; SP,*
064214  104414                          TRAP    14
064216  010316                          MOV     R3,(SP)                 ; ARR.NUM,*                    8115
064220  010446                          MOV     R4,-(SP)                ; ARR.CNT,*
064222  012746  007330                  MOV     #FMT.14,-(SP)
064226  012746  000003                  MOV     #3,-(SP)
```

```
17812                                  ;ML4AD
17813                                  ;               TEST CODE SECTION               29-Mar-1982 16:23:04  TOPS
17814                                                                                  29-Mar-1982 16:21:03  PA:<
17815 064232  010600                          MOV     SP,R0                   ; SP,*
17816 064234  104414                          TRAP    14
17817 064236  062706  000022                  ADD     #22,SP                  ;
17818 064242  104467                  52$:    TRAP    67                      ;                              8112
17819 064244  006000                          ROR     R0                                                     8116
17820 064246  103002                          BHIS    54$
17821 064250  000167  177264          53$:    JMP     29$
17822 064254  005204                  54$:    INC     R4                      ; ARR.CNT
17823 064256  020466  000002          55$:    CMP     R4,2(SP)                ; ARR.CNT,*                    8047
17824 064262  003772                          BLE     53$
17825 064264  062706  000006          56$:    ADD     #6,SP                   ;
17826 064270  000207                          RTS     PC                                                     7924
17827
17828                                  ; Routine Size:  425 words
17829                                  ; Maximum stack depth per invocation:  18 words
17834
17835
17839
17840                                          .SBTTL  T32 TEST CODE SECTION
17844 064272                          T32::
17845 064272  004767  176252          1$:     JSR     PC,$T32                 ;                              8119
17846 064276  104466                          TRAP    66
17847 064300  006000                          ROR     R0
17848 064302  103773                          BLO     1$
17849 064304  000207                          RTS     PC
17850
17851                                  ; Routine Size:  6 words
17852                                  ; Maximum stack depth per invocation:  0 words
17857
17858
17859 ;          8122  !<BLF/PAGE>
```

```
;ML4AD
;                  TEST CODE SECTION                          29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
                                                              29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (85)
;        !
;        BGNTST;
;
;        !++
;        ! TEST NUMBER:  TST 33
;        !
;        ! TEST NAME:    SEQUENCER EXISTENCE TEST
;        !
;        ! TEST DESCRIPTION:
;        !
;        !       TEST SEQUENCER TIMING AND CONTROL
;        !       LOGIC FOR EXISTENCE BY:
;        !
;        !       1.  FIRST WRITING THE GOOD BLOCK VIA DAT_DM MODE WITH A BACKGROUND
;        !           PATTERN OF ONES.
;        !
;        !
;        !       2.  VIA A MBUS WRITE FUNCTION WRITE ONES INTO THE GOOD BLOCK.
;        !
;        !       3.  THEN VIA DAT_DM READ GOOD NIBBLES IN THE GOOD BLOCK AND XOR THEM
;        !           AGAINST THE BACKGROUND PATTERN.
;        !
;        !           RECORD THE NUMBER OF NIBBLES THAT WERE UNCHANGED OR PARTIALLY CHANGED
;        !           BY THE MBUS WIRTE.
;        !
;        !       4.  REPORT A FATAL ERROR AND DROP THIS UNIT IF THE NIBBLES TESTED EQUALS
;        !           THE COUNT OF UNCHANGED NIBBLES.
;        !
;        !           REPORT AN INTERMEDIATE DIAGNOSTIC MESSAGE IF AT LEAST SOME NIBBLES
;        !           WERE CHANGED BY THE MBUS WRITE.
;        !
;        ! IMPLICIT INPUTS:
;        !       PD_TEMP:
;        !       A BIT VECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND ACCESSED FROM.
;        !
;        !       IO_BUF:
;        !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTIONS
;        !       ARE FOUND.
;        !--
;
;        local
;            BG_PAT,                                          !BACK GROUND PATTERN
;            SUM_BAD,                                         !SUM NIBBLE ARE BAD
;            NIB_TSTED,                                       !NIBBLES TESTED
;            ALL_BAD,                                         !ALL NIBBLES ARE BAD
;            RESULT;                                          !RESULTS OF XOR
;
;        CLR_MBUS;
;        BG_PAT = ONES;                                       !BACKGROUND EQL ONES
;        MLD1 = .BG_PAT;                                      !LOAD DATA DIAG REG WITH BG PAT
;        MLD2 = .BG_PAT;
;        MLE2 = .BG_PAT;
```

```
;ML4AD
;               TEST CODE SECTION                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                                                                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (85)
;
;       DAT_DM_XFER ();                                 !SET UP A  DATA DIAG XFERR AT THE GOOD BLOCK
;       MLCS1 = write;                                  !DO A WRITE FUNCTION
;
;       incr WD_CNT from 0 to 127 do                    !WRITE BLOCK WITH BG PAT
;           begin
;           DELAY (ONE_US);
;           DAT_CLK = ONE;
;           end;
;
;       CLR_MBUS;
;       IO_BUF = ZEROES;                                !LOAD FIRST WORD OF IO_BUF
;       BAI = ONE;                                      !MAKE XFERR SET ON ONE ADRS
;       GD_BLK_XFER ();                                 !SET UP A GOOD BLOCK XFERR
;       MLCS1 = write;                                  !DO A WRITE FUNCTION
;       TIME_OUT_LOOP;
;       BGNSUB;
;       CLR_MBUS;
;       ALL_BAD = ZEROES;
;       SUM_BAD = ZEROES;
;       NIB_TSTED = ZEROES;
;       DAT_DM_XFER ();                                 !SET UP SAME DATA DIAG XFERR
;       MLCS1 = read;                                   !DO A READ FUNCTION
;       DELAY (ONE_US);
;
;       incr WD_CNT from 0 to 112 do                    !READ 113 LONG WORDS
;           begin
;           PD_TEMP = .MLPD;                            !GET PROM DATA
;           DAT_CLK = ONE;                              !CLOCK OUT THE DATA WORD
;           DELAY (ONE_US);
;           RD_LNG_WRD;                                 !READ THE DATA WORD
;
;           incr NIB_PTR from 0 to 8 do                 !LOOK AT 9 NIBBLES
;
;               if .PD_TEMP [.NIB_PTR] eql ZERO         !FIND GOOD NIBBLE
;               then
;                   begin
;                   NIB_TSTED = .NIB_TSTED + 1;         !INCREMENT COUNT OF NIBBLES TESTED
;                   XOR_LNG_WRD (.NIB_PTR, .BG_PAT, RESULT);    !XOR NIBBLE WITH BG PAT
;
;                   if .RESULT<0, 4> eql ZERO           !SEE IF ALL BITS IN NIBBLE WERE BAD?
;                   then
;                       ALL_BAD = .ALL_BAD + 1          !INCREMENT COUNT IF ALL BAD
;                   else
;
;                       if .RESULT<0, 4> neq %o'17' then SUM_BAD = .SUM_BAD + 1;
;
;                                                       !SEE IF SOME BITS IN NIBBLE WERE BAD
;                   end;                                !INCREMENT COUNT IF SOME BAD
;
;           end;
;
;       ENDSUB;
```

```
;ML4AD
;                 TEST CODE SECTION                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (85)
;           8227
;           8228  if .NIB_TSTED eql .ALL_BAD                     !WHERE ALL NIBBLES XFERR'ED ALL BAD?
;           8229  then                                           !ERROR IF ALL BAD
;           8230      begin
;           8231      ERRDF (84, SYNC, DUMPER);
;           8232      PRINTB (SEV_FMT, WRD_22, PHR_4, WRD_9, WRD_12, WRD_23, FNC_5, WRD_19);
;           8233      DODU (.ML_LDN);
;           8234      DOCLN;
;           8235      end
;           8236  else
;           8237
;           8238      if .SUM_BAD gtr ZERO                       !SEE IF SEE NIBBLE WERE BAD?
;           8239      then
;           8240          begin                                  !SOME BAD IS OK SO GIVE INTERMEDIATE ERROR
;           8241          ERRDF (85, INTER, DUMPER);
;           8242          PRINTB (SIX_FMT, PHR_4, WRD_9, WRD_12, WRD_23, FNC_5, WRD_19);
;           8243          end;
;           8244
;           8245  ENDTST;


                                          .SBTTL  $T33 TEST CODE SECTION
064306  004167  120300           $T33:    JSR     R1,$SAVE5                            8121
064312  162706  000010                    SUB     #10,SP                  ;
064316  152777  000040  131120            BISB    #40,@ML.REG+40          ;            8168
064324  016705  131502                    MOV     ML.DUT,R5
064330  042705  177770                    BIC     #177770,R5
064334  142777  000007  131102            BICB    #7,@ML.REG+40
064342  150577  131076                    BISB    R5,@ML.REG+40
064346  012766  177777  000002            MOV     #-1,2(SP)               ; *,BG.PAT   8171
064354  012777  177777  131212            MOV     #-1,@ML.REG+170         ;            8172
064362  016677  000002  131214            MOV     2(SP),@ML.REG+200       ; BG.PAT,*   8173
064370  016677  000002  131166            MOV     2(SP),@ML.REG+160       ; BG.PAT,*   8174
064376  004767  132010                    JSR     PC,DAT.DM.XFER          ;            8175
064402  012777  000061  130774            MOV     #61,@ML.REG             ;            8176
064410  005000                            CLR     R0                      ; WD.CNT     8178
064412  012701  000001           1$:      MOV     #1,R1                   ; *,$$TMP2   8180
064416  001411                   2$:      BEQ     5$
064420  016702  115472                    MOV     L$DLY,R2                ; *,$$TMP1
064424  001404                            BEQ     4$
064426  005066  000006           3$:      CLR     6(SP)                   ; $$TMP
064432  005302                            DEC     R2                      ; $$TMP1
064434  001374                            BNE     3$
064436  005301                   4$:      DEC     R1                      ; $$TMP2
064440  000766                            BR      2$
064442  152777  000020  131054   5$:      BISB    #20,@ML.REG+120         ;            8181
064450  005200                            INC     R0                      ; WD.CNT     8178
```

```
                                 ;ML4AD                                                   29-Mar-1982 16:23:04   TOPS
                                 ;               TEST CODE SECTION                        29-Mar-1982 16:21:03   PA:<
064452  020027  000177                   CMP     R0,#177                   ; WD.CNT,*
064456  003755                           BLE     1$
064460  152777  000040  130756           BISB    #40,@ML.REG+40            ;                            8182
064466  016705  131340                   MOV     ML.DUT,R5
064472  042705  177770                   BIC     #177770,R5
064476  142777  000007  130740           BICB    #7,@ML.REG+40
064504  150577  130734                   BISB    R5,@ML.REG+40
064510  005067  127306                   CLR     IO.BUF
064514  152777  000010  130722           BISB    #10,@ML.REG+40            ;                            8185
064522  004767  133564                   JSR     PC,GD.BLK.XFER            ;                            8186
064526  012777  000061  130650           MOV     #61,@ML.REG               ;                            8187
064534  105777  130714           6$:     TSTB    @ML.REG+50                ;                            8188
064540  100375                           BPL     6$
064542  104402                   7$:     TRAP    2
064544  152777  000040  130672           BISB    #40,@ML.REG+40            ;                            8189
064552  016703  131254                   MOV     ML.DUT,R3                 ;                            8190
064556  042703  177770                   BIC     #177770,R3
064562  142777  000007  130654           BICB    #7,@ML.REG+40
064570  150377  130650                   BISB    R3,@ML.REG+40
064574  005004                           CLR     R4                        ; ALL.BAD                    8192
064576  005016                           CLR     (SP)                      ; SUM.BAD                    8193
064600  005005                           CLR     R5                        ; NIB.TSTED                  8194
064602  004767  131604                   JSR     PC,DAT.DM.XFER            ;                            8195
064606  012777  000071  130570           MOV     #71,@ML.REG               ;                            8196
064614  012701  000001                   MOV     #1,R1                     ; *,$$TMP2                   8197
064620  001411                   8$:     BEQ     11$
064622  016702  115270                   MOV     L$DLY,R2                  ; *,$$TMP1
064626  001404                           BEQ     10$
064630  005066  000006           9$:     CLR     6(SP)                     ; $$TMP
064634  005302                           DEC     R2                        ; $$TMP1
064636  001374                           BNE     9$
064640  005301                   10$:    DEC     R1                        ; $$TMP2
064642  000766                           BR      8$
064644  005003                   11$:    CLR     R3                        ; WD.CNT
064646  017767  130762  130466   12$:    MOV     @ML.REG+230,PD.TEMP       ;                            8199
064654  152777  000020  130642           BISB    #20,@ML.REG+120           ;                            8201
064662  012701  000001                   MOV     #1,R1                     ;                            8202
064666  001411                   13$:    BEQ     16$                       ; *,$$TMP2                   8203
064670  016702  115222                   MOV     L$DLY,R2                  ; *,$$TMP1
064674  001404                           BEQ     15$
064676  005066  000006           14$:    CLR     6(SP)                     ; $$TMP
064702  005302                           DEC     R2                        ; $$TMP1
064704  001374                           BNE     14$
064706  005301                   15$:    DEC     R1                        ; $$TMP2
064710  000766                           BR      13$
064712  017767  130656  126454   16$:    MOV     @ML.REG+170,D1.TEMP
064720  017767  130660  126450           MOV     @ML.REG+200,D2.TEMP
064726  017767  130632  126444           MOV     @ML.REG+160,E2.TEMP
064734  005001                           CLR     R1                        ; NIB.PTR                    8206
064736  010102                   17$:    MOV     R1,R2                     ; NIB.PTR,*                  8208
064740  006202                           ASR     R2
064742  006202                           ASR     R2
```

```
                                     ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                     ;                TEST CODE SECTION              29-Mar-1982 16:21:03   PA:<
064744  006202                               ASR     R2
064746  062702  015342                       ADD     #PD.TEMP,R2
064752  010246                               MOV     R2,-(SP)
064754  010146                               MOV     R1,-(SP)                 ; NIB.PTR,*
064756  042716  177770                       BIC     #177770,(SP)
064762  012746  000001                       MOV     #1,-(SP)
064766  005046                               CLR     -(SP)
064770  004767  116640                       JSR     PC,BL$GT2
064774  062706  000010                       ADD     #10,SP
065000  005700                               TST     R0
065002  001027                               BNE     20$
065004  005205                               INC     R5
065006  010146                               MOV     R1,-(SP)                 ; NIB.TSTED                    8211
065010  016646  000004                       MOV     4(SP),-(SP)              ; NIB.PTR,*                    8212
065014  012746  000012                       MOV     #12,-(SP)                ; BG.PAT,*
065020  060616                               ADD     SP,(SP)
065022  004767  134044                       JSR     PC,XOR.LNG.WRD           ; RESULT,*
065026  016602  000012                       MOV     12(SP),R2
065032  042702  177760                       BIC     #177760,R2               ; RESULT,*                     8214
065036  001002                               BNE     18$
065040  005204                               INC     R4
065042  000405                               BR      19$                      ; ALL.BAD                      8216
065044  020227  000017            18$:       CMP     R2,#17                   ;                              8214
065050  001402                               BEQ     19$                      ;                              8219
065052  005266  000006                       INC     6(SP)
065056  062706  000006            19$:       ADD     #6,SP                    ; SUM.BAD
065062  005201                    20$:       INC     R1                       ;                              8210
065064  020127  000010                       CMP     R1,#10                   ; NIB.PTR                      8206
065070  003722                               BLE     17$                      ; NIB.PTR,*
065072  005203                               INC     R3
065074  020327  000160                       CMP     R3,#160                  ; WD.CNT                       8199
065100  003662                               BLE     12$                      ; WD.CNT,*
065102  104467                               TRAP    67
065104  006000                               ROR     R0                       ;                              8224
065106  103615                               BLO     7$
065110  020504                               CMP     R5,R4
065112  001037                               BNE     21$                      ; NIB.TSTED,ALL.BAD            8228
065114  104455                               TRAP    55
065116  000124                               .WORD   124                      ;                              8231
065120  012750                               .WORD   SYNC
065122  026302                               .WORD   DUMPER
065124  012746  010730                       MOV     #WRD.19,-(SP)
065130  012746  012216                       MOV     #FNC.5,-(SP)             ;                              8232
065134  012746  010766                       MOV     #WRD.23,-(SP)
065140  012746  010650                       MOV     #WRD.12,-(SP)
065144  012746  010616                       MOV     #WRD.9,-(SP)
065150  012746  011676                       MOV     #PHR.4,-(SP)
065154  012746  010752                       MOV     #WRD.22,-(SP)
065160  012746  010342                       MOV     #SEV.FMT,-(SP)
065164  012746  000010                       MOV     #10,-(SP)
065170  010600                               MOV     SP,R0                    ; SP,*
065172  104414                               TRAP    14
```

```
                                 ;ML4AD                                                   29-Mar-1982 16:23:04   TOPS
                                 ;              TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
065174  016700  130630                 MOV     ML.LUN,R0
065200  104451                         TRAP    51                    ;                                          8233
065202  104444                         TRAP    44
065204  062706  000022                 ADD     #22,SP
065210  000432                         BR      22$                   ;                                          8230
065212  005716                   21$:  TST     (SP)                  ;                                          8228
065214  003430                         BLE     22$                   ; SUM.BAD                                  8238
065216  104455                         TRAP    55
065220  000125                         .WORD   125                   ;                                          8241
065222  013114                         .WORD   INTER
065224  026302                         .WORD   DUMPER
065226  012746  010730                 MOV     #WRD.19,-(SP)
065232  012746  012216                 MOV     #FNC.5,-(SP)          ;                                          8242
065236  012746  010766                 MOV     #WRD.23,-(SP)
065242  012746  010650                 MOV     #WRD.12,-(SP)
065246  012746  010616                 MOV     #WRD.9,-(SP)
065252  012746  011676                 MOV     #PHR.4,-(SP)
065256  012746  010322                 MOV     #SIX.FMT,-(SP)
065262  012746  000007                 MOV     #7,-(SP)
065266  010600                         MOV     SP,R0                 ; SP,*
065270  104414                         TRAP    14
065272  062706  000020                 ADD     #20,SP
065276  062706  000010           22$:  ADD     #10,SP                ;                                          8240
065302  000207                         RTS     PC                    ;                                          8121

                                 ; Routine Size:  255 words
                                 ; Maximum stack depth per invocation:  19 words



                                       .SBTTL  T33 TEST CODE SECTION
065304                           T33::
065304  004767  176776           1$:   JSR     PC,$T33               ;                                          8243
065310  104466                         TRAP    66
065312  006000                         ROR     R0
065314  103773                         BLO     1$
065316  000207                         RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words
```

```


;		8246	!<BLF/PAGE>
```

```
;ML4AD
;                              TEST CODE SECTION                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (86)
;       !
;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 34
;       !
;       ! TEST NAME:    SYNC DATA BUS CONTINUITY TEST (WRITE PATH)
;       !
;       ! TEST DESCRIPTION:
;       !
;       !       TEST THE CONTINUITY OF THE
;       !       SYNCHRONOUS MODULE WRITE PATH
;       !       DATA BUS BY:
;       !
;       !       1.  VIA DAT_DM MODE WRITE A
;       !           BACKGROUND PATTERN OF ONES
;       !           INTO THE GOOD BLOCK.
;       !
;       !       2.  VIA MBUS WRITE FUNCTION
;       !           WRITE A ZEROES PATTERN INTO
;       !           THE GOOD BLOCK.
;       !
;       !       3.  VIA DAT_DM MODE READ GOOD
;       !           NIBBLES IN THE GOOD BLOCK FOR
;       !           ZEROES.
;       !
;       !       4.  REPEAT WITH COMPLIMENT
;       !           DATA AND BACKGROUND PATTERNS.
;       !
;       ! IMPLICIT INPUTS:
;       !
;       !       PD_TEMP
;       !
;       !       A BIT VECTOR OF 16 BITS WHERE
;       !       THE READ PROM DATA IS STORED
;       !       AND ACCESSED FROM.
;       !
;       !       IO_BUF
;       !
;       !       A VECTOR OF 256 WORDS WHERE
;       !       DATA FOR MBUS READS AND WRITE
;       !       FUNCTION ARE FOUND.
;       !
;       !
;       !--
;
;       local
;           DODU_FLG,                                  !DROP UNIT FLAG
;           BG_PAT,                                    !BACKGROUND PATTERN
;           RESULT,                                    !RESULTS FROM XOR
;           TST_PAT;                                   !TEST PATTERN
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
            TEST CODE SECTION                                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (86)

CLR_THRESHOLD;                                          !CLEAR ERROR PRINT THRESHOLD
DODO_FLG = ZERO;
BG_PAT = ZEROES;                                        !BG PAT EQL 0'S
TST_PAT = ONES;                                         !TST PAT EQL 1'S

incr TWICE from 0 to 1 do                               !REPEAT LOOP TWICE
    begin
    BGNSUB;
    CLR_MBUS;
    MLDT = .BG_PAT;                                     !LOAD DATA DIAG REG WITH BG PAT
    MLD2 = .BG_PAT;
    MLE2 = .BG_PAT;
    DAT_DM_XFER ();                                     !SET UP A DATA DIAG XFERR AT THE GOOD BLK
    MLCS1 = write;                                      !DO A WRITE FUNCTION

    incr WD_CNT from 0 to 127 do                        !LOAD BLOCK WITH BG PAT
        begin
        DELAY (ONE_US);
        DAT_CLK = ONE;
        end;

    CLR_MBUS;
    BAI = ONE;                                          !SET ON FIRST IO BUF ADRS
    IO_BUF = .TST_PAT;                                  !FIRST IO_BUF WORD EQL'S TST_PAT
    GD_BLK_XFER ();                                     !SET UP A GOOD BLOCK XFERR
    MLCS1 = write;                                      !DO A WRITE FUNCTION
    TIME_OUT_LOOP;
    CLR_MBUS;
    DAT_DM_XFER ();                                     !SET UP A DATA DIAG XFERR AT SAME BLOCK
    MLCS1 = read;                                       !DO A READ FUNCTION
    DELAY (ONE_US);

    incr WD_CNT from 0 to 112 do                        !READ 113 LONG WORDS
        begin
        PD_TEMP = .MLPD;                                !GET THE PROM DATA
        DAT_CLK = ONE;                                  !CLOCK OUT THE DATA WORD
        DELAY (ONE_US);
        RD_LNG_WRD;                                     !READ THE DATA WORD

        incr NIB_PTR from 0 to 8 do                     !LOOK AT 9 NIBBLES

            if .PD_TEMP [.NIB_PTR] IS_NOT_SET           !FIND GOOD NIBBLES
            then
                begin
                XOR_LNG_WRD (.NIB_PTR, .TST_PAT, RESULT);       !XOR NIBBLE DATA WITH TST_PAT

                if .RESULT<0, 4> neq ZERO               !SEE IF EQUAL
                then
                    begin                               !ERROR IF NEQ
                    CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
                    ERRDF (86, SYNC, DUMPER);
```

```
18318 ;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
18319 ;                    TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (86)
18320
18321 ;          8351                    PRINTB (FIV_FMT, WRD_24, WRD_25, WRD_10, WRD_12, FNC_5);
18322 ;          8352                    PRINTB (FMT_5, .TST_PAT, .RESULT, .NIB_PTR);
18323 ;          8353                    DODU_FLG = ONE;
18324 ;          8354                    end
18325 ;          8355
18326 ;          8356                end
18327 ;          8357
18328 ;          8358        end;
18329 ;          8359
18330 ;          8360    ENDSUB;
18331 ;          8361
18332 ;          8362    if .DODU_FLG IS_SET                            !DROP THIS UNIT IF DODU IS_SET
18333 ;          8363                                                   !AND EXITS TEST
18334 ;          8364    then
18335 ;          8365        begin
18336 ;          8366        DODU (.ML_LUN);
18337 ;          8367        DOCLN;
18338 ;          8368        end;
18339 ;          8369
18340 ;          8370    BG_PAT = not .BG_PAT;                          !COMPLIMENT BG_PAT
18341 ;          8371    TST_PAT = not .TST_PAT;                        !COMPLIMENT TST_PAT AND REPEAT
18342 ;          8372    end;
18343 ;          8373
18344 ;          8374 ENDTST;
18348
18349
                                            .SBTTL  $T34 TEST CODE SECTION
18353 065320  004167  117266        $T34:   JSR     R1,$SAVE5                       ;                       8245
18354 065324  024646                        CMP     -(SP),-(SP)
18355 065326  005067  130044                CLR     P.CNT                           ;                       8298
18356 065332  005046                        CLR     -(SP)                           ; DODU.FLG              8301
18357 065334  005001                        CLR     R1                              ; BG.PAT                8302
18358 065336  012702  177777                MOV     #-1,R2                          ; *,TST.PAT             8303
18359 065342  005046                        CLR     -(SP)                           ; TWICE                 8305
18360 065344  104402                1$:     TRAP    2                               ;                       8306
18361 065346  152777  000040  130070        BISB    #40,@ML.REG+40                  ;                       8307
18362 065354  016705  130452                MOV     ML.DUT,R5
18363 065360  042705  177770                BIC     #177770,R5
18364 065364  142777  000007  130052        BICB    #7,@ML.REG+40
18365 065372  150577  130046                BISB    R5,@ML.REG+40
18366 065376  010177  130172                MOV     R1,@ML.REG+170                  ; BG.PAT,*              8309
18367 065402  010177  130176                MOV     R1,@ML.REG+200                  ; BG.PAT,*              8310
18368 065406  010177  130152                MOV     R1,@ML.REG+160                  ; BG.PAT,*              8311
18369 065412  004767  130774                JSR     PC,DAT.DM.XFER                  ;                       8312
18370 065416  012777  000061  127760        MOV     #61,@ML.REG                     ;                       8313
18371 065424  005003                        CLR     R3                              ; WD.CNT                8315
18372 065426  012704  000001        2$:     MOV     #1,R4                           ; *,$$TMP2              8317
```

```
                                        ;ML4AD
                                        ;               TEST CODE SECTION                       29-Mar-1982 16:23:04   TOPS
                                                                                                29-Mar-1982 16:21:03   PA:<
065432  001411                          3$:     BEQ     6$
065434  016705  114456                          MOV     L$DLY,R5                        ; *,$$TMP1
065440  001404                                  BEQ     5$
065442  005066  000006                  4$:     CLR     6(SP)                           ; $$TMP
065446  005305                                  DEC     R5                              ; $$TMP1
065450  001374                                  BNE     4$
065452  005304                          5$:     DEC     R4                              ; $$TMP2
065454  000766                                  BR      3$
065456  152777  000020  130040          6$:     BISB    #20,@ML.REG+120                 ;
065464  005203                                  INC     R3                              ; WD.CNT                8318
065466  020327  000177                          CMP     R3,#177                         ; WD.CNT,*              8315
065472  003755                                  BLE     2$
065474  152777  000040  127742                  BISB    #40,@ML.REG+40                  ;                       8319
065502  016705  130324                          MOV     ML.DUT,R5
065506  042705  177770                          BIC     #177770,R5
065512  142777  000007  127724                  BICB    #7,@ML.REG+40
065520  150577  127720                          BISB    R5,@ML.REG+40
065524  152777  000010  127712                  BISB    #10,@ML.REG+40                  ;                       8322
065532  010267  126264                          MOV     R2,IO.BUF                       ; TST.PAT,*             8323
065536  004767  132550                          JSR     PC,GD.BLK.XFER                  ;                       8324
065542  012777  000061  127634                  MOV     #61,@ML.REG                     ;                       8325
065550  105777  127700                  7$:     TSTB    @ML.REG+50
065554  100375                                  BPL     7$
065556  152777  000040  127660                  BISB    #40,@ML.REG+40                  ;                       8326
065564  016705  130242                          MOV     ML.DUT,R5
065570  042705  177770                          BIC     #177770,R5
065574  142777  000007  127642                  BICB    #7,@ML.REG+40
065602  150577  127636                          BISB    R5,@ML.REG+40
065606  004767  130600                          JSR     PC,DAT.DM.XFER                  ;                       8328
065612  012777  000071  127564                  MOV     #71,@ML.REG                     ;                       8329
065620  012704  000001                          MOV     #1,R4                           ; *,$$TMP2              8330
065624  001411                          8$:     BEQ     11$
065626  016705  114264                          MOV     L$DLY,R5                        ; *,$$TMP1
065632  001404                                  BEQ     10$
065634  005066  000006                  9$:     CLR     6(SP)                           ; $$TMP
065640  005305                                  DEC     R5                              ; $$TMP1
065642  001374                                  BNE     9$
065644  005304                          10$:    DEC     R4                              ; $$TMP2
065646  000766                                  BR      8$
065650  005003                          11$:    CLR     R3                              ; WD.CNT
065652  017767  127756  127462          12$:    MOV     @ML.REG+230,PD.TEMP             ;                       8332
065660  152777  000020  127636                  BISB    #20,@ML.REG+120                 ;                       8334
065666  012704  000001                          MOV     #1,R4                           ;                       8335
065672  001411                          13$:    BEQ     16$                             ; *,$$TMP2              8336
065674  016705  114216                          MOV     L$DLY,R5                        ; *,$$TMP1
065700  001404                                  BEQ     15$
065702  005066  000006                  14$:    CLR     6(SP)                           ; $$TMP
065706  005305                                  DEC     R5                              ; $$TMP1
065710  001374                                  BNE     14$
065712  005304                          15$:    DEC     R4                              ; $$TMP2
065714  000766                                  BR      13$
065716  017767  127652  125450          16$:    MOV     @ML.REG+170,D1.TEMP
```

```
                                   ;ML4AD                                                              29-Mar-1982 16:23:04   TOPS
                                   ;               TEST CODE SECTION                                   29-Mar-1982 16:21:03   PA:<

065724  017767  127654  125444             MOV     @ML.REG+200,D2.TEMP
065732  017767  127626  125440             MOV     @ML.REG+160,E2.TEMP
065740  005004                             CLR     R4                          ; NIB.PTR           8339
065742  010405                     17$:    MOV     R4,R5                       ; NIB.PTR,*         8341
065744  006205                             ASR     R5
065746  006205                             ASR     R5
065750  006205                             ASR     R5
065752  062705  015342                     ADD     #PD.TEMP,R5
065756  010546                             MOV     R5,-(SP)
065760  010446                             MOV     R4,-(SP)                    ; NIB.PTR,*
065762  042716  177770                     BIC     #177770,(SP)
065766  012746  000001                     MOV     #1,-(SP)
065772  005046                             CLR     -(SP)
065774  004767  115634                     JSR     PC,BL$GT2
066000  062706  000010                     ADD     #10,SP
066004  005700                             TST     R0
066006  001071                             BNE     20$
066010  010446                             MOV     R4,-(SP)                    ; NIB.PTR,*         8344
066012  010246                             MOV     R2,-(SP)                    ; TST.PAT,*
066014  012746  000012                     MOV     #12,-(SP)
066020  060616                             ADD     SP,(SP)                     ; RESULT,*
066022  004767  133044                     JSR     PC,XOR.LNG.WRD
066026  032766  000017  000012             BIT     #17,12(SP)                  ; *,RESULT          8346
066034  001454                             BEQ     19$
066036  005267  127334                     INC     P.CNT                       ;                   8348
066042  026767  127330  127330             CMP     P.CNT,LIMIT
066050  003403                             BLE     18$
066052  062706  000006                     ADD     #6,SP
066056  000451                             BR      21$
066060  104455                     18$:    TRAP    55                          ;                   8350
066062  000126                             .WORD   126
066064  012750                             .WORD   SYNC
066066  026302                             .WORD   DUMPER
066070  012746  012216                     MOV     #FNC.5,-(SP)                ;                   8351
066074  012746  010650                     MOV     #WRD.12,-(SP)
066100  012746  010630                     MOV     #WRD.10,-(SP)
066104  012746  011002                     MOV     #WRD.25,-(SP)
066110  012746  010774                     MOV     #WRD.24,-(SP)
066114  012746  010304                     MOV     #FIV.FMT,-(SP)
066120  012746  000006                     MOV     #6,-(SP)
066124  010600                             MOV     SP,R0                       ; SP,*
066126  104414                             TRAP    14
066130  010416                             MOV     R4,(SP)                     ; NIB.PTR,*         8352
066132  016646  000030                     MOV     30(SP),-(SP)                ; RESULT,*
066136  010246                             MOV     R2,-(SP)                    ; TST.PAT,*
066140  012746  006650                     MOV     #FMT.5,-(SP)
066144  012746  000004                     MOV     #4,-(SP)
066150  010600                             MOV     SP,R0                       ; SP,*
066152  104414                             TRAP    14
066154  012766  000001  000036             MOV     #1,36(SP)                   ; *,DODU.FLG        8353
066162  062706  000026                     ADD     #26,SP                      ;                   8348
066166  062706  000006             19$:    ADD     #6,SP                       ;                   8343
```

```
18486                                       ;ML4AD                                                                   29-Mar-1982 16:23:04   TOPS
18487                                       ;                  TEST CODE SECTION                                     29-Mar-1982 16:21:03   PA:<
18488
18489 066172  005204                        20$:    INC     R4                              ; NIB.PTR
18490 066174  020427  000010                        CMP     R4,#10                          ; NIB.PTR,*                           8339
18491 066200  003660                                BLE     17$
18492 066202  005203                        21$:    INC     R3                              ; WD.CNT
18493 066204  020327  000160                        CMP     R3,#160                         ; WD.CNT,*                            8332
18494 066210  003620                                BLE     12$
18495 066212  104467                                TRAP    67                              ;                                     8358
18496 066214  006000                                ROR     R0
18497 066216  103002                                BHIS    23$
18498 066220  000167  177120                22$:    JMP     1$
18499 066224  026627  000002  000001        23$:    CMP     2(SP),#1                        ; DODU.FLG,*                          8362
18500 066232  001004                                BNE     24$
18501 066234  016700  127570                        MOV     ML.LUN,R0                       ;                                     8366
18502 066240  104451                                TRAP    51
18503 066242  104444                                TRAP    44
18504 066244  005101                        24$:    COM     R1                              ; BG.PAT                              8370
18505 066246  005102                                COM     R2                              ; TST.PAT                             8371
18506 066250  005216                                INC     (SP)                            ; TWICE                               8305
18507 066252  021627  000001                        CMP     (SP),#1                         ; TWICE,*
18508 066256  003760                                BLE     22$
18509 066260  062706  000010                        ADD     #10,SP                          ;                                     8245
18510 066264  000207                                RTS     PC
18511
18512                                       ; Routine Size:  243 words
18513                                       ; Maximum stack depth per invocation:  24 words
18518
18519
18523
18524                                               .SBTTL  T34 TEST CODE SECTION
18528 066266                                T34::
18529 066266  004767  177026                1$:     JSR     PC,$T34                         ;                                     8372
18530 066272  104466                                TRAP    66
18531 066274  006000                                ROR     R0
18532 066276  103773                                BLO     1$
18533 066300  000207                                RTS     PC
18534
18535                                       ; Routine Size:  6 words
18536                                       ; Maximum stack depth per invocation:  0 words
```

```
;ML4AD                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (86)

;          8375  !<BLF/PAGE>
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (87)

!
BGNTST;

!++
! TEST NUMBER:  TST 35
!
! TEST NAME:    SYNC DATA BUS CONIINUITY /READ PATH
!
! TEST DESCRIPTION:
!       TEST THE CONITNUITY OF THE SYNCHRONOUS MODULE READ
!       DATA BUS BY:
!
!       1.  VIA MBUS WRITE FUNCTION WRITE ONES INTO THE GOOD BLOCK.
!
!       2.  VIA MBUS READ FUNCTION READ THE GOOD BLOCK FOR ONES.
!
!       3.  REPEAT WITH COMPLIMENT DATA PATTERN.
!
! IMPLICIT INPUTS:
!       IO_BUF
!       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
!       FUNCTION ARE FOUND.
!--

local
    DODU_FLG,                                   !DROP UNIT FLAG
    TST_PAT,                                    !TEST PATTERN
    BG_PAT;                                     !BACKGROUND PATTERN

CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
DODU_FLG = ZERO;
TST_PAT = ONES;
BG_PAT = ZEROES;

incr TWICE from 0 to 1 do                       !REPEAT LOOP TWICE
    begin
    CLR_MBUS;
    BAI = ONE;                                  !SET ON FIRST IO_BUF ADRS
    IO_BUF = .TST_PAT;                          !FIRST IO_BUF ADRS GET TST PAT
    GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
    MLCS1 = write;                              !DO A WRITE FUNCTION (WRITES THE TST_PAT)
    TIME_OUT_LOOP;
    BGNSUB;
    CLR_MBUS;

    incr IO_CNT from 0 to 255 do                !LOAD IO_BUF WITH BG PAT
        IO_BUF [.IO_CNT] = .BG_PAT;

    GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
    MLCS1 = read;                               !DO A READ FUNCTION (READ THE TST PAT)
    TIME_OUT_LOOP;
```

```
;ML4AD
;                  TEST CODE SECTION                           29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
                                                               29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (87)
;
;          incr IO_CNT from 0 to 255 do                       !READ THE IO_BUF FOR TEST PATTERN
;
;              if .IO_BUF [.IO_CNT] neq .TST_PAT              !SEE IF IO_BUF WORD EQLS TST PAT
;              then
;                  begin                                      !ERROR AND SET DODU_FLG IF NEQ
;                  CMP_THRESHOLD;                             !COMPARE ERROR PRINT THRESHOLD
;                  ERRDF (87, SYNC, DUMPER);
;                  PRINTB (SEV_FMT, WRD_24, WRD_25, WRD_10, WRD_12, WRD_23, FNC_6, WRD_19);
;                  PRINTB (FMT_2, .TST_PAT, .IO_BUF [.IO_CNT], (.TST_PAT xor .IO_BUF [.IO_CNT]));
;                  DODU_FLG = ONE;
;                  end;
;
;          ENDSUB;
;
;          if .DODU_FLG IS_SET                                !DROP THIS UNIT IF DODU_FLG IS SET
;          then
;              begin
;              DODU (.ML_LUN);
;              DOCLN;
;              end;
;
;          TST_PAT = not .TST_PAT;                            !COMPLIMENT TST_PAT
;          BG_PAT = not .BG_PAT;                              !COMPLIMENT BG_PAT AND REPEAT
;          end;
;
;        ENDTST;


                                               .SBTTL  $T35 TEST CODE SECTION
066302 004167 116304               $T35:      JSR     R1,$SAVE5
066306 005067 127064                          CLR     P.CNT                    ;                     8374
066312 005046                                 CLR     -(SP)                    ;                     8403
066314 012701 177777                          MOV     #-1,R1                   ; DODU.FLG            8406
066320 005004                                 CLR     R4                       ; *,TST.PAT           8407
066322 005005                                 CLR     R5                       ; BG.PAT              8408
066324 152777 000040 127112        1$:        BISB    #40,@ML.REG+40           ; TWICE               8410
066332 016703 127474                          MOV     ML.DUT,R3                ;                     8411
066336 042703 177770                          BIC     #177770,R3
066342 142777 000007 127074                   BICB    #7,@ML.REG+40
066350 150377 127070                          BISB    R3,@ML.REG+40
066354 152777 000010 127062                   BISB    #10,@ML.REG+40
066362 010167 125434                          MOV     R1,IO.BUF                ;                     8413
066366 004767 131720                          JSR     PC,GD.BLK.XFER           ; TST.PAT,*           8414
066372 012777 000061 127004                   MOV     #61,@ML.REG              ;                     8415
066400 105777 127050               2$:        TSTB    @ML.REG+50               ;                     8416
066404 100375                                 BPL     2$
066406 104402                      3$:        TRAP    2                        ;                     8417
```

```
                                        ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
                                        ;          TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<
066410  152777  000040  127026                BISB    #40,@ML.REG+40
066416  016703  127410                        MOV     ML.DUT,R3                 ;                                         8418
066422  042703  177770                        BIC     #177770,R3
066426  142777  000007  127010                BICB    #7,@ML.REG+40
066434  150377  127004                        BISB    R3,@ML.REG+40
066440  005002                                CLR     R2                        ; IO.CNT                                  8421
066442  010203                        4$:     MOV     R2,R3                     ; IO.CNT,*                                8422
066444  006303                                ASL     R3
066446  010463  014022                        MOV     R4,IO.BUF(R3)             ; BG.PAT,*
066452  005202                                INC     R2                        ; IO.CNT                                  8421
066454  020227  000377                        CMP     R2,#377                   ; IO.CNT,*
066460  003770                                BLE     4$
066462  004767  131624                        JSR     PC,GD.BLK.XFER            ;                                         8424
066466  012777  000071  126710                MOV     #71,@ML.REG               ;                                         8425
066474  105777  126754                5$:     TSTB    @ML.REG+50
066500  100375                                BPL     5$
066502  005002                                CLR     R2                        ; IO.CNT                                  8428
066504  010203                        6$:     MOV     R2,R3                     ; IO.CNT,*                                8430
066506  006303                                ASL     R3
066510  062703  014022                        ADD     #IO.BUF,R3
066514  021301                                CMP     (R3),R1                   ; *,TST.PAT
066516  001462                                BEQ     7$
066520  005267  126652                        INC     P.CNT                     ;                                         8432
066524  026767  126646  126646                CMP     P.CNT,LIMIT
066532  003060                                BGT     8$
066534  104455                                TRAP    55                        ;                                         8434
066536  000127                                .WORD   127
066540  012750                                .WORD   SYNC
066542  026302                                .WORD   DUMPER
066544  012746  010730                        MOV     #WRD.19,-(SP)             ;                                         8435
066550  012746  012226                        MOV     #FNC.6,-(SP)
066554  012746  010766                        MOV     #WRD.23,-(SP)
066560  012746  010650                        MOV     #WRD.12,-(SP)
066564  012746  010630                        MOV     #WRD.10,-(SP)
066570  012746  011002                        MOV     #WRD.25,-(SP)
066574  012746  010774                        MOV     #WRD.24,-(SP)
066600  012746  010342                        MOV     #SEV.FMT,-(SP)
066604  012746  000010                        MOV     #10,-(SP)
066610  010600                                MOV     SP,R0                     ; SP,*
066612  104414                                TRAP    14
066614  011316                                MOV     (R3),(SP)                 ;                                         8436
066616  010146                                MOV     R1,-(SP)                  ; TST.PAT,*
066620  046616  000002                        BIC     2(SP),(SP)
066624  040166  000002                        BIC     R1,2(SP)                  ; TST.PAT,*
066630  052616                                BIS     (SP)+,(SP)
066632  011346                                MOV     (R3),-(SP)
066634  010146                                MOV     R1,-(SP)                  ; TST.PAT,*
066636  012746  006506                        MOV     #FMT.2,-(SP)
066642  012746  000004                        MOV     #4,-(SP)
066646  010600                                MOV     SP,R0                     ; SP,*
066650  104414                                TRAP    14
066652  012766  000001  000032                MOV     #1,32(SP)                 ; *,DODU.FLG                              8437
```

```
                                  ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                  ;                 TEST CODE SECTION                             29-Mar-1982 16:21:03   PA:<
      066660  062706  000032              ADD     #32,SP                    ;
      066664  005202              7$:     INC     R2                        ; IO.CNT                                    8432
      066666  020227  000377              CMP     R2,#377                   ; IO.CNT,*                                  8428
      066672  003704                      BLE     6$
      066674  104467              8$:     TRAP    67                        ;                                           8438
      066676  006000                      ROR     R0
      066700  103642                      BLO     3$
      066702  021627  000001              CMP     (SP),#1                   ; DODU.FLG,*                                8442
      066706  001004                      BNE     9$
      066710  016700  127114              MOV     ML.LUN,R0                 ;                                           8445
      066714  104451                      TRAP    51
      066716  104444                      TRAP    44
      066720  005101              9$:     COM     R1                        ; TST.PAT                                   8449
      066722  005104                      COM     R4                        ; BG.PAT                                    8450
      066724  005205                      INC     R5                        ; TWICE                                     8410
      066726  020527  000001              CMP     R5,#1                     ; TWICE,*
      066732  003002                      BGT     10$
      066734  000167  177364              JMP     1$
      066740  005726              10$:    TST     (SP)+                     ;                                           8374
      066742  000207                      RTS     PC

                                  ; Routine Size:  145 words
                                  ; Maximum stack depth per invocation:  20 words



                                          .SBTTL  T35 TEST CODE SECTION
      066744                      T35::
      066744  004767  177332      1$:     JSR     PC,$T35                   ;                                           8451
      066750  104466                      TRAP    66
      066752  006000                      ROR     R0
      066754  103773                      BLO     1$
      066756  000207                      RTS     PC

                                  ; Routine Size:  6 words
                                  ; Maximum stack depth per invocation:  0 words

      ;          8454   !<BLF/PAGE>
```

```
;ML4AD
;                  TEST CODE SECTION                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (88)
;          !
;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 36
;          !
;          ! TEST NAME:     RAM BUS ADRS COUNTER TEST /WRITE PATH
;          !
;          ! TEST DESCRIPTION:
;          !
;          !        TEST ABILITY OF THE RAM_BUS ADDRESS
;          !        COUNTERS TO LOAD/UNLOAD THE SKIP
;          !        RAM DURING WRITE FUNCTIONS BY:
;          !
;          !        1.  LOADING A REPEATING COUNT OF 0
;          !            TO 63 INTO THE NIBBLES OF THE
;          !            FIRST 64 WORDS OF THE IO_BUF.
;          !
;          !        2.  VIA MBUS WRITE FUNCTION WRITE
;          !            THE CONTENTS OF THE IO_BUF
;          !            INTO THE GOOD BLOCK.
;          !
;          !        3.  VIA DAT_DM READ GOOD NIBBLES IN
;          !            THE GOOD BLOCK FOR THE UNBROKEN
;          !            COUNT OF 0 TO 63.
;          !
;          !            ONCE A BAD NIBBLE IS ENCOUNTERED
;          !            MASK THAT NIBBLE FROM FURTHER
;          !            READS.
;          !
;          !        4.  REPEAT READING NIBBLES UNTIL
;          !            113 WORDS ARE READ OR ALL 10 NIBBLES
;          !            ARE MASKED.
;          !
;          ! IMPLICIT INPUTS:
;          !
;          !        PD_TEMP
;          !
;          !        A BIT VECTOR OF 16 BITS WHERE
;          !        THE READ PROM DATA IS STORED
;          !        AND ACCESSED FROM.
;          !
;          !        IO_BUF
;          !        A VECTOR OF 256 WORDS WHERE
;          !        DATA FOR MBUS READS AND WRITE
;          !        FUNCTION ARE FOUND.
;          !
;          !--
;
;          local
;              DODU_FLG,                                   !DROP UNIT FLAG
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    TEST CODE SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (88)
;
;         WRD_CNT,                                       !WORD COUNT
;         NIB_IGNORE : bitvector [16],                   !NIBBLE IGNORE FLAGS
;         ERR_FLG,                                       !ERROR FLAG
;         BAD_NIB_CNT,                                   !BAD NIBBLE COUNT
;         PASS_CNT,                                      !PASS COUNT
;         NIB_PAT;                                       !NIBBLE PATTERN
;
;     CLR_THRESHOLD;                                     !CLEAR ERROR PRINT THRESHOLD
;     DODU_FLG = ZERO;
;     WRD_CNT = ZERO;
;
;     incr CNT from 0 to 63 do                           !LOAD 64 WORDS WITH REPEATING COUNTS OF 0-63
;
;         incr PAT_CNT from -1 to 11 by 4 do             !LOAD NIBBLES IN WORD WITH REPEATING COUNTS OF 0-63
;             begin
;             (IO_BUF [.WRD_CNT])<0, 4> = .PAT_CNT + 1;          !LOAD FIRST NIBBLE IN WORD
;             (IO_BUF [.WRD_CNT])<4, 4> = .PAT_CNT + 2;          !LOAD SECOND NIBBLE IN WORD
;             (IO_BUF [.WRD_CNT])<8, 4> = .PAT_CNT + 3;          !LOAD THIRD NIBBLE IN WORD
;             (IO_BUF [.WRD_CNT])<12, 4> = .PAT_CNT + 4;         !LOAD FORTH NIBBLE IN WORD
;             WRD_CNT = .WRD_CNT + 1;                    !INCREMENT TO NEXT WORD
;             end;
;
;     BGNSUB;
;     CLR_MBUS;
;     GD_BLK_XFER ();                                    !SET UP A GOOD BLOCK XFERR
;     MLCS1 = write;                                     !DO A WRITE FUNCTION
;     TIME_OUT_LOOP;
;     CLR_MBUS;
;     NIB_IGNORE = ZEROES;
;     PASS_CNT = ZEROES;
;     NIB_PAT = ZEROES;
;     BAD_NIB_CNT = ZEROES;
;     DAT_DM_XFER ();                                    !SET UP A DATA DIAG MODE AT THE GOOD BLOCK
;     MLCS1 = read;                                      !DO A READ FUNCTION
;     DELAY (ONE_US);
;
;     do                                                 !LOOP UNTIL THE BLOCK IS READ OR 9 BAD NIBBLES FOUND
;         begin
;         PD_TEMP = .MLPD;                               !GET THE PROM DATA
;         DAT_CLK = ONE;                                 !CLOCK OUT THE DATA WORD
;         DELAY (ONE_US);
;         RD_LNG_WRD;                                    !READ THE DATA DIAG REGISTERS
;
;         incr NIB_PTR from 0 to 8 do                    !LOOK AT 9 NIBBLES
;             begin
;
;             if .PD_TEMP [.NIB_PTR] IS_NOT_SET          !FIND GOOD NIBBLES
;             then
;                 begin
;
;                 if .NIB_IGNORE [.NIB_PTR] IS_NOT_SET           !SEE IF THIS NIBBLE FOUND BAD BEFORE
;                 then
```

```
18883 ;ML4AD                                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
18884 ;                       TEST CODE SECTION                                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (88)
18885
18886 ;              8559                   begin
18887 ;              8560                   TST_LNG_WRD (.NIB_PTR, .NIB_PAT, ERR_FLG);        !TEST THE NIBBLE IF NEVER FOUND BAD
18888 ;              8561
18889 ;              8562                   if .ERR_FLG IS_SET                        !SEE IF TEST FOUND AN ERROR
18890 ;              8563                   then
18891 ;              8564                       begin                                 !ERROR AND SET DODU_FLG IS SET
18892 ;              8565                       CMP_THRESHOLD;                        !COMPARE ERROR PRINT THRESHOLD
18893 ;              8566                       ERRDF (88, ARR_DAT, DUMPER);
18894 ;              8567                       PRINTB (SIX_FMT, FNC_18, WRD_50, WRD_10, WRD_12, FNC_5, WRD_19);
18895 ;              8568                       DODU_FLG = ONE;
18896 ;              8569                       end
18897 ;              8570
18898 ;              8571                   end
18899 ;              8572
18900 ;              8573               end
18901 ;              8574           else                                              !THIS NIBBLE IS BAD
18902 ;              8575               begin
18903 ;              8576               NIB_IGNORE [.NIB_PTR] = ONE;                  !SET THIS NIBBLE NIB_IGNORE FLAG
18904 ;              8577               BAD_NIB_CNT = .BAD_NIB_CNT + 1;               !INCREMENT BAD NIB COUNT
18905 ;              8578               end;
18906 ;              8579
18907 ;              8580           NIB_PAT = .NIB_PAT + 1;                           !INCREMENT NIB PAT
18908 ;              8581           end;
18909 ;              8582
18910 ;              8583       PASS_CNT = .PASS_CNT + 1;                             !INCREMENT PASS COUNT
18911 ;              8584       end
18912 ;              8585   until (.PASS_CNT eql 113) or (.BAD_NIB_CNT eql 9);        !REPEAT UNTIL COMPLETE
18913 ;              8586
18914 ;              8587   ENDSUB;
18915 ;              8588
18916 ;              8589   if .DODU_FLG IS_SET                                       !DROP THIS UNIT IF DODU_FLG SET
18917 ;              8590   then
18918 ;              8591       begin
18919 ;              8592       DODU (.ML_LUN);
18920 ;              8593       DOCLN;
18921 ;              8594       end;
18922 ;              8595
18923 ;              8596   ENDTST;
18927
18928                                             .SBTTL  $T36 TEST CODE SECTION
18932 066760  004167  115626          $T36:     JSR     R1,$SAVE5
18933 066764  162706  000006                    SUB     #6,SP                       ;                         8453
18934 066770  005067  126402                    CLR     P.CNT
18935 066774  005046                            CLR     -(SP)                       ;                         8512
18936 066776  005003                            CLR     R3                          ; DODU.FLG                8515
18937 067000  005002                            CLR     R2                          ; WRD.CNT                 8516
                                                                                    ; CNT                     8518
```

```
                                      ;ML4AD                                                 29-Mar-1982 16:23:04   TOPS
                                      ;                 TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<
067002  012700  177777                1$:     MOV     #-1,R0                  ; *,PAT.CNT                           8520
067006  010301                        2$:     MOV     R3,R1                   ; WRD.CNT,*                           8522
067010  006301                                ASL     R1
067012  062701  014022                        ADD     #IO.BUF,R1
067016  010005                                MOV     R0,R5                   ; PAT.CNT,*
067020  005205                                INC     R5
067022  042705  177760                        BIC     #177760,R5
067026  142711  000017                        BICB    #17,(R1)
067032  150511                                BISB    R5,(R1)
067034  010005                                MOV     R0,R5                   ; PAT.CNT,*                           8523
067036  062705  000002                        ADD     #2,R5
067042  006305                                ASL     R5
067044  006305                                ASL     R5
067046  006305                                ASL     R5
067050  006305                                ASL     R5
067052  042705  177417                        BIC     #177417,R5
067056  142711  000360                        BICB    #360,(R1)
067062  150511                                BISB    R5,(R1)
067064  010005                                MOV     R0,R5                   ; PAT.CNT,*                           8524
067066  062705  000003                        ADD     #3,R5
067072  000305                                SWAB    R5
067074  042705  170377                        BIC     #170377,R5
067100  042711  007400                        BIC     #7400,(R1)
067104  050511                                BIS     R5,(R1)
067106  010005                                MOV     R0,R5                   ; PAT.CNT,*                           8525
067110  062705  000004                        ADD     #4,R5
067114  000305                                SWAB    R5
067116  006305                                ASL     R5
067120  006305                                ASL     R5
067122  006305                                ASL     R5
067124  006305                                ASL     R5
067126  042705  007777                        BIC     #7777,R5
067132  042711  170000                        BIC     #170000,(R1)
067136  050511                                BIS     R5,(R1)
067140  005203                                INC     R3                      ; WRD.CNT                             8526
067142  062700  000004                        ADD     #4,R0                   ; *,PAT.CNT                           8520
067146  020027  000013                        CMP     R0,#13                  ; PAT.CNT,*
067152  003715                                BLE     2$
067154  005202                                INC     R2                      ; CNT                                 8518
067156  020227  000077                        CMP     R2,#77                  ; CNT,*
067162  003707                                BLE     1$
067164  104402                        3$:     TRAP    2                       ;                                     8527
067166  152777  000040  126250                BISB    #40,@ML.REG+40          ;                                     8529
067174  016702  126632                        MOV     ML.DUT,R2
067200  042702  177770                        BIC     #177770,R2
067204  142777  000007  126232                BICB    #7,@ML.REG+40
067212  150277  126226                        BISB    R2,@ML.REG+40
067216  004767  131070                        JSR     PC,GD.BLK.XFER
067222  012777  000061  126154                MOV     #61,@ML.REG             ;                                     8531
067230  105777  126220                4$:     TSTB    @ML.REG+50              ;                                     8532
067234  100375                                BPL     4$
067236  152777  000040  126200                BISB    #40,@ML.REG+40          ;                                     8533
```

```
                                        ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                        ;             TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
067244  016702  126562                          MOV     ML.DUT,R2
067250  042702  177770                          BIC     #177770,R2
067254  142777  000007  126162                  BICB    #7,@ML.REG+40
067262  150277  126156                          BISB    R2,@ML.REG+40
067266  005066  000004                          CLR     4(SP)                   ; NIB.IGNORE            8535
067272  005004                                  CLR     R4                      ; PASS.CNT              8536
067274  005003                                  CLR     R3                      ; NIB.PAT               8537
067276  005005                                  CLR     R5                      ; BAD.NIB.CNT           8538
067300  004767  127106                          JSR     PC,DAT.DM.XFER          ;                       8539
067304  012777  000071  126072                  MOV     #71,@ML.REG             ;                       8540
067312  012701  000001                          MOV     #1,R1                   ; *,$$TMP2              8541
067316  001411                          5$:     BEQ     8$
067320  016702  112572                          MOV     L$DLY,R2                ; *,$$TMP1
067324  001404                                  BEQ     7$
067326  005066  000006                  6$:     CLR     6(SP)                   ; $$TMP
067332  005302                                  DEC     R2                      ; $$TMP1
067334  001374                                  BNE     6$
067336  005301                          7$:     DEC     R1                      ; $$TMP2
067340  000766                                  BR      5$
067342  017767  126266  125772          8$:     MOV     @ML.REG+230,PD.TEMP     ;                       8545
067350  152777  000020  126146                  BISB    #20,@ML.REG+120         ;                       8546
067356  012701  000001                          MOV     #1,R1                   ; *,$$TMP2              8547
067362  001411                          9$:     BEQ     12$
067364  016702  112526                          MOV     L$DLY,R2                ; *,$$TMP1
067370  001404                                  BEQ     11$
067372  005066  000006                  10$:    CLR     6(SP)                   ; $$TMP
067376  005302                                  DEC     R2                      ; $$TMP1
067400  001374                                  BNE     10$
067402  005301                          11$:    DEC     R1                      ; $$TMP2
067404  000766                                  BR      9$
067406  017767  126162  123760          12$:    MOV     @ML.REG+170,D1.TEMP
067414  017767  126164  123754                  MOV     @ML.REG+200,D2.TEMP
067422  017767  126136  123750                  MOV     @ML.REG+160,E2.TEMP
067430  005001                                  CLR     R1                      ; NIB.PTR               8550
067432  010100                          13$:    MOV     R1,R0                   ; NIB.PTR,*             8553
067434  006200                                  ASR     R0
067436  006200                                  ASR     R0
067440  006200                                  ASR     R0
067442  012702  000004                          MOV     #4,R2                   ;                       8557
067446  060602                                  ADD     SP,R2                   ; NIB.IGNORE,*
067450  060002                                  ADD     R0,R2
067452  010046                                  MOV     R0,-(SP)                ;                       8553
067454  062716  015342                          ADD     #PD.TEMP,(SP)
067460  010146                                  MOV     R1,-(SP)                ; NIB.PTR,*
067462  042716  177770                          BIC     #177770,(SP)
067466  012746  000001                          MOV     #1,-(SP)
067472  005046                                  CLR     -(SP)
067474  004767  114134                          JSR     PC,BL$GT2
067500  062706  000010                          ADD     #10,SP
067504  005700                                  TST     R0
067506  001077                                  BNE     16$
067510  010246                                  MOV     R2,-(SP)                ;                       8557
```

```
19051                                   ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
19052                                   ;                     TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
19053
19054 067512  010146                            MOV     R1,-(SP)                ; NIB.PTR,*
19055 067514  042716  177770                    BIC     #177770,(SP)
19056 067520  012746  000001                    MOV     #1,-(SP)
19057 067524  005046                            CLR     -(SP)
19058 067526  004767  114102                    JSR     PC,BL$GT2
19059 067532  062706  000010                    ADD     #10,SP
19060 067536  005700                            TST     R0
19061 067540  001076                            BNE     17$
19062 067542  010146                            MOV     R1,-(SP)                ; NIB.PTR,*                     8560
19063 067544  010346                            MOV     R3,-(SP)                ; NIB.PAT,*
19064 067546  012746  000010                    MOV     #10,-(SP)
19065 067552  060616                            ADD     SP,(SP)                 ; ERR.FLG,*
19066 067554  004767  130616                    JSR     PC,TST.LNG.WRD
19067 067560  026627  000010  000001            CMP     10(SP),#1               ; ERR.FLG,*                     8562
19068 067566  001044                            BNE     15$
19069 067570  005267  125602                    INC     P.CNT                   ;                               8564
19070 067574  026767  125576  125576            CMP     P.CNT,LIMIT
19071 067602  003403                            BLE     14$
19072 067604  062706  000006                    ADD     #6,SP
19073 067610  000457                            BR      18$
19074 067612  104455                    14$:    TRAP    55                      ;                               8566
19075 067614  000130                            .WORD   130
19076 067616  013012                            .WORD   ARR.DAT
19077 067620  026302                            .WORD   DUMPER
19078 067622  012746  010730                    MOV     #WRD.19,-(SP)           ;                               8567
19079 067626  012746  012216                    MOV     #FNC.5,-(SP)
19080 067632  012746  010650                    MOV     #WRD.12,-(SP)
19081 067636  012746  010630                    MOV     #WRD.10,-(SP)
19082 067642  012746  011270                    MOV     #WRD.50,-(SP)
19083 067646  012746  012414                    MOV     #FNC.18,-(SP)
19084 067652  012746  010322                    MOV     #SIX.FMT,-(SP)
19085 067656  012746  000007                    MOV     #7,-(SP)
19086 067662  010600                            MOV     SP,R0                   ; SP,*
19087 067664  104414                            TRAP    14
19088 067666  012766  000001  000026            MOV     #1,26(SP)               ; *,DODU.FLG                    8568
19089 067674  062706  000020                    ADD     #20,SP                  ;                               8564
19090 067700  062706  000006            15$:    ADD     #6,SP                   ;                               8559
19091 067704  000414                            BR      17$                     ;                               8553
19092 067706  010246                    16$:    MOV     R2,-(SP)                ;                               8576
19093 067710  010146                            MOV     R1,-(SP)                ; NIB.PTR,*
19094 067712  042716  177770                    BIC     #177770,(SP)
19095 067716  012746  000001                    MOV     #1,-(SP)
19096 067722  011646                            MOV     (SP),-(SP)
19097 067724  004767  114142                    JSR     PC,BL$PU2
19098 067730  005205                            INC     R5                      ; BAD.NIB.CNT                   8577
19099 067732  062706  000010                    ADD     #10,SP                  ;                               8575
19100 067736  005203                    17$:    INC     R3                      ; NIB.PAT                       8580
19101 067740  005201                            INC     R1                      ; NIB.PTR                       8550
19102 067742  020127  000010                    CMP     R1,#10                  ; NIB.PTR,*
19103 067746  003631                            BLE     13$
19104 067750  005204                    18$:    INC     R4                      ; PASS.CNT                      8583
19105 067752  020427  000161                    CMP     R4,#161                 ; PASS.CNT,*                    8585
```

```
                                     ;ML4AD                                          29-Mar-1982 16:23:04  TOPS
                                     ;              TEST CODE SECTION                29-Mar-1982 16:21:03  PA:<
 067756  001405                             BEQ     19$
 067760  020527  000011                     CMP     R5,#11                  ; BAD.NIB.CNT,*
 067764  001402                             BEQ     19$
 067766  000167  177350                     JMP     8$
 067772  104467                      19$:   TRAP    67
 067774  006000                             ROR     R0
 067776  103002                             BHIS    20$
 070000  000167  177160                     JMP     3$
 070004  021627  000001              20$:   CMP     (SP),#1                 ; DODU.FLG,*             8589
 070010  001004                             BNE     21$
 070012  016700  126012                     MOV     ML.LUN,R0               ;                        8592
 070016  104451                             TRAP    51
 070020  104444                             TRAP    44
 070022  062706  000010              21$:   ADD     #10,SP                  ;                        8453
 070026  000207                             RTS     PC

                                     ; Routine Size:  276 words
                                     ; Maximum stack depth per invocation:  21 words




                                            .SBTTL  T36 TEST CODE SECTION
 070030                              T36::
 070030  004767  176724              1$:    JSR     PC,$T36                 ;                        8594
 070034  104466                             TRAP    66
 070036  006000                             ROR     R0
 070040  103773                             BLO     1$
 070042  000207                             RTS     PC

                                     ; Routine Size:  6 words
                                     ; Maximum stack depth per invocation:  0 words


 ;          8597  !<BLF/PAGE>
```

```
;ML4AD
;                  TEST CODE SECTION                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                                                             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (89)
;          !
;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 37
;          !
;          ! TEST NAME:    RAM BUS ADRS COUNTER TEST /READ PATH
;          !
;          ! TEST DESCRIPTION:
;          !
;          !       TEST ABILITY OF RAM/BUS ADRS
;          !       COUNTERS TO LOAD/UNLOAD THE SKIP
;          !       RAM DURING READ FUNCTIONS BY:
;          !
;          !       1.  LOADING A REPEATING COUNT OF 0
;          !           TO 63 INTO THE NIBBLES OF THE
;          !           FIRST 64 WORDS OF THE IO_BUF.
;          !
;          !       2.  VIA MBUS WRITE FUNCTION WRITE
;          !           THE CONTENTS OF THE IO_BUF
;          !           INTO THE GOOD BLOCK.
;          !
;          !       3.  CLEAR OUT THE IO_BUF
;          !
;          !       4.  VIA MBUS READ FUNCTION READ
;          !           THE GOOD BLOCK FOR THE REPEATING
;          !           COUNT OF 0 TO 63.
;          !
;          ! IMPLICIT INPUTS:
;          !
;          !       IO_BUF
;          !
;          !       A VECTOR OF 256 WORDS WHERE
;          !       DATA FOR MBUS READS AND WRITE
;          !       FUNCTION ARE FOUND.
;          !
;          !--
;
;          local
;              DODU_FLG,                               !DROP UNIT FLAG
;              WRD_CNT,                                !WORD COUNT
;              PAT_INC,                                !PATTERN INCREMENT
;              SIZ_EXP,                                !SIZE EXPRESSION
;              POS_EXP,                                !POSITIONAL EXPRESSION
;              TEMP;                                   !TEMPORARY STORAGE LOCATION
;
;          CLR_THRESHOLD;                              !CLEAR ERROR PRINT THRESHOLD
;          CLR_MBUS;
;          DODU_FLG = ZERO;
;          WRD_CNT = ZERO;
;
```

