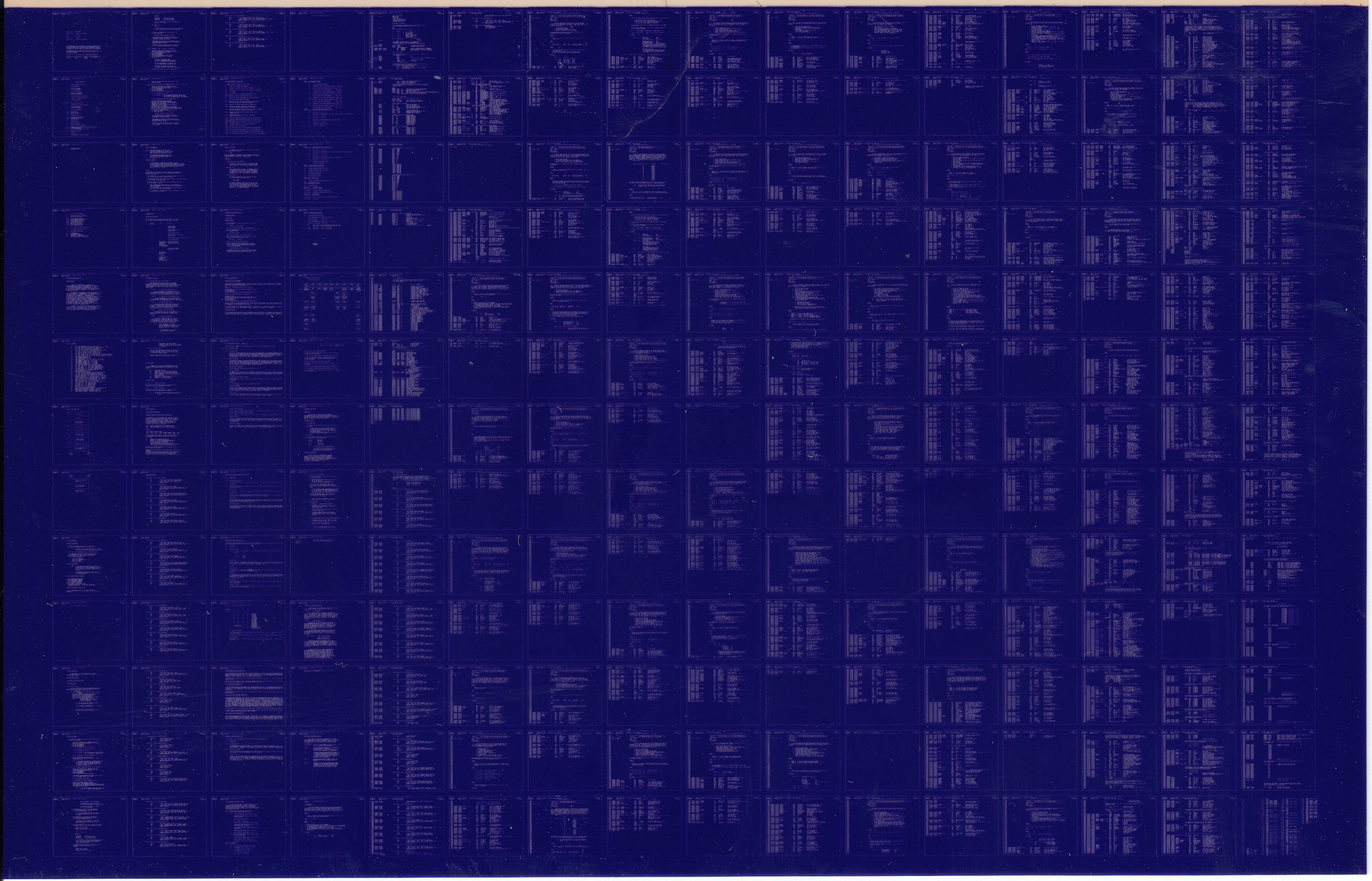
DH11

DIAGNOSTIC
CZDHMD0

AH-8494D-MC

FICHE 1 OF 2

JUL 1978
digital
MADE IN USA



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FICHE 2 OF 2

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PRODUCT CODE: AC-8492D-MC

PRODUCT NAME: CZDHMDO DH11 DIAGNOSTIC

DATE: JUNE 1978

AUTHOR: E. CROWLEY

MAINTAINED BY: DIAGNOSTIC ENGINEERING

TABLE OF CONTENTS

4.1 PERFORMANCE REPORTS
4.2 PROGRESS REPORTS

1.0 GENERAL PROGRAM DESCRIPTION

1.1 PROGRAM PURPOSE

"CZDHM" IS A COMPREHENSIVE DIAGNOSTIC TEST PROGRAM DESIGNED TO AID IN THE ACCEPTANCE TESTING, INSTALLATION CHECKOUT, AND CORRECTIVE MAINTENANCE OF THE DH11 16. LINE ASYNCHRONOUS SERIAL LINE MULTIPLEXOR. IT CONSISTS OF 48. LOGICALLY SEQUENCED DIAGNOSTIC TESTS DESIGNED TO TEST AND VERIFY THAT THE DH11 IS OPERATING IN ACCORDANCE WITH ITS DESIGN SPECIFICATIONS.

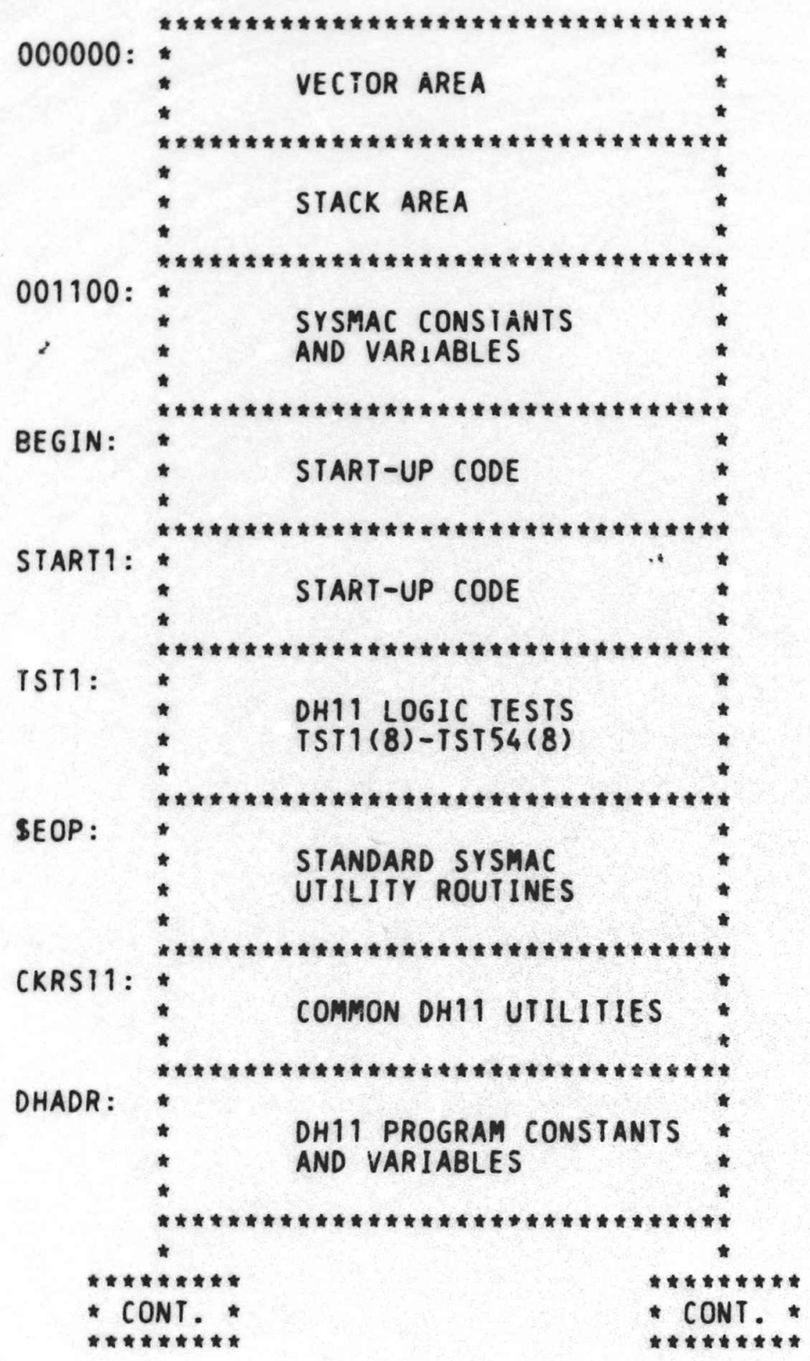
THE PROGRAM IS CONFIGURABLE BY THE AUTOSIZER OR BY CONSOLE DIALOGUE TO ENABLE IT TO AUTOMATICALLY TEST AND VERIFY ALL 16. LINES ON UP TO 16. CONTIGUOUS DH11'S (WITH NON-CONTIGUOUS/ CONTIGUOUS VECTOR ASSIGNMENTS). INDIVIDUAL UNITS AND INDIVIDUAL LINES WITHIN A UNIT MAY BE SELECTED OR DESELECTED TO FACILITATE FAULT ISOLATION TO A PARTICULAR DH11 OR A FUNCTIONAL AREA OF LOGIC AFFECTING A PARTICULAR LINE WITHIN A UNIT. WHENEVER AN ERROR IS DETECTED A COMPREHENSIVE ERROR REPORT IS TYPED THAT ALLOWS THE USER TO ISOLATE THE FAULT TO A FUNCTIONAL AREA OF LOGIC. EXTENSIVE DOCUMENTATION IS PROVIDED TO PERMIT THE USER TO PROCEED FROM THE ERROR REPORT TO ADDITIONAL LOGIC CHECKS TO MAKE IN ORDER TO ISOLATE THE PROBLEM TO A REPLACEABLE UNIT.

IN ORDER TO FACILITATE INSTALLATION CHECKOUT, TESTS 101, AND 105 THROUGH 107 (TEST GROUP 1) OF THE MODEM CONTROL DIAGNOSTIC, CZDHK, HAVE BEEN INCLUDED IN THIS PROGRAM. IN THIS WAY ALL THE LEVEL CONVERTERS AND CABLES CAN BE CHECKED WITH JUST ONE PROGRAM USING THE H315 TURNAROUND CONNECTOR.

1.1.1 LOGIC TEST SUMMARY

T1	CHECK SSYN RESPONSE FROM ALL DH11 REGISTERS
T2	TEST THAT "MASTER CLR" CAN CLEAR THE "SCR","LPR","BKR",AND "SSR" REGS
T3	TEST "SCR" REG R/W BITS CAN SET/CLR (NORMAL MODE)
T4	TEST "SCR" REG. READ ONLY BITS (NORMAL MODE)
T5	TEST "SCR" REG. BITS THAT CAN BE SET/CLR IN MAINT. MODE
T6	TEST THAT ALL R/W BITS IN "LPR" CAN BE SET/CLR
T7	TEST THAT ALL R/W BITS IN "BKR" CAN BE SET/CLR
T10	TEST THAT ALL R/W BITS IN "SSR" CAN BE SET/CLR
T11	TEST THAT CLR/SET OF BIT "N" IN "LPR" DOES NOT CLEAR ANY OTHER BITS
T12	TEST THAT CLR/SET OF BIT "N" IN "BKR" DOES NOT CLEAR ANY OTHER BITS
T13	TEST THAT CLR/SET OF BIT "N" IN "SSR" DOES NOT CLEAR ANY OTHER BITS
T14	"CAR" MEMORY ADDRESSING TEST
T15	"BCR" MEMORY ADDRESSING TEST
T16	"CAR" REGISTER TEST - ALL 1'S / ALL 0'S - ALL LINES
T17	"BCR" REGISTER TEST - ALL 1'S / ALL 0'S - ALL LINES
T20	"CAR" MEMORY PATTERNS TEST / 0'S DISTURB
T21	"BCR" MEMORY PATTERNS TEST / 0'S DISTURB
T22	"CAR" MEMORY PATTERNS TEST / 1'S DISTURB
T23	"BCR" MEMORY PATTERNS TEST / 1'S DISTURB
T24	TEST THAT "CAR" MEMORY EXT BITS SET/CLR PROPERLY
T25	TEST INTR. ENAB. BITS - INTR. CONDITION DISABLED
T26	TEST CHAR. AVAIL. I.E. WITH INTR. CONDITION ACTIVE
T27	TEST SILO OVFLW. I.E. WITH INTR. CONDITION ACTIVE
T30	TEST NON EX MEM I.E. WITH INTR. CONDITION ACTIVE
T31	TEST XMITTR DONE I.E. WITH INTR. CONDITION ACTIVE
T32	BASIC TRANSMITTER "NPR" LOGIC TEST 1
T33	TRANSMITTR NPR LOGIC TEST 2
T34	TEST THAT CHARACTER AVAILABLE CAN CAUSE RCVR INTERRUPT
T35	TEST THAT THE SILO STATUS REG COUNTS UP CORRECTLY
T36	TEST THAT SILO STATUS REGISTER DOWN COUNTS CORRECTLY
T37	TEST SILO ALARM LEVEL FOR COUNTS 0,1,2,4,8,16, AND 32
T40	TRANSMITTER TIMING TEST - ALL SELECTED LINES - ALL SPEEDS
T41	RECEIVER TIMING TEST - ALL SELECTED LINES - ALL SPEEDS
T42	VERIFY STORAGE OVERFLOW - NON MAINT MODE - ALL SELECTED LINES
T43	BASIC DATA TEST - ALL SELECTED LINES/ALL CHAR LENGTHS
T44	SINGLE LINE DATA TEST - ALL SELECTED LINES
T45	BASIC PARITY LOGIC TEST - ALL SELECTED LINES - ODD PARITY
T46	MULTI-LINE PARITY DATA TEST - ALL SELECTED LINES
T47	AUTO ECHO TEST 1 - ALL SELECTED LINES
T50	AUTO ECHO TEST 2 - ALL SELECTED LINES
T51	AUTO ECHO TEST 3 - ALL SELECTED LINES
T52	BREAK BIT TEST - ALL SELECTED LINES
T53	HALF DUPLEX TEST - ALL SELECTED LINES
T54	VERIFY THAT OVERRUN CAN SET PROPERLY - ALL SELECTED LINES
T55	ABBREVIATED MODEM CONTROL DIAGNOSTIC. (DZDHK T101)
T56	MODEM CONTROL DIAGNOSTIC CONTINUED (DZDHK T105)
T57	MODEM CONTROL DIAGNOSTIC CONTINUED (DZDHK T106)
T60	MODEM CONTROL DIAGNOSTIC CONTINUED (DZDHK T107)

1.1.2 CZDHM CORE MEMORY MAP



```
                    *********                    *********
                    * CONT. *                    * CONT. *
                    *********                    *********
                        *                            *
                        ************************************
EM1:                    *                            *
                        *       SYSMAC ERROR MESSAGE *
                        *       BUFFERS              *
                        *                            *
                        ************************************
TITLE:                  *                            *
                        *       DH11 MISCELLANEOUS   *
                        *       MESSAGE BUFFERS      *
                        *                            *
                        ************************************
RBUF:                   *                            *
                        *       TRANSMIT AND RECEIVE *
                        *       DATA BUFFERS         *
                        *                            *
                        ************************************
```

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE REQUIREMENTS

A. ANY PDP11 COMPUTER SYSTEM WITH 12K OF CORE MEMORY
AND A CONSOLE TERMINAL DEVICE (VT50,LA36 ETC)

NOTE: FOR PAPER TAPE SYSTEMS USING THE PDP11 ABSOLUTE LOADER, THE PROGRAM CAN LOAD AND RUN IN 8K OF CORE

B. A DH11 16. LINE ASYNCHRONOUS SERIAL LINE MULTIPLEXOR

C. TEST CONNECTORS AND MODULE (THE NO. OF EACH REQUIRED IS DETERMINED BY THE PARTICULAR TEST APPLICATION. REFER TO SECTION 6.3 FOR A COMPLETE DISCUSSION OF THE MAINTENANCE CONNECTORS)

1. H315 TEST CONNECTOR
2. H8611 TEST CONNECTOR(FOR DH11-AD)
3. M974 TEST MODULE
4. H861 TEST CONNECTOR

1.2.2 SOFTWARE REQUIREMENTS

A. ACT11 / APT11 — THE PROGRAM CONTAINS THE REQUIRED ACT11/APT11 SOFTWARE HOOKS TO PROPERLY INTERFACE WITH THE ACT/APT SYSTEMS. THE PROGRAM CONTAINS AN AUTOSIZER AND CAN BE RUN IN QUICK VERIFY MODE USING "CHAINS".

B. XXDP — THE PROGRAM MAY BE LOADED AND RUN FROM ANY "XXDP" MEDIUM PROVIDED THE SYSTEM HAS AT LEAST 12K OF CORE STORAGE.

1.3 RELATED DOCUMENTS AND STANDARDS

A. DH11-0 ENGINEERING DRAWINGS
B. DH11 MANUAL EK-DH11-MM-002
C. PDP11 PERIPHERALS HANDBOOK
D. PDP11 PROCESSOR HANDBOOK
E. MD-11-DZQAC-C1 SYSMAC.SML
F. MD-11-DZQXA "XXDP" USER'S GUIDE
G. DIAGNOSTIC ENGINEERING STANDARDS AND CONVENTIONS PROGRAMMING PRACTICES DOC NO. 175-003-009-00

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

CZDHM ASSUMES THAT THE FOLLOWING DIAGNOSTICS HAVE BEEN RUN PRIOR TO ITS EXECUTION AND THAT NO ERRORS WERE DETECTED:

A. CPU/CORE MEMORY DIAGNOSTICS

1.5 FAILURE ASSUMPTIONS

CZDHM ASSUMES THAT THE PROGRAM CAN BE LOADED INTO CORE AND STARTED. IT ALSO ASSUMES THE CPU/MEMORY HARDWARE IS FUNCTIONING ERROR FREE.

2.0 OPERATING INSTRUCTIONS

2.1 LOADING AND STARTING PROCEDURES

2.1.1 LOADING PROCEDURES

A. PAPER TAPE SYSTEMS

USE THE STANDARD PDP11 ABSOLUTE LOADER PROCEDURE FOR LOADING PAPER TAPES. AFTER LOADING THE PROGRAM MUST BE MANUALLY STARTED AS DESCRIBED IN SECTION 2.1.2.

B. "XXDP" SYSTEMS (REFER TO "XXDP" USER'S GUIDE MD-11-DZDQXA)

1. MOUNT THE APPROPRIATE MEDIUM (DECTAPE,DISK ETC) CONTAINING THE "XXDP" MONITOR AND CZDHM.
2. BOOT THE SYSTEM TO LOAD THE MONITOR
3. ONCE LOADED THE "XXDP" MONITOR PRINTS AN INTRODUCTORY MESSAGE AND RESPONDS WITH A ".".
4. TYPE: "CZDHM" FOLLOWED BY EITHER A <CR> CARRIAGE RETURN OR AN "ALTMODE" TO LOAD THE PROGRAM.

IF A <CR> WAS TYPED THE USER MUST MANUALLY START THE PROGRAM AFTER LOADING.

IF THE "ALTMODE" TERMINATOR WAS USED THE PROGRAM WILL SELF START AFTER LOADING.

NOTE: WHENEVER THE DH11 CONFIGURATION IS CHANGED THE DIAGNOSTIC SHOULD BE RELOADED.

2.1.2 STARTING PROCEDURES

A. TO AUTOMATICALLY START THE PROGRAM USING THE AUTOSIZER
(START AT LOC 000200(8))

1. INSTALL THE REQUIRED TEST CONNECTORS FOR THE PARTICULAR TEST APPLICATION (REFER TO SECTION 6.3)
2. SET THE HALT/ENABLE SWITCH TO HALT
3. SET THE SR=000200(8)
4. DEPRESS LOAD ADDRESS
5. SET THE SR=000000 (WORST CASE TESTING)

   SET THE SR=000002 (TO TYPE THE DEVICE MAP)

   SET THE SR=004000 (QUICK PASS)

   SET THE SR=002000 (TO SKIP AN ABBREVIATED MODEM CONTROL TEST. REFER TO SECTIONS 1.1 AND 6.3)

   SET THE SR=000400 (HALT AFTER PARAMETER SET-UP)

6. SET THE HALT/ENABLE SWITCH TO ENABLE
7. DEPRESS START - THE PROGRAM WILL TEST ALL LINES ON ALL DH'S FOUND.

   NOTE: THE CSR REGISTER ADDRESS OF THE MODEM CONTROL('S) IS LOADED ONLY FROM THE AUTOSIZER, HOWEVER, AFTER INITIAL LOAD, THE PROGRAM CAN BE STARTED AT 210(8) TO CHANGE SELECTION PARAMETERS AS DESCRIBED IN SECTION 2.1.2 D.

B. TO TYPE IN ALL REQUIRED PARAMETERS (START AT LOC 000200(8))

1. INSTALL THE REQUIRED TEST CONNECTORS FOR THE PARTICULAR TEST APPLICATION (REFER TO SECTION 6.3)
2. SET THE HALT/ENABLE SWITCH TO HALT
3. SET THE SR=000200(8)
4. DEPRESS LOAD ADDRESS
5. SET THE SR=000001 (FOR INPUT DIALOGUE)

   AFTER INPUT DIALOGUE BEGINS BUT PRIOR TO ACTUAL TESTING:
   SET THE SR=000000 (WORST CASE TESTING)

   SET THE SR=004000 (QUICK PASS)

   SET SR=000400 (HALT AFTER PARAMETER SET-UP)

6. SET THE HALT/ENABLE SWITCH TO ENABLE
7. DEPRESS START - THE PROGRAM TYPES THE TITLE AND THEN ASKS FOR THE NUMBER OF ADDRESSES BETWEEN VECTORS. TYPE EITHER 10(8) OR 20(8) DEPENDING UPON THE PARTICULAR CONFIGURATION TO BE TESTED:

   NOTES: IF THE MODEM CONTROL VECTORS ARE INTERLEAVED WITH THE DH11 VECTORS (2040 FRONT END)

THE DISPLACEMENT IS 20(8) ADDRESSES.

FOR STANDARD DH11'S WITH CONTIGUOUS
VECTORS THE DISPLACEMENT IS 10(8) ADDRESSES.

IF <CR> ONLY WAS TYPED, THE DEFAULT
WILL BE 20(8) ADDRESSES.

8. THE PROGRAM WILL ASK FOR THE DEVICE ADDRESS.
   TYPE IN THE ADDRESS (OCTAL) OF THE FIRST DH11
   IN THE SYSTEM FOLLOWED BY A <CR>.

   IF AN INVALID ADDRESS IS TYPED THE PROGRAM
   WILL TYPE AN ERROR MESSAGE AND ASK YOU TO
   TRY AGAIN.

9. THE PROGRAM WILL ASK FOR THE VECTOR ADDRESS.
   TYPE IN RECEIVER VECTOR ADDRESS (OCTAL) OF
   THE FIRST DH11 FOLLOWED BY A <CR>.

   IF AN INVALID VECTOR ADDRESS IS TYPED THE
   PROGRAM WILL TYPE AN ERROR MESSAGE AND ASK
   YOU TO TRY AGAIN.

10. NEXT THE PROGRAM WILL ASK FOR THE DEVICE SELECTION
    PARAMETER. TYPE IN AN OCTAL NO. ENCODED AS FOLLOWS:

    BIT00=1 TEST DH11 #00
    BIT01=1 TEST DH11 #01
    BIT02=0 DO NOT TEST DH11 #C2
      ''
      ''
    BIT15=1 TEST DH11 #15

    EXAMPLES:

    177777<CR> TEST ALL 16. DH11'S
    100000<CR> TEST ONLY DH11 #17(8)
    000005<CR> TEST DH11 #00 AND 02

    IF A <CR> ONLY IS TYPED THE PROGRAM WILL DEFAULT
    TO THE LAST TYPED IN DEVICE SELECT PARAMETER. IF
    THIS IS THE INITIAL LOAD IT WILL DEFAULT TO
    000003 (DH11 #00 AND 01)

11. NEXT THE PROGRAM WILL ASK FOR THE LINE SELECTION
    PARAMETERS. TYPE AN ENCODED OCTAL NO. AS
    FOLLOWS:

    BIT00=1 TEST LINE #00
    BIT01=1 TEST LINE #01
    BIT02=0 DO NOT TEST LINE #02
      ''
      ''
    BIT15=1 TEST LINE #15

EXAMPLES:

177777<CR> TEST ALL 16. LINES
100000<CR> TEST LINE 17(8) ONLY
000005<CR> TEST LINES 00 AND 02

IF A <CR> RETURN ONLY IS TYPED THE PROGRAM WILL DEFAULT TO 16. LINES.

****
NOTE
****

IF MORE THAN ONE DH11 IS TESTED THE SAME COMBINATION OF LINES WILL BE TESTED ON ALL DH11'S SELECTED.