```
;ML4AD
;
        TEST CODE SECTION                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (89)

        incr COUNT from 0 to 63 do                       !LOAD 64 WORDS WITH REPEATING  COUNTS OF 0-63

            incr PAT_CNT from -1 to 11 by 4 do           !LOAD NIBBLES IN WORD WITH REPEATING COUNT OF 0-63
                begin
                (IO_BUF [.WRD_CNT])<0, 4> = .PAT_CNT + 1;        !LOAD FIRST NIBBLE IN WORD
                (IO_BUF [.WRD_CNT])<4, 4> = .PAT_CNT + 2;        !LOAD SECOND NIBBLE IN WORD
                (IO_BUF [.WRD_CNT])<8, 4> = .PAT_CNT + 3;        !LOAD THIRD NIBBLE IN WORD
                (IO_BUF [.WRD_CNT])<12, 4> = .PAT_CNT + 4;       !LOAD FORTH NIBBLE IN WORD
                WRD_CNT = .WRD_CNT + 1;                  !INCREMENT TO NEXT WORD
                end;

        GD_BLK_XFER ();                                  !SET UP A GOOD BLOCK XFERR
        MLCS1 = write;                                   !DO A WRITE FUNCTION
        TIME_OUT_LOOP;
        BGNSUB;

        incr IO_CNT from 0 to 255 do                     !CLEAR OUT IO_BUF
            IO_BUF [.IO_CNT] = ZEROES;

        CLR_MBUS;
        GD_BLK_XFER ();                                  !SET UP A GOOD BLOCK XFERR
        MLCS1 = read;                                    !DO A READ FUNCTION
        TIME_OUT_LOOP;
        CLR_MBUS;
        SIZ_EXP = 4;                                     !FIELD SIZE FOR NIBBLES ALWAYS 4 BITS
        WRD_CNT = 0;

        incr COUNT from 0 to 63 do                       !READ 64 WORDS IN IO_BUF

            incr PAT_CNT from -1 to 11 by 4 do           !READ REPEATING COUNTS OF 0-63
                begin
                POS_EXP = ZERO;                          !FIELD SELECTOR SELECTS THE FOUR NIBBLES
                PAT_INC = ONE;
                TEMP = .IO_BUF [.WRD_CNT];               !GET A WORD OUT OF IO_BUF

                incr CNT from 0 to 3 do                  !READ THE FOUR NIBBLES IN WORD
                    begin

                    if .TEMP<.POS_EXP, .SIZ_EXP> neq (.PAT_CNT + .PAT_INC)
                                                         !COMPARE NIBBLE WITH RESPECTIVE 0 -63 CNT
                    then
                        begin                            !ERROR AND SET DODU_FLG IF NEQ
                        CMP_THRESHOLD;                   !COMPARE ERROR PRINT THRESHOLD
                        ERRDF (89, ARR_DAT, DUMPER);
                        PRINTB (SIX_FMT, FNC_18, WRD_50, WRD_10, WRD_12, FNC_6, WRD_19);
                        DODU_FLG = ONE;
                        end;

                    POS_EXP = .POS_EXP + 4;              !POINT TO THE NEXT NIBBLE IN WORD
                    PAT_INC = .PAT_INC + 1;              !INCREMENT THE 0-63 COUNT
                    end;
```

```
19271 ;ML4AD                                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
19272 ;                       TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (89)
19273
19274 ;               8702            WRD_CNT = .WRD_CNT + 1;                 !GET THE NEXT IO_BUF WORD
19275 ;               8703            end;
19276 ;               8704
19277 ;               8705    ENDSUB;
19278 ;               8706
19279 ;               8707    if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG SET
19280 ;               8708    then
19281 ;               8709        begin
19282 ;               8710        DODU (.ML_LUN);
19283 ;               8711        DOCLN;
19284 ;               8712        end;
19285 ;               8713
19286 ;               8714    ENDTST;
19290
19291                                                   .SBTTL  $T37 TEST CODE SECTION
19295 070044  004167  114542                  $T37:   JSR     R1,$SAVE5                       ;                       8596
19296 070050  162706  000012                          SUB     #12,SP
19297 070054  005067  125316                          CLR     P.CNT                           ;                       8643
19298 070060  152777  000040  125356                  BISB    #40,@ML.REG+40                  ;                       8645
19299 070066  016705  125740                          MOV     ML.DUT,R5                       ;
19300 070072  042705  177770                          BIC     #177770,R5
19301 070076  142777  000007  125340                  BICB    #7,@ML.REG+40
19302 070104  150577  125334                          BISB    R5,@ML.REG+40
19303 070110  005066  000010                          CLR     10(SP)                          ; DODU.FLG              8647
19304 070114  005066  000002                          CLR     2(SP)                           ; WRD.CNT               8648
19305 070120  005002                                  CLR     R2                              ; COUNT                 8650
19306 070122  012703  177777                  1$:     MOV     #-1,R3                          ; *,PAT.CNT             8652
19307 070126  016604  000002                  2$:     MOV     2(SP),R4                        ; WRD.CNT,*             8654
19308 070132  006304                                  ASL     R4
19309 070134  062704  014022                          ADD     #IO.BUF,R4
19310 070140  010305                                  MOV     R3,R5                           ; PAT.CNT,*
19311 070142  005205                                  INC     R5
19312 070144  042705  177760                          BIC     #177760,R5
19313 070150  142714  000017                          BICB    #17,(R4)
19314 070154  150514                                  BISB    R5,(R4)
19315 070156  010305                                  MOV     R3,R5                           ; PAT.CNT,*             8655
19316 070160  062705  000002                          ADD     #2,R5
19317 070164  006305                                  ASL     R5
19318 070166  006305                                  ASL     R5
19319 070170  006305                                  ASL     R5
19320 070172  006305                                  ASL     R5
19321 070174  042705  177417                          BIC     #177417,R5
19322 070200  142714  000360                          BICB    #360,(R4)
19323 070204  150514                                  BISB    R5,(R4)
19324 070206  010305                                  MOV     R3,R5                           ; PAT.CNT,*             8656
19325 070210  062705  000003                          ADD     #3,R5
```

```
                                ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION                   29-Mar-1982 16:21:03   PA:<
070214  000305                          SWAB    R5
070216  042705  170377                  BIC     #170377,R5
070222  042714  007400                  BIC     #7400,(R4)
070226  050514                          BIS     R5,(R4)
070230  010305                          MOV     R3,R5                   ; PAT.CNT,*                        8657
070232  062705  000004                  ADD     #4,R5
070236  000305                          SWAB    R5
070240  006305                          ASL     R5
070242  006305                          ASL     R5
070244  006305                          ASL     R5
070246  006305                          ASL     R5
070250  042705  007777                  BIC     #7777,R5
070254  042714  170000                  BIC     #170000,(R4)
070260  050514                          BIS     R5,(R4)
070262  005266  000002                  INC     2(SP)                   ; WRD.CNT                          8658
070266  062703  000004                  ADD     #4,R3                   ; *,PAT.CNT                        8652
070272  020327  000013                  CMP     R3,#13                  ; PAT.CNT,*
070276  003713                          BLE     2$
070300  005202                          INC     R2                      ; COUNT                            8650
070302  020227  000077                  CMP     R2,#77                  ; COUNT,*
070306  003705                          BLE     1$
070310  004767  127776                  JSR     PC,GD.BLK.XFER          ;                                  8661
070314  012777  000061  125062          MOV     #61,@ML.REG             ;                                  8662
070322  105777  125126          3$:     TSTB    @ML.REG+50
070326  100375                          BPL     3$
070330  104402                  4$:     TRAP    2                       ;                                  8663
070332  005003                          CLR     R3                      ; IO.CNT                           8666
070334  010304                  5$:     MOV     R3,R4                   ; IO.CNT,*                         8667
070336  006304                          ASL     R4
070340  005064  014022                  CLR     IO.BUF(R4)
070344  005203                          INC     R3                      ; IO.CNT                           8666
070346  020327  000377                  CMP     R3,#377                 ; IO.CNT,*
070352  003770                          BLE     5$
070354  152777  000040  125062          BISB    #40,@ML.REG+40          ;                                  8667
070362  016704  125444                  MOV     ML.DUT,R4
070366  042704  177770                  BIC     #177770,R4
070372  142777  000007  125044          BICB    #7,@ML.REG+40
070400  150477  125040                  BISB    R4,@ML.REG+40
070404  004767  127702                  JSR     PC,GD.BLK.XFER          ;                                  8670
070410  012777  000071  124766          MOV     #71,@ML.REG             ;                                  8671
070416  105777  125032          6$:     TSTB    @ML.REG+50
070422  100375                          BPL     6$
070424  152777  000040  125012          BISB    #40,@ML.REG+40          ;                                  8672
070432  016704  125374                  MOV     ML.DUT,R4
070436  042704  177770                  BIC     #177770,R4
070442  142777  000007  124774          BICB    #7,@ML.REG+40
070450  150477  124770                  BISB    R4,@ML.REG+40
070454  012766  000004  000006          MOV     #4,6(SP)                ; *,SIZ.EXP                        8674
070462  005066  000002                  CLR     2(SP)                   ; WRD.CNT                          8675
070466  005001                          CLR     R1                      ; COUNT                            8677
070470  012703  177777          7$:     MOV     #-1,R3                  ; *,PAT.CNT                        8679
070474  005005                  8$:     CLR     R5                      ; POS.EXP                          8681
```

```
                                  ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                  ;               TEST CODE SECTION                           29-Mar-1982 16:21:03   PA:<
070476  012716  000001                    MOV    #1,(SP)                  ; *,PAT.INC                                8682
070502  016604  000002                    MOV    2(SP),R4                 ; WRD.CNT,*                                8683
070506  006304                            ASL    R4
070510  016466  014022  000004            MOV    IO.BUF(R4),4(SP)         ; *,TEMP
070516  005002                            CLR    R2                       ; CNT                                      8685
070520  016646  000004            9$:     MOV    4(SP),-(SP)              ; TEMP,*                                   8688
070524  010546                            MOV    R5,-(SP)                 ; POS.EXP,*
070526  016646  000012                    MOV    12(SP),-(SP)             ; SIZ.EXP,*
070532  005046                            CLR    -(SP)
070534  004767  112752                    JSR    PC,BL$GT1
070540  062706  000010                    ADD    #10,SP
070544  010304                            MOV    R3,R4                    ; PAT.CNT,*
070546  061604                            ADD    (SP),R4                  ; PAT.INC,*
070550  020004                            CMP    R0,R4
070552  001441                            BEQ    10$
070554  005267  124616                    INC    P.CNT                    ;                                          8691
070560  026767  124612  124612            CMP    P.CNT,LIMIT
070566  003042                            BGT    11$
070570  104455                            TRAP   55                       ;                                          8693
070572  000131                            .WORD  131
070574  013012                            .WORD  ARR.DAT
070576  026302                            .WORD  DUMPER
070600  012746  010730                    MOV    #WRD.19,-(SP)            ;                                          8694
070604  012746  012226                    MOV    #FNC.6,-(SP)
070610  012746  010650                    MOV    #WRD.12,-(SP)
070614  012746  010630                    MOV    #WRD.10,-(SP)
070620  012746  011270                    MOV    #WRD.50,-(SP)
070624  012746  012414                    MOV    #FNC.18,-(SP)
070630  012746  010322                    MOV    #SIX.FMT,-(SP)
070634  012746  000007                    MOV    #7,-(SP)
070640  010600                            MOV    SP,R0                    ; SP,*
070642  104414                            TRAP   14
070644  012766  000001  000030            MOV    #1,30(SP)                ; *,DODU.FLG                               8695
070652  062706  000020                    ADD    #20,SP                   ;                                          8691
070656  062705  000004            10$:    ADD    #4,R5                    ; *,POS.EXP                                8698
070662  005216                            INC    (SP)                     ; PAT.INC                                  8699
070664  005202                            INC    R2                       ; CNT                                      8685
070666  020227  000003                    CMP    R2,#3                    ; CNT,*
070672  003712                            BLE    9$
070674  005266  000002            11$:    INC    2(SP)                    ; WRD.CNT                                  8702
070700  062703  000004                    ADD    #4,R3                    ; *,PAT.CNT                                8679
070704  020327  000013                    CMP    R3,#13                   ; PAT.CNT,*
070710  003671                            BLE    8$
070712  005201                            INC    R1                       ; COUNT                                    8677
070714  020127  000077                    CMP    R1,#77                   ; COUNT,*
070720  003663                            BLE    7$
070722  104467                            TRAP   67                       ;                                          8703
070724  006000                            ROR    R0
070726  103600                            BLO    4$
070730  026627  000010  000001            CMP    10(SP),#1                ; DODU.FLG,*                               8707
070736  001004                            BNE    12$
070740  016700  125064                    MOV    ML.LUN,R0                ;                                          8710
```

```
                                   ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
                                   ;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<
070744  104451                              TRAP    51
070746  104444                              TRAP    44
070750  062706  000012             12$:     ADD     #12,SP
070754  000207                              RTS     PC                          ;                                          8596

                                   ; Routine Size:  229 words
                                   ; Maximum stack depth per invocation:  19 words



                                            .SBTTL  T37 TEST CODE SECTION
070756                             T37::
070756  004767  177062             1$:      JSR     PC,$T37                     ;                                          8712
070762  104466                              TRAP    66
070764  006000                              ROR     R0
070766  103773                              BLO     1$
070770  000207                              RTS     PC

                                   ; Routine Size:  6 words
                                   ; Maximum stack depth per invocation:  0 words

;          8715  !<BLF/PAGE>
```

```
;ML4AD
;                         TEST CODE SECTION                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (90)
;          !
;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 38
;          !
;          ! TEST NAME:    SYNC DATA BUS BIT UNIQUENESS TEST/WRITE PATH
;          !
;          ! TEST DESCRIPTION:
;          !
;          !       TEST SYNCHRONOUS DATA BUS FOR
;          !       DATA BIT UNIQUENESS BY:
;          !
;          !       1.  LOADING THE FIRST 16 WORDS IN
;          !           THE IO_BUF WITH A SHIFTING
;          !           ZERO IN A FIELD OF ONES PATTERN.
;          !
;          !       2.  VIA MBUS WRITE FUNCTION WRITE
;          !           SHIFTING PATTERN THROUGH THE
;          !           DATA BUS AND INTO THE GOOD
;          !           BLOCK.
;          !
;          !       3.  VIA DAT_DM MODE READ THE
;          !           GOOD BLOCK AND SAVE ALL GOOD
;          !           NIBBLE DATA, IN THEIR PROPER
;          !           SEQUENCE, INTO A STACK
;          !           STRUCTURE.
;          !
;          !       4.  INTERRIGATE STACK STRUCTURE FOR
;          !           SHIFTED DATA PATTERN.
;          !
;          ! IMPLICIT INPUTS:
;          !
;          !       PD_TEMP
;          !       A BIT VECTOR OF 16 BITS WHERE
;          !       THE READ PROM DATA IS STORED
;          !       AND ACCESSED FROM.
;          !
;          !       IO_BUF
;          !       A VECTOR OF 256 WORDS WHERE
;          !       DATA FOR MBUS READS AND WRITE
;          !       FUNCTION ARE FOUND.
;          !
;          !       STACK
;          !       A VECTOR OF 198 BYTE LOCATIONS
;          !       WHERE GOOD NIBBLE DATA IS STORED
;          !       WHEN STRIPPING AWAY BAD NIBBLE
;          !       LOCATIONS OF A BLOCK.
;          !
```

```
;ML4AD
;               TEST CODE SECTION                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (90)
;               !--
;
;               local
;                   SAV_NIB,                                       !STORES THE SHIFTED BIT PATTERN
;                   DODU_FLG,                                      !DROP UNIT FLAG
;                   NIB_BIT,                                       !NIBBLE PATTERN
;                   TST_PAT,                                       !TEST PATTERN
;                   ALL_ONES_1,                                    !HOW MANY '17' NIBBLE PATTERN POSITION TO READ
;                   ALL_ONES_2,                                    !HOW MANY '17' NIBBLE PATTERN POSITION TO READ
;                   STK_PTR,                                       !STACK POINTER
;                   COUNT;                                         !COUNTER
;
;               CLR_THRESHOLD;                                     !CLEAR ERROR PRINT THRESHOLD
;               BGNSUB;
;               CLR_MBUS;
;               DODU_FLG = ZERO;
;               TST_PAT = ONE;                                     !ONE IN A FIELD OF ZEROES
;
;               incr CNT from 0 to 15 do                           !WRITE 16 WORDS WITH SHIFTING 0 IN FIELD OF 1'S.
;                   begin
;                   IO_BUF [.CNT] = not .TST_PAT;
;                   TST_PAT = .TST_PAT^ONE;
;                   end;
;
;               GD_BLK_XFER ();                                    !SET UP A GOOD BLOCK XFERR
;               MLCS1 = write;                                     !WRITE SHIFTING PATTERN THROUGH SYNC BUS
;               TIME_OUT_LOOP;
;               STRIPPER (21, 8);                                  !CALL ROUTINE TO STRIP OUT BAD NIBBLE DATA FROM ARRAY WORDS
;               STK_PTR = -1;                                      !RESET THE STACK POINTER
;               NIB_BIT = ONE;                                     !SHIFTING NIBBLE PAT OF 1 IN FIELD OF 0'S
;               ALL_ONES_1 = ZERO;                                 !READ NO '17' NIBBLE PATTERN ON FIRST PASS
;               ALL_ONES_2 = 3;                                    !READ THREE '17' NIBBLE PATTERN ON FIRST PASS
;
;               incr BY_FOUR_WRDS from 0 to 3 do                   !READ 4 GROUPS OF 4 WORDS
;                   begin
;
;                   incr BY_ONE_WRD from 0 to 3 do                 !READ 4 GROUPS OF 1 WORD
;                       begin
;                       COUNT = ZERO;                              !CLEAR COUNT
;
;                       until .COUNT eql .ALL_ONES_1 do            !READ X NUMBER OF '17' NIBBLE PAT
;                           begin
;                           COUNT = .COUNT + 1;                    !INCREMENT COUNT
;                           STK_PTR = .STK_PTR + 1;                !INCREMENT STACK POINTER
;
;                           if (.stack [.STK_PTR]) neq %o'000017'          !COMPARE STACK WITH '17'
;                           then
;                               begin                              !ERROR AND SET DODU_FLG IF NEQ
;                               CMP_THRESHOLD;                     !COMPARE ERROR PRINT THRESHOLD
;                               ERRDF (90, SYNC, DUMPER);
;                               PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
;                               PRINTB (FMT_5, ONES, .stack [.STK_PTR], .STR_PTR);
```

```
;ML4AD
;                       TEST CODE SECTION                       29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
                                                                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (90)
;                                               DODU_FLG = ONE;
;                                               end;
;
;                                       end;
;
;                               STK_PTR = .STK_PTR + 1;                 !INCREMENT THE STACK POINTER
;                               SAV_NIB = ( not .NIB_BIT) and (%o'000017');     !GENERATE THE SHIFTED BIT
;
;                               if (.stack [.STK_PTR]) neq (.SAV_NIB)   !COMPARE STACK TO SHIFTED BIT
;                               then
;                                   begin                               !ERROR AND SET DODU_FLG IF NEQ
;                                   CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
;                                   ERRDF (91, SYNC, DUMPER);
;                                   PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
;                                   PRINTB (FMT_15, .STK_PTR);
;                                   PRINTB (FMT_5, .SAV_NIB, .stack [.STK_PTR]);
;                                   DODU_FLG = ONE;
;                                   end;
;
;                               COUNT = ZEROES;                         !CLEAR COUNT
;
;                               until .COUNT eql .ALL_ONES_2 do         !READ X NUMBER OF '17' NIBBLE PAT
;                                   begin
;                                   COUNT = .COUNT + 1;                 !INCREMENT COUNT
;                                   STK_PTR = .STK_PTR + 1;             !INCREMENT STACK POINTER
;
;                                   if (.stack [.STK_PTR]) neq %o'000017'       !COMPARE STACK POINTER WITH  '17'
;                                   then
;                                       begin                           !ERROR AND SET DODU_FLG IF SET
;                                       CMP_THRESHOLD;                  !COMPARE ERROR PRINT THRESHOLD
;                                       ERRDF (92, SYNC, DUMPER);
;                                       PRINTB (SIX_FMT, WRD_23, WRD_39, PHR_4, WRD_12, FNC_5, WRD_19);
;                                       PRINTB (FMT_5, ONES, .stack [.STK_PTR], .STK_PTR);
;                                       DODU_FLG = ONE;
;                                       end;
;
;                                   end;
;
;                               NIB_BIT = .NIB_BIT^ONE;                 !SHIFT THE SHIFTED NIBBLE BIT
;                               end;
;
;                           NIB_BIT = ONE;                              !RESET THE SHIFTED NIBBLE BIT
;                           ALL_ONES_1 = .ALL_ONES_1 + 1;               !READ ONE MORE '17' PATTERN
;                           ALL_ONES_2 = .ALL_ONES_2 - 1;               !READ ONE LESS '17' PATTERN
;                           end;
;
;                       ENDSUB;
;
;                       if .DODU_FLG IS_SET                             !DROP THIS UNIT IF DODU_FLG SET
;                       then
;                           begin
;                           DODU (.ML_LUN);
```

```
19648 ;ML4AD
19649 ;                         TEST CODE SECTION                                   29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
19650                                                                               29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (90)
19651 ;             8872          DOCLN;
19652 ;             8873          end;
19653 ;             8874
19654 ;             8875      ENDTST;
19658
19659                                                       .SBTTL   $T38 TEST CODE SECTION
19663 070772  004167  113614                     $T38:      JSR      R1,$SAVE5
19664 070776  162706  000012                                SUB      #12,SP                          ;                            8714
19665 071002  005067  124370                                CLR      P.CNT
19666 071006  104402                             1$:        TRAP     2                               ;                            8778
19667 071010  152777  000040  124426                        BISB     #40,@ML.REG+40                  ;                            8780
19668 071016  016705  125010                                MOV      ML.DUT,R5                       ;                            8781
19669 071022  042705  177770                                BIC      #177770,R5
19670 071026  142777  000007  124410                        BICB     #7,@ML.REG+40
19671 071034  150577  124404                                BISB     R5,@ML.REG+40
19672 071040  005001                                        CLR      R1                              ; DODU.FLG
19673 071042  012766  000001  000006                        MOV      #1,6(SP)                        ; *,TST.PAT                  8783
19674 071050  005004                                        CLR      R4                              ; CNT                        8784
19675 071052  010405                             2$:        MOV      R4,R5                           ; CNT,*                      8786
19676 071054  006305                                        ASL      R5                                                           8788
19677 071056  016665  000006  014022                        MOV      6(SP),IO.BUF(R5)                ; TST.PAT,*
19678 071064  005165  014022                                COM      IO.BUF(R5)
19679 071070  006366  000006                                ASL      6(SP)                           ; TST.PAT                    8789
19680 071074  005204                                        INC      R4                              ; CNT                        8786
19681 071076  020427  000017                                CMP      R4,#17                          ; CNT,*
19682 071102  003763                                        BLE      2$
19683 071104  004767  127202                                JSR      PC,GD.BLK.XFER                  ;                            8792
19684 071110  012777  000061  124266                        MOV      #61,@ML.REG                     ;                            8793
19685 071116  105777  124332                     3$:        TSTB     @ML.REG+50
19686 071122  100375                                        BPL      3$
19687 071124  012746  000025                                MOV      #25,-(SP)                       ;                            8795
19688 071130  012746  000010                                MOV      #10,-(SP)
19689 071134  004767  125304                                JSR      PC,STRIPPER
19690 071140  012702  177777                                MOV      #-1,R2                          ; *,STK.PTR                  8796
19691 071144  012766  000001  000004                        MOV      #1,4(SP)                        ; *,NIB.BIT                  8797
19692 071152  005066  000010                                CLR      10(SP)                          ; ALL.ONES.1                 8798
19693 071156  012766  000003  000006                        MOV      #3,6(SP)                        ; *,ALL.ONES.2               8799
19694 071164  005004                                        CLR      R4                              ; BY.FOUR.WRDS               8801
19695 071166  005005                             4$:        CLR      R5                              ; BY.ONE.WRD                 8804
19696 071170  005003                             5$:        CLR      R3                              ; COUNT                      8806
19697 071172  020366  000010                     6$:        CMP      R3,10(SP)                       ; COUNT,ALL.ONES.1           8808
19698 071176  001463                                        BEQ      7$
19699 071200  005203                                        INC      R3                              ; COUNT                      8810
19700 071202  005202                                        INC      R2                              ; STK.PTR                    8811
19701 071204  126227  015034  000017                        CMPB     STACK(R2),#17                   ; *(STK.PTR),*               8813
19702 071212  001767                                        BEQ      6$
```

```
                                      ;ML4AD                                               29-Mar-1982 16:23:04   TOPS
                                      ;                 TEST CODE SECTION                  29-Mar-1982 16:21:03   PA:<

071214  005267  124156                        INC      P.CNT
071220  026767  124152  124152                CMP      P.CNT,LIMIT                  ;                         8815
071226  003047                                BGT      7$
071230  104455                                TRAP     55                           ;                         8817
071232  000132                                .WORD    132
071234  012750                                .WORD    SYNC
071236  026302                                .WORD    DUMPER
071240  012746  010730                        MOV      #WRD.19,-(SP)                ;                         8818
071244  012746  012216                        MOV      #FNC.5,-(SP)
071250  012746  010650                        MOV      #WRD.12,-(SP)
071254  012746  011676                        MOV      #PHR.4,-(SP)
071260  012746  011140                        MOV      #WRD.39,-(SP)
071264  012746  010766                        MOV      #WRD.23,-(SP)
071270  012746  010322                        MOV      #SIX.FMT,-(SP)
071274  012746  000007                        MOV      #7,-(SP)
071300  010600                                MOV      SP,R0                        ; SP,*
071302  104414                                TRAP     14
071304  010216                                MOV      R2,(SP)                      ; STK.PTR,*               8819
071306  005046                                CLR      -(SP)
071310  116216  015034                        MOVB     STACK(R2),(SP)               ; *(STK.PTR),*
071314  012746  177777                        MOV      #-1,-(SP)
071320  012746  006650                        MOV      #FMT.5,-(SP)
071324  012746  000004                        MOV      #4,-(SP)
071330  010600                                MOV      SP,R0                        ; SP,*
071332  104414                                TRAP     14
071334  012701  000001                        MOV      #1,R1                        ; *,DODU.FLG              8820
071340  062706  000030                        ADD      #30,SP                       ;                         8815
071344  000712                                BR       6$                           ;                         8808
071346  005202                        7$:     INC      R2                           ; STK.PTR                 8825
071350  012766  000017  000014                MOV      #17,14(SP)                   ; *,SAV.NIB               8826
071356  046666  000004  000014                BIC      4(SP),14(SP)                 ; NIB.BIT,SAV.NIB
071364  005000                                CLR      R0                           ;                         8828
071366  156200  015034                        BISB     STACK(R2),R0                 ; *(STK.PTR),*
071372  020066  000014                        CMP      R0,14(SP)                    ; *,SAV.NIB
071376  001462                                BEQ      8$
071400  005267  123772                        INC      P.CNT                        ;                         8830
071404  026767  123766  123766                CMP      P.CNT,LIMIT
071412  003153                                BGT      11$
071414  104455                                TRAP     55                           ;                         8832
071416  000133                                .WORD    133
071420  012750                                .WORD    SYNC
071422  026302                                .WORD    DUMPER
071424  012746  010730                        MOV      #WRD.19,-(SP)                ;                         8833
071430  012746  012216                        MOV      #FNC.5,-(SP)
071434  012746  010650                        MOV      #WRD.12,-(SP)
071440  012746  011676                        MOV      #PHR.4,-(SP)
071444  012746  011140                        MOV      #WRD.39,-(SP)
071450  012746  010766                        MOV      #WRD.23,-(SP)
071454  012746  010322                        MOV      #SIX.FMT,-(SP)
071460  012746  000007                        MOV      #7,-(SP)
071464  010600                                MOV      SP,R0                        ; SP,*
071466  104414                                TRAP     14
```

```
                                  ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                  ;                  TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<

071470  010216                           MOV    R2,(SP)                 ; STK.PTR,*                      8834
071472  012746  007370                   MOV    #FMT.15,-(SP)
071476  012746  000002                   MOV    #2,-(SP)
071502  010600                           MOV    SP,R0                   ; SP,*
071504  104414                           TRAP   14
071506  005016                           CLR    (SP)                    ;                                8835
071510  116216  015034                   MOVB   STACK(R2),(SP)          ; *(STK.PTR),*
071514  016646  000040                   MOV    40(SP),-(SP)            ; SAV.NIB,*
071520  012746  006650                   MOV    #FMT.5,-(SP)
071524  012746  000003                   MOV    #3,-(SP)
071530  010600                           MOV    SP,R0                   ; SP,*
071532  104414                           TRAP   14
071534  012701  000001                   MOV    #1,R1                   ; *,DODU.FLG                     8836
071540  062706  000032                   ADD    #32,SP                  ;                                8830
071544  005003                   8$:     CLR    R3                      ; COUNT                          8839
071546  020366  000006           9$:     CMP    R3,6(SP)                ; COUNT,ALL.ONES.2               8841
071552  001463                           BEQ    10$
071554  005203                           INC    R3                      ; COUNT                          8843
071556  005202                           INC    R2                      ; STK.PTR                        8844
071560  126227  015034  000017           CMPB   STACK(R2),#17           ; *(STK.PTR),*                   8846
071566  001767                           BEQ    9$
071570  005267  123602                   INC    P.CNT                   ;                                8848
071574  026767  123576  123576           CMP    P.CNT,LIMIT
071602  003047                           BGT    10$
071604  104455                           TRAP   55                      ;                                8850
071606  000134                           .WORD  134
071610  012750                           .WORD  SYNC
071612  026302                           .WORD  DUMPER
071614  012746  010730                   MOV    #WRD.19,-(SP)           ;                                8851
071620  012746  012216                   MOV    #FNC.5,-(SP)
071624  012746  010650                   MOV    #WRD.12,-(SP)
071630  012746  011676                   MOV    #PHR.4,-(SP)
071634  012746  011140                   MOV    #WRD.39,-(SP)
071640  012746  010766                   MOV    #WRD.23,-(SP)
071644  012746  010322                   MOV    #SIX.FMT,-(SP)
071650  012746  000007                   MOV    #7,-(SP)
071654  010600                           MOV    SP,R0                   ; SP,*
071656  104414                           TRAP   14
071660  010216                           MOV    R2,(SP)                 . STK.PTR,*                      8852
071662  005046                           CLR    -(SP)
071664  116216  015034                   MOVB   STACK(R2),(SP)          ; *(STK.PTR),*
071670  012746  177777                   MOV    #-1,-(SP)
071674  012746  006650                   MOV    #FMT.5,-(SP)
071700  012746  000004                   MOV    #4,-(SP)
071704  010600                           MOV    SP,R0                   ; SP,*
071706  104414                           TRAP   14
071710  012701  000001                   MOV    #1,R1                   ; *,DODU.FLG                     8853
071714  062706  000030                   ADD    #30,SP                  ;                                8848
071720  000712                           BR     9$                      ;                                8841
071722  006366  000004           10$:    ASL    4(SP)                   ; NIB.BIT                        8858
071726  005205                           INC    R5                      ; BY.ONE.WRD                     8804
071730  020527  000003                   CMP    R5,#3                   ; BY.ONE.WRD,*
```

```
19816                                   ;ML4AD                                                   29-Mar-1982 16:23:04    TOPS
19817                                   ;               TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<
19818
19819 071734  003002                            BGT     11$
19820 071736  000167  177226                    JMP     5$
19821 071742  012766  000001  000004  11$:      MOV     #1,4(SP)                        ; *,NIB.BIT              8861
19822 071750  005266  000010                    INC     10(SP)                          ; ALL.ONES.1             8862
19823 071754  005366  000006                    DEC     6(SP)                           ; ALL.ONES.2             8863
19824 071760  005204                            INC     R4                              ; BY.FOUR.WRDS           8801
19825 071762  020427  000003                    CMP     R4,#3                           ; BY.FOUR.WRDS,*
19826 071766  003002                            BGT     12$
19827 071770  000167  177172                    JMP     4$
19828 071774  022626                    12$:    CMP     (SP)+,(SP)+                     ;                        8780
19829 071776  104467                            TRAP    67                              ;                        8864
19830 072000  006000                            ROR     R0
19831 072002  103002                            BHIS    13$
19832 072004  000167  176776                    JMP     1$
19833 072010  005301                    13$:    DEC     R1                              ; DODU.FLG               8868
19834 072012  001004                            BNE     14$
19835 072014  016700  124010                    MOV     ML.LUN,R0                       ;                        8871
19836 072020  104451                            TRAP    51
19837 072022  104444                            TRAP    44
19838 072024  062706  000012          14$:    ADD     #12,SP                          ;                        8714
19839 072030  000207                            RTS     PC
19840
19841                                   ; Routine Size:  272 words
19842                                   ; Maximum stack depth per invocation:  26 words
19847
19848
19852
19853                                           .SBTTL  T38 TEST CODE SECTION
19857 072032                            T38::
19858 072032  004767  176734          1$:     JSR     PC,$T38                         ;                        8873
19859 072036  104466                            TRAP    66
19860 072040  006000                            ROR     R0
19861 072042  103773                            BLO     1$
19862 072044  000207                            RTS     PC
19863
19864                                   ; Routine Size:  6 words
19865                                   ; Maximum stack depth per invocation:  0 words
19870 ;           8876   !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;           TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (91)
;
;           !
;           BGNTST;
;
;           !++
;           ! TEST NUMBER:  TST 39
;           !
;           ! TEST NAME:    SYNC DATA BUS BIT UNIQUENESS TEST/READ PATH
;           !
;           ! TEST DESCRIPTION:
;           !       TEST SYNCHRONOUS DATA BUS READ
;           !       PATH FOR DATA BIT UNIQUENESS BY:
;           !
;           !       1.  LOADING THE FIRST 16 WORDS IN THE IO_BUF WITH A SHIFTING
;           !           ZERO IN A FIELD OF ONES PATTERN.
;           !
;           !       2.  VIA MBUS WRITE FUNCTION WRITE SHIFTING PATTERN INTO THE GOOD BLOCK.
;           !
;           !       3.  CLEAR THE IO_BUF.
;           !
;           !       4.  VIA MBUS READ FUNCTION READ THE SHIFTING PATTERN THROUGH THE
;           !           READ PATH.
;           !
;           !       5.  INTERIGATE THE IO_BUF FOR THE SHIFTING PATTERN.
;           !
;           ! IMPLICIT INPUTS:
;           !       IO_BUF
;           !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE FUNCTION ARD FOUND.
;           !--
;
;           local
;               DODU_FLG,                               !DROP UNIT FLAG
;               TST_PAT;                                !TEST PATTERN
;
;           CLR_MBUS;
;           DODU_FLG = ZERO;
;           TST_PAT = ONE;                              !ONE IN A FIELD OF ZEROES
;
;           incr CNT from 0 to 15 do                    !WRITE 16 WORDS WITH SHIFTED 0 IN A FIELD OF 1'S
;               begin
;               IO_BUF [.CNT] = not .TST_PAT;
;               TST_PAT = .TST_PAT^ONE;
;               end;
;
;           GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
;           MLCS1 = write;                              !WRITE SHIFTING PATTERN
;           TIME_OUT_LOOP;
;           BGNSUB;
;
;           incr CNT from 0 to 15 do                    !CLEAR OUT THE IO_BUF
;               IO_BUF [.CNT] = ZEROES;
;
;           CLR_MBUS;
```

```
;ML4AD                                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  TEST CODE SECTION                                  29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (91)

;           8929   GD_BLK_XFER ();                                    !SET UP A GOOD BLOCK XFERR
;           8930   MLCS1 ≡ read;                                      !READ SHIFTING PATTERN THROUGH SYNC BUS
;           8931   TIME_OUT_LOOP;
;           8932   TST_PAT ≡ ONE;                                     !SHIFTING PATTERN
;           8933
;           8934   incr CNT from 0 to 15 do                           !READ IO_BUF FOR SHIFTING 0 IN FIELD OF 1'S
;           8935       begin
;           8936
;           8937       if .IO_BUF [.CNT] neq ( not .TST_PAT)          !COMPARE IO_BUF TO SHIFTED PAT
;           8938       then
;           8939           begin                                      !ERROR AND SET DODU_FLG IF NEQ
;           8940           ERRDF (93, SYNC, DUMPER);
;           8941           PRINTB (FIV_FMT, WRD_23, FNC_6, WRD_19, WRD_39, PHR_4);
;           8942           PRINTB (FMT_2, ( not .TST_PAT), .IO_BUF [.CNT], ( not .TST_PAT xor .IO_BUF [.CNT]));
;           8943           DODU_FLG = ONE;
;           8944           end;
;           8945
;           8946       TST_PAT = .TST_PAT^ONE;                        !SHIFT THE PATTERN AND REPEAT
;           8947       end;
;           8948
;           8949   ENDSUB;
;           8950
;           8951   if .DODU_FLG IS_SET                                !DROP THIS UNIT IF DODU_FLG IS_SET
;           8952   then
;           8953       begin
;           8954       DODU (.ML_LUN);
;           8955       DOCLN;
;           8956       end;
;           8957
;           8958   ENDTST;


                                          .SBTTL  $T39 TEST CODE SECTION
072046  004167  112540            $T39:   JSR     R1,$SAVE5                ;                      8875
072052  152777  000040  123364            BISB    #40,@ML.REG+40           ;                      8908
072060  016705  123746                    MOV     ML.DUT,R5                ;
072064  042705  177770                    BIC     #177770,R5
072070  142777  000007  123346            BICB    #7,@ML.REG+40
072076  150577  123342                    BISB    R5,@ML.REG+40
072102  005005                            CLR     R5                       ; DODU.FLG             8911
072104  012704  000001                    MOV     #1,R4                    ; *.TST.PAT            8912
072110  005000                            CLR     R0                       ; CNT                  8914
072112  010001                    1$:     MOV     R0,R1                    ; CNT,*                8916
072114  006301                            ASL     R1
072116  010461  014022                    MOV     R4,IO.BUF(R1)            ; TST.PAT,*
072122  005161  014022                    COM     IO.BUF(R1)
072126  006304                            ASL     R4                       ; TST.PAT              8917
```

```
19984                                 ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
19985                                 ;                 TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
19986
19987 072130 005200                           INC     R0                            ; CNT                              8914
19988 072132 020027 000017                    CMP     R0,#17                        ; CNT,*
19989 072136 003765                           BLE     1$
19990 072140 004767 126146                    JSR     PC,GD.BLK.XFER
19991 072144 012777 000061 123232             MOV     #61,@ML.REG                   ;                                  8920
19992 072152 105777 123276          2$:       TSTB    @ML.REG+50                    ;                                  8921
19993 072156 100375                           BPL     2$
19994 072160 104402                  3$:       TRAP    2                             ;                                  8922
19995 072162 005000                           CLR     R0                            ; CNT                              8925
19996 072164 010001                  4$:       MOV     R0,R1                         ; CNT,*                            8926
19997 072166 006301                           ASL     R1
19998 072170 005061 014022                    CLR     IO.BUF(R1)
19999 072174 005200                           INC     R0                            ; CNT                              8925
20000 072176 020027 000017                    CMP     R0,#17                        ; CNT,*
20001 072202 003770                           BLE     4$
20002 072204 152777 000040 123232             BISB    #40,@ML.REG+40                ;                                  8926
20003 072212 016703 123614                    MOV     ML.DUT,R3
20004 072216 042703 177770                    BIC     #177770,R3
20005 072222 142777 000007 123214             BICB    #7,@ML.REG+40
20006 072230 150377 123210                    BISB    R3,@ML.REG+40
20007 072234 004767 126052                    JSR     PC,GD.BLK.XFER
20008 072240 012777 000071 123136             MOV     #71,@ML.REG                   ;                                  8929
20009 072246 105777 123202          5$:       TSTB    @ML.REG+50                    ;                                  8930
20010 072252 100375                           BPL     5$
20011 072254 012704 000001                    MOV     #1,R4                         ; *,TST.PAT                        8932
20012 072260 005002                           CLR     R2                            ; CNT                              8934
20013 072262 010201                  6$:       MOV     R2,R1                         ; CNT,*                            8937
20014 072264 006301                           ASL     R1
20015 072266 012703 014022                    MOV     #IO.BUF,R3
20016 072272 060103                           ADD     R1,R3
20017 072274 010401                           MOV     R4,R1                         ; TST.PAT,*
20018 072276 005101                           COM     R1
20019 072300 021301                           CMP     (R3),R1
20020 072302 001447                           BEQ     7$
20021 072304 104455                           TRAP    55                            ;                                  8940
20022 072306 000135                           .WORD   135
20023 072310 012750                           .WORD   SYNC
20024 072312 026302                           .WORD   DUMPER
20025 072314 012746 011676                    MOV     #PHR.4,-(SP)                  ;                                  8941
20026 072320 012746 011140                    MOV     #WRD.39,-(SP)
20027 072324 012746 010730                    MOV     #WRD.19,-(SP)
20028 072330 012746 012226                    MOV     #FNC.6,-(SP)
20029 072334 012746 010766                    MOV     #WRD.25,-(SP)
20030 072340 012746 010304                    MOV     #FIV.FMT,-(SP)
20031 072344 012746 000006                    MOV     #6,-(SP)
20032 072350 010600                           MOV     SP,R0                         ; SP,*
20033 072352 104414                           TRAP    14
20034 072354 011316                           MOV     (R3),(SP)                     ;                                  8942
20035 072356 010146                           MOV     R1,-(SP)
20036 072360 046616 000002                    BIC     2(SP),(SP)
20037 072364 040166 000002                    BIC     R1,2(SP)
20038 072370 052616                           BIS     (SP)+,(SP)
```

```
                                   ;ML4AD                                           29-Mar-1982 16:23:04    TOPS
                                   ;           TEST CODE SECTION                    29-Mar-1982 16:21:03    PA:<

      072372  011346                     MOV     (R3),-(SP)
      072374  010146                     MOV     R1,-(SP)
      072376  012746  006506             MOV     #FMT.2,-(SP)
      072402  012746  000004             MOV     #4,-(SP)
      072406  010600                     MOV     SP,R0              ; SP,*
      072410  104414                     TRAP    14
      072412  012705  000001             MOV     #1,R5              ; *,DODU.FLG                8943
      072416  062706  000026             ADD     #26,SP             ;                           8939
      072422  006304             7$:     ASL     R4                 ; TST.PAT                   8946
      072424  005202                     INC     R2                 ; CNT                       8934
      072426  020227  000017             CMP     R2,#17             ; CNT,*
      072432  003713                     BLE     6$
      072434  104467                     TRAP    67                 ;                           8947
      072436  006000                     ROR     R0
      072440  103647                     BLO     3$
      072442  005305                     DEC     R5                 ; DODU.FLG                  8951
      072444  001004                     BNE     8$
      072446  016700  123356             MOV     ML.LUN,R0          ;                           8954
      072452  104451                     TRAP    51
      072454  104444                     TRAP    44
      072456  000207             8$:     RTS     PC                 ;                           8875

                                 ; Routine Size:  133 words
                                 ; Maximum stack depth per invocation:  17 words



                                         .SBTTL  T39 TEST CODE SECTION
      072460                     T39::
      072460  004767  177362     1$:     JSR     PC,$T39            ;                           8956
      072464  104466                     TRAP    66
      072466  006000                     ROR     R0
      072470  103773                     BLO     1$
      072472  000207                     RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words
 ;             8959   !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (92)

;               !
;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 40
;               !
;               ! TEST NAME:    ARRAY ADDRESS MUX TEST
;               !
;               ! TEST DESCRIPTION:
;               !
;               !       TEST FOR UNIQUE MOS RAM ROW
;               !       AND COLUMN ADDRESSING BY:
;               !
;               !       1.  FIRST FINDING A ERROR FREE
;               !           16K OR 64K CHUNK OF MEMORY.
;               !           THIS REPRESENTS ONE ROW OF
;               !           EITHER 16K OR 64K MOS RAMS.
;               !
;               !       2.  WRITE A BACKGROUND OF ALL
;               !           ONES INTO THE GOOD CHUNK
;               !
;               !       3.  WRITE ZEROES INTO THE FIRST
;               !           BLOCK OF THE GOOD CHUNK.
;               !
;               !       4.  READ REMAINING BLOCKS IN
;               !           GOOD CHUNK FOR ONES.
;               !
;               !
;               ! IMPLICIT INPUTS:
;               !
;               !       IO_BUF
;               !
;               !       A VECTOR OF 256 WORDS
;               !       WHERE DATA FOR MBUS
;               !       READ AND WRITE TRANSFERS
;               !       CAN BE FOUND.
;               !--
;
;               local
;                   DSA_ADRS,                                   !DSA ADRS COUNTER
;                   FND_GD_CHK;                                 !FOUND GOOD 16K/64K CHUNK FLAG
;
;               IO_BUF = ONES;                                  !LOAD FIRST IO_BUF WORD WITH ONES
;               DSA_ADRS = -.RAS_INC;                           !REST DSA COUNT
;               FND_GD_CHK = ZERO;                              !CLEAR FLAG
;
;               do                                              !DO UNTIL FOUND GOOD CHUNK OR LBT
;                   begin
;                   CLR_MBUS;
;                   BAI = ONE;                                  !SET ON FIRST IO BUF WORD
;                   ECC_DIS = ONE;                              !DISABLE ECC
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (92)

;                   DSA_ADRS = .DSA_ADRS + .RAS_INC;        !INCREMENT DSA ADRS COUNTER
;                   MLWC = .W_C_SIZE;                       !16K OR 64K WORDS
;                   MLBA = IO_BUF;                          !LOAD UBUS ADRS
;                   MLDA = .DSA_ADRS;                       !LOAD DSA ADRS
;                   ML_FUNC = write;                        !DO A WRITE FUNCTION
;                   TIME_OUT_LOOP;
;
;                   if .SC IS_NOT_SET                       !DID XFERR CAUSE AN SC
;                   then
;                       begin                               !XFERR WAS OK
;                       MLWC = .W_C_SIZE;                   !LOAD WORD COUNT
;                       MLBA = IO_BUF;                      !LOAD UBUS ADRS
;                       MLDA = .DSA_ADRS;                   !LOAD DSA ADRS
;                       ML_FUNC = WRT_CHK;                  !DO A WRITE CHECK FUNCTION
;                       TIME_OUT_LOOP;
;
;                       if .SC IS_NOT_SET                   !IS THIS CHUNK GOOD
;                       then
;                           FND_GD_CHK = ONE;               !YES SET FLG
;
;                       end
;
;                   end
;               !
;               !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
;               !
;               until (.FND_GD_CHK IS_SET ) or (.DSA_ADRS eqlU .LST_ARR + .ARR_INC);
;
;                                                           !REPEAT UNTIL FOUND GOOD CHUNCK OR AT LBT
;
;               !
;               !VER CZMLAD CHANGED TEST TO UNSIGNED TEST
;               !
;               if .DSA_ADRS eqlU .LST_ARR + .ARR_INC
;               then
;                   begin
;                   ERRDF (111, INTER, DUMPER);
;                   PRINTB (FIV_FMT, FNC_13, FNC_17, WRD_50, WRD_60, WRD_56);
;                   PRINTB (THR_FMT, WRD_14, PHR_10, FNC_15);
;                   end
;               else                                        !A GOOD CHUNCK WAS FOUND CONTINUE TEST
;                   begin
;                   CLR_MBUS;
;                   BAI = ONE;
;                   ECC_DIS = ONE;                          !DISABLE ECC
;                   IO_BUF = ZEROES;                        !FIRST BLOCK IN CHUNCK GETS ZEROES
;                   MLDA = .DSA_ADRS;                       !LOAD DSA
;                   MLWC = not 255;                         !LOAD WORD COUNT
;                   MLBA = IO_BUF;                          !LOAD UBUS ADRS
;                   ML_FUNC = write;                        !DO A WRITE FUNCTION
;                   TIME_OUT_LOOP;
;                   CLR_MBUS;
```

```
20208 ;ML4AD                                                         29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
20209 ;                       TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (92)
20210
20211 ;          9064              BAI = ONE;
20212 ;          9065              IO_BUF = ONES;                    !READ REMAINING BLOCKS FOR ONES
20213 ;          9066              ECC_DIS = ONE;
20214 ;          9067              MLDA = .DSA_ADRS + 1;             !LOAD DSA WITH NEXT DSA INCREMENT
20215 ;          9068              MLBA = IO_BUF;                    !LOAD  UBUS ADRS
20216 ;          9069              MLWC = .W_C_SIZE + 256;           !LOAD WORD COUNT WITH LESS ONE BLOCK
20217 ;          9070              ML_FUNC = WRT_CHK;                !DO A WRITE CHECK FUNCTION
20218 ;          9071              TIME_OUT_LOOP;
20219 ;          9072
20220 ;          9073              if .WCE IS_SET                    !WERE ANY BITS DISTURBED
20221 ;          9074              then
20222 ;          9075                  begin                         !ERROR IF WRITE CHECK FOUND BAD DATA
20223 ;          9076                  ERRDF (112, ASYNC, DUMPER);
20224 ;          9077                  PRINTB (FOR_FMT, FNC_17, WRD_50, WRD_60, WRD_14);
20225 ;          9078                  PRINTB (FMT_9, (.MLDA - 1));
20226 ;          9079                  DODU (.ML_LUN);
20227 ;          9080                  DOCLN;
20228 ;          9081                  end;
20229 ;          9082
20230 ;          9083              end;
20231 ;          9084
20232 ;          9085          ENDTST;
20236
20237                                               .SBTTL  $T40 TEST CODE SECTION
20241 072474 004167 112040             $T40:     JSR     R1,$SAVE2                         ;               8958
20242 072500 012767 177777 121314               MOV     #-1,IO.BUF                        ;               9003
20243 072506 016702 122634                      MOV     RAS.INC,R2                        ; *,DSA.ADRS    9004
20244 072512 005402                             NEG     R2                                ; DSA.ADRS
20245 072514 005000                             CLR     R0                                ; FND.GD.CHK    9005
20246 072516 152777 000040 122720  1$:          BISB    #40,@ML.REG+40                    ;               9008
20247 072524 016701 123302                      MOV     ML.DUT,R1
20248 072530 042701 177770                      BIC     #177770,R1
20249 072534 142777 000007 122702               BICB    #7,@ML.REG+40
20250 072542 150177 122676                      BISB    R1,@ML.REG+40
20251 072546 152777 000010 122670               BISB    #10,@ML.REG+40                    ;               9010
20252 072554 152777 000002 122742               BISB    #2,@ML.REG+120                    ;               9011
20253 072562 066702 122560                      ADD     RAS.INC,R2                        ; *,DSA.ADRS    9012
20254 072566 016777 122552 122620               MOV     W.C.SIZE,@ML.REG+10               ;               9013
20255 072574 012777 014022 122622               MOV     #IO.BUF,@ML.REG+20                ;               9014
20256 072602 010277 122626                      MOV     R2,@ML.REG+30                     ; DSA.ADRS,*    9015
20257 072606 142777 000077 122570               BICB    #77,@ML.REG                       ;               9016
20258 072614 152777 000061 122562               BISB    #61,@ML.REG                       ;
20259 072622 105777 122626             2$:      TSTB    @ML.REG+50
20260 072626 100375                             BPL     2$
20261 072630 032777 100000 122546               BIT     #100000,@ML.REG                   ;               9019
20262 072636 001027                             BNE     4$
```

```
                                         ;ML4AD                                                29-Mar-1982 16:23:04   TOPS
                                         ;                     TEST CODE SECTION               29-Mar-1982 16:21:03   PA:<

072640  016777  122500  122546                   MOV     W.C.SIZE,@ML.REG+10            ;                              9022
072646  012777  014022  122550                   MOV     #IO.BUF,@ML.REG+20             ;                              9023
072654  010277  122554                           MOV     R2,@ML.REG+30                  ; DSA.ADRS,*                   9024
072660  142777  000077  122516                   BICB    #77,@ML.REG                    ;                              9025
072666  152777  000051  122510                   BISB    #51,@ML.REG
072674  105777  122554                   3$:     TSTB    @ML.REG+50
072700  100375                                   BPL     3$
072702  032777  100000  122474                   BIT     #100000,@ML.REG                ;                              9028
072710  001002                                   BNE     4$
072712  012700  000001                           MOV     #1,R0                          ; *,FND.GD.CHK                 9030
072716  020027  000001                   4$:     CMP     R0,#1                          ; FND.GD.CHK,*                 9038
072722  001406                                   BEQ     5$
072724  016701  121070                           MOV     LST.ARR,R1
072730  066701  121050                           ADD     ARR.INC,R1
072734  020201                                   CMP     R2,R1                          ; DSA.ADRS,*
072736  001267                                   BNE     1$
072740  016701  121054                   5$:     MOV     LST.ARR,R1                     ;                              9045
072744  066701  121034                           ADD     ARR.INC,R1
072750  020201                                   CMP     R2,R1                          ; DSA.ADRS,*
072752  001043                                   BNE     6$
072754  104455                                   TRAP    55                             ;                              9048
072756  000157                                   .WORD   157
072760  013114                                   .WORD   INTER
072762  026302                                   .WORD   DUMPER
072764  012746  011344                           MOV     #WRD.56,-(SP)                  ;                              9049
072770  012746  011400                           MOV     #WRD.60,-(SP)
072774  012746  011270                           MOV     #WRD.50,-(SP)
073000  012746  012404                           MOV     #FNC.17,-(SP)
073004  012746  012334                           MOV     #FNC.13,-(SP)
073010  012746  010304                           MOV     #FIV.FMT,-(SP)
073014  012746  000006                           MOV     #6,-(SP)
073020  010600                                   MOV     SP,R0                          ; SP,*
073022  104414                                   TRAP    14
073024  012716  012360                           MOV     #FNC.15,(SP)                   ;                              9050
073030  012746  012006                           MOV     #PHR.10,-(SP)
073034  012746  010664                           MOV     #WRD.14,-(SP)
073040  012746  010256                           MOV     #THR.FMT,-(SP)
073044  012746  000004                           MOV     #4,-(SP)
073050  010600                                   MOV     SP,R0                          ; SP,*
073052  104414                                   TRAP    14
073054  062706  000026                           ADD     #26,SP                         ;                              9047
073060  000207                                   RTS     PC                             ;                              9045
073062  152777  000040  122354           6$:     BISB    #40,@ML.REG+40                 ;                              9053
073070  016701  122736                           MOV     ML.DUT,R1
073074  042701  177770                           BIC     #177770,R1
073100  142777  000007  122336                   BICB    #7,@ML.REG+40
073106  150177  122332                           BISB    R1,@ML.REG+40
073112  152777  000010  122324                   BISB    #10,@ML.REG+40                 ;                              9055
073120  152777  000002  122376                   BISB    #2,@ML.REG+120                 ;                              9056
073126  005067  120670                           CLR     IO.BUF                         ;                              9057
073132  010277  122276                           MOV     R2,@ML.REG+30                  ; DSA.ADRS,*                   9058
073136  012777  177400  122250                   MOV     #-400,@ML.REG+10               ;                              9059
```

```
                                    ;ML4AD                                                 29-Mar-1982 16:23:04   TOPS
                                    ;             TEST CODE SECTION                        29-Mar-1982 16:21:03   PA:<

073144  012777  014022  122252            MOV     #IO.BUF,@ML.REG+20          ;                                9060
073152  142777  000077  122224            BICB    #77,@ML.REG                 ;                                9061
073160  152777  000061  122216            BISB    #61,@ML.REG                 ;
073166  105777  122262            7$:     TSTB    @ML.REG+50
073172  100375                            BPL     7$
073174  152777  000040  122242            BISB    #40,@ML.REG+40              ;                                9062
073202  016701  122624                    MOV     ML.DUT,R1
073206  042701  177770                    BIC     #177770,R1
073212  142777  000007  122224            BICB    #7,@ML.REG+40
073220  150177  122220                    BISB    R1,@ML.REG+40
073224  152777  000010  122212            BISB    #10,@ML.REG+40              ;                                9064
073232  012767  177777  120562            MOV     #-1,IO.BUF                  ;                                9065
073240  152777  000002  122256            BISB    #2,@ML.REG+120              ;                                9066
073246  010201                            MOV     R2,R1                       ; DSA.ADRS,*                     9067
073250  005201                            INC     R1
073252  010177  122156                    MOV     R1,@ML.REG+30
073256  012777  014022  122140            MOV     #IO.BUF,@ML.REG+20          ;                                9068
073264  016702  122054                    MOV     W.C.SIZE,R2                 ;                                9069
073270  062702  000400                    ADD     #400,R2
073274  010277  122114                    MOV     R2,@ML.REG+10
073300  142777  000077  122076            BICB    #77,@ML.REG                 ;                                9070
073306  152777  000051  122070            BISB    #51,@ML.REG
073314  105777  122134            8$:     TSTB    @ML.REG+50
073320  100375                            BPL     8$
073322  032777  040000  122114            BIT     #40000,@ML.REG+40           ;                                9073
073330  001441                            BEQ     9$
073332  104455                            TRAP    55                          ;                                9076
073334  000160                            .WORD   160
073336  012706                            .WORD   ASYNC
073340  026302                            .WORD   DUMPER
073342  012746  010664                    MOV     #WRD.14,-(SP)               ;                                9077
073346  012746  011400                    MOV     #WRD.60,-(SP)
073352  012746  011270                    MOV     #WRD.50,-(SP)
073356  012746  012404                    MOV     #FNC.17,-(SP)
073362  012746  010270                    MOV     #FOR.FMT,-(SP)
073366  012746  000005                    MOV     #5,-(SP)
073372  010600                            MOV     SP,R0                       ; SP,*
073374  104414                            TRAP    14
073376  017716  122032                    MOV     @ML.REG+30,(SP)             ;                                9078
073402  005316                            DEC     (SP)
073404  012746  007064                    MOV     #FMT.9,-(SP)
073410  012746  000002                    MOV     #2,-(SP)
073414  010600                            MOV     SP,R0                       ; SP,*
073416  104414                            TRAP    14
073420  016700  122404                    MOV     ML.LUN,R0                   ;                                9079
073424  104451                            TRAP    51
073426  104444                            TRAP    44
073430  062706  000020                    ADD     #20,SP                      ;                                9075
073434  000207                    9$:     RTS     PC                          ;                                8958

                                    ; Routine Size:  241 words
                                    ; Maximum stack depth per invocation:  14 words
```

```
                                 ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                 ;               TEST CODE SECTION               29-Mar-1982 16:21:03   PA:<



                                         .SBTTL  T40 TEST CODE SECTION
073436                           T40::
073436  004767  177032           1$:     JSR     PC,$T40                 ;                       9083
073442  104466                           TRAP    66
073444  006000                           ROR     R0
073446  103773                           BLO     1$
073450  000207                           RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words


;        9086   !<BLF/PAGE>
```

```
;ML4AD                                                29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;           TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (93)

!
BGNTST;

!++
! TEST NUMBER:  TST 41
!
! TEST NAME:    NIBBLE OFFSET TEST
!
! TEST DESCRIPTION:
!       TEST NIBBLE OFFSET COUNTERS TO OFFSET GOOD NIBBLE DATA A MAX
!       OF 14 WORDS ON DETECTION OF ALL BAD NIBBLES BY:
!
!       1.  LOADING FIRST 2 1/4 WORDS OF THE IO_BUF WITH ZEROES AND THE
!           REMAINING OF BUFFER WITH ONES.
!
!       2.  VIA DAT_DM MODE WRITE THE GOOD BLOCK WITH BACKGROUND
!           ON ONES.
!
!       3.  VIA PROM R/W MODE FORCE ALL ARRAY NIBBLES BAD.
!
!       4.  VIA A MBUS WRITE FUNCTION LOAD IO_BUF INTO THE GOOD BLOCK.
!
!       5.  VIA DAT_DM MODE READ FIRST 15 ARRAY WORDS FOR ZEROES AND THE
!           REMAINING WORDS FOR ONES.
!
! IMPLICIT INPUTS:
!       PD_TEMP
!       A BIT VECTOR OF 16 BITS WHERE THE READ PROM DATA IS STORED AND
!       ACCESSED FROM.
!
!       IO_BUF
!       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
!       FUNCTIONS ARE FOUND.
!--

local
    DODU_FLG,                                   !DROP UNIT FLAG
    TST_PAT,                                    !TEST PATTERN
    START,                                      !STARTING WORD
    FINISH,                                     !ENDING WORD
    ERR_FLG;                                    !ERROR FLAG

CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
BGNSUB;
CLR_MBUS;
DODU_FLG = ZERO;

incr WD_CNT from 0 to 255 do                    !LOAD IO_BUF WITH ONES
    IO_BUF [.WD_CNT] = ONES;

IO_BUF [0] = ZEROES;                            !LOAD FIRST 2 1/4 WORDS WITH ZEROES
IO_BUF [1] = ZEROES;
```

```
:ML4AD                                                  29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
            TEST CODE SECTION                           29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (93)

IO_BUF [2] = %o'177760';
MLD1 = ONES;                                            !LOAD DATA DIAG REGISTERS WITH ONES
MLD2 = ONES;
MLE2 = ONES;
DAT_DM_XFER ();                                         !SET UP A DATA DIAG MODE XFERR
MLCS1 = write;                                          !DO A WRITE XFERR

incr WD_CNT from 0 to 127 do                            !LOAD BLOCK WITH BG PAT
    begin
    DELAY (ONE_US);
    DAT_CLK = ONE;
    end;

CLR_MBUS;
WRT_PD (ONES, 19);                                      !FORCE ALL NIBBLES BAD
PROM_RW = ONE;                                          !SET PROM READ WRITE
GD_BLK_XFER ();                                         !SET UP A GOOD BLOCK XFERR
MLCS1 = write;                                          !WRITE ZEROES IN FIRST BLOCK WORD LOCATION
                                                        !OFFSETTING 14 NIBBLES WITH ZEROES ALSO.
TIME_OUT_LOOP;
CLR_MBUS;
START = ZERO;                                           !START AT THE FIRST BLOCK WORD
FINISH = 14;                                            !END AT THE 14'TH BLOCK WORD
TST_PAT = ZEROES;                                       !TEST FOR ZEROES IN FIRST 14 WORDS
DAT_DM_XFER ();                                         !SET UP A DATA DIAG MODE XFERR
MLCS1 = read;                                           !DO A READ FUNCTION
DELAY (ONE_US);

incr TWICE from 0 to 1 do                               !READ WORDS 0-14 FOR 0'S AND 15-126 FOR 1'S
    begin

    incr WRD_CNT from .START to .FINISH do              !READ BLOCK WORDS FORM START TO FINISH
        begin
        PD_TEMP = .MLPD;                                !GET PROM DATA
        DAT_CLK = ONE;                                  !CLOCK OUT THE DATA WORD
        DELAY (ONE_US);
        RD_LNG_WRD;                                     !READ THE DATA DIAG REGISTERS

        incr NIB_PTR from 0 to 8 do                     !LOOK AT 9 NIBBLES

            if .PD_TEMP [.NIB_PTR] IS_NOT_SET           !FIND GOOD NIBBLES
            then
                begin
                TST_LNG_WRD (.NIB_PTR, .TST_PAT, ERR_FLG);      !COMPARE NIBBLE WITH TST PAT

                if .ERR_FLG IS_SET                      !SEE IF COMPARE FOUND AN ERROR
                then
                    begin                               !ERROR AND SET DODU_FLG IF ERROR FLG SET
                    CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
                    ERRDF (94, ARR_DAT, DUMPER);
                    PRINTB (THR_FMT, WRD_41, WRD_46, WRD_10);
                    PRINTB (FMT_6, .NIB_PTR);
```

```
20522 ;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
20523 ;                  TEST CODE SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (93)
20524
20525 ;           9191                    DODU_FLG = ONE;
20526 ;           9192                    end;
20527 ;           9193
20528 ;           9194               end;
20529 ;           9195
20530 ;           9196          end;
20531 ;           9197
20532 ;           9198      TST_PAT = not .TST_PAT;                        !NOW READ FOR ONES
20533 ;           9199      START = 15;                                    !START A 15
20534 ;           9200      FINISH = 126;                                  !END AT 126
20535 ;           9201      end
20536 ;           9202
20537 ;           9203  ENDSUB;
20538 ;           9204
20539 ;           9205  if .DODU_FLG IS_SET                                !DROP THIS UNIT IF DODU_FLG SET
20540 ;           9206  then
20541 ;           9207      begin
20542 ;           9208      DODU (.ML_LUN);
20543 ;           9209      DOCLN;
20544 ;           9210      end;
20545 ;           9211
20546 ;           9212  ENDTST;
20550
20551                                        .SBTTL  $T41 TEST CODE SECTION
20555 073452  004167  111134        $T41:   JSR     R1,$SAVE5                  ;                  9085
20556 073456  162706  000012                SUB     #12,SP
20557 073462  005067  121710                CLR     P.CNT                      ;                  9127
20558 073466  104402                1$:     TRAP    2                          ;                  9129
20559 073470  152777  000040  121746        BISB    #40,@ML.REG+40             ;                  9130
20560 073476  016704  122330                MOV     ML.DUT,R4
20561 073502  042704  177770                BIC     #177770,R4
20562 073506  142777  000007  121730        BICB    #7,@ML.REG+40
20563 073514  150477  121724                BISB    R4,@ML.REG+40
20564 073520  005066  000004                CLR     4(SP)                      ; DODU.FLG         9132
20565 073524  005002                        CLR     R2                         ; WD.CNT           9134
20566 073526  010203                2$:     MOV     R2,R3                      ; WD.CNT,*         9135
20567 073530  006303                        ASL     R3
20568 073532  012763  177777  014022        MOV     #-1,IO.BUF(R3)
20569 073540  005202                        INC     R2                         ; WD.CNT           9134
20570 073542  020227  000377                CMP     R2,#377                    ; WD.CNT,*
20571 073546  003767                        BLE     2$
20572 073550  005067  120246                CLR     IO.BUF                     ;                  9137
20573 073554  005067  120244                CLR     IO.BUF+2                   ;                  9138
20574 073560  012767  177760  120240        MOV     #-20,IO.BUF+4              ;                  9139
20575 073566  012777  177777  122000        MOV     #-1,@ML.REG+170            ;                  9140
20576 073574  012777  177777  122002        MOV     #-1,@ML.REG+200            ;                  9141
```

```
                                   ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
                                   ;                TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
073602 012777 177777 121754              MOV     #-1,@ML.REG+160         ;                                           9142
073610 004767 122576                     JSR     PC,DAT.DM.XFER          ;                                           9143
073614 012777 000061 121562              MOV     #61,@ML.REG             ;                                           9144
073622 005001                            CLR     R1                      ; WD.CNT                                    9146
073624 012702 000001             3$:     MOV     #1,R2                   ; *,$STMP2                                  9148
073630 001411                    4$:     BEQ     7$
073632 016703 106260                     MOV     L$DLY,R3                ; *,$STMP1
073636 001404                            BEQ     6$
073640 005066 000010             5$:     CLR     10(SP)                  ; $STMP
073644 005303                            DEC     R3                      ; $STMP1
073646 001374                            BNE     5$
073650 005302                    6$:     DEC     R2                      ; $STMP2
073652 000766                            BR      4$
073654 152777 000020 121642      7$:     BISB    #20,@ML.REG+120         ;                                           9149
073662 005201                            INC     R1                      ; WD.CNT                                    9146
073664 020127 000177                     CMP     R1,#177                 ; WD.CNT,*
073670 003755                            BLE     3$
073672 152777 000040 121544              BISB    #40,@ML.REG+40          ;                                           9150
073700 016704 122126                     MOV     ML.DUT,R4
073704 042704 177770                     BIC     #177770,R4
073710 142777 000007 121526              BICB    #7,@ML.REG+40
073716 150477 121522                     BISB    R4,@ML.REG+40
073722 012746 177777                     MOV     #-1,-(SP)               ;                                           9153
073726 012746 000023                     MOV     #23,-(SP)
073732 004767 127512                     JSR     PC,WRT.PD
073736 152777 000100 121560              BISB    #100,@ML.REG+120        ;                                           9154
073744 004767 124342                     JSR     PC,GD.BLK.XFER          ;                                           9155
073750 012777 000061 121426              MOV     #61,@ML.REG             ;                                           9156
073756 105777 121472             8$:     TSTB    @ML.REG+50
073762 100375                            BPL     8$
073764 152777 000040 121452              BISB    #40,@ML.REG+40          ;                                           9158
073772 016704 122034                     MOV     ML.DUT,R4
073776 042704 177770                     BIC     #177770,R4
074002 142777 000007 121434              BICB    #7,@ML.REG+40
074010 150477 121430                     BISB    R4,@ML.REG+40
074014 005066 000006                     CLR     6(SP)                   ; START                                     9160
074020 012766 000016 000004              MOV     #16,4(SP)               ; *,FINISH                                  9161
074026 005005                            CLR     R5                      ; TST.PAT                                   9162
074030 004767 122356                     JSR     PC,DAT.DM.XFER          ;                                           9163
074034 012777 000071 121342              MOV     #71,@ML.REG             ;                                           9164
074042 012702 000001                     MOV     #1,R2                   ; *,$STMP2                                  9165
074046 001411                    9$:     BEQ     12$
074050 016703 106042                     MOV     L$DLY,R3                ; *,$STMP1
074054 001404                            BEQ     11$
074056 005066 000014             10$:    CLR     14(SP)                  ; $STMP
074062 005303                            DEC     R3                      ; $STMP1
074064 001374                            BNE     10$
074066 005302                    11$:    DEC     R2                      ; $STMP2
074070 000766                            BR      9$
074072 005004                    12$:    CLR     R4                      ; TWICE                                     9167
074074 016601 000006             13$:    MOV     6(SP),R1                ; START,WRD.CNT                             9170
074100 005301                            DEC     R1                      ; WRD.CNT
```

```
                                        ;ML4AD                                                             29-Mar-1982 16:23:04   TOPS
                                        ;                 TEST CODE SECTION                                 29-Mar-1982 16:21:03   PA:<

074102  000545                                  BR      23$
074104  017767  121524  121230          14$:    MOV     @ML.REG+230,PD.TEMP        ;                                          9172
074112  152777  000020  121404                  BISB    #20,@ML.REG+120            ;                                          9173
074120  012702  000001                          MOV     #1,R2                      ; *,$STMP2                                 9174
074124  001411                          15$:    BEQ     18$
074126  016703  105764                          MOV     L$DLY,R3                   ; *,$STMP1
074132  001404                                  BEQ     17$
074134  005066  000014                  16$:    CLR     14(SP)                     ; $STMP
074140  005303                                  DEC     R3                         ; $STMP1
074142  001374                                  BNE     16$
074144  005302                          17$:    DEC     R2                         ; $STMP2
074146  000766                                  BR      15$
074150  017767  121420  117216          18$:    MOV     @ML.REG+170,D1.TEMP
074156  017767  121422  117212                  MOV     @ML.REG+200,D2.TEMP
074164  017767  121374  117206                  MOV     @ML.REG+160,E2.TEMP
074172  005002                                  CLR     R2                         ; NIB.PTR                                  9177
074174  010203                          19$:    MOV     R2,R3                      ; NIB.PTR,*                                9179
074176  006203                                  ASR     R3
074200  006203                                  ASR     R3
074202  006203                                  ASR     R3
074204  062703  015342                          ADD     #PD.TEMP,R3
074210  010346                                  MOV     R3,-(SP)
074212  010246                                  MOV     R2,-(SP)                   ; NIB.PTR,*
074214  042716  177770                          BIC     #177770,(SP)
074220  012746  000001                          MOV     #1,-(SP)
074224  005046                                  CLR     -(SP)
074226  004767  107402                          JSR     PC,BL$GT2
074232  062706  000010                          ADD     #10,SP
074236  005700                                  TST     R0
074240  001062                                  BNE     22$
074242  010246                                  MOV     R2,-(SP)                   ; NIB.PTR,*                                9182
074244  010546                                  MOV     R5,-(SP)                   ; TST.PAT,*
074246  012746  000020                          MOV     #20,-(SP)
074252  060616                                  ADD     SP,(SP)                    ; ERR.FLG,*
074254  004767  124116                          JSR     PC,TST.LNG.WRD
074260  026627  000020  000001                  CMP     20(SP),#1                  ; ERR.FLG,*                                9184
074266  001045                                  BNE     21$
074270  005267  121102                          INC     P.CNT                      ;                                          9186
074274  026767  121076  121076                  CMP     P.CNT,LIMIT
074302  003403                                  BLE     20$
074304  062706  000006                          ADD     #6,SP
074310  000442                                  BR      23$
074312  104455                          20$:    TRAP    55                         ;                                          9188
074314  000136                                  .WORD   136
074316  013012                                  .WORD   ARR.DAT
074320  026302                                  .WORD   DUMPER
074322  012746  010630                          MOV     #WRD.10,-(SP)              ;                                          9189
074326  012746  011226                          MOV     #WRD.46,-(SP)
074332  012746  011154                          MOV     #WRD.41,-(SP)
074336  012746  010256                          MOV     #THR.FMT,-(SP)
074342  012746  000004                          MOV     #4,-(SP)
074346  010600                                  MOV     SP,R0                      ; SP,*
```

```
                                    ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                    ;                   TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<

074350  104414                              TRAP    14
074352  010216                              MOV     R2,(SP)                 ; NIB.PTR,*             9190
074354  012746  006752                      MOV     #FMT.6,-(SP)
074360  012746  000002                      MOV     #2,-(SP)
074364  010600                              MOV     SP,R0                   ; SP,*
074366  104414                              TRAP    14
074370  012766  000001  000034              MOV     #1,34(SP)               ; *,DODU.FLG            9191
074376  062706  000016                      ADD     #16,SP                  ;                       9186
074402  062706  000006              21$:    ADD     #6,SP                   ;                       9181
074406  005202                      22$:    INC     R2                      ; NIB.PTR               9177
074410  020227  000010                      CMP     R2,#10                  ; NIB.PTR,*
074414  003667                              BLE     19$
074416  005201                      23$:    INC     R1                      ; WRD.CNT               9170
074420  020166  000004                      CMP     R1,4(SP)                ; WRD.CNT,FINISH
074424  003627                              BLE     14$
074426  005105                              COM     R5                      ; TST.PAT               9198
074430  012766  000017  000006              MOV     #17,6(SP)               ; *,START               9199
074436  012766  000176  000004              MOV     #176,4(SP)              ; *,FINISH              9200
074444  005204                              INC     R4                      ; TWICE                 9167
074446  020427  000001                      CMP     R4,#1                   ; TWICE,*
074452  003610                              BLE     13$
074454  022626                              CMP     (SP)+,(SP)+             ;                       9129
074456  104467                              TRAP    67                      ;                       9201
074460  006000                              ROR     R0
074462  103002                              BHIS    24$
074464  000167  176776                      JMP     1$
074470  026627  000004  000001      24$:    CMP     4(SP),#1                ; DODU.FLG,*            9205
074476  001004                              BNE     25$
074500  016700  121324                      MOV     ML.LUN,R0               ;                       9208
074504  104451                              TRAP    51
074506  104444                              TRAP    44
074510  062706  000012              25$:    ADD     #12,SP                  ;                       9085
074514  000207                              RTS     PC

                                    ; Routine Size:  274 words
                                    ; Maximum stack depth per invocation:  23 words




                                            .SBTTL  T41 TEST CODE SECTION
074516                              T41::
074516  004767  176730              1$:     JSR     PC,$T41                 ;                       9210
```

```
                                 ;ML4AD                                            29-Mar-1982 16:23:04   TOPS
                                 ;              TEST CODE SECTION                  29-Mar-1982 16:21:03   PA:<

074522  104466                          TRAP    66
074524  006000                          ROR     R0
074526  103773                          BLO     1$
074530  000207                          RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words



;           9213   !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
;          TEST CODE SECTION                            29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (94)

;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 42
;          !
;          ! TEST NAME:    CS1 FUNCTION ABORT TEST
;          !
;          ! TEST DESCRIPTION:
;          !       TEST CS1 FUNCTION ABORTS ON DETECTION OF CLASS 'A' & 'B' ERRORS BY:
;          !
;          !       1.  VIA MBUS WRITE FUNCTION LOAD THE GOOD BLOCK WITH BACKGROUND
;          !           PATTERN OF ONES.
;          !
;          !       2.  CLEAR THE IO_BUF
;          !
;          !       3.  DO A MBUS READ FUNCTION.  WHILE THE READ IS IN PROGRESS WRITE TO
;          !           MLDA (CLASS 'A' ERROR) READ THE IO_BUF FOR ONES.
;          !
;          !       4.  CLEAR THE IO_BUF
;          !
;          !       5.  VIA PROM R/W MODE FORCE UV ERROR TO THE UV ADRS ERROR PROM
;          !           (CLASS 'B' ERROR).  DO A MBUS READ.
;          !
;          !       6.  READ IO_BUF FOR ZEROES
;          !
;          ! IMPLICIT INPUTS:
;          !       IO_BUF
;          !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND
;          !       WRITE FUNCTION ARE FOUND.
;          !--
;
;          CLR_THRESHOLD;                               !CLEAR ERROR PRINT THRESHOLD
;          CLR_MBUS;
;          BAI = ONE;                                   !SET ON FIRST IO_BUF ADRS
;          IO_BUF = ONES;                               !LOAD FIRST IO_BUF ADRS
;          GD_BLK_XFER ();                              !SET UP A GOOD BLOCK XFERR
;          MLCS1 = write;                               !WRITE BACKGROUND PATTERN
;          TIME_OUT_LOOP;
;
;          incr TWICE from 0 to 1 do                    !FORCE CLASS 'A' AND CLASS 'B' ERRORS
;              begin
;              BGNSUB;
;              CLR_MBUS;
;
;              incr CNT from 0 to 255 do
;                  IO_BUF [.CNT] = ZEROES;              !CLEAR OUT IO_BUF
;
;              if .TWICE eql 1                          !IF 2ND PASS THEN FORCE 'B' ERROR
;              then
;                  begin
;                  PROM_RW = ONE;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (94)

;                    MLPD = %o'777';
;                    end;
;
;                GD_BLK_XFER ();                        !SET UP A GOOD BLOCK XFERR
;                MLCS1 = read;                          !DO A READ FUNCTION
;
;                if .TWICE eql 0 then MLDA = ONES;      !IF FIRST PASS THEN FORCE AN 'A' ERROR
;
;                TIME_OUT_LOOP;
;
;                if .TWICE eql 0                        !SEE WHICH PASS WE'RE ON
;                then
;                    begin                              !CLASS 'A' ERROR
;
;                    incr WRD_CNT from 0 to 64 do       !SEE IF XFERR WAY ALLOWED TO CONTINUE
;                        begin
;
;                        if .IO_BUF [.WRD_CNT] neq ONES      !READ IO_BUF FOR BG PAT
;                        then
;                            begin                      !ERROR AND EXIT LOOP IF ZEROES
;                            CMP_THRESHOLD;             !COMPARE ERROR PRINT THRESHOLD
;                            ERRDF (95, SYNC, DUMPER);
;                            PRINTB (FOR_FMT, PHR_8, FNC_13, WRD_19, WRD_10);
;                            exitloop;
;                            end;
;
;                        end;
;
;                    end
;                else                                   !CLASS 'B' ERROR
;                    begin
;
;                    incr WRD_CNT from 0 to 64 do       !SEE IF XFERR WAS ABORTED
;                        begin
;
;                        if .IO_BUF [.WRD_CNT] neq ZEROES    !READ IO_BUF CLEARED DATA
;                        then
;                            begin                      !ERROR IF ONES AND EXIT LOOP
;                            CMP_THRESHOLD;             !COMPARE ERROR PRINT THRESHOLD
;                            ERRDF (96, SYNC, DUMPER);
;                            PRINTB (FOR_FMT, PHR_9, FNC_13, WRD_19, WRD_10);
;                            exitloop
;                            end;
;
;                        end;
;
;                    end;
;
;                if .SC IS_NOT_SET                      !SEE IF SC BIT SET
;                then
;                    begin                              !ERROR IF NOT SET
;                    ERRDF (104, SYNC, DUMPER);
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
:                        TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (94)

:             9318               PRINTB (FIV_FMT, WRD_59, PHR_1, WRD_11, WRD_19, FNC_13)
:             9319               end;
:             9320
:             9321          ENDSUB;
:             9322          end;
:             9323
:             9324      ENDTST;


                                          .SBTTL  $T42 TEST CODE SECTION
074532  004167  110016          $T42:     JSR     R1,$SAVE3                          ;                 9212
074536  005067  120634                    CLR     P.CNT                              ;                 9215
074542  152777  000040  120674            BISB    #40,@ML.REG+40                     ;                 9246
074550  016703  121256                    MOV     ML.DUT,R3
074554  042703  177770                    BIC     #177770,R3
074560  142777  000007  120656            BICB    #7,@ML.REG+40
074566  150377  120652                    BISB    R3,@ML.REG+40
074572  152777  000010  120644            BISB    #10,@ML.REG+40
074600  012767  177777  117214            MOV     #-1,IO.BUF                         ;                 9248
074606  004767  123500                    JSR     PC,GD.BLK.XFER                     ;                 9249
074612  012777  000061  120564            MOV     #61,@ML.REG                        ;                 9250
074620  105777  120630          1$:       TSTB    @ML.REG+50                         ;                 9251
074624  100375                            BPL     1$
074626  005003                            CLR     R3                                 ; TWICE           9254
074630  104402                  2$:       TRAP    2                                  ;                 9255
074632  152777  000040  120604            BISB    #40,@ML.REG+40                     ;                 9256
074640  016702  121166                    MOV     ML.DUT,R2
074644  042702  177770                    BIC     #177770,R2
074650  142777  000007  120566            BICB    #7,@ML.REG+40
074656  150277  120562                    BISB    R2,@ML.REG+40
074662  005000                            CLR     R0                                 ; CNT             9259
074664  010001                  3$:       MOV     R0,R1                              ; CNT,*           9260
074666  006301                            ASL     R1
074670  005061  014022                    CLR     IO.BUF(R1)
074674  005200                            INC     R0                                 ; CNT             9259
074676  020027  000377                    CMP     R0,#377                            ; CNT,*
074702  003770                            BLE     3$
074704  020327  000001                    CMP     R3,#1                              ; TWICE,*         9262
074710  001006                            BNE     4$
074712  152777  000100  120604            BISB    #100,@ML.REG+120                   ;                 9265
074720  012777  000777  120706            MOV     #777,@ML.REG+230                   ;                 9266
074726  004767  123360          4$:       JSR     PC,GD.BLK.XFER                     ;                 9269
074732  012777  000071  120444            MOV     #71,@ML.REG                        ;                 9270
074740  005002                            CLR     R2                                 ;                 9272
074742  005703                            TST     R3                                 ; TWICE
074744  001004                            BNE     5$
074746  005202                            INC     R2
```

```
                                   ;ML4AD                                           29-Mar-1982 16:23:04   TOPS
                                   ;              TEST CODE SECTION                 29-Mar-1982 16:21:03   PA:<

074750 012777 177777 120456                MOV    #-1,@ML.REG+30
074756 105777 120472           5$:         TSTB   @ML.REG+50
074762 100375                              BPL    5$
074764 006002                              ROR    R2                      ;                          9276
074766 103045                              BCC    8$
074770 005002                              CLR    R2                      ; WRD.CNT                  9280
074772 010201                  6$:         MOV    R2,R1                   ; WRD.CNT,*                9283
074774 006301                              ASL    R1
074776 026127 014022 177777                CMP    IO.BUF(R1),#-1
075004 001431                              BEQ    7$
075006 005267 120364                       INC    P.CNT                   ;                          9285
075012 026767 120360 120360                CMP    P.CNT,LIMIT
075020 003075                              BGT    12$
075022 104455                              TRAP   55                      ;                          9287
075024 000137                              .WORD  137
075026 012750                              .WORD  SYNC
075030 026302                              .WORD  DUMPER
075032 012746 010630                       MOV    #WRD.10,-(SP)           ;                          9288
075036 012746 010730                       MOV    #WRD.19,-(SP)
075042 012746 012334                       MOV    #FNC.13,-(SP)
075046 012746 011762                       MOV    #PHR.8,-(SP)
075052 012746 010270                       MOV    #FOR.FMT,-(SP)
075056 012746 000005                       MOV    #5,-(SP)
075062 010600                              MOV    SP,R0                   ; SP,*
075064 104414                              TRAP   14
075066 000443                              BR     10$                     ;                          9289
075070 005202                  7$:         INC    R2                      ; WRD.CNT                  9280
075072 020227 000100                       CMP    R2,#100                 ; WRD.CNT,*
075076 003735                              BLE    6$
075100 000445                              BR     12$                     ;                          9276
075102 005002                  8$:         CLR    R2                      ; WRD.CNT                  9298
075104 010201                  9$:         MOV    R2,R1                   ; WRD.CNT,*                9301
075106 006301                              ASL    R1
075110 005761 014022                       TST    IO.BUF(R1)
075114 001433                              BEQ    11$
075116 005267 120254                       INC    P.CNT                   ;                          9303
075122 026767 120250 120250                CMP    P.CNT,LIMIT
075130 003031                              BGT    12$
075132 104455                              TRAP   55                      ;                          9305
075134 000140                              .WORD  140
075136 012750                              .WORD  SYNC
075140 026302                              .WORD  DUMPER
075142 012746 010630                       MOV    #WRD.10,-(SP)           ;                          9306
075146 012746 010730                       MOV    #WRD.19,-(SP)
075152 012746 012334                       MOV    #FNC.13,-(SP)
075156 012746 011774                       MOV    #PHR.9,-(SP)
075162 012746 010270                       MOV    #FOR.FMT,-(SP)
075166 012746 000005                       MOV    #5,-(SP)
075172 010600                              MOV    SP,R0                   ; SP,*
075174 104414                              TRAP   14
075176 062706 000014           10$:        ADD    #14,SP                  ;                          9307
075202 000404                              BR     12$
```

```
20988                                   ;ML4AD                                                          29-Mar-1982 16:23:04    TOPS
20989                                   ;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<
20990
20991 075204  005202                    11$:    INC     R2                          ; WRD.CNT                           9298
20992 075206  020227  000100                    CMP     R2,#100                     ; WRD.CNT,*
20993 075212  003734                            BLE     9$
20994 075214  032777  100000  120162    12$:    BIT     #100000,@ML.REG             ;                                   9314
20995 075222  001026                            BNE     13$
20996 075224  104455                            TRAP    55                          ;                                   9317
20997 075226  000150                            .WORD   150
20998 075230  012750                            .WORD   SYNC
20999 075232  026302                            .WORD   DUMPER
21000 075234  012746  012334                    MOV     #FNC.13,-(SP)               ;                                   9318
21001 075240  012746  010730                    MOV     #WRD.19,-(SP)
21002 075244  012746  010640                    MOV     #WRD.11,-(SP)
21003 075250  012746  011610                    MOV     #PHR.1,-(SP)
21004 075254  012746  011374                    MOV     #WRD.59,-(SP)
21005 075260  012746  010304                    MOV     #FIV.FMT,-(SP)
21006 075264  012746  000006                    MOV     #6,-(SP)
21007 075270  010600                            MOV     SP,R0                       ; SP,*
21008 075272  104414                            TRAP    14
21009 075274  062706  000016                    ADD     #16,SP                      ;                                   9316
21010 075300  104467                    13$:    TRAP    67                          ;                                   9319
21011 075302  006000                            ROR     R0
21012 075304  103002                            BHIS    15$
21013 075306  000167  177316            14$:    JMP     2$
21014 075312  005203                    15$:    INC     R3                          ; TWICE                             9254
21015 075314  020327  000001                    CMP     R3,#1                       ; TWICE,*
21016 075320  003772                            BLE     14$
21017 075322  000207                            RTS     PC                          ;                                   9212
21018
21019                                   ; Routine Size:  189 words
21020                                   ; Maximum stack depth per invocation:  11 words
21025
21026
21030
21031                                           .SBTTL  T42 TEST CODE SECTION
21035 075324                            T42::
21036 075324  004767  177202            1$:     JSR     PC,$T42                     ;                                   9322
21037 075330  104466                            TRAP    66
21038 075332  006000                            ROR     R0
21039 075334  103773                            BLO     1$
21040 075336  000207                            RTS     PC
21041
21042                                   ; Routine Size:  6 words
```

```
                          ;ML4AD
                          ;            TEST CODE SECTION

                          ; Maximum stack depth per invocation:  0 words


;         9325  !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (95)

;          !
;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 43
;          !
;          ! TEST NAME:    LAST BLOCK TRANSFER TEST
;          !
;          ! TEST DESCRIPTION:
;          !
;          !        TEST THE LAST BLOCK INDICATOR BIT
;          !        FOR SETTING/NOT SETTING AND THE
;          !        DSA REGISTER FOR INCREMENTING BY:
;          !
;          !        1.  DOING MBUS TRANSFERRS AT EACH
;          !            BLOCK FROM BLOCK ZERO TO
;          !            LAST BLOCK -1 AND TEST LBT
;          !            CLEAR AND DSA REGISTER TO BE
;          !            INCREMENTED.
;          !
;          !        2.  DO A MBUS TRANSFERR AT
;          !            THE LAST BLOCK.
;          !            TEST LBT TO BE SET AND
;          !            TEST FOR CLEAR.
;          !            TEST DSA REG TO BE INCREMENTED.
;          !
;          ! IMPLICIT INPUTS:
;          !        IO_BUF
;          !        A VECTOR OF 256 WORDS WHERE
;          !        DATA FOR MBUS READS AND WRITE
;          !        FUNCTION ARE FOUND.
;          !
;          !--
;
;          CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
;
;          !
;          !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
;          !
;          incrU DSA_CNT from 0 to .LST_BLK - 1 do                 !DO XFERRS UP TO THE LAST BLOCK
;              begin
;              BGNSUB;
;              CLR_MBUS;
;              ECC_DIS = ONE;                              !DISABLE ECC
;              MLWC = not 255;                             !LOAD WORD COUNT
;              MLBA = IO_BUF;                              !LOAD UBUS ADRS
;              MLDA = .DSA_CNT;                            !LOAD DSA WITH DSA_CNT
;              MLCS1 = write;                              !DO A WRITE FUNCTION
;              TIME_OUT_LOOP;
;
;              if .LBT IS_SET                              !SEE IF THE LAST BLOCK XFERR BIT SET
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;            TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (95)
;
;       then
;           begin
;           CMP_THRESHOLD;                               !COMPARE ERROR PRINT THRESHOLD
;           ERRDF (97, ASYNC, DUMPER);
;           PRINTB (THR_FMT, WRD_27, PHR_5, WRD_29);
;           PRINTB (FMT_7, .DSA_CNT);
;           end;
;
;       if .MLDA neq .DSA_CNT + 1                        !SEE IF THE DSA REG INCREMENTED
;       then
;           begin
;           CMP_THRESHOLD;                               !COMPARE ERROR PRINT THRESHOLD
;           ERRDF (98, ASYNC, DUMPER);
;           PRINTB (THR_FMT, REG_6, WRD_31, WRD_14);
;           PRINTB (FMT_7, .DSA_CNT);
;           end;
;
;       ENDSUB;
;       end;
;
;   BGNSUB;
;   CLR_MBUS;
;   ECC_DIS = ONE;                                       !DISABLE ECC
;   LAST_BLK_XFER ();                                    !SET UP A LAST BLOCK XFERR
;   MLCST = write;                                       !DO A WRITE FUNCTION
;   TIME_OUT_LOOP;
;
;   if .MLDA neq .LST_BLK + 1                            !SEE IF DSA REGISTER INCREMENTED
;   then
;       begin
;       ERRDF (101, ASYNC, DUMPER);
;       PRINTB (THR_FMT, REG_6, WRD_31, WRD_14);
;       PRINTB (FMT_7, .LST_BLK);
;       end;
;
;   if .LBT IS_SET                                       !SEE IF LBT BIT SET
;   then
;       begin
;       MLDA = ONES;                                     !IF SET THEN TRY TO CLEAR IT
;
;       if .LBT IS_SET                                   !SEE IF BIT CLEARED
;       then
;           begin                                        !ERROR IF NOT
;           ERRDF (99, ASYNC, DUMPER);
;           PRINTB (FIV_FMT, WRD_27, PHR_2, WRD_11, WRD_17, REG_6);
;           end;
;
;       end
;   else                                                 !LBT NOT SET
;       begin
;       ERRDF (100, ASYNC, DUMPER);
;       PRINTB (FOR_FMT, WRD_27, PHR_1, WRD_11, WRD_27);
```

```
;ML4AD                                                29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;                       TEST CODE SECTION             29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (95)

;              9430         end;
;              9431
;              9432     ENDSUB;
;              9433     ENDTST;

                                             .SBTTL  $T43 TEST CODE SECTION
075340  004167  107210             $T43:     JSR     R1,$SAVE3              ;                    9324
075344  005067  120026                       CLR     P.CNT                  ;                    9328
075350  016703  116440                       MOV     LST.BLK,R3             ;                    9366
075354  005303                               DEC     R3
075356  005001                               CLR     R1                     ; DSA.CNT
075360  000551                               BR      7$
075362  010102                     1$:       MOV     R1,R2                  ; DSA.CNT,*          9386
075364  005202                               INC     R2
075366  104402                     2$:       TRAP    2                      ;                    9367
075370  152777  000040  120046               BISB    #40,@ML.REG+40         ;                    9368
075376  016700  120430                       MOV     ML.DUT,R0
075402  042700  177770                       BIC     #177770,R0
075406  142777  000007  120030               BICB    #7,@ML.REG+40
075414  150077  120024                       BISB    R0,@ML.REG+40
075420  152777  000002  120076               BISB    #2,@ML.REG+120         ;                    9370
075426  012777  177400  117760               MOV     #-400,@ML.REG+10       ;                    9371
075434  012777  014022  117762               MOV     #IO.BUF,@ML.REG+20     ;                    9372
075442  010177  117766                       MOV     R1,@ML.REG+30          ; DSA.CNT,*          9373
075446  012777  000061  117730               MOV     #61,@ML.REG            ;                    9374
075454  105777  117774             3$:       TSTB    @ML.REG+50
075460  100375                               BPL     3$
075462  032777  002000  117764               BIT     #2000,@ML.REG+50       ;                    9377
075470  001437                               BEQ     4$
075472  005267  117700                       INC     P.CNT                  ;                    9379
075476  026767  117674  117674               CMP     P.CNT,LIMIT
075504  003076                               BGT     6$
075506  104455                               TRAP    55                     ;                    9381
075510  000141                               .WORD   141
075512  012706                               .WORD   ASYNC
075514  026302                               .WORD   DUMPER
075516  012746  011032                       MOV     #WRD.29,-(SP)          ;                    9382
075522  012746  011714                       MOV     #PHR.5,-(SP)
075526  012746  011024                       MOV     #WRD.27,-(SP)
075532  012746  010256                       MOV     #THR.FMT,-(SP)
075536  012746  000004                       MOV     #4,-(SP)
075542  010600                               MOV     SP,R0                  ; SP,*
075544  104414                               TRAP    14
075546  010116                               MOV     R1,(SP)                ; DSA.CNT,*          9383
075550  012746  007002                       MOV     #FMT.7,-(SP)
075554  012746  000002                       MOV     #2,-(SP)
```

```
                                 ;ML4AD                                                         29-Mar-1982 16:23:04   TOPS
                                 ;                 TEST CODE SECTION                            29-Mar-1982 16:21:03   PA:<
075560  010600                          MOV     SP,R0                           ; SP,*
075562  104414                          TRAP    14
075564  062706  000016                  ADD     #16,SP                          ;                                   9379
075570  027702  117640          4$:     CMP     @ML.REG+30,R2                   ;                                   9386
075574  001437                          BEQ     5$
075576  005267  117574                  INC     P.CNT                           ;                                   9388
075602  026767  117570  117570          CMP     P.CNT,LIMIT
075610  003034                          BGT     6$
075612  104455                          TRAP    55
075614  000142                          .WORD   142                             ;                                   9390
075616  012706                          .WORD   ASYNC
075620  026302                          .WORD   DUMPER
075622  012746  010664                  MOV     #WRD.14,-(SP)                   ;                                   9391
075626  012746  011054                  MOV     #WRD.31,-(SP)
075632  012746  012540                  MOV     #REG.6,-(SP)
075636  012746  010256                  MOV     #THR.FMT,-(SP)
075642  012746  000004                  MOV     #4,-(SP)
075646  010600                          MOV     SP,R0                           ; SP,*
075650  104414                          TRAP    14
075652  010116                          MOV     R1,(SP)                         ; DSA.CNT,*                         9392
075654  012746  007002                  MOV     #FMT.7,-(SP)
075660  012746  000002                  MOV     #2,-(SP)
075664  010600                          MOV     SP,R0                           ; SP,*
075666  104414                          TRAP    14
075670  062706  000016                  ADD     #16,SP                          ;                                   9388
075674  104467                  5$:     TRAP    67                              ;                                   9393
075676  006000                          ROR     R0
075700  103632                          BLO     2$
075702  005201                  6$:     INC     R1                              ; DSA.CNT                           9366
075704  020103                  7$:     CMP     R1,R3                           ; DSA.CNT,*
075706  101625                          BLOS    1$
075710  104402                  8$:     TRAP    2                               ;                                   9396
075712  152777  000040  117524          BISB    #40,@ML.REG+40                  ;                                   9398
075720  016703  120106                  MOV     ML.DUT,R3
075724  042703  177770                  BIC     #177770,R3
075730  142777  000007  117506          BICB    #7,@ML.REG+40
075736  150377  117502                  BISB    R3,@ML.REG+40
075742  152777  000002  117554          BISB    #2,@ML.REG+120                  ;                                   9400
075750  004767  122370                  JSR     PC,LAST.BLK.XFER                ;                                   9401
075754  012777  000061  117422          MOV     #61,@ML.REG                     ;                                   9402
075762  105777  117466          9$:     TSTB    @ML.REG+50
075766  100375                          BPL     9$
075770  016701  116020                  MOV     LST.BLK,R1                      ;                                   9405
075774  005201                          INC     R1
075776  027701  117432                  CMP     @ML.REG+30,R1
076002  001432                          BEQ     10$
076004  104455                          TRAP    55                              ;                                   9408
076006  000145                          .WORD   145
076010  012706                          .WORD   ASYNC
076012  026302                          .WORD   DUMPER
076014  012746  010664                  MOV     #WRD.14,-(SP)                   ;                                   9409
076020  012746  011054                  MOV     #WRD.31,-(SP)
```

```
                                    ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                                    ;                 TEST CODE SECTION                        29-Mar-1982 16:21:03   PA:<

076024  012746  012540                      MOV     #REG.6,-(SP)
076030  012746  010256                      MOV     #THR.FMT,-(SP)
076034  012746  000004                      MOV     #4,-(SP)
076040  010600                              MOV     SP,R0                   ; SP,*
076042  104414                              TRAP    14
076044  016716  115744                      MOV     LST.BLK,(SP)            ;                9410
076050  012746  007002                      MOV     #FMT.7,-(SP)
076054  012746  000002                      MOV     #2,-(SP)
076060  010600                              MOV     SP,R0                   ; SP,*
076062  104414                              TRAP    14
076064  062706  000016                      ADD     #16,SP                  ;                9407
076070  032777  002000  117356      10$:    BIT     #2000,@ML.REG+50        ;                9413
076076  001436                              BEQ     11$
076100  012777  177777  117326              MOV     #-1,@ML.REG+30          ;                9416
076106  032777  002000  117340              BIT     #2000,@ML.REG+50        ;                9418
076114  001453                              BEQ     12$
076116  104455                              TRAP    55                      ;                9421
076120  000143                              .WORD   143
076122  012706                              .WORD   ASYNC
076124  026302                              .WORD   DUMPER
076126  012746  012540                      MOV     #REG.6,-(SP)            ;                9422
076132  012746  010712                      MOV     #WRD.17,-(SP)
076136  012746  010640                      MOV     #WRD.11,-(SP)
076142  012746  011626                      MOV     #PHR.2,-(SP)
076146  012746  011024                      MOV     #WRD.27,-(SP)
076152  012746  010304                      MOV     #FIV.FMT,-(SP)
076156  012746  000006                      MOV     #6,-(SP)
076162  010600                              MOV     SP,R0                   ; SP,*
076164  104414                              TRAP    14
076166  062706  000016                      ADD     #16,SP                  ;                9420
076172  000424                              BR      12$                     ;                9413
076174  104455                      11$:    TRAP    55                      ;                9428
076176  000144                              .WORD   144
076200  012706                              .WORD   ASYNC
076202  026302                              .WORD   DUMPER
076204  012746  011024                      MOV     #WRD.27,-(SP)           ;                9429
076210  012746  010640                      MOV     #WRD.11,-(SP)
076214  012746  011610                      MOV     #PHR.1,-(SP)
076220  012746  011024                      MOV     #WRD.27,-(SP)
076224  012746  010270                      MOV     #FOR.FMT,-(SP)
076230  012746  000005                      MOV     #5,-(SP)
076234  010600                              MOV     SP,R0                   ; SP,*
076236  104414                              TRAP    14
076240  062706  000014                      ADD     #14,SP                  ;                9427
076244  104467                      12$:    TRAP    67                      ;                9430
076246  006000                              ROR     R0
076250  103617                              BLO     8$
076252  000207                              RTS     PC                      ;                9324

                                    ; Routine Size:  230 words
                                    ; Maximum stack depth per invocation:  11 words
```

```
 21342
 21343
 21347
 21348                                          .SBTTL  T43 TEST CODE SECTION
 21352 076254                           T43::
 21353 076254  004767  177060           1$:     JSR     PC,$T43                         ;               9432
 21354 076260  104466                           TRAP    66
 21355 076262  006000                           ROR     R0
 21356 076264  103773                           BLO     1$
 21357 076266  000207                           RTS     PC
 21358
 21359                                  ; Routine Size:  6 words
 21360                                  ; Maximum stack depth per invocation:  0 words
 21365
 21366
 21367 ;          9434   !<BLF/PAGE>
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  TEST CODE SECTION                                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (96)

;      !
;      !
;      BGNTST;
;
;      !++
;      ! TEST NUMBER:  TST 44
;      !
;      ! TEST NAME:    INVALID ADRS TEST
;      !
;      ! TEST DESCRIPTION:
;      !
;      !       TEST THE DETECTION OF ILLEGAL DSA
;      !       ADDRESSES BY:
;      !
;      !       1.  DOING A MBUS WRITE FUNCTION
;      !           AT ALL POSSIBLE ILLEGAL DSA
;      !           ADDRESSES AND TEST THE
;      !           IAE BIT SET.
;      !
;      ! IMPLICIT INPUTS:
;      !
;      !       IO_BUF
;      !       A VECTOR OF 256 WORDS WHERE
;      !       DATA FOR MBUS READS AND WRITE
;      !       FUNCTION ARE FOUND.
;      !
;      !
;      !--
;
;      local
;          IAE_CNT;                                      !INVLID ADRS COUNT
;
;      CLR_THRESHOLD;                                    !CLEAR ERROR PRINT THRESHOLD
;      IAE_CNT = .LST_BLK;                               !START AT LAST  BLOCK + 1
;
;      do                                                !TEST FOR ALL INVALID ADDRESSES
;          begin
;          IAE_CNT = .IAE_CNT + 1;                       !INCREMENT IAE_CNT
;          BGNSUB;
;          CLR_MBUS;
;          MLDA = .IAE_CNT;                              !LOAD DSA
;          MLWC = not 255;                               !LOAD WORD COUNT
;          MLBA = IO_BUF;                                !LOAD UBUS ADRS
;          MLCS1 = write;                                !DO A WRITE FUNCTION
;
;          if .IAE IS_NOT_SET                            !SET IF IAE SET
;          then
;              begin                                     !ERROR IF NOT SET
;              CMP_THRESHOLD;                            !COMPARE ERROR PRINT THRESHOLD
;              ERRDF (102, ASYNC, DUMPER);
;              PRINTB (FIV_FMT, WRD_30, PHR_1, WRD_11, WRD_30, WRD_10);
;              end;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    TEST CODE SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (96)

;              9487
;              9488       ENDSUB;
;              9489       end
;              9490   !
;              9491   !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
;              9492   !
;              9493   until .IAE_CNT eqlU %o'177777';                  !REPEAT UNTIL ALL TESTED
;              9494
;              9495   ENDTST;


                                      .SBTTL  $T44 TEST CODE SECTION
076270  010146                  $T44: MOV     R1,-(SP)                  ;                   9433
076272  005067  117100                CLR     P.CNT                     ;                   9465
076276  016701  115512                MOV     LST.BLK,R1                ; *,IAE.CNT         9468
076302  005201                  1$:   INC     R1                        ; IAE.CNT           9472
076304  104402                  2$:   TRAP    2
076306  152777  000040  117130        BISB    #40,@ML.REG+40            ;                   9473
076314  016700  117512                MOV     ML.DUT,R0
076320  042700  177770                BIC     #177770,R0
076324  142777  000007  117112        BICB    #7,@ML.REG+40
076332  150077  117106                BISB    R0,@ML.REG+40
076336  010177  117072                MOV     R1,@ML.REG+30             ; IAE.CNT,*         9475
076342  012777  177400  117044        MOV     #-400,@ML.REG+10          ;                   9476
076350  012777  014022  117046        MOV     #IO.BUF,@ML.REG+20        ;                   9477
076356  012777  000061  117020        MOV     #61,@ML.REG               ;                   9478
076364  032777  002000  117072        BIT     #2000,@ML.REG+60          ;                   9480
076372  001034                        BNE     3$
076374  005267  116776                INC     P.CNT                     ;                   9482
076400  026767  116772  116772        CMP     P.CNT,LIMIT
076406  003031                        BGT     4$
076410  104455                        TRAP    55                        ;                   9484
076412  000146                        .WORD   146
076414  012706                        .WORD   ASYNC
076416  026302                        .WORD   DUMPER
076420  012746  010630                MOV     #WRD.10,-(SP)             ;                   9485
076424  012746  011046                MOV     #WRD.30,-(SP)
076430  012746  010640                MOV     #WRD.11,-(SP)
076434  012746  011610                MOV     #PHR.1,-(SP)
076440  012746  011046                MOV     #WRD.30,-(SP)
076444  012746  010304                MOV     #FIV.FMT,-(SP)
076450  012746  000006                MOV     #6,-(SP)
076454  010600                        MOV     SP,R0                     ; SP,*
076456  104414                        TRAP    14
076460  062706  000016                ADD     #16,SP                    ;                   9482
076464  104467                  3$:   TRAP    67                        ;                   9486
076466  006000                        ROR     R0
```

```
21481                                   ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
21482                                   ;               TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<
21483
21484 076470  103705                            BLO     2$
21485 076472  020127  177777            4$:     CMP     R1,#-1                          ; IAE.CNT,*                    9493
21486 076476  001301                            BNE     1$
21487 076500  012601                            MOV     (SP)+,R1                        ;                              9433
21488 076502  000207                            RTS     PC
21489
21490                                   ; Routine Size:  70 words
21491                                   ; Maximum stack depth per invocation:  8 words
21496
21497
21501
21502                                           .SBTTL  T44 TEST CODE SECTION
21506 076504                            T44::
21507 076504  004767  177560            1$:     JSR     PC,$T44                         ;                              9493
21508 076510  104466                            TRAP    66
21509 076512  006000                            ROR     R0
21510 076514  103773                            BLO     1$
21511 076516  000207                            RTS     PC
21512
21513                                   ; Routine Size:  6 words
21514                                   ; Maximum stack depth per invocation:  0 words
21519
21520
21521 ;             9496    !<BLF/PAGE>
```

```
;ML4AD                                                         29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                            29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (97)

;                 !
;                 BGNTST;
;
;                 !++
;                 ! TEST NUMBER:  TST 45
;                 !
;                 ! TEST NAME:    ADRS OVERFLOW BIT TEST
;                 !
;                 ! TEST DESCRIPTION:
;                 !        TEST THE DETECTION OF ADDRESS OVERFLOWS BY:
;                 !
;                 !        1.  STARTING AT THE LAST BLOCK DO A TWO BLOCK TRANSFER.
;                 !
;                 !        2.  READ THE AOE BIT SET.
;                 !
;                 ! IMPLICIT INPUTS:
;                 !        IO_BUF
;                 !        A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITE
;                 !        FUNCTIONS ARE FOUND.
;                 !--
;
;                 CLR_MBUS;
;                 MLWC = not 511;                               !DO TWO BLOCK XFERR
;                 MLBA = IO_BUF;                                !LOAD UBUS ADRS
;                 MLDA = .LST_BLK;                              !START AT LAST BLOCK
;                 MLCS1 = write;                                !DO A WRITE FUNCTION
;                 TIME_OUT_LOOP;
;
;                 if .AOE IS_NOT_SET                            !SEE IF AOE SET
;                 then
;                     begin                                     !ERROR IF NOT SET
;                     ERRDF (103, SYNC, DUMPER);
;                     PRINTB (FOR_FMT, WRD_26, PHR_1, WRD_11, FNC_19);
;                     end;
;
;                 ENDTST;


                                       .SBTTL  $T45 TEST CODE SECTION
076520  152777  000040  116716  $T45:  BISB    #40,@ML.REG+40             ;      9498
076526  016700  117300                 MOV     ML.DUT,R0
076532  042700  177770                 BIC     #177770,R0
076536  142777  000007  116700         BICB    #7,@ML.REG+40
076544  150077  116674                 BISB    R0,@ML.REG+40
076550  012777  177000  116636         MOV     #-1000,@ML.REG+10          ;      9519
076556  012777  014022  116640         MOV     #IO.BUF,@ML.REG+20         ;      9520
076564  016777  115224  116642         MOV     LST.BLK,@ML.REG+30         ;      9521
```

```
                                     ;ML4AD                                                                  29-Mar-1982 16:23:04   TOPS
                                     ;              TEST CODE SECTION                                        29-Mar-1982 16:21:03   PA:<

 076572  012777  000061  116604              MOV     #61,@ML.REG
 076600  105777  116650          1$:         TSTB    @ML.REG+50                   ;                                                9522
 076604  100375                              BPL     1$
 076606  032777  001000  116650              BIT     #1000,@ML.REG+60             ;                                                9525
 076614  001024                              BNE     2$
 076616  104455                              TRAP    55                           ;                                                9528
 076620  000147                              .WORD   147
 076622  012750                              .WORD   SYNC
 076624  026302                              .WORD   DUMPER
 076626  012746  012426                      MOV     #FNC.19,-(SP)                ;                                                9529
 076632  012746  010640                      MOV     #WRD.11,-(SP)
 076636  012746  011610                      MOV     #PHR.1,-(SP)
 076642  012746  011016                      MOV     #WRD.26,-(SP)
 076646  012746  010270                      MOV     #FOR.FMT,-(SP)
 076652  012746  000005                      MOV     #5,-(SP)
 076656  010600                              MOV     SP,R0                        ; SP,*
 076660  104414                              TRAP    14
 076662  062706  000014                      ADD     #14,SP                       ;                                                9527
 076666  000207                  2$:         RTS     PC                           ;                                                9495

                                 ; Routine Size:  52 words
                                 ; Maximum stack depth per invocation:  6 words



                                             .SBTTL  T45 TEST CODE SECTION
 076670                          T45::
 076670  004767  177624          1$:         JSR     PC,$T45                      ;                                                9530
 076674  104466                              TRAP    66
 076676  006000                              ROR     R0
 076700  103773                              BLO     1$
 076702  000207                              RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words


 ;              9533  !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;              TEST CODE SECTION                                29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (98)
;
;              !
;              BGNTST;
;
;              !++
;              ! TEST NUMBER:  TST 46
;              !
;              ! TEST NAME:    SYNC BUS PARITY TEST
;              !
;              ! TEST DESCRIPTION:
;              !       TEST ABILITY OF SYNC BUS TO DETECT AND GENERATE
;              !       GOOD PARITY BY:
;              !
;              !       1.  VIA MBUS WRITE FUNCTION WRITE ALTERNATING ONES AND ZEROES TO THE
;              !           DEVICE AND READ THE DPAR BIT CLEARED.
;              !
;              !       2.  REPEAT WITH SHIFTED DATA
;              !
;              !       3.  VIA MBUS READ FUNCTION READ THE ALTERNATING PATTERN AND MDPE CLEARED.
;              !
;              ! IMPLICIT INPUTS:
;              !       IO_BUF
;              !       A VECTOR OF 256 WORDS WHERE DATA FOR MBUS READS AND WRITES
;              !       FUNCTIONS ARE FOUND.
;              !--
;
;              if .PAR_DIS IS_SET                               !SEE IF PARITY IS DISABLED
;              then
;                  begin                                        !PRINT MESSAGE AND EXIT TST IF YES
;                  PRINTB (THR_FMT, FNC_3, WRD_7, WRD_37);
;                  EXIT_TST;
;                  end;
;
;              CLR_MBUS;
;              BAI = ONE;                                       !SET ON FIRST IO_BUF ADRS
;              IO_BUF = %o'125252';                             !ALTERNATE 1, 0 PATTERN
;
;              incr TWICE from 0 to 1 do                        !REPEAT LOOP TWICE
;                  begin
;                  BGNSUB;
;                  GD_BLK_XFER ();                              !SET UP A GOOD BLOCK XFERR
;                  MLCS1 = write;                               !DO A WRITE FUNCTION
;                  TIME_OUT_LOOP;
;
;                  if .DPAR IS_SET                              !SEE IF DPAR GOT SET
;                  then
;                      begin                                    !ERROR IF SET
;                      ERRDF (105, SYNC, DUMPER);
;                      PRINTB (FOR_FMT, WRD_23, WRD_6, WRD_7, WRD_9);
;                      end;
;
;                  IO_BUF = .IO_BUF^ONE;                        !SHIFT THE IO BUF & REPEAT
;                  MLER = ZEROES;                               !CLEAR OUT ERROR REG & REPEAT
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (98)

;           9586        ENDSUB;
;           9587        end;
;           9588
;           9589    incr TWICE from 0 to 1 do                   !REPEATE LOOP TWICE
;           9590        begin
;           9591        BGNSUB;
;           9592        CLR_MBUS;
;           9593        BAI = ONE;                              !SET ON FIRST IO_BUF ADRS
;           9594        GD_BLK_XFER ();                         !SET UP A GOOD BLOCK XFERR
;           9595        MLCS1 = read;                           !DO A READ XFERR
;           9596        TIME_OUT_LOOP;
;           9597
;           9598        if .MDPE IS_SET                         !SEE IF READ GENERATED BAD PARITY
;           9599        then
;           9600            begin                               !ERROR IF MDPE SET
;           9601            ERRDF (106, SYNC, DUMPER);
;           9602            PRINTB (FOR_FMT, WRD_23, WRD_6, WRD_7, WRD_8);
;           9603            end;
;           9604
;           9605        ENDSUB;
;           9606        IO_BUF = .IO_BUF^ONE;                   !MAKE DATA PATTERN HAVE ONE LESS ONE
;           9607        GD_BLK_XFER ();                         !SET UP A GOOD BLK XFER
;           9608        MLCS1 = write;                          !CHANGE THE BACKGROUND IN MEMORY
;           9609        TIME_OUT_LOOP;
;           9610        end;
;           9611
;           9612    ENDTST;


                                          .SBTTL  $T46 TEST CODE SECTION
076704  010146                    $T46:   MOV     R1,-(SP)                  ;        9532
076706  026727  115076  000001            CMP     PAR.DIS,#1                ;        9559
076714  001021                            BNE     1$
076716  012746  011122                    MOV     #WRD.37,-(SP)             ;        9562
076722  012746  010566                    MOV     #WRD.7,-(SP)
076726  012746  012172                    MOV     #FNC.3,-(SP)
076732  012746  010256                    MOV     #THR.FMT,-(SP)
076736  012746  000004                    MOV     #4,-(SP)
076742  010600                            MOV     SP,R0                     ; SP,*
076744  104414                            TRAP    14
076746  104463                            TRAP    63
076750  062706  000012                    ADD     #12,SP                    ;        9559
076754  000167  000402                    JMP     9$                        ;        9561
076760  152777  000040  116456    1$:     BISB    #40,@ML.REG+40            ;        9564
076766  016701  117040                    MOV     ML.DUT,R1
076772  042701  177770                    BIC     #177770,R1
076776  142777  000007  116440            BICB    #7,@ML.REG+40
```

```
                                        ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                                        ;          TEST CODE SECTION                        29-Mar-1982 16:21:03   PA:<

 077004  150177  116434                      BISB    R1,@ML.REG+40
 077010  152777  000010  116426              BISB    #10,@ML.REG+40          ;                                  9567
 077016  012767  125252  114776              MOV     #-52526,IO.BUF          ;                                  9568
 077024  005001                              CLR     R1                      ; TWICE                            9570
 077026  104402                      2$:     TRAP    2                       ;                                  9571
 077030  004767  121256                      JSR     PC,GD.BLK.XFER          ;                                  9573
 077034  012777  000061  116342              MOV     #61,@ML.REG             ;                                  9574
 077042  105777  116406              3$:     TSTB    @ML.REG+50
 077046  100375                              BPL     3$
 077050  132777  000040  116406              BITB    #40,@ML.REG+60          ;                                  9577
 077056  001424                              BEQ     4$
 077060  104455                              TRAP    55                      ;                                  9580
 077062  000151                              .WORD   151
 077064  012750                              .WORD   SYNC
 077066  026302                              .WORD   DUMPER
 077070  012746  010616                      MOV     #WRD.9,-(SP)            ;                                  9581
 077074  012746  010566                      MOV     #WRD.7,-(SP)
 077100  012746  010560                      MOV     #WRD.6,-(SP)
 077104  012746  010766                      MOV     #WRD.23,-(SP)
 077110  012746  010270                      MOV     #FOR.FMT,-(SP)
 077114  012746  000005                      MOV     #5,-(SP)
 077120  010600                              MOV     SP,R0                   ; SP,*
 077122  104414                              TRAP    14
 077124  062706  000014                      ADD     #14,SP                  ;                                  9579
 077130  006367  114666              4$:     ASL     IO.BUF                  ;                                  9584
 077134  005077  116324                      CLR     @ML.REG+60              ;                                  9585
 077140  104467                              TRAP    67
 077142  006000                              ROR     R0
 077144  103730                              BLO     2$
 077146  005201                              INC     R1                      ; TWICE                            9570
 077150  020127  000001                      CMP     R1,#1                   ; TWICE,*
 077154  003724                              BLE     2$
 077156  005001                              CLR     R1                      ; TWICE                            9589
 077160  104402                      5$:     TRAP    2                       ;                                  9590
 077162  152777  000040  116254              BISB    #40,@ML.REG+40          ;                                  9591
 077170  016700  116636                      MOV     ML.DUT,R0
 077174  042700  177770                      BIC     #177770,R0
 077200  142777  000007  116236              BICB    #7,@ML.REG+40
 077206  150077  116232                      BISB    R0,@ML.REG+40
 077212  152777  000010  116224              BISB    #10,@ML.REG+40          ;                                  9593
 077220  004767  121066                      JSR     PC,GD.BLK.XFER          ;                                  9594
 077224  012777  000071  116152              MOV     #71,@ML.REG             ;                                  9595
 077232  105777  116216              6$:     TSTB    @ML.REG+50
 077236  100375                              BPL     6$
 077240  032777  000400  116176              BIT     #400,@ML.REG+40         ;                                  9598
 077246  001424                              BEQ     7$
 077250  104455                              TRAP    55                      ;                                  9601
 077252  000152                              .WORD   152
 077254  012750                              .WORD   SYNC
 077256  026302                              .WORD   DUMPER
 077260  012746  010602                      MOV     #WRD.8,-(SP)            ;                                  9602
 077264  012746  010566                      MOV     #WRD.7,-(SP)
```

```
                                 ;ML4AD                                                           29-Mar-1982 16:23:04    TOPS
                                 ;               TEST CODE SECTION                                29-Mar-1982 16:21:03    PA:<

077270  012746  010560                   MOV     #WRD.6,-(SP)
077274  012746  010766                   MOV     #WRD.23,-(SP)
077300  012746  010270                   MOV     #FOR.FMT,-(SP)
077304  012746  000005                   MOV     #5,-(SP)
077310  010600                           MOV     SP,R0                        ; SP,*
077312  104414                           TRAP    14
077314  062706  000014                   ADD     #14,SP                       ;                         9600
077320  104467                   7$:     TRAP    67                           ;                         9603
077322  006000                           ROR     R0
077324  103715                           BLO     5$
077326  006367  114470                   ASL     IO.BUF                       ;                         9606
077332  004767  120754                   JSR     PC,GD.BLK.XFER               ;                         9607
077336  012777  000061  116040           MOV     #61,@ML.REG                  ;                         9608
077344  105777  116104           8$:     TSTB    @ML.REG+50
077350  100375                           BPL     8$
077352  005201                           INC     R1                           ; TWICE                   9589
077354  020127  000001                   CMP     R1,#1                        ; TWICE,*
077360  003677                           BLE     5$
077362  012601                   9$:     MOV     (SP)+,R1                     ;                         9532
077364  000207                           RTS     PC

                                 ; Routine Size:  153 words
                                 ; Maximum stack depth per invocation:  7 words




                                         .SBTTL  T46 TEST CODE SECTION
077366                           T46::
077366  004767  177312           1$:     JSR     PC,$T46                      ;                         9610
077372  104466                           TRAP    66
077374  006000                           ROR     R0
077376  103773                           BLO     1$
077400  000207                           RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words

;            9613    !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (99)

;       !
;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 47
;       !
;       ! TEST NAME:    WRITE READ ML11
;       !
;       ! TEST DESCRIPTION:
;       !
;       !       PROVIDES A MBUS READ/WRITE
;       !       DATA TRANSFER TROUBLE SHOOTING
;       !       LOOP BY:
;       !
;       !       1.  LOAD APPROPRIATE RH REGISTERS.
;       !           DO A WRITE FUNCTION.
;       !
;       !       2.  LOAD APPROPRIATE RH REGISTERS
;       !           DO A WRITE CHECK FUNCTION.
;       !
;       !       3.  COMPLIMENT DATA AND
;       !           REPEAT.
;       !
;       ! IMPLICIT INPUTS:
;       !
;       !       IO_BUF
;       !       A VECTOR OF 256 WORDS WHERE
;       !       DATA FOR MBUS READ AND WRITE
;       !       FUNCTIONS IS FOUND.
;       !
;       !--
;
;       local
;           TST_PAT;                                    !TEST PATTERN
;
;       TST_PAT = %o'052525';
;
;       incr TWICE from 0 to 1 do                       !WRITE READ 1'S AND 0'S ON MBUS
;           begin
;           CLR_MBUS;
;           BAI = ONE;                                  !SET ON FIRST IO_BUF ADRS
;           IO_BUF = .TST_PAT;                          !LOAD FIRST IO_BUF ADRS
;           GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
;           MLCS1 = write;                              !DO A WRITE FUNCTION
;           TIME_OUT_LOOP;
;           CLR_MBUS;
;           BAI = ONE;                                  !SET ON FIRST IO_BUF ADRS
;           GD_BLK_XFER ();                             !SET UP A GOOD BLOCK XFERR
;           MLCS1 = WRT_CHK;                            !DO A WRITE CHECK FUNCTION
;           TIME_OUT_LOOP;
;
```

```
21915 ;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
21916 ;                         TEST CODE SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (99)
21917
21918 ;             9666      if .WCE IS_SET                        !SEE IF WRITE CHECK ERROR SET
21919 ;             9667      then
21920 ;             9668          begin                             !ERROR IF SET
21921 ;             9669          ERRDF (109, TRBLE_LOOP, DUMPER);
21922 ;             9670          PRINTB (SIX_FMT, FNC_4, WRD_10, WRD_12, FNC_5, FNC_6, FNC_3);
21923 ;             9671          end;
21924 ;             9672
21925 ;             9673      TST_PAT = not .TST_PAT;               !COMPLIMENT TST_PAT AND REPEAT
21926 ;             9674      end;
21927 ;             9675
21928 ;             9676  ENDTST;
21932
21933                                        .SBTTL  $T47 TEST CODE SECTION
21937 077402  004167  105132         $T47:   JSR     R1,$SAVE2                         ;                9612
21938 077406  012701  052525                 MOV     #52525,R1                         ; *,TST.PAT      9650
21939 077412  005002                         CLR     R2                                ; TWICE          9652
21940 077414  152777  000040  116022  1$:   BISB    #40,@ML.REG+40                    ;                9653
21941 077422  016700  116404                 MOV     ML.DUT,R0
21942 077426  042700  177770                 BIC     #177770,R0
21943 077432  142777  000007  116004        BICB    #7,@ML.REG+40
21944 077440  150077  116000                 BISB    R0,@ML.REG+40
21945 077444  152777  000010  115772        BISB    #10,@ML.REG+40
21946 077452  010167  114344                 MOV     R1,IO.BUF                         ;                9655
21947 077456  004767  120630                 JSR     PC,GD.BLK.XFER                    ; TST.PAT,*      9656
21948 077462  012777  000061  115714        MOV     #61,@ML.REG                       ;                9657
21949 077470  105777  115760         2$:     TSTB    @ML.REG+50                        ;                9658
21950 077474  100375                         BPL     2$
21951 077476  152777  000040  115740        BISB    #40,@ML.REG+40                    ;                9659
21952 077504  016700  116322                 MOV     ML.DUT,R0
21953 077510  042700  177770                 BIC     #177770,R0
21954 077514  142777  000007  115722        BICB    #7,@ML.REG+40
21955 077522  150077  115716                 BISB    R0,@ML.REG+40
21956 077526  152777  000010  115710        BISB    #10,@ML.REG+40                    ;                9661
21957 077534  004767  120552                 JSR     PC,GD.BLK.XFER                    ;                9662
21958 077540  012777  000051  115636        MOV     #51,@ML.REG                       ;                9663
21959 077546  105777  115702         3$:     TSTB    @ML.REG+50
21960 077552  100375                         BPL     3$
21961 077554  032777  040000  115662        BIT     #40000,@ML.REG+40                 ;                9666
21962 077562  001430                         BEQ     4$
21963 077564  104455                         TRAP    55                                ;                9669
21964 077566  000155                         .WORD   155
21965 077570  013250                         .WORD   TRBLE.LOOP
21966 077572  026302                         .WORD   DUMPER
21967 077574  012746  012172                 MOV     #FNC.3,-(SP)                      ;                9670
21968 077600  012746  012226                 MOV     #FNC.6,-(SP)
21969 077604  012746  012216                 MOV     #FNC.5,-(SP)
```

```
                                ;ML4AD                                                           29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION                                29-Mar-1982 16:21:03   PA:<

077610  012746  010650                  MOV     #WRD.12,-(SP)
077614  012746  010630                  MOV     #WRD.10,-(SP)
077620  012746  012200                  MOV     #FNC.4,-(SP)
077624  012746  010322                  MOV     #SIX.FMT,-(SP)
077630  012746  000007                  MOV     #7,-(SP)
077634  010600                          MOV     SP,R0                   ; SP,*
077636  104414                          TRAP    14
077640  062706  000020                  ADD     #20,SP                  ;                               9668
077644  005101                  4$:     COM     R1                      ; TST.PAT                       9673
077646  005202                          INC     R2                      ; TWICE                         9652
077650  020227  000001                  CMP     R2,#1                   ; TWICE,*
077654  003657                          BLE     1$
077656  000207                          RTS     PC                      ;                               9612

                                ; Routine Size:  87 words
                                ; Maximum stack depth per invocation:  11 words




                                        .SBTTL  T47 TEST CODE SECTION
077660                          T47::
077660  004767  177516          1$:     JSR     PC,$T47                 ;                               9674
077664  104466                          TRAP    66
077666  006000                          ROR     R0
077670  103773                          BLO     1$
077672  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words



;               9677    !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (100)

;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 48
;       !
;       ! TEST NAME:    CRC DATA BUS TEST
;       !
;       ! TEST DESCRIPTION:
;       !       TEST THE CRC DATA BUS BETWEEN THE CRC
;       !       GENERATORS AND THE CRC/MBUS DATA
;       !       MUX FOR CONTINUITY AND BIT UNIQUENESS
;       !       BY:
;       !
;       !       1.  WHILE IN ECC DIAGNOSTIC MODE DO
;       !           GOOD BLOCK TRANSFERS WITH VARIOUS
;       !           CRC_A,CRC_B AND PAR_CRC_WRD WHICH
;       !           WILL EXERCISE BUS CONTINUITY AND
;       !           UNIQUENESS.
;       !
;       !       2.  THEN IN DATA DIAGNOSTEC MODE READ
;       !           THE CRC NIBBLES FROM ONE CRC GROUP
;       !           FOR CORRECT CRC_A,CRC_B AND PAR_CRC_WRD
;       !           DATA PATTERNS.
;       !
;       ! IMPLICIT INPUTS:
;       !       PD_TEMP
;       !       A BIT VECTOR OF 16 BITS WHERE THE READ
;       !       PROM DATA IS STORED OAND ACCESSED FROM.
;       !
;       !
;       !--
;
;       local
;           TMP_E1,                                     !TEMP STORAGE FOR E1 DATA WORD
;           DODU_FLG,                                   !DROP UNIT FLAG
;           CRC_NIB,                                    !POINTER TO THE CRC NIBBLE
;           CRC_TSTED,                                  !STORES HOW MANY CRC NIBBLES WE HAVE TESTED
;           ERR_FLG,                                    !ERROR FLAG
;           NIB_PAT;                                    !TEST DATA FOR THE CRC NIBBLE
;
;       CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
;       CRC_NIB = 9;                                    !SET CRC NIBBLE POINTER
;       DODU_FLG = ZERO;                                !CLEAR THE DROP UNIT FLAG
;
;       incr LOOP from 0 to 4 do                        !REPEAT THE TEST WITH FIVE NIBBLE PATTERNS
;           begin
;           BGNSUB;                                     !START OF THE SCOPE LOOP
;           CLR_MBUS;
;           ECC_DM = ONE;                               !SET ECC DIAG MOD
;
;           case .LOOP from 0 to 4 of                   !SELECT ONE OF THE FIVE NIBBLE PATTERNS
```

```
;ML4AD                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    TEST CODE SECTION              29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (100)

;                  set

;                  [0] :                                  !PATTERN 0
                       NIB_PAT = %b'110';

;                  [1] :                                  !PATTERN 1
                       begin
                       MLE1 = ONES;
                       MLE2 = ONES;
                       NIB_PAT = %b'001';
                       end;

;                  [2] :                                  !PATTERN 2
                       begin
                       CRC_A = ONES;
                       CRC_B = ONES;
                       NIB_PAT = %b'000';
                       end;