12. IF SR8=1, THE PROGRAM WILL HALT AND PRINT THE FOLLOWING MESSAGE:

    "DEPRESS CONTINUE TO START TESTING"

    AT THIS POINT SET UP THE DESIRED SWITCH REGISTER OPTIONS (REFER TO PARA 2.3.1) AND DEPRESS "CONTINUE" TO START THE TESTING.

    THE PURPOSE OF THIS HALT IS TO ALLOW THE USER TO DUMP THE PROGRAM AFTER SETTING UP THE CONFIGURATION PARAMETERS FOR HIS SYSTEM.

13. PROGRAM WILL BEGIN EXECUTION. REFER TO SECTIONS 2.4, 3.0, AND 4.0 FOR ERROR AND STATUS REPORTS.

C. DEFAULT PARAMETER START ** (START AT LOC 000204(8))

1. INSTALL THE REQUIRED TEST CONNECTORS FOR THE PARTICULAR TEST APPLICATION (REFER TO SECTION 6.3)
2. SET THE HALT/ENABLE SWITCH TO HALT
3. SET THE SR=000204(8)
4. DEPRESS LOAD ADDRESS
5. SET THE SR=000000 (WORST CASE TESTING)
6. SET THE HALT/ENABLE SWITCH TO ENABLE
7. DEPRESS START

** IF THIS IS THE INITIAL LOAD, THE DEFAULT PARAMETERS ASSUME TWO DH11'S WITH THE FOLLOWING ADDRESS ASSIGNMENTS

DH11 #0 DEVADR=760020, VECTOR=330, BR5
DH11 #1 DEVADR=760040, VECTOR=350, BR5

OTHERWISE, THE PROGRAM WILL DEFAULT TO THE PARAMETERS USED IN THE PREVIOUS EXECUTION.

8. PROGRAM EXECUTION BEGINS. REFER TO SECTIONS 2.4, 3.0,

AND 4.0 FOR EXECUTION TIMES, ERROR REPORTS, AND
PROGRESS REPORTS.

D. TO CHANGE DEVICE AND LINE SELECT PARAMETERS ONLY (START AT LOC 000210(8))

1. INSTALL THE REQUIRED TEST CONNECTORS FOR THE PARTICULAR TEST APPLICATION (REFER TO SECTION 6.3)
2. SET THE HALT/ENABLE SWITCH TO HALT
3. SET THE SR=000210(8)
4. DEPRESS LOAD ADDRESS
5. SET THE SR=000000 (WORST CASE TESTING)

   SET THE SR=004000 (QUICK PASS)

   SET THE SR=002000 (TO SKIP AN ABBREVIATED MODEM CONTROL TEST. THIS ASSUMES THE AUTOSIZER WAS PREVIOUSLY USED TO LOAD THE MODEM CONTROL CSR ADDRESSES.)

   SET THE SR=000400 (HALT AFTER PARAMETER SET-UP)

6. SET THE HALT/ENABLE SWITCH TO ENABLE
7. DEPRESS START - THE PROGRAM TYPES THE TITLE AND THEN ASKS FOR DEVICE SELECTION PARAMETER. PROCEED AS IN (B-10) ABOVE.
9. PROGRAM WILL ASK FOR LINE SELECTION PARAMETERS. PROCEED AS IN (B-11) ABOVE.
   NOTE: THE DEVICE SELECTION AND LINE SELECTION PARAMETERS APPLY TO BOTH THE DH11 AND THE MODEM CONTROL, THAT IS, IF DH #7, LINE #3 IS CHOSEN THEN MODEM CONTROL #7 LINE #3 WILL ALSO BE TESTED.
10. IF SR8=1, THE PROGRAM WILL HALT AND PRINT THE FOLLOWING MESSAGE:

    "DEPRESS CONTINUE TO START TESTING"

    AT THIS POINT SET UP THE DESIRED SWITCH REGISTER OPTIONS (REFER TO PARA 2.3.1) AND DEPRESS "CONTINUE" TO START THE TESTING.

    THE PURPOSE OF THIS HALT IS TO ALLOW THE USER TO DUMP THE PROGRAM AFTER SETTING UP THE CONFIGURATION PARAMETERS FOR HIS SYSTEM.

11. PROGRAM WILL BEGIN EXECUTION. REFER TO SECTIONS 2.4, 3.0, AND 4.0 FOR EXECUTION TIMES ERROR AND STATUS REPORTS.

2.2 SPECIAL ENVIRONMENTS

2.2.1 ACT11/APT11

WHEN UNDER CONTROL OF THE ACT11/APT11 SYSTEMS THE PROGRAM MAY BE LOADED IN DUMP MODE AND CAN BE RUN AS PART OF A QUICK VERIFY CHAIN SINCE AN AUTOSIZER IS USED.

2.2.2 XXDP

THE PROGRAM MAY BE LOADED AND RUN FROM ANY "XXDP" MEDIUM PROVIDED THERE IS AT LEAST 12K OF CORE. IT MAY BE RUN AS PART OF AN "XXDP" CHAIN.

2.2.3 SWITCHLESS FEATURE

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER. IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH REGISTER (LOC. 176) IS USED.

CONTROL:

THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

1) TYPE CONTROL G < G>; THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.

2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)

3) AFTER THE ''NEW='' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE TTY:

   A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY OCTAL NUMBERS WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED)
   IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.

   B) IF A CONTROL U < U> IS DEPRESSED THEN THE PROGRAM WILL DO A <CR>. RETYPE THE DESIRED NUMBER.

2.3 PROGRAM OPTIONS

2.3.1 CONSOLE SWITCH REGISTER

THE FOLLOWING TABLE ILLUSTRATES THE FUNCTIONS OF THE CONSOLE SWITCH REGISTER DURING PROGRAM START AND DURING DH TESTING:

SWITCH REGISTER	START	TESTING
15 = 1	-----	HALT ON ERROR (AFTER TYPING ERROR MESSAGE)
14 = 1	-----	LOOP CONTINUOUSLY ON CURRENT TEST.
13 = 1	-----	INHIBIT ERROR TYPOUTS.
11 = 1	-----	INHIBIT SUB-TEST ITERATIONS (QUICK PASS)
10 = 1	-----	INHIBIT MODEM CONTROL ABBREVIATED TESTS.
9 = 1	-----	LOCK ON HARD ERRORS
8 = 1	HALTS AFTER CONFIGURATION TO PERMIT DUMPING PRE-CONFIGURED COPIES OF THE PROGRAM.	SEARCH FOR AND LOCK ON TEST SELECTED BY CONTENTS OF SR <07:00>
<07:00>		CONTAINS TEST NUMBER TO SEARCH FOR WHEN SR 08 = 1
1 = 1	TYPES DEVICE MAP GENERATED BY THE AUTOSIZER.	-----
0 = 1	ALLOWS THE USER TO INPUT DH PARAMETERS MANUALLY. (INHIBITS THE AUTOSIZER)	-----

2.3.2 CORE MEMORY LOCATIONS

A. DH11 CONFIGURATION TABLES AND VARIABLES

WHEN THE AUTOSIZER OPTION IS USED, THIS PROGRAM CAN RUN NON-STANDARD DH11 CONFIGURATIONS (NON-CONTIGUOUS ADDRESSES). THE USER CAN ALSO PATCH IN HIS OWN ADDRESSES TO MATCH HIS CONFIGURATION AND THEN USE THE DEFAULT START TO RUN THE UPDATED PROGRAM. THE TABLES AND LOCATIONS TO MODIFY ARE DESCRIBED BELOW:

1. DHADTB: 16. WORD DEVICE ADDRESS TABLE

THE USER CAN DEPOSIT THE ADDRESSES FOR HIS NON-STANDARD CONFIGURATION IN THIS TABLE. THE POSITION OF THE ENTRY IN THE TABLE CORRESPONDS DIRECTLY TO THE DEVICE NO. (IE DH11 #00 - WORD 00, DH11 #01 - WORD 01 ETC.)

2. DHVCTB: 16. WORD DEVICE VECTOR ADDRESS TABLE

THE USER CAN DEPOSIT THE VECTOR ADDRESSES FOR HIS NON-STANDARD CONFIGURATION IN THIS TABLE. AGAIN THE POSITION IN THE TABLE CORRESPONDS DIRECTLY TO DEVICE NUMBER.

3. BRLVL: 16. WORD BR LEVEL TABLE

THIS TABLE STORES THE BR LEVELS ASSUMED BY THE INTERRUPT SERVICE ROUTINES FOR EACH DH11. THE RCVR BR LEVEL IS STORED IN THE LOW BYTE AND THE XMITTER BR LEVEL IN THE HIGH BYTE. AGAIN THE POSITION IN THE TABLE CORRESPONDS DIRECTLY TO THE DH11 DEVICE NO.

4. DHSEL: DEVICE SELECTION PARAMETER

THIS WORD MUST BE SET UP TO CORRESPOND TO THE DEFAULT CONFIGURATION DEFINED BY THE TABLE SET-UPS. REFER TO SECTION 2.1.2.(B10) FOR A DESCRIPTION OF ITS ENCODING.

5. LINSEL: LINE SELECTION PARAMETER

THIS WORD IS PROGRAM LOADED AS A 177777(8) TO SPECIFY THAT ALL LINES (16.) ARE TO BE TESTED. IT MAY BE MODIFIED AT CONFIGURATION TIME TO SPECIFY ANY COMBINATION OF LINES TO TEST. REFER TO SECTION 2.1.3.(B11) FOR A DESCRIPTION OF ITS ENCODING.

NOTE: ONCE THE PROGRAM IS STARTED IT IS TABLE DRIVEN AND USES "DHASEL", "LINSEL" AND THE CONTENTS OF THE THREE TABLES ABOVE TO DEFINE THE CONFIGURATION TO TEST.

NOTE: IT IS RECOMMENDED THAT WHEN NON-STANDARD CONFIGURATIONS ARE

ENCOUNTERED, THE MODEM CONTROL DIAGNOSTIC, CZDHK, SHOULD BE RUN, RATHER THAN ALTERING THE MODEM CONTROL TABLES IN THIS PROGRAM.

B. SUB-TEST ITERATION COUNT

THERE IS A LOCATION TAGGED "$MXCNT:" THAT DETERMINES HOW MANY TIMES EACH SUB-TEST IS REPEATED (SR11=0) IT IS PROGRAM LOADED TO 000010(8) BUT CAN BE CHANGED TO MODIFY THE ITERATION COUNT.

NOTE THAT MODIFYING THIS LOCATION WILL CHANGE THE PROGRAM EXECUTION TIME DEFINED IN PARA 2.4(B).

2.3.3 REGISTER USAGE

IN MOST OF THE TESTS THE GENERAL REGISTERS CONTAIN STANDARD INFORMATION AS SHOWN BELOW. ON PROGRAM HALTS THE REGISTERS CAN BE EXAMINED DIRECTLY TO DISPLAY THIS INFORMATION.

R0	TEST NUMBER IN OCTAL
R1	ADDRESS OF THE "SCR" REG (DEVICE ADDRESS)
R2	ADDRESS OF THE DH11 REGISTER BEING TESTED
R3	ACTUAL CONTENTS OF THE DH11 REG BEING TESTED
R4	WHAT THE CONTENTS OF THE DH11 REG BEING TESTED SHOULD HAVE BEEN
R5	GENERAL USE - REFER TO THE LISTING FOR ITS USE
R6	CONTENTS OF THE STACK POINTER
R7	CONTENTS OF THE PROGRAM COUNTER

2.4 EXECUTION TIMES

A. SR11 = 0 SUB-TEST ITERATIONS

WITH ONE DH11 SELECTED FOR TESTING 16. LINES ONE COMPLETE ERROR FREE PASS TAKES APPROXIMATELY 8 MINUTES.

B. SR11 = 1 INHIBIT ITERATIONS

WITH ONE DH11 SELECTED FOR TESTING 16. LINES ONE COMPLETE ERROR FREE PASS TAKES APPROXIMATELY ONE MINUTE

NOTE: THE ABOVE TIMES WERE DETERMINED WHEN THE PROGRAM WAS RUN ON A PDP-11/45 AND A PDP-11/40 CPU.

3.0 ERROR INFORMATION

3.1 ERROR REPORTING PROCEDURES

3.1.1 STANDARD SYSMAC.SML ERROR REPORTING CONVENTIONS

THE PROGRAM UTILIZES THE STANDARD PDP11 DIAGNOSTICS ERROR UTILITIES. THE TEST ROUTINE CALLS THESE UTILITIES USING AN "ERROR N" INSTRUCTION (CODED EMT) WHERE "N" IS THE NUMBER OF THE ERROR MESSAGE. THE UTILITY ROUTINE USES "N" TO ACCESS THE PROPER ERROR INFORMATION VIA THE ERROR TABLE DESCRIBED IN SECTION 3.1.2 BELOW. EACH MESSAGE RESULTS IN THREE LINES OF TYPEOUT AS FOLLOWS:

LINE 1 A BRIEF DESCRIPTION OF THE FAILING FUNCTION
LINE 2 LABELS TO IDENTIFY THE DATA TYPED ON LINE 3
LINE 3 THE ACTUAL ERROR DATA (UP TO 8 OCTAL OR DECIMAL NOS.)

EXAMPLE:

```
SYSTEM CONTROL REGISTER ERROR
 (PC)    (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B
002720  000002  001074  000003  160020  160020  000000  000001
```

THE ERROR TABLE ITEMS SHOWN IN THE NEXT SECTION DESCRIBE ALL THE DH ERROR MESSAGES WITHIN CZDHM AND ARE INTERPRETED AS FOLLOWS:

EM ADDRESS OF THE MESSAGE FOR LINE 1
DH ADDRESS OF THE DATA HEADER MESSAGE FOR LINE 2
DT ADDRESS OF THE TABLE OF ADDRESSES THAT POINT TO THE DATA WORDS TO BE PRINTED
DF ADDRESS THAT POINTS TO THE DATA DESCRIPTOR TABLE THAT DEFINES WETHER AN ITEM IS OCTAL OR DECIMAL. IF THIS ENTRY IS "0" ALL DATA WORDS ARE IN OCTAL.

SECTION 3.1.3 DEFINES THE MEANING OF THE MNEUMONICS USED IN THE VARIOUS DATA HEADERS.

THERE ARE ONLY TWO MESSAGES IN THE MODEM CONTROL PORTION OF THIS PROGRAM:
ONE INFORMS THE USER THAT NO MODEM CONTROL'S WERE FOUND BY THE AUTOSIZER AND THE PROGRAM THEN CONTINUES TESTING THE DH11'S.
THE OTHER INSTRUCTS THE USER TO RUN THE MODEM CONTROL DIAGNOSTIC, CZDHK, DUE TO AN ERROR. THE PROGRAM THEN CONTINUES.

3.1.2 ERROR MESSAGE TABLES

```
;ERROR TABLE ITEM FOR ERROR MESSAGE 1

        EM1             ;"DH11 REGISTER REFERENCE CAUSED TIMEOUT"
        DH1             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR "
        DT1             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 2

        EM2             ;"SYSTEM CONTROL REGISTER ERROR"
        DH2             ; (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 3

        EM3             ;"DH11 MASTER CLEAR FAILED TO CLR SPECIFIED REG"
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 4

        EM4             ;"LINE PARAMETER REGISTER ERROR"
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 5

        EM5             ;"BREAK CONTROL REGISTER ERROR"
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 6

        EM6             ;"SILO STATUS REGISTER ERROR"
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 7

        EM7             ;"CURRENT ADDRESS REGISTER ERROR - LINE #XX"
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL
```

```
                ;ERROR TABLE ITEM FOR ERROR MESSAGE 10

                        EM10            ;"BYTE COUNTER REGISTER ERROR - LINE #XX"
                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR ERROR MESSAGE 11

                        EM11            ;"UNEXPECTED DH11 RCVR INTERRUPT"
                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR ERROR MESSAGE 12

                        EM12            ;"UNEXPECTED DH11 XMITTR INTERRUPT"
                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR ERROR MESSAGE 13

                        EM13            ;"CHAR AVAILABLE FAILED TO GENERATE RCVR INTERRUPT"
                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR ERROR MESSAGE 14

                        EM14            ;"TRANSMITTER NPR LOGIC ERROR - LINE #  "
                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR ERROR MESSAGE 15

                        EM15            ;"XMITTR FAILED TO INTERRUPT - LINE #  "
                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR ERROR MESSAGE 16

                        EM16            ;"RCVR FAILED TO INTERRUPT"
                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL
```

```
;ERROR TABLE ITEM FOR ERROR MESSAGE 17

        EM17            ;"TRANSMITTER TIMING ERROR - LINE #  "
        DH6             ;" (PC)  (PS)  (SP)  TEST  DEVADR  SPEED   TIMEB   TIMEC"
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 20

        EM20            ;RECEIVER TIMING ERROR - LINE #  "
        DH6             ;" (PC)  (PS)  (SP)  TEST  DEVADR  SPEED   TIMEB   TIMEC"
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 21

        EM21            ;"RCVR FAILED TO INTERRUPT - LINE #  "
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 22

        EM22            ;"CHAR AVAIL FAILED TO SET ON TIME - LINE #  "
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 23

        EM23            ;"BASIC DATA TEST ERROR - LINE #  "
        DH7             ;" (PC)  (PS)  (SP)  TEST  DEVADR  CHRLNG  WAS  S/B "
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 24

        EM24            ;"AUTO ECHO TEST ERROR - LINE #  "
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 25

        EM25            ;"BREAK BIT TEST ERROR - LINE #  "
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL
```

```
;ERROR TABLE ITEM FOR ERROR MESSAGE 26

        EM26            ;"HALF-DUPLEX TEST ERROR - LINE #  "
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 27

        EM27            ;"UNEXPECTED BUS ERROR TRAP"
        DH3             ; (PC)  (PS)  (SP)  TEST  TRPPC  TRPPS
        DT3             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR EkROR MESSAGE 30

        EM30            ;"UNEXPECTED RSVD INSTR TRAP"
        DH3             ; (PC)  (PS)  (SP)  TEST  TRPPC  TRPPS
        DT3             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 31

        EM31            ;"AUTO ECHO DATA COMPARE ERROR - LINE #  "
        DH4             ; (PC)   (PS)   (SP)    TEST   WASADR  SBADR   WAS    S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 32

        EM32            ;"AUTO ECHO TEST TIMEOUT - LINE #  "
        DH5             ;" (PC)  (LPRG)   TEST""
        DT4             ;$ERRPC,$TMP0,$TMP2
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 33

        EM33            ;"PARITY LOGIC TEST ERROR - LINE #  "
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B"
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 34

        EM34            ;"MULTI-LINE PARITY DATA TEST ERROR - LINE #   - SUBTEST #  "
        DH4             ;" (PC)  (PS)  (SP)  TEST  WASADR  SBADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL
```

```
;ERROR TABLE ITEM FOR ERROR MESSAGE 35

        EM35            ;"MULTI-LINE PARITY DATA TEST TIMEOUT"
        DH14            ;" (PC)  (LPRG)  LINACT "
        DT6             ;"$ERRPC,$TMP0,$TMP3"
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 36

        EM36            ;CHAR AVAILABLE TIMEOUT"
        DH5             ;" (PC)  (LPRG)   TEST"
        DT4             ;$ERRPC,$TMP0,$TMP2
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 37

        EM37            ;"DATA COMPARE ERROR - LINE #  "
        DH4             ;" (PC)  (PS)  (SP)  TEST  WASADR  SBADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 40

        EM40            ;"BUFFER ACTIVE REG ERROR - LINE #  "
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 41

        EM41            ;"RCVR FALSE INTERRUPT"
        DH5             ;" (PC)  (LPRG)   TEST"
        DT4             ;$ERRPC,$TMP0,$TMP2
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 42

        EM42            ;"SILO OVERFLOW ERROR"
        DH5             ;" (PC)  (LPRG)   TEST"
        DT4             ;$ERRPC,$TMP0,$TMP2
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 43

        EM43            ;"SILO OVERFLOW FAILED TO GENERATE RCVR INTERRUPT"
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL
```

```
;ERROR TABLE ITEM FOR ERROR MESSAGE 44

        EM44            ;"NON EX MEMORY FAILED TO GENERATE XMITTR INTERRUPT"
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 45

        EM45            ;"XMIT DONE FAILED TO GENERATE XMITTR INTERRUPT"
        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 46

        EM46            ;"CURRENT ADDRESS MEMORY PATTERNS TEST ERROR - LINE #  "
        DH10            ;" (PC)   LINEWR  PATTRN   TEST   DEVADR  REGADR   WAS     S/B"
        DT5             ;$ERRPC,$TMPO,$TMP1,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 47

        EM47            ;"BYTE COUNT MEMORY PATTERNS TEST ERROR - LINE #  "
        DH10            ; (PC)   LINEWR  PATTRN   TEST   DEVADR  REGADR   WAS     S/B"
        DT5             ;$ERRPC,$TMPO,$TMP1,$REG0,$REG1,$REG2,$REG3,$REG4
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 50

        EM50            ;"TEST TIMEOUT WAITING FOR XMIT DONE - LINE #  "
        DH2             ;" (PC)    (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
        DT2             ;"$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4"
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 51

        EM51            ;"NPR LOGIC TEST 2 ERROR"
        DH11            ;" (PC)   LINACT  LINCHK   TEST   DEVADR  REGADR   WAS     S/B"
        DT5             ;$ERRPC,$TMPO,$TMP1,$REG0,$REG1,$REG2,$REG3,$REG4"
        0               ;PRINT ALL OCTAL

;ERROR TABLE ITEM FOR ERROR MESSAGE 52

        EM52            ;"BASIC DATA COMPARE ERROR"
        DH2             ;" (PC)   (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
        DT2             ;$ERRPC,$TMPO,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4"
        0               ;PRINT ALL OCTAL
```

```
                ;ERROR TABLE ITEM FOR ERROR MESSAGE 53

                        EM50            ;"TEST TIMEOUT WAITING FOR XMIT DONE - LINE #  "
                        DH12            ;" (PC)   SPEED    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR ERROR MESSAGE 54

                        EM22            ;"CHAR AVAIL FAILED TO SET ON TIME - LINE #  "
                        DH12            ;" (PC)   SPEED    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                    ;   0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR EkROR MESSAGE 55

                        EM22            ;"CHAR AVAIL FAILED TO SET ON TIME - LINE #  "
                        DH13            ;" (PC)    (PS)    (SP)    TEST   DEVADR  CHRLNG  SCRWAS  SCRS/B"
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR ERROR MESSAGE 56

                        EM56            ;"OVERRUN BIT FAILED TO SET - LINE #  "
                        DH2             ; (PC)    (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL

                ;ERROR TABLE ITEM FOR ERROR MESSAGE 57

                        EM57            ;"STORAGE OVERFLOW BIT FAILED - LINE #  "
                        DH2             ; (PC)    (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
                        0               ;PRINT ALL OCTAL
```

3.1.3 DATA HEADER MNEUMONIC DEFINITIONS

ALL NUMBERS PRINTED AS ERROR DATA ARE IN OCTAL

(PC)	ADDRESS OF THE ERROR CALL (ERROR PC)
(PS)	CONTENTS OF THE PSW AT THE TIME OF THE ERROR
(SP)	CONTENTS OF THE STACK POINTER AT THE TIME OF THE ERROR
TEST	TEST NUMBER
DEVADR	DEVICE ADDRESS - 1ST ADDRESS IN THE SELECTED DH11
REGADR	ADDRESS OF THE DH11 RFGISTER BEING TESTED
WAS	WHAT THE ACTUAL DATA READ WAS (DH11 REG OR CORE LOC.)
S/B	WHAT THE DATA READ SHOULD HAVE BEEN
SPEED	SPEED CODE IN THE "LPR" REG AT THE TIME OF THE ERROR REFER TO SECTION 5.2.3 FOR SPEED CODE TABLES
TIMEB	CONTENTS OF SOFTWARE COUNTER USED IN TIMING TESTS
TIMEC	CONTENTS OF SOFTWARE COUNTER USED IN TIMING TESTS NOTE:"TIMEB" SHOULD ALWAYS BE LESS THAN "TIMEC"
CHRLNG	CHARACTER LENGTH CODE IN THE "LPR" AT THE TIME OF THE ERROR 00=5 BITS, 01=6 BITS, 02=7 BITS, 03= 8 BITS
TRPPC	CONTENTS OF THE PC (R7) AT THE TIME OF A BUS ERROR OR RSVD INSTR TRAP.
TRPPS	CONTENTS OF THE PSW AT THE TIME OF A BUS ERROR OR RSVD INSTR TRAP.
(LPRG)	CONTENTS OF THE "LPR" REGISTER AT THE TIME OF THE ERROR
LINACT	FLAGS USED BY MULTI-LINE TESTS TO INDICATE LINES STILL ACTIVE
WASADR	CORE MEMORY ADDRESS OF THE "WAS" DATA (ACTUAL DATA READ)
SBADR	CORE MEMORY ADDRESS OF THE S/B DATA (GOOD DATA)
SCRWAS	CONTENTS OF THE "SCR" REGISTER
SCRS/B	WHAT THE CONTENTS OF THE "SCR" REGISTER SHOULD HAVE BEEN
LINCHK	LINE NO. BEING CHECKED DURING "CAR" AND "BCR" MEMORY TESTS
LINEWR	LINE NO. BEING WRITTEN INTO DURING "CAR" AND "BCR" MEMORY TESTS
PATTRN	TEST PATTERN BEING WRITTEN INTO EITHER THE "CAR" OR "BCR" MEMORIES

3.2 POWER FAIL PRINTOUT

IF A POWER FAILURE OCCURS WHILE THE PROGRAM IS RUNNING, THE FOLLOWING PRINTOUT OCCURS:

"POWER"

AFTER THE PRINTOUT THE PROGRAM WILL BE RESTARTED AUTOMATICALLY FROM THE BEGINNING. NO ATTEMPT IS MADE TO CONTINUE THE PROGRAM FROM THE POINT OF THE POWER FAIL INTERRUPTION.