;                  [3] :                                  !PATTERN 3
                       begin
                       PAR_CRC_WRD = ONES;
                       CRC_B = ONES;
                       NIB_PAT = %b'011';
                       end;

;                  [4] :                                  !PATTERN 4
                       begin
                   !+
                   ! THE FOLLOWING ASSIGNMENT:
                   !
                   !       MLE1 = .TMP_E1
                   !
                   ! IS EQUIVALENT TO THE FOLLOWING
                   ! TWO ASSINGMENTS:
                   !
                   !   PAR_CRC_WRD = ONES;          !LOAD PAR_CRC_WRD WITH REM_TBL
                   !   CRC_A = ONES;                      !LOAD CRC_A WITH REM_TBL
                   !
                   ! THIS IS NECESSARY DUE TO THE FACT THAT
                   ! THE E1 REGISTER IS WORD ORIENTATED AND
                   ! THE BLISS COMPILER GENERATES BYTE INST
                   ! TO ACCESS THE REGISTER.
                   !-

                       TMP_E1 = ZEROES;                          !CLEAR OUT THE TEMP WORD
                       TMP_E1<0, 6> = ONES;               !LOAD CRC_A WITH REM_TBL
                       TMP_E1<8, 6> = ONES;               !LOAD PAR_CRC_WRD WITH REM_TBL
                       MLE1 = .TMP_E1;                           !LOAD THE E1 REGISTER WITH DATA

                       NIB_PAT = %b'101';
                       end;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (100)
;
;                       tes;
;
;                   GD_BLK_XFER ();                     !SET UP A GOOD BLOCK TRANSFER
;                   MLCS1 = write;                      !DO A WRITE TRANSFER
;                   TIME_OUT_LOOP;                      !WAIT UNTIL DRIVE READY
;                   DAT_DM = ONE;                       !SET DATA DIAG MODE
;                   GD_BLK_XFER ();                     !SET UP A GOOD BLOCK TRANSFER
;                   MLCS1 = read;                       !DO A READ TRANSFER
;                   CRC_TSTED = ZERO;
;                   DELAY (ONE_US);
;
;                   do                                  !TEST ONE CRC GROUP '6 CRC NIBBLES'
;                       begin
;                       PD_TEMP = .MLPD;                !READ THE PROM DATA FOR THIS ARRAY WORD
;                       DAT_CLK = ONE;                  !CLOCK OUT AN ARRAY WORD INTO THE DATA DIAG REG'S
;                       DELAY (ONE_US);                 !DELAY ONE MICRO SECOND
;                       RD_LNG_WRD;                     !READ THE DATA DIAG REG'S INTO MEMORY
;
;                       if .PD_TEMP [.CRC_NIB] IS_NOT_SET       !TEST THIS CRC NIBBLE IF GOOD
;                       then
;                           begin
;                           CRC_TSTED = .CRC_TSTED + 1;         !INCREMENT THE GOOD NIBBLE COUNTER
;                           TST_LNG_WRD (.CRC_NIB, .NIB_PAT, ERR_FLG);  !TEST THE CRC NIBBLE
;
;                           if .ERR_FLG IS_SET                  !SEE IF THE TEST FOUND AN ERROR
;                           then
;                               begin                           !REPORT ERROR IF FLAG IS SET
;                               CMP_THRESHOLD;                  !COMPARE ERROR PRINT THRESHOLD
;                               ERRDF (131, SYNC, DUMPER);
;                               PRINTB (FOR_FMT, WRD_64, WRD_24, WRD_73, WRD_10);
;                               PRINTB (FMT_5, .NIB_PAT, .NIB_SAVE [NIB_9], 8);
;                               DODU_FLG = ONE;                 !SET THE DROP UNIT FLAG
;                               end;
;
;                           end;
;
;                       end
;                   until .CRC_TSTED eql 6;             !REPEAT UNTIL ONE CRC GROUP HAS BEEN TESTED
;
;                   ENDSUB;                             !END OF SCOPE LOOP
;                   end;
;
;               if .DODU_FLG IS_SET
;               then
;                   begin
;                   DODU (.ML_LUN);
;                   DOCLN;
;                   end;
;
;               ENDTST;
```

```
22193
22194                                                .SBTTL  $T48 TEST CODE SECTION
22198 077674  004167  104712            $T48:        JSR     R1,$SAVE5                      ;                    9676
22199 077700  162706  000012                         SUB     #12,SP
22200 077704  005067  115466                         CLR     P.CNT                          ;                    9717
22201 077710  012746  000011                         MOV     #11,-(SP)                      ; *,CRC.NIB          9720
22202 077714  005066  000006                         CLR     6(SP)                          ; DODU.FLG           9721
22203 077720  005001                                 CLR     R1                             ; LOOP               9723
22204 077722  104402                    1$:          TRAP    2                              ;                    9724
22205 077724  152777  000040  115512                 BISB    #40,@ML.REG+40                 ;                    9725
22206 077732  016705  116074                         MOV     ML.DUT,R5
22207 077736  042705  177770                         BIC     #177770,R5
22208 077742  142777  000007  115474                 BICB    #7,@ML.REG+40
22209 077750  150577  115470                         BISB    R5,@ML.REG+40
22210 077754  152777  000001  115542                 BISB    #1,@ML.REG+120                 ;                    9727
22211 077762  010105                                 MOV     R1,R5                          ; LOOP,*             9729
22212 077764  006305                                 ASL     R5
22213 077766  066507  077772                         ADD     2$(R5),PC
22214 077772  000012                    2$:          .WORD   3$-2$
22215 077774  000020                                 .WORD   4$-2$
22216 077776  000042                                 .WORD   5$-2$
22217 100000  000062                                 .WORD   6$-2$
22218 100002  000104                                 .WORD   7$-2$
22219 100004  012703  000006            3$:          MOV     #6,R3                          ; *,NIB.PAT          9733
22220 100010  000444                                 BR      8$                             ;                    9729
22221 100012  012777  177777  115534    4$:          MOV     #-1,@ML.REG+150                ;                    9737
22222 100020  012777  177777  115536                 MOV     #-1,@ML.REG+160                ;                    9738
22223 100026  012703  000001                         MOV     #1,R3                          ; *,NIB.PAT          9739
22224 100032  000433                                 BR      8$                             ;                    9729
22225 100034  152777  000077  115512    5$:          BISB    #77,@ML.REG+150                ;                    9744
22226 100042  152777  000077  115514                 BISB    #77,@ML.REG+160                ;                    9745
22227 100050  005003                                 CLR     R3                             ; NIB.PAT            9746
22228 100052  000423                                 BR      8$                             ;                    9729
22229 100054  052777  037400  115472    6$:          BIS     #37400,@ML.REG+150             ;                    9751
22230 100062  152777  000077  115474                 BISB    #77,@ML.REG+160                ;                    9752
22231 100070  012703  000003                         MOV     #3,R3                          ; *,NIB.PAT          9753
22232 100074  000412                                 BR      8$                             ;                    9729
22233 100076  005066  000002            7$:          CLR     2(SP)                          ; TMP.E1             9775
22234 100102  052766  037477  000002                 BIS     #37477,2(SP)                   ; *,TMP.E1           9777
22235 100110  016677  000002  115436                 MOV     2(SP),@ML.REG+150              ; TMP.E1,*           9778
22236 100116  012703  000005                         MOV     #5,R3                          ; *,NIB.PAT          9780
22237 100122  004767  120164            8$:          JSR     PC,GD.BLK.XFER                 ;                    9784
22238 100126  012777  000061  115250                 MOV     #61,@ML.REG                    ;                    9785
22239 100134  105777  115314            9$:          TSTB    @ML.REG+50
22240 100140  100375                                 BPL     9$
22241 100142  152777  000010  115354                 BISB    #10,@ML.REG+120                ;                    9787
22242 100150  004767  120136                         JSR     PC,GD.BLK.XFER                 ;                    9788
22243 100154  012777  000071  115222                 MOV     #71,@ML.REG                    ;                    9789
```

```
                                    ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
                                    ;               TEST CODE SECTION                          29-Mar-1982 16:21:03   PA:<

100162  005066  000004                      CLR     4(SP)                       ; CRC.TSTED                       9790
100166  012704  000001                      MOV     #1,R4                       ; *,$STMP2                        9791
100172  001411                      10$:    BEQ     13$
100174  016705  101716                      MOV     L$DLY,R5                    ; *,$STMP1
100200  001404                              BEQ     12$
100202  005066  000012              11$:    CLR     12(SP)                      ; $STMP
100206  005305                              DEC     R5                          ; $STMP1
100210  001374                              BNE     11$
100212  005304                      12$:    DEC     R4                          ; $STMP2
100214  000766                              BR      10$
100216  011602                      13$:    MOV     (SP),R2                     ; CRC.NIB,*                       9800
100220  006202                              ASR     R2
100222  006202                              ASR     R2
100224  006202                              ASR     R2
100226  062702  015342                      ADD     #PD.TEMP,R2
100232  017767  115376  115102      14$:    MOV     @ML.REG+230,PD.TEMP         ;                                 9795
100240  152777  000020  115256              BISB    #20,@ML.REG+120             ;                                 9796
100246  012704  000001                      MOV     #1,R4                       ; *,$STMP2                        9797
100252  001411                      15$:    BEQ     18$
100254  016705  101636                      MOV     L$DLY,R5                    ; *,$STMP1
100260  001404                              BEQ     17$
100262  005066  000012              16$:    CLR     12(SP)                      ; $STMP
100266  005305                              DEC     R5                          ; $STMP1
100270  001374                              BNE     16$
100272  005304                      17$:    DEC     R4                          ; $STMP2
100274  000766                              BR      15$
100276  017767  115272  113070      18$:    MOV     @ML.REG+170,D1.TEMP
100304  017767  115274  113064              MOV     @ML.REG+200,D2.TEMP
100312  017767  115246  113060              MOV     @ML.REG+160,E2.TEMP
100320  010246                              MOV     R2,-(SP)                    ;                                 9800
100322  016646  000002                      MOV     2(SP),-(SP)                 ; CRC.NIB,*
100326  042716  177770                      BIC     #177770,(SP)
100332  012746  000001                      MOV     #1,-(SP)
100336  005046                              CLR     -(SP)
100340  004767  103270                      JSR     PC,BL$GT2
100344  062706  000010                      ADD     #10,SP
100350  005700                              TST     R0
100352  001102                              BNE     21$
100354  005266  000004                      INC     4(SP)                       ; CRC.TSTED                       9803
100360  011646                              MOV     (SP),-(SP)                  ; CRC.NIB,*                       9804
100362  010346                              MOV     R3,-(SP)                    ; NIB.PAT,*
100364  012746  000016                      MOV     #16,-(SP)
100370  060616                              ADD     SP,(SP)                     ; ERR.FLG,*
100372  004767  120000                      JSR     PC,TST.LNG.WRD
100376  026627  000016  000001              CMP     16(SP),#1                   ; ERR.FLG,*                       9806
100404  001063                              BNE     20$
100406  005267  114764                      INC     P.CNT                       ;                                 9808
100412  026767  114760  114760              CMP     P.CNT,LIMIT
100420  003403                              BLE     19$
100422  062706  000006                      ADD     #6,SP
100426  000460                              BR      22$
100430  104455                      19$:    TRAP    55                          ;                                 9810
```

```
                                  ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                  ;              TEST CODE SECTION                            29-Mar-1982 16:21:03   PA:<

 100432  000203                             .WORD   203
 100434  012750                             .WORD   SYNC
 100436  026302                             .WORD   DUMPER
 100440  012746  010630                     MOV     #WRD.10,-(SP)           ;                                9811
 100444  012746  011532                     MOV     #WRD.73,-(SP)
 100450  012746  010774                     MOV     #WRD.24,-(SP)
 100454  012746  011446                     MOV     #WRD.64,-(SP)
 100460  012746  010270                     MOV     #FOR.FMT,-(SP)
 100464  012746  000005                     MOV     #5,-(SP)
 100470  010600                             MOV     SP,R0                   ; SP,*
 100472  104414                             TRAP    14
 100474  012716  000010                     MOV     #10,(SP)                ;                                9812
 100500  016705  112674                     MOV     NIB.SAVE+4,R5
 100504  006205                             ASR     R5
 100506  006205                             ASR     R5
 100510  006205                             ASR     R5
 100512  006205                             ASR     R5
 100514  000305                             SWAB    R5
 100516  042705  177770                     BIC     #177770,R5
 100522  010546                             MOV     R5,-(SP)
 100524  010346                             MOV     R3,-(SP)                ; NIB.PAT,*
 100526  012746  006650                     MOV     #FMT.5,-(SP)
 100532  012746  000004                     MOV     #4,-(SP)
 100536  010600                             MOV     SP,R0                   ; SP,*
 100540  104414                             TRAP    14
 100542  012766  000001  000040             MOV     #1,40(SP)               ; *,DODU.FLG                     9813
 100550  062706  000024                     ADD     #24,SP                  ;                                9808
 100554  062706  000006             20$:    ADD     #6,SP                   ;                                9802
 100560  026627  000004  000006     21$:    CMP     4(SP),#6                ; CRC.TSTED,*                    9819
 100566  001221                             BNE     14$
 100570  104467                     22$:    TRAP    67
 100572  006000                             ROR     R0
 100574  103002                             BHIS    24$
 100576  000167  177120             23$:    JMP     1$
 100602  005201                     24$:    INC     R1                      ; LOOP                           9723
 100604  020127  000004                     CMP     R1,#4                   ; LOOP,*
 100610  003772                             BLE     23$
 100612  026627  000006  000001             CMP     6(SP),#1                ; DODU.FLG,*                     9824
 100620  001004                             BNE     25$
 100622  016700  115202                     MOV     ML.LUN,R0               ;                                9827
 100626  104451                             TRAP    51
 100630  104444                             TRAP    44
 100632  062706  000014             25$:    ADD     #14,SP                  ;                                9676
 100636  000207                             RTS     PC

                                  ; Routine Size:  242 words
                                  ; Maximum stack depth per invocation:  25 words
```

```
                                        .SBTTL  T48 TEST CODE SECTION
      100640                     T48::
      100640  004767  177030     1$:    JSR     PC,$T48                 ;                    9829
      100644  104466                    TRAP    66
      100646  006000                    ROR     R0
      100650  103773                    BLO     1$
      100652  000207                    RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words


;             9832  !<BLF/PAGE>
```

```
;ML4AD                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;           TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (101)

!
BGNTST;

!++
! TEST NUMBER:  TST 49
!
! TEST NAME:    UNIQUE NIBBLE CRC GENERATION TEST
!
! TEST DESCRIPTION:
!       TEST CRC CODES GENERATED FOR ONE CRC
!       GROUP (52 UNIQUE UNIBUS NIBBLES) BY:
!
!       1.  DOING MASS BUS WRITE TRANSFERSS WITH THE
!       FIRST IO_BUF CRC GROUP HAVING 51 NIBBLES
!       OF %B'0000' PATTERN AND THE REMAINING NIBBLE
!           WITH PATTERNS OF %B'0000' TO %B'1111'.
!
!       2.  THEN IN DATA DIAGNOSTIC MODE CALCULATE
!           THE CRC CODE FOR THE FIRST CRC
!           GROUP AND COMPARE IT AGAINST THE
!           HARDWARE GENERATED CRC CODE.
!
!       3.  REPEAT PATTERN OF %B'0000' TO %B'1111'
!           FOR EACH OF THE 52 NIBBLES.
!
! IMPLICIT INPUTS:
!       IO_BUF
!       A  VECTOR OF 256 WORDS WHERE DATA
!       FOR MBUS READS AND WRITES TRANSFERS
!       IS FOUND.
!
!
!--

local
    DODU_FLG,                                       !DROP UNIT FLAG
    TEMP,                                           !TEMPORARY STORAGE LOCATION
    NIB_SEL;                                        !SELECTS 4 BITS 'ONE NIBBLE' FROM THE IO_BUF

DODU_FLG = ZEROES;                                  !CLEAR THE DROP UNIT FLAG
CLR_THRESHOLD;                                      !CLEAR ERROR PRINT THRESHOLD

incr CNT from 0 to 13 do                            !CLEAR THE FIRST 14 IO_BUF WORDS
    IO_BUF [.CNT] = ZEROES;

incr WRD_CNT from 0 to 12 do                        !DO THIS TEST ON 13 IO_BUF WORDS
    begin
    NIB_SEL = -4;                                   !RESET THE NIBBLE SELECTOR

    incr NIB_TST from 0 to 3 do                     !DO THIS TEST ON 4 NIBBLES PER WORD
        begin

```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (101)
;
;               if (.WRD_CNT eql 12) and (.NIB_TST eql 2) then exitloop;        !THE LAST 2 NIBBLES ARE NOT TESTED
;
;               NIB_SEL = .NIB_SEL + 4;                         !INCREMENT THE NIBBLE SELECTED
;               TEMP = ZEROES;                                  !CLEAR  TEMP LOCATION
;
;               incr NIB_PAT from %b'0000' to %b'1111' by %b'0001' do   !RUN PATTERNS ON THEIS NIBBLE
;                   begin
;                   BGNSUB;                                     !START OF SCOPE LOOP
;                   TEMP<.NIB_SEL, 4> = .NIB_PAT;               !LOAD PATTERN INTO TEMP AT THIS NIBBLE
;                   IO_BUF [.WRD_CNT] = .TEMP;                  !LOAD THE GENERATED PATTERN INTO THE IO_BUF
;                   CLR_MBUS;
;                   GD_BLK_XFER ();                             !SET UP A GOOD BLOCK TRANSFER
;                   MLCS1 = write;                              !DO A WRITE TRANSFER
;                   TIME_OUT_LOOP;                              !WAIT FOR THE TRANSFER TO COMPLETE
;                   A_GEN = ZEROES;                             !CLEAR THE GEN & CAL STORAGE LOCATIONS
;                   B_GEN = ZEROES;
;                   P_GEN = ZEROES;
;                   A_CAL = ZEROES;
;                   B_CAL = ZEROES;
;                   P_CAL = ZEROES;
;                   CAL_CRC ();                                 !CALL ROUTINE TO CALCULATE THE CRC CODE FOR THIS PATTERN
;
;                   if ERR_CHK_CRC ()                           !NOW SEE IF THE GEN CRC IS SAME AS CAL CRC
;                   then
;                       begin                                   !REPORT THE ERROR IF NOT THE SAME
;                       CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;                       ERRDF (132, SYNC, DUMPER);
;                       PRINTB (THR_FMT, WRD_5, WRD_64, WRD_8);
;                       PRINTB (FMT_19, .B_GEN, .A_GEN, .P_GEN);
;                       PRINTB (FMT_20, .B_CAL, .A_CAL, .P_CAL);
;                       DODU_FLG = ONE;
;                       end;
;
;                   ENDSUB;                                     !END OF SCOPE LOOP
;                   end;
;
;               IO_BUF [.WRD_CNT] = ZEROES;                     !CLEAR THIS IO_BUF WORD FO NEXT NIBBLE
;               end;
;
;           end;
;
;       if .DODU_FLG IS_SET                                     !DROP THIS UNIT IF THE DODU FLAG GOT SET
;       then
;           begin
;           DODU (.ML_LUN);
;           DOCLN;
;           end;
;
;       ENDTST;
```

```
22496                                          ;ML4AD                                                   29-Mar-1982 16:23:04   TOPS
22497                                          ;            TEST CODE SECTION                           29-Mar-1982 16:21:03   PA:<
22498
22499
22500                                                 .SBTTL  $T49 TEST CODE SECTION
22504 100654 004167 103732                     $T49:  JSR     R1,$SAVE5             ;                          9831
22505 100660 024646                                   CMP     -(SP),-(SP)
22506 100662 005066 000002                            CLR     2(SP)                 ; DODU.FLG                 9872
22507 100666 005067 114504                            CLR     P.CNT
22508 100672 005000                                   CLR     R0                    ; CNT                      9875
22509 100674 010001                            1$:    MOV     R0,R1                 ; CNT,*                    9876
22510 100676 006301                                   ASL     R1
22511 100700 005061 014022                            CLR     IO.BUF(R1)
22512 100704 005200                                   INC     R0                    ; CNT                      9875
22513 100706 020027 000015                            CMP     R0,#15                ; CNT,*
22514 100712 003770                                   BLE     1$
22515 100714 005002                                   CLR     R2                    ; WRD.CNT                  9878
22516 100716 012716 177774                     2$:    MOV     #-4,(SP)              ; *,NIB.SEL                9880
22517 100722 010201                                   MOV     R2,R1                 ; WRD.CNT,*                9894
22518 100724 006301                                   ASL     R1
22519 100726 005004                                   CLR     R4                    ; NIB.TST                  9882
22520 100730 020227 000014                     3$:    CMP     R2,#14                ; WRD.CNT,*                9885
22521 100734 001003                                   BNE     4$
22522 100736 020427 000002                            CMP     R4,#2                 ; NIB.TST,*
22523 100742 001575                                   BEQ     10$
22524 100744 062716 000004                     4$:    ADD     #4,(SP)               ; *,NIB.SEL                9887
22525 100750 005005                                   CLR     R5                    ; TEMP                     9888
22526 100752 005003                                   CLR     R3                    ; NIB.PAT                  9890
22527 100754 104402                            5$:    TRAP    2                     ;                          9891
22528 100756 010546                                   MOV     R5,-(SP)              ; TEMP,*                   9893
22529 100760 016646 000002                            MOV     2(SP),-(SP)           ; NIB.SEL,*
22530 100764 012746 000004                            MOV     #4,-(SP)
22531 100770 010346                                   MOV     R3,-(SP)              ; NIB.PAT,*
22532 100772 004767 103000                            JSR     PC,BL$PU1
22533 100776 010005                                   MOV     R0,R5                 ; *,TEMP                   9891
22534 101000 010561 014022                            MOV     R5,IO.BUF(R1)         ; TEMP,*                   9894
22535 101004 152777 000040 114432                     BISB    #40,@ML.REG+40
22536 101012 016700 115014                            MOV     ML.DUT,R0
22537 101016 042700 177770                            BIC     #177770,R0
22538 101022 142777 000007 114414                     BICB    #7,@ML.REG+40
22539 101030 150077 114410                            BISB    R0,@ML.REG+40
22540 101034 004767 117252                            JSR     PC,GD.BLK.XFER        ;                          9896
22541 101040 012777 000061 114336                     MOV     #61,@ML.REG           ;                          9897
22542 101046 105777 114402                     6$:    TSTB    @ML.REG+50
22543 101052 100375                                   BPL     6$
22544 101054 005067 114310                            CLR     A.GEN                 ;                          9899
22545 101060 005067 114306                            CLR     B.GEN                 ;                          9900
22546 101064 005067 114304                            CLR     P.GEN                 ;                          9901
22547 101070 005067 114266                            CLR     A.CAL                 ;                          9902
22548 101074 005067 114264                            CLR     B.CAL                 ;                          9903
22549 101100 005067 114262                            CLR     P.CAL                 ;                          9904
22550 101104 004767 115732                            JSR     PC,CAL.CRC            ;                          9905
```

```
                                      ;ML4AD                                                              29-Mar-1982 16:23:04   TOPS
                                      ;             TEST CODE SECTION                                     29-Mar-1982 16:21:03   PA:<

101110  004767  116326                        JSR     PC,ERR.CHK.CRC               ;                                         9907
101114  006000                                ROR     R0
101116  103066                                BCC     8$
101120  005267  114252                        INC     P.CNT                        ;                                         9909
101124  026767  114246  114246                CMP     P.CNT,LIMIT
101132  003403                                BLE     7$
101134  062706  000010                        ADD     #10,SP
101140  000462                                BR      9$
101142  104455                        7$:     TRAP    55                           ;                                         9911
101144  000204                                .WORD   204
101146  012750                                .WORD   SYNC
101150  026302                                .WORD   DUMPER
101152  012746  010602                        MOV     #WRD.8,-(SP)                 ;                                         9912
101156  012746  011446                        MOV     #WRD.64,-(SP)
101162  012746  010552                        MOV     #WRD.5,-(SP)
101166  012746  010256                        MOV     #THR.FMT,-(SP)
101172  012746  000004                        MOV     #4,-(SP)
101176  010600                                MOV     SP,R0                        ; SP,*
101200  104414                                TRAP    14
101202  016716  114166                        MOV     P.GEN,(SP)                   ;                                         9913
101206  016746  114156                        MOV     A.GEN,-(SP)
101212  016746  114154                        MOV     B.GEN,-(SP)
101216  012746  007632                        MOV     #FMT.19,-(SP)
101222  012746  000004                        MOV     #4,-(SP)
101226  010600                                MOV     SP,R0                        ; SP,*
101230  104414                                TRAP    14
101232  016716  114130                        MOV     P.CAL,(SP)                   ;                                         9914
101236  016746  114120                        MOV     A.CAL,-(SP)
101242  016746  114116                        MOV     B.CAL,-(SP)
101246  012746  007702                        MOV     #FMT.20,-(SP)
101252  012746  000004                        MOV     #4,-(SP)
101256  010600                                MOV     SP,R0                        ; SP,*
101260  104414                                TRAP    14
101262  012766  000001  000044                MOV     #1,44(SP)                    ; *,DODU.FLG                              9915
101270  062706  000032                        ADD     #32,SP                       ;                                         9909
101274  062706  000010                8$:     ADD     #10,SP                       ;                                         9891
101300  104467                                TRAP    67                           ;                                         9916
101302  006000                                ROR     R0
101304  103623                                BLO     5$
101306  005203                        9$:     INC     R3                           ; NIB.PAT                                 9890
101310  020327  000017                        CMP     R3,#17                       ; NIB.PAT,*
101314  003617                                BLE     5$
101316  005061  014022                        CLR     IO.BUF(R1)                   ;                                         9921
101322  005204                                INC     R4                           ; NIB.TST                                 9882
101324  020427  000003                        CMP     R4,#3                        ; NIB.TST,*
101330  003002                                BGT     10$
101332  000167  177372                        JMP     3$
101336  005202                        10$:    INC     R2                           ; WRD.CNT                                 9878
101340  020227  000014                        CMP     R2,#14                       ; WRD.CNT,*
101344  003002                                BGT     11$
101346  000167  177344                        JMP     2$
101352  026627  000002  000001        11$:    CMP     2(SP),#1                     ; DODU.FLG,*                              9926
```

```
                                  ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                  ;               TEST CODE SECTION                       29-Mar-1982 16:21:03   PA:<

      101360  001004                      BNE     12$
      101362  016700  114442              MOV     ML.LUN,R0                    ;                                  9929
      101366  104451                      TRAP    51
      101370  104444                      TRAP    44
      101372  022626              12$:    CMP     (SP)+,(SP)+                  ;                                  9831
      101374  000207                      RTS     PC

                                  ; Routine Size:  169 words
                                  ; Maximum stack depth per invocation:  25 words



                                          .SBTTL  T49 TEST CODE SECTION
      101376                      T49::
      101376  004767  177252      1$:     JSR     PC,$T49                      ;                                  9931
      101402  104466                      TRAP    66
      101404  006000                      ROR     R0
      101406  103773                      BLO     1$
      101410  000207                      RTS     PC

                                  ; Routine Size:  6 words
                                  ; Maximum stack depth per invocation:  0 words


;             9934   !
;             9935   !<BLF/PAGE>
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;              TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (102)

;              !
;              BGNTST;
;
;              !++
;              ! TEST NUMBER:  TST 50
;              !
;              ! TEST NAME:             UNIQUE WORD CRC GENERATION TEST
;              !
;              ! TEST DESCRIPTION:
;              !       TEST CRC CODES GENERATED FOR ONE
;              !       CRC GROUP (13 UNIBUS WORDS) BY:
;              !
;              !       1.  DOING MASS BUS WRITE TRANSFERS
;              !           USING VARIOUS WORD DATA PATTERENS.
;              !
;              !       2.  THEN IN DATA DIAGNOSTIC MODE
;              !           CALCULATE THE CRC CODE FOR THE
;              !           FIRST CRC GROUP AND COMPARE IT TO
;              !           THE HARDWARE GENERATED CRC CODE.
;              !
;              ! IMPLICIT INPUTS:
;              !       IO_BUF
;              !       A  VECTOR OF 256 WORDS WHERE DATA
;              !       FOR MBUS READS AND WRITES TRANSFERS
;              !       IS FOUND.
;              !
;              !--
;
;              local
;                  DODU_FLG,                               !DROP UNIT FLAG
;                  TST_PAT;                                !TEST PATTERN SAVE LOCATION
;
;              DODU_FLG = ZEROES;                          !CLEAR THE DROP UNIT FLAG
;
;              incr PAT_SEL from 0 to 3 do                 !RUN THE TEST ON 4 PATTERNS
;                  begin
;                  BGNSUB;                                 !START OF SCOPE LOOP
;                  CLR_MBUS;
;
;                  case .PAT_SEL from 0 to 3 of            !SELECT ONE OF THE 4 PATTERNS
;                      set
;
;                      [0] :
;                          TST_PAT = ONES;
;
;                      [1] :
;                          TST_PAT = %o'052525';
;
;                      [2] :
;                          TST_PAT = %o'125252';
;
;                      [3] :
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;            TEST CODE SECTION                             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (102)

;                       TST_PAT = %o'070707';
;                   tes;
;
;               incr CNT from 0 to 255 do                  !LOAD THE FIRST 13 IO_BUF WORDS WITH TST_PAT
;                   IO_BUF [.CNT] = .TST_PAT;
;
;               GD_BLK_XFER ();                            !SET UP A GOOD BLOCK TRANSFER
;               MLCS1 = write;                             !DO A WRITE TRANSFER
;               TIME_OUT_LOOP;                             !WAIT FOR THE TRANSFER TO COMPLETE
;               A_GEN = ZEROES;                            !CLEAR THE GEN & CAL SAVE LOCATIONS
;               B_GEN = ZEROES;
;               P_GEN = ZEROES;
;               A_CAL = ZEROES;
;               B_CAL = ZEROES;
;               P_CAL = ZEROES;
;               CAL_CRC ();                                !CALCULATE WHAT THE CRC CODE SHOULD BE
;
;               if ERR_CHK_CRC ()                          !NOW SEE IF THE GENERATED CRC CODE IS THE SAME
;               then
;                   begin                                  !REPORT THE ERROR IF NOT THE SAME
;                   ERRDF (133, SYNC, DUMPER);
;                   PRINTB (THR_FMT, WRD_5, WRD_64, WRD_8);
;                   PRINTB (FMT_19, .B_GEN, .A_GEN, .P_GEN);
;                   PRINTB (FMT_20, .B_CAL, .A_CAL, .P_CAL);
;                   DODU_FLG = ONE;
;                   end;
;
;               ENDSUB;                                    !END OF SCOPE LOOP
;               end;
;
;           if .DODU_FLG IS_SET                            !DROP THIS UNIT IF THE DODU FLAG GOT SET
;           then
;               begin
;               DODU (.ML_LUN);
;               DOCLN;
;               end;
;
;           ENDTST;


                                                .SBTTL  $T50 TEST CODE SECTION
101412  004167  103174                 $T50:    JSR     R1,$SAVE5                     ;                       9933
101416  005005                                  CLR     R5                            ; DODU.FLG              9968
101420  005004                                  CLR     R4                            ; PAT.SEL               9970
101422  104402                         1$:      TRAP    2                             ;                       9971
101424  152777  000040  114012                  BISB    #40,@ML.REG+40                ;                       9972
101432  016703  114374                          MOV     ML.DUT,R3
```

```
22764                                   ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
22765                                   ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<
22766
22767 101436 042703 177770                     BIC     #177770,R3
22768 101442 142777 000007 113774              BICB    #7,@ML.REG+40
22769 101450 150377 113770                     BISB    R3,@ML.REG+40
22770 101454 010403                            MOV     R4,R3                   ; PAT.SEL,*                             9975
22771 101456 006303                            ASL     R3
22772 101460 066307 101464                     ADD     2$(R3),PC
22773 101464 000010                     2$:    .WORD   3$-2$
22774 101466 000016                            .WORD   4$-2$
22775 101470 000024                            .WORD   5$-2$
22776 101472 000032                            .WORD   6$-2$
22777 101474 012701 177777              3$:    MOV     #-1,R1                  ; *,TST.PAT                             9979
22778 101500 000410                            BR      7$                      ;                                       9975
22779 101502 012701 052525              4$:    MOV     #52525,R1               ; *,TST.PAT                             9982
22780 101506 000405                            BR      7$                      ;                                       9975
22781 101510 012701 125252              5$:    MOV     #-52526,R1              ; *,TST.PAT                             9985
22782 101514 000402                            BR      7$                      ;                                       9975
22783 101516 012701 070707              6$:    MOV     #70707,R1               ; *,TST.PAT                             9988
22784 101522 005002                     7$:    CLR     R2                      ; CNT                                   9991
22785 101524 010203                     8$:    MOV     R2,R3                   ; CNT,*                                 9992
22786 101526 006303                            ASL     R3
22787 101530 010163 014022                     MOV     R1,IO.BUF(R3)           ; TST.PAT,*
22788 101534 005202                            INC     R2                      ; CNT                                   9991
22789 101536 020227 000377                     CMP     R2,#377                 ; CNT,*
22790 101542 003770                            BLE     8$
22791 101544 004767 116542                     JSR     PC,GD.BLK.XFER          ;                                       9994
22792 101550 012777 000061 113626              MOV     #61,@ML.REG             ;                                       9995
22793 101556 105777 113672              9$:    TSTB    @ML.REG+50
22794 101562 100375                            BPL     9$
22795 101564 005067 113600                     CLR     A.GEN                   ;                                       9997
22796 101570 005067 113576                     CLR     B.GEN                   ;                                       9998
22797 101574 005067 113574                     CLR     P.GEN                   ;                                       9999
22798 101600 005067 113556                     CLR     A.CAL                   ;                                       1000
22799 101604 005067 113554                     CLR     B.CAL                   ;                                       1000
22800 101610 005067 113552                     CLR     P.CAL                   ;                                       1000
22801 101614 004767 115222                     JSR     PC,CAL.CRC              ;                                       1000
22802 101620 004767 115616                     JSR     PC,ERR.CHK.CRC          ;                                       1000
22803 101624 006000                            ROR     R0                      ;                                       1000
22804 101626 103054                            BCC     10$
22805 101630 104455                            TRAP    55                      ;                                       1000
22806 101632 000205                            .WORD   205
22807 101634 012750                            .WORD   SYNC
22808 101636 026302                            .WORD   DUMPER
22809 101640 012746 010602                     MOV     #WRD.8,-(SP)            ;                                       1000
22810 101644 012746 011446                     MOV     #WRD.64,-(SP)
22811 101650 012746 010552                     MOV     #WRD.5,-(SP)
22812 101654 012746 010256                     MOV     #THR.FMT,-(SP)
22813 101660 012746 000004                     MOV     #4,-(SP)
22814 101664 010600                            MOV     SP,R0                   ; SP,*
22815 101666 104414                            TRAP    14
22816 101670 016716 113500                     MOV     P.GEN,(SP)              ;                                       1001
22817 101674 016746 113470                     MOV     A.GEN,-(SP)
22818 101700 016746 113466                     MOV     B.GEN,-(SP)
```

```
                                :ML4AD                                                29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION                     29-Mar-1982 16:21:03   PA:<

101704  012746  007632                  MOV     #FMT.19,-(SP)
101710  012746  000004                  MOV     #4,-(SP)
101714  010600                          MOV     SP,R0                   ; SP,*
101716  104414                          TRAP    14
101720  016716  113442                  MOV     P.CAL,(SP)              ;                       1001
101724  016746  113432                  MOV     A.CAL,-(SP)
101730  016746  113430                  MOV     B.CAL,-(SP)
101734  012746  007702                  MOV     #FMT.20,-(SP)
101740  012746  000004                  MOV     #4,-(SP)
101744  010600                          MOV     SP,R0                   ; SP,*
101746  104414                          TRAP    14
101750  012705  000001                  MOV     #1,R5                   ; *,DODU.FLG            1001
101754  062706  000032                  ADD     #32,SP                  ;                       1000
101760  104467                  10$:    TRAP    67                      ;                       1001
101762  006000                          ROR     R0
101764  103616                          BLO     1$
101766  005204                          INC     R4                      ; PAT.SEL               9970
101770  020427  000003                  CMP     R4,#3                   ; PAT.SEL,*
101774  003612                          BLE     1$
101776  005305                          DEC     R5                      ; DODU.FLG              1001
102000  001004                          BNE     11$
102002  016700  114022                  MOV     ML.LUN,R0               ;                       1002
102006  104451                          TRAP    51
102010  104444                          TRAP    44
102012  000207                  11$:    RTS     PC                      ;                       9933

                                ; Routine Size:  129 words
                                ; Maximum stack depth per invocation:  19 words



                                        .SBTTL  T50 TEST CODE SECTION
102014                          T50::
102014  004767  177372          1$:     JSR     PC,$T50                 ;                       1002
102020  104466                          TRAP    66
102022  006000                          ROR     R0
102024  103773                          BLO     1$
102026  000207                          RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words
```

```
;               10026 !<BLF/PAGE>
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (103)

;        !
;        BGNTST;
;
;        !++
;        ! TEST NUMBER:  TST 51
;        !
;        ! TEST NAME:              CORRECTABLE ERROR SYNDRONE DECODE TEST
;        !
;        ! TEST DESCRIPTION:
;        !       TEST SYNDRONE DECODE AND ERROR
;        !       CORRECTION TO DECODE AND CORRECT
;        !       SINGLE BIT AND MULTIPLE BIT
;        !       CHANNEL ERRORS BY:
;        !
;        !       1.  VIA ECC DIAG MODE FORCE SYNDRONE
;        !           BITS TO DECODE SINGLE BIT AND
;        !           MULTIPLE BIT CHANNEL ERRORS.
;        !
;        !       2.  THEN DO A MASS BUS READ TRANSFER
;        !           AND EXAM THE IO_BUF FOR CORRECT
;        !           BIT COMPLIMENTING.
;        !
;        ! IMPLICIT INPUTS:
;        !       IO_BUF
;        !       A  VECTOR OF 256 WORDS WHERE DATA
;        !       FOR MBUS READS AND WRITES TRANSFERS
;        !       IS FOUND.
;        !
;        !
;        !--
;
;        local
;            BITS_XFERED;                                !POINTS TO THE CHANNEL BEING TESTED
;
;        CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
;        BAI = ONE;                                      !BEFORE WE START LETS CLEAR OUT THE ML11'S
;        IO_BUF = ZEROES;                                !GOOD BLOCK BY WRITTING ZEROES TO IT
;        GD_BLK_XFER ();
;        MLCS1 = write;
;        TIME_OUT_LOOP;
;        BITS_XFERED = -1;                               !RESET THE CHANNEL POINTER
;
;        incr PLOG from 0 to 5 do                        !TEST ONE CRC GROUP '6 ARRAY WORDS'
;            begin
;
;            incr CHANNEL from 0 to 35 do                !TEST 36 BITS IN EACH ARRAY WORD
;                begin
;                BGNSUB;                                 !START OF SCOPE LOOP
;                CLR_MBUS;                               !CLEAR THE DRIVE
;                BITS_XFERED = .BITS_XFERED + 1;         !INCREMENT THE CHANNEL POINTER
;
;                incr CNT from 0 to 255 do               !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
```

```
:ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
:               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (103)

                        IO_BUF [.CNT] = ZEROES;

                FORCE_REM (.PLOG, .CHANNEL);                    !FORCE THIS BIT IN THIS WORD IN ERROR
                GD_BLK_XFER ();                                 !SET UP A GOOD BLOCK TRANSFER
                ECC_DIS = ZERO;                                 !CLEAR ECC DISABLE
                MLCS1 = read;                                   !DO A READ TRANSFER
                TIME_OUT_LOOP;                                  !WAIT FOR THE TRANSFER TO COMPLETE

                if not FIND_COMP_BIT (.BITS_XFERED)             !SEARCH THE IO_BUF FOR THE COMP BIT
                then
                    begin                                       !REPORT AN ERROR IF THIS BIT IS NOT COMP
                    CMP_THRESHOLD;                              !COMPARE ERROR PRINT THRESHOLD
                    ERRDF (134, SYNC, DUMPER);
                    PRINTB (THR_FMT, WRD_74, WRD_75, PHR_1);
                    PRINTB (FMT_21, .PLOG, .CHANNEL);
                    end;

                incr WRD_CNT from 0 to 12 do                    !SEE IF ANY OTHER BITS GOT COMP'ED

                    if .IO_BUF [.WRD_CNT] neq ZEROES            !TEST THE IO_BUF FOR ZEROES
                    then
                        begin                                   !REPORT AN ERROR IF ANY OTHERS ARE SET
                        CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
                        ERRDF (135, SYNC, DUMPER);
                        PRINTB (FOR_FMT, WRD_61, WRD_74, WRD_75, PHR_5);
                        PRINTB (FMT_21, .PLOG, .CHANNEL);
                        end;

                ENDSUB;                                         !END OF SCOPE LOOP
                end;

            end;

        BITS_XFERED = -1;                                       !RESET THE CHANNEL POINTER

        incr CHANNEL from 0 to 35 do                            !TEST 36 CHANNELS FOR MULTIPLE BIT ERRORS
            begin
            BGNSUB;                                             !START OF SCOPE LOOP
            CLR_MBUS;                                           !CLEAR THE DRIVE
            BITS_XFERED = .BITS_XFERED + 1;                     !INCREMENT THE CHANNEL POINTER

            incr CNT from 0 to 20 do                            !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
                IO_BUF [.CNT] = ZEROES;

            FORCE_REM (58, .CHANNEL);                           !FORCE ALL 6 BITS IN THIS CHANNEL IN ERROR
            GD_BLK_XFER ();                                     !SET UP A GOOD BLOCK TRANSFER
            ECC_DIS = ZERO;                                     !CLEAR ECC DISABLE
            MLCS1 = read;                                       !DO A READ TRANSFER
            TIME_OUT_LOOP;                                      !WAIT FOR THE TRANSFER TO CMOPLETE

            incr BIT_OFFSET from 0 to 180 by 36 do              !SEE IF EVERY 36TH BIT GOT COMP'ED

```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (103)

;          10131          if not FIND_COMP_BIT (.BITS_XFERED + .BIT_OFFSET)       !SEARCH THE IO_BUF FOR THE COMP'ED BITS
;          10132          then
;          10133              begin                                     !REPORT AN ERROR IF ANY OF THE BITS ARE NOT COMP'ED
;          10134              CMP_THRESHOLD;                            !COMPARE ERROR PRINT THRESHOLD
;          10135              ERRDF (134, SYNC, DUMPER);
;          10136              PRINTB (THR_FMT, WRD_74, WRD_75, PHR_1);
;          10137              PRINTB (FMT_21, 58, .CHANNEL);
;          10138              end;
;          10139
;          10140      incr WRD_CNT from 0 to 12 do                      !ALSO SEE IF ANY OTHER BIT GOT COMP'ED
;          10141
;          10142          if .IO_BUF [.WRD_CNT] neq ZEROES              !TEST THE IO_BUF FOR ALL ZEROES
;          10143          then
;          10144              begin                                     !REPORT AN ERROR IF ANY OTHERS ARE COMP'ED
;          10145              CMP_THRESHOLD;                            !COMPARE ERROR PRINT THRESHOLD
;          10146              ERRDF (135, SYNC, DUMPER);
;          10147              PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
;          10148              PRINTB (FMT_21, 58, .CHANNEL);
;          10149              end;
;          10150
;          10151      ENDSUB;                                           !END OF SCOPE LOOP
;          10152      end;
;          10153
;          10154 ENDTST;


                                          .SBTTL  $T51 TEST CODE SECTION
 102030  004167  102556          $T51:    JSR     R1,$SAVE5                   ;                        1002
 102034  005746                           TST     -(SP)
 102036  005067  113334                   CLR     P.CNT                       ;                        1005
 102042  152777  000010  113374           BISB    #10,@ML.REG+40              ;                        1006
 102050  005067  111746                   CLR     IO.BUF                      ;                        1006
 102054  004767  116232                   JSR     PC,GD.BLK.XFER              ;                        1006
 102060  012777  000061  113316           MOV     #61,@ML.REG                 ;                        1006
 102066  105777  113362          1$:      TSTB    @ML.REG+50                  ;                        1006
 102072  100375                           BPL     1$
 102074  012716  177777                   MOV     #-1,(SP)                    ; *,BITS.XFERED          1006
 102100  005005                           CLR     R5                          ; PLOG                   1006
 102102  005004                  2$:      CLR     R4                          ; CHANNEL                1007
 102104  104402                  3$:      TRAP    2                           ;                        1007
 102106  152777  000040  113330           BISB    #40,@ML.REG+40              ;                        1007
 102114  016703  113712                   MOV     ML.DUT,R3
 102120  042703  177770                   BIC     #177770,R3
 102124  142777  000007  113312           BICB    #7,@ML.REG+40
 102132  150377  113306                   BISB    R3,@ML.REG+40
 102136  005216                           INC     (SP)                        ; BITS.XFERED            1007
 102140  005001                           CLR     R1                          ; CNT                    1007
```

```
                                 ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                 ;           TEST CODE SECTION                   29-Mar-1982 16:21:03   PA:<

102142  010102                   4$:   MOV     R1,R2             ; CNT,*                      1007
102144  006302                         ASL     R2
102146  005062  014022                 CLR     IO.BUF(R2)
102152  005201                         INC     R1                ; CNT                        1007
102154  020127  000377                 CMP     R1,#377           ; CNT,*
102160  003770                         BLE     4$
102162  010546                         MOV     R5,-(SP)          ; PLOG,*                     1008
102164  010446                         MOV     R4,-(SP)          ; CHANNEL,*
102166  004767  115640                 JSR     PC,FORCE.REM
102172  004767  116114                 JSR     PC,GD.BLK.XFER
102176  142777  000002  113320         BICB    #2,@ML.REG+120    ;                            1008
102204  012777  000071  113172         MOV     #71,@ML.REG       ;                            1008
102212  105777  113236           5$:   TSTB    @ML.REG+50        ;                            1008
102216  100375                         BPL     5$
102220  016646  000004                 MOV     4(SP),-(SP)       ; BITS.XFERED,*              1008
102224  004767  115430                 JSR     PC,FIND.COMP.BIT
102230  005726                         TST     (SP)+
102232  006000                         ROR     R0
102234  103442                         BLO     7$
102236  005267  113134                 INC     P.CNT             ;                            1008
102242  026767  113130  113130         CMP     P.CNT,LIMIT
102250  003402                         BLE     6$
102252  022626                         CMP     (SP)+,(SP)+
102254  000512                         BR      11$
102256  104455                   6$:   TRAP    55                ;                            1009
102260  000206                         .WORD   206
102262  012750                         .WORD   SYNC
102264  026302                         .WORD   DUMPER
102266  012746  011610                 MOV     #PHR.1,-(SP)      ;                            1009
102272  012746  011552                 MOV     #WRD.75,-(SP)
102276  012746  011540                 MOV     #WRD.74,-(SP)
102302  012746  010256                 MOV     #THR.FMT,-(SP)
102306  012746  000004                 MOV     #4,-(SP)
102312  010600                         MOV     SP,R0             ; SP,*
102314  104414                         TRAP    14
102316  010416                         MOV     R4,(SP)           ; CHANNEL,*                  1009
102320  010546                         MOV     R5,-(SP)          ; PLOG,*
102322  012746  007754                 MOV     #FMT.21,-(SP)
102326  012746  000003                 MOV     #3,-(SP)
102332  010600                         MOV     SP,R0             ; SP,*
102334  104414                         TRAP    14
102336  062706  000020                 ADD     #20,SP            ;                            1008
102342  005003                   7$:   CLR     R3                ; WRD.CNT                    1009
102344  010302                   8$:   MOV     R3,R2             ; WRD.CNT,*                  1009
102346  006302                         ASL     R2
102350  005762  014022                 TST     IO.BUF(R2)
102354  001442                         BEQ     9$
102356  005267  113014                 INC     P.CNT             ;                            1010
102362  026767  113010  113010         CMP     P.CNT,LIMIT
102370  003040                         BGT     10$
102372  104455                         TRAP    55                ;                            1010
102374  000207                         .WORD   207
```

```
                                          ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                          ;                    TEST CODE SECTION                          29-Mar-1982 16:21:03   PA:<

102376  012750                                    .WORD   SYNC
102400  026302                                    .WORD   DUMPER
102402  012746  011714                            MOV     #PHR.5,-(SP)              ;                                 1010
102406  012746  011552                            MOV     #WRD.75,-(SP)
102412  012746  011540                            MOV     #WRD.74,-(SP)
102416  012746  011416                            MOV     #WRD.61,-(SP)
102422  012746  010270                            MOV     #FOR.FMT,-(SP)
102426  012746  000005                            MOV     #5,-(SP)
102432  010600                                    MOV     SP,R0                     ; SP,*
102434  104414                                    TRAP    14
102436  010416                                    MOV     R4,(SP)                   ; CHANNEL,*                       1010
102440  010546                                    MOV     R5,-(SP)                  ; PLOG,*
102442  012746  007754                            MOV     #FMT.21,-(SP)
102446  012746  000003                            MOV     #3,-(SP)
102452  010600                                    MOV     SP,R0                     ; SP,*
102454  104414                                    TRAP    14
102456  062706  000022                            ADD     #22,SP                    ;                                 1010
102462  005203                            9$:     INC     R3                        ; WRD.CNT                         1009
102464  020327  000014                            CMP     R3,#14                    ; WRD.CNT,*
102470  003725                                    BLE     8$
102472  022626                            10$:    CMP     (SP)+,(SP)+               ;                                 1007
102474  104467                                    TRAP    67                        ;                                 1010
102476  006000                                    ROR     R0
102500  103601                                    BLO     3$
102502  005204                            11$:    INC     R4                        ; CHANNEL                         1007
102504  020427  000043                            CMP     R4,#43                    ; CHANNEL,*
102510  003002                                    BGT     12$
102512  000167  177366                            JMP     3$
102516  005205                            12$:    INC     R5                        ; PLOG                            1006
102520  020527  000005                            CMP     R5,#5                     ; PLOG,*
102524  003002                                    BGT     13$
102526  000167  177350                            JMP     2$
102532  012716  177777                    13$:    MOV     #-1,(SP)                  ; *,BITS.XFERED                   1011
102536  005003                                    CLR     R3                        ; CHANNEL                         1011
102540  104402                            14$:    TRAP    2                         ;                                 1011
102542  152777  000040  112674                    BISB    #40,@ML.REG+40            ;                                 1011
102550  016705  113256                            MOV     ML.DUT,R5
102554  042705  177770                            BIC     #177770,R5
102560  142777  000007  112656                    BICB    #7,@ML.REG+40
102566  150577  112652                            BISB    R5,@ML.REG+40
102572  005216                                    INC     (SP)                      ; BITS.XFERED                     1011
102574  005001                                    CLR     R1                        ; CNT                             1012
102576  010102                            15$:    MOV     R1,R2                     ; CNT,*                           1012
102600  006302                                    ASL     R2
102602  005062  014022                            CLR     IO.BUF(R2)
102606  005201                                    INC     R1                        ; CNT                             1012
102610  020127  000024                            CMP     R1,#24                    ; CNT,*
102614  003770                                    BLE     15$
102616  012746  000072                            MOV     #72,-(SP)                 ;                                 1012
102622  010346                                    MOV     R3,-(SP)                  ; CHANNEL,*
102624  004767  115202                            JSR     PC,FORCE.REM
102630  004767  115456                            JSR     PC,GD.BLK.XFER            ;                                 1012
```

```
23166                                   ;ML4AD                                             29-Mar-1982 16:23:04   TOPS
23167                                   ;          TEST CODE SECTION                       29-Mar-1982 16:21:03   PA:<
23168
23169 102634 142777 000002 112662          BICB    #2,@ML.REG+120          ;                        1012
23170 102642 012777 000071 112534          MOV     #71,@ML.REG             ;                        1012
23171 102650 105777 112600          16$:    TSTB    @ML.REG+50
23172 102654 100375                         BPL     16$
23173 102656 005002                         CLR     R2                      ; BIT.OFFSET             1012
23174 102660 010246                  17$:    MOV     R2,-(SP)                ; BIT.OFFSET,*           1013
23175 102662 066616 000006                  ADD     6(SP),(SP)              ; BITS.XFERED,*
23176 102666 004767 114766                  JSR     PC,FIND.COMP.BIT
23177 102672 005726                         TST     (SP)+
23178 102674 006000                         ROR     R0
23179 102676 103441                         BLO     18$
23180 102700 005267 112472                  INC     P.CNT                   ;                        1013
23181 102704 026767 112466 112466           CMP     P.CNT,LIMIT
23182 102712 003040                         BGT     19$
23183 102714 104455                         TRAP    55                      ;                        1013
23184 102716 000206                         .WORD   206
23185 102720 012750                         .WORD   SYNC
23186 102722 026302                         .WORD   DUMPER
23187 102724 012746 011610                  MOV     #PHR.1,-(SP)            ;                        1013
23188 102730 012746 011552                  MOV     #WRD.75,-(SP)
23189 102734 012746 011540                  MOV     #WRD.74,-(SP)
23190 102740 012746 010256                  MOV     #THR.FMT,-(SP)
23191 102744 012746 000004                  MOV     #4,-(SP)
23192 102750 010600                         MOV     SP,R0                   ; SP,*
23193 102752 104414                         TRAP    14
23194 102754 010316                         MOV     R3,(SP)                 ; CHANNEL,*              1013
23195 102756 012746 000072                  MOV     #72,-(SP)
23196 102762 012746 007754                  MOV     #FMT.21,-(SP)
23197 102766 012746 000003                  MOV     #3,-(SP)
23198 102772 010600                         MOV     SP,R0                   ; SP,*
23199 102774 104414                         TRAP    14
23200 102776 062706 000020                  ADD     #20,SP                  ;                        1013
23201 103002 062702 000044          18$:    ADD     #44,R2                  ; *,BIT.OFFSET           1012
23202 103006 020227 000264                  CMP     R2,#264                 ; BIT.OFFSET,*
23203 103012 003722                         BLE     17$
23204 103014 005001                  19$:    CLR     R1                      ; WRD.CNT                1014
23205 103016 010102                  20$:    MOV     R1,R2                   ; WRD.CNT,*              1014
23206 103020 006302                         ASL     R2
23207 103022 005762 014022                  TST     IO.BUF(R2)
23208 103026 001445                         BEQ     21$
23209 103030 005267 112342                  INC     P.CNT                   ;                        1014
23210 103034 026767 112336 112336           CMP     P.CNT,LIMIT
23211 103042 003043                         BGT     22$
23212 103044 104455                         TRAP    55                      ;                        1014
23213 103046 000207                         .WORD   207
23214 103050 012750                         .WORD   SYNC
23215 103052 026302                         .WORD   DUMPER
23216 103054 012746 011462                  MOV     #WRD.67,-(SP)           ;                        1014
23217 103060 012746 010650                  MOV     #WRD.12,-(SP)
23218 103064 012746 011552                  MOV     #WRD.75,-(SP)
23219 103070 012746 011540                  MOV     #WRD.74,-(SP)
23220 103074 012746 011416                  MOV     #WRD.61,-(SP)
```

```
                                   ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                   ;              TEST CODE SECTION                        29-Mar-1982 16:21:03   PA:<

103100  012746  010304                    MOV     #FIV.FMT,-(SP)
103104  012746  000006                    MOV     #6,-(SP)
103110  010600                            MOV     SP,R0                  ; SP,*
103112  104414                            TRAP    14
103114  010316                            MOV     R3,(SP)                ; CHANNEL,*              1014
103116  012746  000072                    MOV     #72,-(SP)
103122  012746  007754                    MOV     #FMT.21,-(SP)
103126  012746  000003                    MOV     #3,-(SP)
103132  010600                            MOV     SP,R0                  ; SP,*
103134  104414                            TRAP    14
103136  062706  000024                    ADD     #24,SP                 ;                        1014
103142  005201                    21$:    INC     R1                     ; WRD.CNT                1014
103144  020127  000014                    CMP     R1,#14                 ; WRD.CNT,*
103150  003722                            BLE     20$
103152  022626                    22$:    CMP     (SP)+,(SP)+            ;                        1011
103154  104467                            TRAP    67                     ;                        1014
103156  006000                            ROR     R0
103160  103002                            BHIS    24$
103162  000167  177352            23$:    JMP     14$
103166  005203                    24$:    INC     R3                     ; CHANNEL                1011
103170  020327  000043                    CMP     R3,#43                 ; CHANNEL,*
103174  003772                            BLE     23$
103176  005726                            TST     (SP)+                  ;                        1002
103200  000207                            RTS     PC

                                  ; Routine Size:  309 words
                                  ; Maximum stack depth per invocation:  19 words



                                          .SBTTL  T51 TEST CODE SECTION
103202                            T51::
103202  004767  176622            1$:     JSR     PC,$T51                ;                        1015
103206  104466                            TRAP    66
103210  006000                            ROR     R0
103212  103773                            BLO     1$
103214  000207                            RTS     PC

                                  ; Routine Size:  6 words
                                  ; Maximum stack depth per invocation:  0 words
```

```
;           10155 !<BLF/PAGE>
```

```
;ML4AD                                             29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (104)

!
BGNTST;

!++
! TEST NUMBER:  TST 52
!
! TEST NAME:            UNCORRECTABLE ERROR SYNDRONE DECODE TEST AT CHANNELS > 35
!
! TEST DESCRIPTION:
!       TEST SYNDRONE DECODE TO DETECT BUT
!       NOT CORRECT UNCORRECTABLE CHANNEL
!       ERRORS BY:
!
!       1.  VIA ECC DIAG MODE FORCE SYNDRONE
!           BITS TO INDICATE CHANNEL ERRORS
!           AT WORDS OF A CRC GROUP BUT AT CHANNELS
!           GREATER THAN 35.
!
!       2.  DO A MASS BUS READ TRANSFER
!
!       3.  THEN EXAMIN THE IO_BUF FOR NO
!           BITS COMPLIMENTED AND ECH  AND
!           BITS SET
!
! IMPLICIT INPUTS:
!       IO_BUF
!       A  VECTOR OF 256 WORDS WHERE DATA
!       FOR MBUS READS AND WRITES TRANSFERS
!       IS FOUND.
!
!
!--

local
    PLOG;                                          !INDEX INTO REMAINDER TABLE 'REM_TBL'

CLR_THRESHOLD;                                     !CLEAR ERROR PRINT THRESHOLD
BAI = ONE;                                         !FIRST LETS CLEAR THE ML11'S GOOD BLOCK
IO_BUF = ZEROES;                                   !BY WRITING ZEROES TO IT
GD_BLK_XFER ();
MLCS1 = write;
TIME_OUT_LOOP;

incr PLOG_SEL from 0 to 6 do                       !TEST SYNDRONE DECODE AT 7 DIFFERENT PLOG VALUES
    begin

    case .PLOG_SEL from 0 to 6 of                  !SELECT A PLOG VALUE
        set

        [0] :                                      !POINTS TO WORD 0 IN THE CRC GROUP
            PLOG = 0;

```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                    TEST CODE SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (104)

                    [1] :                                !POINTS TO WORD 1 IN THE CRC GROUP
                        PLOG = 1;

                    [2] :                                !POINTS TO WORD 2 IN THE CRC GROUP
                        PLOG = 2;

                    [3] :                                !POINTS TO WORD 3 IN THE CRC GROUP
                        PLOG = 3;

                    [4] :                                !POINTS TO WORD 4 IN THE CRC GROUP
                        PLOG = 4;

                    [5] :                                !POINTS TO WORD 5 IN THE CRC GROUP
                        PLOG = 5;

                    [6] :                                !POINTS TO ALL 6 WORDS IN THE CRC GROUP
                        PLOG = 58;
                    tes;

                incr CHANNEL from 36 to 62 do            !TEST AT CHANNELS > 35 TO FORCE UNCORRECTABLE ERROR
                    begin
                    BGNSUB;                              !START OF SCOPE LOOP
                    CLR_MBUS;                            !CLEAR THE DRIVE

                    incr COUNT from 0 to 255 do          !CLEAR THE FIRST CRC GROUP IN THE IO_BUF
                        IO_BUF [.COUNT] = ZEROES;

                    FORCE_REM (.PLOG, .CHANNEL);         !FORCE UNCORRECTABLE ERROR AT THIS WORD AND CHANNEL
                    GD_BLK_XFER ();                      !SET UP A GOOD BLOCK TRANSFER
                    ECC_DIS = ZERO;                      !CLEAR ECC DISABLE
                    MLCS1 = read;                        !DO A READ TRANSFER
                    TIME_OUT_LOOP;                       !WAIT FOR THE  TRANSFER TO COMPLETE

                    if not ((.ECH_ERR) and (.UNC_ERR))   !SEE IF THE ERROR WAS DETECTED
                    then
                        begin                            !ERROR IF NOT DECTECTED
                        CMP_THRESHOLD;                   !COMPARE ERROR PRINT THRESHOLD
                        ERRDF (136, SYNC, DUMPER);
                        PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_76, WRD_9);
                        PRINTB (FMT_21, .PLOG, .CHANNEL);
                        end;

                    incr CNT from 0 to 12 do             !SEE IF ANY CORRECTION WAS DONE

                        if .IO_BUF [.CNT] neq ZEROES     !SEARCH THE IO_BUF FOR ALL ZEROES
                        then
                            begin                        !REPORT AN ERROR IF ANY CORRECTION WAS DONE
                            CMP_THRESHOLD;               !COMPARE ERROR PRINT THRESHOLD
                            ERRDF (137, SYNC, DUMPER);
                            PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
                            PRINTB (FMT_21, .PLOG, .CHANNEL);
                            end;
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (104)

;          10260
;          10261          ENDSUB;                        !END OF SCOPE LOOP
;          10262          end;
;          10263
;          10264      end;
;          10265
;          10266 ENDTST;


                                          .SBTTL  $T52 TEST CODE SECTION
103216  004167  101370           $T52:    JSR     R1,$SAVE5                 ;                1015
103222  005067  112150                    CLR     P.CNT                     ;                1019
103226  152777  000010  112210            BISB    #10,@ML.REG+40            ;                1019
103234  005067  110562                    CLR     IO.BUF                    ;                1019
103240  004767  115046                    JSR     PC,GD.BLK.XFER            ;                1019
103244  012777  000061  112132            MOV     #61,@ML.REG               ;                1019
103252  105777  112176           1$:      TSTB    @ML.REG+50                ;
103256  100375                            BPL     1$
103260  005005                            CLR     R5                        ; PLOG.SEL       1019
103262  010504                   2$:      MOV     R5,R4                     ; PLOG.SEL,*     1020
103264  006304                            ASL     R4
103266  066407  103272                    ADD     3$(R4),PC
103272  000016                   3$:      .WORD   4$-3$
103274  000022                            .WORD   5$-3$
103276  000030                            .WORD   6$-3$
103300  000036                            .WORD   7$-3$
103302  000044                            .WORD   8$-3$
103304  000052                            .WORD   9$-3$
103306  000060                            .WORD   10$-3$
103310  005003                   4$:      CLR     R3                        ; PLOG           1020
103312  000421                            BR      11$                       ;                1020
103314  012703  000001           5$:      MOV     #1,R3                     ; *,PLOG         1020
103320  000416                            BR      11$                       ;                1020
103322  012703  000002           6$:      MOV     #2,R3                     ; *,PLOG         1021
103326  000413                            BR      11$                       ;                1020
103330  012703  000003           7$:      MOV     #3,R3                     ; *,PLOG         1021
103334  000410                            BR      11$                       ;                1020
103336  012703  000004           8$:      MOV     #4,R3                     ; *,PLOG         1021
103342  000405                            BR      11$                       ;                1020
103344  012703  000005           9$:      MOV     #5,R3                     ; *,PLOG         1022
103350  000402                            BR      11$                       ;                1020
103352  012703  000072           10$:     MOV     #72,R3                    ; *,PLOG         1022
103356  012704  000044           11$:     MOV     #44,R4                    ; *,CHANNEL      1022
103362  104402                   12$:     TRAP    2                         ;                1022
103364  152777  000040  112052            BISB    #40,@ML.REG+40            ;                1022
103372  016702  112434                    MOV     ML.DUT,R2                 ;
103376  042702  177770                    BIC     #177770,R2
```

```
                                      ;ML4AD                                                        29-Mar-1982 16:23:04   TOPS
                                      ;          TEST CODE SECTION                                  29-Mar-1982 16:21:03   PA:<

103402  142777  000007  112034              BICB    #7,@ML.REG+40
103410  150277  112030                      BISB    R2,@ML.REG+40
103414  005001                              CLR     R1                        ; COUNT                    1023
103416  010102                      13$:    MOV     R1,R2                     ; COUNT,*                  1023
103420  006302                              ASL     R2
103422  005062  014022                      CLR     IO.BUF(R2)
103426  005201                              INC     R1                        ; COUNT                    1023
103430  020127  000377                      CMP     R1,#377                   ; COUNT,*
103434  003770                              BLE     13$
103436  010346                              MOV     R3,-(SP)                  ; PLOG,*                   1023
103440  010446                              MOV     R4,-(SP)                  ; CHANNEL,*
103442  004767  114364                      JSR     PC,FORCE.REM
103446  004767  114640                      JSR     PC,GD.BLK.XFER            ;                          1023
103452  142777  000002  112044              BICB    #2,@ML.REG+120            ;                          1023
103460  012777  000071  111716              MOV     #71,@ML.REG               ;                          1023
103466  105777  111762              14$:    TSTB    @ML.REG+50
103472  100375                              BPL     14$
103474  132777  000100  111762              BITB    #100,@ML.REG+60           ;                          1024
103502  001403                              BEQ     15$
103504  005777  112104                      TST     @ML.REG+210
103510  100444                              BMI     17$
103512  005267  111660              15$:    INC     P.CNT                     ;                          1024
103516  026767  111654  111654              CMP     P.CNT,LIMIT
103524  003402                              BLE     16$
103526  022626                              CMP     (SP)+,(SP)+
103530  000520                              BR      22$
103532  104455                      16$:    TRAP    55                        ;                          1024
103534  000210                              .WORD   210
103536  012750                              .WORD   SYNC
103540  026302                              .WORD   DUMPER
103542  012746  010616                      MOV     #WRD.9,-(SP)              ;                          1024
103546  012746  011562                      MOV     #WRD.76,-(SP)
103552  012746  010630                      MOV     #WRD.10,-(SP)
103556  012746  011462                      MOV     #WRD.67,-(SP)
103562  012746  010270                      MOV     #FOR.FMT,-(SP)
103566  012746  000005                      MOV     #5,-(SP)
103572  010600                              MOV     SP,R0                     ; SP,*
103574  104414                              TRAP    14
103576  010416                              MOV     R4,(SP)                   ; CHANNEL,*                1024
103600  010346                              MOV     R3,-(SP)                  ; PLOG,*
103602  012746  007754                      MOV     #FMT.21,-(SP)
103606  012746  000003                      MOV     #3,-(SP)
103612  010600                              MOV     SP,R0                     ; SP,*
103614  104414                              TRAP    14
103616  062706  000022                      ADD     #22,SP                    ;                          1024
103622  005001                      17$:    CLR     R1                        ; CNT                      1025
103624  010102                      18$:    MOV     R1,R2                     ; CNT,*                    1025
103626  006302                              ASL     R2
103630  005762  014022                      TST     IO.BUF(R2)
103634  001444                              BEQ     19$
103636  005267  111534                      INC     P.CNT                     ;                          1025
103642  026767  111530  111530              CMP     P.CNT,LIMIT
```

```
                              ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                              ;                 TEST CODE SECTION                             29-Mar-1982 16:21:03   PA:<

 103650  003042                        BGT     20$
 103652  104455                        TRAP    55                               ;                                    1025
 103654  000211                        .WORD   211
 103656  012750                        .WORD   SYNC
 103660  026302                        .WORD   DUMPER
 103662  012746  011462                MOV     #WRD.67,-(SP)                    ;                                    1025
 103666  012746  010650                MOV     #WRD.12,-(SP)
 103672  012746  011552                MOV     #WRD.75,-(SP)
 103676  012746  011540                MOV     #WRD.74,-(SP)
 103702  012746  011416                MOV     #WRD.61,-(SP)
 103706  012746  010304                MOV     #FIV.FMT,-(SP)
 103712  012746  000006                MOV     #6,-(SP)
 103716  010600                        MOV     SP,R0                            ; SP,*
 103720  104414                        TRAP    14
 103722  010416                        MOV     R4,(SP)                          ; CHANNEL,*                          1025
 103724  010346                        MOV     R3,-(SP)                         ; PLOG,*
 103726  012746  007754                MOV     #FMT.21,-(SP)
 103732  012746  000003                MOV     #3,-(SP)
 103736  010600                        MOV     SP,R0                            ; SP,*
 103740  104414                        TRAP    14
 103742  062706  000024                ADD     #24,SP                           ;                                    1025
 103746  005201                19$:    INC     R1                               ; CNT                                1025
 103750  020127  000014                CMP     R1,#14                           ; CNT,*
 103754  003723                        BLE     18$
 103756  022626                20$:    CMP     (SP)+,(SP)+                      ;                                    1022
 103760  104467                        TRAP    67                               ;                                    1025
 103762  006000                        ROR     R0
 103764  103002                        BHIS    22$
 103766  000167  177370        21$:    JMP     12$
 103772  005204                22$:    INC     R4                               ; CHANNEL                            1022
 103774  020427  000076                CMP     R4,#76                           ; CHANNEL,*
 104000  003772                        BLE     21$
 104002  005205                        INC     R5                               ; PLOG.SEL                           1019
 104004  020527  000006                CMP     R5,#6                            ; PLOG.SEL,*
 104010  003002                        BGT     23$
 104012  000167  177244                JMP     2$
 104016  000207                23$:    RTS     PC                               ;                                    1015

                              ; Routine Size:  193 words
                              ; Maximum stack depth per invocation:  18 words



                                       .SBTTL  T52 TEST CODE SECTION
```

```
104020                        T52::
104020  004767  177172        1$:     JSR     PC,$T52                   ;       1026
104024  104466                        TRAP    66
104026  006000                        ROR     R0
104030  103773                        BLO     1$
104032  000207                        RTS     PC

                              ; Routine Size:  6 words
                              ; Maximum stack depth per invocation:  0 words


;            10267 !<BLF/PAGE>
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (105)

;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 53
;               !
;               ! TEST NAME:            MULTIPLE CHANNEL ERROR SYNDRONE DECODE TEST
;               !
;               ! TEST DESCRIPTION:
;               !       TEST SYNDRONE DECODE TO DETECT BUT NOT
;               !       CORRECT UNCORRECTABLE MULTIPLE CHANNEL
;               !       ERRORS BY:
;               !
;               !       1.  VIA ECC DIAGNOSTIC MODE FORCE SYNDRONE
;               !           BITS TO INDICATE MULTIPLE CHANNEL ERRORS
;               !           BY ASSIGNING CRC_A EQUAL TO CRC_B
;               !
;               !       2.  DO A MASS BUS READ TRANSFER
;               !
;               !       3.  THEN EXAMIN THE IO_BUF FOR  NO BITS
;               !           COMPLIMENTED AND ECH AND UNC BITS SET
;               !
;               ! IMPLICIT INPUTS:
;               !       IO_BUF
;               !       A  VECTOR OF 256 WORDS WHERE DATA
;               !       FOR MBUS READS AND WRITES TRANSFERS
;               !       IS FOUND.
;               !
;               !
;               !--
;
;               local
;                   PLOG;                               !INDEX INTO REMAINDER TABLE 'REM_TBL'
;
;               CLR_THRESHOLD;                          !CLEAR ERROR PRINT THRESHOLD
;               BAI = ONE;                              !FIRST LETS CLEAR THE ML11'S GOOD
;               IO_BUF = ZEROES;                        !BLOCK BY WRITING ZEROES TO IT
;               GD_BLK_XFER ();
;               MLCS1 = write;
;               TIME_OUT_LOOP;
;
;               incr PLOG_SEL from 0 to 6 do            !TEST SYNDRONE DECODE AT 7 DIFFERENT PLOG VALUES
;                   begin
;
;                   case .PLOG_SEL from 0 to 6 of       !SELECT A PLOG VALUE
;                       set
;
;                       [0] :                           !POINTS TO CRC WORD 0
;                           PLOG = 0;
;
;                       [1] :                           !POINTS TO CRC WORD 1
;                           PLOG = 1;
```

```
;ML4AD                                                   29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                      29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (105)

;
;                 [2] :                                  !POINTS TO CRC WORD 2
;                     PLOG = 2;
;
;                 [3] :                                  !POINTS TO CRC WORD 3
;                     PLOG = 3;
;
;                 [4] :                                  !POINTS TO CRC WORD 4
;                     PLOG = 4;
;
;                 [5] :                                  !POINTS TO CRC WORD 5
;                     PLOG = 5;
;
;                 [6] :                                  !POINTS TO ALL 6 WORDS IN CRC GROUP
;                     PLOG = 58;
;                 tes;
;
;             incr CHANNEL from 1 to 35 do               !TEST 35 CHANNELS STARTING AT CHANNEL 1
;                 begin
;                 BGNSUB;                                !START OF SCOPE LOOP
;                 CLR_MBUS;                              !CLEAR THE DRIVE
;
;                 incr COUNT from 0 to 255 do            !CLEAR FIRST CRC GROUP IN THE IO_BUF
;                     IO_BUF [.COUNT] = ZEROES;
;
;                 FORCE_REM (.PLOG, .CHANNEL);           !FORCE ERR AT THIS WORD AND CHANNEL
;                 CRC_A = .CRC_B;                        !CRC_A EQL TO CRC_B CAUSES THE UNC ERROR
;                 GD_BLK_XFER ();                        !SET UP A GOOD BLOCK TRANSFER
;                 ECC_DIS = ZERO;                        !CLEAR ECC DISABLE
;                 MLCS1 = read;                          !DO A READ TRANSFER
;                 TIME_OUT_LOOP;                         !WAIR UNTIL THE TRANSFER IS COMPLETE
;
;                 if not ((.ECH_ERR) and (.UNC_ERR))     !SEE IF THE ERROR WAS DETECTED
;                 then
;                     begin                              !REPORT ERROR IF NOT DETECTED
;                     CMP_THRESHOLD;                     !COMPARE ERROR PRINT THRESHOLD
;                     ERRDF (138, SYNC, DUMPER);
;                     PRINTB (FOR_FMT, WRD_77, WRD_10, WRD_76, WRD_9);
;                     PRINTB (FMT_21, .PLOG, .CHANNEL);
;                     end;
;
;                 incr CNT from 0 to 12 do               !SEE IF ANY ERROR CORRECTION WAS DONE
;
;                     if .IO_BUF [.CNT] neq ZEROES       !TEST THE IO_BUF FOR ALL ZEROES
;                     then
;                         begin                          !ERROR IF ANY BITS GOT FLIPPED
;                         CMP_THRESHOLD;                 !COMPARE ERROR PRINT THRESHOLD
;                         ERRDF (139, SYNC, DUMPER);
;                         PRINTB (FIV_FMT, WRD_61, WRD_74, WRD_75, WRD_12, WRD_67);
;                         PRINTB (FMT_21, .PLOG, .CHANNEL);
;                         end;
;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (105)

;               10372           ENDSUB;                         !END OF SCOPE LOOP
;               10373           end;
;               10374
;               10375       end;
;               10376
;               10377 ENDTST;


                                                .SBTTL  $T53 TEST CODE SECTION
104034  004167  100552                  $T53:   JSR     R1,$SAVE5                       ;                       1026
104040  005067  111332                          CLR     P.CNT                           ;                       1030
104044  152777  000010  111372                  BISB    #10,@ML.REG+40                  ;                       1030
104052  005067  107744                          CLR     IO.BUF                          ;                       1030
104056  004767  114230                          JSR     PC,GD.BLK.XFER                  ;                       1030
104062  012777  000061  111314                  MOV     #61,@ML.REG                     ;                       1030
104070  105777  111360                  1$:     TSTB    @ML.REG+50                      ;                       1030
104074  100375                                  BPL     1$
104076  005005                                  CLR     R5
104100  010504                          2$:     MOV     R5,R4                           ; PLOG.SEL              1030
104102  006304                                  ASL     R4                              ; PLOG.SEL,*            1031
104104  066407  104110                          ADD     3$(R4),PC
104110  000016                          3$:     .WORD   4$-3$
104112  000022                                  .WORD   5$-3$
104114  000030                                  .WORD   6$-3$
104116  000036                                  .WORD   7$-3$
104120  000044                                  .WORD   8$-3$
104122  000052                                  .WORD   9$-3$
104124  000060                                  .WORD   10$-3$
104126  005003                          4$:     CLR     R3                              ; PLOG                  1031
104130  000421                                  BR      11$                             ;                       1031
104132  012703  000001                  5$:     MOV     #1,R3                           ; *,PLOG                1031
104136  000416                                  BR      11$                             ;                       1031
104140  012703  000002                  6$:     MOV     #2,R3                           ; *,PLOG                1032
104144  000413                                  BR      11$                             ;                       1031
104146  012703  000003                  7$:     MOV     #3,R3                           ; *,PLOG                1032
104152  000410                                  BR      11$                             ;                       1031
104154  012703  000004                  8$:     MOV     #4,R3                           ; *,PLOG                1032
104160  000405                                  BR      11$                             ;                       1031
104162  012703  000005                  9$:     MOV     #5,R3                           ; *,PLOG                1033
104166  000402                                  BR      11$                             ;                       1031
104170  012703  000072                  10$:    MOV     #72,R3                          ; *,PLOG                1033
104174  012704  000001                  11$:    MOV     #1,R4                           ; *,CHANNEL             1033
104200  104402                          12$:    TRAP    2                               ;                       1033
104202  152777  000040  111234                  BISB    #40,@ML.REG+40                  ;                       1033
104210  016702  111616                          MOV     ML.DUT,R2
104214  042702  177770                          BIC     #177770,R2
104220  142777  000007  111216                  BICB    #7,@ML.REG+40
```

```
                                   ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                   ;            TEST CODE SECTION                                  29-Mar-1982 16:21:03   PA:<

104226  150277  111212                         BISB    R2,@ML.REG+40
104232  005001                                 CLR     R1                         ; COUNT                           1034
104234  010102                         13$:    MOV     R1,R2                      ; COUNT,*                         1034
104236  006302                                 ASL     R2
104240  005062  014022                         CLR     IO.BUF(R2)
104244  005201                                 INC     R1                         ; COUNT                           1034
104246  020127  000377                         CMP     R1,#377                    ; COUNT,*
104252  003770                                 BLE     13$
104254  010346                                 MOV     R3,-(SP)                   ; PLOG,*                          1034
104256  010446                                 MOV     R4,-(SP)                   ; CHANNEL,*
104260  004767  113546                         JSR     PC,FORCE.REM
104264  117702  111274                         MOVB    @ML.REG+160,R2             ;                                 1034
104270  042702  177700                         BIC     #177700,R2
104274  142777  000077  111252                 BICB    #77,@ML.REG+150
104302  150277  111246                         BISB    R2,@ML.REG+150
104306  004767  114000                         JSR     PC,GD.BLK.XFER             ;                                 1034
104312  142777  000002  111204                 BICB    #2,@ML.REG+120             ;                                 1034
104320  012777  000071  111056                 MOV     #71,@ML.REG                ;                                 1034
104326  105777  111122                 14$:    TSTB    @ML.REG+50
104332  100375                                 BPL     14$
104334  132777  000100  111122                 BITB    #100,@ML.REG+60            ;                                 1035
104342  001403                                 BEQ     15$
104344  005777  111244                         TST     @ML.REG+210
104350  100444                                 BMI     17$
104352  005267  111020                 15$:    INC     P.CNT                      ;                                 1035
104356  026767  111014  111014                 CMP     P.CNT,LIMIT
104364  003402                                 BLE     16$
104366  022626                                 CMP     (SP)+,(SP)+
104370  000520                                 BR      22$
104372  104455                         16$:    TRAP    55                         ;                                 1035
104374  000212                                 .WORD   212
104376  012750                                 .WORD   SYNC
104400  026302                                 .WORD   DUMPER
104402  012746  010616                         MOV     #WRD.9,-(SP)               ;                                 1035
104406  012746  011562                         MOV     #WRD.76,-(SP)
104412  012746  010630                         MOV     #WRD.10,-(SP)
104416  012746  011570                         MOV     #WRD.77,-(SP)
104422  012746  010270                         MOV     #FOR.FMT,-(SP)
104426  012746  000005                         MOV     #5,-(SP)
104432  010600                                 MOV     SP,R0                      ; SP,*
104434  104414                                 TRAP    14
104436  010416                                 MOV     R4,(SP)                    ; CHANNEL,*                       1035
104440  010346                                 MOV     R3,-(SP)                   ; PLOG,*
104442  012746  007754                         MOV     #FMT.21,-(SP)
104446  012746  000003                         MOV     #3,-(SP)
104452  010600                                 MOV     SP,R0                      ; SP,*
104454  104414                                 TRAP    14
104456  062706  000022                         ADD     #22,SP                     ;                                 1035
104462  005001                         17$:    CLR     R1                         ; CNT                             1036
104464  010102                         18$:    MOV     R1,R2                      ; CNT,*                           1036
104466  006302                                 ASL     R2
104470  005762  014022                         TST     IO.BUF(R2)
```

```
                                        ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                        ;                   TEST CODE SECTION                           29-Mar-1982 16:21:03   PA:<

104474  001444                                  BEQ     19$
104476  005267  110674                          INC     P.CNT
104502  026767  110670  110670                  CMP     P.CNT,LIMIT                     ;                       1036
104510  003042                                  BGT     20$
104512  104455                                  TRAP    55                              ;                       1036
104514  000213                                  .WORD   213
104516  012750                                  .WORD   SYNC
104520  026302                                  .WORD   DUMPER
104522  012746  011462                          MOV     #WRD.67,-(SP)                   ;                       1036
104526  012746  010650                          MOV     #WRD.12,-(SP)
104532  012746  011552                          MOV     #WRD.75,-(SP)
104536  012746  011540                          MOV     #WRD.74,-(SP)
104542  012746  011416                          MOV     #WRD.61,-(SP)
104546  012746  010304                          MOV     #FIV.FMT,-(SP)
104552  012746  000006                          MOV     #6,-(SP)
104556  010600                                  MOV     SP,R0                           ; SP,*
104560  104414                                  TRAP    14
104562  010416                                  MOV     R4,(SP)                         ; CHANNEL,*             1036
104564  010346                                  MOV     R3,-(SP)                        ; PLOG,*
104566  012746  007754                          MOV     #FMT.21,-(SP)
104572  012746  000003                          MOV     #3,-(SP)
104576  010600                                  MOV     SP,R0                           ; SP,*
104600  104414                                  TRAP    14
104602  062706  000024                          ADD     #24,SP                          ;                       1036
104606  005201                          19$:    INC     R1                              ; CNT                   1036
104610  020127  000014                          CMP     R1,#14                          ; CNT,*
104614  003723                                  BLE     18$
104616  022626                          20$:    CMP     (SP)+,(SP)+                     ;                       1033
104620  104467                                  TRAP    67                              ;                       1037
104622  006000                                  ROR     R0
104624  103002                                  BHIS    22$
104626  000167  177346                  21$:    JMP     12$
104632  005204                          22$:    INC     R4                              ; CHANNEL               1033
104634  020427  000043                          CMP     R4,#43                          ; CHANNEL,*
104640  003772                                  BLE     21$
104642  005205                                  INC     R5                              ; PLOG.SEL              1030
104644  020527  000006                          CMP     R5,#6                           ; PLOG.SEL,*
104650  003002                                  BGT     23$
104652  000167  177222                          JMP     2$
104656  000207                          23$:    RTS     PC                              ;                       1026

                                        ; Routine Size:  202 words
                                        ; Maximum stack depth per invocation:  18 words
```

```
                                  ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                  ;                 TEST CODE SECTION                     29-Mar-1982 16:21:03   PA:<



                                          .SBTTL  T53 TEST CODE SECTION
 104660                           T53::
 104660  004767  177150           1$:     JSR     PC,$T53                 ;                                    1037
 104664  104466                           TRAP    66
 104666  006000                           ROR     R0
 104670  103773                           BLO     1$
 104672  000207                           RTS     PC

                                  ; Routine Size:  6 words
                                  ; Maximum stack depth per invocation:  0 words


 ;        10378 !<BLF/PAGE>
```

```
;ML4AD                                                     29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                 TEST CODE SECTION                        29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (106)

;        !
;        BGNTST;
;
;        !++
;        ! TEST NUMBER:  TST 54
;        !
;        ! TEST NAME:            SINGLE BIT ERROR SYNDRONE GENERATION & DECODE TEST
;        !
;        ! TEST DESCRIPTION:
;        !       TEST SYNDRONE GENERATION, SYNDRONE DECODE
;        !       AND ERROR CORRECTION FOR SINGLE BIT CHANNEL
;        !       ERRORS BY:
;        !
;        !       1.  CLEAR THE FIRST CRC GROUP IN THE
;        !           IO_BUF AND GOOD BLOCK TO ZEROES
;        !
;        !       2.  VIA DATA DIAGNOSTIC MODE FLIP A BIT
;        !           TO A ONE
;        !
;        !       3.  THEN DO A MASS BUS READ TRANSFER AND
;        !           EXAMIN THE IO_BUF FOR ZEROES INDICATING
;        !           THE CORRECTION WAS PERFORMED
;        !
;        !       4.  REPEAT WITH ALL BITS IN THE CRC GROUP
;        !
;        ! IMPLICIT INPUTS:
;        !       IO_BUF
;        !       A  VECTOR OF 256 WORDS WHERE DATA
;        !       FOR MBUS READS AND WRITES TRANSFERS
;        !       IS FOUND.
;        !
;        !       PD_TEMP
;        !       A BIT VECTOR OF 16 BITS WHERE THE READ
;        !       PROM DATA IS STORED AND ACCESSED FROM.
;        !
;        !
;        !--
;
;        local
;            DONE,                                         !DONE FLAG
;            NIB_PAT : bitvector [4],                      !STORAGE FOR SBE DATA GENERATED
;            NIB_SEL,                                      !POINTER WHERE SBE IS TO BE WRITTEN
;            GD_WRD_CNT;                                   !COUNT OF WHERE GOOD 'NIB_SEL' ARE FOUND
;
;        CLR_THRESHOLD;                                    !CLEAR ERROR PRINT THRESHOLD
;
;        incr WRD_CNT from 0 to 5 do                       !FORCE SINGLE BIT ERRORS IN ONE CRC GROUP
;            begin
;
;              incr BIT_CNT from 0 to 35 do                !FORCE SBE'S AT EACH BIT OF A WORD
;                  begin
;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                     TEST CODE SECTION                 29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (106)

;              incr CNT from 0 to 255 do                !CLEAR FIRST CRC GROUP OF IO_BUF
;                  IO_BUF [.CNT] = ZEROES;
;
;              CLR_MBUS;                                !CLEAR THE DRIVE
;              GD_BLK_XFER ();                          !SET UP A GOOF BLOCK TRANSFER
;              MLCS1 = write;                           !DO A WRITE TRANSFER
;              TIME_OUT_LOOP;                           !WAIT UNTIL THE TRANSFER IS COMPLETE
;              CLR_MBUS;                                !CLEAR THE DRIVE AGAIN
;              DONE = ZERO;                             !CLEAR THE DONE FLAG
;              GD_WRD_CNT = -1;                         !RESET THE COUNT
;              MLD1 = ZEROES;                           !LOAD THE DATA DIAG REG (BITS 0-38)
;              MLD2 = ZEROES;                           !WITH ZEROES PAT AND CRC BIT FOR
;              MLE2 = %o'060000';                       !ZEROES PAT
;              NIB_SEL = .BIT_CNT/4;                    !CALCULATE THE NIBBLE WHERE THE SBE IS TO GO
;              DAT_DM_XFER ();                          !SET UP A DATA DIAG MODE TRANSFER
;              MLCS1 = write;                           !DO A WRITE TRANSFER
;              DELAY (ONE_US);                          !GIVE THE PROM DATA TIME TO GET OUT
;
;              do                                       !FIND THE GOOD NIB AT THE TESTED WORD
;                  begin
;                  PD_TEMP = .MLPD;                     !READ THE PROM DATA FOR THIS ARRAY WORD
;
;                  if .PD_TEMP [.NIB_SEL] IS_SET        !IS THIS A GOOD NIBBLE
;                  then
;                      DAT_CLK = ONE                    !IF NOT THEN GET THE NEXT ARRAY WORD
;                  else
;                      begin                            !ELSE SEE IF WE ARE AT THE TESTED WORD
;                      GD_WRD_CNT = .GD_WRD_CNT + 1;    !UP THE COUNT
;                                                       !AND SEE IF WE ARE DONE
;
;                      if .GD_WRD_CNT eql .WRD_CNT then DONE = ONE else DAT_CLK = ONE;
;
;                      end;
;
;                  end
;              until .DONE IS_SET;                      !REPEAT UNTIL WE ARE DONE
;
;              NIB_PAT = ZEROES;                        !CLEAR THE SAVE LOCATION
;              NIB_PAT [.BIT_CNT mod 4] = ONE;          !AND SET THE SBE IN THIS NIBBLE
;              D1_TEMP = ZEROES;                        !CLEAR THE OTHER NIBBLES IN THIS ARRAY WORD
;              D2_TEMP = ZEROES;                        !TO BE ZEROES PATTERN AND ZEROES CRC PATTERN
;              E2_TEMP = %o'060000';
;              LD_LNG_WRD (.NIB_SEL, .NIB_PAT);         !LOAD THE SBE INTO THE SAVE LOCATION
;              WRT_LNG_WRD;                             !AND WRITE THE SBE INTO THE DATA DIAG RES'S
;              DAT_CLK = ONE;                           !CLOCK THE SBE INTO THE ARRAYS MEMORY
;              DELAY (ONE_US);                          !GIVE IT TIME TO WRITE INTO THE MEMORY
;              BGNSUB;                                  !START OF SCOPE LOOP
;              CLR_MBUS;                                !CLEAR OUT THE DATA DIAG MODE XFERR
;              GD_BLK_XFER ();                          !SET UP A GOOD BLOCK TRANSFER
;              ECC_DIS = ZERO;                          !CLEAR ECC DISABLE
;              MLCS1 = read;                            !AND READ OUT THE SBE
;              TIME_OUT_LOOP;
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       TEST CODE SECTION                     29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (106)

;               10483
;               10484           incr CNT from 0 to 13 do                        !SEE IF THE SBE WAS CORRECTED
;               10485
;               10486               if .IO_BUF [.CNT] neq ZEROES                !TEST THE IO_BUF FOR ALL ZEROES
;               10487               then
;               10488                   begin                                   !ERROR IF THE ERROR WAS NOT CORRECTED
;               10489                   CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;               10490                   ERRDF (140, SYNC, DUMPER);
;               10491                   PRINTB (THR_FMT, PHR_12, WRD_76, WRD_9);
;               10492                   PRINTB (FMT_22, .WRD_CNT, .BIT_CNT);
;               10493                   end;
;               10494
;               10495           ENDSUB;                                         !END OF SCOPE LOOP
;               10496           end;
;               10497
;               10498       end;
;               10499
;               10500 ENDTST;


                                             .SBTTL  $T54 TEST CODE SECTION
104674  004167  077712               $T54:   JSR     R1,$SAVE5                       ;               1037
104700  162706  000010                       SUB     #10,SP
104704  005067  110466                       CLR     P.CNT                           ;               1042
104710  005001                               CLR     R1                              ; WRD.CNT       1042
104712  005002                       1$:     CLR     R2                              ; BIT.CNT       1042
104714  005003                       2$:     CLR     R3                              ; CNT           1043
104716  010304                       3$:     MOV     R3,R4                           ; CNT,*         1043
104720  006304                               ASL     R4
104722  005064  014022                       CLR     IO.BUF(R4)
104726  005203                               INC     R3                              ; CNT           1043
104730  020327  000377                       CMP     R3,#377                         ; CNT,*
104734  003770                               BLE     3$
104736  152777  000040  110500               BISB    #40,@ML.REG+40                  ;               1043
104744  016704  111062                       MOV     ML.DUT,R4
104750  042704  177770                       BIC     #177770,R4
104754  142777  000007  110462               BICB    #7,@ML.REG+40
104762  150477  110456                       BISB    R4,@ML.REG+40
104766  004767  113320                       JSR     PC,GD.BLK.XFER                  ;               1043
104772  012777  000061  110404               MOV     #61,@ML.REG                     ;               1043
105000  105777  110450               4$:     TSTB    @ML.REG+50
105004  100375                               BPL     4$
105006  152777  000040  110430               BISB    #40,@ML.REG+40                  ;               1043
105014  016704  111012                       MOV     ML.DUT,R4
105020  042704  177770                       BIC     #177770,R4
105024  142777  000007  110412               BICB    #7,@ML.REG+40
105032  150477  110406                       BISB    R4,@ML.REG+40
```

```
                                  ;ML4AD                                            29-Mar-1982 16:23:04   TOPS
                                  ;             TEST CODE SECTION                   29-Mar-1982 16:21:03   PA:<

105036  005066  000002                      CLR     2(SP)                   ; DONE                          1043
105042  012716  177777                      MOV     #-1,(SP)                ; *,GD.WRD.CNT                  1044
105046  005077  110522                      CLR     @ML.REG+170             ;                               1044
105052  005077  110526                      CLR     @ML.REG+200             ;                               1044
105056  012777  060000  110500              MOV     #60000,@ML.REG+160      ;                               1044
105064  010246                              MOV     R2,-(SP)                ; BIT.CNT,*                     1044
105066  012746  000004                      MOV     #4,-(SP)
105072  004767  077350                      JSR     PC,BL$DIV
105076  010005                              MOV     R0,R5                   ; *,NIB.SEL
105100  004767  111306                      JSR     PC,DAT.DM.XFER          ;                               1044
105104  012777  000061  110272              MOV     #61,@ML.REG             ;                               1044
105112  012703  000001                      MOV     #1,R3                   ; *,$$TMP2                      1044
105116  001411                      5$:     BEQ     8$
105120  016704  074772                      MOV     L$DLY,R4                ; *,$$TMP1
105124  001404                              BEQ     7$
105126  005066  000012              6$:     CLR     12(SP)                  ; $$TMP
105132  005304                              DEC     R4                      ; $$TMP1
105134  001374                              BNE     6$
105136  005303                      7$:     DEC     R3                      ; $$TMP2
105140  000766                              BR      5$
105142  010504                      8$:     MOV     R5,R4                   ; NIB.SEL,*                     1045
105144  006204                              ASR     R4
105146  006204                              ASR     R4
105150  006204                              ASR     R4
105152  062704  015342                      ADD     #PD.TEMP,R4
105156  017767  110452  110156      9$:     MOV     @ML.REG+230,PD.TEMP     ;                               1045
105164  010446                              MOV     R4,-(SP)                ;                               1045
105166  010546                              MOV     R5,-(SP)                ; NIB.SEL,*
105170  042716  177770                      BIC     #177770,(SP)
105174  012746  000001                      MOV     #1,-(SP)
105200  005046                              CLR     -(SP)
105202  004767  076426                      JSR     PC,BL$GT2
105206  062706  000010                      ADD     #10,SP
105212  005300                              DEC     R0
105214  001411                              BEQ     10$                     ;                               1045
105216  005266  000004                      INC     4(SP)                   ; GD.WRD.CNT                    1045
105222  026601  000004                      CMP     4(SP),R1                ; GD.WRD.CNT,WRD.CNT            1046
105226  001004                              BNE     10$
105230  012766  000001  000006              MOV     #1,6(SP)                ; *,DONE
105236  000403                              BR      11$
105240  152777  000020  110256      10$:    BISB    #20,@ML.REG+120
105246  026627  000006  000001      11$:    CMP     6(SP),#1                ; DONE,*                        1046
105254  001340                              BNE     9$
105256  005066  000010                      CLR     10(SP)                  ; NIB.PAT                       1046
105262  010246                              MOV     R2,-(SP)                ; BIT.CNT,*                     1046
105264  012746  000004                      MOV     #4,-(SP)
105270  004767  077164                      JSR     PC,BL$MOD
105274  010004                              MOV     R0,R4
105276  006200                              ASR     R0
105300  006200                              ASR     R0
105302  006200                              ASR     R0
105304  012703  000014                      MOV     #14,R3
```

```
24118                                   ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
24119                                   ;              TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<
24120
24121 105310  060603                            ADD     SP,R3                       ; NIB.PAT,*
24122 105312  060300                            ADD     R3,R0
24123 105314  010016                            MOV     R0,(SP)
24124 105316  010446                            MOV     R4,-(SP)
24125 105320  042716  177770                    BIC     #177770,(SP)
24126 105324  012746  000001                    MOV     #1,-(SP)
24127 105330  011646                            MOV     (SP),-(SP)
24128 105332  004767  076534                    JSR     PC,BLSPU2
24129 105336  005067  106032                    CLR     D1.TEMP                     ;                        1047
24130 105342  005067  106030                    CLR     D2.TEMP                     ;                        1047
24131 105346  012767  060000  106024            MOV     #60000,E2.TEMP              ;                        1047
24132 105354  010516                            MOV     R5,(SP)                     ; NIB.SEL,*              1047
24133 105356  016646  000022                    MOV     22(SP),-(SP)                ; NIB.PAT,*
24134 105362  004767  113766                    JSR     PC,LD.LNG.WRD
24135 105366  016777  106002  110200            MOV     D1.TEMP,@ML.REG+170
24136 105374  016777  105776  110202            MOV     D2.TEMP,@ML.REG+200
24137 105402  016777  105772  110154            MOV     E2.TEMP,@ML.REG+160
24138 105410  152777  000020  110106            BISB    #20,@ML.REG+120
24139 105416  012703  000001                    MOV     #1,R3                       ;                        1047
24140 105422  001411                    12$:    BEQ     15$                         ; *,$STMP2               1047
24141 105424  016704  074466                    MOV     LSDLY,R4                    ; *,$STMP1
24142 105430  001404                            BEQ     14$
24143 105432  005066  000026            13$:    CLR     26(SP)                      ; $STMP
24144 105436  005304                            DEC     R4                          ; $STMP1
24145 105440  001374                            BNE     13$
24146 105442  005303                    14$:    DEC     R3                          ; $STMP2
24147 105444  000766                            BR      12$
24148 105446  104402                    15$:    TRAP    2
24149 105450  152777  000040  107766            BISB    #40,@ML.REG+40              ;                        1047
24150 105456  016704  110350                    MOV     ML.DUT,R4
24151 105462  042704  177770                    BIC     #177770,R4
24152 105466  142777  000007  107750            BICB    #7,@ML.REG+40
24153 105474  150477  107744                    BISB    R4,@ML.REG+40
24154 105500  004767  112606                    JSR     PC,GD.BLK.XFER
24155 105504  142777  000002  110012            BICB    #2,@ML.REG+120              ;                        1047
24156 105512  012777  000071  107664            MOV     #71,@ML.REG                 ;                        1048
24157 105520  105777  107730            16$:    TSTB    @ML.REG+50                  ;                        1048
24158 105524  100375                            BPL     16$
24159 105526  005003                            CLR     R3                          ; CNT                    1048
24160 105530  010304                    17$:    MOV     R3,R4                       ; CNT,*                  1048
24161 105532  006304                            ASL     R4
24162 105534  005764  014022                    TST     IO.BUF(R4)
24163 105540  001440                            BEQ     18$
24164 105542  005267  107630                    INC     P.CNT                       ;                        1048
24165 105546  026767  107624  107624            CMP     P.CNT,LIMIT
24166 105554  003036                            BGT     19$
24167 105556  104455                            TRAP    55                          ;                        1049
24168 105560  000214                            .WORD   214
24169 105562  012750                            .WORD   SYNC
24170 105564  026302                            .WORD   DUMPER
24171 105566  012746  010616                    MOV     #WRD.9,-(SP)                ;                        1049
24172 105572  012746  011562                    MOV     #WRD.76,-(SP)
```

```
24174                                  :ML4AD                                                      29-Mar-1982 16:23:04    TOPS
24175                                  ;                TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<
24176
24177 105576  012746  012036                    MOV     #PHR.12,-(SP)
24178 105602  012746  010256                    MOV     #THR.FMT,-(SP)
24179 105606  012746  000004                    MOV     #4,-(SP)
24180 105612  010600                            MOV     SP,R0                   ; SP,*
24181 105614  104414                            TRAP    14
24182 105616  010216                            MOV     R2,(SP)                 ; BIT.CNT,*                    1049
24183 105620  010146                            MOV     R1,-(SP)                ; WRD.CNT,*
24184 105622  012746  010026                    MOV     #FMT.22,-(SP)
24185 105626  012746  000003                    MOV     #3,-(SP)
24186 105632  010600                            MOV     SP,R0                   ; SP,*
24187 105634  104414                            TRAP    14
24188 105636  062706  000020                    ADD     #20,SP                  ;                              1048
24189 105642  005203                    18$:    INC     R3                      ; CNT                          1048
24190 105644  020327  000015                    CMP     R3,#15                  ; CNT,*
24191 105650  003727                            BLE     17$
24192 105652  104467                    19$:    TRAP    67                      ;                              1049
24193 105654  006000                            ROR     R0
24194 105656  103673                            BLO     15$
24195 105660  062706  000020                    ADD     #20,SP                  ;                              1042
24196 105664  005202                            INC     R2                      ; BIT.CNT                      1042
24197 105666  020227  000043                    CMP     R2,#43                  ; BIT.CNT,*
24198 105672  003002                            BGT     20$
24199 105674  000167  177014                    JMP     2$
24200 105700  005201                    20$:    INC     R1                      ; WRD.CNT                      1042
24201 105702  020127  000005                    CMP     R1,#5                   ; WRD.CNT,*
24202 105706  003002                            BGT     21$
24203 105710  000167  176776                    JMP     1$
24204 105714  062706  000010            21$:    ADD     #10,SP                  ;                              1037
24205 105720  000207                            RTS     PC
24206
24207                                  ; Routine Size:  267 words
24208                                  ; Maximum stack depth per invocation:  26 words
24213
24214
24218
24219                                          .SBTTL  T54 TEST CODE SECTION
24223 105722                          T54::
24224 105722  004767  176746          1$:     JSR     PC,$T54                 ;                              1049
24225 105726  104466                          TRAP    66
24226 105730  006000                          ROR     R0
24227 105732  103773                          BLO     1$
24228 105734  000207                          RTS     PC
```

```
                          ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                          ;                 TEST CODE SECTION                       29-Mar-1982 16:21:03   PA:<


                          ; Routine Size:  6 words
                          ; Maximum stack depth per invocation:  0 words


;           10501 !<BLF/PAGE>
```

```
!
BGNTST;

!++
! TEST NUMBER:  TST 55
!
! TEST NAME:               MULTIPLE BIT ERROR SYNDRONE GENERATION AND DECODE TEST
!
! TEST DESCRIPTION:
!        TEST SYNDRONE GENERATION, SYNDRONE DECODE
!        AND ERROR CORRECTION FOR MULTIPLE BIT
!        CHANNEL ERRORS BY:
!
!        1.  CLEAR THE FIRST CRC GROUP IN THE
!            IO_BUF AND GOOD BLOCK TO ZEROES
!
!        2.  VIA DATA DIAG MODE FLIP ALL BITS IN
!            A CHANNEL TO ONES
!
!        3.  THEN DO A MASS BUS READ TRANSFER AND
!            EXAMIN THE IO BUF FOR ZEROES INDICATING
!            THE CORRECTION WAS PERFORMED
!
!        4.  REPEAT FOR ALL CHANNELS IN THE CRC GROUP
!
! IMPLICIT INPUTS:
!        PD_TEMP
!        A BIT VECTOR OF 16 BITS WHERE THE READ
!        PROM DATA IS STORED OAND ACCESSED FROM.
!
!        IO_BUF
!        A  VECTOR OF 256 WORDS WHERE DATA
!        FOR MBUS READS AND WRITES TRANSFERS
!        IS FOUND.
!
!
!--

local
    NIB_PAT : bitvector [4],                    !STORAGE FOR SBE TO BE GENERATED
    NIB_SEL,                                    !POINTER TO WHERE ERROR IS TO BE WRITTEN
    GD_WRD_CNT;                                 !COUNT OF WHERE GOOD 'NIB_SEL' ARE FOUND

CLR_THRESHOLD;                                  !CLEAR ERROR PRINT THRESHOLD
E2_TEMP<12, 3> = %b'110';                       !LOAD DATA STRUCTURE WITH ZEROES CRC PATTERN

incr BIT_CNT from 0 to 35 do                    !TEST FOR MULTILPLE ERRORS AT 36 CHANNELS
    begin
    CLR_MBUS;                                   !CLEAR THE DRIVE

    incr CNT from 0 to 255 do                   !CLEAR FIRST CRC GROUP IN THE IO_BUF
        IO_BUF [.CNT] = ZEROES;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (107)

;
;       GD_BLK_XFER ();                                 !ALSO CLEAR THTE FIRST CRC GROUP
;       MLCS1 = write;                                  !IN THE ML11'S GOOD BLOCK
;       TIME_OUT_LOOP;
;       GD_WRD_CNT = ZERO;                              !CLEAR COUNT
;       D1_TEMP = ZEROES;                               !CLEAR D1_TEMP
;       D2_TEMP = ZEROES;                               !CLEAR D2_TEMP
;       NIB_PAT = ZEROES;                               !CLEAR NIBBLE PATTERN
;       NIB_SEL = .BIT_CNT/4;                           !CALCULATE THE NIBBLE TO BE IN ERROR
;       NIB_PAT [.BIT_CNT mod 4] = ONE;                 !CALCULATE AND THE BIT TO BE IN ERROR
;       LD_LNG_WRD (.NIB_SEL, .NIB_PAT);                !LOAD THE ERROR IN D1_TEMP OR D2_TEMP
;       WRT_LNG_WRD;                                    !LOAD THE REGISTER WITH THE ERROR
;       DAT_DM_XFER ();                                 !SET UP A DATA DIAG MODE TRANSFER
;       MLCS1 = write;                                  !DO A WRITE TRANSFER
;       DELAY (ONE_US);                                 !GIVE THE PROM DATA TIME TO COME OUT
;
;       do                                              !LOAD THIS CHANNEL WITH MULTIPLE ERRORS
;           begin
;           PD_TEMP = .MLPD;                            !READ THIS ARRAY WORDS PROM_DATA
;
;           if .PD_TEMP [.NIB_SEL] IS_SET               !SEE IF THIS A GOOD NIBBLE
;           then
;               DAT_CLK = ONE                           !CLOCK OUT ANOTHER ARRAY WORD IF BAD
;           else
;               begin                                   !ELSE CLOCK IN THE ERROR INTO A GOOD NIBBLE
;               GD_WRD_CNT = .GD_WRD_CNT + 1;
;               DAT_CLK = ONE;
;               end;
;
;           end
;       until .GD_WRD_CNT eql 6;                        !REPEAT UNTIL 6 WORDS ARE WRITTEN
;
;       BGNSUB;                                         !START OF SCOPE LOOP
;       CLR_MBUS;                                       !CLEAR OUT THE DATA DISG MODE TRANSFER
;       GD_BLK_XFER ();                                 !SET UP A GOOD BLOCK TRANSFER
;       ECC_DIS = 0;                                    !ENABLE ERROR CORRECTION
;       MLCS1 = read;                                   !READ OUT THE ERRORS
;       TIME_OUT_LOOP;                                  !WAIT FOR THE TRANSFER TO COMPLETE
;
;       incr WRD_CNT from 0 to 13 do                    !SEE IF THE CORRECTIONS WHERE DONE
;
;           if .IO_BUF [.WRD_CNT] neq ZEROES            !TEST THE IO_BUF FOR ALL ZEROES
;           then
;               begin                                   !REPORT THE ERROR IF ANY LOCATIONS ARE NOT ZEROES
;               CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;               ERRDF (141, SYNC, DUMPER);
;               PRINTB (THR_FMT, PHR_13, WRD_76, WRD_9);
;               PRINTB (FMT_22, .WRD_CNT, .BIT_CNT);
;               end;
;
;       ENDSUB;                                         !END OF SCOPE LOOP
;       end;
```

```
24356 ;ML4AD                                                          29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
24357 ;                  TEST CODE SECTION                             29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (107)
24358
24359 ;          10606
24360 ;          10607 ENDTST;
24364
24365                                              .SBTTL  $T55 TEST CODE SECTION
24369 105736 004167 076650              $T55:      JSR     R1,$SAVE5
24370 105742 024646                                CMP     -(SP),-(SP)                  ;                    1050
24371 105744 005067 107426                         CLR     P.CNT                        ;                    1054
24372 105750 042767 070000 105422                  BIC     #70000,E2.TEMP               ;                    1054
24373 105756 052767 060000 105414                  BIS     #60000,E2.TEMP
24374 105764 005003                                CLR     R3                           ; BIT.CNT            1054
24375 105766 152777 000040 107450     1$:         BISB    #40,@ML.REG+40               ;                    1054
24376 105774 016702 110032                         MOV     ML.DUT,R2
24377 106000 042702 177770                         BIC     #177770,R2
24378 106004 142777 000007 107432                  BICB    #7,@ML.REG+40
24379 106012 150277 107426                         BISB    R2,@ML.REG+40
24380 106016 005001                                CLR     R1                           ; CNT                1055
24381 106020 010102                       2$:       MOV     R1,R2                        ; CNT,*              1055
24382 106022 006302                                ASL     R2
24383 106024 005062 014022                         CLR     IO.BUF(R2)
24384 106030 005201                                INC     R1                           ; CNT                1055
24385 106032 020127 000377                         CMP     R1,#377                      ; CNT,*
24386 106036 003770                                BLE     2$
24387 106040 004767 112246                         JSR     PC,GD.BLK.XFER               ;                    1055
24388 106044 012777 000061 107332                  MOV     #61,@ML.REG                  ;                    1055
24389 106052 105777 107376              3$:        TSTB    @ML.REG+50
24390 106056 100375                                BPL     3$
24391 106060 005005                                CLR     R5                           ; GD.WRD.CNT         1055
24392 106062 005067 105306                         CLR     D1.TEMP                      ;                    1055
24393 106066 005067 105304                         CLR     D2.TEMP                      ;                    1056
24394 106072 005016                                CLR     (SP)                         ; NIB.PAT            1056
24395 106074 010346                                MOV     R3,-(SP)                     ; BIT.CNT,*          1056
24396 106076 012746 000004                         MOV     #4,-(SP)
24397 106102 004767 076340                         JSR     PC,BL$DIV
24398 106106 010004                                MOV     R0,R4                        ; *,NIB.SEL
24399 106110 010346                                MOV     R3,-(SP)                     ; BIT.CNT,*          1056
24400 106112 012746 000004                         MOV     #4,-(SP)
24401 106116 004767 076336                         JSR     PC,BL$MOD
24402 106122 010002                                MOV     R0,R2
24403 106124 006200                                ASR     R0
24404 106126 006200                                ASR     R0
24405 106130 006200                                ASR     R0
24406 106132 012701 000010                         MOV     #10,R1
24407 106136 060601                                ADD     SP,R1                        ; NIB.PAT,*
24408 106140 060100                                ADD     R1,R0
24409 106142 010016                                MOV     R0,(SP)
24410 106144 010246                                MOV     R2,-(SP)
```

```
                                   ;ML4AD                                                    29-Mar-1982 16:23:04   TOPS
                                   ;                TEST CODE SECTION                        29-Mar-1982 16:21:03   PA:<

106146  042716  177770                     BIC     #177770,(SP)
106152  012746  000001                     MOV     #1,-(SP)
106156  011646                             MOV     (SP),-(SP)
106160  004767  075706                     JSR     PC,BL$PU2
106164  010416                             MOV     R4,(SP)                        ; NIB.SEL,*             1056
106166  016646  000016                     MOV     16(SP),-(SP)                   ; NIB.PAT,*
106172  004767  113156                     JSR     PC,LD.LNG.WRD
106176  016777  105172  107370             MOV     D1.TEMP,@ML.REG+170
106204  016777  105166  107372             MOV     D2.TEMP,@ML.REG+200
106212  016777  105162  107344             MOV     E2.TEMP,@ML.REG+160
106220  004767  110166                     JSR     PC,DAT.DM.XFER                 ;                       1056
106224  012777  000061  107152             MOV     #61,@ML.REG                    ;                       1056
106232  012701  000001                     MOV     #1,R1                          ; *,$$TMP2              1056
106236  001411                     4$:     BEQ     7$
106240  016702  073652                     MOV     L$DLY,R2                       ; *,$$TMP1
106244  001404                             BEQ     6$
106246  005066  000022             5$:     CLR     22(SP)                         ; $$TMP
106252  005302                             DEC     R2                             ; $$TMP1
106254  001374                             BNE     5$
106256  005301                     6$:     DEC     R1                             ; $$TMP2
106260  000766                             BR      4$
106262  010402                     7$:     MOV     R4,R2                          ; NIB.SEL,*             1057
106264  006202                             ASR     R2
106266  006202                             ASR     R2
106270  006202                             ASR     R2
106272  062702  015342                     ADD     #PD.TEMP,R2
106276  017767  107332  107036     8$:     MOV     @ML.REG+230,PD.TEMP            ;                       1057
106304  010246                             MOV     R2,-(SP)                       ;                       1057
106306  010446                             MOV     R4,-(SP)                       ; NIB.SEL,*
106310  042716  177770                     BIC     #177770,(SP)
106314  012746  000001                     MOV     #1,-(SP)
106320  005046                             CLR     -(SP)
106322  004767  075306                     JSR     PC,BL$GT2
106326  062706  000010                     ADD     #10,SP
106332  005300                             DEC     R0
106334  001401                             BEQ     9$                             ;                       1057
106336  005205                             INC     R5                             ; GD.WRD.CNT            1057
106340  152777  000020  107156     9$:     BISB    #20,@ML.REG+120                ;                       1058
106346  020527  000006                     CMP     R5,#6                          ; GD.WRD.CNT,*          1058
106352  001351                             BNE     8$
106354  104402                     10$:    TRAP    2
106356  152777  000040  107060             BISB    #40,@ML.REG+40                 ;                       1058
106364  016702  107442                     MOV     ML.DUT,R2
106370  042702  177770                     BIC     #177770,R2
106374  142777  000007  107042             BICB    #7,@ML.REG+40
106402  150277  107036                     BISB    R2,@ML.REG+40
106406  004767  111700                     JSR     PC,GD.BLK.XFER                 ;                       1058
106412  142777  000002  107104             BICB    #2,@ML.REG+120                 ;                       1058
106420  012777  000071  106756             MOV     #71,@ML.REG                    ;                       1059
106426  105777  107022             11$:    TSTB    @ML.REG+50
106432  100375                             BPL     11$
106434  005001                             CLR     R1                             ; WRD.CNT               1059
```

```
                                 ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                 ;          TEST CODE SECTION                                29-Mar-1982 16:21:03   PA:<

106436  010102                   12$:  MOV     R1,R2                  ; WRD.CNT,*                                   1059
106440  006302                         ASL     R2
106442  005762  014022                 TST     IO.BUF(R2)
106446  001440                         BEQ     13$
106450  005267  106722                 INC     P.CNT                  ;                                             1059
106454  026767  106716  106716         CMP     P.CNT,LIMIT
106462  003036                         BGT     14$
106464  104455                         TRAP    55                     ;                                             1059
106466  000215                         .WORD   215
106470  012750                         .WORD   SYNC
106472  026302                         .WORD   DUMPER
106474  012746  010616                 MOV     #WRD.9,-(SP)           ;                                             1060
106500  012746  011562                 MOV     #WRD.76,-(SP)
106504  012746  012060                 MOV     #PHR.13,-(SP)
106510  012746  010256                 MOV     #THR.FMT,-(SP)
106514  012746  000004                 MOV     #4,-(SP)
106520  010600                         MOV     SP,R0                  ; SP,*
106522  104414                         TRAP    14
106524  010316                         MOV     R3,(SP)                ; BIT.CNT,*                                   1060
106526  010146                         MOV     R1,-(SP)               ; WRD.CNT,*
106530  012746  010026                 MOV     #FMT.22,-(SP)
106534  012746  000003                 MOV     #3,-(SP)
106540  010600                         MOV     SP,R0                  ; SP,*
106542  104414                         TRAP    14
106544  062706  000020                 ADD     #20,SP                 ;                                             1059
106550  005201                   13$:  INC     R1                     ; WRD.CNT                                     1059
106552  020127  000015                 CMP     R1,#15                 ; WRD.CNT,*
106556  003727                         BLE     12$
106560  104467                   14$:  TRAP    67                     ;                                             1060
106562  006000                         ROR     R0
106564  103673                         BLO     10$
106566  062706  000020                 ADD     #20,SP                 ;                                             1054
106572  005203                         INC     R3                     ; BIT.CNT                                     1054
106574  020327  000043                 CMP     R3,#43                 ; BIT.CNT,*
106600  003002                         BGT     15$
106602  000167  177160                 JMP     1$
106606  022626                   15$:  CMP     (SP)+,(SP)+            ;                                             1050
106610  000207                         RTS     PC

                                 ; Routine Size:  214 words
                                 ; Maximum stack depth per invocation:  24 words



                                       .SBTTL  T55 TEST CODE SECTION
```

```
24524                                   ;ML4AD                                                       29-Mar-1982 16:23:04   TOPS
24525                                   ;               TEST CODE SECTION                            29-Mar-1982 16:21:03   PA:<
24526
24530 106612                            T55::
24531 106612  004767  177120           1$:     JSR     PC,$T55                 ;                                          1060
24532 106616  104466                           TRAP    66
24533 106620  006000                           ROR     R0
24534 106622  103773                           BLO     1$
24535 106624  000207                           RTS     PC
24536
24537                                   ; Routine Size:  6 words
24538                                   ; Maximum stack depth per invocation:  0 words
24543
24544
24545 ;         10608 !<BLF/PAGE>
```

```
:ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
:             TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (108)

!
BGNTST;

!++
! TEST NUMBER:  TST 56
!
! TEST NAME:               ECC ERROR REGISTER TEST
!
! TEST DESCRIPTION:
!          TEST THE ECC ERROR REGISTER FOR
!          CLEARING AND LATCHING OF ECC ERROR
!          INFORMATION ON DETTECTION
!          OF ECC ERRORS BY:
!
!          1.  THIS TEST IS TABLE DRIVEN.  DATA TABLE (DT_1)
!              CONTAINS ERROR FORCING DATA AND EXPECTED
!              MLEE DATA AS A RESULT OF THE FORCED ERROR
!
!          2.  THE TEST THEREFOR INDEXES INTO DT_1 TO FORCE
!              AN ECC ERROR
!
!          3.  A MASS BUS READ TRANSFER IS DONE
!
!          4.  DT_1 IS AGAIN INDEXED AND ITS CONTENTS
!              IS COMPARED AGAINST THE RESULTING
!              MLEE REGISTER  CONTENTS
!
!          5.  A MASS BUS CLEAR IS DONE AN MLEE IS CHECKED FOR
!              ZEROES
!
!          6.  THE ECH BIT IS ALSO EXAMINED FOR CORRECT
!              LATCHING INFORMATION
!
!
!
!--

local
    TMP_E1,                                     !TEMP STORAGE FOR E1 DATA WORD
    FINISH,                                     !VARIABLE ENDING CONDITION FOR LATCH_LOOP
    ERR_FLG;                                    !ERROR FLAG

CLR_MBUS;                                       !CLEAR THE DRIVE
FINISH = 4;                                     !MAKE LATCH_LOOP DO 5 LOOPS AT FIRST

incr CLR_LOOP from 0 to 1 do                    !THE FIRST PASS TESTS MLEE FOR LATCHING
    !THE SECOND PASS TESTS MLEE FOR CLEARING
    begin

    incr LATCH_LOOP from 0 to .FINISH do        !TEST MLEE FOR LATCHING BY USING DT_1 DATA
        begin
        BGNSUB;                                 !START OF SCOPE LOOP
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (108)

;               ERR_FLG = ZERO;                         !CLEAR THE ERROR FLAG
;               MLER = ZEROES;                          !CLEAR THE ERROR REGISTER
;               ECC_DM = ONE;                           !ENABLE ECC DIAG MODE
;               !+
;               ! THE FOLLOWING ASSIGNMENT:
;               !
;               !       MLE1 = .TMP_E1
;               !
;               ! IS EQUIVALENT TO THE FOLLOWING
;               ! TWO ASSINGMENTS:
;               !
;               !   PAR_CRC_WRD = .DT_1 [.LATCH_LOOP, P0_5];          !LOAD PAR_CRC_WRD WITH REM_TBL
;               !   CRC_A = .DT_1 [.LATCH_LOOP, A0_5];                !LOAD CRC_A WITH REM_TBL
;               !
;               ! THIS IS NECESSARY DUE TO THE FACT THAT
;               ! THE E1 REGISTER IS WORD ORIENTATED AND
;               ! THE BLISS COMPILER GENERATES BYTE INST
;               ! TO ACCESS THE REGISTER.
;               !-
;
;               TMP_E1 = ZEROES;                                  !CLEAR OUT THE TEMP WORD
;               TMP_E1<0, 6> = .DT_1 [.LATCH_LOOP, A0_5];                 !LOAD CRC_A WITH REM_TBL
;               TMP_E1<8, 6> = .DT_1 [.LATCH_LOOP, P0_5];                 !LOAD PAR_CRC_WRD WITH REM_TBL
;               MLE1 = .TMP_E1;                         !LOAD THE E1 REGISTER WITH DATA
;
;               CRC_B = .DT_1 [.LATCH_LOOP, B0_5];      !GET CRC_B FROM DT_1
;               GD_BLK_XFER ();                         !SET UP A GOOD BLOCK TRANSFER
;               ECC_DIS = ZERO;                         !DISABLE ECC DIABLE
;               MLCS1 = read;                           !READ THE ERROR AND LACTH MLEE
;               TIME_OUT_LOOP;
;
;               if .CRC_ERR neq .DT_1 [.LATCH_LOOP, CRC_DATA] then ERR_FLG = ONE;       !TEST CRC_ERR
;
;               if .SGL_ERR neq .DT_1 [.LATCH_LOOP, SGL_DATA] then ERR_FLG = ONE;       !TEST SGL_ERR
;
;               if .UNC_ERR neq .DT_1 [.LATCH_LOOP, UNC_DATA] then ERR_FLG = ONE;       !TEST UNC
;
;               if .BIT_IN_ERR neq .DT_1 [.LATCH_LOOP, E0_5] then ERR_FLG = ONE;        !TEST BIT IN ERROR
;
;               if .CHAN_IN_ERR neq .DT_1 [.LATCH_LOOP, C0_5] then ERR_FLG = ONE;       !TEST CHANNEL IN ERROR
;
;               if .ECH_ERR neq .DT_1 [.LATCH_LOOP, ECH_DATA]   !TEST IF ECH GOT SET
;               then
;                   begin                               !REPORT ERROR IF NOT SET
;                   ERRDF (123, ASYNC, DUMPER);
;                   PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_69, WRD_14);
;                   end;
;
;               if .ERR_FLG IS_SET                      !TEST IF THE ERROR FLAG GOT SET
;               then
;                   begin                               !REPORT ERROR IF SET
;                   ERRDF (124, SYNC, DUMPER);
```

```
24659 ;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
24660 ;                 TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (108)
24661
24662 ;         10713                 PRINTB (THR_FMT, REG_14, WRD_52, PHR_11);
24663 ;         10714                 PRINTB (FMT_1, .DT_1 [.LATCH_LOOP, EE_DATA], .MLEE);
24664 ;         10715                 PRINTB (FMT_19, .DT_1 [.LATCH_LOOP, B0_5], .DT_1 [.LATCH_LOOP, A0_5], .DT_1 [.LATCH_LOOP, P0_5])
24665 ;         10716                 end;
24666 ;         10717
24667 ;         10718             ENDSUB;                                 !END OF SCOPE LOOP
24668 ;         10719             end;
24669 ;         10720
24670 ;         10721         CLR_MBUS;                                   !CLEAR THE REGISTER
24671 ;         10722
24672 ;         10723         if .MLEE neq ZERO                           !SEE IF THE REGISTER GOT CLEARED
24673 ;         10724         then
24674 ;         10725             begin                                   !REPORT ERROR IF NOT CLEARED
24675 ;         10726             ERRDF (125, SYNC, DUMPER);
24676 ;         10727             PRINTB (FOR_FMT, REG_14, WRD_52, FNC_7, WRD_14);
24677 ;         10728             end;
24678 ;         10729
24679 ;         10730         ECC_DM = ONE;                               !ENABLE ECC DISABLE
24680 ;         10731         FINISH = ZERO;                              !MAKE LATCH_LOOP LOOP ONCE TO CLEAR MLEE AGAIN
24681 ;         10732         end;
24682 ;         10733
24683 ;         10734 ENDTST;
24687
24688                                           .SBTTL  $T56 TEST CODE SECTION
24692 106626  004167  075760           $T56:   JSR     R1,$SAVE5                   ;                       1060
24693 106632  162706  000006                   SUB     #6,SP
24694 106636  152777  000040  106600           BISB    #40,@ML.REG+40              ;                       1064
24695 106644  016705  107162                   MOV     ML.DUT,R5
24696 106650  042705  177770                   BIC     #177770,R5
24697 106654  142777  000007  106562           BICB    #7,@ML.REG+40
24698 106662  150577  106556                   BISB    R5,@ML.REG+40
24699 106666  011766  000004                   MOV     (PC),4(SP)                  ; *,FINISH              1065
24700 106672  005066  000002                   CLR     2(SP)                       ; CLR.LOOP              1065
24701 106676  005004                   1$:     CLR     R4                          ; LATCH.LOOP            1065
24702 106700  000167  000656                   JMP     16$
24703 106704  010446                   2$:     MOV     R4,-(SP)                    ; LATCH.LOOP,*          1068
24704 106706  012746  000006                   MOV     #6,-(SP)
24705 106712  004767  075304                   JSR     PC,BL$MUL
24706 106716  010005                           MOV     R0,R5
24707 106720  012701  015764                   MOV     #DT.1,R1                    ;                       1069
24708 106724  060501                           ADD     R5,R1
24709 106726  012702  015766                   MOV     #DT.1+2,R2                  ;                       1068
24710 106732  060502                           ADD     R5,R2
24711 106734  104402                   3$:     TRAP    2                           ;                       1065
24712 106736  005003                           CLR     R3                          ; ERR.FLG               1066
24713 106740  005077  106520                   CLR     @ML.REG+60                  ;                       1066
```

```
                                      ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                      ;                   TEST CODE SECTION                       29-Mar-1982 16:21:03   PA:<

106744  152777  000001  106552                BISB    #1,aML.REG+120                                                    1066
106752  005066  000004                        CLR     4(SP)                        ; TMP.E1                             1068
106756  111200                                MOVB    (R2),R0                      ;                                    1068
106760  042700  177700                        BIC     #177700,R0
106764  142766  000077  000004                BICB    #77,4(SP)                    ; *,TMP.E1
106772  050066  000004                        BIS     R0,4(SP)                     ; *,TMP.E1
106776  011200                                MOV     (R2),R0                      ;                                    1068
107000  006300                                ASL     R0
107002  006300                                ASL     R0
107004  042700  140377                        BIC     #140377,R0
107010  042766  037400  000004                BIC     #37400,4(SP)                 ; *,TMP.E1
107016  050066  000004                        BIS     R0,4(SP)                     ; *,TMP.E1
107022  016677  000004  106524                MOV     4(SP),aML.REG+150            ; TMP.E1,*                           1068
107030  116500  015770                        MOVB    DT.1+4(R5),R0                ;                                    1068
107034  042700  177700                        BIC     #177700,R0
107040  142777  000077  106516                BICB    #77,aML.REG+160
107046  150077  106512                        BISB    R0,aML.REG+160
107052  004767  111234                        JSR     PC,GD.BLK.XFER               ;                                    1068
107056  142777  000002  106440                BICB    #2,aML.REG+120               ;                                    1068
107064  012777  000071  106312                MOV     #71,aML.REG                  ;                                    1068
107072  105777  106356                4$:     TSTB    aML.REG+50
107076  100375                                BPL     4$
107100  011146                                MOV     (R1),-(SP)                   ;                                    1069
107102  042716  157777                        BIC     #157777,(SP)
107106  017700  106502                        MOV     aML.REG+210,R0
107112  042700  157777                        BIC     #157777,R0
107116  020026                                CMP     R0,(SP)+
107120  001402                                BEQ     5$
107122  012703  000001                        MOV     #1,R3                        ; *,ERR.FLG
107126  011146                        5$:     MOV     (R1),-(SP)                   ;                                    1069
107130  042716  137777                        BIC     #137777,(SP)
107134  017700  106454                        MOV     aML.REG+210,R0
107140  042700  137777                        BIC     #137777,R0
107144  020026                                CMP     R0,(SP)+
107146  001402                                BEQ     6$
107150  012703  000001                        MOV     #1,R3                        ; *,ERR.FLG
107154  011146                        6$:     MOV     (R1),-(SP)                   ;                                    1069
107156  042716  077777                        BIC     #77777,(SP)
107162  017700  106426                        MOV     aML.REG+210,R0
107166  042700  077777                        BIC     #77777,R0
107172  020026                                CMP     R0,(SP)+
107174  001402                                BEQ     7$
107176  012703  000001                        MOV     #1,R3                        ; *,ERR.FLG
107202  111146                        7$:     MOVB    (R1),-(SP)                   ;                                    1069
107204  042716  177700                        BIC     #177700,(SP)
107210  117700  106400                        MOVB    aML.REG+210,R0
107214  042700  177700                        BIC     #177700,R0
107220  020026                                CMP     R0,(SP)+
107222  001402                                BEQ     8$
107224  012703  000001                        MOV     #1,R3                        ; *,ERR.FLG
107230  011146                        8$:     MOV     (R1),-(SP)                   ;                                    1070
107232  042716  170077                        BIC     #170077,(SP)
```

```
24771                                  ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
24772                                  ;                TEST CODE SECTION                         29-Mar-1982 16:21:03   PA:<
24773
24774 107236 017700 106352                     MOV     @ML.REG+210,R0
24775 107242 042700 170077                     BIC     #170077,R0
24776 107246 020026                            CMP     R0,(SP)+
24777 107250 001402                            BEQ     9$
24778 107252 012703 000001                     MOV     #1,R3                   ; *,ERR.FLG
24779 107256 011246                    9$:     MOV     (R2),-(SP)              ;                        1070
24780 107260 005046                            CLR     -(SP)
24781 107262 032766 010000 000002              BIT     #10000,2(SP)
24782 107270 001401                            BEQ     10$
24783 107272 005216                            INC     (SP)
24784 107274 005000                    10$:    CLR     R0
24785 107276 132777 000100 106160              BITB    #100,@ML.REG+60
24786 107304 001401                            BEQ     11$
24787 107306 005200                            INC     R0
24788 107310 020026                    11$:    CMP     R0,(SP)+
24789 107312 001002                            BNE     12$
24790 107314 005726                            TST     (SP)+
24791 107316 000425                            BR      13$
24792 107320 005726                    12$:    TST     (SP)+
24793 107322 104455                            TRAP    55                      ;                        1070
24794 107324 000173                            .WORD   173
24795 107326 012706                            .WORD   ASYNC
24796 107330 026302                            .WORD   DUMPER
24797 107332 012746 010664                     MOV     #WRD.14,-(SP)           ;                        1070
24798 107336 012746 011474                     MOV     #WRD.69,-(SP)
24799 107342 012746 010630                     MOV     #WRD.10,-(SP)
24800 107346 012746 011462                     MOV     #WRD.67,-(SP)
24801 107352 012746 010270                     MOV     #FOR.FMT,-(SP)
24802 107356 012746 000005                     MOV     #5,-(SP)
24803 107362 010600                            MOV     SP,R0                   ; SP,*
24804 107364 104414                            TRAP    14
24805 107366 062706 000014                     ADD     #14,SP                  ;                        1070
24806 107372 020327 000001             13$:    CMP     R3,#1                   ; ERR.FLG,*              1070
24807 107376 001062                            BNE     14$
24808 107400 104455                            TRAP    55                      ;                        1071
24809 107402 000174                            .WORD   174
24810 107404 012750                            .WORD   SYNC
24811 107406 026302                            .WORD   DUMPER
24812 107410 012746 012020                     MOV     #PHR.11,-(SP)           ;                        1071
24813 107414 012746 011310                     MOV     #WRD.52,-(SP)
24814 107420 012746 012620                     MOV     #REG.14,-(SP)
24815 107424 012746 010256                     MOV     #THR.FMT,-(SP)
24816 107430 012746 000004                     MOV     #4,-(SP)
24817 107434 010600                            MOV     SP,R0                   ; SP,*
24818 107436 104414                            TRAP    14
24819 107440 017716 106150                     MOV     @ML.REG+210,(SP)        ;                        1071
24820 107444 011146                            MOV     (R1),-(SP)
24821 107446 012746 006442                     MOV     #FMT.1,-(SP)
24822 107452 012746 000003                     MOV     #3,-(SP)
24823 107456 010600                            MOV     SP,R0                   ; SP,*
24824 107460 104414                            TRAP    14
24825 107462 011200                            MOV     (R2),R0                 ;                        1071
```

```
                                        ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
                                        ;                TEST CODE SECTION                          29-Mar-1982 16:21:03   PA:<

107464  006200                                  ASR     R0
107466  006200                                  ASR     R0
107470  006200                                  ASR     R0
107472  006200                                  ASR     R0
107474  006200                                  ASR     R0
107476  006200                                  ASR     R0
107500  042700  177700                          BIC     #177700,R0
107504  010016                                  MOV     R0,(SP)
107506  111246                                  MOVB    (R2),-(SP)
107510  042716  177700                          BIC     #177700,(SP)
107514  116546  015770                          MOVB    DT.1+4(R5),-(SP)
107520  042716  177700                          BIC     #177700,(SP)
107524  012746  007632                          MOV     #FMT.19,-(SP)
107530  012746  000004                          MOV     #4,-(SP)
107534  010600                                  MOV     SP,R0                           ; SP,*
107536  104414                                  TRAP    14
107540  062706  000030                          ADD     #30,SP                          ;                         1071
107544  104467                          14$:    TRAP    67                              ;                         1071
107546  006000                                  ROR     R0
107550  103002                                  BHIS    15$
107552  000167  177156                          JMP     3$
107556  022626                          15$:    CMP     (SP)+,(SP)+                     ;                         1065
107560  005204                                  INC     R4                              ; LATCH.LOOP              1065
107562  020466  000004                  16$:    CMP     R4,4(SP)                        ; LATCH.LOOP,FINISH
107566  003002                                  BGT     17$
107570  000167  177110                          JMP     2$
107574  152777  000040  105642          17$:    BISB    #40,@ML.REG+40                  ;                         1071
107602  016705  106224                          MOV     ML.DUT,R5
107606  042705  177770                          BIC     #177770,R5
107612  142777  000007  105624                  BICB    #7,@ML.REG+40
107620  150577  105620                          BISB    R5,@ML.REG+40
107624  005777  105764                          TST     @ML.REG+210                     ;                         1072
107630  001424                                  BEQ     18$
107632  104455                                  TRAP    55                              ;                         1072
107634  000175                                  .WORD   175
107636  012750                                  .WORD   SYNC
107640  026302                                  .WORD   DUMPER
107642  012746  010664                          MOV     #WRD.14,-(SP)                   ;                         1072
107646  012746  012234                          MOV     #FNC.7,-(SP)
107652  012746  011310                          MOV     #WRD.52,-(SP)
107656  012746  012620                          MOV     #REG.14,-(SP)
107662  012746  010270                          MOV     #FOR.FMT,-(SP)
107666  012746  000005                          MOV     #5,-(SP)
107672  010600                                  MOV     SP,R0                           ; SP,*
107674  104414                                  TRAP    14
107676  062706  000014                          ADD     #14,SP                          ;                         1072
107702  152777  000001  105614          18$:    BISB    #1,@ML.REG+120                  ;                         1073
107710  005066  000004                          CLR     4(SP)                           ; FINISH                  1075
107714  005266  000002                          INC     2(SP)                           ; CLR.LOOP                1065
107720  026627  000002  000001                  CMP     2(SP),#1                        ; CLR.LOOP,*
107726  003002                                  BGT     19$
107730  000167  176742                          JMP     1$
```

```
24883                              ;ML4AD                                                    29-Mar-1982 16:23:04    TOPS
24884                              ;              TEST CODE SECTION                          29-Mar-1982 16:21:03    PA:<
24885
24886 107734  062706  000006      19$:    ADD     #6,SP                      ;                                      1060
24887 107740  000207                      RTS     PC
24888
24889                              ; Routine Size:  294 words
24890                              ; Maximum stack depth per invocation:  23 words
24895
24896
24900
24901                                      .SBTTL  T56 TEST CODE SECTION
24905 107742                       T56::
24906 107742  004767  176660      1$:     JSR     PC,$T56                    ;                                      1073
24907 107746  104466                      TRAP    66
24908 107750  006000                      ROR     R0
24909 107752  103773                      BLO     1$
24910 107754  000207                      RTS     PC
24911
24912                              ; Routine Size:  6 words
24913                              ; Maximum stack depth per invocation:  0 words
24918
24919
24920 ;          10735 !<BLF/PAGE>
```

```
;ML4AD                                         29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                  TEST CODE SECTION           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (109)

;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 57
;       !
;       ! TEST NAME:                ECC ERROR LOCATION REGISTER TEST
;       !
;       ! TEST DESCRIPTION:
;       !       TEST THE ECC ERROR LOCATION REGISTER FOR CLOCKING, BIT UNIQUENESS
;       !       CLEARING AND LATCHING OF DSA ADDRESSES ON DETECTION OF ECC ERROR BY:
;       !
;       !       1.  TEST FOR CLOCKING BY:
;       !           A. DO A MASS BUS CLEAR FORCING REGISTER BITS TO ZEROES
;       !           B. FORCE AN ECC ERROR AT THE LAST BLOCK AND DO A READ TRANSFER
;       !           C. CHECK MLEL FOR LAST BLOCK ADDRESS
;       !
;       !       2.  TEST FOR BIT UNIQUENESS BY:
;       !           A. WITH FORCED ECC ERRORS DO READ TRANSFERS AT VARIOUS DSA
;       !              ADDRESSES AND CHECK MLEL FOR LATCHED DSA ADDRESSES
;       !           B. DO CLEAR AND REPEAT
;       !
;       !       3.  TEST FOR LATCHING AND CLEARING BY:
;       !           A. WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT THE
;       !              LAST BLOCK. (LATCHES MLEL WITH THE LAST BLOCK ADDRESS TO START THE TEST OFF)
;       !           B. AGAIN WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT DSA
;       !              ZERO AND CHECK MLEL FOR NOT LATCHING.
;       !              NO CLEAR DONE
;       !           C. WITH FORCED UNCORRECTABLE ERRORS DO A READ TRANSFER AT DSA
;       !              ZERO  CHECK MLEL FOR LATCHED DSA ZERO
;       !              NO CLEAR DONE
;       !           D. WITH FORCED SINGLE BIT ERRORS DO A READ TRANSFER AT THE LAST
;       !              BLOCK AND CHECK MLEL FOR NOT LATCHING
;       !              NO CLEAR DONE
;       !           E. WITH A FORCED UNCORRECTABLE ERROR DO A READ TRANSFER AT
;       !              THE LAST BLOCK AN CHECK MLEL FOR NOT LATCHING
;       !           F. DO A MASS BUS CLEAR
;       !           G. WITH A FORCED SINGLE BIT ERROR DO A READ TRANSFER AT THE
;       !              LAST BLOCK
;       !           H. DO A MASS BUS CLEAR AGAIN AND CHECK MLEL FOR ZEROES
;       !
;       ! IMPLICIT INPUTS:
;       !       IO_BUF
;       !       A  VECTOR OF 256 WORDS WHERE DATA
;       !       FOR MBUS READS AND WRITES TRANSFERS
;       !       IS FOUND.
;       !
;       !
;       !--
;
;       local
;           SGL,                                  !SINGLE BIT ERROR PARRAMETER
```

```
;ML4AD                                                      29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                           29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (109)

;                       UNC,                                !UNCORRECTABLE ERR PARRAMETER
;                       SAVE,                               !TEMPORY SAVE LOCATION
;                       SHF_DATA,                           !SHIFTING DATA PATTERN SAVE LOCATION
;                       DSA_PAT;                            !EXPECTED DSA PATTERN LATCHED IN MLEL
;
;               CLR_THRESHOLD;                              !CLEAR ERROR PRINT THRESHOLD
;               BGNSUB;                                     !START OF SCOPE LOOP
;               CLR_MBUS;                                   !CLEAR THE MLEL REGISTER
;               FOR_ECC_ERR (SGL = 1, UNC = 0);             !FORCE A SBE
;               MLDA = .LST_BLK;                            !LATCH THE LAST BLK ADRS INTO THE MLEL
;               MLWC = not 255;
;               MLBA = IO_BUF;
;               MLCS1 = read;                               !DO A READ AND LATCH THE MLEL
;               TIME_OUT_LOOP;
;
;               if .MLEL eql ZEROES                         !SEE IF THE MLEL GOT CLOCKED
;               then
;                   begin                                   !REPORT AN ERROR IF NOT CLOCKED
;                   ERRDF (126, SYNC, DUMPER);
;                   PRINTB (THR_FMT, REG_15, WRD_52, PHR_11);