3.3 ERROR HALTS

A. SYSMAC ERROR SERVICE ROUTINE HALT

WHEN SR15=1 A "HALT" IS EXECUTED IN THE SYSMAC ERROR UTILITY AFTER THE ERROR TYPEOUT. TO RESUME TESTING FROM THE POINT OF THE "HALT" SIMPLY DEPRESS CONTINUE.

B. POWER FAIL HALT

WHEN A POWER DOWN IS DETECTED, THE PROGRAM HALTS IN THE POWER FAIL UTILITY ROUTINE. IF FOR SOME REASON THE AUTO-START FEATURE FAILS TO RESTART THE PROGRAM, THE PROGRAM WILL "LOCK" ON THIS HALT IF CONTINUE IS DEPRESSED. IN THIS CASE THE PROGRAM MUST BE RESTARTED.

C. TRAP CATCHER HALTS

ALL INACTIVE VECTORS ARE SET UP WITH THE STANDARD PDP11 TRAP CATCHER AS DESCRIBED BELOW:

```
VN   / VN+2
VN+2/ HALT
```

IF A TRAP OR INTERRUPT OCCURS TO A VECTOR THAT HAS NOT BEEN SET UP BY THE TEST ROUTINE, A "HALT" OCCURS IN THE VECTOR AREA. THE ADDRESS DISPLAY INDICATES WHICH VECTOR THE PROGRAM TRAPPED TO AND THE LAST ENTRY PUSHED ON TO THE STACK INDICATES WHERE THE PROGRAM WAS WHEN THE TRAP OR INTERRUPT OCCURRED.

4.0 PERFORMANCE AND PROGRESS REPORTS

4.1 PERFORMANCE REPORTS

(NONE PROVIDED)

4.2 PROGRESS REPORTS

A. WHEN THE PROGRAM IS STARTED OR RESTARTED IT PRINTS THE TITLE MESSAGE:

"CZDHM-"X" DH11 DIAGNOSTIC"

WHERE "X" IS THE REVISION LEVEL LETTER DESIGNATION.

B. WHEN THE PROGRAM BEGINS TESTING ON EACH DH11 IT TYPES THE FOLLOWING MESSAGE:

"TESTING DH11 #NN"

WHERE "NN" IS THE DEVICE NO. IN OCTAL (00-17)

C. WHEN THE PROGRAM COMPLETES A PASS (TESTED ALL SELECTED LINES ON ALL SELECTED DH11'S) IT TYPES:

"END PASS #XXXXX"

WHERE "X" IS THE PASS COUNT IN DECIMAL.

D. WHEN THE PROGRAM IS IN THE CONFIGURATION DIALOGUE (START AT 200, OR 210) AND SR8 AND SR0=1, THE PROGRAM WILL HALT AFTER ACCEPTING THE INPUT PARAMETERS AND TYPE THE FOLLOWING MESSAGE:

"DEPRESS CONTINUE TO START TESTING"

THE PURPOSE OF THIS HALT IS TO ALLOW THE USER TO DUMP THE UPDATED PROGRAM ON THE LOAD MEDIUM FOR NON-STANDARD CONFIGURATIONS. (SEE SECTION 2.2.2 AND 2.3.2)

5.0 DH11 DEVICE INFORMATION

5.1 ADDRESS AND VECTOR ASSIGNMENTS

THE DH11 USES FLOATING ADDRESSES AND IS LOCATED AFTER DJ11'S IN THE FLOATING ADDRESS SPACE THAT BEGINS A
BECAUSE THE DH11 HAS EIGHT REGISTERS, IT MUST BE ASSIGNED AN ADDRESS THAT IS A MULTIPLE OF 20 (OCTAL).
SYSTEM SHOULD HAVE CONSECUTIVE ADDRESSES.

EXAMPLE #1: A SYSTEM WITH NO DJ11'S BUT TWO DH11'S.

760 010 CANNOT USE FOR DH11'S BECAUSE NOT MULTIPLE OF 20.
760 020 FIRST DH11
760 040 SECOND DH11
760 060 DH11 GAP (INDICATES THAT THERE ARE NO MORE DH11'S).

EXAMPLE #2: A SYSTEM WITH ONE DJ11, TWO DH11'S:

760 010 FIRST DJ11
760 020 DJ11 GAP (INDICATES THAT THERE ARE NO MORE DJ11'S).
760 030 CANNOT USE FOR DH11'S BECAUSE NOT MULTIPLE OF 20.
760 040 FIRST DH11
760 060 SECOND DH11
760 100 DH11 GAP (INDICATES THAT THERE ARE NO MORE DH11'S).

THE DH11 VECTORS (2) FOLLOW THOSE OF THE DJ11 IN THE FLOATING VECTOR SPACE THAT STARTS AT ADDRESS 300.
AT 300 ARE USED IN THE FOLLOWING ORDER: DC11; KL11/DL11-A, B; DP11; DM11-A; DN11; DM11-BB; DR11-A; DR11-
PA611 PUNCHES; DT11; DX11; DL11-C, D, E; DH11.

THE RECEIVER VECTOR IS THE LOWER NUMBERED VECTOR. THE PRIORITY OF THE RECEIVER AND TRANSMITTER INTERRUPT
SELECTABLE BY MEANS OF TWO STANDARD PDP11 PRIORITY JUMPER PLUGS. BR LEVEL 5 IS STANDARD.

5.2 REGISTER DEFINITION

THE FOLLOWING SECTION DESCRIBES THE BIT ASSIGNMENTS WITHIN EACH REGISTER: BITS MARKED UNUSED AND WRITE O
AS ZERO. ATTEMPTING TO WRITE INTO UNUSED OR READ ONLY BITS HAS NO EFFECT ON THOSE BITS. INIT REFERS TO T
GENERATED BY THE PROCESSOR (E.G. UPON EXECUTION OF A RESET INSTRUCTION). TRANSMIT AND RECEIVE ARE WITH R

5.2.1 THE SYSTEM CONTROL REGISTER - ADDRESS X00

THE SYSTEM CONTROL REGISTER IS A BYTE-ADDRESSABLE REGISTER. THE BIT ASSIGNMENT IS AS FOLLOWS:

BITS	DESCRIPTION

00-03 LINE SELECTION

EACH OF THE 16 LINES SERVED BY THE DH11 HAS ITS OWN STORAGE FOR LINE PARAMETER INFORMATION, CURR BYTE COUNT. THESE STORAGE LOCATIONS ARE LOADED BY THE PROGRAM VIA THE LINE PARAMETER REGISTER, C REGISTER, AND BYTE COUNT REGISTER, BUT THE HARDWARE MUST FIRST BE TOLD WHICH LINE IS TO HAVE ITS CURRENT ADDRESS, OR BYTE COUNT CHANGED. THIS ROUTING IS ACCOMPLISHED BY SETTING THE LINE SELECTI THE BINARY ADDRESS (0000-1111) OF THE DESIRED LINE. THESE BITS ARE READ/WRITE.

04, 05 MEMORY EXTENSION

THE INFORMATION STORED IN THESE BITS BECOMES BITS 16 AND 17 RESPECTIVELY OF ANY CURRENT ADDRESS PROGRAM INTO THE CURRENT ADDRESS REGISTER. THESE BITS ARE READ/WRITE BUT, WHEN READ, REPRESENT O OF BITS 4 AND 5 OF THE SYSTEM CONTROL REGISTER, NOT THE STATUS OF ADDRESS BITS 16 AND 17 OF THE SEE THE SILO STATUS REGISTER FOR FURTHER INFORMATION. THIS ARRANGEMENT PERMITS INTERRUPT SERVICE SAVE THE CONTENTS OF THE SYSTEM CONTROL REGISTER ACCURATELY.

06 RECEIVER INTERRUPT ENABLE

THIS BIT, WHEN SET, ENABLES RECEIVER INTERRUPTS (BIT 7)

07 RECEIVER INTERRUPT

THIS BIT, WHEN SET, INDICATES THAT THE NUMBER OF CHARACTERS STORED IN THE SILO EXCEEDS THE "ALAR SPECIFIED BY THE LOW BYTE OF THE SILO STATUS REGISTER. THIS BIT IS READ ONLY, EXCEPT IN MAINTENA WHERE IT IS READ/WRITE. SETTING OF THIS BIT WILL GENERATE AN INTERRUPT REQUEST IF BIT 6 (ABOVE) IS ALSO SET.

08 CLEAR NON-EXISTENT MEMORY INTERRUPT

THIS BIT, WHEN SET, CLEARS THE NON-EXISTENT MEMORY INTERRUPT FLIP-FLOP (BIT 10) AND CLEARS ITSEL IS READ/WRITE.

09 MAINTENANCE

THIS BIT, WHEN SET, PLACES THE DH11 IN MAINTENANCE MODE.

10 NON-EXISTENT MEMORY

THIS BIT IS SET WHENEVER THE NPR HARDWARE PLACES THE ADDRESSES OF A MEMORY LOCATION ON THE UNIBU NO SLAVE SYNC IS RECEIVED IN 20 S. THIS INDICATES THAT THE ADDRESSED LOCATION OR DEVICE DOES NOT THIS BIT CAUSES AN INTERRUPT REQUEST IF SET WHILE TRANSMITTER AND NON-EXISTENT MEMORY INTERRUPT THIS BIT IS READ ONLY, EXCEPT IN MAINTENANCE MODE, WHERE IT IS READ/WRITE.

11 MASTER CLEAR

THIS BIT, WHEN SET, GENERATES "INITIALIZE" WITHIN THE DH11, CLEARING THE SILO, THE UARTS, AND TH EXACT BITS CLEARED ARE DISCUSSED IN THE SECTION ON INITIALIZATION. READ/WRITE.

12 STORAGE INTERRUPT ENABLE

THIS BIT, WHEN SET, PERMITS THE SETTING OF BIT 14 TO GENERATE AN INTERRUPT REQUEST. THIS BIT IS

13 TRANSMITTER AND NON-EX-MEM INTERRUPT ENABLE

THIS BIT, WHEN SET, PERMITS THE SETTING OF BIT 10 OR 15 TO GENERATE AN INTERRUPT REQUEST. THIS B

14 STORAGE INTERRUPT

THIS BIT IS SET WHEN THE RECEIVER SCANNER FINDS A RECEIVER HOLDING BUFFER WITH A CHARACTER IN IT STORE THAT CHARACTER IN THE SILO, AND CANNOT DO SO BECAUSE OF A LACK OF SPACE. WHEN SET THIS BIT AN INTERRUPT REQUEST IF BIT 12 IS SET. THIS BIT IS READ ONLY, EXCEPT IN MAINTENANCE MODE, WHERE IT IS READ/WRITE.

15 TRANSMITTER INTERRUPT

THIS BIT IS SET WHEN THE DH11 CONCLUDES AN NPR CYCLE THAT INCREMENTED A BYTE COUNT TO ZERO, INDI CHARACTER IN A MESSAGE BUFFER WAS LOADED INTO A UART TRANSMITTER HOLDING REGISTER. THIS BIT WILL REQUEST IF BIT 13 IS SET. THIS BIT IS READ/WRITE. (IT IS SET DURING AN NPR CYCLE.)

5.2.2 NEXT RECEIVED CHARACTER REGISTER ADDRESS X02

BITS	DESCRIPTION
00-07	NEXT RECEIVED CHARACTER THESE BITS CONTAIN THE NEXT RECEIVED CHARACTER, RIGHT JUSTIFIED. THE LEAST SIGNIFICANT BIT IS BI
08-11	LINE NUMBER THESE BITS INDICATE THE LINE NUMBER ON WHICH THE NEXT RECEIVED CHARACTER WAS RECEIVED. BIT 8 IS LEAST SIGNIFICANT BIT.
12	PARITY ERROR THIS BIT IS SET IF THE PARITY OF THE RECEIVED CHARACTER DOES NOT AGREE WITH THAT DESIGNATED FOR
13	FRAMING ERROR THIS BIT IS SET IF THE RECEIVER SAMPLES A LINE FOR THE FIRST STOP BIT, AND FINDS THE LINE IN A S (LOGICAL 0). THIS CONDITION USUALLY INDICATES THE RECEPTION OF A BREAK.
14	DATA OVERRUN THIS BIT IS SET WHEN THE RECEIVED CHARACTER WAS PRECEDED BY A CHARACTER THAT WAS LOST DUE TO THE RECEIVER SCANNER TO SERVICE THE UART RECEIVER HOLDING BUFFER. REFER TO THE SECTION ON PROGRAMMIN FURTHER DETAILS ON DOUBLE-BUFFERED RECEPTION.
15	VALID DATA PRESENT THIS BIT INDICATES THAT THE DATA PRESENTED IN BITS 14-00 IS VALID. IT PERMITS A CHARACTER HANDLI CHARACTERS FROM THE SILO UNTIL IT IS EMPTY. THIS IS DONE BY READING THIS REGISTER AND CHECKING B IS OBTAINED FOR WHICH BIT 15 IS A ZERO. THE ENTIRE NEXT RECEIVED CHARACTER REGISTER IS READ-ONLY ONLY ON A WORD BASIS.

5.2.3 LINE PARAMETER REGISTER ADDRESS X04

THIS REGISTER SHOULD BE LOADED ONLY AFTER THE LINE SELECTION BITS OF THE SYSTEM CONTROL REGISTER HAVE BE
LINE TO WHICH THESE PARAMETERS APPLY. THIS REGISTER IS WRITE ONLY.

BITS	DESCRIPTION

00-01 CHARACTER LENGTH

THESE BITS SHOULD BE SET AS SHOWN TO RECEIVE AND TRANSMIT CHARACTERS OF THE LENGTH (EXCLUDING PA

BIT 01	00	
0	0	5 BIT
0	1	6 BIT
1	0	7 BIT
1	1	8 BIT

02 TWO STOP BITS

THIS BIT, WHEN SET, CONDITIONS A LINE TRANSMITTING WITH 6, 7, OR 8-BIT CODE TO TRANSMIT CHARACTE
MARKS. IF THE LINE IS TRANSMITTING 5-BIT CODE, ASSERTION OF THIS BIT CAUSES THE CHARACTERS TO BE
1.5 STOP MARKS. IF THIS BIT IS NOT ASSERTED, 1 STOP MARK IS SENT.

03 NOT USED

04 PARITY ENABLED

IF THIS BIT IS SET, CHARACTERS TRANSMITTED ON THIS LINE WILL HAVE AN APPROPRIATE PARITY BIT AFFI
RECEIVED ON THIS LINE WILL HAVE THEIR PARITY CHECKED.

05 ODD PARITY

IF THIS BIT AND BIT 4 ARE SET, CHARACTERS OF ODD PARITY WILL BE GENERATED ON THIS LINE AND INCOM
WILL BE EXPECTED TO HAVE ODD PARITY. IF THIS BIT IS NOT SET, BUT BIT 4 IS SET, CHARACTERS OF EVE
GENERATED ON THIS LINE AND INCOMING CHARACTERS WILL BE EXPECTED TO HAVE EVEN PARITY. IF BIT 4 IS
OF THIS BIT IS IMMATERIAL.

06-09 RECEIVER SPEED

THE STATE OF THESE BITS DETERMINES THE OPERATING SPEED FOR THIS LINE'S RECEIVER. THE SPEED TABLE
BELOW IS APPLICABLE.

10-13 TRANSMITTER SPEED

THE STATE OF THESE BITS DETERMINES THE OPERATING SPEED FOR THIS LINE'S TRANSMITTER. THE SPEED
TABLE ON THE NEXT PAGE IS APPLICABLE.

SPEED TABLE FOR RECEIVER AND TRANSMITTER SPEEDS:

	BIT				
TRANSMITTER	13	12	11	10	
RECEIVER	9	8	7	6	
	0	0	0	0	ZERO BAUD
	0	0	0	1	50 BAUDS
	0	0	1	0	75 BAUDS
	0	0	1	1	110 BAUDS
	0	1	0	0	134.5 BAUDS
	0	1	0	1	150 BAUDS
	0	1	1	0	200 BAUDS
	0	1	1	1	300 BAUDS
	1	0	0	0	600 BAUDS
	1	0	0	1	1200 BAUDS
	1	0	1	0	1800 BAUDS
	1	0	1	1	2400 BAUDS
	1	1	0	0	4800 BAUDS
	1	1	0	1	9600 BAUDS
	1	1	1	0	EXTERNAL INPUT A
	1	1	1	1	EXTERNAL INPUT B

14 HALF DUPLEX/FULL DUPLEX

IF THIS BIT IS SET, THIS LINE WILL OPERATE IN HALF-DUPLEX MODE. IF NOT SET, THIS LINE WILL OPERA
IN FULL-DUPLEX MODE.

IN THIS APPLICATION HALF-DUPLEX MEANS THAT THE DH11 RECEIVER IS BLINDED DURING TRANSMISSION OF A

15 AUTO-ECHO ENABLE

WHEN THIS BIT IS SET, CHARACTERS RECEIVE ON THIS LINE WILL BE HARDWARE ECHOED. SEE THE DISCUSSI
FURTHER DETAILS.

5.2.4 CURRENT ADDRESS REGISTER ADDRESS X06

THIS REGISTER SHOULD BE LOADED ONLY AFTER THE SYSTEM CONTROL REGISTER (SCR) HAS HAD THE APPROPRIATE BITS DESIRED LINE NUMBER. WHEN THIS REGISTER IS LOADED, ADDRESS BITS 00-15 ARE TRANSFERRED INTO SEMICONDUCTOR MEMORIES IN THE DH11 FROM BITS 00-15 OF THIS REGISTER. ADDRESS BITS 16-17 ARE TRANSFERRED INTO SEMICONDU MEMORIES IN THE DH11 FROM BITS 4-5 OF THE SYSTEM CONTROL REGISTER.

INTERRUPTS MUST BE INHIBITED OR THE SCR SAVED BETWEEN THE SETTING OF THE SCR BITS 0-3 AND THE READ OF WR ADDRESS REGISTER.

WHEN THIS REGISTER IS READ, IT WILL INDICATE THE CURRENT ADDRESS OF THE LINE SELECTED BY THE SYSTEM CONT BITS 16 AND 17 WILL APPEAR IN THE SILO STATUS REGISTER, BITS 6 AND 7.

5.2.5 BYTE COUNT REGISTER ADDRESS X10

IN THE SAME FASHION AS THE LINE PARAMETER AND CURRENT ADDRESS REGISTERS, THIS REGISTER SHOULD NOT BE LOA FIRST SELECTING A LINE NUMBER BY MEANS OF THE LOWER-ORDER FOUR BITS OF THE SYSTEM CONTROL REGISTER. THIS LOADED WITH THE TWO'S COMPLEMENT OF THE NUMBER OF CHARACTERS (BYTES) TO BE TRANSMITTED ON THAT LINE. THE IS READ/WRITE.

INTERRUPTS MUST BE INHIBITED OR THE SCR SAVED BETWEEN THE SETTING OF THE SCR BITS 0-3 AND THE READ OR WR COUNT REGISTER

5.2.6 BUFFER ACTIVE REGISTER (BAR) ADDRESS X12

THIS REGISTER CONTAINS ONE BIT FOR EACH LINE. THE BITS ARE INDIVIDUALLY SET USING BIS INSTRUCTIONS. SETT TRANSMISSION ON THE ASSOCIATED LINE. THE BIT IS CLEARED BY THE HARDWARE WHEN THE LAST CHARACTER TO BE TR IS LOADED INTO THE TRANSMITTER DATA HOLDING REGISTER OF THE UART FOR THIAT LINE. IT SHOULD BE NOTED THAT THE CLEARING OF A BAR DOES INDICATE THAT A MESSAGE MAY BE SENT, IT DOES NOT INDICATE THAT THE LAST CHARA FROM THE PRECEDING MESSAGE HAVE BEEN COMPLETELY SENT. SPECIFICALLY, TWO MORE CHARACTERS WILL BE SENT AFT BIT CLEARS. THESE ARE THE LAST TWO CHARACTERS OF THE MESSAGE; ONE OF THEM WAS JUST STARTING WHEN THE BAR AND ONE WAS THAT FINAL CHARACTER THAT WAS LOADED INTO THE HOLDING REGISTER, THUS CLEARING THE BAR BIT. T IS A NORMAL CONSEQUENCE OF DOUBLE-BUFFERED TRANSMISSION AND IS MENTIONED HERE FOR THE BENEFIT OF PROGRAM WANT TO WRITE PROGRAMS THAT CONTROL SUCH MODEM LEADS ARE REQUEST TO SEND. REQUEST TO SEND (RTS) SHOULD N DROPPED UNTIL AT LEAST TWO CHARACTER TIMES AFTER THE BAR BIT FOR A GIVEN LINE CLEARS.

THIS TIMING MAY BE EFFECTED BY SENDING TWO EXTRA (NULL) CHARACTERS IN A MESSAGE AND DROPPING RTS WHEN BA

CLEARING A BAR BIT SHOULD NOT BE USED TO ABORT TRANSMISSION ON A LINE. RATHER, THE BYTE COUNT FOR THAT L TO ZERO. THE BUFFER ACTIVE REGISTER BITS ARE READ/WRITE.

5.2.7 BREAK CONTROL REGISTER ADDRESS X14

THIS REGISTER CONTAINS ONE BIT FOR EACH LINE. SETTING A BIT IN THIS REGISTER WILL IMMEDIATELY GENERATE A ON THE LINE CORRESPONDING TO THAT BIT NUMBER. CLEARING THE BIT WILL TERMINATE THE BREAK CONDITION. THE B MAY BE TIMED BY SENDING CHARACTERS DURING THE BREAK INTERVAL, SINCE THESE CHARACTERS WILL NEVER ACTUALLY FURTHER COMMENTS CONCERNING THE TRANSMISSION OF BREAK SIGNALS MAY BE FOUND IN THE BREAK SIGNALS SECTION.

5.2.8 SILO STATUS REGISTER ADDRESS X16

THIS REGISTER IS ACTUALLY TWO BYTE-SIZED REGISTERS. THE BIT ASSIGNMENTS ARE:

BIT	DESCRIPTION
00-05	SILO ALARM LEVEL

THE PROGRAM MAY LOAD AN INTEGRAL POWER OF 2 BETWEEN 0 AND 63 INTO THIS LOCATION (E.G., 0, 1, 2, WHEN THE NUMBER OF CHARACTERS STORED IN THE SILO EXCEEDS THAT NUMBER, AN INTERRUPT REQUEST (SYST REGISTER BIT 7) IS GENERATED, IF SYSTEM CONTROL REGISTER BIT 6 IS SET. THESE BITS ARE READ/WRITE

06-07	READ EXTENDED MEMORY

THESE BITS ARE READ ONLY AND CONTAIN THE A16 AND A17 BITS OF THE CURRENT LINE ADDRESS WHICH THE SELECTION BITS OF THE SYSTEM CONTROL REGISTER ARE POINTING.

08-13	SILO FILL LEVEL

THESE BITS ARE AN UP-DOWN COUNTER THAT INDICATES THE ACTUAL NUMBER OF CHARACTERS IN THE SILO. IT BE NOTED THAT THERE ARE SIX BITS, HENCE NUMBERS BETWEEN 0 AND 63 CAN BE REPRESENTED. A FULL SILO ENTRIES AND THE FILL LEVEL APPEARS AS 00000, BUT ONE MAY EASILY TELL THE DIFFERENCE BETWEEN AN E SILO (00000) AND A FULL SILO (00000) BY CHECKING THE STORAGE OVERFLOW BIT (BIT 14 OF SYSTEM CONT THESE BITS ARE READ ONLY.

5.3 DH11 FUNCTIONAL LOGIC PARTITIONING

THIS SECTION LISTS ALL OF THE PRINTS FOR ALL OF THE MODULES IN THE DH11 SUBSYSTEM. IT BRIEFLY SUMMARIZES THE FUNCTIONAL LOGIC DESCRIBED ON EACH PRINT. THIS INFORMATION MAY PROVE USEFUL FOR A MODULE OR CHIP REPLACEMENT GUIDE WHEN THE FUNCTIONAL AREA OF LOGIC THAT IS FAULTY IS KNOWN TO BE INTERMITTENTLY FAILING.