;                   EXIT_TST;
;                   end;
;
;               ENDSUB;                                     !END OF SCOPE LOOP
;               SHF_DATA = .LST_ARR;                        !LOAD  THE SHIFT DATA
;
;               incr LOOP from 0 to 16 do                   !FIRST TEST FOR 1'S AND 0'S THEN SHIFT DATA
;                   begin
;                   BGNSUB;                                 !START OF SCOPE LOOP
;                   CLR_MBUS;                               !CLEAR THE DRIVE
;                   FOR_ECC_ERR (SGL = 1, UNC = 0);         !FORCE A SBE
;
;                   selectone .LOOP of                      !SELECT THE TEST PATTERN
;                       set
;
;                       [0] :                               !ZEROES PATTERN
;                           begin
;                           DSA_PAT = ZEROES;
;                           MLDA = .DSA_PAT;
;                           end;
;
;                       [1] :                               !MOSTLY ONES PATTERN
;                           begin
;                           DSA_PAT = .LST_BLK;
;                           MLDA = .DSA_PAT;
;                           end;
;
;                       [otherwise] :                       !SHIFT PATTERN
;                           begin
;                           DSA_PAT = .SHF_DATA;
;                           MLDA = .SHF_DATA;
;                           SHF_DATA = .SHF_DATA^-ONE;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (109)
;
;                       end;
;                   tes;
;
;               MLWC = not 255;                         !SET UP THE TRANSFER
;               MLBA = IO_BUF;
;               MLCS1 = read;                           !DO THE TRANSFER AND LATCH MLEL
;               TIME_OUT_LOOP;
;               SAVE = .MLEL;                           !READ AND SAVE THE MLEL REGISTER
;
;               if .SAVE neq .DSA_PAT                   !SEE IF SAVE IS WHAT WE EXPECTED
;               then
;                   begin                               !REPORT AN ERROR IF NOT THE SAME
;                   CMP_THRESHOLD;                      !COMPARE ERROR PRINT THRESHOLD
;                   ERRDF (127, ASYNC, DUMPER);
;                   PRINTB (TWO_FMT, REG_15, PHR_4);
;                   PRINTB (FMT_2, .DSA_PAT, .SAVE, (.DSA_PAT xor .SAVE));
;                   end;
;
;               ENDSUB;                                 !END OF SCOPE LOOP
;               end;
;
;           CLR_MBUS;                                   !CLEAR THE DRIVE
;           FOR_ECC_ERR (SGL = 1, UNC = 0);             !FORCE A SBE
;           MLWC = not 255;                             !SET UP A LAST BLOCK TRANSFER
;           MLBA = IO_BUF;                              !TO LATCH THE MLEL WITH T
;           MLDA = .LST_BLK;
;           MLCS1 = read;
;           TIME_OUT_LOOP;
;
;           incr LOOP from 0 to 4 do                    !NOW TEST FOR CORRECT LATCHING
;               begin
;               BGNSUB;                                 !START OF SCOPE LOOP
;               MLER = ZEROES;                          !CLEAR THE ERROR REGISTER
;
;               case .LOOP from 0 to 4 of               !SELECT TEST DATA
;                   set
;
;                   [0] :                               !FORCE A SBE AND CHECK FOR THE LST BLK ADRS
;                       begin
;                       SGL = 1;
;                       UNC = 0;
;                       DSA_PAT = .LST_BLK;
;                       MLDA = ZEROES;
;                       end;
;
;                   [1] :                               !FORCE A UNC ERROR AND CHECK FOR ADRS ZERO
;                       begin
;                       SGL = 0;
;                       UNC = 1;
;                       DSA_PAT = ZEROES;
;                       MLDA = ZEROES;
;                       end;
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (109)
;
;
;               [2] :                                   !FORCE SBE AND CHECK FOR ADRS ZERO
;                   begin
;                   SGL = 1;
;                   UNC = 0;
;                   DSA_PAT = ZEROES;
;                   MLDA = .LST_BLK;
;                   end;
;
;               [3] :                                   !FORCE UNC ERROR AND CHECK FOR ADRS ZERO
;                   begin
;                   SGL = 0;
;                   UNC = 1;
;                   DSA_PAT = ZEROES;
;                   MLDA = .LST_BLK;
;                   end;
;
;               [4] :                                   !FORCE SBE AND CHECK FOR ADRS ZERO
;                   begin
;                   CLR_MBUS;
;                   SGL = 1;
;                   UNC = 0;
;                   DSA_PAT = ZEROES;
;                   MLDA = .LST_BLK;
;                   end;
;               tes;
;
;           FOR_ECC_ERR (.SGL, .UNC);                   !FORCE SELECTED FORCED ERROR INTO ML11
;           MLWC = not 255;                             !SET UP A TRANSFER
;           MLBA = IO_BUF;
;           MLCS1 = read;                               !READ THE ERROR OUT AND LATCH MLEL
;           TIME_OUT_LOOP;
;
;           if .LOOP neq 4                              !TEST THE REG FOR LATCH DATA IF LOOP NEQ 4
;           then
;               SAVE = .MLEL
;           else
;               begin                                   !ELSE TEST THE REG FOR CLEAR
;               CLR_MBUS;
;               SAVE = .MLEL;
;               end;
;
;           if .SAVE neq .DSA_PAT                       !SEE IF THE REG LATCHED  OK
;           then
;               begin                                   !REPORT ERROR IF NOT LATCHED
;               CMP_THRESHOLD;                          !COMPARE ERROR PRINT THRESHOLD
;               ERRDF (128, SYNC, DUMPER);
;               PRINTB (THR_FMT, REG_15, WRD_71, WRD_10);
;               PRINTB (FMT_1, .DSA_PAT, .SAVE)
;               end;
;
;           ENDSUB;                                     !END OF SCOPE LOOP
```

```
;ML4AD                                                              29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                        TEST CODE SECTION                          29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (109)

;               10944      end;
;               10945
;               10946 ENDTST;


                                             .SBTTL  $T57 TEST CODE SECTION
107756  004167  074630              $T57:    JSR     R1,$SAVE5                        ;                    1073
107762  005746                               TST     -(SP)
107764  005067  105406                       CLR     P.CNT                            ;                    1079
107770  104402                      1$:      TRAP    2                                ;                    1079
107772  152777  000040  105444               BISB    #40,@ML.REG+40                   ;                    1079
110000  016705  106026                       MOV     ML.DUT,R5
110004  042705  177770                       BIC     #177770,R5
110010  142777  000007  105426               BICB    #7,@ML.REG+40
110016  150577  105422                       BISB    R5,@ML.REG+40
110022  012703  000001                       MOV     #1,R3                            ; *,SGL              1079
110026  010346                               MOV     R3,-(SP)                         ; SGL,*
110030  005001                               CLR     R1                               ; UNC
110032  005046                               CLR     -(SP)
110034  004767  110150                       JSR     PC,FOR.ECC.ERR
110040  016777  103750  105366               MOV     LST.BLK,@ML.REG+30               ;                    1079
110046  012777  177400  105340               MOV     #-400,@ML.REG+10                 ;                    1079
110054  012777  014022  105342               MOV     #IO.BUF,@ML.REG+20               ;                    1079
110062  012777  000071  105314               MOV     #71,@ML.REG                      ;                    1080
110070  105777  105360              2$:      TSTB    @ML.REG+50
110074  100375                               BPL     2$
110076  005777  105522                       TST     @ML.REG+220                      ;                    1080
110102  001025                               BNE     3$
110104  104455                               TRAP    55                               ;                    1080
110106  000176                               .WORD   176
110110  012750                               .WORD   SYNC
110112  026302                               .WORD   DUMPER
110114  012746  012020                       MOV     #PHR.11,-(SP)                    ;                    1080
110120  012746  011310                       MOV     #WRD.52,-(SP)
110124  012746  012626                       MOV     #REG.15,-(SP)
110130  012746  010256                       MOV     #THR.FMT,-(SP)
110134  012746  000004                       MOV     #4,-(SP)
110140  010600                               MOV     SP,R0                            ; SP,*
110142  104414                               TRAP    14
110144  104463                               TRAP    63
110146  062706  000016                       ADD     #16,SP                           ;                    1080
110152  000167  001052                       JMP     31$                              ;                    1080
110156  022626                      3$:      CMP     (SP)+,(SP)+                      ;                    1079
110160  104467                               TRAP    67                               ;                    1080
110162  006000                               ROR     R0
110164  103701                               BLO     1$
110166  016705  103626                       MOV     LST.ARR,R5                       ; *,SHF.DATA         1081
```

```
                                   :ML4AD                                                              29-Mar-1982 16:23:04    TOPS
                                   ;                  TEST CODE SECTION                                29-Mar-1982 16:21:03    PA:<

110172 005002                            CLR     R2                               ; LOOP                      1081
110174 104402                      4$:   TRAP    2                                ;                           1081
110176 152777 000040 105240              BISB    #40,@ML.REG+40                   ;                           1081
110204 016700 105622                     MOV     ML.DUT,R0
110210 042700 177770                     BIC     #177770,R0
110214 142777 000007 105222              BICB    #7,@ML.REG+40
110222 150077 105216                     BISB    R0,@ML.REG+40
110226 012703 000001                     MOV     #1,R3                            ; *,SGL                     1081
110232 010346                            MOV     R3,-(SP)                         ; SGL,*
110234 005001                            CLR     R1                               ; UNC
110236 005046                            CLR     -(SP)
110240 004767 107744                     JSR     PC,FOR.ECC.ERR
110244 005702                            TST     R2                               ; LOOP                      1082
110246 001002                            BNE     5$
110250 005004                            CLR     R4                               ; DSA.PAT                   1082
110252 000405                            BR      6$                               ;                           1082
110254 020227 000001               5$:   CMP     R2,#1                            ; LOOP,*                    1082
110260 001005                            BNE     7$
110262 016704 103526                     MOV     LST.BLK,R4                       ; *,DSA.PAT                 1083
110266 010477 105142               6$:   MOV     R4,@ML.REG+30                    ; DSA.PAT,*                 1083
110272 000404                            BR      8$                               ;                           1082
110274 010504                      7$:   MOV     R5,R4                            ; SHF.DATA,DSA.PAT          1083
110276 010577 105132                     MOV     R5,@ML.REG+30                    ; SHF.DATA,*                1083
110302 006205                            ASR     R5                               ; SHF.DATA                  1083
110304 012777 177400 105102        8$:   MOV     #-400,@ML.REG+10                 ;                           1084
110312 012777 014022 105104              MOV     #IO.BUF,@ML.REG+20               ;                           1084
110320 012777 000071 105056              MOV     #71,@ML.REG                      ;                           1084
110326 105777 105122               9$:   TSTB    @ML.REG+50
110332 100375                            BPL     9$
110334 017766 105264 000004              MOV     @ML.REG+220,4(SP)                ; *,SAVE                    1084
110342 026604 000004                     CMP     4(SP),R4                         ; SAVE,DSA.PAT              1084
110346 001451                            BEQ     11$
110350 005267 105022                     INC     P.CNT                            ;                           1085
110354 026767 105016 105016              CMP     P.CNT,LIMIT
110362 003402                            BLE     10$
110364 022626                            CMP     (SP)+,(SP)+
110366 000445                            BR      12$
110370 104455                      10$:  TRAP    55                               ;                           1085
110372 000177                            .WORD   177
110374 012706                            .WORD   ASYNC
110376 026302                            .WORD   DUMPER
110400 012746 011676                     MOV     #PHR.4,-(SP)                     ;                           1085
110404 012746 012626                     MOV     #REG.15,-(SP)
110410 012746 010246                     MOV     #TWO.FMT,-(SP)
110414 012746 000003                     MOV     #3,-(SP)
110420 010600                            MOV     SP,R0                            ; SP,*
110422 104414                            TRAP    14
110424 016616 000014                     MOV     14(SP),(SP)                      ; SAVE,*                    1085
110430 010446                            MOV     R4,-(SP)                         ; DSA.PAT,*
110432 046616 000002                     BIC     2(SP),(SP)
110436 040466 000002                     BIC     R4,2(SP)                         ; DSA.PAT,*
110442 052616                            BIS     (SP)+,(SP)
```

```
                                    ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
                                    ;              TEST CODE SECTION                           29-Mar-1982 16:21:03   PA:<

110444 016646 000014                       MOV     14(SP),-(SP)                ; SAVE,*
110450 010446                              MOV     R4,-(SP)                    ; DSA.PAT,*
110452 012746 006506                       MOV     #FMT.2,-(SP)
110456 012746 000004                       MOV     #4,-(SP)
110462 010600                              MOV     SP,R0                       ; SP,*
110464 104414                              TRAP    14
110466 062706 000020                       ADD     #20,SP                      ;                         1085
110472 022626                     11$:     CMP     (SP)+,(SP)+                 ;                         1081
110474 104467                              TRAP    67                          ;                         1085
110476 006000                              ROR     R0
110500 103635                              BLO     4$
110502 005202                     12$:     INC     R2                          ; LOOP                    1081
110504 020227 000020                       CMP     R2,#20                      ; LOOP,*
110510 003631                              BLE     4$
110512 152777 000040 104724                BISB    #40,@ML.REG+40              ;                         1085
110520 016705 105306                       MOV     ML.DUT,R5
110524 042705 177770                       BIC     #177770,R5
110530 142777 000007 104706                BICB    #7,@ML.REG+40
110536 150577 104702                       BISB    R5,@ML.REG+40
110542 012703 000001                       MOV     #1,R3                       ; *,SGL                   1086
110546 010346                              MOV     R3,-(SP)                    ; SGL,*
110550 005001                              CLR     R1                          ; UNC
110552 005046                              CLR     -(SP)
110554 004767 107430                       JSR     PC,FOR.ECC.ERR
110560 012777 177400 104626                MOV     #-400,@ML.REG+10            ;                         1086
110566 012777 014022 104630                MOV     #IO.BUF,@ML.REG+20          ;                         1086
110574 016777 103214 104632                MOV     LST.BLK,@ML.REG+30          ;                         1086
110602 012777 000071 104574                MOV     #71,@ML.REG                 ;                         1086
110610 105777 104640              13$:     TSTB    @ML.REG+50
110614 100375                              BPL     13$
110616 005002                              CLR     R2                          ; LOOP                    1086
110620 104402                     14$:     TRAP    2                           ;                         1087
110622 005077 104636                       CLR     @ML.REG+60                  ;                         1087
110626 010205                              MOV     R2,R5                       ; LOOP,*                  1087
110630 006305                              ASL     R5
110632 066507 110636                       ADD     15$(R5),PC
110636 000012                     15$:     .WORD   16$-15$
110640 000026                              .WORD   17$-15$
110642 000044                              .WORD   19$-15$
110644 000046                              .WORD   20$-15$
110646 000056                              .WORD   21$-15$
110650 012703 000001              16$:     MOV     #1,R3                       ; *,SGL                   1087
110654 005001                              CLR     R1                          ; UNC                     1088
110656 016704 103132                       MOV     LST.BLK,R4                  ; *,DSA.PAT               1088
110662 000404                              BR      18$                         ;                         1088
110664 005003                     17$:     CLR     R3                          ; SGL                     1088
110666 012701 000001                       MOV     #1,R1                       ; *,UNC                   1088
110672 005004                              CLR     R4                          ; DSA.PAT                 1088
110674 005077 104534              18$:     CLR     @ML.REG+30                  ;                         1089
110700 000430                              BR      24$                         ;                         1087
110702 000420                     19$:     BR      22$                         ;                         1089
110704 005003                     20$:     CLR     R3                          ; SGL                     1090
```

```
                                 ;ML4AD                                                       29-Mar-1982 16:23:04   TOPS
                                 ;               TEST CODE SECTION                            29-Mar-1982 16:21:03   PA:<

110706 012701 000001                     MOV     #1,R1                          ; *,UNC               1090
110712 000417                            BR      23$                            ;                     1090
110714 152777 000040 104522      21$:    BISB    #40,@ML.REG+40                 ;                     1091
110722 016705 105104                     MOV     ML.DUT,R5
110726 042705 177770                     BIC     #177770,R5
110732 142777 000007 104504              BICB    #7,@ML.REG+40
110740 150577 104500                     BISB    R5,@ML.REG+40
110744 012703 000001             22$:    MOV     #1,R3                          ; *,SGL               1091
110750 005001                            CLR     R1                             ; UNC                 1091
110752 005004                    23$:    CLR     R4                             ; DSA.PAT             1091
110754 016777 103034 104452              MOV     LST.BLK,@ML.REG+30             ;                     1091
110762 010346                    24$:    MOV     R3,-(SP)                       ; SGL,*               1091
110764 010146                            MOV     R1,-(SP)                       ; UNC,*
110766 004767 107216                     JSR     PC,FOR.ECC.ERR
110772 012777 177400 104414              MOV     #-400,@ML.REG+10               ;                     1092
111000 012777 014022 104416              MOV     #IO.BUF,@ML.REG+20             ;                     1092
111006 012777 000071 104370              MOV     #71,@ML.REG                    ;                     1092
111014 105777 104434             25$:    TSTB    @ML.REG+50
111020 100375                            BPL     25$
111022 020227 000004                     CMP     R2,#4                          ; LOOP,*              1092
111026 001014                            BNE     26$                            ;                     1092
111030 152777 000040 104406              BISB    #40,@ML.REG+40                 ;                     1092
111036 016705 104770                     MOV     ML.DUT,R5
111042 042705 177770                     BIC     #177770,R5
111046 142777 000007 104370              BICB    #7,@ML.REG+40
111054 150577 104364                     BISB    R5,@ML.REG+40
111060 017766 104540 000010      26$:    MOV     @ML.REG+220,10(SP)             ; *,SAVE              1093
111066 026604 000010                     CMP     10(SP),R4                      ; SAVE,DSA.PAT        1093
111072 001443                            BEQ     28$
111074 005267 104276                     INC     P.CNT                          ;                     1093
111100 026767 104272 104272              CMP     P.CNT,LIMIT
111106 003402                            BLE     27$
111110 022626                            CMP     (SP)+,(SP)+
111112 000437                            BR      29$
111114 104455                    27$:    TRAP    55                             ;                     1093
111116 000200                            .WORD   200
111120 012750                            .WORD   SYNC
111122 026302                            .WORD   DUMPER
111124 012746 010630                     MOV     #WRD.10,-(SP)                  ;                     1093
111130 012746 011514                     MOV     #WRD.71,-(SP)
111134 012746 012626                     MOV     #REG.15,-(SP)
111140 012746 010256                     MOV     #THR.FMT,-(SP)
111144 012746 000004                     MOV     #4,-(SP)
111150 010600                            MOV     SP,R0                          ; SP,*
111152 104414                            TRAP    14
111154 016616 000022                     MOV     22(SP),(SP)                    ; SAVE,*              1094
111160 010446                            MOV     R4,-(SP)                       ; DSA.PAT,*
111162 012746 006442                     MOV     #FMT.1,-(SP)
111166 012746 000003                     MOV     #3,-(SP)
111172 010600                            MOV     SP,R0                          ; SP,*
111174 104414                            TRAP    14
111176 062706 000020                     ADD     #20,SP                         ;                     1093
```

```
                                    ;ML4AD                                                                  29-Mar-1982 16:23:04   TOPS
                                    ;                 TEST CODE SECTION                                     29-Mar-1982 16:21:03   PA:<

        111202  022626              28$:    CMP     (SP)+,(SP)+                 ;                                              1087
        111204  104467                      TRAP    67                          ;                                              1094
        111206  006000                      ROR     R0
        111210  103603                      BLO     14$
        111212  005202              29$:    INC     R2                          ; LOOP                                         1086
        111214  020227  000004              CMP     R2,#4                       ; LOOP,*
        111220  003002                      BGT     30$
        111222  000167  177372              JMP     14$
        111226  022626              30$:    CMP     (SP)+,(SP)+                 ;                                              1073
        111230  005726              31$:    TST     (SP)+
        111232  000207                      RTS     PC

                                    ; Routine Size:  343 words
                                    ; Maximum stack depth per invocation:  19 words



                                            .SBTTL  T57 TEST CODE SECTION
        111234                      T57::
        111234  004767  176516      1$:     JSR     PC,$T57                     ;                                              1094
        111240  104466                      TRAP    66
        111242  006000                      ROR     R0
        111244  103773                      BLO     1$
        111246  000207                      RTS     PC

                                    ; Routine Size:  6 words
                                    ; Maximum stack depth per invocation:  0 words


        ;           10947 !<BLF/PAGE>
```

```
;ML4AD                                                     29-Mar-1982 16:23:04   TOPS-20 Bliss-16 V2(212)
;          TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<NEALE>ML4AD.BLI.4 (110)

;          !
;          BGNTST;
;
;          !++
;          ! TEST NUMBER:  TST 58
;          !
;          ! TEST NAME:              ECC HARD ERROR BIT TEST
;          !
;          ! TEST DESCRIPTION:
;          !        VIA ECC_DM AND ECC_DIS TEST THE
;          !        ECH BIT FOR SETTING AND NOT SETTING BY:
;          !
;          !        1.   VIA ECC_DM AND A WRITE TRANSFER FORCE
;          !             ECC ERRORS INTO THE ML11'S GOOD BLOCK
;          !
;          !        2.   WITH ECC_DM = 0 AND ECC_DIS = 0
;          !             DO A READ TRANSFER AND CHECK ECH SET
;          !
;          !        3.   WITH ECC_DM = 0 AND ECC_DIS = 1
;          !             DO A READ TRANSFER AND CHECK ECH NOT SET
;          !
;          ! IMPLICIT INPUTS:
;          !       IO_BUF
;          !       A  VECTOR OF 256 WORDS WHERE DATA
;          !       FOR MBUS READS AND WRITES TRANSFERS
;          !       IS FOUND.
;          !
;          !
;          !--
;
;          local
;              EXPECTED;                                   !EXPECTED ECH_ERR VALUE
;
;          CLR_MBUS;                                       !CLEAR THE DRIVE
;          ECC_DM = ONE;                                   !SET ECC DIAG MODE
;          PAR_CRC_WRD = ZEROES;                           !FORCE UNCORRECTABLE ERRORS INTO THE GOOD BLOCK
;          CRC_A = ZEROES;
;          CRC_B = ZEROES;
;          BAI = ONE;
;          IO_BUF = ONES;
;          GD_BLK_XFER ();
;          MLCS1 = write;
;          TIME_OUT_LOOP;
;
;          incr LOOP from 0 to 1 do                        !TEST ECH BIT FOR SETTING / NOT SETTING
;              begin
;              BGNSUB;                                     !START OF SCOPE LOOP
;              CLR_MBUS;                                   !CLEAR THE DRIVE
;              GD_BLK_XFER ();                             !SET UP A GOOD BLOCK TRANSFER
;
;              if .LOOP eql ZERO                           !SELECT THE TEST DATA
;              then
```

```
;ML4AD                                                        29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                     TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (110)
;
;             11000           begin                           !EXPECT ECH BIT TO SET
;             11001           ECC_DIS = 0;
;             11002           EXPECTED = 1;
;             11003           end
;             11004       else
;             11005           begin                           !EXPECT ECH BIT NOT TO SET
;             11006           ECC_DIS = 1;
;             11007           EXPECTED = 0;
;             11008           end;
;             11009
;             11010       MLCS1 = read;                       !READ THE ERROR OUT
;             11011       TIME_OUT_LOOP;
;             11012
;             11013       if .ECH_ERR neq .EXPECTED           !IS ECH BIT WHAT WE EXPECTED
;             11014       then
;             11015           begin                           !ERROR IF NOT
;             11016           ERRDF (129, SYNC, DUMPER);
;             11017           PRINTB (FOR_FMT, WRD_67, WRD_10, WRD_69, WRD_14);
;             11018           PRINTB (FMT_1, .EXPECTED, .ECH_ERR);
;             11019           end;
;             11020
;             11021       ENDSUB;                             !END OF SCOPE LOOP
;             11022       end;
;             11023
;             11024 ENDTST;


                                          .SBTTL  $T58 TEST CODE SECTION
111250  004167  073300           $T58:    JSR     R1,$SAVE3                   ;         1094
111254  152777  000040  104162            BISB    #40,@ML.REG+40              ;         1097
111262  016702  104544                    MOV     ML.DUT,R2
111266  042702  177770                    BIC     #177770,R2
111272  142777  000007  104144            BICB    #7,@ML.REG+40
111300  150277  104140                    BISB    R2,@ML.REG+40
111304  152777  000001  104212            BISB    #1,@ML.REG+120              ;         1098
111312  042777  037400  104234            BIC     #37400,@ML.REG+150          ;         1098
111320  142777  000077  104226            BICB    #77,@ML.REG+150             ;         1098
111326  142777  000077  104230            BICB    #77,@ML.REG+160             ;         1098
111334  152777  000010  104102            BISB    #10,@ML.REG+40              ;         1098
111342  012767  177777  102452            MOV     #-1,IO.BUF                  ;         1098
111350  004767  106736                    JSR     PC,GD.BLK.XFER              ;         1098
111354  012777  000061  104022            MOV     #61,@ML.REG                 ;         1098
111362  105777  104066           1$:      TSTB    @ML.REG+50                  ;         1098
111366  100375                            BPL     1$
111370  005001                            CLR     R1                          ; LOOP    1099
111372  104402                   2$:      TRAP    2                           ;         1099
111374  152777  000040  104042            BISB    #40,@ML.REG+40              ;         1099
```

```
                                 :ML4AD                                                          29-Mar-1982 16:23:04   TOPS
                                 ;               TEST CODE SECTION                               29-Mar-1982 16:21:03   PA:<

111402  016700  104424                  MOV     ML.DUT,R0
111406  042700  177770                  BIC     #177770,R0
111412  142777  000007  104024          BICB    #7,@ML.REG+40
111420  150077  104020                  BISB    R0,@ML.REG+40
111424  004767  106662                  JSR     PC,GD.BLK.XFER                  ;                       1099
111430  005701                          TST     R1                              ; LOOP                  1099
111432  001006                          BNE     3$
111434  142777  000002  104062          BICB    #2,@ML.REG+120                  ;                       1100
111442  012702  000001                  MOV     #1,R2                           ; *,EXPECTED            1100
111446  000404                          BR      4$                              ;                       1099
111450  152777  000002  104046  3$:     BISB    #2,@ML.REG+120                  ;                       1100
111456  005002                          CLR     R2                              ; EXPECTED              1100
111460  012777  000071  103716  4$:     MOV     #71,@ML.REG                     ;                       1101
111466  105777  103762          5$:     TSTB    @ML.REG+50
111472  100375                          BPL     5$
111474  010203                          MOV     R2,R3                           ; EXPECTED,*            1101
111476  005000                          CLR     R0
111500  132777  000100  103756          BITB    #100,@ML.REG+60
111506  001401                          BEQ     6$
111510  005200                          INC     R0
111512  020003                  6$:     CMP     R0,R3
111514  001441                          BEQ     8$
111516  104455                          TRAP    55                              ;                       1101
111520  000201                          .WORD   201
111522  012750                          .WORD   SYNC
111524  026302                          .WORD   DUMPER
111526  012746  010664                  MOV     #WRD.14,-(SP)                   ;                       1101
111532  012746  011474                  MOV     #WRD.69,-(SP)
111536  012746  010630                  MOV     #WRD.10,-(SP)
111542  012746  011462                  MOV     #WRD.67,-(SP)
111546  012746  010270                  MOV     #FOR.FMT,-(SP)
111552  012746  000005                  MOV     #5,-(SP)
111556  010600                          MOV     SP,R0                           ; SP,*
111560  104414                          TRAP    14
111562  005016                          CLR     (SP)                            ;                       1101
111564  132777  000100  103672          BITB    #100,@ML.REG+60
111572  001401                          BEQ     7$
111574  005216                          INC     (SP)
111576  010246                  7$:     MOV     R2,-(SP)                        ; EXPECTED,*
111600  012746  006442                  MOV     #FMT.1,-(SP)
111604  012746  000003                  MOV     #3,-(SP)
111610  010600                          MOV     SP,R0                           ; SP,*
111612  104414                          TRAP    14
111614  062706  000022                  ADD     #22,SP                          ;                       1101
111620  104467                  8$:     TRAP    67                              ;                       1101
111622  006000                          ROR     R0
111624  103662                          BLO     2$
111626  005201                          INC     R1                              ; LOOP                  1099
111630  020127  000001                  CMP     R1,#1                           ; LOOP,*
111634  003656                          BLE     2$
111636  000207                          RTS     PC                              ;                       1094
```

```
                                 ;ML4AD                                          29-Mar-1982 16:23:04   TOPS
                                 ;              TEST CODE SECTION                29-Mar-1982 16:21:03   PA:<

                                 ; Routine Size:  124 words
                                 ; Maximum stack depth per invocation:  13 words



                                        .SBTTL  T58 TEST CODE SECTION
111640                           T58::
111640  004767  177404           1$:    JSR     PC,$T58                 ;                               1102
111644  104466                          TRAP    66
111646  006000                          ROR     R0
111650  103773                          BLO     1$
111652  000207                          RTS     PC

                                 ; Routine Size:  6 words
                                 ; Maximum stack depth per invocation:  0 words


;        11025 !<BLF/PAGE>
```

```
;ML4AD                                                    29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                         29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (111)
;
;       !
;       BGNTST;
;
;       !++
;       ! TEST NUMBER:  TST 59
;       !
;       ! TEST NAME:              DATA CHECK ERROR BIT TEST
;       !
;       ! TEST DESCRIPTION:
;       !       VIA ECC_EN, ECC_DM AND ECC_DM TEST THE
;       !       DCK BIT FOR SETTING AND NOT SETTING BY:
;       !
;       !       1.  VIA ECC_DM AND A WRITE TRANSFER FORCE
;       !           ECC ERRORS INTO THE ML11'S GOOD BLOCK
;       !
;       !       2.  WITH DCK_EN = 1, ECC_DM = 0, ECC_DIS = 0
;       !           DO A READ TRANSFER AND CHECK THE DCK BIT SET
;       !
;       !       3.  WITH DCK_EN = 0, ECC_DM = 0, ECC_DIS = 0
;       !           DO A READ TRANSFER AND CHECK THE DCK BIT NOT SET
;       !
;       !       4.  WITH ECK_EN = 1, ECC_DM = 0, ECC_DIS = 1
;       !           DO A READ TRANSFER AND CHECK THE DCK BIT SET
;       !
;       !
;       ! IMPLICIT INPUTS:
;       !       IO_BUF
;       !       A  VECTOR OF 256 WORDS WHERE DATA
;       !       FOR MBUS READS AND WRITES TRANSFERS
;       !       IS FOUND.
;       !
;       !
;       !--
;
;       local
;           SGL,                                          !SINGLE BIT ERROR PARRAMETER
;           UNC,                                          !UNCORRECTABLE ERROR PARRAMETER
;           EXPECTED;                                     !EXPECTED DATA CHECK BIT VALUE
;
;       CLR_MBUS;                                         !CLEAR THE DRIVE
;       FOR_ECC_ERR (SGL = 1, UNC = 0);                   !FORCE  A SBE
;       BAI = ONE;
;       IO_BUF = ZEROES;
;       GD_BLK_XFER ();                                   !SET UP A GOOD BLOCK TRANSFER
;       MLCS1 = write;                                    !WRITE THE DRIVE WITH THE ERROR
;       TIME_OUT_LOOP;
;
;       incr LOOP from 0 to 2 do                          !TEST DCK BIT FOR 3 CONDITIONS
;           begin
;           BGNSUB;                                       !START OF SCOPE LOOP
;           CLR_MBUS;                                     !CLEAR THE DRIVE
;           GD_BLK_XFER ();                               !SET UP A GOOD BLOCK TRANSFER
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                   TEST CODE SECTION                   29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (111)

;
;           case .LOOP from 0 to 2 of                   !SELECT THE TEST DATA
;               set
;
;               [0] :                                   !EXPECT THE DCK BIT TO SET
;                   begin
;                   DCK_EN = 1;
;                   ECC_DIS = 0;
;                   EXPECTED = 1;
;                   end;
;
;               [1] :                                   !EXPECT THE DCK BIT NOT TO SET
;                   begin
;                   DCK_EN = 0;
;                   ECC_DIS = 0;
;                   EXPECTED = 0;
;                   end;
;
;               [2] :                                   !EXPECT THE DCK BIT TO SET
;                   begin
;                   DCK_EN = 1;
;                   ECC_DIS = 1;
;                   EXPECTED = 1;
;                   end;
;               tes;
;
;           MLCS1 = read;                               !READ THE ERROR AND CLOCK THE DCK BIT
;           TIME_OUT_LOOP;
;
;           if .DCK neq .EXPECTED                       !IS THE DCK BIT WHAT WE EXPECTED
;           then
;               begin                                   !REPORT THE ERRRO IF NOT THE SAME
;
;               if .LOOP neq ONE then ERRDF (130, SYNC, DUMPER) else ERRDF (130, ASYNC, DUMPER);
;
;                                                       !CHOOSE WHICH THE ERROR IS ON
;               PRINTB (THR_FMT, WRD_72, PHR_5, WRD_10);
;               PRINTB (FMT_1, .EXPECTED, .DCK);
;               end;
;
;           ENDSUB;                                     !END OF THE SCOPE LOOP
;           end;
;
;       ENDTST;

                        .SBTTL  $T59 TEST CODE SECTION
```

```
                                   ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                   ;                  TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<

 111654  004167  072674            $T59:   JSR     R1,$SAVE3                ;                           1102
 111660  152777  000040  103556            BISB    #40,@ML.REG+40           ;                           1106
 111666  016702  104140                    MOV     ML.DUT,R2
 111672  042702  177770                    BIC     #177770,R2
 111676  142777  000007  103540            BICB    #7,@ML.REG+40
 111704  150277  103534                    BISB    R2,@ML.REG+40
 111710  012701  000001                    MOV     #1,R1                    ; *,SGL                     1106
 111714  010146                            MOV     R1,-(SP)                 ; SGL,*
 111716  005001                            CLR     R1                       ; UNC
 111720  005046                            CLR     -(SP)
 111722  004767  106262                    JSR     PC,FOR.ECC.ERR
 111726  152777  000010  103510            BISB    #10,@ML.REG+40           ;                           1106
 111734  005067  102062                    CLR     IO.BUF                   ;                           1106
 111740  004767  106346                    JSR     PC,GD.BLK.XFER           ;                           1106
 111744  012777  000061  103432            MOV     #61,@ML.REG              ;                           1107
 111752  105777  103476            1$:     TSTB    @ML.REG+50
 111756  100375                            BPL     1$
 111760  005001                            CLR     R1                       ; LOOP                      1107
 111762  104402                    2$:     TRAP    2                        ;                           1107
 111764  152777  000040  103452            BISB    #40,@ML.REG+40           ;                           1107
 111772  016700  104034                    MOV     ML.DUT,R0
 111776  042700  177770                    BIC     #177770,R0
 112002  142777  000007  103434            BICB    #7,@ML.REG+40
 112010  150077  103430                    BISB    R0,@ML.REG+40
 112014  004767  106272                    JSR     PC,GD.BLK.XFER           ;                           1107
 112020  010100                            MOV     R1,R0                    ; LOOP,*                    1107
 112022  006300                            ASL     R0
 112024  066007  112030                    ADD     3$(R0),PC
 112030  000006                    3$:     .WORD   4$-3$
 112032  000024                            .WORD   5$-3$
 112034  000044                            .WORD   6$-3$
 112036  152777  000004  103460    4$:     BISB    #4,@ML.REG+120           ;                           1108
 112044  142777  000002  103452            BICB    #2,@ML.REG+120           ;                           1108
 112052  000416                            BR      7$                       ;                           1108
 112054  142777  000004  103442    5$:     BICB    #4,@ML.REG+120           ;                           1109
 112062  142777  000002  103434            BICB    #2,@ML.REG+120           ;                           1109
 112070  005002                            CLR     R2                       ; EXPECTED                  1109
 112072  000410                            BR      8$                       ;                           1107
 112074  152777  000004  103422    6$:     BISB    #4,@ML.REG+120           ;                           1109
 112102  152777  000002  103414            BISB    #2,@ML.REG+120           ;                           1109
 112110  012702  000001            7$:     MOV     #1,R2                    ; *,EXPECTED                1110
 112114  012777  000071  103262    8$:     MOV     #71,@ML.REG              ;                           1110
 112122  105777  103326            9$:     TSTB    @ML.REG+50
 112126  100375                            BPL     9$
 112130  010203                            MOV     R2,R3                    ; EXPECTED,*                1110
 112132  005000                            CLR     R0
 112134  005777  103324                    TST     @ML.REG+60
 112140  100001                            BPL     10$
 112142  005200                            INC     R0
 112144  020003                    10$:    CMP     R0,R3
 112146  001446                            BEQ     14$
 112150  020127  000001                    CMP     R1,#1                    ; LOOP,*                    1111
```

```
                                :ML4AD                                                   29-Mar-1982 16:23:04   TOPS
                                ;               TEST CODE SECTION                        29-Mar-1982 16:21:03   PA:<

112154  001405                          BEQ     11$
112156  104455                          TRAP    55
112160  000202                          .WORD   202
112162  012750                          .WORD   SYNC
112164  026302                          .WORD   DUMPER
112166  000404                          BR      12$
112170  104455                  11$:    TRAP    55
112172  000202                          .WORD   202
112174  012706                          .WORD   ASYNC
112176  026302                          .WORD   DUMPER
112200  012746  010630          12$:    MOV     #WRD.10,-(SP)
112204  012746  011714                  MOV     #PHR.5,-(SP)            ;                       1111
112210  012746  011524                  MOV     #WRD.72,-(SP)
112214  012746  010256                  MOV     #THR.FMT,-(SP)
112220  012746  000004                  MOV     #4,-(SP)
112224  010600                          MOV     SP,R0                   ; SP,*
112226  104414                          TRAP    14
112230  005016                          CLR     (SP)                    ;                       1111
112232  005777  103226                  TST     @ML.REG+60
112236  100001                          BPL     13$
112240  005216                          INC     (SP)
112242  010246                  13$:    MOV     R2,-(SP)                ; EXPECTED,*
112244  012746  006442                  MOV     #FMT.1,-(SP)
112250  012746  000003                  MOV     #3,-(SP)
112254  010600                          MOV     SP,R0                   ; SP,*
112256  104414                          TRAP    14
112260  062706  000020                  ADD     #20,SP                  ;                       1110
112264  104467                  14$:    TRAP    67                      ;                       1111
112266  006000                          ROR     R0
112270  103634                          BLO     2$
112272  005201                          INC     R1                      ; LOOP                  1107
112274  020127  000002                  CMP     R1,#2                   ; LOOP,*
112300  003630                          BLE     2$
112302  022626                          CMP     (SP)+,(SP)+             ;                       1102
112304  000207                          RTS     PC

                                ; Routine Size:  141 words
                                ; Maximum stack depth per invocation:  14 words



                                        .SBTTL  T59 TEST CODE SECTION
```

```
                                ;ML4AD                                                  29-Mar-1982 16:23:04    TOPS
                                ;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<

 112306                         T59::
 112306  004767  177342         1$:     JSR     PC,$T59                 ;                               1111
 112312  104466                         TRAP    66
 112314  006000                         ROR     R0
 112316  103773                         BLO     1$
 112320  000207                         RTS     PC

                                ; Routine Size:  6 words
                                ; Maximum stack depth per invocation:  0 words


 ;          11122 !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                       29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (112)

;               !
;               BGNTST;
;
;               !++
;               ! TEST NUMBER:  TST 60
;               !
;               ! TEST NAME:    PROM DATA TEST
;               !
;               ! TEST DESCRIPTION:
;               !
;               !       VERIFY THAT CHECK SUM VALUES FOR
;               !       ALL PRESENT MEMORY ARRAY UV PROM
;               !       LOCATIONS ARE ERROR FREE BY:
;               !
;               !       1.  DOING MBUS TRANSFERS
;               !           AT ALL PRESENT BLOCKS
;               !           AND TESTING THE UNS BIT
;               !           TO BE CLEARED.
;               !
;               ! IMPLICIT INPUTS:
;               !
;               !       IO_BUF
;               !
;               !       A VECTOR OF 256 WORDS WHERE
;               !       DATA FOR MBUS READ AND WRITE
;               !       FUNCTIONS IS FOUND.
;               !
;               !
;               !       CHIP_SIZ
;               !       INDICATED THE SIZE OF THE
;               !       ARRAY MODULES MOS RAMS.
;               !
;               !
;               !--
;
;               CLR_THRESHOLD;                          !CLEAR ERROR PRINT THRESHOLD
;
;               !
;               !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
;               !
;               incrU DSA_CNT from 0 to .LST_BLK do     !WRITE TO ALL PRESENT BLK'S AND CHECK UNS BIT
;                   begin
;                   BGNSUB;
;                   CLR_MBUS;
;                   ECC_DIS = ONE;                      !DISABLE ECC
;                   MLWC = not 255;                     !LOAD WORD COUNT
;                   MLBA = IO_BUF;                      !LOAD UBUS ADRS
;                   MLDA = .DSA_CNT;                    !LOAD DSA
;                   MLCS1 = write;                      !DO A WRITE FUNCTION
;                   TIME_OUT_LOOP;
;
;                   if .UNS IS_SET                      !SEE IF XFERR CAUSED AN UNS ERROR
```

```
 ;ML4AD                                                   29-Mar-1982 16:23:04     TOPS-20 Bliss-16 V2(212)
 ;                  TEST CODE SECTION                     29-Mar-1982 16:21:03     PA:<NEALE>ML4AD.BLI.4 (112)

 ;          11175       then
 ;          11176           begin                         !ERROR IF SET
 ;          11177           CMP_THRESHOLD;                !COMPARE ERROR PRINT THRESHOLD
 ;          11178           ERRDF (107, ARR_DAT, DUMPER);
 ;          11179           PRINTB (TWO_FMT, WRD_35, PHR_4);
 ;          11180           PRINTB (FMT_9, .DSA_CNT);
 ;          11181
 ;          11182           if .CHIP_SIZ eql 64           !NEED TO KNOW CHIP SIZE TO PRINT ARRAY NUMBER
 ;          11183           then
 ;          11184               begin
 ;          11185               PRINTB (FMT_8, ((.DSA_CNT<11, 4>) + 1));    !64K MOS RAM
 ;          11186               end
 ;          11187           else
 ;          11188               begin
 ;          11189               PRINTB (FMT_8, ((.DSA_CNT<9, 4>) + 1));     !16K MOS RAM
 ;          11190               end
 ;          11191
 ;          11192           end;
 ;          11193
 ;          11194       ENDSUB;
 ;          11195       end;
 ;          11196
 ;          11197 ENDTST;


                                             .SBTTL  $T60 TEST CODE SECTION
 112322  004167  072212            $T60:     JSR     R1,$SAVE2                  ;                    1112
 112326  005067  103044                      CLR     P.CNT                      ;                    1112
 112332  016702  101456                      MOV     LST.BLK,R2                 ;                    1116
 112336  005001                              CLR     R1                         ; DSA.CNT
 112340  000544                              BR      7$
 112342  104402                    1$:       TRAP    2                          ;                    1116
 112344  152777  000040  103072              BISB    #40,@ML.REG+40             ;                    1116
 112352  016700  103454                      MOV     ML.DUT,R0
 112356  042700  177770                      BIC     #177770,R0
 112362  142777  000007  103054              BICB    #7,@ML.REG+40
 112370  150077  103050                      BISB    R0,@ML.REG+40
 112374  152777  000002  103122              BISB    #2,@ML.REG+120             ;                    1116
 112402  012777  177400  103004              MOV     #-400,@ML.REG+10           ;                    1116
 112410  012777  014022  103006              MOV     #IO.BUF,@ML.REG+20         ;                    1116
 112416  010177  103012                      MOV     R1,@ML.REG+30              ; DSA.CNT,*          1117
 112422  012777  000061  102754              MOV     #61,@ML.REG                ;                    1117
 112430  105777  103020            2$:       TSTB    @ML.REG+50
 112434  100375                              BPL     2$
 112436  032777  040000  103020              BIT     #40000,@ML.REG+60          ;                    1117
 112444  001476                              BEQ     5$
 112446  005267  102724                      INC     P.CNT                      ;                    1117
```

```
                                     ;ML4AD                                                              29-Mar-1982 16:23:04   TOPS
                                     ;             TEST CODE SECTION                                     29-Mar-1982 16:21:03   PA:<

112452  026767  102720  102720              CMP     P.CNT,LIMIT
112460  003073                              BGT     6$
112462  104455                              TRAP    55                      ;                                   1117
112464  000153                              .WORD   153
112466  013012                              .WORD   ARR.DAT
112470  026302                              .WORD   DUMPER
112472  012746  011676                      MOV     #PHR.4,-(SP)            ;                                   1117
112476  012746  011110                      MOV     #WRD.35,-(SP)
112502  012746  010246                      MOV     #TWO.FMT,-(SP)
112506  012746  000003                      MOV     #3,-(SP)
112512  010600                              MOV     SP,R0                   ; SP,*
112514  104414                              TRAP    14
112516  010116                              MOV     R1,(SP)                 ; DSA.CNT,*                         1118
112520  012746  007064                      MOV     #FMT.9,-(SP)
112524  012746  000002                      MOV     #2,-(SP)
112530  010600                              MOV     SP,R0                   ; SP,*
112532  104414                              TRAP    14
112534  026727  101252  000100              CMP     CHIP.SIZ,#100           ;                                   1118
112542  001020                              BNE     3$
112544  010100                              MOV     R1,R0                   ; DSA.CNT,*                         1118
112546  006200                              ASR     R0
112550  006200                              ASR     R0
112552  006200                              ASR     R0
112554  000300                              SWAB    R0
112556  042700  177760                      BIC     #177760,R0
112562  010046                              MOV     R0,-(SP)
112564  005216                              INC     (SP)
112566  012746  007030                      MOV     #FMT.8,-(SP)
112572  012746  000002                      MOV     #2,-(SP)
112576  010600                              MOV     SP,R0                   ; SP,*
112600  104414                              TRAP    14
112602  000415                              BR      4$                      ;                                   1118
112604  010100                      3$:     MOV     R1,R0                   ; DSA.CNT,*                         1118
112606  006200                              ASR     R0
112610  000300                              SWAB    R0
112612  042700  177760                      BIC     #177760,R0
112616  010046                              MOV     R0,-(SP)
112620  005216                              INC     (SP)
112622  012746  007030                      MOV     #FMT.8,-(SP)
112626  012746  000002                      MOV     #2,-(SP)
112632  010600                              MOV     SP,R0                   ; SP,*
112634  104414                              TRAP    14
112636  062706  000022              4$:     ADD     #22,SP                  ;                                   1117
112642  104467                      5$:     TRAP    67                      ;                                   1119
112644  006000                              ROR     R0
112646  103635                              BLO     1$
112650  005201                      6$:     INC     R1                      ; DSA.CNT                           1116
112652  020102                      7$:     CMP     R1,R2                   ; DSA.CNT,*
112654  101632                              BLOS    1$
112656  000207                              RTS     PC                      ;                                   1112

                                     ; Routine Size:  111 words
```

```
                              ;ML4AD                                          29-Mar-1982 16:23:04    TOPS
                              ;                TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<

                              ; Maximum stack depth per invocation:  12 words



                                        .SBTTL  T60 TEST CODE SECTION
      112660                  T60::
      112660  004767  177436  1$:       JSR     PC,$T60                  ;                              1119
      112664  104466                    TRAP    66
      112666  006000                    ROR     R0
      112670  103773                    BLO     1$
      112672  000207                    RTS     PC

                              ; Routine Size:  6 words
                              ; Maximum stack depth per invocation:  0 words


 ;            11198 !<BLF/PAGE>
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;       TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (113)

;       !
;       !
;       BGNTST;                                         !BEGIN THE TEST
;
;       !++
;       !  TEST NUMBER: TST 61
;       !
;       !  TEST NAME:   BATTERY BACK-UP TEST
;       !
;       !  TEST DESCRIPTION:
;       !       THIS TEST IS DESIGNED SPECIFICALLY FOR THE
;       !       MARLBORO MFG'ING VERIFY STATION.  ITS PURPOSE
;       !       IS TO TEST THE ML-11 SYSTEM FOR BATTERY BACK-UP DURING
;       !       POWER LOSS AND NO ECC INITIALIZE DURING POWER
;       !       UP WITH GOOD BATTERY BACK-UP.
;       !
;       !--
;
;       local
;           DSA_CNT,                                    !COUNTS THE NUMBER OF BLOCKS TRANSFERED
;           SIZE,                                       !STORES THE SIZE OF MASS BUS TRANSFERS
;           DST,                                        !STORES THE DESTINATION ADRS OF MASS BUS TRANSFERS
;           SRC,                                        !STORES THE SOURCE ADRS OF MASS BUS TRANSFERS
;           INIT_ERR,                                   !COUNTS THE # OF WORDS FOUND TO HAVE ZEROES DATA
;           BB_ERR;                             !COUNTS THE # OF WORDS FOUND TO HAVE NONE ONES DATA BUT NOT 0'S DATA
;
;       !+
;       ! PERFORM THIS TEST ONLY IF THE OPERATOR HAS
;       ! ENABLED MANUAL INTERVENTION TEST VIA THE S/W
;       ! QUESTIONS.
;       !-
;
;       if .INTERVEN                                    !DO THIS TEST IF INTERVEN IS SET
;       then
;           begin
;       !
;       !
;       ! PRINT WHICH TEST NUMBER THIS
;       !
;       !
;           PRINTB (ONE_FMT, T_61);
;       !
;       !
;       ! TO START THE TEST OFF WRITE THE ENTIRE ML-11 MEMORY
;       ! WITH ALL ONES DATA.  THIS WILL BE THE BACK GROUND FOR
;       ! THE ECC INITIALIZE PORTION OF THIS TEST.  THIS ALL ONES
;       ! DATA PATTERN SHOULD STILL BE IN MEMORY AFTER THE POWER
;       ! IS TURNED BACK ON WITH GOOD BATTERY BACK-UP.
;       !
;       !
;           CLR_MBUS;                                   !CLEAR THE MASS BUS
;           IO_BUF = ONES;                              !LOAD THE FIRST IO BUF WORD WITH ONES DATA
```

```
;ML4AD                                                  29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       TEST CODE SECTION               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (113)
;
;          DSA_CNT = -1;                                 !RESET THE DSA COUNTER
;
;          do                                            !LOAD ALL OF MEMORY WITH ONE'S DATA
;              begin
;              BREAK;                                    !LOOK FOR CONTROL C
;              DSA_CNT = .DSA_CNT + 1;                   !UP THE DSA COUNTER
;              WRT_TRANSFER (SIZE = -256, DST = .DSA_CNT, SRC = IO_BUF);       !DO THE WRITE XFER
;              end
;      !
;      !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
;      !
;          until .DSA_CNT eqlU .LST_BLK;                 !REPEAT WRITING UNTIL THE LAST BLOCK IS DONE
;
;      !
;      !
;      ! SET THE VOLUMN VALID BIT 'VV'
;      ! AND TELL THE OPERATOR TO TURN THE BOX
;      ! POWER OFF WITH GOOD BATTERY BACK-UP.
;      ! THE BACK GROUND PATTERN OF ALL ONES SHOULD
;      ! BE MAINTAINED BY BATTERY BACK-UP AND ECC INIT
;      ! ON POWER UP SHOULD NOT CLEAR THE PATTERN OUT.
;      !
;      !
;          CLR_MBUS;                                     !CLEAR THE MASS BUS
;          MLCS1 = RD_IN_PRE;                            !SET THE VV BIT via A RD_IN_PRE FUNC
;          PRINTB (ONE_FMT, PWR_OFF);                    !TELL OPERATOR TO SHUT POWER OFF
;
;          do                                            !DO NOTHING
;              begin
;              BREAK;                                    !LOOK FOR CONTROL C
;              end
;          until not (.MOL);                             !UNTIL THE DRIVE POWER IS OFF
;
;          DELAY (TWO_TH_US);                            !DELAY FOR BATTERY BACK-UP MAINTAIN MEMORY
;      !
;      !
;      ! NOW TELL THE OPERATOR TO POWER UP THE BOX
;      ! WITH GOOD BATTERY BACK-UP.  THEN TEST THE
;      ! VV BIT TO BE STILL SET AND THE BACK GROUND
;      ! PATTERN OF ALL ONES TO STILL BE IN MEMORY.
;      !
;      !
;          PRINTB (ONE_FMT, PUP_BB);                     !TELL OPERATOR TO TURN BOX POWER BACK ON
;
;          do                                            !DO NOTHING
;              begin
;              BREAK;                                    !LOOK FOR CONTROL C
;              end
;          until .DRY;                                   !UNTIL THE DRIVE IS READY
;
;          DELAY (10);                                   !WAIT FOR THE DRIVE TO SETTLE
;
```

```
;ML4AD                                                          29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;               TEST CODE SECTION                               29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (113)

;                   if not (.VV)                                !DID POWERING UP WITH GOOD BB CLEAR THE VV BIT
;                   then
;                       begin                                   !THE VV BIT GOT CLEARED
;                       ERRDF (154, ASYNC, DUMPER);             !REPORT THE ERROR TO THE OPERATOR
;                       PRINTB (ONE_FMT, BB_VV_ERR);            !TELL WHAT THE ERROR IS
;                       end;
;
;                   INIT_ERR = ZERO;                            !CLEAR THE INIT COUNTER
;                   BB_ERR = ZERO;                              !CLEAR THE BATTERY BACK-UP COUNTER
;                   DSA_CNT = -1;                               !RESET THE DSA COUNTER
;
;                   do                                  !WRITE CHECK MEMORY AND TEST FOR BAT BACK-UP AND/OR NO ECC INIT
;                       begin
;                       BREAK;                                  !LOOK FOR CONTROL C
;                       DSA_CNT = .DSA_CNT + 1;                 !UP THE DSA COUNTEER
;                       WRT_CHK_TRANSFER (SIZE = -256, DST = .DSA_CNT, SRC = IO_BUF);   !DO THE WRITE CHECK XFER
;
;                       if .WCE                                 !IS THIS BLOCK IN ERROR
;                       then
;                           begin                               !THIS BLOCK IS IN ERROR
;
;                           if .MLDB eql ZERO                   !SEE WHAT KIND OF AN ERROR IT IS
;                           then
;                               INIT_ERR = .INIT_ERR + 1        !IT'S A INITIALIZE ERROR
;                           else
;                               BB_ERR = .BB_ERR + 1;           !IT'S A BAT BACK-UP ERROR
;
;                           end;
;
;                       end
;               !
;               !VERSION CZMLAD CHANGED TEST TO UNSIGNED TEST
;               !
;                   until .DSA_CNT eqlU .LST_BLK;               !REPEAT WRITE CHECKING UNTIL THE LAST BLOCK
;
;               !
;               ! IF THERE ARE MORE THAN 127 SECTORS IN
;               ! ERROR WITH ALL ZEORES DATA THEN THE
;               ! PROBLEM IS PROBIBLY IN
;               ! THE ECC INITIALIZE LOGIC AND NOT IN THE
;               ! BATTERY BACK-UP OF MEMORY.
;               !
;               ! IF INIT_ERR IS NOT > 127 AND THERE ARE
;               ! > 100 WORDS READ WITH DATA OTHER THAN
;               ! ALL ONES OR ALL ZEROES THEN THE PROBLEM
;               ! IS PROBIBLY CAUSED BY THE BATTERY BACK-UP
;               ! LOGIC NOT MAINTAINING THE MEMORY DURING
;               ! POWER FAILURE.
;               !
;
;                   if .INIT_ERR gtr 127                        !IS THE ECC INIT LOGIC IN ERROR
;                   then
```

```
;ML4AD                                                       29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                       TEST CODE SECTION                    29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (113)

;               11355           begin                        !THE ECC INIT LOGIC IS IN ERROR
;               11356           ERRDF (155, ASYNC, DUMPER);  !REPORT THE ERROR TO THE OPERATOR
;               11357           PRINTB (ONE_FMT, BB_INIT_ERR); !TELL WHAT THE ERROR IS
;               11358           end
;               11359       else
;               11360           begin                        !THE ECC INIT LOGIC IS NOT IN ERROR
;               11361
;               11362           if .BB_ERR gtr 100           !IS THE BATTERY BACK-UP LOGIC IN ERROR
;               11363           then
;               11364               begin                    !THE BATTERY BACK-UP LOGIC IS IN ERROR
;               11365               ERRDF (156, ASYNC, DUMPER); !REPORT THE ERROR TO THE OPERATOR
;               11366               PRINTB (ONE_FMT, BB_BB_ERR); !TELL WHAT THE ERROR IS
;               11367               end;
;               11368
;               11369           end;
;               11370
;               11371       end;
;               11372
;               11373 ENDTST;                                !END THE TEST


                                          .SBTTL  $T61 TEST CODE SECTION
112674  004167  071712          $T61:    JSR     R1,$SAVE5                 ;                 1119
112700  024646                           CMP     -(SP),-(SP)
112702  032767  000001  067500           BIT     #1,INTERVEN               ;                 1123
112710  001002                           BNE     1$
112712  000167  000600                   JMP     20$
112716  012746  005012          1$:      MOV     #T.61,-(SP)               ;                 1123
112722  012746  010240                   MOV     #ONE.FMT,-(SP)
112726  012746  000002                   MOV     #2,-(SP)
112732  010600                           MOV     SP,R0                     ; SP,*
112734  104414                           TRAP    14
112736  152777  000040  102500           BISB    #40,@ML.REG+40
112744  016705  103062                   MOV     ML.DUT,R5
112750  042705  177770                   BIC     #177770,R5
112754  142777  000007  102462           BICB    #7,@ML.REG+40
112762  150577  102456                   BISB    R5,@ML.REG+40
112766  012767  177777  101026           MOV     #-1,IO.BUF                ;                 1125
112774  012702  177777                   MOV     #-1,R2                    ; *,DSA.CNT       1125
113000  104422                  2$:      TRAP    22                        ;                 1125
113002  005202                           INC     R2                        ; DSA.CNT         1125
113004  012705  177400                   MOV     #-400,R5                  ; *,SIZE          1125
113010  010546                           MOV     R5,-(SP)                  ; SIZE,*
113012  010266  000010                   MOV     R2,10(SP)                 ; DSA.CNT,DST
113016  010246                           MOV     R2,-(SP)                  ; DSA.CNT,*
113020  012701  014022                   MOV     #IO.BUF,R1                ; *,SRC
113024  010146                           MOV     R1,-(SP)                  ; SRC,*
```

```
26293                                   ;ML4AD                                                      29-Mar-1982 16:23:04   TOPS
26294                                   ;               TEST CODE SECTION                           29-Mar-1982 16:21:03   PA:<
26295
26296 113026  004767  114374                    JSR     PC,WRT.TRANSFER
26297 113032  062706  000006                    ADD     #6,SP                   ;                                  1125
26298 113036  020267  100752                    CMP     R2,LST.BLK              ; DSA.CNT,*                        1126
26299 113042  001356                            BNE     2$
26300 113044  152777  000040  102372            BISB    #40,@ML.REG+40
26301 113052  016704  102754                    MOV     ML.DUT,R4
26302 113056  042704  177770                    BIC     #177770,R4
26303 113062  142777  000007  102354            BICB    #7,@ML.REG+40
26304 113070  150477  102350                    BISB    R4,@ML.REG+40
26305 113074  012777  000021  102302            MOV     #21,@ML.REG             ;                                  1127
26306 113102  012716  005112                    MOV     #PWR.OFF,(SP)           ;                                  1127
26307 113106  012746  010240                    MOV     #ONE.FMT,-(SP)
26308 113112  012746  000002                    MOV     #2,-(SP)
26309 113116  010600                            MOV     SP,R0                   ; SP,*
26310 113120  104414                            TRAP    14
26311 113122  104422                    3$:     TRAP    22                      ;                                  1127
26312 113124  032777  010000  102322            BIT     #10000,@ML.REG+50       ;                                  1128
26313 113132  001373                            BNE     3$
26314 113134  012703  003720                    MOV     #3720,R3                ; *,$STMP2                         1128
26315 113140  001411                    4$:     BEQ     7$
26316 113142  016704  066750                    MOV     L$DLY,R4                ; *,$STMP1
26317 113146  001404                            BEQ     6$
26318 113150  005066  000014            5$:     CLR     14(SP)                  ; $STMP
26319 113154  005304                            DEC     R4                      ; $STMP1
26320 113156  001374                            BNE     5$
26321 113160  005303                    6$:     DEC     R3                      ; $STMP2
26322 113162  000766                            BR      4$
26323 113164  012716  006060            7$:     MOV     #PUP.BB,(SP)            ;                                  1129
26324 113170  012746  010240                    MOV     #ONE.FMT,-(SP)
26325 113174  012746  000002                    MOV     #2,-(SP)
26326 113200  010600                            MOV     SP,R0                   ; SP,*
26327 113202  104414                            TRAP    14
26328 113204  104422                    8$:     TRAP    22                      ;                                  1129
26329 113206  105777  102242                    TSTB    @ML.REG+50              ;                                  1129
26330 113212  100374                            BPL     8$
26331 113214  012703  000012                    MOV     #12,R3                  ; *,$STMP2                         1130
26332 113220  001411                    9$:     BEQ     12$
26333 113222  016704  066670                    MOV     L$DLY,R4                ; *,$STMP1
26334 113226  001404                            BEQ     11$
26335 113230  005066  000020            10$:    CLR     20(SP)                  ; $STMP
26336 113234  005304                            DEC     R4                      ; $STMP1
26337 113236  001374                            BNE     10$
26338 113240  005303                    11$:    DEC     R3                      ; $STMP2
26339 113242  000766                            BR      9$
26340 113244  132777  000100  102202    12$:    BITB    #100,@ML.REG+50         ;                                  1130
26341 113252  001016                            BNE     13$
26342 113254  104455                            TRAP    55                      ;                                  1130
26343 113256  000232                            .WORD   232
26344 113260  012706                            .WORD   ASYNC
26345 113262  026302                            .WORD   DUMPER
26346 113264  012746  006150                    MOV     #BB.VV.ERR,-(SP)        ;                                  1130
26347 113270  012746  010240                    MOV     #ONE.FMT,-(SP)
```

```
                                    ;ML4AD                                                  29-Mar-1982 16:23:04   TOPS
                                    ;                  TEST CODE SECTION                    29-Mar-1982 16:21:03   PA:<
113274  012746  000002                      MOV     #2,-(SP)
113300  010600                              MOV     SP,R0                   ; SP,*
113302  104414                              TRAP    14
113304  062706  000006                      ADD     #6,SP                   ;                                      1130
113310  005003                      13$:    CLR     R3                      ; INIT.ERR                             1131
113312  005004                              CLR     R4                      ; BB.ERR                               1131
113314  012702  177777                      MOV     #-1,R2                  ; *,DSA.CNT                            1131
113320  104422                      14$:    TRAP    22                      ;                                      1131
113322  005202                              INC     R2                      ; DSA.CNT                              1131
113324  012705  177400                      MOV     #-400,R5                ; *,SIZE                               1131
113330  010546                              MOV     R5,-(SP)                ; SIZE,*
113332  010266  000020                      MOV     R2,20(SP)               ; DSA.CNT,DST
113336  010246                              MOV     R2,-(SP)                ; DSA.CNT,*
113340  012701  014022                      MOV     #IO.BUF,R1              ; *,SRC
113344  010146                              MOV     R1,-(SP)                ; SRC,*
113346  004767  113604                      JSR     PC,WRT.CHK.TRANSFE
113352  032777  040000  102064              BIT     #40000,@ML.REG+40       ;                                      1132
113360  001406                              BEQ     16$
113362  005777  102126                      TST     @ML.REG+110             ;                                      1132
113366  001002                              BNE     15$
113370  005203                              INC     R3                      ; INIT.ERR                             1132
113372  000401                              BR      16$                     ;                                      1132
113374  005204                      15$:    INC     R4                      ; BB.ERR                               1132
113376  062706  000006              16$:    ADD     #6,SP                   ;                                      1131
113402  020267  100406                      CMP     R2,LST.BLK              ; DSA.CNT,*                            1133
113406  001344                              BNE     14$
113410  020327  000177                      CMP     R3,#177                 ; INIT.ERR,*                           1135
113414  003415                              BLE     17$
113416  104455                              TRAP    55                      ;                                      1135
113420  000233                              .WORD   233
113422  012706                              .WORD   ASYNC
113424  026302                              .WORD   DUMPER
113426  012746  006242                      MOV     #BB.INIT.ERR,-(SP)      ;                                      1135
113432  012746  010240                      MOV     #ONE.FMT,-(SP)
113436  012746  000002                      MOV     #2,-(SP)
113442  010600                              MOV     SP,R0                   ; SP,*
113444  104414                              TRAP    14
113446  000417                              BR      18$                     ;                                      1135
113450  020427  000144              17$:    CMP     R4,#144                 ; BB.ERR,*                             1136
113454  003416                              BLE     19$
113456  104455                              TRAP    55                      ;                                      1136
113460  000234                              .WORD   234
113462  012706                              .WORD   ASYNC
113464  026302                              .WORD   DUMPER
113466  012746  006334                      MOV     #BB.BB.ERR,-(SP)        ;                                      1136
113472  012746  010240                      MOV     #ONE.FMT,-(SP)
113476  012746  000002                      MOV     #2,-(SP)
113502  010600                              MOV     SP,R0                   ; SP,*
113504  104414                              TRAP    14
113506  062706  000006              18$:    ADD     #6,SP                   ;                                      1136
113512  062706  000016              19$:    ADD     #16,SP                  ;                                      1123
113516  022626                      20$:    CMP     (SP)+,(SP)+             ;                                      1119
```

```
                              ;ML4AD                                      29-Mar-1982 16:23:04   TOPS
                              ;               TEST CODE SECTION           29-Mar-1982 16:21:03   PA:<

113520  000207                        RTS     PC

                              ; Routine Size:  203 words
                              ; Maximum stack depth per invocation:  18 words




                                      .SBTTL  T61 TEST CODE SECTION
113522                        T61::
113522  004767  177146        1$:     JSR     PC,$T61                 ;                           1137
113526  104466                        TRAP    66
113530  006000                        ROR     R0
113532  103773                        BLO     1$
113534  000207                        RTS     PC

                              ; Routine Size:  6 words
                              ; Maximum stack depth per invocation:  0 words


;               11374 !<BLF/PAGE>
```

```
;ML4AD                                                            29-Mar-1982 16:23:04    TOPS-20 Bliss-16 V2(212)
;                   TEST CODE SECTION                             29-Mar-1982 16:21:03    PA:<NEALE>ML4AD.BLI.4 (114)

;            11375 !
;            11376 ! CLEAN UP SECTION
;            11377 !
;            11378 !        THE CLEAN UP SECTION IS ENTERED WHEN:
;            11379 !        1.  A NORMAL END OF PASS IS DONE
;            11380 !            ie. WHEN ONE COMPLETE PASS OF
;            11381 !                THE DIAG IS DONE.
;            11382 !
;            11383 !        2.  WHEN A DRIVE ERROR IS DECTECTED AND
;            11384 !            AND THE UNIT IS DROPPED AND THE DOCLN
;            11385 !            MACRO IS CALLED.
;            11386 !
;            11387 !        3.  WHEN A ^C IS TYPE AT THE CONSOLE TERMINAL
;            11388 !            DURING EXECUTION OF A TEST.
;            11389 !
;            11390 !        IN ANY EVENT OF ENTERING THIS SECTION THE
;            11391 !        ML11 CONTROL BOARD TESTER'S POWER SUPPLIES
;            11392 !        ARE POWERED DOWN via THE ROUTINE CALL: ''
;            11393
;            11394 !++
;            11395 BGNCLN;                                             !BEGIN THE CLEAN UP CODE
;            11396 CLR = ONE;                                          !CLEAR THE MASS BUS
;            11397 return;                                            !RETURN TO DRS>
;            11398 ENDCLN;                                            !END THE CLEAN UP CODE

                                          .SBTTL  LCLEAN TEST CODE SECTION
113536  152777  000040  101700  LCLEAN: BISB    #40,@ML.REG+40                  ;          1139
113544  000207                          RTS     PC                              ;          1137

                                ; Routine Size:  4 words
                                ; Maximum stack depth per invocation:  0 words



                                          .SBTTL  L$CLEAN TEST CODE SECTION
113546                          L$CLEAN::
```

```
                                      ;ML4AD                                                     29-Mar-1982 16:23:04   TOPS
                                      ;             TEST CODE SECTION                            29-Mar-1982 16:21:03   PA:<

113546  004767  177764                        JSR     PC,LCLEAN                       ;                                 1139
113552  104412                                TRAP    12
113554  000207                                RTS     PC

                                      ; Routine Size:  4 words
                                      ; Maximum stack depth per invocation:  0 words


;             11399 LASTAD;                                                   !DEFINE THE DIAG'S LAST ADDRESS
;             11400 BGNSETUP (0);                                             !SET UP ZERO P-TABLES
;             11401 ENDSETUP;                                                 !END THE SETUP


113556  113562                        BL$LAS::.WORD   T$FREE
113560  000000                                .WORD   <<T$FREE-<BL$LAS+4>>/2>
113562  000000                        T$FREE::.WORD   0


        113562                        L$LAST==                BL$LAS+4
        000000                        T$PTHV==                0


                                              .SBTTL  $END.LINK TEST CODE SECTION
113564                                $END.LINK::
113564  000207                                RTS     PC                              ;                                 1139

                                      ; Routine Size:  1 word
                                      ; Maximum stack depth per invocation:  0 words


;             11402 end
;             11403
;             11404 eludom
```

```
                              ;ML4AD                                              29-Mar-1982 16:23:04   TOPS
                              ;               TEST CODE SECTION                   29-Mar-1982 16:21:03   PA:<

                              ; OTS external references
                                      .GLOBL  BL$GT2, $SAVE5, $SAVE4, $SAVE3
                                      .GLOBL  $SAVE2, BL$PU2, BL$PU1, BL$GT1
                                      .GLOBL  BL$DIV, BL$MOD, BL$MUL







                              ; Size:         15786 code + 2346 data words
                              ; Run Time:     02:46.0
                              ; Elapsed Time: 03:20.7
                              ; Memory Used:  124 pages
                              ; Compilation Complete

        000001                        .END
```

```
ADR    = 000020 G
ARR.DA= 013012
ARR.IN  014004
ARR.16  014016
ASSEMB= 000010
ASYNC = 012706
A.CAL   015362
A.GEN   015370
BB.BB.= 006334
BB.INI= 006242
BB.VV.= 006150
BIT0   = 000001 G
BIT00 = 000001 G
BIT01 = 000002 G
BIT02 = 000004 G
BIT03 = 000010 G
BIT04 = 000020 G
BIT05 = 000040 G
BIT06 = 000100 G
BIT07 = 000200 G
BIT08 = 000400 G
BIT09 = 001000 G
BIT1   = 000002 G
BIT10 = 002000 G
BIT11 = 004000 G
BIT12 = 010000 G
BIT13 = 020000 G
BIT14 = 040000 G
BIT15 = 100000 G
BIT2   = 000004 G
BIT3   = 000010 G
BIT4   = 000020 G
BIT5   = 000040 G
BIT6   = 000100 G
BIT7   = 000200 G
BIT8   = 000400 G
BIT9   = 001000 G
BL$DIV  004446 G
BL$GT1  003512 G
BL$GT2  003634 G
BL$LAS  113556 G
BL$MOD  004460 G
BL$MUL  004222 G
BL$PU1  003776 G
BL$PU2  004072 G
BL$SHF  004472 G
BOE    = 000400 G
B.CAL   015364
B.GEN   015372
CAL.CR  017042
CHIP.S  014012
C$AU   = 000052
C$AUTO= 000061
C$BRK = 000022
C$BSEG= 000004
C$BSUB= 000002
C$CEFG= 000045
C$CLCK= 000062
C$CLEA= 000012
C$CLOS= 000035
C$CLP1= 000006
C$CVEC= 000036
C$DCLN= 000044
C$DODU= 000051
C$DRPT= 000024
C$DU   = 000053
C$EDIT= 000003
C$ERDF= 000055
C$ERHR= 000056
C$ERRO= 000060
C$ERSF= 000054
C$ERSO= 000057
C$ESCA= 000010
C$ESEG= 000005
C$ESUB= 000003
C$ETST= 000001
C$EXIT= 000032
C$GETB= 000026
C$GETW= 000027
C$GMAN= 000043
C$GPHR= 000042
C$GPLO= 000030
C$GPRI= 000040
C$INIT= 000011
C$INLP= 000020
C$MANI= 000050
C$MEM = 000031
C$MSG = 000023
C$OPEN= 000034
C$PNTB= 000014
C$PNTF= 000017
C$PNTS= 000016
C$PNTX= 000015
C$QIO = 000377
C$RDBU= 000007
C$REFG= 000047
C$RESE= 000033
C$REVI= 000003
C$RFLA= 000021
C$RPT = 000025
C$SEFG= 000046
C$SPRI= 000041
C$SVEC= 000037
C$TPRI= 000013
DATA.L= 013154
DAT.DM  016412
DFPTBL  002360 G
DIAGMC= 000000
DIVMOD  004264
DRIVE.  015354
DROP.C  015402
DT.1    015764
DUMPER  026302 G
D1.TEM= 013374
D2.TEM= 013376
EF.CON= 000036 G
EF.NEW= 000035 G
EF.PWR= 000034 G
EF.RES= 000037 G
EF.STA= 000040 G
EIG.FM= 010364
ELV.FM= 010466
ERRBLK  002160 G
ERRMSG  002156 G
ERRNBR  002154 G
ERRTHR  002402 G
ERRTYP  002152 G
ERR.CH  017442
EVL    = 000004 G
E$END = 002100
E$LOAD= 000035
E2.TEM= 013400
FIND.C  017660
FIRST.  020262
FIV.FM= 010304
FMT.1 = 006442
FMT.10= 007116
FMT.11= 007170
FMT.12= 007224
FMT.13= 007254
FMT.14= 007330
FMT.15= 007370
FMT.16= 007436
FMT.17= 007526
FMT.18= 007562
FMT.19= 007632
FMT.2 = 006506
FMT.20= 007702
FMT.21= 007754
FMT.22= 010026
FMT.23= 010072
FMT.24= 010142
FMT.25= 010166
FMT.26= 010206
FMT.3 = 006574
FMT.4 = 006620
FMT.5 = 006650
FMT.6 = 006752
FMT.7 = 007002
FMT.8 = 007030
FMT.9 = 007064
FNC.1 = 012150
FNC.10= 012272
FNC.11= 012302
FNC.12= 012322
FNC.13= 012334
FNC.14= 012344
FNC.15= 012360
FNC.16= 012372
FNC.17= 012404
FNC.18= 012414
FNC.19= 012426
FNC.2 = 012164
FNC.21= 012440
FNC.22= 012452
FNC.23= 012464
FNC.3 = 012172
FNC.4 = 012200
FNC.5 = 012216
FNC.6 = 012226
FNC.7 = 012234
FNC.8 = 012244
FNC.9 = 012260
FORCE.  020032
FOR.EC  020210
FOR.FM= 010270
F$AU   = 000015
F$AUTO= 000020
F$BGN = 000040
F$CLEA= 000007
F$DU   = 000016
F$END = 000041
F$HARD= 000004
F$HW   = 000013
F$INIT= 000006
F$JMP = 000050
F$MOD = 000000
F$MSG = 000011
F$PROT= 000021
F$PWR = 000017
F$RPT = 000012
F$SEG = 000003
F$SOFT= 000005
F$SRV = 000010
F$SUB = 000002
F$SW   = 000014
F$TEST= 000001
GD.BLK  020312
GOOD.B  014006
G$CNTO= 000200
G$DELM= 000372
G$DISP= 000003
G$EXCP= 000400
G$HILI= 000002
G$LOLI= 000001
G$NO   = 000000
G$OFFS= 000400
G$OFSI= 000376
G$PRMA= 000001
G$PRMD= 000002
G$PRML= 000000
G$RADA= 000140
G$RADB= 000000
G$RADD= 000040
G$RADL= 000120
G$RADO= 000020
G$XFER= 000004
G$YES = 000010
HELP   = 000000
HOE    = 100000 G
HW.OR.  013402
IBE    = 010000 G
IDU    = 000040 G
IER    = 020000 G
INTER = 013114
INTERV  002410 G
IO.BUF  014022
ISR    = 000100 G
IXE    = 004000 G
I$AU   = 000041
I$AUTO= 000041
I$CLN = 000041
I$DU   = 000041
I$HRD = 000041
I$INIT= 000041
I$MOD = 000041
I$MSG = 000041
I$PROT= 000040
I$PTAB= 000041
I$PWR = 000041
I$RPT = 000041
I$SEG = 000041
I$SETU= 000041
I$SFT = 000041
I$SRV = 000041
I$SUB = 000041
I$TST = 000041
J$JMP = 000167
LAST.B  020344
LAU     004704
LAUTO   004660
LCLEAN  113536
LDU     004672
LD.LNG  021354
LIMIT   015400
LINIT   027650
LOAD.S  016034
LOE    = 040000 G
LOT    = 000010 G
LRPT    004646
LST.AR  014020
LST.BL  014014
LST.DU  015356
L$ACP   002110 G
L$APT   002036 G
L$AU    004706 G
L$AUT   002070 G
L$AUTO  004662 G
L$CCP   002106 G
L$CLEA  113546 G
L$CO    002032 G
L$DEPO  002011 G
L$DESC  002130 G
L$DESP  002076 G
L$DEVP  002060 G
```

```
L$DISP  002164 G    MSGH7   003052      P.AAC   005112    P.ACH   010566    P.AEM   011454
L$DLY   002116 G    MSGS1   003160      P.AAD   005202    P.ACI   010602    P.AEN   011462
L$DTP   002040 G    MSGS2   003224      P.AAE   005272    P.ACJ   010616    P.AEO   011470
L$DTYP  002034 G    MSGS3   003270      P.AAF   005340    P.ACK   010630    P.AEP   011474
L$DU    004674 G    MSGS4   003334      P.AAG   005414    P.ACL   010640    P.AEQ   011502
L$DUT   002072 G    MSGS5   003400      P.AAH   005470    P.ACM   010650    P.AER   011514
L$DVTY  002122 G    M$DUMP  026312      P.AAI   005570    P.ACN   010660    P.AES   011524
L$EF    002052 G    NIB.SA  013374      P.AAJ   005652    P.ACO   010664    P.AET   011532
L$ENVI  002044 G    NIN.FM= 010410      P.AAK   005722    P.ACP   010676    P.AEU   011540
L$ERRT  002152 G    NO.INI= 005470      P.AAL   005764    P.ACQ   010704    P.AEV   011552
L$ETP   002102 G    ONEFIL= 000001      P.AAM   006060    P.ACR   010712    P.AEW   011562
L$EXP1  002046 G    ONEPAS  002406 G    P.AAN   006150    P.ACS   010724    P.AEX   011570
L$EXP4  002064 G    ONE.FM= 010240      P.AAO   006242    P.ACT   010730    P.AEY   011610
L$EXP5  002066 G    OP.NUM  014002      P.AAP   006334    P.ACU   010736    P.AEZ   011626
L$HARD  002414 G    O$APTS= 000001      P.AAQ   006442    P.ACV   010744    P.AFA   011644
L$HIME  002120 G    O$AU  = 000001      P.AAR   006506    P.ACW   010752    P.AFB   011676
L$HPCP  002016 G    O$BGNR= 000001      P.AAS   006574    P.ACX   010766    P.AFC   011714
L$HPTP  002022 G    O$BGNS= 000001      P.AAT   006620    P.ACY   010774    P.AFD   011726
L$HW    002360 G    O$DU  = 000001      P.AAU   006650    P.ACZ   011002    P.AFE   011740
L$ICP   002104 G    O$ERRT= 000001      P.AAV   006752    P.ADA   011016    P.AFF   011762
L$INIT  030714 G    O$GNSW= 000001      P.AAW   007002    P.ADB   011024    P.AFG   011774
L$LADP  002026 G    O$POIN= 000001      P.AAX   007030    P.ADC   011032    P.AFH   012006
L$LAST= 113562 G    O$SETU= 000001      P.AAY   007064    P.ADD   011046    P.AFI   012020
L$LOAD  002100 G    PAR.DI  014010      P.AAZ   007116    P.ADE   011054    P.AFJ   012036
L$LUN   002074 G    PD.TEM  015342      P.ABA   007170    P.ADF   011070    P.AFK   012060
L$MREV  002050 G    PHR.1 = 011610      P.ABB   007224    P.ADG   011076    P.AFL   012104
L$NAME  002000 G    PHR.10= 012006      P.ABC   007254    P.ADH   011102    P.AFM   012136
L$PRIO  002042 G    PHR.11= 012020      P.ABD   007330    P.ADI   011110    P.AFN   012150
L$PROT  003444 G    PHR.12= 012036      P.ABE   007370    P.ADJ   011116    P.AFO   012164
L$PRT   002112 G    PHR.13= 012060      P.ABF   007436    P.ADK   011122    P.AFP   012172
L$REPP  002062 G    PHR.14= 012104      P.ABG   007526    P.ADL   011132    P.AFQ   012200
L$REV   002010 G    PHR.15= 012136      P.ABH   007562    P.ADM   011140    P.AFR   012216
L$RPT   004650 G    PHR.2 = 011626      P.ABI   007632    P.ADN   011150    P.AFS   012226
L$SOFT  003122 G    PHR.3 = 011644      P.ABJ   007702    P.ADO   011154    P.AFT   012234
L$SPC   002056 G    PHR.4 = 011676      P.ABK   007754    P.ADP   011170    P.AFU   012244
L$SPCP  002020 G    PHR.5 = 011714      P.ABL   010026    P.ADQ   011176    P.AFV   012260
L$SPTP  002024 G    PHR.6 = 011726      P.ABM   010072    P.ADR   011206    P.AFW   012272
L$STA   002030 G    PHR.7 = 011740      P.ABN   010142    P.ADS   011214    P.AFX   012302
L$SW    002400 G    PHR.8 = 011762      P.ABO   010166    P.ADT   011226    P.AFY   012322
L$TEST  002114 G    PHR.9 = 011774      P.ABP   010206    P.ADU   011240    P.AFZ   012334
L$TIML  002014 G    PNT   = 001000 G    P.ABQ   010240    P.ADV   011250    P.AGA   012344
L$UNIT  002012 G    PRI   = 002000 G    P.ABR   010246    P.ADW   011260    P.AGB   012360
L10000  002376      PRI00 = 000000 G    P.ABS   010256    P.ADX   011270    P.AGC   012372
L10001  002412      PRI01 = 000040 G    P.ABT   010270    P.ADY   011276    P.AGD   012404
L10002  002510      PRI02 = 000100 G    P.ABU   010304    P.ADZ   011310    P.AGE   012414
L10003  003160      PRI03 = 000140 G    P.ABV   010322    P.AEA   011316    P.AGF   012426
MB.DIS= 005570      PRI04 = 000200 G    P.ABW   010342    P.AEB   011326    P.AGG   012440
MEM.AR= 013052      PRI05 = 000240 G    P.ABX   010364    P.AEC   011336    P.AGH   012452
ML.DUT  016032      PRI06 = 000300 G    P.ABY   010410    P.AED   011344    P.AGI   012464
ML.LUN  016030      PRI07 = 000340 G    P.ABZ   010436    P.AEE   011352    P.AGJ   012500
ML.REG  015404      PRSN    002400 G    P.ACA   010466    P.AEF   011362    P.AGK   012510
MSGH1   002510      PTBL.P  014000      P.ACB   010520    P.AEG   011374    P.AGL   012516
MSGH2   002556      PUP.BB= 006060      P.ACC   010524    P.AEH   011400    P.AGM   012524
MSGH3   002624      PWR.OF= 005112      P.ACD   010536    P.AEI   011416    P.AGN   012532
MSGH4   002670      PWR.ON= 005202      P.ACE   010544    P.AEJ   011432    P.AGO   012540
MSGH5   002736      P.AAA   004716      P.ACF   010552    P.AEK   011440    P.AGP   012546
MSGH6   003004      P.AAB   005012      P.ACG   010560    P.AEL   011446    P.AGQ   012554
```

```
P.AGR   012562
P.AGS   012570
P.AGT   012576
P.AGU   012604
P.AGV   012612
P.AGW   012620
P.AGX   012626
P.AGY   012634
P.AGZ   012642
P.AHA   012652
P.AHB   012660
P.AHC   012666
P.AHD   012676
P.AHE   012706
P.AHF   012750
P.AHG   013012
P.AHH   013052
P.AHI   013114
P.AHJ   013154
P.AHK   013214
P.AHL   013250
P.AHM   013302
P.AHN   013330
P.CAL   015366
P.CNT   015376
P.GEN   015374
RAS.IN  015346
RD.CS1  021762
RD.DA   022316
RD.DAT  015352
RD.DS   025216
RD.D1   024104
RD.D2   024416
RD.D3   024744
RD.EE   023760
RD.EL   023716
RD.ER   022140
RD.E1   023074
RD.E2   023314
RD.MR   022474
RD.PA   022666
RD.PD   023556
RD.REG  025712
REGDMP  002404 G
REG.IN  015360
REG.1 = 012500
REG.10= 012570
REG.11= 012576
REG.12= 012604
REG.13= 012612
REG.14= 012620
REG.15= 012626
REG.16= 012634
REG.17= 012642
REG.18= 012652
REG.19= 012660
REG.2 = 012510

REG.20= 012666
REG.21= 012676
REG.3 = 012516
REG.4 = 012524
REG.5 = 012532
REG.6 = 012540
REG.7 = 012546
REG.8 = 012554
REG.9 = 012562
REM.TB  015664
RE2     004640
RE3     004636
RE4     004634
RH.ADD  016022
RH.ERR= 013302
RH.TYP  016024
RH.VEC  016026
SC.SET= 013214
SEV.FM= 010342
SFPTBL  002400 G
SIX.FM= 010322
STACK   015034
STK.OF  015022
STRIPP  016444
SVCGBL= 177777
SVCINS= 177777
SVCSUB= 177777
SVCTAG= 177777
SVCTST= 177777
SYNC  = 012750
S$LSYM= 010000
TEN.FM= 010436
THR.FM= 010256
TIME.O= 013330
TRBLE.= 013250
TST.LN  020376
TWO.FM= 010246
T$ARGC= 000002
T$CODE= 004130
T$ERRN= 000000
T$EXCP= 000000
T$FREE  113562 G
T$GMAN= 000000
T$HILI= 000007
T$LAST= 000000
T$LOLI= 000000
T$LSYM= 010000
T$NEST= 177777
T$NS0 = 000000
T$NS1 = 000021
T$PTHV= 000000 G
T$PTNU= 000000
T$SAVL= 177777
T$SEGL= 177777
T$SUBN= 000000
T$TAGL= 177777
T$TAGN= 010005

T$TEMP= 000000
T$TEST= 000000
T$TSTM= 177777
T$TSTS= 000000
T$$HAR= 010002
T$$HW = 010000
T$$PRO= 010004
T$$SOF= 010003
T$$SW = 010001
T.21  = 004716
T.61  = 005012
T1      031134 G
T10     036266 G
T11     036510 G
T12     037066 G
T13     040230 G
T14     041462 G
T15     042714 G
T16     043556 G
T17     045044 G
T18     045260 G
T19     046430 G
T2      031460 G
T20     047430 G
T21     051176 G
T22     051724 G
T23     052262 G
T24     053456 G
T25     054270 G
T26     055466 G
T27     056244 G
T28     057230 G
T29     060342 G
T3      031666 G
T30     061136 G
T31     062534 G
T32     064272 G
T33     065304 G
T34     066266 G
T35     066744 G
T36     070030 G
T37     070756 G
T38     072032 G
T39     072460 G
T4      032336 G
T40     073436 G
T41     074516 G
T42     075324 G
T43     076254 G
T44     076504 G
T45     076670 G
T46     077366 G
T47     077660 G
T48     100640 G
T49     101376 G
T5      033006 G
T50     102014 G

T51     103202 G
T52     104020 G
T53     104660 G
T54     105722 G
T55     106612 G
T56     107742 G
T57     111234 G
T58     111640 G
T59     112306 G
T6      033476 G
T60     112660 G
T61     113522 G
T7      034354 G
T8      035370 G
T9      035624 G
UAM   = 000200 G
UNS.ER= 005272
VV.CLE= 005414
VV.NOT= 005340
VV.SET= 005764
WC.ERR= 005652
WRD.1 = 010520
WRD.10= 010630
WRD.11= 010640
WRD.12= 010650
WRD.13= 010660
WRD.14= 010664
WRD.15= 010676
WRD.16= 010704
WRD.17= 010712
WRD.18= 010724
WRD.19= 010730
WRD.2 = 010524
WRD.20= 010736
WRD.21= 010744
WRD.22= 010752
WRD.23= 010766
WRD.24= 010774
WRD.25= 011002
WRD.26= 011016
WRD.27= 011024
WRD.29= 011032
WRD.3 = 010536
WRD.30= 011046
WRD.31= 011054
WRD.32= 011070
WRD.33= 011076
WRD.34= 011102
WRD.35= 011110
WRD.36= 011116
WRD.37= 011122
WRD.38= 011132
WRD.39= 011140
WRD.4 = 010544
WRD.40= 011150
WRD.41= 011154
WRD.42= 011170

WRD.43= 011176
WRD.44= 011206
WRD.45= 011214
WRD.46= 011226
WRD.47= 011240
WRD.48= 011250
WRD.49= 011260
WRD.5 = 010552
WRD.50= 011270
WRD.51= 011276
WRD.52= 011310
WRD.53= 011316
WRD.54= 011326
WRD.55= 011336
WRD.56= 011344
WRD.57= 011352
WRD.58= 011362
WRD.59= 011374
WRD.6 = 010560
WRD.60= 011400
WRD.61= 011416
WRD.62= 011432
WRD.63= 011440
WRD.64= 011446
WRD.65= 011454
WRD.67= 011462
WRD.68= 011470
WRD.69= 011474
WRD.7 = 010566
WRD.70= 011502
WRD.71= 011514
WRD.72= 011524
WRD.73= 011532
WRD.74= 011540
WRD.75= 011552
WRD.76= 011562
WRD.77= 011570
WRD.8 = 010602
WRD.9 = 010616
WRT.CH  027156
WRT.CS  021712
WRT.DA  022246
WRT.DS  025214
WRT.D1  024020
WRT.D2  024332
WRT.D3  024644
WRT.EE  023756
WRT.EL  023714
WRT.ER  022070
WRT.E1  023010
WRT.E2  023216
WRT.MR  022424
WRT.PA  022602
WRT.PD  023450
WRT.RE  025324
WRT.TR  027426
WT.DAT  015350
```