M7277 CURRENT ADDR REG MEMORY AND ADDR SELECT

SH3: CONTROL STROBE MUX FOR THE "LPR" REGISTER

TRANSMITTER DATA MUX WITH AUTO-ECHO CONTROL LOGIC SELECTION

MSYN / SSYN TIMING CHAIN

DH11 MASTER CLEAR LOGIC

SH4: UNIBUS ADDRESS SELECTION LOGIC WITH JUMPERS

TRANSMITTER SCAN COUNTER WITH XMITTER STATUS MULTIPLEXOR (BAR N * TBMT N)

SH5: BYTE COUNT AND CURRENT ADDRESS MEMORY WRITE TIMING LOGIC

CURRENT ADDRESS MEMORY LOGIC BITS<17:08>

UNIBUS ADDRESS DRIVERS BITS <17:08>

SH6: BYTE COUNT AND CURRENT ADDRESS MEMORY ADDRESS SELECT MULTIPLEXOR

CURRENT ADDRESS MEMORY LOGIC FOR BITS <07:00>

UNIBUS ADDRESS DRIVERS FOR BITS <07:00>

TRANSMITTER EVEN/ODD BYTE DATA MULTIPLEXOR

M7279 FIFO BUFFER

SH1: INPUT DATA MULTIPLEXOR FOR SILO MEMORY

SH2: SILO MEMORY CHIPS (FOUR 64 X 4 CHIPS)

SILO MEMORY READ/WRITE TIMING LOGIC

"SSR" REGISTER BITS <13:08>

SILO ALARM LEVEL COMPARATOR

RECEIVED "DATA READY" STATUS FLAG

M7288 LINE PARAMETER CONTROL
****

SH3: CLOCK TIMING SIGNAL BUFFERS

SH4: TRANSMITTER CLOCK SELECTION MULTIPLEXORS LINES<03:00>

SH5: RECEIVER CLOCK SELECTION MULTIPLEXORS LINES <03:00>

AUTO ECHO AND HALF DUPLEX CONTROL LINES<03:00>

SH6: TRANSMITTER CLOCK SELECTION MULTIPLEXORS LINES<07:04>

SH7: RECEIVER CLOCK SELECTION MULTIPLEXORS LINES <07:04>

AUTO ECHO AND HALF DUPLEX CONTROL LINES <07:04>

SH8: TRANSMITTER CLOCK SELECTION MULTIPLEXORS LINES<11:08>

SH9: RECEIVER CLOCK SELECTION MULTIPLEXORS LINES <11:08>

AUTO ECHO AND HALF DUPLEX CONTROL LINES <11:08>

SH10: TRANSMITTER CLOCK SELECTION MULTIPLEXORS LINES<15:12>

SH11: RECEIVER CLOCK SELECTION MULTIPLEXORS LINES <15:12>

AUTO ECHO AND HALF DUPLEX CONTROL LINES <15:12>

M7280 #1 MULTIPLE UART CARD FOR LINES <0-7>
****

SH2: UART CHIPS BIT<1:0>

RECEIVER SCAN MULTIPLEXORS (CLR R DONE, STB RD, MASTER DA, AND MASTER OR)

SH3: UART CHIPS BIT<3:2>

SH4: UART CHIPS BIT<5:4>

RECEIVER SCAN MULTIPLEEXORS (MASTER FE AND MASTER PE)

SH5: UART CHIPS BIT<7:6>

TRANSMITTER SCAN MULTIPLEXOR

-12 VOLT DC REGULATOR

M7280 #2 MULTIPLE UART CARD FOR LINES <8-15>
****

SH2: UART CHIPS BIT<9:8>

RECEIVER SCAN MULTIPLEXORS (CLR R DONE, STB RD, MASTER DA, AND MASTER OR)

SH3: UART CHIPS BIT<11:10>

SH4: UART CHIPS BIT<13:12>

RECEIVER SCAN MULTIPLEEXORS (MASTER FE AND MASTER PE)

SH5: UART CHIPS BIT<15:14>

TRANSMITTER SCAN MULTIPLEXOR

-12 VOLT DC REGULATOR

M7289 SYSTEM CONTROL AND RCVR SCAN
****

SH3: TRANSMITTER AND RECEIVER SCAN LOGIC

SH4: TRANSMITTER AND RECEIVER SCAN TIMING

SH5: HALF-DUPLEX CONTROL LOGIC

UART DATA MULTIPLEXORS

SH6: SYSTEM CONTROL REGISTER

M4540 DC11 - DH11 CLOCK
****

SH1: CRYSTAL OSCILLATOR AND FREQUENCY DIVIDERS

M796 UNIBUS MASTER CONTROL
****

SH1: NPR CONTROL LOGIC

M7281 #1 INTERRUPT CONTROL
****

"A" SECTION: RECEIVER INTERRUPT CONTROL LOGIC

"B" SECTION: TRANSMITTER INTERRUPT CONTROL LOGIC

M7281 #2 NPR CONTROL
****

"A" SECTION: USED TO GAIN CONTROL OF THE BUS FOR NPR XFERS

"B" SECTION: (NOT USED)

M7278 REGISTER AND BYTE CONTROL
****

SH3: CLEAR "BAR" REG MULTIPLEXOR

BYTE COUNT MEMORY AND CONTROL - BITS<15:08>

UNIBUS RECEIVERS BIT<15:08>

SH4: BYTE COUNT MEMORY AND CONTROL LOGIC BIT<07:00>

UNIBUS DATA RECEIVERS BIT<07:00>

SH5 - SH8: "BAR", "BCR", "LPR", AND "SSR" REGISTERS PLUS THE DATA OUTPUT MUX AND UNIBUS DRIVERS FOR DATA LINES.

SH5:	BIT<15:12>	SH7:	BIT<07:04>
SH6:	BIT<11:08>	SH8:	BIT<03:00>

5.4 DH11 MODULE ALLOCATION CHART

VIEW FROM WIRING SIDE

	SLOT 1	2	3	4	5	6	7	8	9
	M920	M7821	M7277	M7287	M7289	M7821	M7360	M7288	M920
	CABLE								CABLE
ROW A	UNIBUS CONNECTOR (NOTE #3)	NPR CNTL	REG 8 BYTE CNT	CURRENT ADDRS 8 ADDRS	SYSTEM CNTL 8 RCV SCAN	INTR CNTL	PRIORITY SELECTOR (NOTE #9)	LINE PARAMETER CNTL	UNIBUS CONNECTOR (NOTES #1) 8 #2)
		M796				M405	M971		
							CABLE		
B		UNIBUS MASTER CNTL				EXTERNAL B CLOCK (NOTE #5)	DATA CABLE (NOTES #6 8 #9)		
	M7247	M7247				M7280	M7280		M7279
C	* CONTROL MUX LINES 8-15 (NOTE #7)	* CONTROL MUX LINES 0-7 (NOTE #8)				MULTIPLE UART LINES 0-7	MULTIPLE UART LINES 8-15		FIFO BUFFER
D									
	M105	M7246							M405
E	* ADDRESS SELECTOR (NOTE #7)	* CONTROL SCAN (NOTES #4) 8 #8							EXTERNAL A CLOCK (NOTE #5)
	M7821								M4540
F	* INTR CNTL (NOTE #7)								DH11 DC11 CLOCK

FIGURE 2-4 DH11 MODULE UTILIZATION DIAGRAM
PAGE 2

NOTES:

1. IF END OF BUS, REPLACE M920 WITH M930.
2. IF LAST UNIT IN BASIC BOX, REPLACE M920 WITH BC11A CABLE WHEN EXPANDING TO PERIPHERAL BOX.
3. IF FIRST UNIT IN EXPANDER BOX, REPLACE M920 WITH BC11A CABLE.
4. E02 MUST BE G727 GRANT CONTINUITY IF MODEM CONTROL MODULE SET IS NOT INSTALLED. * DENOTES MODEM CONTROL OPTION, WITH DH11-AA OR AC.
5. MODULE SLOTS PROVIDE FOR ADDITIONAL CLOCK RATES.
6. FOR DIAGNOSTIC CHECKOUT OF DH11-AA, AB, OR AC, REPLACES M971 WITH M974.
7. THIS SLOT CONTAINS MODEM CONTROL MODULE M7807 WITH DH11-AD.
8. THIS SLOT CONTAINS MODEM CONTROL MODULE M7808 WITH DH11-AD.
9. THIS SLOT CONTAINS EIA CONVERTER AND PRIORITY MODULE M5906 FOR DH11-AD OR AE.

6.0 MAINTENANCE PROCEDURES

6.1 INTRODUCTION

THIS SECTION DESCRIBES HOW TO USE CZDHM AS A TROUBLESHOOTING TOOL. IT OUTLINES SOME PRELIMINARY CHECKS TO MAKE BEFORE STARTING DETAILED DEBUG PROCEDURES. IT ATTEMPTS TO PROVIDE THE USER WITH SUGGESTIONS FOR PROCEEDING FROM THE ERROR PRINTOUT TO DETAILED ISOLATION OF THE FAULT.

6.2 PRELIMINARY CHECKS

A. VISUAL INSPECTION

PERFORM A VISUAL INSPECTION OF THE DH11 SUBSYSTEM TO INSURE THAT:

1) ALL MODULES ARE INSTALLED IN THEIR PROPER SLOTS (REFER TO PARA 5.3) AND ARE PROPERLY SEATED.
2) THE CABLING IS CORRECT AND ALL CABLE CONNECTORS ARE FIRMLY SEATED.
3) THE REQUIRED MAINTENANCE CONNECTORS ARE PROPERLY INSTALLED. (REFER TO SECTION 6.3)

B. POWER CHECKS

USE A SCOPE TO CHECK THE FOLLOWING POWER SUPPLY AND CONTROL SIGNALS ON THE DH11 BACKPLANE:

+15 VDC	GRAY WIRE
-15 VDC	BLUE WIRE
+5 VDC	RED WIRE
AC LO	YELLOW WIRE
DC LO	PURPLE WIRE

NOTES: USE THE BLACK WIRE FOR GROUND REFERENCE

"AC LO" AND "DC LO" SHOULD BOTH BE "HIGH" - "LOW" GOING GLITCHES ON THESE LINES CAN CAUSE UNUSUAL AND SUBTLE SYMPTOMS.

6.3 MAINTENANCE CONNECTORS

MOST OF THE TESTS IN MD-DZDHM USE HARDWARE DIAGNOSTIC AIDS TO TURN THE DATA AROUND. THESE AIDS REQUIRE THAT THE USER INSTALL SPECIFIC TURNAROUND CONNECTORS OR MODULES BEFORE RUNNING THE PROGRAM. DEPENDENT UPON THE SPECIFIC DH11 CONFIGURATION AND THE TYPE OF TESTING DESIRED, CERTAIN MAINTENANCE AIDS MUST BE INSTALLED AS OUTLINED BELOW:

A. DH11-AA, AB, OR AC CONFIGURATIONS

1) TESTING LOGIC FOR ALL LINES WITHOUT DATA CABLES OR LEVEL CONVERTERS.

A. REMOVE THE DATA CABLE FROM SLOT B7 IN EACH DH11 TO BE TESTED.
B. INSTALL AN M974 MAINT JUMPER MODULE INTO SLOT B7 OF EACH DH11 TO BE TESTED.

2) TESTING ALL 16. LINES INCLUDING DATA CABLES WHICH CONNECT TO DISTRIBUTION PANEL. DOES NOT TEST LEVEL CONVERTER CIRCUITS LOCATED IN DISTRIBUTION PANEL.

A. INSTALL THE M974 MAINT JUMPER MODULE INTO SLOT B3 OF THE MULTIPLEXOR DISTRIBUTION PANEL FOR EACH DH11 TO BE TESTED. ALL LEVEL CONVERTERS IN THE DISTRIBUTION PANEL MUST BE REMOVED FOR THIS TEST.

3) TESTING ONE OR MORE SINGLE LINES INCLUDING EIA LEVEL CONVERTERS AND DEVICE CABLES WHICH ARE NOT TESTED IN 1 AND 2 ABOVE.

A. INSTALL AN H315 TEST CONNECTOR AT THE END OF THE DEVICE CABLE FOR EACH LINE TO BE TESTED.

B. DH11-AD CONFIGURATION

1. TESTING ALL 16. LINES WITHOUT DATA CABLES

A. DISCONNECT THE DATA CABLES (2) FROM THE TWO CONNECTORS ON THE M5906 MODULE (SLOT AB7 OF THE DH11 BACKPLANE.

B. INSTALL TWO H8611 TEST CONNECTORS ON THE M5906 IN PLACE OF THE CABLES.

C. IF MODEM CONTROL SECTION IS TO BE TESTED, DISCONNECT 4 BC08R CABLES FROM DISTRIBUTION PANEL AND CONNECT CABLES TO H861 TURNAROUND CONNECTOR.

2. TESTING ONE OR MORE SINGLE LINES INCLUDING DATA CABLES

A. DISCONNECT THE DEVICE CABLE FROM THE DH11-AD DISTRIBUTION PANEL FOR EACH LINE TO BE TESTED.

B. INSTALL AN H315 TEST CONNECTOR IN ITS PLACE ON THE DH11-AD DISTRIBUTION PANEL.

NOTE: TO TEST THE DEVICE CABLE AS WELL, INSTALL THE H315 TEST CONNECTOR AT THE END OF THE

DEVICE CABLE AND LEAVE THE DEVICE CABLE
CONNECTED TO THE DISTRIBUTION PANEL.

6.4 COMPLETE DH11 SUBSYSTEM CHECKOUT

COMPLETE DH11 SUB-SYSTEM VERIFICATION INVOLVES RUNNING THE FOLLOWING PROGRAMS IN THE SEQUENCE SUGGESTED:

A. CZDHM DH11 DIAGNOSTIC

LOAD AND RUN THE BASIC DIAGNOSTIC CONFIGURED TO TEST ALL 16. LINES ON ALL DH11'S INSTALLED IN THE SYSTEM AND ALLOW IT TO COMPLETE AT LEAST TWO COMPLETE PASSES. (THE FIRST PASS IS A QUICK VERIFY WITHOUT SUB-TEST ITERATIONS AND THE SECOND PASS INCLUDES SUB-TEST ITERATIONS). IF ANY ERRORS ARE REPORTED, STOP HERE, AND REFER TO PARA 6.5 FOR SUBSEQUENT PROCEDURES.

B. CZDHN DATA RELIABILITY TEST

LOAD AND RUN THE DATA RELIABILITY SUB-PROGRAM OF CZDHN CONFIGURED TO TEST ALL 16. LINES ON ALL DH11'S INSTALLED IN THE SYSTEM AND ALLOW IT TO COMPLETE AT LEAST ONE PASS WITH SR07=0 (QUICK TEST MODE). IN THIS MODE ONE PASS TAKES APPROXIMATELY 5 MINUTES. IF ANY ERRORS ARE REPORTED, REFER TO THE DOCUMENTATION FOR CZDHN FOR SUBSEQUENT PROCEDURES.

FOR MORE COMPLETE DATA RELIABILITY TESTING ,THE PROGRAM MAY BE RUN WITH SR07=1 (COMPLETE TEST) BUT THIS WILL REQUIRE A RUN TIME OF APPROX 15. MINUTES FOR EACH SELECTED LINE, SO IN MOST CASES IT IS ONLY USED FOR OVER-NIGHT RUNS.

C. SYSTEMS EXERCISER "DHAX" EXERCISER MODULE

WHERE "X" DESIGNATES THE REVISION LEVEL IN USE.

ASSUMING THAT BOTH THE DIAGNOSTIC AND THE DATA RELIABILITY INDICATE ERROR FREE PERFORMANCE, THE FINAL STEP IS TO RUN THE SYSTEM'S EXERCISER PROGRAM THAT INCLUDES A DH11 EXERCISER MODULE. THIS IS NECESSARY TO DETECT CERTAIN CLASSES OF BUS PROBLEMS THAT ONLY MANIFEST THEMSELVES WHEN THE DH11 IS RUN CONCURRENTLY WITH ALL THE OTHER DEVICES IN THE SYSTEM

IF ALL TESTS UP TO THIS POINT INDICATE ERROR FREE PERFORMANCE OF THE DH11, THE SUB-SYSTEM SHOULD BE CAPABLE OF RUNNING SYSTEM SOFTWARE. THERE ARE, HOWEVER, CERTAIN SUBTLE OR INTERMITTENT PROBLEMS THAT COULD STILL CAUSE THE DH11 SUB-SYSTEM TO FAIL IN THE OPERATING SYSTEM ENVIRONMENT. IN THESE RARE CASES, THE USER WILL HAVE TO USE THE SYMPTOMS GATHERED FROM THE FAILING MODE TO ISOLATE THE PROBLEM. ONCE A SYMPTOM IS RECOGNIZED, THE TWO OTHER PROGRAMS IN CZDHN, THE ECHO TEST AND THE DATA PATTERNS/CABLE TESTS MAY

PROVE USEFUL AS A TROUBLESHOOTING AID TO DUPLICATE THE
PROBLEM FOR FAULT ISOLATION.

6.5 MAINTENANCE HEADER DESCRIPTION

EACH TEST IN THE LISTING IS PREFACED BY A STANDARD MAINTENANCE HEADER TO PROVIDE INFORMATION THAT WILL FACILITATE RAPID ISOLATION OF THE FAULT THAT CAUSED A PARTICULAR TEST TO FAIL. EACH HEADER HAS THE SAME FORMAT (SEE EXAMPLE BELOW) AS FOLLOWS:

TEST ABSTRACT:	THIS IS A CAPSULE SUMMARY OF WHAT THE TEST IS DESIGNED TO TEST AND HOW IT OPERATES.
ERRORS:	LISTS THE PARTICULAR ERROR CALLS INVOKED BY THE TEST WHEN A FAULT IS DETECTED. (REFER TO PARA 3.1.2 AND 3.1.3 FOR A DETAILED DESCRIPTION OF THE ERROR CALL INFORMATION)
SYNC:	LISTS ONE OR MORE SIGNALS THAT MAY BE USED TO SYNCHRONIZE THE OSCILLOSCOPE WHEN AN ERROR LOOP IS ESTABLISHED (SR09=1). FOR (H) SIGNALS USE (-) SLOPE TO TRIGGER ON THE TRAILING EDGE OF THE SIGNAL AND FOR (L) SIGNALS USE (+) SLOPE TO TRIGGER ON THE TRAILING EDGE.
DEBUG:	CONTAINS SUGGESTIONS OF THINGS TO CHECK AND WHERE POSSIBLE THE MOST PROBABLE MODULE IS GIVEN.
KEY LOGIC:	CONTAINS A LIST OF LOGIC SIGNALS AND/OR LOGIC COMPONENTS WITH MODULE NAMES AND PRINT NUMBERS TO RELATE THE TEST ROUTINE FUNCTION TO THE FUNCTIONAL AREAS OF LOGIC WITHIN THE PRINTS. WHERE POSSIBLE SIGNAL PIN NOS. ARE LISTED.

```
EXAMPLE:        MAINTENANCE HEADER FOR TEST 1
********

TEST ABSTRACT:
******************

        THIS TEST ATTEMPTS TO REFERENCE EACH OF THE EIGHT REGISTERS
IN THE DH11 SELECTED FOR TEST USING ITS ASSIGNED UNIBUS ADDRESS. IF
ANY ADDRESS FAILS TO RESPOND A BUS ERROR TRAP VECTORS THE TEST TO THE
ERROR SET-UP AND CALL ROUTINE. AFTER THE ERROR IS TYPED THE TEST WILL
TEST THE NEXT DH11 ADDRESS IN SEQUENCE UNTIL ALL EIGHT ARE TESTED.

ERRORS:
*******

1.)  ERROR  1  REPORTS THAT THE REGISTER WHOSE ADDRESS IS IN R2 FAILED
     TO RESPOND WITH "SSYN" WHEN REFERENCED.

SYNC:           (NONE)
*****

DEBUG:
******

1.) PROBLEM IS MOST LIKELY THE M7277 MODULE.
2.) IF ALL EIGHT REGISTERS FAIL TO RESPOND, MAKE SURE THAT YOU CONFIGURED
    THE PROGRAM PROPERLY BEFORE STARTING.  IF YOU DID, CHECK THE SETTINGS
    OF THE ADDRESS SELECT JUMPERS ON THE M7277 MODULE.
3.) IF ONE OR MORE RESPONDED PROPERLY, SET UP AN ERROR SCOPE LOOP AND
    BACKTRACK THROUGH THE LOGIC STARTING WITH THE KEY LOGIC SIGNALS
    LISTED BELOW.

KEY LOGIC:
**********

        M7277   SH3     SSYN H                  CE2
                        DEVICE RESPONDING L     E72-6
                SH4     DEVICE SELECTED H       E09-11
```

```
                                .LIST   ME,SEQ,BIN
                        165400  $SWR=165400
                                .ENABLE ABS
                                .TITLE  CZDHM-D-0
                                ;*COPYRIGHT (C) 1976,1978
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY ED CROWLEY
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*
                        000001  $TN=1
                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        11            INHIBIT ITERATIONS
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<7:0>
                                .SBTTL  TRAP CATCHER

                        000000          .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                        000174          .=174
000174  000000         DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000         SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                .SBTTL  STARTING ADDRESS(ES)
000200  000137  026162          JMP     @#INPARX        ;;JUMP TO STARTING ADDRESS OF PROGRAM
000204  000137  002156          JMP     @#BEGIN         ;BEGIN EXECUTION WITH DEFAULT PARAMETERS
000210  000137  026146          JMP     @#INPARC        ;INPUT PARAMETERS - DEVICE SELECTION ONLY

                                .SBTTL  ACT11 HOOKS

                                ;;**********************************************************************
                                ;HOOKS REQUIRED BY ACT11
                        000214          $SVPC=.                 ;SAVE PC
                        000046          .=46
000046  020750                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                        000052          .=52
000052  120000                          .WORD   120000          ;;2)SET LOC.52 TO 120000
                        000214          .=$SVPC                 ;; RESTORE PC
                                .SBTTL  APT PARAMETER BLOCK

                                ;;**********************************************************************
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;**********************************************************************
                        000214          .$X=.   ;;SAVE CURRENT LOCATION
                        000024          .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024  000200                          200     ;;FOR APT START UP
```

```
                                        .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
000044  000214                         $APTHDR ;;POINT TO APT HEADER BLOCK
000214                                  .=.$X   ;;RESET LOCATION COUNTER
                                ;;*****************************************************************
                                ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                ;INTERFACE SPEC.

000214                          $APTHD:
000214  000000                  $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
000216  001232                  $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
000220  000036                  $TSTM:  .WORD   30.     ;;RUN TIM OF LONGEST TEST
000222  000170                  $PASTM: .WORD   120.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
000224  000170                  $UNITM: .WORD   120.    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
000226  000052                          .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)


                                .SBTTL  BASIC DEFINITIONS

                                ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                          STACK=  1100
                                .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                                .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

                                ;*MISCELLANEOUS DEFINITIONS
000011                          HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                          LF=     12              ;;CODE FOR LINE FEED
000015                          CR=     15              ;;CODE FOR CARRIAGE RETURN
000200                          CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776                          PS=     177776          ;;PROCESSOR STATUS WORD
                                .EQUIV  PS,PSW
177774                          STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                          PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                          DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                          DDISP=  177570          ;;HARDWARE DISPLAY REGISTER

                                ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                          R0=     %0              ;;GENERAL REGISTER
000001                          R1=     %1              ;;GENERAL REGISTER
000002                          R2=     %2              ;;GENERAL REGISTER
000003                          R3=     %3              ;;GENERAL REGISTER
000004                          R4=     %4              ;;GENERAL REGISTER
000005                          R5=     %5              ;;GENERAL REGISTER
000006                          R6=     %6              ;;GENERAL REGISTER
000007                          R7=     %7              ;;GENERAL REGISTER
000006                          SP=     %6              ;;STACK POINTER
000007                          PC=     %7              ;;PROGRAM COUNTER

                                ;*PRIORITY LEVEL DEFINITIONS
000000                          PR0=    0               ;;PRIORITY LEVEL 0
000040                          PR1=    40              ;;PRIORITY LEVEL 1
000100                          PR2=    100             ;;PRIORITY LEVEL 2
000140                          PR3=    140             ;;PRIORITY LEVEL 3
000200                          PR4=    200             ;;PRIORITY LEVEL 4
000240                          PR5=    240             ;;PRIORITY LEVEL 5
000300                          PR6=    300             ;;PRIORITY LEVEL 6
000340                          PR7=    340             ;;PRIORITY LEVEL 7
```

```
2303
2304                            ;*"SWITCH REGISTER" SWITCH DEFINITIONS
2305    100000                  SW15=   100000
2306    040000                  SW14=   40000
2307    020000                  SW13=   20000
2308    010000                  SW12=   10000
2309    004000                  SW11=   4000
2310    002000                  SW10=   2000
2311    001000                  SW09=   1000
2312    000400                  SW08=   400
2313    000200                  SW07=   200
2314    000100                  SW06=   100
2315    000040                  SW05=   40
2316    000020                  SW04=   20
2317    000010                  SW03=   10
2318    000004                  SW02=   4
2319    000002                  SW01=   2
2320    000001                  SW00=   1
2321                            .EQUIV  SW09,SW9
2322                            .EQUIV  SW08,SW8
2323                            .EQUIV  SW07,SW7
2324                            .EQUIV  SW06,SW6
2325                            .EQUIV  SW05,SW5
2326                            .EQUIV  SW04,SW4
2327                            .EQUIV  SW03,SW3
2328                            .EQUIV  SW02,SW2
2329                            .EQUIV  SW01,SW1
2330                            .EQUIV  SW00,SW0
2331
2332                            ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
2333    100000                  BIT15=  100000
2334    040000                  BIT14=  40000
2335    020000                  BIT13=  20000
2336    010000                  BIT12=  10000
2337    004000                  BIT11=  4000
2338    002000                  BIT10=  2000
2339    001000                  BIT09=  1000
2340    000400                  BIT08=  400
2341    000200                  BIT07=  200
2342    000100                  BIT06=  100
2343    000040                  BIT05=  40
2344    000020                  BIT04=  20
2345    000010                  BIT03=  10
2346    000004                  BIT02=  4
2347    000002                  BIT01=  2
2348    000001                  BIT00=  1
2349                            .EQUIV  BIT09,BIT9
2350                            .EQUIV  BIT08,BIT8
2351                            .EQUIV  BIT07,BIT7
2352                            .EQUIV  BIT06,BIT6
2353                            .EQUIV  BIT05,BIT5
2354                            .EQUIV  BIT04,BIT4
2355                            .EQUIV  BIT03,BIT3
2356                            .EQUIV  BIT02,BIT2
2357                            .EQUIV  BIT01,BIT1
2358                            .EQUIV  BIT00,BIT0
```

```
2359
2360                            ;*BASIC "CPU" TRAP VECTOR ADDRESSES
2361        000004              ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
2362        000010              RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
2363        000014              TBITVEC=14              ;;"T" BIT
2364        000014              TRTVEC= 14              ;;TRACE TRAP
2365        000014              BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
2366        000020              IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
2367        000024              PWRVEC= 24              ;;POWER FAIL
2368        000030              EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
2369        000034              TRAPVEC=34              ;;"TRAP" TRAP
2370        000060              TKVEC=  60              ;;TTY KEYBOARD VECTOR
2371        000064              TPVEC=  64              ;;TTY PRINTER VECTOR
2372        000240              PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
```

```
                                .SBTTL  COMMON TAGS

                                ;;*****************************************************************
                                ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                ;*USED IN THE PROGRAM.

                        001100          .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                  .WORD   0
001102     000          $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103     000          $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114     000          $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115     001          $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                  .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                  .WORD   0
001134     000          $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135     000          $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000                  .WORD   0
001140  177570          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001144  177560          $TKS:   177560                  ;;TTY KBD STATUS
001146  177562          $TKB:   177562                  ;;TTY KBD BUFFER
001150  177564          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154     000          $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155     002          $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156     012          $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157     000          $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  000000          $REGAD: .WORD   0               ;;CONTAINS THE ADDRESS FROM
                                                        ;;WHICH  ($REG0) WAS OBTAINED
001162  000000          $REG0:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001164  000000          $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001166  000000          $REG2:  .WORD   0               ;;CONTAINS (($REGAD)+4)
001170  000000          $REG3:  .WORD   0               ;;CONTAINS (($REGAD)+6)
001172  000000          $REG4:  .WORD   0               ;;CONTAINS (($REGAD)+10)
001174  000000          $REG5:  .WORD   0               ;;CONTAINS (($REGAD)+12)
001176  000000          $REG6:  .WORD   0               ;;CONTAINS (($REGAD)+14)
001200  000000          $REG7:  .WORD   0               ;;CONTAINS (($REGAD)+16)
001202  000000          $TMP0:  .WORD   0               ;;USER DEFINED
001204  000000          $TMP1:  .WORD   0               ;;USER DEFINED
001206  000000          $TMP2:  .WORD   0               ;;USER DEFINED
001210  000000          $TMP3:  .WORD   0               ;;USER DEFINED
001212  000000          $TMP4:  .WORD   0               ;;USER DEFINED
001214  000000          $TMP5:  .WORD   0               ;;USER DEFINED
001216  000000          $TMP6:  .WORD   0               ;;USER DEFINED
001220  000000          $TMP7:  .WORD   0               ;;USER DEFINED
001222  000000          $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
```

```
2429  001224  000000                  $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
2430  001226     077                  $QUES:  .ASCII  /?/             ;;QUESTION MARK
2431  001227     015                  $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
2432  001230  000012                  $LF:    .ASCIZ  <12>            ;;LINE FEED
2433                                  ;;*****************************************************************
2434                                  .SBTTL  APT MAILBOX-ETABLE
2435
2436                                  ;;*****************************************************************
2437                                  .EVEN
2438  001232                          $MAIL:                          ;;APT MAILBOX
2439  001232  000000                  $MSGTY: .WORD   AMSGTY   ;;MESSAGE TYPE CODE
2440  001234  000000                  $FATAL: .WORD   AFATAL   ;;FATAL ERROR NUMBER
2441  001236  000000                  $TESTN: .WORD   ATESTN   ;;TEST NUMBER
2442  001240  000000                  $PASS:  .WORD   APASS    ;;PASS COUNT
2443  001242  000000                  $DEVCT: .WORD   ADEVCT   ;;DEVICE COUNT
2444  001244  000000                  $UNIT:  .WORD   AUNIT    ;;I/O UNIT NUMBER
2445  001246  000000                  $MSGAD: .WORD   AMSGAD   ;;MESSAGE ADDRESS
2446  001250  000000                  $MSGLG: .WORD   AMSGLG   ;;MESSAGE LENGTH
2447  001252                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
2448  001252     000                  $ENV:   .BYTE   AENV     ;;ENVIRONMENT BYTE
2449  001253     000                  $ENVM:  .BYTE   AENVM    ;;ENVIRONMENT MODE BITS
2450  001254  000000                  $SWREG: .WORD   ASWREG   ;;APT SWITCH REGISTER
2451  001256  000000                  $USWR:  .WORD   AUSWR    ;;USER SWITCHES
2452  001260  000000                  $CPUOP: .WORD   ACPUOP   ;;CPU TYPE,OPTIONS
2453                                  ;*                              BITS 15-11=CPU TYPE
2454                                  ;*                                   11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
2455                                  ;*                                   11/70=06,PDQ=07,Q=10
2456                                  ;*                              BIT 10=REAL TIME CLOCK
2457                                  ;*                              BIT  9=FLOATING POINT PROCESSOR
2458                                  ;*                              BIT  8=MEMORY MANAGEMENT
2459  001262     000                  $MAMS1: .BYTE   AMAMS1   ;;HIGH ADDRESS,M.S. BYTE
2460  001263     000                  $MTYP1: .BYTE   AMTYP1   ;;MEM. TYPE,BLK#1
2461                                  ;*                              MEM.TYPE BYTE   --  (HIGH BYTE)
2462                                  ;*                                   900 NSEC CORE=001
2463                                  ;*                                   300 NSEC BIPOLAR=002
2464                                  ;*                                   500 NSEC MOS=003
2465  001264  000000                  $MADR1: .WORD   AMADR1   ;;HIGH ADDRESS,BLK#1
2466                                  ;*                                MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
2467  001266     000                  $MAMS2: .BYTE   AMAMS2   ;;HIGH ADDRESS,M.S. BYTE
2468  001267     000                  $MTYP2: .BYTE   AMTYP2   ;;MEM.TYPE,BLK#2
2469  001270  000000                  $MADR2: .WORD   AMADR2   ;;MEM.LAST ADDRESS,BLK#2
2470  001272     000                  $MAMS3: .BYTE   AMAMS3   ;;HIGH ADDRESS,M.S.BYTE
2471  001273     000                  $MTYP3: .BYTE   AMTYP3   ;;MEM.TYPE,BLK#3
2472  001274  000000                  $MADR3: .WORD   AMADR3   ;;MEM.LAST ADDRESS,BLK#3
2473  001276     000                  $MAMS4: .BYTE   AMAMS4   ;;HIGH ADDRESS,M.S.BYTE
2474  001277     000                  $MTYP4: .BYTE   AMTYP4   ;;MEM.TYPE,BLK#4
2475  001300  000000                  $MADR4: .WORD   AMADR4   ;;MEM.LAST ADDRESS,BLK#4
2476  001302  000000                  $VECT1: .WORD   AVECT1   ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
2477  001304  000000                  $VECT2: .WORD   AVECT2   ;;INTERRUPT VECTOR#2BUS PRIORITY#2
2478  001306  000000                  $BASE:  .WORD   ABASE    ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
2479  001310  000000                  $DEVM:  .WORD   ADEVM    ;;DEVICE MAP
2480  001312  000000                  $CDW1:  .WORD   ACDW1    ;;CONTROLLER DESCRIPTION WORD#1
2481  001314  000000                  $CDW2:  .WORD   ACDW2    ;;CONTROLLER DESCRIPTION WORD#2
2482  001316  000000                  $DDW0:  .WORD   ADDW0    ;;DEVICE DESCRIPTOR WORD#0
2483  001320  000000                  $DDW1:  .WORD   ADDW1    ;;DEVICE DESCRIPTOR WORD#1
2484  001322  000000                  $DDW2:  .WORD   ADDW2    ;;DEVICE DESCRIPTOR WORD#2
```

```
 2485  001324  000000                $DDW3:  .WORD   ADDW3   ;;DEVICE DESCRIPTOR WORD#3
 2486  001326  000000                $DDW4:  .WORD   ADDW4   ;;DEVICE DESCRIPTOR WORD#4
 2487  001330  000000                $DDW5:  .WORD   ADDW5   ;;DEVICE DESCRIPTOR WORD#5
 2488  001332  000000                $DDW6:  .WORD   ADDW6   ;;DEVICE DESCRIPTOR WORD#6
 2489  001334  000000                $DDW7:  .WORD   ADDW7   ;;DEVICE DESCRIPTOR WORD#7
 2490  001336  000000                $DDW8:  .WORD   ADDW8   ;;DEVICE DESCRIPTOR WORD#8
 2491  001340  000000                $DDW9:  .WORD   ADDW9   ;;DEVICE DESCRIPTOR WORD#9
 2492  001342  000000                $DDW10: .WORD   ADDW10  ;;DEVICE DESCRIPTOR WORD#10
 2493  001344  000000                $DDW11: .WORD   ADDW11  ;;DEVICE DESCRIPTOR WORD#11
 2494  001346  000000                $DDW12: .WORD   ADDW12  ;;DEVICE DESCRIPTOR WORD#12
 2495  001350  000000                $DDW13: .WORD   ADDW13  ;;DEVICE DESCRIPTOR WORD#13
 2496  001352  000000                $DDW14: .WORD   ADDW14  ;;DEVICE DESCRIPTOR WORD#14
 2497  001354  000000                $DDW15: .WORD   ADDW15  ;;DEVICE DESCRIPTOR WORD#15
 2498
 2499
 2500  001356                        $ETEND:
 2501
```

```
                                .SBTTL  ERROR POINTER TABLE

                                ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
                                ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                                ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
                                ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

                                ;*      EM              ;;POINTS TO THE ERROR MESSAGE
                                ;*      DH              ;;POINTS TO THE DATA HEADER
                                ;*      DT              ;;POINTS TO THE DATA
                                ;*      DF              ;;POINTS TO THE DATA FORMAT


001356                          $ERRTB:
                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 1

001356  030360                          EM1             ;"DH11 REGISTER REFERENCE CAUSED TIMEOUT"
001360  030427                          DH1             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR "
001362  030506                          DT1             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2
001364  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 2

001366  030524                          EM2             ;"SYSTEM CONTROL REGISTER ERROR"
001370  030562                          DH2             ; (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001372  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001374  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 3

001376  030702                          EM3             ;"DH11 MASTER CLEAR FAILED TO CLR SPECIFIED REG"
001400  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001402  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001404  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 4

001406  030760                          EM4             ;"LINE PARAMETER REGISTER ERROR"
001410  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001412  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001414  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 5

001416  031016                          EM5             ;"BREAK CONTROL REGISTER ERROR"
001420  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001422  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001424  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 6

001426  031053                          EM6             ;"SILO STATUS REGISTER ERROR"
001430  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001432  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001434  000000                          0               ;PRINT ALL OCTAL
```

```
                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 7

001436  031106                          EM7             ;"CURRENT ADDRESS REGISTER ERROR - LINE #XX"
001440  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001442  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001444  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 10

001446  031160                          EM10            ;"BYTE COUNTER REGISTER ERROR - LINE #XX"
001450  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001452  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001454  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 11

001456  031227                          EM11            ;"UNEXPECTED DH11 RCVR INTERRUPT"
001460  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001462  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001464  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 12

001466  031266                          EM12            ;"UNEXPECTED DH11 XMITTR INTERRUPT"
001470  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001472  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001474  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 13

001476  031327                          EM13            ;"CHAR AVAILABLE FAILED TO GENERATE RCVR INTERRUPT"
001500  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001502  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001504  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 14

001506  031410                          EM14            ;"TRANSMITTER NPR LOGIC ERROR - LINE #  "
001510  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001512  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001514  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 15

001516  031457                          EM15            ;"XMITTR FAILED TO INTERRUPT - LINE #  "
001520  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001522  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001524  000000                          0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 16

001526  031525                          EM16            ;"RCVR FAILED TO INTERRUPT"
001530  030562                          DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001532  030660                          DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001534  000000                          0               ;PRINT ALL OCTAL
```

```
                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 17

001536  031556                        EM17            ;"TRANSMITTER TIMING ERROR - LINE #  "
001540  031622                        DH6             ;" (PC)  (PS)  (SP)  TEST  DEVADR  SPEED   TIMEB   TIMEC"
001542  030660                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001544  000000                        0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 20

001546  031720                        EM20            ;RECEIVER TIMING ERROR - LINE #  "
001550  031622                        DH6             ;" (PC)  (PS)  (SP)  TEST  DEVADR  SPEED   TIMEB   TIMEC"
001552  030660                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001554  000000                        0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 21

001556  031761                        EM21            ;"RCVR FAILED TO INTERRUPT - LINE #  "
001560  030562                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001562  030660                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001564  000000                        0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 22

001566  032025                        EM22            ;"CHAR AVAIL FAILED TO SET ON TIME - LINE #  "
001570  030562                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001572  030660                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001574  000000                        0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 23

001576  032101                        EM23            ;"BASIC DATA TEST ERROR - LINE #  "
001600  032142                        DH7             ;" (PC)  (PS)  (SP)  TEST  DEVADR  CHRLNG  WAS  S/B "
001602  030660                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001604  000000                        0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 24

001606  032237                        EM24            ;"AUTO ECHO TEST ERROR - LINE #  "
001610  030562                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001612  030660                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001614  000000                        0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 25

001616  032277                        EM25            ;"BREAK BIT TEST ERROR - LINE #  "
001620  030562                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001622  030660                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
001624  000000                        0               ;PRINT ALL OCTAL

                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 26

001626  032337                        EM26            ;"HALF-DUPLEX TEST ERROR - LINE #  "
001630  030562                        DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
001632  030660                        DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
```

```
 2670  001634  000000                    0               ;PRINT ALL OCTAL
 2671
 2672                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 27
 2673
 2674  001636  032401                    EM27            ;"UNEXPECTED BUS ERROR TRAP"
 2675  001640  032433                    DH3             ; (PC)  (PS)  (SP)  TEST  TRPPC  TRPPS
 2676  001642  032512                    DT3             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2
 2677  001644  000000                    0               ;PRINT ALL OCTAL
 2678
 2679                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 30
 2680
 2681  001646  032530                    EM30            ;"UNEXPECTED RSVD INSTR TRAP"
 2682  001650  032433                    DH3             ; (PC)  (PS)  (SP)  TEST  TRPPC  TRPPS
 2683  001652  032512                    DT3             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2
 2684  001654  000000                    0               ;PRINT ALL OCTAL
 2685
 2686                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 31
 2687
 2688  001656  032563                    EM31            ;"AUTO ECHO DATA COMPARE ERROR - LINE #  "
 2689  001660  032633                    DH4             ; (PC)   (PS)   (SP)    TEST   WASADR  SBADR   WAS    S/B "
 2690  001662  030660                    DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
 2691  001664  000000                    0               ;PRINT ALL OCTAL