W.C.SI	015344	$T11	036302	$T25	053472	$T39	072046	$T52	103216
W.ERR =	005722	$T12	036524	$T26	054304	$T4	031702	$T53	104034
XOR.LN	021072	$T13	037102	$T27	055502	$T40	072474	$T54	104674
X$ALWA=	000000	$T14	040244	$T28	056260	$T41	073452	$T55	105736
X$FALS=	000040	$T15	041476	$T29	057244	$T42	074532	$T56	106626
X$OFFS=	000400	$T16	042730	$T3	031474	$T43	075340	$T57	107756
X$TRUE=	000020	$T17	043572	$T30	060356	$T44	076270	$T58	111250
$END.L	113564 G	$T18	045060	$T31	061152	$T45	076520	$T59	111654
$PATCH	003452 G	$T19	045274	$T32	062550	$T46	076704	$T6	033022
$SAVE2	004540 G	$T2	031150	$T33	064306	$T47	077402	$T60	112322
$SAVE3	004554 G	$T20	046444	$T34	065320	$T48	077674	$T61	112674
$SAVE4	004572 G	$T21	047444	$T35	066302	$T49	100654	$T7	033512
$SAVE5	004612 G	$T22	051212	$T36	066760	$T5	032352	$T8	034370
$T1	030724	$T23	051740	$T37	070044	$T50	101412	$T9	035404
$T10	035640	$T24	052276	$T38	070772	$T51	102030		

```
. ABS.  113566    000
        000000    001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  35594 WORDS  ( 140 PAGES)
DYNAMIC MEMORY:  21558 WORDS  ( 82 PAGES)
ELAPSED TIME:  00:16:01
ML11,ML11/-SP/CR:SYM=SVC/ML,CZMLAD.DOC,ML2AD,OTS,ML3AD,ML4AD
```

```
ML11        CREATED BY  MACRO  ON 30-MAR-82 AT 11:24      PAGE 1
SYMBOL  CROSS REFERENCE                                   CREF                                                              SEQ 0550
SYMBOL   VALUE             REFERENCES
ADR      = 000020   G      #94-2561
ARR.DA   = 013012          #98-2777    224-8947    230-9210    235-9514    243-9909    289-12284   290-12353   292-12438   336-14770
                            342-15047   348-15402   349-15426   349-15450   350-15474   350-15494   361-16098   418-19076   424-19406
                            447-20681   551-25985
ARR.IN     014004          #88-2240   *205-8023   *205-8043    307-13243   308-13292   308-13294   359-15984   369-16514   369-16523
                            388-17530   389-17548   391-17695   392-17713   440-20280   440-20284
ARR.16     014016          #89-2251   *205-8008   *205-8024   *205-8044    308-13293
ASSEMB   = 000010           6-13        6-13
ASYNC    = 012706          #98-2775    216-8527    220-8730    224-8929    229-9188    235-9494    236-9556    243-9900    249-10237
                            250-10261   250-10281   253-10418   256-10574   256-10590   257-10610   261-10817   261-10832   262-10853
                            262-10870   262-10886   263-10924   263-10943   264-10971   268-11190   269-11209   269-11226   269-11243
                            269-11259   270-11297   270-11316   271-11344   275-11587   276-11606   276-11623   276-11640   277-11660
                            277-11694   278-11717   278-11741   282-11937   283-11957   283-11975   283-11991   284-12012   284-12029
                            295-12602   299-12830   300-12851   300-12869   301-12905   301-12938   302-12984   306-13191   306-13207
                            307-13228   307-13261   308-13311   316-13715   316-13729   316-13742   316-13758   317-13778   318-13835
                            318-13855   319-13912   320-13958   324-14134   324-14156   325-14184   329-14369   355-15775   374-16800
                            383-17250   393-17797   441-20351   458-21211   459-21237   459-21275   460-21301   460-21316   463-21466
                            528-24795   536-25244   547-25801   557-26344   558-26382   558-26394
A.CAL      015362          #89-2268    108-3283   *108-3284   *108-3285    111-3408   *483-22547   484-22582  *488-22798   489-22828
A.GEN      015370          #89-2271    111-3384    111-3408   *483-22544   484-22575  *488-22795   488-22817
BB.BB.   = 006334          #95-2592    558-26396
BB.INI   = 006242          #95-2591    558-26384
BB.VV.   = 006150          #95-2590    557-26346
BIT0     = 000001   G      #94-2545
BIT00    = 000001   G      #94-2535
BIT01    = 000002   G      #94-2534
BIT02    = 000004   G      #94-2533
BIT03    = 000010   G      #94-2532
BIT04    = 000020   G      #94-2531
BIT05    = 000040   G      #94-2530
BIT06    = 000100   G      #94-2529
BIT07    = 000200   G      #94-2528
BIT08    = 000400   G      #94-2527
BIT09    = 001000   G      #93-2522
BIT1     = 000002   G      #94-2544
BIT10    = 002000   G      #93-2521
BIT11    = 004000   G      #93-2520
BIT12    = 010000   G      #93-2519
BIT13    = 020000   G      #93-2518
BIT14    = 040000   G      #93-2517
BIT15    = 100000   G      #93-2516
BIT2     = 000004   G      #94-2543
BIT3     = 000010   G      #94-2542
BIT4     = 000020   G      #94-2541
BIT5     = 000040   G      #94-2540
BIT6     = 000100   G      #94-2539
BIT7     = 000200   G      #94-2538
BIT8     = 000400   G      #94-2537
BIT9     = 001000   G      #94-2536
BL$DIV     004446   G      #35-1170    112-3480    514-24072   520-24397   562-26560
BL$GT1     003512   G      #11-169     424-19395   562-26559
BL$GT2     003634   G      #16-384     104-3098    108-3255    113-3506    299-12824   301-12899   302-12978   334-14654   336-14740
```

```
SYMBOL   VALUE           REFERENCES
                          348-15353  361-16070  368-16472  374-16773  380-17106  382-17223  389-17573  392-17737  399-18095
                          406-18446  417-19045  418-19058  447-20663  478-22282  514-24096  521-24447  562-26558
BL$LAS      113556  G    #561-26522  561-26523  561-26527
BL$MOD      004460  G    #36-1201    113-3488   514-24111  520-24401  562-26560
BL$MUL      004222  G    #32-1022    526-24705  562-26560
BL$PU1      003776  G    #21-592     483-22532  562-26559
BL$PU2      004072  G    #27-829     111-3383   111-3392   111-3401   301-12932  418-19097  515-24128  521-24418  562-26559
BL$SHF      004472  G     11-181     11-184     11-188     11-192     12-217     17-406     17-409     17-413     17-417
                          17-438     21-595     21-599     21-605     22-632     27-838     27-842     27-848     28-880
                         #37-1236
BOE       = 000400  G    #94-2565
B.CAL       015364       #89-2269    108-3289  *108-3290  *108-3291   111-3410  *483-22548  484-22583 *488-22799  489-22829
B.GEN       015372       #89-2272    111-3393   111-3410  *483-22545  484-22576 *488-22796  488-22818
CAL.CR      017042       #107-3224   483-22550  488-22801
CHIP.S      014012       #89-2248   *205-8022  *205-8042   551-25998
C$AU      = 000052       #6-13
C$AUTO    = 000061       #6-13
C$BRK     = 000022       #6-13
C$BSEG    = 000004       #6-13
C$BSUB    = 000002       #6-13
C$CEFG    = 000045       #6-13
C$CLCK    = 000062       #6-13
C$CLEA    = 000012       #6-13
C$CLOS    = 000035       #6-13
C$CLP1    = 000006       #6-13
C$CVEC    = 000036       #6-13
C$DCLN    = 000044       #6-13
C$DODU    = 000051       #6-13
C$DRPT    = 000024       #6-13
C$DU      = 000053       #6-13
C$EDIT    = 000003       #6-13
C$ERDF    = 000055       #6-13
C$ERHR    = 000056       #6-13
C$ERRO    = 000060       #6-13
C$ERSF    = 000054       #6-13
C$ERSO    = 000057       #6-13
C$ESCA    = 000010       #6-13
C$ESEG    = 000005       #6-13
C$ESUB    = 000003       #6-13
C$ETST    = 000001       #6-13
C$EXIT    = 000032       #6-13
C$GETB    = 000026       #6-13
C$GETW    = 000027       #6-13
C$GMAN    = 000043       #6-13
C$GPHR    = 000042       #6-13
C$GPLO    = 000030       #6-13
C$GPRI    = 000040       #6-13
C$INIT    = 000011       #6-13
C$INLP    = 000020       #6-13
C$MANI    = 000050       #6-13
C$MEM     = 000031       #6-13
C$MSG     = 000023       #6-13
```

```
SYMBOL  VALUE                REFERENCES
C$OPEN  = 000034             #6-13
C$PNTB  = 000014             #6-13
C$PNTF  = 000017             #6-13
C$PNTS  = 000016             #6-13
C$PNTX  = 000015             #6-13
C$QIO   = 000377             #6-13
C$RDBU  = 000007             #6-13
C$REFG  = 000047             #6-13
C$RESE  = 000033             #6-13       #6-13
C$REVI  = 000003             #6-13        6-65
C$RFLA  = 000021             #6-13
C$RPT   = 000025             #6-13
C$SEFG  = 000046             #6-13
C$SPRI  = 000041             #6-13
C$SVEC  = 000037             #6-13
C$TPRI  = 000013             #6-13
DATA.L  = 013154             #98-2780
DAT.DM    016412             #101-2946   103-3054    348-15380   373-16711   373-16732   397-18014   398-18054   404-18369   405-18405
                              417-19006  446-20582   446-20619   514-24074   521-24425
DFPTBL    002360   G         #6-119
DIAGMC  = 000000              6-13        6-13
DIVMOD    004264             #33-1091     35-1171     36-1202
DRIVE.    015354             #89-2262    *205-8019   *205-8039    236-9552    236-9565
DROP.C    015402             #89-2276    *203-7936   *204-7972   *204-7976    204-7979
DT.1      015764             #93-2485     526-24707   526-24709   527-24731   529-24840
DUMPER    026302   G         #191-7313    196-7603    196-7622    199-7727    199-7744    209-8208    212-8370    216-8528    219-8672
                              220-8731    224-8930    224-8939    224-8948    229-9189    229-9198    230-9211    235-9495    235-9506
                              235-9515    236-9557    243-9901    243-9910    249-10238   250-10262   250-10282   253-10419   256-10575
                              256-10591   257-10611   261-10818   262-10837   262-10854   262-10871   262-10887   263-10925   263-10930
                              263-10944   264-10972   264-10977   268-11191   269-11210   269-11227   269-11244   269-11260   270-11298
                              270-11303   271-11321   271-11345   271-11350   271-11371   275-11588   276-11607   276-11624   276-11641
                              277-11661   277-11695   277-11700   278-11718   278-11742   278-11747   279-11772   282-11938   283-11958
                              283-11976   283-11992   284-12013   284-12030   289-12285   290-12354   292-12439   295-12603   300-12835
                              300-12852   300-12870   301-12906   301-12939   302-12985   306-13192   306-13208   307-13229   307-13262
                              308-13312   316-13716   316-13730   316-13743   316-13759   317-13779   318-13836   318-13856   319-13913
                              320-13959   324-14135   324-14157   325-14185   329-14370   329-14385   335-14698   336-14771   342-15048
                              348-15403   349-15427   349-15451   350-15475   350-15495   355-15776   361-16099   369-16529   374-16801
                              380-17130   383-17251   391-17675   393-17798   399-18128   400-18154   406-18465   411-18690   418-19077
                              424-19407   430-19713   430-19748   431-19790   435-20024   440-20290   441-20352   447-20682   453-20951
                              453-20976   454-20999   458-21212   459-21238   459-21276   460-21302   460-21317   463-21467   466-21590
                              469-21764   469-21799   472-21966   479-22306   484-22566   488-22808   494-23084   495-23114   496-23186
                              496-23215   502-23487   503-23518   508-23792   509-23823   515-24170   522-24481   528-24796   528-24811
                              529-24866   535-25185   536-25245   538-25354   542-25558   547-25797   547-25802   551-25986   557-26345
                              558-26383   558-26395
D1.TEM  = 013374             #98-2785    *104-3082   *355-15744  *360-16052   367-16403  *368-16457  *374-16759  *380-17092  *382-17209
                             *398-18077  *405-18428  *417-19028  *447-20649  *478-22274  *515-24129   515-24135  *520-24392   521-24422
D2.TEM  = 013376             #98-2786    *104-3083   *355-15745  *361-16057   367-16404  *368-16458  *374-16760  *380-17093  *382-17210
                             *398-18078  *406-18433  *417-19029  *447-20650  *478-22275  *515-24130   515-24136  *520-24393   521-24423
EF.CON  = 000036   G         #94-2548
EF.NEW  = 000035   G         #94-2549
EF.PWR  = 000034   G         #94-2550
EF.RES  = 000037   G         #94-2547
```

```
SYMBOL    VALUE              REFERENCES
EF.STA   = 000040   G        #94-2546
EIG.FM   = 010364            #95-2626
ELV.FM   = 010466            #95-2629
ERRBLK     002160   G        #6-96
ERRMSG     002156   G        #6-96
ERRNBR     002154   G        #6-96
ERRTHR     002402   G        #6-161      93-2513    205-8011
ERRTYP     002152   G        #6-96
ERR.CH     017442            #110-3367   484-22555  488-22802
EVL      = 000004   G        #94-2559
E$END    = 002100            #6-13
E$LOAD   = 000035            #6-13       6-65
E2.TEM   = 013400            #98-2787   *104-3084  *355-15746 *361-16058  367-16405 *368-16459 *374-16761 *380-17094 *382-17211
                            *398-18079 *406-18434 *417-19030 *447-20651 *478-22276 *515-24131  515-24137 *520-24372 *520-24373
                              521-24424
FIND.C     017660            #112-3475   494-23072  496-23176
FIRST.     020262            #120-3807   261-10811  268-11184  275-11581  323-14119  341-14976  354-15696  354-15718  381-17164
FIV.FM   = 010304            #95-2623    212-8376   236-9525   256-10581  257-10601  257-10617  261-10824  262-10843  262-10860
                              262-10877  263-10897  263-10936  264-10954  264-10983  268-11197  269-11216  269-11233  269-11250
                              270-11270  270-11309  271-11327  271-11356  275-11594  276-11613  276-11630  276-11647  277-11667
                              277-11706  278-11724  278-11753  283-11949  283-11964  283-11982  284-12003  284-12020  292-12445
                              300-12858  301-12912  302-12949  306-13198  306-13215  307-13235  307-13268  308-13318  316-13749
                              317-13769  317-13785  324-14141  324-14163  325-14191  355-15782  375-16811  406-18471  435-20030
                              440-20296  454-21005  460-21308  463-21473  497-23225  503-23524  509-23829
FMT.1    = 006442            #95-2593    220-8741   528-24821  538-25364  542-25572  547-25815
FMT.10   = 007116            #95-2602    335-14711
FMT.11   = 007170            #95-2603    213-8385
FMT.12   = 007224            #95-2604    324-14146  324-14168  325-14196
FMT.13   = 007254            #95-2605    337-14807
FMT.14   = 007330            #95-2606    393-17809
FMT.15   = 007370            #95-2607    431-19764
FMT.16   = 007436            #95-2608    225-8970   230-9229   236-9532   243-9925   289-12303  291-12376  292-12452  319-13922
FMT.17   = 007526            #95-2609    206-8073
FMT.18   = 007562            #95-2610
FMT.19   = 007632            #95-2611    484-22577  489-22823  529-24842
FMT.2    = 006506            #95-2594    219-8690   236-9566   253-10435  342-15067  411-18709  436-20045  537-25263
FMT.20   = 007702            #95-2612    484-22584  489-22830
FMT.21   = 007754            #95-2613    494-23094  495-23125  496-23196  497-23231  502-23498  503-23530  508-23803  509-23835
FMT.22   = 010026            #95-2614    516-24184  522-24491
FMT.23   = 010072            #95-2615    192-7383
FMT.24   = 010142            #95-2616    192-7390   192-7397   192-7404   193-7415   193-7422   193-7429   193-7436   193-7443
                              193-7450   193-7457   193-7464   194-7475   194-7483   194-7492   194-7499
FMT.25   = 010166            #95-2617    246-10078
FMT.26   = 010206            #95-2618    246-10088
FMT.3    = 006574            #95-2595
FMT.4    = 006620            #95-2596    295-12613
FMT.5    = 006650            #95-2597    406-18478  430-19728  431-19771  431-19805  479-22325
FMT.6    = 006752            #95-2598    448-20695
FMT.7    = 007002            #95-2599    302-12997  350-15511  458-21221  459-21247  460-21289
FMT.8    = 007030            #95-2600    551-26008  551-26019
FMT.9    = 007064            #95-2601    308-13277  308-13323  361-16108  441-20363  551-25994
FNC.1    = 012150            #97-2728    253-10421
```

```
SYMBOL   VALUE             REFERENCES
FNC.10   = 012272          #97-2737    306-13194   306-13210   307-13231   307-13264   308-13314
FNC.11   = 012302          #97-2738    306-13211   316-13731   316-13745   316-13761   317-13781
FNC.12   = 012322          #97-2739    324-14137   324-14159   325-14187
FNC.13   = 012334          #97-2740    381-17143   440-20295   453-20954   453-20979   454-21000
FNC.14   = 012344          #97-2741    355-15777
FNC.15   = 012360          #97-2742    369-16530   391-17680   440-20300
FNC.16   = 012372          #97-2743    374-16803
FNC.17   = 012404          #97-2744    391-17678   393-17801   440-20294   441-20356
FNC.18   = 012414          #97-2745    418-19083   424-19413
FNC.19   = 012426          #97-2746    466-21591
FNC.2    = 012164          #97-2729    256-10577   257-10597   257-10613   300-12872   301-12908
FNC.21   = 012440          #98-2751    335-14704
FNC.22   = 012452          #98-2752    380-17131
FNC.23   = 012464          #98-2753    209-8210    235-9517    292-12441
FNC.3    = 012172          #97-2730    219-8676    220-8734    283-11945   283-11995   284-12016   284-12036   468-21734   472-21967
FNC.4    = 012200          #97-2731    261-10820   262-10873   263-10893   263-10932   264-10950   264-10979   473-21976
FNC.5    = 012216          #97-2732    224-8952    230-9215    268-11193   269-11246   270-11266   270-11305   271-11323   271-11352
                            272-11377   289-12289   290-12358   399-18130   400-18156   406-18466   418-19079   430-19715   430-19750
                            431-19792   472-21969
FNC.6    = 012226          #97-2733    212-8371    224-8951    230-9214    275-11590   276-11643   277-11663   277-11702   278-11720
                            278-11749   279-11774   289-12288   290-12357   335-14699   411-18692   424-19409   435-20028   472-21968
FNC.7    = 012234          #97-2734    283-11944   283-11994   284-12015   284-12035   529-24868
FNC.8    = 012244          #97-2735    295-12604   295-12607   300-12836   300-12853
FNC.9    = 012260          #97-2736
FORCE.     020032          #115-3603   494-23065   495-23163   502-23469   508-23770
FOR.EC     020210          #118-3748   535-25173   536-25216   537-25284   538-25330   546-25747
FOR.FM   = 010270          #95-2622    295-12608   300-12840   300-12876   329-14375   329-14390   337-14794   342-15053   393-17803
                            441-20357   453-20956   453-20981   460-21322   466-21595   469-21769   470-21808   479-22311   495-23119
                            502-23492   508-23797   528-24801   529-24871   542-25563
F$AU     = 000015          #6-13
F$AUTO   = 000020          #6-13
F$BGN    = 000040          #6-13       6-39        7-229       7-277       7-316       7-348
F$CLEA   = 000007          #6-13
F$DU     = 000016          #6-13
F$END    = 000041          #6-13       6-13        6-13        6-13        6-13        6-13        6-13        6-13        6-13
                            6-13        6-13        6-13        6-13        6-13        6-13        6-13        6-13        6-39
                            7-250       7-295       7-348
F$HARD   = 000004          #6-13       7-229       7-250
F$HW     = 000013          #6-13       6-119       6-139
F$INIT   = 000006          #6-13
F$JMP    = 000050          #6-13
F$MOD    = 000000          #6-13       6-39        7-348
F$MSG    = 000011          #6-13
F$PROT   = 000021          #6-13       7-316       7-322
F$PWR    = 000017          #6-13
F$RPT    = 000012          #6-13
F$SEG    = 000003          #6-13
F$SOFT   = 000005          #6-13       7-277       7-295
F$SRV    = 000010          #6-13
F$SUB    = 000002          #6-13
F$SW     = 000014          #6-13       6-150       6-165
F$TEST   = 000001          #6-13
```

```
SYMBOL   VALUE           REFERENCES
GD.BLK     020312        #121-3858   398-18041  405-18396  410-18653  411-18674  416-18989  423-19351  423-19368  429-19683
                          435-19990  435-20007  446-20607  452-20903  452-20925  469-21755  469-21790  470-21817  472-21947
                          472-21957  477-22237  477-22242  483-22540  488-22791  493-23038  494-23066  495-23164  501-23421
                          502-23470  507-23722  508-23775  513-24052  515-24154  520-24387  521-24461  527-24735  541-25522
                          542-25537  546-25750  546-25761
GOOD.B     014006        #88-2241    101-2948   121-3860  *205-8007  *369-16507
G$CNTO   = 000200        #6-13
G$DELM   = 000372        #6-13
G$DISP   = 000003        #6-13
G$EXCP   = 000400        #6-13
G$HILI   = 000002        #6-13
G$LOLI   = 000001        #6-13
G$NO     = 000000        #6-13
G$OFFS   = 000400        #6-13       7-242      7-243      7-244      7-245      7-246      7-247      7-248      7-288
                          7-289      7-290      7-291      7-292
G$OFSI   = 000376        #6-13       7-242      7-243      7-244      7-245      7-246      7-247      7-248      7-288
                          7-289      7-290      7-291      7-292
G$PRMA   = 000001        #6-13       7-242
G$PRMD   = 000002        #6-13       7-243      7-244      7-245      7-247
G$PRML   = 000000        #6-13       7-246      7-248      7-288      7-289      7-290      7-291      7-292
G$RADA   = 000140        #6-13
G$RADB   = 000000        #6-13
G$RADD   = 000040        #6-13       7-245
G$RADL   = 000120        #6-13       7-246      7-248      7-288      7-289      7-290      7-291      7-292
G$RADO   = 000020        #6-13       7-242      7-243      7-244      7-247
G$XFER   = 000004        #6-13
G$YES    = 000010        #6-13       7-242      7-243      7-244      7-245      7-246      7-247      7-248      7-288
                          7-289      7-290      7-291      7-292
HELP     = 000000        #6-4        6-8        6-30       6-48       6-67       6-105      6-121      6-152     #7-170
                          7-231      7-252      7-279      7-298      7-324      7-341      7-351
HOE      = 100000  G     #94-2572
HW.OR.     013402        #88-2234   *341-14991  342-15035
IBE      = 010000  G     #94-2569
IDU      = 000040  G     #94-2562
IER      = 020000  G     #94-2570
INTER    = 013114        #98-2779    196-7602   196-7621   199-7726   199-7743   219-8671   271-11370  279-11771  335-14697
                          369-16528  380-17129  391-17674  400-18153  440-20289
INTERV     002410  G     #6-164      93-2512    315-13690  556-26269
IO.BUF     014022        #89-2253    101-2949   113-3492  *113-3493   120-3810   121-3861   122-3911  *317-13795  317-13803
                         *320-13938  320-13945  360-16004  360-16028  366-16376  367-16429  389-17547  392-17712 *398-18039
                         *405-18395 *410-18652 *411-18670  411-18681  416-18945  422-19309 *423-19359  424-19389 *429-19677
                         *429-19678 *434-19980 *434-19981 *435-19998  435-20015 *439-20242  439-20255  440-20268 *440-20316
                          441-20323 *441-20334  441-20339 *445-20568 *445-20572 *445-20573 *445-20574 *452-20902 *452-20917
                          453-20943  453-20968  458-21199  463-21457  465-21576 *469-21752 *469-21774 *470-21816 *472-21946
                         *483-22511 *483-22534 *484-22597 *488-22787 *493-23037 *494-23059  494-23102 *495-23157  496-23207
                         *501-23420 *502-23463  502-23506 *507-23721 *508-23764  508-23811 *513-24043  515-24162 *520-24383
                          522-24473  535-25176  536-25230  537-25286  538-25332 *541-25521 *546-25749  550-25969 *556-26282
                          556-26290  558-26365
ISR      = 000100  G     #94-2563
IXE      = 004000  G     #94-2568
I$AU     = 000041        #6-13
I$AUTO   = 000041        #6-13
```

```
SYMBOL   VALUE            REFERENCES
I$CLN    = 000041         #6-13
I$DU     = 000041         #6-13
I$HRD    = 000041         #7-229     #7-250
I$INIT   = 000041         #6-13
I$MOD    = 000041         #6-13       6-39      #6-39       7-348     #7-348
I$MSG    = 000041         #6-13
I$PROT   = 000040         #6-13      #7-316
I$PTAB   = 000041         #6-13
I$PWR    = 000041         #6-13
I$RPT    = 000041         #6-13
I$SEG    = 000041         #6-13
I$SETU   = 000041         #6-13
I$SFT    = 000041         #7-277     #7-295
I$SRV    = 000041         #6-13
I$SUB    = 000041         #6-13
I$TST    = 000041         #6-13
J$JMP    = 000167         #6-13
LAST.B     020344         #122-3908   379-17042   379-17064   381-17182   459-21265
LAU        004704         #44-188     44-206
LAUTO      004660         #42-87      42-105
LCLEAN     113536         #560-26478  561-26502
LDU        004672         #43-136     43-154
LD.LNG     021354         #133-4443   367-16398   515-24134   521-24421
LIMIT      015400         #89-2275   *205-8013   *205-8015    212-8365    224-8919    229-9178    235-9480    242-9886    289-12278
                           290-12347   292-12432   307-13257   308-13307   324-14130   324-14152   324-14176   335-14693   342-15043
                           348-15398   349-15422   349-15446   350-15470   350-15490   406-18458   411-18685   418-19070   424-19402
                           430-19708   430-19743   431-19785   447-20675   453-20946   453-20971   458-21207   459-21233   463-21462
                           478-22295   484-22559   494-23077   494-23105   496-23181   496-23210   502-23480   502-23509   508-23785
                           509-23818   515-24165   522-24476   536-25238   538-25347   551-25981
LINIT      027650         #203-7927   206-8101
LOAD.S     016034         #98-2795    104-3111
LOE      = 040000   G     #94-2571
LOT      = 000010   G     #94-2560
LRPT       004646         #41-34      41-52
LST.AR     014020         #89-2252   *205-8009   *205-8029   *205-8030   *206-8055   *206-8056    307-13242   308-13291   359-15983
                           369-16513   369-16522   440-20279   440-20283   535-25200
LST.BL     014014         #89-2250    122-3910   *205-8010   *205-8035   *205-8036   *205-8037   *206-8063   *206-8064   *206-8065
                           317-13807   320-13952   381-17151   458-21185   459-21269   460-21288   463-21447   465-21577   535-25174
                           536-25223   537-25287   537-25304   538-25327   550-25958   557-26298   558-26376
LST.DU     015356         #89-2264    194-7487   *206-8069   *206-8071    212-8338
L$ACP      002110   G     #6-65
L$APT      002036   G     #6-65
L$AU       004706   G      6-65      #44-206
L$AUT      002070   G     #6-65
L$AUTO     004662   G      6-65      #42-105
L$CCP      002106   G     #6-65
L$CLEA     113546   G      6-65      #560-26497
L$CO       002032   G     #6-65
L$DEPO     002011   G     #6-65
L$DESC     002130   G      6-65      #6-87
L$DESP     002076   G     #6-65
L$DEVP     002060   G     #6-65
```

```
SYMBOL   VALUE            REFERENCES
L$DISP    002164  G        6-65      #6-103
L$DLY     002116  G       #6-65      103-3031    103-3058    103-3071    209-8196    212-8355    216-8516    220-8711    256-10563
                          263-10904  270-11277   277-11674   282-11926   328-14354   334-14633   341-14982   341-15006   341-15019
                          354-15701  354-15722   355-15737   360-16010   360-16033   360-16045   367-16410   367-16433   368-16450
                          373-16716  373-16736   374-16752   379-17047   379-17068   380-17085   381-17186   382-17202   389-17553
                          392-17718  397-18019   398-18058   398-18070   405-18378   405-18409   405-18421   417-19010   417-19021
                          446-20587  446-20623   447-20642   478-22251   478-22267   514-24078   515-24141   521-24429   557-26316
                          557-26333
L$DTP     002040  G       #6-65
L$DTYP    002034  G       #6-65
L$DU      004674  G        6-65      #43-154
L$DUT     002072  G       #6-65
L$DVTY    002122  G        6-65      #6-80
L$EF      002052  G       #6-65
L$ENVI    002044  G       #6-65
L$ERRT    002152  G        6-65      #6-96
L$ETP     002102  G       #6-65
L$EXP1    002046  G       #6-65
L$EXP4    002064  G       #6-65
L$EXP5    002066  G       #6-65
L$HARD    002414  G        6-65       7-229      #7-229
L$HIME    002120  G       #6-65
L$HPCP    002016  G       #6-65
L$HPTP    002022  G       #6-65
L$HW      002360  G        6-65       6-119      #6-119
L$ICP     002104  G       #6-65
L$INIT    030714  G        6-65      #206-8101
L$LADP    002026  G       #6-65
L$LAST  = 113562  G        6-65      #561-26527
L$LOAD    002100  G       #6-65
L$LUN     002074  G       #6-65
L$MREV    002050  G       #6-65
L$NAME    002000  G       #6-65
L$PRIO    002042  G       #6-65
L$PROT    003444  G        6-65      #7-316
L$PRT     002112  G       #6-65
L$REPP    002062  G       #6-65
L$REV     002010  G       #6-65
L$RPT     004650  G        6-65      #41-52
L$SOFT    003122  G        6-65       7-277      #7-277
L$SPC     002056  G       #6-65
L$SPCP    002020  G       #6-65
L$SPTP    002024  G       #6-65
L$STA     002030  G       #6-65
L$SW      002400  G        6-65       6-150      #6-150
L$TEST    002114  G       #6-65
L$TIML    002014  G       #6-65
L$UNIT    002012  G       #6-65       203-7920    204-7942    204-7987
L10000    002376           6-119     #6-139
L10001    002412           6-150     #6-165
L10002    002510           7-229     #7-250
L10003    003160           7-277     #7-295
```

```
SYMBOL   VALUE       REFERENCES
MB.DIS   = 005570    #95-2585   319-13914
MEM.AR   = 013052    #98-2778
ML.DUT     016032    #93-2509   103-3049   104-3120   169-6292   170-6317   173-6482   174-6507   178-6695   179-6723
                      196-7586   199-7713  *205-8002   206-8078   209-8188   212-8348   216-8509   219-8661   219-8665
                      219-8667   219-8683   219-8689   220-8702   220-8721   220-8726   220-8740   223-8898   229-9161
                      234-9446   235-9468   240-9769   249-10227  250-10252  250-10272  253-10401  256-10556  261-10806
                      263-10916  264-10963  268-11179  270-11289  271-11336  275-11576  277-11686  278-11733  282-11918
                      289-12261  290-12330  291-12403  295-12587  299-12806  299-12813  299-12820  300-12884  301-12895
                      301-12921  301-12928  302-12963  302-12967  302-12974  306-13181  307-13248  308-13298  315-13700
                      317-13811  323-14114  328-14336  333-14606  340-14966  341-14997  347-15328  354-15688  354-15713
                      359-15991  360-16022  366-16369  367-16422  373-16702  373-16728  379-17033  379-17059  381-17158
                      381-17177  389-17539  392-17705  397-18006  398-18035  398-18047  404-18362  405-18390  405-18401
                      410-18647  411-18663  416-18985  417-18998  422-19299  423-19364  423-19373  429-19668  434-19971
                      435-20003  439-20247  440-20310  441-20329  445-20560  446-20599  446-20612  452-20897  452-20910
                      458-21193  459-21260  463-21451  465-21571  468-21743  469-21785  472-21941  472-21952  477-22206
                      483-22536  487-22762  493-23047  495-23149  501-23452  507-23753  513-24048  513-24057  515-24150
                      520-24376  521-24457  526-24695  529-24857  535-25165  536-25208  537-25276  538-25320  538-25339
                      541-25512  542-25533  546-25739  546-25757  550-25963  556-26278  557-26301
ML.LUN     016030    #93-2508   196-7609   197-7632   199-7733   199-7750  *203-7935  *204-7941   204-7942   204-7945
                      204-7981  *204-7985  *204-7986   204-7987   204-7990   206-8072   209-8223   213-8399   216-8541
                      225-8989   230-9253   236-9573   243-9948   264-10995  272-11389  279-11786  292-12472  337-14819
                      342-15082  356-15790  362-16124  369-16537  375-16815  400-18144  407-18501  412-18727  419-19120
                      424-19437  432-19835  436-20060  441-20367  448-20721  479-22343  485-22612  489-22844
ML.REG     015404    #89-2278   101-2947   101-2948   101-2949   101-2950   103-3048   103-3051   103-3052   103-3055
                      103-3067   103-3068   104-3082   104-3083   104-3084   104-3119   104-3122   104-3123   115-3620
                      115-3631   115-3634   115-3635   118-3749   118-3757   118-3758   120-3808   120-3809   120-3810
                      120-3811   121-3859   121-3860   121-3861   121-3862   122-3909   122-3910   122-3911   122-3912
                      135-4569   135-4571   135-4572   135-4574   137-4668   137-4670   137-4671   137-4674   137-4675
                      138-4728   138-4730   138-4731   138-4733   140-4828   140-4830   140-4831   140-4834   140-4835
                      141-4888   141-4890   141-4891   141-4893   143-4987   143-4989   143-4990   143-4993   143-4994
                      144-5047   144-5049   144-5050   144-5052   146-5147   146-5149   146-5150   146-5153   146-5154
                      147-5200   147-5206   147-5208   147-5209   147-5211   147-5212   149-5302   149-5308   149-5310
                      149-5311   149-5314   149-5315   149-5320   150-5362   150-5368   150-5370   150-5371   150-5373
                      150-5374   152-5464   152-5470   152-5472   152-5473   152-5476   152-5477   152-5482   153-5537
                     *153-5538   153-5544   153-5546   153-5547   154-5553  *154-5554   154-5555   156-5649  *156-5650
                      156-5656   156-5658   156-5659   156-5662   156-5663  *156-5668   156-5669   157-5724   157-5725
                      157-5731   157-5733   158-5738   158-5740   158-5741   158-5742   158-5743   160-5837   160-5838
                      160-5844   160-5846   160-5847   160-5850   160-5851   160-5856   160-5857   163-5990   166-6125
                      167-6170   167-6176   167-6178   167-6179   167-6181   167-6182   169-6285   169-6286   169-6287
                      169-6288   169-6291   169-6294   169-6295   169-6296   169-6302   169-6304   170-6309   170-6312
                      170-6316   170-6319   170-6320   171-6362   171-6368   171-6370   171-6371   171-6373   171-6374
                      173-6475   173-6476   173-6477   173-6478   173-6481   173-6484   173-6485   173-6486   173-6492
                      173-6494   173-6495   174-6502   174-6506   174-6509   174-6510   175-6566  *175-6567   175-6573
                      175-6575   175-6576   176-6582  *176-6583   176-6584  *178-6687   178-6688   178-6689   178-6690
                      178-6691   178-6694   178-6697   178-6698   178-6699   178-6705   179-6711   179-6712   179-6715
                      179-6716  *179-6721   179-6722   179-6725   179-6726   182-6869   182-6871   182-6872   182-6875
                      182-6876   192-7387   192-7388   192-7394   192-7395   192-7401   192-7402   192-7408   192-7409
                      193-7419   193-7420   193-7426   193-7427   193-7433   193-7434   193-7440   193-7441   193-7447
                      193-7448   193-7454   193-7455   193-7461   193-7462   194-7472   194-7473   194-7480   194-7481
                      194-7489   194-7490   194-7496   194-7497   196-7585   196-7588   196-7589   196-7590   196-7591
                      196-7592   196-7593   196-7594   196-7595   196-7596   196-7598   196-7613   196-7615   196-7617
                      199-7712   199-7715   199-7716   199-7717   199-7718   199-7719   199-7720   199-7721   199-7722
```