 2692
 2693                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 32
 2694
 2695  001666  032730                    EM32            ;"AUTO ECHO TEST TIMEOUT - LINE #  "
 2696  001670  032772                    DH5             ;" (PC)  (LPRG)   TEST"
 2697  001672  033020                    DT4             ;$ERRPC,$TMP0,$TMP2
 2698  001674  000000                    0               ;PRINT ALL OCTAL
 2699
 2700
 2701                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 33
 2702
 2703  001676  033030                    EM33            ;"PARITY LOGIC TEST ERROR - LINE #  "
 2704  001700  030562                    DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B"
 2705  001702  030660                    DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
 2706  001704  000000                    0               ;PRINT ALL OCTAL
 2707
 2708                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 34
 2709
 2710  001706  033073                    EM34            ;"MULTI-LINE PARITY DATA TEST ERROR - LINE #   - SUBTEST #  "
 2711  001710  032633                    DH4             ;" (PC)  (PS)  (SP)  TEST  WASADR  SBADR  WAS  S/B "
 2712  001712  030660                    DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
 2713  001714  000000                    0               ;PRINT ALL OCTAL
 2714
 2715                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 35
 2716
 2717  001716  033166                    EM35            ;"MULTI-LINE PARITY DATA TEST TIMEOUT"
 2718  001720  033232                    DH14            ;" (PC)  (LPRG)  LINACT "
 2719  001722  033262                    DT6             ;"$ERRPC,$TMP0,$TMP3"
 2720  001724  000000                    0               ;PRINT ALL OCTAL
 2721
 2722                                ;ERROR TABLE ITEM FOR ERROR MESSAGE 36
 2723
 2724  001726  033272                    EM36            ;CHAR AVAILABLE TIMEOUT"
 2725  001730  032772                    DH5             ;" (PC)  (LPRG)   TEST"
```

```
2726  001732  033020                  DT4             ;$ERRPC,$TMP0,$TMP2
2727  001734  000000                  0               ;PRINT ALL OCTAL
2728
2729                          ;ERROR TABLE ITEM FOR ERROR MESSAGE 37
2730
2731  001736  033321                  EM37            ;"DATA COMPARE ERROR - LINE #  "
2732  001740  032633                  DH4             ;" (PC)  (PS)  (SP)  TEST  WASADR  SBADR  WAS  S/B "
2733  001742  030660                  DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
2734  001744  000000                  0               ;PRINT ALL OCTAL
2735
2736                          ;ERROR TABLE ITEM FOR ERROR MESSAGE 40
2737
2738  001746  033357                  EM40            ;"BUFFER ACTIVE REG ERROR - LINE #  "
2739  001750  030562                  DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
2740  001752  030660                  DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
2741  001754  000000                  0               ;PRINT ALL OCTAL
2742
2743                          ;ERROR TABLE ITEM FOR ERROR MESSAGE 41
2744
2745  001756  033422                  EM41            ;"RCVR FALSE INTERRUPT"
2746  001760  032772                  DH5             ;" (PC)  (LPRG)  TEST"
2747  001762  033020                  DT4             ;$ERRPC,$TMP0,$TMP2
2748  001764  000000                  0               ;PRINT ALL OCTAL
2749
2750                          ;ERROR TABLE ITEM FOR ERROR MESSAGE 42
2751
2752  001766  033447                  EM42            ;"SILO OVERFLOW ERROR"
2753  001770  032772                  DH5             ;" (PC)  (LPRG)  TEST"
2754  001772  033020                  DT4             ;$ERRPC,$TMP0,$TMP2
2755  001774  000000                  0               ;PRINT ALL OCTAL
2756
2757                          ;ERROR TABLE ITEM FOR ERROR MESSAGE 43
2758
2759  001776  033473                  EM43            ;"SILO OVERFLOW FAILED TO GENERATE RCVR INTERRUPT"
2760  002000  030562                  DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
2761  002002  030660                  DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
2762  002004  000000                  0               ;PRINT ALL OCTAL
2763
2764                          ;ERROR TABLE ITEM FOR ERROR MESSAGE 44
2765
2766  002006  033553                  EM44            ;"NON EX MEMORY FAILED TO GENERATE XMITTR INTERRUPT"
2767  002010  030562                  DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
2768  002012  030660                  DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
2769  002014  000000                  0               ;PRINT ALL OCTAL
2770
2771                          ;ERROR TABLE ITEM FOR ERROR MESSAGE 45
2772
2773  002016  033635                  EM45            ;"XMIT DONE FAILED TO GENERATE XMITTR INTERRUPT"
2774  002020  030562                  DH2             ;" (PC)  (PS)  (SP)  TEST  DEVADR  REGADR  WAS  S/B "
2775  002022  030660                  DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
2776  002024  000000                  0               ;PRINT ALL OCTAL
2777
2778                          ;ERROR TABLE ITEM FOR ERROR MESSAGE 46
2779
2780  002026  033713                  EM46            ;"CURRENT ADDRESS MEMORY PATTERNS TEST ERROR - LINE #  "
2781  002030  034001                  DH10            ;" (PC)   LINEWR  PATTRN   TEST   DEVADR  REGADR   WAS     S/B"
```

```
2782  002032  034076                    DT5             ;$ERRPC,$TMP0,$TMP1,$REG0,$REG1,$REG2,$REG3,$REG4
2783  002034  000000                    0               ;PRINT ALL OCTAL
2784
2785                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 47
2786
2787  002036  034120                    EM47            ;"BYTE COUNT MEMORY PATTERNS TEST ERROR - LINE #  "
2788  002040  034001                    DH10            ; (PC)   LINEWR  PATTRN   TEST   DEVADR  REGADR   WAS     S/B"
2789  002042  034076                    DT5             ;$ERRPC,$TMP0,$TMP1,$REG0,$REG1,$REG2,$REG3,$REG4
2790  002044  000000                    0               ;PRINT ALL OCTAL
2791
2792                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 50
2793
2794  002046  034201                    EM50            ;"TEST TIMEOUT WAITING FOR XMIT DONE - LINE #  '
2795  002050  030562                    DH2             ;" (PC)    (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
2796  002052  030660                    DT2             ;"$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4"
2797  002054  000000                    0               ;PRINT ALL OCTAL
2798
2799                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 51
2800
2801  002056  034257                    EM51            ;"NPR LOGIC TEST 2 ERROR"
2802  002060  034306                    DH11            ;" (PC)   LINACT  LINCHK   TEST   DEVADR  REGADR   WAS     S/B"
2803  002062  034076                    DT5             ;$ERRPC,$TMP0,$TMP1,$REG0,$REG1,$REG2,$REG3,$REG4"
2804  002064  000000                    0               ;PRINT ALL OCTAL
2805
2806                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 52
2807
2808  002066  034403                    EM52            ;"BASIC DATA COMPARE ERROR"
2809  002070  030562                    DH2             ;" (PC)    (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
2810  002072  030660                    DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4"
2811  002074  000000                    0               ;PRINT ALL OCTAL
2812
2813                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 53
2814
2815  002076  034201                    EM50            ;"TEST TIMEOUT WAITING FOR XMIT DONE - LINE #  "
2816  002100  034434                    DH12            ;" (PC)   SPEED    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
2817  002102  030660                    DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
2818  002104  000000                    0               ;PRINT ALL OCTAL
2819
2820                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 54
2821
2822  002106  032025                    EM22            ;"CHAR AVAIL FAILED TO SET ON TIME - LINE #  "
2823  002110  034434                    DH12            ;" (PC)   SPEED    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
2824  002112  030660                    DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
2825  002114  000000                    0               ;PRINT ALL OCTAL
2826
2827                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 55
2828
2829  002116  032025                    EM22            ;"CHAR AVAIL FAILED TO SET ON TIME - LINE #  "
2830  002120  034531                    DH13            ;" (PC)    (PS)    (SP)    TEST   DEVADR  CHRLNG  SCRWAS  SCRS/B
2831  002122  030660                    DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4
2832  002124  000000                    0               ;PRINT ALL OCTAL
2833
2834                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 56
2835
2836  002126  034630                    EM56            ;"OVERRUN BIT FAILED TO SET - LINE #  "
2837  002130  030562                    DH2             ;" (PC)   (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
```

```
2838  002132  030660                    DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4"
2839  002134  000000                    0               ;PRINT ALL OCTAL
2840
2841                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 57
2842
2843  002136  034675                    EM57            ;"STORAGE OVERFLOW BIT FAILED - LINE #  "
2844  002140  030562                    DH2             ;" (PC)   (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B"
2845  002142  030660                    DT2             ;$ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4"
2846  002144  000000                    0               ;PRINT ALL OCTAL
2847
2848                              ;ERROR TABLE ITEM FOR ERROR MESSAGE 60
2849  002146  036140                    MSG4            ;MODEM CONTROL ERROR.. RUN DZDHK
2850  002150  034744                    DH15            ;" (PC) DEVADR  LINE    "
2851  002152  033020                    DT4             ;$ERRPC,$TMP0,$TMP2
2852  002154  000000                    0
2853
```

```
2854  002156  004737  027244          BEGIN:  JSR     PC,DCACHE       ;DISABLE CACHE  ;;++D
2855  002162  005000                          CLR     R0              ;INIT R0 TO INDICATE DEFAULT PARAMETERS
2856  002164  005037  030346          BEGINA: CLR     TITFLG          ;INIT TITLE MESSAGE FLAG
2857                                  .SBTTL  INITIALIZE THE COMMON TAGS
2858                                  ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
2859  002170  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
2860  002174  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
2861  002176  022706  001140                  CMP     #SWR,R6 ;;DONE?
2862  002202  001374                          BNE     .-6             ;;LOOP BACK IF NO
2863  002204  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
2864                                  ;;INITIALIZE A FEW VECTORS
2865  002210  012737  021004  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
2866  002216  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
2867  002224  012737  021274  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
2868  002232  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
2869  002240  012737  024060  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
2870  002246  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
2871  002254  012737  024142  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
2872  002262  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
2873  002270  013737  020716  020710          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
2874  002276  005037  001222                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
2875  002302  005037  001224                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
2876  002306  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
2877  002314  012737  002314  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
2878  002322  012737  002322  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
2879                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
2880                                  ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
2881  002330  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
2882  002334  012737  002370  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
2883  002342  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
2884  002350  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
2885  002356  022777  177777  176554          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
2886  002364  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
2887                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
2888  002366  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
2889  002370  012716  002376          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
2890  002374  000002                          RTI
2891  002376  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
2892  002404  012737  000174  001142          MOV     #DISPREG,DISPLAY
2893  002412  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
2894
2895  002416  005037  001240                  CLR     $PASS           ;;CLEAR PASS COUNT
2896  002422  132737  000200  001253          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
2897  002430  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
2898  002432  012737  001254  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
2899  002440                          67$:
2900                                  .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
2901  002440  005737  000042                  TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
2902  002444  001012                          BNE     68$             ;;BRANCH IF YES
2903  002446  123727  001252  000001          CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
2904  002454  001406                          BEQ     68$             ;;BRANCH IF YES
2905  002456  023727  001140  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
2906  002464  001005                          BNE     69$             ;;BRANCH IF NO
2907  002466  104406                          GTSWR                   ;;GET SOFT-SWR SETTINGS
2908  002470  000403                          BR      69$
2909  002472  112737  000001  001134  68$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
```

```
  2910  002500                          69$:
```

```
2911  002500  012737  026640  000004  START1: MOV     #BUSER,ERRVEC   ;SET UP THE BUS ERROR VECTOR
2912  002506  012737  000340  000006          MOV     #340,ERRVEC+2
2913  002514  012737  026714  000010          MOV     #RESERR,RESVEC  ;SET UP THE RSVD INSTR VECTOR
2914  002522  012737  000340  000012          MOV     #340,RESVEC+2
2915  002530  005737  030346                  TST     TITFLG          ;HAVE WE TYPED TITLE ONCE ?
2916  002534  001012                          BNE     1$              ;BR IF YES
2917  002536  104401                          TYPE                    ;GO TYPE PROGRAM TITLE
2918  002540  035000                          TITLE
2919  002542  005137  030346                  COM     TITFLG          ;SET FLAG - TYPE TITLE ONLY ONCE PER LOAD
2920  002546  032777  000001  176364          BIT     #BIT0,@SWR      ;DO WE WANT TO AUTOSIZE?
2921  002554  001002                          BNE     1$              ;BRANCH IF NOT.
2922  002556  004737  025140                  JSR     PC,AUTOSZ       ;GO AUTOSIZE.
2923  002562  005737  030000          1$:     TST     VCFLG           ;START AT 200 ??
2924  002566  001413                          BEQ     11$             ;BR IF NOT
2925  002570  032777  000001  176342          BIT     #BIT0,@SWR      ;ARE PARAMETERS TO BE INPUT MANUALLY?
2926  002576  001003                          BNE     9$              ;BRANCH IF YES.
2927  002600  013700  030306                  MOV     ADRVEC,R0       ;OTHERWISE, GET ADDRESSES BETWEEN VECTORS FROM AUTOSIZER
2928  002604  000402                          BR      10$
2929  002606  004737  026110          9$:     JSR     PC,INPARA       ;GO ASK FOR PARAMETERS
2930  002612  005037  030000          10$:    CLR     VCFLG           ;RE INIT VECTOR FLAG
2931  002616  005700                  11$:    TST     R0              ;USE DEFAULT PARAMETERS ?
2932  002620  001407                          BEQ     START2          ;BR IF YES
2933  002622  022700  177777                  CMP     #-1,R0          ;CHANGE DH SELECT PARAM ONLY ?
2934  002626  001002                          BNE     2$              ;BR IF NOT
2935  002630  000137  026270                  JMP     INPAR3          ;GO ASK FOR SELECT PARAM.
2936  002634  000137  026200          2$:     JMP     INPAR           ;GO ASK FOR ALL PARAMETERS
2937
2938  002640  012737  027676  030326  START2: MOV     #DHADTB-2,ADPTR ;GET POINTER TO ADDRESS TABLE
2939  002646  012737  027736  030330          MOV     #DHVCTB-2,VCPTR ;GET POINTER TO VECTOR TABLE
2940  002654  012737  030000  030332          MOV     #BRLVL-2,BRPTR  ;GET POINTER TO BR LEVEL TABLE
2941  002662  012737  177777  030320          MOV     #-1,DHNUM       ;START WITH DH #00
2942  002670  012737  000001  027306          MOV     #1,SELMSK       ;SET UP DH11 BIT TEST MARKER
2943
2944  002676  005237  030320          RESTRT: INC     DHNUM           ;GENERATE DH11 DEV NUMBER
2945  002702  062737  000002  030326          ADD     #2,ADPTR        ;UPDATE TABLE POINTERS
2946  002710  062737  000002  030330          ADD     #2,VCPTR
2947  002716  062737  000002  030332          ADD     #2,BRPTR
2948  002724  033737  027306  027310          BIT     SELMSK,DHSEL    ;TEST FOR SELECTED DH11
2949  002732  001004                          BNE     RSTRTA          ;BR IF SELECTED FOR TEST
2950  002734  006337  027306          REST1:  ASL     SELMSK          ;SHIFT MARKER TO TEST NEXT DH11
2951  002740  001737                          BEQ     START2          ;BR IF 16 TESTED - START OVER
2952  002742  000755                          BR      RESTRT          ;GO TEST IF THIS ONE SELECTED
2953  002744  017737  025356  027302  RSTRTA: MOV     @ADPTR,DHADR    ;SET UP DH11 ADDRESS
2954  002752  017737  025352  027304          MOV     @VCPTR,DHVCT    ;SET UP THE DH11 VECTOR ENTRY
2955  002760  017737  025346  030316          MOV     @BRPTR,DHRLVL   ;GET BR LEVEL VALUES
2956  002766  004537  024636                  JSR     R5,SUNUM        ;GO SET DH NUMBER IN THE MESSAGE BUFFER
2957  002772  030320                          DHNUM
2958  002774  035057                          TITLE2+20
2959  002776  104401                          TYPE                    ;GO PRINT "TESTING DH11 #XX"
2960  003000  035037                          TITLE2
2961  003002  004737  024330                  JSR     PC,LDTBF1       ;GO LOAD XMITTR OUTPUT BUFFER WITH
2962                                                                  ;BINARY COUNT PATTERN
2963  003006  012737  003006  001106          MOV     #.,$LPADR       ;INIT SCOPE LOOP RETURN
```

```
                        ;;*****************************************************************
                        ;*TEST 1        CHECK SSYN RESPONSE FROM ALL DH11 REGISTERS
                        ;;*****************************************************************
003014  000004          TST1:   SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        ******************

                                THIS TEST ATTEMPTS TO REFERENCE EACH OF THE EIGHT REGISTERS
                        IN THE DH11 SELECTED FOR TEST USING ITS ASSIGNED UNIBUS ADDRESS. IF
                        ANY ADDRESS FAILS TO RESPOND A BUS ERROR TRAP VECTORS THE TEST TO THE
                        ERROR SET-UP AND CALL ROUTINE. AFTER THE ERROR IS TYPED THE TEST WILL
                        TEST THE NEXT DH11 ADDRESS IN SEQUENCE UNTIL ALL EIGHT ARE TESTED.

                        ERRORS:
                        *******

                        1.)  ERROR  1  REPORTS THAT THE REGISTER WHOSE ADDRESS IS IN R2 FAILED
                            TO RESPOND WITH "SSYN" WHEN REFERENCED.

                        SYNC:           (NONE)
                        *****

                        DEBUG:
                        ******

                        1.) PROBLEM IS MOST LIKELY THE M7277 MODULE.
                        2.) IF ALL EIGHT REGISTTERS FAIL TO RESPOND, MAKE SURE THAT YOU CONFIGURED
                            THE PROGRAM PROPERLY BEFORE STARTING.  IF YOU DID, CHECK THE SE*TINGS
                            OF THE ADDRESS SELECT JUMPERS ON THE M7277 MODULE.
                        3.) IF ONE OR MORE RESPONDED PROPERLY, SET UP AN ERROR SCOPE LOOP AND
                            BACKTRACK THROUGH THE LOGIC STARTING WITH THE KEY LOGIC SIGNALS
                            LISTED BELOW.

                        KEY LOGIC:
                        **********

                                M7277   SH3     SSYN H                  CE2
                                                DEVICE RESPONDING L     E72-6
                                        SH4     DEVICE SELECTED H       E09-11
                        %
003016  010102                  MOV     R1,R2           ;COPY IT INTO R2
003020  010205                  MOV     R2,R5           ;ALSO R5
003022  062705  000020          ADD     #20,R5          ;R5 WILL TELL US WHEN WE'VE TESTED ALL 8
003026  013746  000004          MOV     ERRVEC,-(SP)    ;SAVE BUS ERROR VECTOR
003032  012737  003060  000004  MOV     #3$,ERRVEC      ;GO TO 3$ IF REG FAILS TO RESPOND
003040  162702  000002          SUB     #2,R2           ;SO WE START WITH FIRST REG

003044  062702  000002  1$:     ADD     #2,R2           ;POINT TO A DH11 REGISTER
003050  020205                  CMP     R2,R5           ;TESTED ALL EIGHT ??
003052  001412                  BEQ     4$              ;BR IF YES
003054  005712          2$:     TST     (R2)            ;ACCESS DH11 REG ADDR
003056  000772                  BR      1$              ;BR WHEN ALL 8 ARE DONE

003060  004737  024352  3$:     JSR     PC,SUER1        ;GO SET UP ERROR INFO
003064  022626                  CMP     (SP)+,(SP)+     ;FIX SP BECAUSE OF TRAP
```

```
 3020  003066  012737  003054  001110          MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
 3021  003074  104001                          ERROR   1               ;DH11 REGISTER FAILED TO RESPOND TO MSYN
 3022
 3023  003076  000762                          BR      1$              ;GO TEST NEXT ONE
 3024  003100  012637  000004          4$:     MOV     (SP)+,ERRVEC    ;RESTORE BUS ERROR VECTOR
```

```
                                ;;*****************************************************************
                                ;*TEST 2        TEST THAT "MASTER CLR" CAN CLEAR THE "SCR","LPR","BKR",AND "SSR" REGS
                                ;;*****************************************************************
003104  000004                  TST2:   SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST SETS ALL WRITEABLE BITS IN THE TARGET REGISTER
                                (SCR, LPR, BKR, AND SSR) THEN SETS BIT11 IN THE "SCR" (MASTER CLEAR)
                                AND CHECKS THAT IT INDEED CLEARED ALL BITS IN THE TARGET REGISTER.
                                IT PERFORMS THIS SEQUENCE FOR ALL TARGET REGISTERS.
                                IF A REGISTER FAILS TO CLEAR PROPERLY, THE ERROR IS REPORTED, AND THEN
                                THE ROUTINE TESTS THE NEXT REGISTER IN SEQUENCE.

                                ERRORS:
                                *******

                                1.)  ERROR  3  REPORTS THAT THE REGISTER WHOSE ADDRESS IS IN R2 FAILED
                                    TO CLEAR WHEN MASTER CLEAR WAS ACTIVATED.

                                SYNC:
                                *****

                                        M7289   SH6     SCR 11 H (MASTER CLEAR)         FK2

                                DEBUG:
                                ******

                                1.) IF THE ERROR REPORTS INDICATE THAT ALL REGISTERS ARE FAILING, ESTABLISH
                                    AN ERROR SCOPE LOOP AND PROCEED TO BACKTRACK THROUGH THE KEY LOGIC
                                    SIGNALS LISTED BELOW.
                                2.) IF ONLY ONE REGISTER FAILS WITH ALL SET BITS -- THEN LET TESTS 03-10
                                    RUN -- THEY WILL PROBABLY GIVE BETTER ISOLATION. USE ONE OF THESE
                                    TESTS TO DEBUG THE FAULT.

                                KEY LOGIC:
                                **********

                                        M7277   SH3     INIT A L                FR2
                                                        INIT B L                FM2
                                                        INIT A H                EF2
                                                        INIT B H                FV2
                                                SH4     LOAD SCR HIGH BYTE H    CP1

                                        M7289   SH6     SCR 11 H (MASTER CLEAR) FK2

                                        M7278   SH3     BUFF DATA 11 H          AA1
                                %
003106  012705  027320                  MOV     #MSTCLR,R5      ;GET POINTER TO ADDRESS TABLE
003112  010125                          MOV     R1,(R5)+        ;SET UP THE TEST ADDRESS TABLE SO THAT
003114  010125                          MOV     R1,(R5)+        ;IT CONTAINS THE ADDRESSES OF THE
003116  010125                          MOV     R1,(R5)+        ;SCR,LPR,BKR, AND SSR REGISTERS
003120  010125                          MOV     R1,(R5)+
003122  062745  000016                  ADD     #SSR,-(R5)      ;GENERATE SSR ADDRESS
003126  062745  000014                  ADD     #BKR,-(R5)      ;GENERATE BKR ADDRESS
```

```
3081  003132  062745  000004              ADD     #LPR,-(R5)      ;GENERATE LPR ADDRESS
3082  003136  005745                      TST     -(R5)           ;POINT R5 TO FIRST ADDR ENTRY (SCR)
3083  003140  005004                      CLR     R4              ;RESULT S/B 000000 AFTER MASTER CLEAR
3084
3085  003142  012502              1$:     MOV     (R5)+,R2        ;GET REG ADDRESS
3086  003144  022705  027330              CMP     #MSTCLR+10,R5   ;DONE ALL FOUR REGS ??
3087  003150  001415                      BEQ     TST3            ;;BR IF YES
3088  003152  012712  177777      2$:     MOV     #-1,(R2)        ;SET 1'S IN REGISTER
3089  003156  052711  004000              BIS     #BIT11,(R1)     ;ISSUE MASTER CLEAR
3090  003162  011203                      MOV     (R2),R3         ;GET CONTENT OF REGISTER
3091  003164  001766                      BEQ     1$              ;;BR IF IT'S ALL ZEROES
3092
3093  003166  004737  024412              JSR     PC,SUER2        ;GO SET UP ERROR INFO
3094  003172  012737  003152  001110      MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
3095  003200  104003                      ERROR   3               ;MASTER CLR FAILED TO CLR SEL. REG.
3096  003202  000757                      BR      1$              ;GO TEST NEXT REGISTER
```

```
                                ;;*****************************************************************
                                ;*TEST 3        TEST "SCR" REG R/W BITS CAN SET/CLR (NORMAL MODE)
                                ;;*****************************************************************
003204  000004                  TST3:   SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST VERIFIES THAT EACH R/W BIT IN THE "SCR" REGISTER
                                CAN BE INDIVIDUALLY SET AND CLEARED IN NORMAL MODE (MAINT BIT = 0)
                                A BIT MASK (RGMSK1:  131177) IS USED TO DEFINE THE R/W BITS ( ALL BUT
                                BITS 14, 11, 10, 8, AND 7). THE TEST IS REPEATED ELEVEN TIMES WITH A
                                DIFFERENT BIT SELECTED FOR EACH TEST. R5 CONTAINS THE BIT CURRENTLY
                                BEING TESTED. IF AN ERROR IS DETECTED, IT IS REPORTED AND THEN THE TEST
                                RESUMES WITH THE NEXT BIT IN SEQUENCE UNTIL ALL HAVE BEEN TESTED.

                                ERRORS:
                                *******

                                1.)  ERROR  2  IS CALLED TO REPORT A FAILURE TO SET PROPERLY AND
                                AGAIN TO REPORT A FAILURE TO CLEAR PROPERLY.

                                SYNC:
                                *****

                                1.) SET FAILURE         M7277   SH4     LOAD SSR LOW BYTE H     CR1

                                2.) CLR FAILURE         M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                                DEBUG:
                                ******

                                1.) IF ALL BITS FAIL - SUSPECT THE "LOAD SCR" SIGNALS ON THE M7277 SH4.
                                2.) IF ONLY ONE OR TWO BITS FAIL - SUSPECT EITHER THE "SCR" REGISTER
                                    FLOPS ON THE M7289 SH6, THE BUS RECEIVERS ON THE M7278 SH3 AND SH4,
                                    OR THE MULTIPLEXORS AND BUS DRIVERS ON THE M7289 SH5-8.

                                KEY LOGIC:
                                **********

                                        M7278   SH3     BUFF DATA <15:08> H
                                                SH4     BUFF DATA <07:00> H

                                        M7277   SH4     LOAD SCR LOW BYTE H     CT2
                                                        LOAD SCR HIGH BYTE H    CP1
                                                        DATA TO BUS H           EN2
                                                        DATA SOURCE <A,B,C> H   DU1,DU2,DT2

                                        M7289   SH5     BUF DATA TO BUS B H     E05-12
                                                        BUS DATA <15:12> L
                                                SH6     BUS DATA <11:08> L
                                                        SCR <15:00> H
                                                SH7     BUF DATA TO BUS A H     E05-8
                                                        BUS DATA <07:04> L
                                                SH8     BUS DATA <03:00> L
                                %
```

```
3153  003206  012737  003236  001110          MOV     #4$,$LPERR      ;SET UP ERROR LOOP RETURN
3154  003214  010102                          MOV     R1,R2           ;GET REGISTER ADDRESS
3155  003216  012705  000001                  MOV     #1,R5           ;SET UP TO START WITH BIT00
3156
3157  003222  030537  027662          1$:     BIT     R5,RGMSK1       ;SHALL WE TEST THIS BIT ?
3158  003226  001003                          BNE     4$              ;BR IF YES
3159  003230  006305                  2$:     ASL     R5              ;SHIFT TO TST NEXT BIT
3160  003232                          3$:
3161  003232  001430                          BEQ     TST4            ;;<BR IF DONE ALL R/W BITS>
3162  003234  000772                          BR      1$              ;GO TEST NEXT BIT
3163
3164  003236  010504                  4$:     MOV     R5,R4           ;RESULT S/B IN R4
3165  003240  005012                          CLR     (R2)            ;INIT REG BEING TESTED
3166  003242  112761  000000  000016          MOVB    #0,SSR(R1)      ;SCOPE SYNC
3167  003250  010512                          MOV     R5,(R2)         ;SET THE BIT
3168  003252  011203                          MOV     (R2),R3         ;GET THE WAS DATA
3169  003254  020403                          CMP     R4,R3           ;RESULT = S/B DATA ??
3170  003256  001403                          BEQ     5$              ;BR IF YES
3171
3172  003260  004737  024412                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
3173  003264  104002                          ERROR   2               ;SELECTED BIT FAILED TO SET IN SCR
3174
3175  003266  005004                  5$:     CLR     R4              ;SET UP TO CLEAR THE BIT S/B=000000
3176  003270  112761  000000  000017          MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
3177  003276  040512                          BIC     R5,(R2)         ;CLR THE SELECTED BIT
3178  003300  011203                          MOV     (R2),R3         ;GET THE WAS DATA
3179  003302  001403                          BEQ     6$              ;BR IF IT CLEARED
3180
3181  003304  004737  024412                  JSR     PC,SUER2        ;GO SET UP THE ERROR INFO
3182  003310  104002                          ERROR   2               ;SELECTED BIT FAILED TO CLEAR IN SCR
3183  003312  000746                  6$:     BR      2$              ;GO SELECT NEXT BIT
```

```
                        ;;*******************************************************************
                        ;*TEST 4        TEST "SCR" REG. READ ONLY BITS (NORMAL MODE)
                        ;;*******************************************************************
003314  000004          TST4:   SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        **************

                                THIS TEST VERIFIES THAT THE "SCR" REGISTER READ ONLY BITS CAN
                        NOT BE SET OR CLEARED IN NORMAL MODE. A BIT MASK (RGMSK2:  046600)
                        IS USED TO DEFINE THE READ ONLY BITSS (14,11,10,8, AND 7). THE TEST
                        IS REPEATED FIVE TIMES, ONCE FOR EACH BIT TO BE TESTED, AND ANY
                        ERRORS DETECTED ARE REPORTED. AFTER THE ERROR REPORT THE TEST RESUMES
                        WITH THE NEXT BIT IN SEQUENCE UNTIL ALL BITS HAVE BEEN TESTED.

                        ERRORS:
                        *******

                        1.)  ERROR  2  IS CALLED TO REPORT ANY READ ONLY BIT THAT FAILED
                            TO RESPOND PROPERLY.

                        SYNC:
                        *****

                                M7277   SH4     LOAD SSR LOW BYTE H      CR1

                        DEBUG:
                        ******

                                SAME AS FOR TEST 03

                        KEY LOGIC:
                        **********

                                SAME AS FOR TEST 03

                        %
003316  010102                  MOV     R1,R2           ;MAKE IT THE REG. ADDR ALSO
003320  012705  000001          MOV     #1,R5           ;INIT BIT TEST MARKER
003324  030537  027664  1$:     BIT     R5,RGMSK2       ;IS IT A READ ONLY BIT ??
003330  001003                  BNE     3$              ;BR IF IT IS - GO TEST IT
003332  006305          2$:     ASL     R5              ;SHIFT BIT MARKER
003334  001420                  BEQ     TST5            ;;BR IF DONE ALL BITS
003336  000772                  BR      1$              ;GO TEST THIS BIT

003340  005004          3$:     CLR     R4              ;RESULT S/B = 000000
003342  005012                  CLR     (R2)            ;INIT REG BEING TESTED
003344  112761  000000  000016  MOVB    #0,SSR(R1)      ;SCOPE SYNC
003352  010512                  MOV     R5,(R2)         ;ATTEMPT TO SET A READ ONLY BIT
003354  011203                  MOV     (R2),R3         ;GET THE WAS DATA
003356  001765                  BEQ     2$              ;BR IF THE BIT DIDN'T SET

003360  004737  024412          JSR     PC,SUER2        ;GO SET UP ERROR INFO
003364  012737  003340  001110  MOV     #3$,$LPERR      ;SET UP ERROR LOOP RETURN ADDR
003372  104002                  ERROR   2               ;READ ONLY BIT SET IN "SCR"
003374  000756                  BR      2$              ;CONTINUE WITH NEXT BIT
```

```
                        ;;*******************************************************************
                        ;*TEST 5        TEST "SCR" REG. BITS THAT CAN BE SET/CLR IN MAINT. MODE
                        ;;*******************************************************************
003376  000004          TST5:   SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        ***************

                                THIS TEST VERIFIES THAT THE "SCR" REGISTER READ-ONLY BITS
                        (14, 10, AND 07) CAN BE SET/CLR IN MAINT. MODE (SCR09=1) ONLY.
                        A BIT MASK (RGMSK6:  042200) IS USED TO DEFINE THE BITS TO TEST.
                        THE TEST PERFORMS THE FOLLOWING SEQUENCE:

                                1. SELECT A BIT TO TEST
                                2. SET MAINT. MODE
                                3. SET THE BIT AND VERIFY THAT IT SET
                                4. CLEAR THE MAINT. MODE BIT
                                5. ATTEMPT TO CLEAR THE TEST BIT
                                6. TEST TO SEE THAT IT DID NOT CLEAR
                                7. SET MAINT. MODE
                                8. CLEAR THE TEST BIT AND VERIFY THAT IT CLEARED
                                9. REPEAT 1-7 UNTIL ALL BITS HAVE BEEN TESTED

                        ANY ERRORS DETECTED ARE REPORTED AND THE TEST RESUMES WITH THE NEXT
                        BIT IN SEQUENCE UNTIL ALL BITS HAVE BEEN TESTED.

                        ERRORS:
                        ********

                        1.)  ERROR  2  IS CALLED AT THREE DIFFERENT POINTS TO REPORT ONE OF
                            THE THREE POSSIBLE FAILURE MODES DESCRIBED IN 3, 6, AND 7 IN THE
                            ABSTRACT.

                        SYNC:
                        ******

                        1.) STEP 3 FAILURE TO SET WITH MAINT. MODE SET

                                M7277   SH4     LOAD SSR LOW BYTE H     CR1

                        2.) STEP 5 FAILURE TO REMAIN SET WITH MAINT MODE NOT SET

                                M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                        3.) STEP 8 FAILURE TO CLEAR WITH MAINT. MODE SET

                                M7277   SH4     LOAD LPR H              EP2

                        DEBUG:
                        ******

                        1.) ASSUMING THE PREVIOUS TESTS RAN SUCCESSFULLY THE FAULT IS MOST
                            LIKELY THE M7289 MODULE.

                        KEY LOGIC:
                        **********
```

```
                                        SAME AS TEST 03 WITH THE FOLLOWING ADDITION
                                        M7289   SH4     74121 ONE-SHOTS E35-6, E23-6
                                %
003400  012737  003430  001110       MOV     #3$,$LPERR      ;SET UP THE ERROR LOOP RETURN
003406  010102                       MOV     R1,R2           ;MAKE IT REG ADDR TOO
003410  012705  000001               MOV     #1,R5           ;INIT BIT TEST MARKER
003414  030537  027674       1$:     BIT     R5,RGMSK6       ;IS IT A READ ONLY BIT ??
003420  001003                       BNE     3$              ;BR IF YES - TEST IT
003422  006305               2$:     ASL     R5              ;SHIFT THE BIT MARKER
003424  001457                       BEQ     TST6            ;;BR IF DONE ALL SELECTED BITS
003426  000772                       BR      1$              ;GO TEST FOR THIS BIT

003430  010504               3$:     MOV     R5,R4           ;SET UP S/B DATA
003432  052704  001000               BIS     #BIT09,R4       ;PUT IN THE MAINT. BIT
003436  005012                       CLR     (R2)            ;INIT REG BEING TESTED
003440  052712  001000               BIS     #BIT09,(R2)     ;TURN ON MAINT. MODE
003444  112761  000000  000016       MOVB    #0,SSR(R1)      ;SCOPE SYNC
003452  050512                       BIS     R5,(R2)         ;SET THE SELECTED BIT
003454  011203                       MOV     (R2),R3         ;GET THE WAS DATA
003456  020304                       CMP     R3,R4           ;DID SELECTED BIT GET SET ??
003460  001404                       BEQ     4$              ;BR IF IT DID

003462  004737  024412               JSR     PC,SUER2        ;GO SET UP ERROR INFO
003466  104002                       ERROR   2               ;SELECTED BIT FAILED TO SET IN MAINT MODE
003470  000754                       BR      2$              ;GO TEST NEXT BIT

003472  042712  001000       4$:     BIC     #BIT09,(R2)     ;TURN OFF MAINT. MODE
003476  042704  001000               BIC     #BIT09,R4       ;CLR MAINT BIT IN S/B DATA
003502  112761  000000  000017       MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
003510  040512                       BIC     R5,(R2)         ;ATTEMPT TO CLR SELECTED BIT
003512  011203                       MOV     (R2),R3         ;GET THE WAS DATA
003514  020304                       CMP     R3,R4           ;DID BIT GET CLEARED ??
003516  001404                       BEQ     5$              ;BR IF IT DIDN'T

003520  004737  024412               JSR     PC,SUER2        ;GO SET UP ERROR INFO
003524  104002                       ERROR   2               ;SELECTED BIT GOT CLEARED WITH MAINT MODE OFF
003526  000735                       BR      2$              ;GO TEST NEXT BIT

003530  012704  001000       5$:     MOV     #BIT09,R4       ;SET UP S/B DATA
003534  050412                       BIS     R4,(R2)         ;SET MAINT. MODE
003536  012761  000000  000004       MOV     #0,LPR(R1)      ;SCOPE SYNC
003544  040512                       BIC     R5,(R2)         ;NOW CLR SELECTED BIT
003546  011203                       MOV     (R2),R3         ;GET THE WAS DATA
003550  020304                       CMP     R3,R4           ;DID BIT GET CLEARED OK ??
003552  001723                       BEQ     2$              ;BR IF YES

003554  004737  024412               JSR     PC,SUER2        ;GO SET UP ERROR INFO
003560  104002                       ERROR   2               ;FAILED TO CLR SELECTED BIT IN MAINT MODE
003562  000717                       BR      2$              ;GO SELECT NEXT BIT FOR TEST
```

```
                                ;;*****************************************************************
                                ;*TEST 6        TEST THAT ALL R/W BITS IN "LPR" CAN BE SET/CLR
                                ;;*****************************************************************
003564  000004                  TST6:   SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST VERIFIES THAT ALL R/W BITS IN THE "LPR" REG-
                                ISTER CAN BE SET AND CLEARED INDIVIDUALLY. A BIT MASK (RGMSK3:  177767)
                                IS USED TO DEFINE THE BITS TO BE TESTED (ALL BUT BIT03). THE TEST
                                SEQUENCE IS AS FOLLOWS:

                                        1. SELECT A BIT TO TEST
                                        2. SET THE BIT AND VERIFY IT SET
                                        3. CLEAR THE BIT AND VERIFY IT CLEARED
                                        4. REPEAT 1 THRU 3 UNTIL ALL BITS TESTED

                                ANY ERRORS DETECTED ARE REPORTED AND AFTER THE ERROR, THE TEST
                                RESUMES WITH THE NEXT BIT IN SEQUENCE.

                                ERRORS:
                                *******

                                1.)  ERROR  4  IS CALLED TO REPORT BOTH FAIL TO SET AND FAIL TO
                                    CLEAR FAULTS.

                                SYNC:
                                *******

                                1.) FAIL TO SET:        M7277   SH4     LOAD SSR LOW BYTE H     CR1
                                2.) FAIL TO CLEAR:      M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                                DEBUG:
                                ******

                                1.) IF ALL BITS FAIL THE PROBLEM IS MOST LIKELY THE M7277 MODULE
                                    (LPR LOAD SIGNALS)
                                2.) IF NOT THEN IT IS PROBABLY AN "LPR" REGISTER CHIP OR
                                    BAD OUTPUT DATA MUX CHIP, BOTH ON THE M7278 MODULE.

                                KEY LOGIC:
                                **********

                                        M7277   SH4     LOAD LPR H              EP2

                                        M7278   SH5     LPR <15:12> L   (E52)
                                                SH6     LPR <11:08> L   (E37)
                                                SH7     LPR <07:04> L   (E59)
                                                SH8     LPR <03:00> L   (E61)
                                                SH5,6,7,8       OUTPUT MUX CHIPS  (74151'S PIN 2)

                                %
003566  012737  003622  001110          MOV     #3$,$LPERR      ;SET UP THE ERROR LOOP RETURN
003574  010102                          MOV     R1,R2           ;COPY IT IN R2
003576  062702  000004                  ADD     #LPR,R2         ;GENERATE REGADR IN R2
```

```
3403  003602  012705  000001              MOV     #1,R5           ;INIT BIT TEST MARKER
3404  003606  030537  027666        1$:   BIT     R5,RGMSK3       ;TEST THIS BIT ??
3405  003612  001003                      BNE     3$              ;BR IF YES
3406  003614  006305                2$:   ASL     R5              ;SHIFT THE MARKER
3407  003616  001430                      BEQ     TST7            ;;BR IF DONE ALL BITS
3408  003620  000772                      BR      1$              ;GO TEST NXT BIT
3409
3410  003622  010504                3$:   MOV     R5,R4           ;SET UP S/B DATA
3411  003624  005012                      CLR     (R2)            ;INIT REG BEING TESTED
3412  003626  112761  000000  000016      MOVB    #0,SSR(R1)      ;SCOPE SYNC
3413  003634  010512                      MOV     R5,(R2)         ;SET LPR BIT
3414  003636  011203                      MOV     (R2),R3         ;GET THE WAS DATA
3415  003640  020304                      CMP     R3,R4           ;DID IT SET
3416  003642  001403                      BEQ     4$              ;BR IF IT SET PROPERLY
3417
3418  003644  004737  024412              JSR     PC,SUER2        ;GO SET UP ERROR INFO
3419  003650  104004                      ERROR   4               ;LPR BIT FAILED TO SET PROPERLY
3420
3421  003652  005004                4$:   CLR     R4              ;GET READY TO CLEAR SELECTED BIT
3422  003654  112761  000000  000017      MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
3423  003662  040512                      BIC     R5,(R2)         ;CLEAR THE BIT
3424  003664  011203                      MOV     (R2),R3         ;GET THE WAS DATA
3425  003666  001752                      BEQ     2$              ;BR IF BIT CLEARED PROPERLY
3426
3427  003670  004737  024412              JSR     PC,SUER2        ;GO SET UP ERROR INFO
3428  003674  104004                      ERROR   4               ;LPR BIT FAILED TO CLEAR PROPERLY
3429  003676  000746                      BR      2$              ;GO SELECT NEXT BIT
```

```
                                ;;*****************************************************************
                                ;*TEST 7        TEST THAT ALL R/W BITS IN "BKR" CAN BE SET/CLR
                                ;;*****************************************************************
003700  000004                  TST7:   SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THAT ALL BITS IN THE BREAK CONTROL REGISTER
                                CAN BE SET AND CLEARED INDIVIDUALLY. IT USES A BIT MASK (RGMSK4:  177777)
                                TO DEFINE THE R/W BITS (ALL 16.). R5 ALWAYS CONTAINS THE BIT CURRENTLY
                                SELECTED FOR TEST. THE TEST SEQUENCE IS AS FOLLOWS:

                                        1. SELECT A BIT TO TEST
                                        2. SET THE BIT AND VERIFY THAT IT SET PROPERLY
                                        3. CLEAR THE BIT AND VERIFY THAT IT CLEARED PROPERLY
                                        4. REPEAT 1 THRU 4 UNTIL ALL BITS HAVE BEEN TESTED.

                                ANY ERROR DETECTED IS REPORTED AND THE TEST RESUMES WITH THE NEXT BIT
                                IN SEQUENCE.

                                ERRORS:
                                ********

                                1.)  ERROR  5  IS CALLED TO REPORT BOTH FAIL TO SET PROPERLY AND FAIL
                                    TO CLEAR PROPERLY FAULTS.

                                SYNC:
                                ******

                                1.) FAIL TO SET:        M7277   SH4     LOAD SSR LOW BYTE H     CR1
                                2.) FAIL TO CLR:        M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                                DEBUG:
                                ******

                                1.) THE ONLY DIFFERENCES IN THE DATA PATH HERE AND THAT FOT THE PREVIOUS
                                    TESTS ARE THE ACTUAL REGISTER CHIPS AND THE INPUT SELECTED ON THE
                                    OUTPUT DATA MULTIPLEXORS.

                                2.) IF ALL BITS FAIL THE PROBLEM IS MOST LIKELY THE M7277.

                                3.) IF ONLY ONE OR TWO FAIL THE PROBLEM IS MOST LIKELY THE M7278.

                                KEY LOGIC:
                                ***********

                                        M7277   SH4     LOAD BCR H              FU1
                                                        DATA TO BUS H           EN2
                                                        DATA SOURCE (A,B,C) H   DU1,DU2,DT2

                                        M7278   SH5 - SH8 74175 REGISTER CHIPS (E51,E38,E67,E60)
                                                SH5 - SH8 74151'S MUX CHIPS INPUT PIN 13
                                %
003702  012737  003736  001110        MOV     #3$,$LPERR      ;SET UP THE ERROR LOOP RETURN
003710  010102                        MOV     R1,R2           ;GENERATE "BKR" ADDRESS IN R2
```

```
3486  003712  062702  000014                ADD     #BKR,R2
3487  003716  012705  000001                MOV     #1,R5           ;INIT BIT TEST MARKER
3488  003722  030537  027670        1$:     BIT     R5,RGMSK4       ;TEST THIS BIT ??
3489  003726  001003                        BNE     3$              ;BR IF YES
3490  003730  006305                2$:     ASL     R5              ;SHIFT BIT MARKER
3491  003732  001430                        BEQ     TST10           ;;BR IF ALL BITS TESTED
3492  003734  000772                        BR      1$              ;GO TEST THE BIT
3493
3494  003736  010504                3$:     MOV     R5,R4           ;SET UP S/B DATA
3495  003740  005012                        CLR     (R2)            ;INIT REG BEING TESTED
3496  003742  112761  000000  000016        MOVB    #0,SSR(R1)      ;SCOPE SYNC
3497  003750  050512                        BIS     R5,(R2)         ;SET THE SELECTED BIT IN "BKR"
3498  003752  011203                        MOV     (R2),R3         ;GET THE WAS DATA
3499  003754  020304                        CMP     R3,R4           ;DID BIT SET OK
3500  003756  001403                        BEQ     4$              ;BR IF YES
3501
3502  003760  004737  024412                JSR     PC,SUER2        ;GO SET UP ERROR INFO
3503  003764  104005                        ERROR   5               ;BKR BIT FAILED TO SET PROPERLY
3504
3505  003766  005004                4$:     CLR     R4              ;SET UP S/B DATA
3506  003770  112761  000000  000017        MOVB    #0,SSR+1(R1)    ;SCOPEE SYNC
3507  003776  040512                        BIC     R5,(R2)         ;CLEAR BKR BIT
3508  004000  011203                        MOV     (R2),R3         ;GET THE BKR WAS DATA
3509  004002  001752                        BEQ     2$              ;BR IF BKR BIT CLEARED OK
3510
3511  004004  004737  024412                JSR     PC,SUER2        ;GO SET UP ERROR INFO
3512  004010  104005                        ERROR   5               ;BKR BIT FAILED TO CLR PROPERLY
3513  004012  000746                        BR      2$              ;GO SELECT NEXT BIT
```

```
3514                            ;;*****************************************************************
3515                            ;*TEST 10       TEST THAT ALL R/W BITS IN "SSR" CAN BE SET/CLR
3516                            ;;*****************************************************************
3517  004014  000004           TST10:  SCOPE
3518                            .REM    %
3519                            TEST ABSTRACT:
3520                            ***************
3521
3522                                    THIS TEST VERIFIES THAT ALL R/W BITS IN THE SILO STATUS REGISTER
3523                            (SSR) CAN BE SET AND CLEARED INDIVIDUALLY. IT USES A BIT MASK (RGMSK5:  100077)
3524                            TO DEFINE THE R/W BITS (15,5,4,3,2,1, AND 0). R5 ALWAYS CONTAINS THE BIT
3525                            CURRENTLY SELECTED FOR TEST. THE TEST SEQUENCE IS AS FOLLOWS:
3526
3527                                    1. SELECT A BIT TO TEST
3528                                    2. SET THE BIT AND VERIFY THAT IT SET PROPERLY
3529                                    3. CLEAR THE BIT AND VERIFY THAT IT CLEARED PROPERLY
3530                                    4. REPEAT 1 THRU 3 UNTIL ALL BITS ARE TESTED
3531
3532                            ANY ERRORS DETECTED ARE REPORTED AND THEN THE TEST RESUMES WITH THE
3533                            NEXT BIT IN SEQUENCE.
3534
3535                            ERRORS:
3536                            ********
3537
3538                            1.)  ERROR  6  IS CALLED TO REPOORT BOTH FAIL TO SET PROPERLY AND
3539                                FAIL TO CLEAR PROPERLY FAULTS.
3540
3541                            SYNC:
3542                            *****
3543
3544                            1.) FAIL TO SET:  M7277 SH4     LOAD LPR H      EP2
3545                            2.) FAIL TO CLR:  M7277 SH4     LOAD BCR H      FU1
3546
3547                            DEBUG:
3548                            ******
3549
3550                            1.) THE ONLY DIFFERENCES BETWEEN THEE DATA PATHS USED BY THIS TEST AND
3551                                THAT USED BY THE PREVIOUS TESTS ARE THE ACTUAL "SSR" REGISTER
3552                                CHIPS AND THE INPUT PIN SELECTED ON THE OUTPUT DATA MULTIPLEXORS.
3553                            2.) IF ALL BITS FAIL IT IS MOST LIKELY THE M7277
3554                            3.) IF BITS <13:08> FAIL IT IS MOST LIKELY THE M7279
3555                            4.) IF JUST ONE OR TWO BITS FAIL IT IS MOST LIKELY THE M7278
3556
3557                            KEY LOGIC:
3558                            ***********
3559
3560                                    M7277   SH4     LOAD SSR LOW BYTE H     CR1
3561                                                    LOAD SSR HIGH BYTE H    CP2
3562                                                    DATA TO BUS H           EN2
3563                                                    DATA SOURCE (A,B,C) H   DU1,DU2,DT2
3564
3565                                    M7279   SH2     SSR <13:08> H  (E20 AND E24)
3566
3567                                    M7278   SH5 - SH8       REGISTER CHIPS E53,E68, OR E69 (74175'S)
3568                                                            OUTPUT MUX CHIPS - (74151'S  PIN 12)
3569                            %
```

```
 3570  004016  012737  004052  001110          MOV     #3$,$LPERR      ;SET UP THE ERROR LOOP RETURN
 3571  004024  010102                          MOV     R1,R2           ;GENERATE "SSR" ADDRESS IN R2
 3572  004026  062702  000016                  ADD     #SSR,R2
 3573  004032  012705  000001                  MOV     #1,R5           ;INIT BIT TEST MARKER
 3574  004036  030537  027672          1$:     BIT     R5,RGMSK5       ;TEST THIS BIT ??
 3575  004042  001003                          BNE     3$              ;BR IF YES
 3576  004044  006305                  2$:     ASL     R5              ;SHIFT BIT MARKER
 3577  004046  001435                          BEQ     TST11           ;;BR IF ALL BITS TESTED
 3578  004050  000772                          BR      1$              ;GO TEST THE BIT
 3579
 3580  004052  010504                  3$:     MOV     R5,R4           ;SET UP S/B DATA
 3581  004054  005012                          CLR     (R2)            ;INIT REG BEING TESTED
 3582  004056  012761  000000  000004          MOV     #0,LPR(R1)      ;SCOPE SYNC
 3583  004064  050512                          BIS     R5,(R2)         ;SET THE SELECTED BIT IN "SSR"
 3584  004066  011203                          MOV     (R2),R3         ;GET THE WAS DATA
 3585  004070  042703  077700                  BIC     #77700,R3       ;CLEAR OUT DON'T CARE BITS
 3586  004074  020304                          CMP     R3,R4           ;DID BIT SET OK
 3587  004076  001403                          BEQ     4$              ;BR IF YES
 3588
 3589  004100  004737  024412                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
 3590  004104  104006                          ERROR   6               ;SSR BIT FAILED TO SET PROPERLY
 3591
 3592  004106  005004                  4$:     CLR     R4              ;SET UP S/B DATA
 3593  004110  012761  000000  000014          MOV     #0,BKR(R1)      ;SCOPE SYNC
 3594  004116  040512                          BIC     R5,(R2)         ;CLEAR SSR BIT
 3595  004120  011203                          MOV     (R2),R3         ;GET THE SSR WAS DATA
 3596  004122  042703  077700                  BIC     #77700,R3       ;CLEAR JUNK BITS
 3597  004126  020304                          CMP     R3,R4           ;DID THE SSR BIT GET CLEARED ??
 3598  004130  001745                          BEQ     2$              ;BR IF SSR BIT CLEARED OK
 3599
 3600  004132  004737  024412                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
 3601  004136  104006                          ERROR   6               ;SSR BIT FAILED TO CLR PROPERLY
 3602  004140  000741                          BR      2$              ;GO SELECT NEXT BIT
```

```
                                ;;*****************************************************************
                                ;*TEST 11       TEST THAT CLR/SET OF BIT "N" IN "LPR" DOES NOT CLEAR ANY OTHER BITS
                                ;;*****************************************************************
004142  000004                  TST11:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST VERIFIES THAT SETTING AND CLEARING EACH R/W BIT IN
                                THE "LPR" REGISTER DOES NOT DISTURB (CLEAR) ANY OTHER BIT IN THE REGISTER.
                                A BIT MASK (RGMSK3:  177767) IS USED TO DEFINE THE R/W BITS (ALL BUT BIT 03).
                                R5 ALWAYS CONTAINS THE BIT CURRENTLY SELECTED FOR TEST. THE TEST SEQUENCE
                                IS AS FOLLOWS:

                                        1. SELECT A BIT TO TEST
                                        2. SET ALL THE WRITABLE BITS
                                        3. CLEAR THE SELECTED BIT - VERIFY IT CLEARED PROPERLY
                                        4. SET THE SELECTED BIT - VERIFY IT SET PROPERLY
                                        5. REPEAT 1 THRU 4 UNTIL ALL BITS ARE TESTED

                                ANY ERRORS DETECTED ARE REPORTED AND THEN THE TEST RESUMES WITH THE
                                NEXT BIT IN SEQUENCE .

                                ERRORS:
                                *******

                                1.)  ERROR  4  IS CALLED TO REPORT BOTH FAIL TO CLEAR PROPERLY AND
                                    FAIL TO SET PROPERLY FAULTS.

                                SYNC:
                                *******

                                1.) FAIL TO CLR:        M7277   LOAD SSR LOW BYTE H     CR1
                                2.) FAIL TO SET:        M7277   LOAD SSR HIGH BYTE H    CP2

                                DEBUG:
                                ******

                                1.) PROBLEMS DETECTED BY THIS TEST INDICATE ADJACENT BIT INTERFERENCE
                                    CAUSED BY CROSS TALK OR NOISE. PROBLEM IS MOST LIKELY THE M7278.

                                KEY LOGIC:      (SAME AS FOR TEST 6)
                                ************
                                %
004144  012737  004200  001110          MOV     #3$,$LPERR      ;SET UP THE ERROR LOOP RETURN
004152  010102                        MOV     R1,R2           ;SET UP THE REG ADDR
004154  062702  000004                ADD     #LPR,R2
004160  012705  000001                MOV     #1,R5           ;INIT BIT TEST MASK
004164  030537  027666          1$:   BIT     R5,RGMSK3       ;TEST THIS BIT ??
004170  001003                        BNE     3$              ;BR IF YES