SYMBOL VALUE REFERENCES

199-7737	199-7739	*204-7963	206-8077	206-8080	206-8081	209-8187	209-8190	209-8191
209-8192	209-8193	209-8203	212-8347	212-8350	212-8351	212-8352	212-8362	213-6384
216-8508	216-8511	216-8512	216-8513	216-8523	219-8660	219-8663	219-8664	219-8665
219-8666	220-8706	220-8707	220-8708	220-8723	220-8724	220-8725	223-8897	223-8900
224-8905	225-8969	229-9160	229-9163	229-9164	230-9228	*234-9439	234-9445	234-9448
234-9449	234-9460	234-9461	234-9463	235-9470	235-9471	236-9531	*236-9551	236-9552
240-9768	240-9771	240-9772	243-9924	246-10050	246-10057	246-10060	246-10066	246-10076
249-10226	249-10229	249-10230	249-10231	249-10232	249-10233	250-10251	250-10254	250-10255
250-10256	250-10257	250-10271	250-10274	250-10275	250-10276	250-10277	252-10396	253-10403
253-10404	253-10407	253-10426	256-10555	256-10558	256-10559	256-10560	256-10570	256-10586
257-10606	261-10805	261-10808	261-10809	261-10812	261-10813	261-10828	262-10849	262-10866
262-10882	263-10911	263-10913	263-10915	263-10918	263-10919	263-10920	264-10960	264-10962
264-10965	264-10966	264-10967	268-11178	268-11181	268-11182	268-11185	268-11186	268-11201
269-11222	269-11239	269-11255	270-11284	270-11286	270-11288	270-11291	270-11292	270-11293
271-11333	271-11335	271-11338	271-11339	271-11340	271-11366	275-11575	275-11578	275-11579
275-11582	275-11583	276-11602	276-11619	276-11636	277-11656	277-11681	277-11683	277-11685
277-11688	277-11689	277-11690	278-11730	278-11732	278-11735	278-11736	278-11737	279-11767
282-11917	282-11920	282-11921	282-11922	282-11923	282-11933	283-11953	283-11971	283-11987
284-12008	284-12025	289-12260	289-12263	289-12264	289-12302	290-12329	290-12332	290-12333
291-12375	291-12402	291-12405	291-12406	291-12417	291-12418	292-12451	295-12586	295-12589
295-12590	295-12597	295-12598	299-12805	299-12808	299-12809	299-12810	299-12811	299-12812
300-12847	300-12864	300-12865	300-12883	301-12918	301-12919	301-12933	301-12934	302-12959
302-12960	302-12965	302-12966	306-13180	306-13183	306-13184	306-13185	306-13186	306-13187
306-13203	307-13224	307-13247	307-13250	307-13251	307-13252	307-13253	307-13254	308-13297
308-13300	308-13301	308-13302	308-13303	308-13304	315-13699	315-13702	315-13703	315-13704
315-13706	315-13707	316-13724	316-13725	316-13738	316-13754	317-13774	317-13810	317-13813
317-13814	318-13825	318-13829	318-13849	318-13851	319-13900	319-13901	319-13921	320-13948
323-14113	323-14116	323-14117	323-14120	323-14121	324-14127	324-14173	328-14335	328-14338
328-14339	328-14340	328-14347	328-14349	328-14351	328-14361	329-14380	333-14605	334-14612
334-14613	334-14615	334-14630	334-14640	340-14965	340-14968	340-14969	341-14975	341-14977
341-14978	341-14991	341-14992	341-14996	341-14999	341-15000	341-15001	341-15003	341-15013
341-15016	341-15026	347-15327	347-15330	347-15331	348-15381	348-15383	348-15384	348-15385
348-15386	354-15687	354-15690	354-15691	354-15692	354-15693	354-15694	354-15695	354-15697
354-15708	354-15712	354-15715	354-15716	354-15717	354-15719	355-15734	355-15744	355-15745
355-15746	359-15990	359-15993	359-15994	359-15995	359-15996	360-16001	360-16002	360-16003
360-16004	360-16005	360-16006	360-16017	360-16021	360-16024	360-16025	360-16026	360-16027
360-16028	360-16029	360-16030	360-16041	360-16042	360-16052	361-16057	361-16058	366-16368
366-16371	366-16372	366-16373	366-16374	366-16375	366-16376	367-16403	367-16404	367-16405
367-16406	367-16417	367-16421	367-16424	367-16425	367-16426	367-16427	367-16428	367-16429
367-16430	367-16442	367-16443	368-16457	368-16458	368-16459	373-16701	373-16704	373-16705
373-16708	373-16709	373-16710	373-16712	373-16723	373-16727	373-16730	373-16731	373-16733
373-16744	373-16745	374-16759	374-16760	374-16761	379-17032	379-17035	379-17036	379-17038
379-17039	379-17040	379-17041	379-17043	379-17054	379-17058	379-17061	379-17062	379-17063
379-17065	379-17077	380-17082	380-17092	380-17093	380-17094	381-17153	381-17154	381-17155
381-17157	381-17160	381-17161	381-17163	381-17165	381-17169	381-17176	381-17179	381-17180
381-17181	381-17183	382-17198	382-17199	382-17209	382-17210	382-17211	389-17538	389-17541
389-17542	389-17545	389-17546	389-17547	389-17549	389-17550	389-17560	390-17595	390-17603
390-17604	390-17609	390-17618	390-17619	390-17623	390-17631	390-17632	390-17637	391-17650
391-17651	391-17656	391-17657	391-17664	392-17704	392-17707	392-17708	392-17710	392-17711
392-17712	392-17714	392-17715	392-17725	392-17741	392-17754	393-17760	393-17762	393-17764
393-17766	393-17768	393-17774	393-17776	393-17782	393-17790	397-18005	397-18008	397-18009
397-18011	397-18012	397-18013	397-18015	397-18026	398-18034	398-18037	398-18038	398-18040

```
SYMBOL  VALUE           REFERENCES
                         398-18042   398-18043   398-18046   398-18049   398-18050   398-18055   398-18066   398-18067   398-18077
                         398-18078   398-18079   404-18361   404-18364   404-18365   404-18366   404-18367   404-18368   404-18370
                         405-18385   405-18389   405-18392   405-18393   405-18394   405-18397   405-18398   405-18400   405-18403
                         405-18404   405-18406   405-18417   405-18418   405-18428   406-18433   406-18434   410-18646   410-18649
                         410-18650   410-18651   410-18654   410-18655   411-18662   411-18665   411-18666   411-18675   411-18676
                         416-18984   416-18987   416-18988   416-18990   416-18991   416-18993   417-19000   417-19001   417-19007
                         417-19017   417-19018   417-19028   417-19029   417-19030   422-19298   422-19301   422-19302   423-19352
                         423-19353   423-19363   423-19366   423-19367   423-19369   423-19370   423-19372   423-19375   423-19376
                         429-19667   429-19670   429-19671   429-19684   429-19685   434-19970   434-19973   434-19974   435-19991
                         435-19992   435-20002   435-20005   435-20006   435-20008   435-20009   439-20246   439-20249   439-20250
                         439-20251   439-20252   439-20254   439-20255   439-20256   439-20257   439-20258   439-20259   439-20261
                         440-20267   440-20268   440-20269   440-20270   440-20271   440-20272   440-20274   440-20309   440-20312
                         440-20313   440-20314   440-20315   440-20317   440-20318   441-20323   441-20324   441-20325   441-20326
                         441-20328   441-20331   441-20332   441-20333   441-20335   441-20338   441-20339   441-20342   441-20343
                         441-20344   441-20345   441-20347   441-20361   445-20559   445-20562   445-20563   445-20575   445-20576
                         446-20581   446-20583   446-20594   446-20598   446-20601   446-20602   446-20606   446-20608   446-20609
                         446-20611   446-20614   446-20615   446-20620   447-20638   447-20639   447-20649   447-20650   447-20651
                         452-20896   452-20899   452-20900   452-20901   452-20904   452-20905   452-20909   452-20912   452-20913
                         452-20923   452-20924   452-20926   453-20935   453-20936   454-20994   458-21192   458-21195   458-21196
                         458-21197   458-21198   458-21199   458-21200   458-21201   458-21202   458-21204   459-21230   459-21259
                         459-21262   459-21263   459-21264   459-21266   459-21267   459-21271   460-21294   460-21296   460-21297
                         463-21450   463-21453   463-21454   463-21455   463-21456   463-21457   463-21458   463-21459   465-21570
                         465-21573   465-21574   465-21575   465-21576   465-21577   466-21582   466-21583   466-21585   468-21742
                         468-21745   469-21750   469-21751   469-21756   469-21757   469-21759   469-21775   469-21784   469-21787
                         469-21788   469-21789   469-21791   469-21792   469-21794   470-21818   470-21819   472-21940   472-21943
                         472-21944   472-21945   472-21948   472-21949   472-21951   472-21954   472-21955   472-21956   472-21958
                         472-21959   472-21961   477-22205   477-22208   477-22209   477-22210   477-22221   477-22222   477-22225
                         477-22226   477-22229   477-22230   477-22235   477-22238   477-22239   477-22241   477-22243   478-22263
                         478-22264   478-22274   478-22275   478-22276   483-22535   483-22538   483-22539   483-22541   483-22542
                         487-22761   488-22768   488-22769   488-22792   488-22793   493-23036   493-23039   493-23040   493-23046
                         493-23049   493-23050   494-23067   494-23068   494-23069   495-23148   495-23151   495-23152   496-23169
                         496-23170   496-23171   501-23419   501-23422   501-23423   501-23451   502-23458   502-23459   502-23471
                         502-23472   502-23473   502-23475   502-23477   507-23720   507-23723   507-23724   507-23752   507-23755
                         508-23760   508-23771   508-23773   508-23774   508-23776   508-23777   508-23778   508-23780   508-23782
                         513-24047   513-24050   513-24051   513-24053   513-24054   513-24056   513-24059   513-24060   514-24067
                         514-24068   514-24069   514-24075   514-24090   514-24105   515-24135   515-24136   515-24137   515-24138
                         515-24149   515-24152   515-24153   515-24155   515-24156   515-24157   520-24375   520-24378   520-24379
                         520-24388   520-24389   521-24422   521-24423   521-24424   521-24426   521-24441   521-24452   521-24456
                         521-24459   521-24460   521-24462   521-24463   521-24464   526-24694   526-24697   526-24698   526-24713
                         527-24718   527-24730   527-24733   527-24734   527-24736   527-24737   527-24738   527-24742   527-24749
                         527-24756   527-24763   528-24774   528-24785   528-24819   529-24856   529-24859   529-24860   529-24861
                         529-24876   535-25164   535-25167   535-25168   535-25174   535-25175   535-25176   535-25177   535-25178
                         535-25180   536-25207   536-25210   536-25211   536-25224   536-25227   536-25229   536-25230   536-25231
                         536-25232   536-25234   537-25275   537-25278   537-25279   537-25285   537-25286   537-25287   537-25288
                         537-25289   537-25293   537-25309   538-25319   538-25322   538-25323   538-25327   538-25331   538-25332
                         538-25333   538-25334   538-25338   538-25341   538-25342   538-25343   541-25511   541-25514   541-25515
                         541-25516   541-25517   541-25518   541-25519   541-25520   541-25523   541-25524   541-25528   542-25535
                         542-25536   542-25540   542-25543   542-25545   542-25546   542-25550   542-25568   546-25738   546-25741
                         546-25742   546-25748   546-25751   546-25752   546-25756   546-25759   546-25760   546-25768   546-25769
                         546-25771   546-25772   546-25775   546-25776   546-25778   546-25779   546-25783   547-25811   550-25962
                         550-25965   550-25966   550-25967   550-25968   550-25969   550-25970   550-25971   550-25972   550-25974
                         556-26277   556-26280   556-26281   557-26300   557-26303   557-26304   557-26305   557-26312   557-26329
```

```
SYMBOL  VALUE              REFERENCES
                             557-26340  558-26368  558-26370  560-26478
MSGH1     002510             7-242     #7-259
MSGH2     002556             7-243     #7-260
MSGH3     002624             7-244     #7-261
MSGH4     002670             7-245     #7-262
MSGH5     002736             7-246     #7-263
MSGH6     003004             7-247     #7-264
MSGH7     003052             7-248     #7-265
MSGS1     003160             7-288     #7-304
MSGS2     003224             7-289     #7-305
MSGS3     003270             7-290     #7-306
MSGS4     003334             7-291     #7-307
MSGS5     003400             7-292     #7-308
M$DUMP    026312             191-7313  #192-7374
NIB.SA    013374            #88-2232    98-2785    98-2786    98-2787    99-2822    99-2828    99-2834    99-2840    99-2846
                             99-2852   100-2866   100-2872   100-2882   100-2891   125-4066   125-4073   125-4084   126-4096
                             126-4108  126-4115   126-4126   126-4134   126-4146   127-4158   130-4296   130-4299   130-4307
                             130-4309  130-4311   130-4318   130-4324   130-4326   130-4332   130-4336  *133-4460  *133-4467
                            *133-4471 *134-4483  *134-4484  *134-4487  *134-4494  *134-4498  *134-4506  *134-4507  *134-4511
                            *134-4519 *134-4520   479-22316
NIN.FM  = 010410            #95-2627
NO.INI  = 005470            #95-2584   320-13960
ONEFIL  = 000001            #2-4       4-1152     5-1153     6-34       6-167      7-193      7-364
ONEPAS    002406   G        #6-163     93-2512    204-7977
ONE.FM  = 010240            #95-2619   192-7379   196-7605   196-7624   199-7729   199-7746   216-8530   315-13694  316-13718
                             317-13816 318-13838  318-13844  318-13858  319-13915  320-13961  556-26273  557-26307  557-26324
                             557-26347 558-26385  558-26397
OP.NUM    014002            #88-2238  *205-8006   205-8025   205-8031   205-8045   206-8057   253-10405  253-10433  308-13289
                             389-17535 391-17696
O$APTS  = 000001            #6-13     #6-46       6-65
O$AU    = 000001            #6-13     #6-46       6-65
O$BGNR  = 000001            #6-13     #6-46       6-65
O$BGNS  = 000001            #6-13     #6-46       6-65
O$DU    = 000001            #6-13     #6-46       6-65
O$ERRT  = 000001            #6-13     #6-46       6-65
O$GNSW  = 000001            #6-13     #6-46       6-65
O$POIN  = 000001            #6-13     #6-46       6-46       6-65
O$SETU  = 000001            #6-13     #6-46       6-65
PAR.DI    014010            #89-2247  *205-8000   249-10222  468-21730
PD.TEM    015342            #89-2256  *103-3067   104-3092  *360-16041  361-16064 *367-16442  368-16466 *373-16744  374-16767
                            *379-17077 380-17100 *382-17198  382-17217 *389-17560  389-17567 *392-17725  392-17731 *398-18066
                             399-18089 *405-18417 406-18440 *417-19017  417-19040 *447-20638  447-20657  478-22262 *478-22263
                             514-24089 *514-24090 521-24440 *521-24441
PHR.1   = 011610            #97-2713   261-10822  262-10841  264-10952  268-11195  269-11214  271-11325  275-11592  276-11611
                             278-11722 283-11980  295-12606  300-12838  300-12855  307-13233  308-13316  324-14161  329-14373
                             329-14388 349-15456  350-15480  350-15500  454-21003  460-21320  463-21471  466-21593  494-23085
                             496-23187
PHR.10  = 012006            #97-2722   369-16531  391-17681  440-20301
PHR.11  = 012020            #97-2723   528-24812  535-25186
PHR.12  = 012036            #97-2724   516-24177
PHR.13  = 012060            #97-2725   522-24484
PHR.14  = 012104            #97-2726   192-7378
```

```
SYMBOL    VALUE            REFERENCES
PHR.15    = 012136         #97-2727     246-10077  246-10087
PHR.2     = 011626         #97-2714     256-10579  262-10858  263-10934  264-10981  269-11231  270-11307  271-11354  276-11628
                            277-11704   273-11751  300-12874  301-12910  302-12947  306-13196  316-13747  324-14139  460-21306
PHR.3     = 011644         #97-2715     216-8529
PHR.4     = 011676         #97-2716     209-8209   219-8678   224-8954   230-9217   236-9524   236-9558   289-12291  290-12360
                            292-12444   342-15049  355-15780  375-16809  380-17133  399-18134  400-18160  430-19717  430-19752
                            431-19794   435-20025  536-25246  551-25987
PHR.5     = 011714         #97-2717     212-8374   257-10599  257-10615  262-10855  262-10875  263-10895  269-11228  269-11248
                            270-11268   272-11379  276-11645  277-11665  279-11776  283-11947  283-11959  283-11962  284-12001
                            284-12018   306-13213  307-13266  316-13763  317-13783  325-14189  349-15412  349-15432  458-21214
                            495-23115   547-25804
PHR.6     = 011726         #97-2718     262-10838  269-11211  276-11608  276-11625  283-11977  302-12990
PHR.7     = 011740         #97-2719     302-12986
PHR.8     = 011762         #97-2720     453-20955
PHR.9     = 011774         #97-2721     453-20980
PNT       = 001000   G     #94-2566
PRI       = 002000   G     #94-2567
PRI00     = 000000   G     #94-2558
PRI01     = 000040   G     #94-2557
PRI02     = 000100   G     #94-2556
PRI03     = 000140   G     #94-2555
PRI04     = 000200   G     #94-2554
PRI05     = 000240   G     #94-2553
PRI06     = 000300   G     #94-2552
PRI07     = 000340   G     #94-2551
PRSN        002400   G     #6-160       93-2512    245-10044
PTBL.P      014000         #88-2236    *204-7947   204-7948   204-7950   204-7951   204-7953  *204-7992   205-7997   205-7999
                            205-8001    205-8003   205-8016   206-8066
PUP.BB    = 006060         #95-2589     557-26323
PWR.OF    = 005112         #94-2575     317-13815  557-26306
PWR.ON    = 005202         #94-2576     318-13843
P.AAA       004716         #66-960      94-2573
P.AAB       005012         #66-980      94-2574
P.AAC       005112         #66-1002     94-2575
P.AAD       005202         #67-1025     94-2576
P.AAE       005272         #67-1044     94-2577
P.AAF       005340         #67-1057     94-2578
P.AAG       005414         #68-1076     95-2583
P.AAH       005470         #68-1091     95-2584
P.AAI       005570         #68-1113     95-2585
P.AAJ       005652         #69-1134     95-2586
P.AAK       005722         #69-1148     95-2587
P.AAL       005764         #69-1160     95-2588
P.AAM       006060         #70-1184     95-2589
P.AAN       006150         #70-1203     95-2590
P.AAO       006242         #70-1223     95-2591
P.AAP       006334         #71-1247     95-2592
P.AAQ       006442         #71-1271     95-2593
P.AAR       006506         #71-1283     95-2594
P.AAS       006574         #72-1305     95-2595
P.AAT       006620         #72-1312     95-2596
P.AAU       006650         #72-1320     95-2597
```

SYMBOL	VALUE	REFERENCES	
P.AAV	006752	#72-1342	95-2598
P.AAW	007002	#73-1354	95-2599
P.AAX	007030	#73-1362	95-2600
P.AAY	007064	#73-1372	95-2601
P.AAZ	007116	#73-1381	95-2602
P.ABA	007170	#73-1395	95-2603
P.ABB	007224	#74-1409	95-2604
P.ABC	007254	#74-1417	95-2605
P.ABD	007330	#74-1432	95-2606
P.ABE	007370	#74-1443	95-2607
P.ABF	007436	#74-1456	95-2608
P.ABG	007526	#75-1479	95-2609
P.ABH	007562	#75-1489	95-2610
P.ABI	007632	#75-1503	95-2611
P.ABJ	007702	#76-1521	95-2612
P.ABK	007754	#76-1535	95-2613
P.ABL	010026	#76-1549	95-2614
P.ABM	010072	#76-1561	95-2615
P.ABN	010142	#77-1579	95-2616
P.ABO	010166	#77-1586	95-2617
P.ABP	010206	#77-1592	95-2618
P.ABQ	010240	#77-1601	95-2619
P.ABR	010246	#77-1603	95-2620
P.ABS	010256	#77-1606	95-2621
P.ABT	010270	#77-1610	95-2622
P.ABU	010304	#77-1614	95-2623
P.ABV	010322	#77-1619	95-2624
P.ABW	010342	#77-1625	95-2625
P.ABX	010364	#78-1635	95-2626
P.ABY	010410	#78-1642	95-2627
P.ABZ	010436	#78-1650	95-2628
P.ACA	010466	#78-1658	95-2629
P.ACB	010520	#78-1667	95-2630
P.ACC	010524	#78-1669	95-2631
P.ACD	010536	#78-1673	95-2632
P.ACE	010544	#78-1675	95-2633
P.ACF	010552	#78-1677	95-2634
P.ACG	010560	#78-1679	96-2639
P.ACH	010566	#78-1681	96-2640
P.ACI	010602	#79-1689	96-2641
P.ACJ	010616	#79-1693	96-2642
P.ACK	010630	#79-1697	96-2643
P.ACL	010640	#79-1700	96-2644
P.ACM	010650	#79-1703	96-2645
P.ACN	010660	#79-1706	96-2646
P.ACO	010664	#79-1708	96-2647
P.ACP	010676	#79-1712	96-2648
P.ACQ	010704	#79-1714	96-2649
P.ACR	010712	#79-1716	96-2650
P.ACS	010724	#79-1720	96-2651
P.ACT	010730	#79-1722	96-2652
P.ACU	010736	#79-1724	96-2653

SYMBOL	VALUE	REFERENCES	
P.ACV	010744	#79-1726	96-2654
P.ACW	010752	#79-1728	96-2655
P.ACX	010766	#79-1732	96-2656
P.ACY	010774	#79-1734	96-2657
P.ACZ	011002	#79-1736	96-2658
P.ADA	011016	#80-1744	96-2659
P.ADB	011024	#80-1746	96-2660
P.ADC	011032	#80-1748	96-2661
P.ADD	011046	#80-1752	96-2662
P.ADE	011054	#80-1754	96-2663
P.ADF	011070	#80-1758	96-2664
P.ADG	011076	#80-1760	96-2665
P.ADH	011102	#80-1762	96-2666
P.ADI	011110	#80-1764	96-2667
P.ADJ	011116	#80-1766	96-2668
P.ADK	011122	#80-1768	96-2669
P.ADL	011132	#80-1771	96-2670
P.ADM	011140	#80-1773	96-2671
P.ADN	011150	#80-1776	96-2672
P.ADO	011154	#80-1778	96-2673
P.ADP	011170	#80-1782	96-2674
P.ADQ	011176	#80-1784	96-2675
P.ADR	011206	#80-1787	96-2676
P.ADS	011214	#80-1789	96-2677
P.ADT	011226	#80-1793	96-2678
P.ADU	011240	#81-1801	96-2679
P.ADV	011250	#81-1804	96-2680
P.ADW	011260	#81-1807	96-2681
P.ADX	011270	#81-1810	96-2682
P.ADY	011276	#81-1812	96-2683
P.ADZ	011310	#81-1816	96-2684
P.AEA	011316	#81-1818	96-2685
P.AEB	011326	#81-1821	96-2686
P.AEC	011336	#81-1824	96-2687
P.AED	011344	#81-1826	96-2688
P.AEE	011352	#81-1828	96-2689
P.AEF	011362	#81-1831	96-2690
P.AEG	011374	#81-1835	97-2695
P.AEH	011400	#81-1837	97-2696
P.AEI	011416	#81-1842	97-2697
P.AEJ	011432	#81-1846	97-2698
P.AEK	011440	#81-1848	97-2699
P.AEL	011446	#81-1850	97-2700
P.AEM	011454	#82-1856	97-2701
P.AEN	011462	#82-1858	97-2702
P.AEO	011470	#82-1860	97-2703
P.AEP	011474	#82-1862	97-2704
P.AEQ	011502	#82-1864	97-2705
P.AER	011514	#82-1868	97-2706
P.AES	011524	#82-1871	97-2707
P.AET	011532	#82-1873	97-2708
P.AEU	011540	#82-1875	97-2709

SYMBOL	VALUE	REFERENCES	
P.AEV	011552	#82-1879	97-2710
P.AEW	011562	#82-1882	97-2711
P.AEX	011570	#82-1884	97-2712
P.AEY	011610	#82-1890	97-2713
P.AEZ	011626	#82-1895	97-2714
P.AFA	011644	#82-1900	97-2715
P.AFB	011676	#83-1913	97-2716
P.AFC	011714	#83-1918	97-2717
P.AFD	011726	#83-1922	97-2718
P.AFE	011740	#83-1926	97-2719
P.AFF	011762	#83-1932	97-2720
P.AFG	011774	#83-1936	97-2721
P.AFH	012006	#83-1940	97-2722
P.AFI	012020	#83-1944	97-2723
P.AFJ	012036	#83-1949	97-2724
P.AFK	012060	#83-1955	97-2725
P.AFL	012104	#83-1962	97-2726
P.AFM	012136	#84-1975	97-2727
P.AFN	012150	#84-1979	97-2728
P.AFO	012164	#84-1983	97-2729
P.AFP	012172	#84-1985	97-2730
P.AFQ	012200	#84-1987	97-2731
P.AFR	012216	#84-1992	97-2732
P.AFS	012226	#84-1995	97-2733
P.AFT	012234	#84-1997	97-2734
P.AFU	012244	#84-2000	97-2735
P.AFV	012260	#84-2004	97-2736
P.AFW	012272	#84-2008	97-2737
P.AFX	012302	#84-2011	97-2738
P.AFY	012322	#84-2017	97-2739
P.AFZ	012334	#85-2025	97-2740
P.AGA	012344	#85-2028	97-2741
P.AGB	012360	#85-2032	97-2742
P.AGC	012372	#85-2036	97-2743
P.AGD	012404	#85-2040	97-2744
P.AGE	012414	#85-2043	97-2745
P.AGF	012426	#85-2047	97-2746
P.AGG	012440	#85-2051	98-2751
P.AGH	012452	#85-2055	98-2752
P.AGI	012464	#85-2059	98-2753
P.AGJ	012500	#85-2063	98-2754
P.AGK	012510	#85-2066	98-2755
P.AGL	012516	#85-2068	98-2756
P.AGM	012524	#85-2070	98-2757
P.AGN	012532	#85-2072	98-2758
P.AGO	012540	#85-2074	98-2759
P.AGP	012546	#86-2080	98-2760
P.AGQ	012554	#86-2082	98-2761
P.AGR	012562	#86-2084	98-2762
P.AGS	012570	#86-2086	98-2763
P.AGT	012576	#86-2088	98-2764
P.AGU	012604	#86-2090	98-2765

```
SYMBOL   VALUE    REFERENCES
P.AGV    012612   #86-2092     98-2766
P.AGW    012620   #86-2094     98-2767
P.AGX    012626   #86-2096     98-2768
P.AGY    012634   #86-2098     98-2769
P.AGZ    012642   #86-2100     98-2770
P.AHA    012652   #86-2103     98-2771
P.AHB    012660   #86-2105     98-2772
P.AHC    012666   #86-2107     98-2773
P.AHD    012676   #86-2110     98-2774
P.AHE    012706   #86-2113     98-2775
P.AHF    012750   #86-2125     98-2776
P.AHG    013012   #87-2141     98-2777
P.AHH    013052   #87-2152     98-2778
P.AHI    013114   #87-2164     98-2779
P.AHJ    013154   #87-2175     98-2780
P.AHK    013214   #87-2186     98-2781
P.AHL    013250   #88-2200     98-2782
P.AHM    013302   #88-2209     98-2783
P.AHN    013330   #88-2217     98-2784
P.CAL    015366   #89-2270     108-3277    *108-3278    *108-3279     111-3406    *483-22549   484-22581   *488-22800    489-22827
P.CNT    015376   #89-2274    *212-8336    *212-8364     212-8365    *223-8891    *224-8918    224-8919    *229-9153    *229-9177
                   229-9178   *234-9438    *235-9479     235-9480    *240-9766    *242-9885    242-9886    *288-12252   *289-12277
                   289-12278  *290-12346    290-12347   *292-12431    292-12432   *307-13241  *307-13256    307-13257   *308-13288
                  *308-13306   308-13307   *323-14105   *324-14129    324-14130   *324-14151   324-14152   *324-14175    324-14176
                  *333-14604  *335-14692    335-14693   *340-14964   *342-15042    342-15043  *347-15323   *348-15397    348-15398
                  *349-15421   349-15422   *349-15445    349-15446   *350-15469    350-15470  *350-15489    350-15490   *404-18355
                  *406-18457   406-18458   *410-18641   *411-18684    411-18685   *415-18934  *418-19069    418-19070   *422-19297
                  *424-19401   424-19402   *429-19665   *430-19707    430-19708   *430-19742   430-19743   *431-19784    431-19785
                  *445-20557  *447-20674    447-20675   *452-20895   *453-20945    453-20946  *453-20970    453-20971   *458-21184
                  *458-21206   458-21207   *459-21232    459-21233   *463-21446   *463-21461   463-21462   *477-22200   *478-22294
                   478-22295  *483-22507   *484-22558    484-22559   *493-23035   *494-23076   494-23077   *494-23104    494-23105
                  *496-23180   496-23181   *496-23209    496-23210   *501-23418   *502-23479   502-23480   *502-23508    502-23509
                  *507-23719  *508-23784    508-23785   *509-23817    509-23818   *513-24037  *515-24164    515-24165   *520-24371
                  *522-24475   522-24476   *535-25162   *536-25237    536-25238   *538-25346   538-25347   *550-25957   *550-25976
                   551-25981
P.GEN    015374   #89-2273     111-3378     111-3406    *483-22546    484-22574   *488-22797   488-22816
RAS.IN   015346   #89-2259    *205-8021    *205-8041     369-16509    439-20243    439-20253
RD.CS1   021762   #137-4661    189-7216     242-9847
RD.DA    022316   #143-4980    189-7226     242-9861
RD.DAT   015352   #89-2261    *137-4676     137-4677    *140-4836     140-4837    *143-4995    143-4996    *146-5155     146-5156
                  *149-5316    149-5317    *152-5478     152-5479    *156-5664     156-5665   *160-5852    160-5853    *163-5990
                   163-5991   *166-6125     166-6126    *170-6312     170-6313    *174-6502    174-6503    *179-6717     179-6718
                  *182-6877    182-6878     225-8963     230-9222     236-9529     243-9918    289-12296    290-12365    292-12449
                   319-13919
RD.DS    025216   #182-6862    190-7270
RD.D1    024104   #169-6283    190-7275
RD.D2    024416   #173-6473    190-7280
RD.D3    024744   #178-6685    190-7285
RD.EE    023760   #166-6123    189-7256
RD.EL    023716   #163-5988    189-7261
RD.ER    022140   #140-4821    189-7221     242-9854
RD.E1    023074   #152-5462    189-7236     242-9875
```

```
SYMBOL   VALUE           REFERENCES
RD.E2      023314         #156-5647   189-7241    242-9882
RD.MR      022474         #146-5140   189-7231
RD.PA      022666         #149-5300   189-7246    242-9868
RD.PD      023556         #160-5835   189-7251
RD.REG     025712         #188-7189   224-8915    229-9174    235-9476    289-12274   290-12343   292-12428   319-13907
REGDMP     002404    G    #6-162      93-2512     192-7375
REG.IN     015360         #89-2266    169-6289    173-6479    178-6692   *291-12397  *291-12419  *292-12469
REG.1    = 012500         #98-2754    192-7389
REG.10   = 012570         #98-2763
REG.11   = 012576         #98-2764
REG.12   = 012604         #98-2765
REG.13   = 012612         #98-2766
REG.14   = 012620         #98-2767    194-7474    528-24814   529-24870
REG.15   = 012626         #98-2768    194-7482    535-25188   536-25247   538-25357
REG.16   = 012634         #98-2769
REG.17   = 012642         #98-2770    193-7421    209-8211
REG.18   = 012652         #98-2771    192-7396
REG.19   = 012660         #98-2772    192-7403
REG.2    = 012510         #98-2755    193-7428    300-12857
REG.20   = 012666         #98-2773    194-7491
REG.21   = 012676         #98-2774    194-7498
REG.3    = 012516         #98-2756    193-7435    284-12031
REG.4    = 012524         #98-2757    193-7449
REG.5    = 012532         #98-2758    193-7442    301-12940   302-12987
REG.6    = 012540         #98-2759    193-7414    219-8673    459-21241   460-21283   460-21303
REG.7    = 012546         #98-2760    193-7456    236-9559
REG.8    = 012554         #98-2761
REG.9    = 012562         #98-2762    193-7463
REM.TB     015664         #92-2448    108-3275    108-3281    108-3287    115-3622    115-3626    115-3632
RE2        004640          39-1349   #39-1379
RE3        004636          39-1357   #39-1378
RE4        004634          39-1366   #39-1377
RH.ADD     016022         #93-2505   *204-7950    204-7961
RH.ERR   = 013302         #98-2783    209-8207    212-8369
RH.TYP     016024         #93-2506   *204-7952
RH.VEC     016026         #93-2507   *204-7954
SC.SET   = 013214         #98-2781
SEV.FM   = 010342         #95-2625    391-17683   399-18136   411-18698
SFPTBL     002400    G    #6-150
SIX.FM   = 010322         #95-2624    219-8679    224-8955    230-9218    272-11382   279-11779   284-12037   289-12292   290-12361
                           302-12992   335-14705   337-14784   349-15414   349-15434   349-15458   350-15482   350-15502   400-18161
                           418-19084   424-19414   430-19720   430-19755   431-19797   473-21977
STACK      015034         #89-2255   *100-2885   *100-2886   *100-2898   *100-2899    107-3235    111-3377    429-19701   430-19726
                           430-19739   431-19769   431-19782   431-19803
STK.OF     015022         #89-2254    98-2798    *103-3044    104-3103   *104-3107
STRIPP     016444         #103-3038   107-3228    429-19689
SVCGBL   = 177777         #6-13      #6-22        6-65        6-65        6-65        6-65        6-65        6-65        6-65
                           6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65
                           6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65
                           6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65
                           6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65
                           6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65        6-65
```

```
SYMBOL    VALUE           REFERENCES
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-80
                          6-80      6-80      6-87      6-87      6-87      6-96      6-96      6-96      6-103
                          6-103     6-103     6-119     6-119     6-119     6-119     6-119     6-119     6-150
                          6-150     6-150     6-150     6-150     6-150     7-229     7-229     7-229     7-277
                          7-277     7-277     7-316     7-316     7-316
SVCINS    = 177777        #6-13     #6-19     6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65      6-65
                          6-65      6-65      6-65      6-65      6-80      6-80      6-87      6-87      6-103
                          6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103
                          6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103
                          6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103
                          6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103
                          6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103
                          6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-103
                          6-103     6-103     6-103     6-103     6-103     6-103     6-103     6-119     6-150
                          7-229     7-242     7-242     7-242     7-242     7-243     7-243     7-243     7-243
                          7-243     7-244     7-244     7-244     7-244     7-244     7-245     7-245     7-245
                          7-245     7-245     7-246     7-246     7-246     7-247     7-247     7-247     7-247
                          7-247     7-248     7-248     7-248     7-250     7-277     7-288     7-288     7-288
                          7-289     7-289     7-289     7-290     7-290     7-290     7-291     7-291     7-291
                          7-292     7-292     7-292     7-295
SVCSUB    = 177777        #6-13     #6-21
SVCTAG    = 177777        #6-13     #6-23     6-139     6-139     6-139     6-165     6-165     6-165     7-250
                          7-250     7-250     7-295     7-295     7-295
SVCTST    = 177777        #6-13     #6-20
SYNC      = 012750        #98-2776  224-8938  229-9197  235-9505  263-10929 264-10976 270-11302 271-11349 277-11699
                          278-11746 329-14384 399-18127 406-18464 411-18689 430-19712 430-19747 431-19789 435-20023
                          453-20950 453-20975 454-20998 466-21589 469-21763 469-21798 479-22305 484-22565 488-22807
                          494-23083 495-23113 496-23185 496-23214 502-23486 503-23517 508-23791 509-23822 515-24169
                          522-24480 528-24810 529-24865 535-25184 538-25353 542-25557 547-25796
S$LSYM    = 010000        #6-13     #6-139    #6-165    #7-250    #7-295
TEN.FM    = 010436        #95-2628
THR.FM    = 010256        #95-2621  209-8212  220-8735  243-9914  250-10246 250-10266 250-10286 361-16103 369-16533
                          381-17138 383-17255 440-20303 447-20686 458-21216 459-21242 460-21284 468-21735 484-22570
                          488-22812 494-23088 496-23190 516-24178 522-24485 528-24815 535-25189 538-25358 547-25806
TIME.O    = 013330        #98-2784
TRBLE.    = 013250        #98-2782  472-21965
TST.LN      020376        #125-4047 355-15752 361-16078 368-16480 374-16781 380-17114 382-17231 418-19066 447-20671
                          478-22291
TWO.FM    = 010246        #95-2620  236-9560  251-10302 253-10422 316-13733 381-17144 536-25248 551-25989
T$ARGC    = 000002        #6-65     6-65      #6-65     6-65      6-65      #6-65     6-65      6-65      #6-65
                          6-65      6-65      #6-65     6-65      6-65      #6-65     6-65      6-65
T$CODE    = 004130        #7-242    7-242     #7-242    7-242     #7-242    7-242     #7-243    7-243     #7-243
```

```
SYMBOL  VALUE             REFERENCES
                           7-243    #7-243     7-243    #7-244     7-244    #7-244     7-244    #7-244     7-244
                          #7-245     7-245    #7-245     7-245    #7-245     7-245    #7-246     7-246    #7-246
                           7-246    #7-246     7-246    #7-247     7-247    #7-247     7-247    #7-247     7-247
                          #7-248     7-248    #7-248     7-248    #7-248     7-248    #7-288     7-288    #7-288
                           7-288    #7-288     7-288    #7-289     7-289    #7-289     7-289    #7-289     7-289
                          #7-290     7-290    #7-290     7-290    #7-290     7-290    #7-291     7-291    #7-291
                           7-291    #7-291     7-291    #7-292     7-292    #7-292     7-292    #7-292     7-292
T$ERRN  = 000000          #6-13
T$EXCP  = 000000          #7-242     7-242    #7-243     7-243    #7-244     7-244    #7-245     7-245    #7-247
                           7-247
T$FREE    113562  G        561-26522  561-26523 #561-26524
T$GMAN  = 000000          #6-13
T$HILI  = 000007          #7-242     7-242    #7-243     7-243    #7-244     7-244    #7-245     7-245    #7-247
                           7-247
T$LAST  = 000000          #6-13
T$LOLI  = 000000          #7-242     7-242    #7-243     7-243    #7-244     7-244    #7-245     7-245    #7-247
                           7-247
T$LSYM  = 010000          #6-13      6-13      6-139     6-165     7-250     7-295
T$NEST  = 177777          #6-13      6-39     #6-39      6-39      6-119    #6-119     6-119     6-139     6-139
                           6-139    #6-139     6-150    #6-150     6-150     6-165     6-165     6-165    #6-165
                           7-229    #7-229     7-229     7-250     7-250     7-250    #7-250     7-277    #7-277
                           7-277     7-295     7-295     7-295    #7-295     7-316    #7-316     7-316     7-322
                           7-322     7-322    #7-322     7-348     7-348     7-348    #7-348
T$NS0   = 000000          #6-39      7-348
T$NS1   = 000021          #6-119     6-139    #6-150     6-165    #7-229     7-250    #7-277     7-295    #7-316
                           7-322
T$PTHV  = 000000  G        6-65     #561-26528
T$PTNU  = 000000          #6-13
T$SAVL  = 177777          #6-13
T$SEGL  = 177777          #6-13
T$SUBN  = 000000          #6-13
T$TAGL  = 177777          #6-13
T$TAGN  = 010005          #6-13      6-119     6-119    #6-119     6-150     6-150    #6-150     7-229     7-229
                          #7-229     7-277     7-277    #7-277     7-316     7-316    #7-316
T$TEMP  = 000000          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
                          #6-103     6-103     6-103    #6-103     6-103     6-103    #6-103     6-103     6-103
```

```
SYMBOL   VALUE        REFERENCES
                      #6-103    6-103     6-103     #6-103    6-103     6-103     #6-103    6-103     6-103
                      #6-103    6-103     6-103     #6-103    6-103     6-103     #6-103    6-103     6-103
                      #6-103    6-103     6-103     #6-103    #6-139    6-139     #6-165    6-165     #7-242
                       7-242    #7-242    7-242     #7-242    7-242     #7-243    7-243     #7-243    7-243
                      #7-243    7-243     #7-244    7-244     #7-244    7-244     #7-244    7-244     #7-245
                       7-245    #7-245    7-245     #7-245    7-245     #7-246    7-246     #7-246    7-246
                      #7-246    7-246     #7-247    7-247     #7-247    7-247     #7-247    7-247     #7-248
                       7-248    #7-248    7-248     #7-248    7-248     #7-250    7-250     #7-288    7-288
                      #7-288    7-288     #7-288    7-288     #7-289    7-289     #7-289    7-289     #7-289
                       7-289    #7-290    7-290     #7-290    7-290     #7-290    7-290     #7-291    7-291
                      #7-291    7-291     #7-291    7-291     #7-292    7-292     #7-292    7-292     #7-292
                       7-292    #7-295    7-295     #7-322    7-322     #7-348    7-348
T$TEST   = 000000     #6-13
T$TSTM   = 177777     #6-13
T$TSTS   = 000000     #6-13
T$$HAR   = 010002     #7-229    7-229     7-250
T$$HW    = 010000     #6-119    6-119     6-139
T$$PRO   = 010004     #7-316
T$$SOF   = 010003     #7-277    7-277     7-295
T$$SW    = 010001     #6-150    6-150     6-165
T.21     = 004716     #94-2573  315-13693
T.61     = 005012     #94-2574  556-26272
T1         031134  G   6-103    #210-8249
T10        036266  G   6-103    #251-10325
T11        036510  G   6-103    #254-10464
T12        037066  G   6-103    #257-10645
T13        040230  G   6-103    #265-11021
T14        041462  G   6-103    #272-11411
T15        042714  G   6-103    #279-11808
T16        043556  G   6-103    #285-12070
T17        045044  G   6-103    #293-12498
T18        045260  G   6-103    #296-12647
T19        046430  G   6-103    #303-13033
T2         031460  G   6-103    #213-8421
T20        047430  G   6-103    #309-13356
T21        051176  G   6-103    #321-13995
T22        051724  G   6-103    #325-14231
T23        052262  G   6-103    #330-14424
T24        053456  G   6-103    #338-14843
T25        054270  G   6-103    #343-15108
T26        055466  G   6-103    #351-15546
T27        056244  G   6-103    #356-15813
T28        057230  G   6-103    #362-16150
T29        060342  G   6-103    #370-16564
T3         031666  G   6-103    #217-8565
T30        061136  G   6-103    #375-16838
T31        062534  G   6-103    #383-17289
T32        064272  G   6-103    #394-17844
T33        065304  G   6-103    #400-18185
T34        066266  G   6-103    #407-18528
T35        066744  G   6-103    #412-18755
T36        070030  G   6-103    #419-19142
```

```
SYMBOL  VALUE               REFERENCES
T37       070756  G          6-103      #425-19463
T38       072032  G          6-103      #432-19857
T39       072460  G          6-103      #436-20081
T4        032336  G          6-103      #221-8773
T40       073436  G          6-103      #442-20393
T41       074516  G          6-103      #448-20743
T42       075324  G          6-103      #454-21035
T43       076254  G          6-103      #461-21352
T44       076504  G          6-103      #464-21506
T45       076670  G          6-103      #466-21618
T46       077366  G          6-103      #470-21843
T47       077660  G          6-103      #473-22004
T48       100640  G          6-103      #480-22367
T49       101376  G          6-103      #485-22634
T5        033006  G          6-103      #225-9011
T50       102014  G          6-103      #489-22865
T51       103202  G          6-103      #497-23266
T52       104020  G          6-103      #504-23572
T53       104660  G          6-103      #510-23877
T54       105722  G          6-103      #516-24223
T55       106612  G          6-103      #523-24530
T56       107742  G          6-103      #530-24905
T57       111234  G          6-103      #539-25401
T58       111640  G          6-103      #543-25605
T59       112306  G          6-103      #548-25849
T6        033476  G          6-103      #231-9279
T60       112660  G          6-103      #552-26052
T61       113522  G          6-103      #559-26426
T7        034354  G          6-103      #237-9599
T8        035370  G          6-103      #244-9974
T9        035624  G          6-103      #247-10114
UAM     = 000200  G         #94-2564
UNS.ER  = 005272            #94-2577    318-13837
VV.CLE  = 005414            #95-2583    316-13717
VV.NOT  = 005340            #94-2578    316-13732
VV.SET  = 005764            #95-2588    318-13857
WC.ERR  = 005652            #95-2586    196-7604    196-7623
WRD.1   = 010520            #95-2630    256-10580   261-10823   262-10839   262-10856   263-10935   264-10982   268-11196   269-11212
                             269-11229  270-11308   271-11355   275-11593   276-11609   276-11626   277-11705   278-11752   283-11948
                             283-11960  283-11978   306-13197   316-13748   324-14140
WRD.10  = 010630            #96-2643    243-9911    335-14703   361-16100   383-17252   393-17799   406-18468   411-18695   418-19081
                             424-19411  447-20683   453-20952   453-20977   463-21468   473-21975   479-22307   502-23490   508-23795
                             528-24799  538-25355   542-25561   547-25803
WRD.11  = 010640            #96-2644    256-10578   257-10598   257-10614   263-10933   264-10951   264-10980   270-11306   271-11324
                             271-11353  277-11703   278-11721   278-11750   283-11946   300-12837   300-12854   300-12873   301-12909
                             301-12942  302-12989   306-13195   306-13212   316-13746   316-13762   317-13782   324-14138   324-14160
                             329-14372  329-14387   454-21002   460-21305   460-21319   463-21470   466-21592
WRD.12  = 010650            #96-2645    212-8373    219-8677    224-8953    230-9216    235-9519    261-10821   262-10874   263-10894
                             268-11194  269-11247   270-11267   272-11378   275-11591   276-11644   277-11664   279-11775   284-12000
                             284-12017  289-12290   290-12359   292-12443   295-12605   307-13232   307-13265   308-13315   325-14188
                             335-14702  355-15779   375-16808   391-17679   399-18132   400-18158   406-18467   411-18694   418-19080
                             424-19410  430-19716   430-19751   431-19793   473-21974   496-23217   503-23520   509-23825
```

```
SYMBOL   VALUE          REFERENCES
WRD.13   = 010660       #96-2646    219-8674    284-12032   380-17132
WRD.14   = 010664       #96-2647    220-8732    253-10420   284-12033   369-16532   391-17682   440-20302   441-20353   459-21239
                         459-21277  528-24797   529-24867   542-25559
WRD.15   = 010676       #96-2648    300-12839   300-12875   301-12911   302-12948   302-12991
WRD.16   = 010704       #96-2649    300-12856   307-13234
WRD.17   = 010712       #96-2650    301-12941   302-12988   460-21304
WRD.18   = 010724       #96-2651
WRD.19   = 010730       #96-2652    256-10576   257-10596   257-10612   261-10819   262-10872   262-10888   263-10931   264-10949
                         264-10978  268-11192   269-11245   270-11265   270-11304   271-11322   271-11351   271-11372   275-11589
                         276-11642  277-11662   277-11701   278-11719   278-11748   279-11773   282-11939   283-11993   284-12014
                         284-12034  300-12871   301-12907   306-13193   306-13209   307-13230   307-13263   308-13313   316-13744
                         316-13760  317-13780   324-14136   324-14158   325-14186   342-15050   399-18129   400-18155   411-18691
                         418-19078  424-19408   430-19714   430-19749   431-19791   435-20027   453-20953   453-20978   454-21001
WRD.2    = 010524       #95-2631    262-10842   262-10859   264-10953   269-11215   269-11232   271-11326   276-11612   276-11629
                         278-11723  283-11963   283-11981
WRD.20   = 010736       #96-2653    272-11380   279-11777   329-14389
WRD.21   = 010744       #96-2654    329-14371   329-14374   329-14386
WRD.22   = 010752       #96-2655    355-15781   375-16810   399-18135
WRD.23   = 010766       #96-2656    399-18131   400-18157   411-18693   430-19719   430-19754   431-19796   435-20029   469-21768
                         470-21807
WRD.24   = 010774       #96-2657    349-15408   349-15428   349-15452   350-15476   350-15496   406-18470   411-18697   479-22309
WRD.25   = 011002       #96-2658    406-18469   411-18696
WRD.26   = 011016       #96-2659    466-21594
WRD.27   = 011024       #96-2660    458-21215   460-21307   460-21318   460-21321
WRD.29   = 011032       #96-2661    458-21213
WRD.3    = 010536       #95-2632    257-10600   262-10876   269-11249   276-11646   284-12002   306-13214   317-13768   324-14162
WRD.30   = 011046       #96-2662    463-21469   463-21472
WRD.31   = 011054       #96-2663    459-21240   459-21278
WRD.32   = 011070       #96-2664    349-15411   349-15431   349-15455   350-15479   350-15499
WRD.33   = 011076       #96-2665    349-15409   349-15429   349-15453   350-15477   350-15497
WRD.34   = 011102       #96-2666    349-15413   349-15433   349-15457   350-15481   350-15501
WRD.35   = 011110       #96-2667    335-14700   342-15052   361-16102   551-25988
WRD.36   = 011116       #96-2668    342-15051
WRD.37   = 011122       #96-2669    219-8675    220-8733    243-9912    361-16101   391-17677   393-17800   468-21732
WRD.38   = 011132       #96-2670    243-9913
WRD.39   = 011140       #96-2671    393-17802   430-19718   430-19753   431-19795   435-20026
WRD.4    = 010544       #95-2633    257-10616   263-10896   270-11269   277-11666   284-12019   307-13267   308-13317   317-13784
                         325-14190
WRD.40   = 011150       #96-2672    336-14774   337-14790
WRD.41   = 011154       #96-2673    447-20685
WRD.42   = 011170       #96-2674    336-14775   337-14791
WRD.43   = 011176       #96-2675    262-10840   262-10857   269-11213   269-11230   276-11610   276-11627   283-11961   283-11979
WRD.44   = 011206       #96-2676
WRD.45   = 011214       #96-2677    335-14701   355-15778
WRD.46   = 011226       #96-2678    337-14781   337-14793   447-20684
WRD.47   = 011240       #96-2679    337-14792
WRD.48   = 011250       #96-2680    374-16802
WRD.49   = 011260       #96-2681
WRD.5    = 010552       #95-2634    249-10241   349-15454   350-15478   350-15498   484-22569   488-22811
WRD.50   = 011270       #96-2682    383-17254   418-19082   424-19412   440-20293   441-20355
WRD.51   = 011276       #96-2683    337-14780   383-17253
WRD.52   = 011310       #96-2684    212-8372    224-8950    230-9213    235-9518    289-12287   290-12356   292-12442   528-24813
```

```
SYMBOL   VALUE            REFERENCES
                           529-24869   535-25187
WRD.53   = 011316         #96-2685     250-10296
WRD.54   = 011326         #96-2686     337-14782
WRD.55   = 011336         #96-2687     337-14783
WRD.56   = 011344         #96-2688     224-8949    230-9212    235-9516    289-12286   290-12355   292-12440   381-17142   391-17676
                           440-20291
WRD.57   = 011352         #96-2689
WRD.58   = 011362         #96-2690
WRD.59   = 011374         #97-2695     454-21004
WRD.6    = 010560         #96-2639     250-10265   250-10285   349-15410   349-15430   469-21767   470-21806
WRD.60   = 011400         #97-2696     440-20292   441-20354
WRD.61   = 011416         #97-2697     272-11381   279-11778   495-23118   496-23220   503-23523   509-23828
WRD.62   = 011432         #97-2698     212-8375
WRD.63   = 011440         #97-2699
WRD.64   = 011446         #97-2700     479-22310   484-22568   488-22810
WRD.65   = 011454         #97-2701
WRD.67   = 011462         #97-2702     496-23216   502-23491   503-23519   509-23824   528-24800   542-25562
WRD.68   = 011470         #97-2703
WRD.69   = 011474         #97-2704     528-24798   542-25560
WRD.7    = 010566         #96-2640     249-10240   250-10264   250-10284   250-10297   468-21733   469-21766   469-21801
WRD.70   = 011502         #97-2705
WRD.71   = 011514         #97-2706     538-25356
WRD.72   = 011524         #97-2707     547-25805
WRD.73   = 011532         #97-2708     479-22308
WRD.74   = 011540         #97-2709     494-23087   495-23117   496-23189   496-23219   503-23522   509-23827
WRD.75   = 011552         #97-2710     494-23086   495-23116   496-23188   496-23218   503-23521   509-23826
WRD.76   = 011562         #97-2711     502-23489   508-23794   515-24172   522-24483
WRD.77   = 011570         #97-2712     508-23796
WRD.8    = 010602         #96-2641     250-10283   469-21800   484-22567   488-22809
WRD.9    = 010616         #96-2642     249-10239   250-10263   399-18133   400-18159   469-21765   502-23488   508-23793   515-24171
                           522-24482
WRT.CH     027156         #196-7584    320-13947   558-26367
WRT.CS     021712         #135-4563    185-7017    240-9777    241-9809
WRT.DA     022246         #141-4882    185-7027    241-9787    241-9817
WRT.DS     025214         #180-6775    186-7071
WRT.D1     024020         #167-6169    186-7076
WRT.D2     024332         #171-6361    186-7081
WRT.D3     024644         #175-6565    186-7086
WRT.EE     023756         #164-6041    185-7057
WRT.EL     023714         #161-5904    186-7066
WRT.ER     022070         #138-4722    185-7022    240-9780    241-9813
WRT.E1     023010         #150-5361    185-7037    241-9793    241-9825
WRT.E2     023216         #153-5536    185-7042    241-9796
WRT.MR     022424         #144-5041    185-7032
WRT.PA     022602         #147-5199    185-7047    241-9790    241-9821
WRT.PD     023450         #157-5723    185-7052    446-20605
WRT.RE     025324         #184-6990    224-8910    229-9169    234-9454    289-12269   290-12338   291-12411
WRT.TR     027426         #199-7711    317-13805   557-26296
WT.DAT     015350         #89-2260    *137-4673    137-4677   *140-4833    140-4837   *143-4992    143-4996   *146-5152    146-5156
                          *149-5313    149-5317   *152-5475    152-5479   *156-5661    156-5665   *160-5849    160-5853   *163-5989
                           163-5991   *166-6124    166-6126   *170-6311    170-6313   *174-6501    174-6503   *179-6714    179-6718
                          *182-6874    182-6878    225-8964    230-9223    243-9919    289-12297   291-12370
```

```
SYMBOL   VALUE         REFERENCES
W.C.SI     015344      #89-2257   *205-8020  *205-8040   439-20254  440-20267  441-20340
W.ERR    = 005722      #95-2587    199-7728   199-7745
XOR.LN     021072      #129-4275   399-18104  406-18454
X$ALWA   = 000000      #6-13
X$FALS   = 000040      #6-13
X$OFFS   = 000400      #6-13
X$TRUE   = 000020      #6-13
$END.L     113564  G   #561-26535
$PATCH     003452  G   #7-338
$SAVE2     004540  G    32-1022    37-1269   #39-1344    112-3476   125-4048   135-4563   137-4661   138-4722   140-4821
                        141-4882   143-4980   144-5041   146-5140   147-5199   149-5300   150-5361   152-5462   153-5536
                        156-5647   157-5723   160-5835   167-6169   169-6283   171-6361   173-6473   175-6565   178-6685
                        182-6862   184-6990   188-7189   209-8183   252-10394  261-10802  268-11175  275-11572  328-14331
                        439-20241  472-21937  550-25956  562-26559
$SAVE3     004554  G    11-169     12-217     16-384     17-438     27-829     28-880    #39-1351    98-2796    110-3368
                        203-7927   219-8657   245-10043  249-10221  295-12585  299-12804  306-13179  452-20894  458-21183
                        541-25510  546-25737  562-26558
$SAVE4     004572  G   #39-1359    115-3604   129-4276   216-8504   223-8889   562-26558
$SAVE5     004612  G    33-1091    37-1269   #39-1368    103-3039   107-3224   212-8334   229-9151   234-9436   240-9764
                        288-12248  315-13688  323-14104  333-14602  340-14961  347-15321  354-15681  359-15979  366-16361
                        373-16698  379-17029  388-17527  397-18003  404-18353  410-18640  415-18932  422-19295  429-19663
                        434-19969  445-20555  477-22198  483-22504  487-22757  493-23033  501-23417  507-23718  513-24035
                        520-24369  526-24692  535-25160  556-26267  562-26558
$T1        030724      #209-8183   210-8250
$T10       035640      #249-10221  251-10326
$T11       036302      #252-10394  254-10465
$T12       036524      #256-10552  257-10646
$T13       037102      #261-10802  265-11022
$T14       040244      #268-11175  272-11412
$T15       041476      #275-11572  279-11809
$T16       042730      #282-11914  285-12071
$T17       043572      #288-12248  293-12499
$T18       045060      #295-12585  296-12648
$T19       045274      #299-12804  303-13034
$T2        031150      #212-8334   213-8422
$T20       046444      #306-13179  309-13357
$T21       047444      #315-13688  321-13996
$T22       051212      #323-14104  325-14232
$T23       051740      #328-14331  330-14425
$T24       052276      #333-14602  338-14844
$T25       053472      #340-14961  343-15109
$T26       054304      #347-15321  351-15547
$T27       055502      #354-15681  356-15814
$T28       056260      #359-15979  362-16151
$T29       057244      #366-16361  370-16565
$T3        031474      #216-8504   217-8566
$T30       060356      #373-16698  375-16839
$T31       061152      #379-17029  383-17290
$T32       062550      #388-17527  394-17845
$T33       064306      #397-18003  400-18186
$T34       065320      #404-18353  407-18529
$T35       066302      #410-18640  412-18756
```

SYMBOL	VALUE	REFERENCES	
$T36	066760	#415-18932	419-19143
$T37	070044	#422-19295	425-19464
$T38	070772	#429-19663	432-19858
$T39	072046	#434-19969	436-20082
$T4	031702	#219-8657	221-8774
$T40	072474	#439-20241	442-20394
$T41	073452	#445-20555	448-20744
$T42	074532	#452-20894	454-21036
$T43	075340	#458-21183	461-21353
$T44	076270	#463-21445	464-21507
$T45	076520	#465-21570	466-21619
$T46	076704	#468-21729	470-21844
$T47	077402	#472-21937	473-22005
$T48	077674	#477-22198	480-22368
$T49	100654	#483-22504	485-22635
$T5	032352	#223-8889	225-9012
$T50	101412	#487-22757	489-22866
$T51	102030	#493-23033	497-23267
$T52	103216	#501-23417	504-23573
$T53	104034	#507-23718	510-23878
$T54	104674	#513-24035	516-24224
$T55	105736	#520-24369	523-24531
$T56	106626	#526-24692	530-24906
$T57	107756	#535-25160	539-25402
$T58	111250	#541-25510	543-25606
$T59	111654	#546-25737	548-25850
$T6	033022	#229-9151	231-9280
$T60	112322	#550-25956	552-26053
$T61	112674	#556-26267	559-26427
$T7	033512	#234-9436	237-9600
$T8	034370	#240-9764	244-9975
$T9	035404	#245-10043	247-10115