004172  006305                  2$:   ASL     R5              ;SHIFT THE BIT TEST MASK
004174  001436                        BEQ     TST12           ;;BR IF TESTED ALL BITS
004176  000772                        BR      1$              ;GO TEST THIS BIT

004200  013704  027666          3$:   MOV     RGMSK3,R4       ;SET UP S/B DATA
004204  005012                        CLR     (R2)            ;INIT REG BEING TESTED
```

```
 3659  004206  112761  000000  000016          MOVB    #0,SSR(R1)      ;SCOPE SYNC
 3660  004214  040504                          BIC     R5,R4           ;CLR BIT "N"
 3661  004216  013712  027666                  MOV     RGMSK3,(R2)     ;SET ALL R/W BITS IN LPR
 3662  004222  040512                          BIC     R5,(R2)         ;CLEAR BIT "N" IN LPR
 3663  004224  011203                          MOV     (R2),R3         ;GET THE WAS DATA
 3664  004226  020304                          CMP     R3,R4           ;DID IT CLEAR OK ?
 3665  004230  001404                          BEQ     4$              ;BR IF YES
 3666
 3667  004232  004737  024412                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
 3668  004236  104004                          ERROR   4               ;BIT "N" FAILED TO CLR PROPERLY
 3669  004240  000754                          BR      2$              ;GO TEST NEXT BIT
 3670
 3671  004242  050504                  4$:     BIS     R5,R4           ;SET BIT "N" IN S/B DATA
 3672  004244  112761  000000  000017          MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
 3673  004252  050512                          BIS     R5,(R2)         ;SET BIT "N" IN LPR
 3674  004254  011203                          MOV     (R2),R3         ;GET THE WAS DATA
 3675  004256  020304                          CMP     R3,R4           ;DID BIT "N" SET PROPERLY ?
 3676  004260  001744                          BEQ     2$              ;BR IF YES
 3677
 3678  004262  004737  024412                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
 3679  004266  104004                          ERROR   4               ;BIT "N" FAILED TO SET PROPERLY
 3680  004270  000740                          BR      2$              ;GO SELECT NEXT BIT
```

```
                                ;;**********************************************************************
                                ;*TEST 12       TEST THAT CLR/SET OF BIT "N" IN "BKR" DOES NOT CLEAR ANY OTHER BITS
                                ;;**********************************************************************
004272  000004                  TST12:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST VERIFIES THAT CLEARING AND SETTING EACH R/W
                                BIT IN THE BREAK CONTROL REGISTER INDIVIDUALLY DOES NOT DISTURB ANY
                                OF THE OTHER BITS. A BIT MASK (RGMSK4:  177777) IS USED TO DEFINE
                                THE R/W BITS (ALL 16.). R5 ALWAYS CONTAINS THE BIT CURRENTLY SELECTED
                                FOR TEST. THE TEST SEQUENCE IS AS FOLLOWS:

                                        1. SELECT A BIT TO TEST
                                        2. SET ALL WRITABLE BITS IN THE "BKR"
                                        3. CLEAR THE SELECTED BIT AND VERIFY THAT IT CLEARED PROPERLY
                                        4. SET THE SELECTED BIT AND VERIFY THAT IT SET PROPERLY
                                        5. REPEAT 1 THRU 4 UNTIL ALL BITS HAVE BEEN TESTED

                                ANY ERROR DETECTED IS REORTRD AND THEN THE TEST RESUMES WITH THE
                                NEXT BIT IN SEQUENCE.

                                ERRORS:
                                ********

                                1.)  ERROR  5  IS CALLED TO REPORT BOTH CLEAR AND SET FAULTS.

                                SYNC:
                                *****

                                1.) FAIL TO CLR:        M7277   SH4     LOAD SSR LOW BYTE H     CR1
                                2.) FAIL TO SET:        M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                                DEBUG:
                                ******

                                1.) LIKE THE PREVIOUS TEST, FAILURES HERE INDICATE ADJACENT BIT
                                    INTERFERENCE CAUSED BY CROSS TALK OR NOISE. THE FAULT IS MOST
                                    LIKELY THE M7278 MODULE.

                                KEY LOGIC:      (SAME AS FOR TEST 7)
                                **********
                                %
004274  012737  004330  001110          MOV     #3$,$LPERR      ;SET UP THE ERROR LOOP RETURN
004302  010102                          MOV     R1,R2           ;SET UP THE REG ADDR
004304  062702  000014                  ADD     #BKR,R2
004310  012705  000001                  MOV     #1,R5           ;INIT BIT TEST MASK
004314  030537  027670          1$:     BIT     R5,RGMSK4       ;TEST THIS BIT ??
004320  001003                          BNE     3$              ;BR IF YES
004322  006305                  2$:     ASL     R5              ;SHIFT THE BIT TEST MASK
004324  001436                          BEQ     TST13           ;;BR IF TESTED ALL BITS
004326  000772                          BR      1$              ;GO TEST THIS BIT

004330  013704  027670          3$:     MOV     RGMSK4,R4       ;SET UP S/B DATA
004334  040504                          BIC     R5,R4           ;CLR BIT "N"
```

```
 3737  004336  005012                          CLR     (R2)              ;INIT REG BEING TESTED
 3738  004340  013712  027670                  MOV     RGMSK4,(R2)       ;SET ALL R/W BITS IN BKR
 3739  004344  112761  000000  000016          MOVB    #0,SSR(R1)        ;SCOPE SYNC
 3740  004352  040512                          BIC     R5,(R2)           ;CLEAR BIT "N" IN BKR
 3741  004354  011203                          MOV     (R2),R3           ;GET THE WAS DATA
 3742  004356  020304                          CMP     R3,R4             ;DID IT CLEAR OK ?
 3743  004360  001404                          BEQ     4$                ;BR IF YES
 3744
 3745  004362  004737  024412                  JSR     PC,SUER2          ;GO SET UP ERROR INFO
 3746  004366  104005                          ERROR   5                 ;BIT "N" FAILED TO CLR PROPERLY
 3747  004370  000754                          BR      2$                ;GO TEST NEXT BIT
 3748
 3749  004372  050504                  4$:     BIS     R5,R4             ;SET BIT "N" IN S/B DATA
 3750  004374  112761  000000  000017          MOVB    #0,SSR+1(R1)      ;SCOPE SYNC
 3751  004402  050512                          BIS     R5,(R2)           ;SET BIT "N" IN BKR
 3752  004404  011203                          MOV     (R2),R3           ;GET THE WAS DATA
 3753  004406  020304                          CMP     R3,R4             ;DID BIT "N" SET PROPERLY ?
 3754  004410  001744                          BEQ     2$                ;BR IF YES
 3755
 3756  004412  004737  024412                  JSR     PC,SUER2          ;GO SET UP ERROR INFO
 3757  004416  104005                          ERROR   5                 ;BIT "N" FAILED TO SET PROPERLY
 3758  004420  000740                          BR      2$                ;GO SELECT NEXT BIT
```

```
                        ;;*********************************************************************
                        ;*TEST 13       TEST THAT CLR/SET OF BIT "N" IN "SSR" DOES NOT CLEAR ANY OTHER BITS
                        ;;*********************************************************************
004422  000004         TST13:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        ****************

                                THIS TEST VERIFIES THAT CLEARING AND SETTING EACH R/W
                        BIT IN THE SILO STATUS REGISTER INDIVIDUALLY DOES NOT DISTURB ANY
                        OF THE OTHER BITS. A BIT MASK (RGMSK5:  100077) IS USED TO DEFINE
                        THE R/W BITS (15,5,4,3,2,1, AND 0). R5 ALWAYS CONTAINS THE BIT CURRENTLY SELECTED
                        FOR TEST. THE TEST SEQUENCE IS AS FOLLOWS:

                                1. SELECT A BIT TO TEST
                                2. SET ALL WRITABLE BITS IN THE "SSR"
                                3. CLEAR THE SELECTED BIT AND VERIFY THAT IT CLEARED PROPERLY
                                4. SET THE SELECTED BIT AND VERIFY THAT IT SET PROPERLY
                                5. REPEAT 1 THRU 4 UNTIL ALL BITS HAVE BEEN TESTED

                        ANY ERROR DETECTED IS REORTRD AND THEN THE TEST RESUMES WITH THE
                        NEXT BIT IN SEQUENCE.

                        ERRORS:
                        ********

                        1.)  ERROR  6  IS CALLED TO REPORT BOTH CLEAR AND SET FAULTS.

                        SYNC:
                        *****

                        1.) FAIL TO CLR:        M7277   SH4     LOAD LPR H      EP2
                        2.) FAIL TO SET:        M7277   SH4     LOAD BCR H      FU1

                        DEBUG:
                        ******

                        1.) LIKE THE PREVIOUS TEST, FAILURES HERE INDICATE ADJACENT BIT
                            INTERFERENCE CAUSED BY CROSS TALK OR NOISE. THE FAULT IS MOST
                            LIKELY THE M7278 MODULE.

                        KEY LOGIC:      (SAME AS FOR TEST 10)
                        **********
                        %
004424  012737  004460  001110         MOV     #3$,$LPERR      ;SET UP THE ERROR LOOP RETURN
004432  010102                         MOV     R1,R2           ;SET UP THE REG ADDR
004434  062702  000016                 ADD     #SSR,R2
004440  012705  000001                 MOV     #1,R5           ;INIT BIT TEST MASK
004444  030537  027672         1$:     BIT     R5,RGMSK5       ;TEST THIS BIT ??
004450  001003                         BNE     3$              ;BR IF YES
004452  006305                 2$:     ASL     R5              ;SHIFT THE BIT TEST MASK
004454  001442                         BEQ     TST14           ;;BR IF TESTED ALL BITS
004456  000772                         BR      1$              ;GO TEST THIS BIT

004460  013704  027672         3$:     MOV     RGMSK5,R4       ;SET UP S/B DATA
004464  040504                         BIC     R5,R4           ;CLR BIT "N"
```

```
3815  004466  005012                        CLR     (R2)            ;INIT REG BEING TESTED
3816  004470  013712  027672                MOV     RGMSK5,(R2)     ;SET ALL R/W BITS IN SSR
3817  004474  012761  000000  000004        MOV     #0,LPR(R1)      ;SCOPE SYNC
3818  004502  040512                        BIC     R5,(R2)         ;CLEAR BIT "N" IN SSR
3819  004504  011203                        MOV     (R2),R3         ;GET THE WAS DATA
3820  004506  042703  077700                BIC     #77700,R3       ;CLEAR JUNK BITS
3821  004512  020304                        CMP     R3,R4           ;DID IT CLEAR OK ?
3822  004514  001404                        BEQ     4$              ;BR IF YES
3823
3824  004516  004737  024412                JSR     PC,SUER2        ;GO SET UP ERROR INFO
3825  004522  104006                        ERROR   6               ;BIT "N" FAILED TO CLR PROPERLY
3826  004524  000752                        BR      2$              ;GO TEST NEXT BIT
3827
3828  004526  050504                4$:     BIS     R5,R4           ;SET BIT "N" IN S/B DATA
3829  004530  012761  000000  000014        MOV     #0,BKR(R1)      ;SCOPE SYNC
3830  004536  050512                        BIS     R5,(R2)         ;SET BIT "N" IN SSR
3831  004540  011203                        MOV     (R2),R3         ;GET THE WAS DATA
3832  004542  042703  077700                BIC     #77700,R3       ;CLEAR JUNK BITS
3833  004546  020304                        CMP     R3,R4           ;DID BIT "N" SET PROPERLY ?
3834  004550  001740                        BEQ     2$              ;BR IF YES
3835
3836  004552  004737  024412                JSR     PC,SUER2        ;GO SET UP ERROR INFO
3837  004556  104006                        ERROR   6               ;BIT "N" FAILED TO SET PROPERLY
3838  004560  000734                        BR      2$              ;GO SELECT NEXT BIT
```

```
                        ;;*******************************************************************
                        ;*TEST 14       "CAR" MEMORY ADDRESSING TEST
                        ;;*******************************************************************
004562  000004          TST14:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        ***************

                                THIS TEST VERIFIES THAT EACH LOCATION IN THE CURRENT ADDRESS
                        MEMORY CAN BE UNIQUELY ADDRESSED. IT WRITES THE PATTERN SHOWN BELOW
                        INTO THE MEMORY AND THEN READS BACK EACH LOCATION TO VERIFY THAT IT
                        WAS WRITTEN CORRECTLY. SINCE THE MEMORY LOGIC IS PARTITIONED INTO
                        FOUR 16 X 4 READ/WRITE MEMORY CHIPS, THE PATTERN RESULTS IN THE LINE
                        NUMBER (00 - 17(8)) BEING WRITTEN AS DATA INTO TO EACH LOCATION
                        (00 - 17(8)) IN EACH CHIP. THAT IS:  LOC00 = 00, LOC 01 = 01,
                        .......LOC 17 = 17.


                                MEMORY PATTERN: LOCATION        CONTENTS        (BOTH OCTAL)

                                                00              000000
                                                01              010421
                                                02              021042
                                                03              031463
                                                04              042104
                                                05              052525
                                                06              063146
                                                07              073567
                                                10              104210
                                                11              114631
                                                12              125252
                                                13              135673
                                                14              146314
                                                15              156735
                                                16              167356
                                                17              177777

                        ANY ERRORS DETECTED ARE REPORTED AND THEN THE TEST RESUMES CHECKING
                        THEE NEXT LOCATION IN SEQUENCE UNTIL ALL 16. HAVE BEEN CHECKED.

                                NOTE:   THIS TEST ALWAYS CHECKS ALL 16. LINES REGARDLESS
                                        OF HOW THE LINE SELECTION PARAMETER WAS INITIALLY
                                        SET UP.

                        ERRORS:
                        ********

                        1.)  ERROR  7  IS CALLED TO REPORT ANY LINES (LOCATIONS) THAT FAIL.
                             THE FAILING LINE # IS INCLUDED AS PART OF THE ERROR HEADER MESSAGE.

                        SYNC:
                        ******

                        1.) WRITE SYNC: M7277   SH4     LOAD SSR LOW BYTE H     CR1
                        2.) READ SYNC:  M7277   SH4     LOAD SSR HIGH BYTE H    CP2
```

```
                                DEBUG:
                                ******

                                1.) ANALYZE THE ERROR REPORTS CAREFULLY ASKING THE FOLLOWING QUESTIONS:

                                        A. DOES THE FAULT AFFECT ONLY ONE LINE ?
                                        B. DOES THE FAULT AFFECT ONLY ONE 4-BIT DATA GROUP ?
                                           IE <15:12>, <11:08>, <07:04>, OR <03:00>
                                        C. DOES ANY DATA AT ALL APPEAR TO BE WRITTEN ?

                                2.) IF "A" IS TRUE THEN SUSPECT AN ADDRESSING PROBLEM IN THE MEMORY
                                    ADDRESS MUX.

                                3.) IF "B" IS TRUE THEN SUSPECT A DATA MUX, UP-COUNTER, MEMORY,
                                    OR INVERTER CHIP PROBLEM.

                                4.) IF "C" IS TRUE SUSPECT A MEMORY WRITE TIMING PROBLEM.

                                5.) IN MOST CASES THE FAULT IS MOST LIKELY THE M7277 OR M7278.

                                KEY LOGIC:
                                **********

                                        M7277   SH4     LOAD CA H               E58-13
                                                        DATA TO BUS H           EN2
                                                        DATA SOURCE (A,B,C)     DU1,DU2,DT2

                                                SH5     MEMADD SOURCE SEL H     E55-8
                                                        CA MEM WRITE ENAB L     E50-1
                                                        BUF ADDRS TO BUS H      E33-1 (SHD BE LOW)
                                                        74157 MUX CHIPS E33,E27,E20 BITS<17:08>
                                                        74193 COUNTER CHIPS E19,E26,E32 BITS<17:08>
                                                        7489 MEMORY CHIPS E18,E25,E31 BITS<17:08>
                                                        7404 INVERTER CHIPS E30,E24,E17 BITS<17:08>

                                                SH5     74157 MUX CHIP  E48
                                                        74157 DATA MUX CHIPS E13,E06 BITS<07:00>
                                                        74193 COUNTER CHIPS E12,E05 BITS<07:00>
                                                        7489 MEMORY CHIPS E11,E04 BITS<07:00>


                                                M7278   SH5 THRU SH8    74151 DATA MUX OUTPUT CHIPS (PIN 1 INPUT)
                                %
004564  010102                          MOV     R1,R2           ;COPY IT IN R2
004566  062702  000006                  ADD     #CAR,R2         ;SET UP REGADR IN R2
004572  013737  027312  001220          MOV     LINSEL,$TMP7    ;SAVE LINE SELECT PARAMETER
004600  012737  177777  027312          MOV     #-1,LINSEL      ;DO ALL LINES FOR THIS TEST
004606  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE NO.
004612  000415                          BR      3$              ;;BR IF DONE ALL SELECTED LINES
004614  105737  030322                  TSTB    LINE            ;DOING LINE 00 ?
004620  001001                          BNE     2$              ;BR IF NOT
004622  005004                          CLR     R4              ;INIT TEST DATA

004624  153711  030322          2$:     BISB    LINE,(R1)       ;SELECT A LINE
004630  112761  000000  000016          MOVB    #0,SSR(R1)      ;SCOPE SYNC
004636  010412                          MOV     R4,(R2)         ;LOAD THE CAR REG.
```

```
3951  004640  062704  010421          ADD     #10421,R4       ;GENERATE NEW DATA
3952  004644  000760                  BR      1$              ;GO DO NEXT LINE
3953
3954  004646  004737  024544    3$:   JSR     PC,SELINE       ;GO SELECT A LINE NO.
3955  004652  000434                  BR      7$              ;;BR IF CHECKED ALL LINES
3956  004654  105737  030322          TSTB    LINE            ;DOING LINE 00 ?
3957  004660  001001                  BNE     4$              ;BR IF NOT
3958  004662  005004                  CLR     R4              ;INIT S/B DATA
3959
3960  004664  153711  030322    4$:   BISB    LINE,(R1)       ;SELECT A LINE
3961  004670  112761  000000  000017  MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
3962  004676  011203                  MOV     (R2),R3         ;GET CONTENTS OF CAR
3963  004700  020304                  CMP     R3,R4           ;WAS DATA OK ?
3964  004702  001412                  BEQ     5$              ;BR IF YES
3965
3966  004704  004737  024412          JSR     PC,SUER2        ;GO SET UP ERROR INFO
3967  004710  004537  024636          JSR     R5,SUNUM        ;SET UP LINE NO. IN MSG BUFFER
3968  004714  030322                  LINE
3969  004716  031155                  EM7+47
3970  004720  012737  004736  001110  MOV     #6$,$LPERR      ;SET UP ERROR LOOP RETURN
3971  004726  104007                  ERROR   7               ;CAR ADDRESSING ERROR
3972
3973  004730  062704  010421    5$:   ADD     #10421,R4       ;GENERATE NEW S/B DATA
3974  004734  000744                  BR      3$              ;GO CHECK NEXT LINE
3975
3976  004736  005037  030322    6$:   CLR     LINE            ;RESTART AT LINE 00 IF LOOPING
3977  004742  000721                  BR      1$              ;GO RESTART
3978
3979  004744  013737  001220  027312  7$:   MOV     $TMP7,LINSEL    ;RESTORE LINE SELECT PARAMETER
```

```
                        ;;*******************************************************************
                        ;*TEST 15       "BCR" MEMORY ADDRESSING TEST
                        ;;*******************************************************************
004752  000004          TST15:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        ***************

                                THIS TEST VERIFIES THAT EACH LOCATION IN THE BYTE COUNT
                        MEMORY CAN BE UNIQUELY ADDRESSED. IT WRITES THE PATTERN SHOWN BELOW
                        INTO THE MEMORY AND THEN READS BACK EACH LOCATION TO VERIFY THAT IT
                        WAS WRITTEN CORRECTLY. SINCE THE MEMORY LOGIC IS PARTITIONED INTO
                        FOUR 16 X 4 READ/WRITE MEMORY CHIPS, THE PATTERN RESULTS IN THE LINE
                        NUMBER (00 - 17(8)) BEING WRITTEN AS DATA INTO TO EACH LOCATION
                        (00 - 17(8)) IN EACH CHIP. THAT IS:  LOC00 = 00, LOC 01 = 01,
                        .......LOC 17 = 17.


                                MEMORY PATTERN: LOCATION        CONTENTS        (BOTH OCTAL)

                                                00              000000
                                                01              010421
                                                02              021042
                                                03              031463
                                                04              042104
                                                05              052525
                                                06              063146
                                                07              073567
                                                10              104210
                                                11              114631
                                                12              125252
                                                13              135673
                                                14              146314
                                                15              156735
                                                16              167356
                                                17              177777

                        ANY ERRORS DETECTED ARE REPORTED AND THEN THE TEST RESUMES CHECKING
                        THEE NEXT LOCATION IN SEQUENCE UNTIL ALL 16. HAVE BEEN CHECKED.

                                NOTE:   THIS TEST ALWAYS CHECKS ALL 16. LINES REGARDLESS
                                        OF HOW THE LINE SELECTION PARAMETER WAS INITIALLY
                                        SET UP.

                        ERRORS:
                        ********

                        1.)  ERROR  10  IS CALLED TO REPORT ANY LINES (LOCATIONS) THAT FAIL.
                            THE FAILING LINE # IS INCLUDED AS PART OF THE ERROR HEADER MESSAGE.

                        SYNC:
                        ******

                        1.) WRITE SYNC: M7277   SH4     LOAD SSR LOW BYTE H     CR1
                        2.) READ SYNC:  M7277   SH4     LOAD SSR HIGH BYTE H    CP2
```

```
4036                                    DEBUG:
4037                                    ******
4038
4039                                    1.) ANALYZE THE ERROR REPORTS CAREFULLY ASKING THE FOLLOWING QUESTIONS:
4040
4041                                            A. DOES THE FAULT AFFECT ONLY ONE LINE ?
4042                                            B. DOES THE FAULT AFFECT ONLY ONE 4-BIT DATA GROUP ?
4043                                               IE <15:12>, <11:08>, <07:04>, OR <03:00>
4044                                            C. DOES ANY DATA AT ALL APPEAR TO BE WRITTEN ?
4045
4046                                    2.) IF "A" IS TRUE THEN SUSPECT AN ADDRESSING PROBLEM IN THE MEMORY
4047                                        ADDRESS MUX.
4048
4049                                    3.) IF "B" IS TRUE THEN SUSPECT A DATA MUX, UP-COUNTER, MEMORY,
4050                                        OR INVERTER CHIP PROBLEM.
4051
4052                                    4.) IF "C" IS TRUE SUSPECT A MEMORY WRITE TIMING PROBLEM.
4053
4054                                    5.) IN MOST CASES THE FAULT IS MOST LIKELY THE M7277 OR M7278.
4055
4056                                    KEY LOGIC:
4057                                    **********
4058
4059                                            M7277   SH4     LOAD BC H               FU2
4060                                                            DATA TO BUS H           EN2
4061                                                            DATA SOURCE (A,B,C)     DU1,DU2,DT2
4062
4063                                                    SH5     MEMADD SOURCE SEL H     E55-8
4064                                                            BC MEM WRITE ENAB L     E57-4
4065                                                            BUF ADDRS TO BUS H      E33-1 (SHD BE LOW)
4066                                            M7278   SH3     BITS<15:08>
4067                                                            74157 INPUT MUX CHIPS E18,E19
4068                                                            74193 UP COUNTER CHIPS E27,E26
4069                                                            7489 MEMORY CHIPS E33,E34
4070                                                            7404 INVERTER CHIPS E41,E42
4071
4072                                                    SH4     BITS<07:00>
4073                                                            74157 INPUT MUX CHIPS E16,E17
4074                                                            74193 UP COUNTER CHIPS E24,E25
4075                                                            7489 MEMORY CHIPS E31,E32
4076                                                            7404 INVERTER CHIPS E39,E40
4077
4078                                                    SH5 THRU SH8    74151 DATA MUX OUTPUT CHIPS (PIN 1 INPUT)
4079                                    %
4080  004754  010102                            MOV     R1,R2           ;COPY IT IN R2
4081  004756  062702  000010                   ADD     #BCR,R2         ;SET UP REGADR IN R2
4082  004762  013737  027312  001220           MOV     LINSEL,$TMP7    ;SAVE LINE SELECT PARAMETER
4083  004770  012737  177777  027312           MOV     #-1,LINSEL      ;DO ALL LINES FOR THIS TEST
4084  004776  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE NO.
4085  005002  000415                            BR      3$              ;;BR IF DONE ALL SELECTED LINES
4086  005004  105737  030322                   TSTB    LINE            ;DOING LINE 00 ?
4087  005010  001001                            BNE     2$              ;BR IF NOT
4088  005012  005004                            CLR     R4              ;INIT TEST DATA
4089
4090  005014  153711  030322          2$:     BISB    LINE,(R1)       ;SELECT A LINE
4091  005020  112761  000000  000016           MOVB    #0,SSR(R1)      ;SCOPE SYNC
```

```
 4092  005026  010412                          MOV     R4,(R2)          ;LOAD THE BCR REG.
 4093  005030  062704  010421                  ADD     #10421,R4        ;GENERATE NEW DATA
 4094  005034  000760                          BR      1$               ;GO DO NEXT LINE
 4095
 4096  005036  004737  024544          3$:     JSR     PC,SELINE        ;GO SELECT A LINE NO.
 4097  005042  000434                          BR      7$               ;;BR IF CHECKED ALL LINES
 4098  005044  105737  030322                  TSTB    LINE             ;DOING LINE 00 ?
 4099  005050  001001                          BNE     4$               ;BR IF NOT
 4100  005052  005004                          CLR     R4               ;INIT S/B DATA
 4101
 4102  005054  153711  030322          4$:     BISB    LINE,(R1)        ;SELECT A LINE
 4103  005060  112761  000000  000017          MOVB    #0,SSR+1(R1)     ;SCOPE SYNC
 4104  005066  011203                          MOV     (R2),R3          ;GET CONTENTS OF BCR
 4105  005070  020304                          CMP     R3,R4            ;WAS DATA OK ?
 4106  005072  001412                          BEQ     5$               ;BR IF YES
 4107
 4108  005074  004737  024412                  JSR     PC,SUER2         ;GO SET UP ERROR INFO
 4109  005100  004537  024636                  JSR     R5,SUNUM         ;GO SET UP LINE NO. IN MSG BUFFER
 4110  005104  030322                          LINE
 4111  005106  031224                          EM10+44
 4112  005110  012737  005126  001110          MOV     #6$,$LPERR       ;SET UP ERROR LOOP RETURN
 4113  005116  104010                          ERROR   10               ;BCR ADDRESSING ERROR
 4114
 4115  005120  062704  010421          5$:     ADD     #10421,R4        ;GENERATE NEW S/B DATA
 4116  005124  000744                          BR      3$               ;GO CHECK NEXT LINE
 4117
 4118  005126  005037  030322          6$:     CLR     LINE             ;RESTART AT LINE 00 IF LOOPING
 4119  005132  000721                          BR      1$               ;GO RESTART
 4120
 4121  005134  013737  001220  027312  7$:     MOV     $TMP7,LINSEL     ;RESTORE THE LINE SELECT PARAMETER
```

```
                                ;;*********************************************************************
                                ;*TEST 16       "CAR" REGISTER TEST - ALL 1'S / ALL 0'S - ALL LINES
                                ;;*********************************************************************
005142  000004                  TST16:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THE ABILITY TO SET AND CLEAR ALL BITS IN
                                ALL THE SELECTED LOCATIONS (LINES) OF THE CURRENT ADDRESS MEMORY.
                                IT USES THE CONFIGURATION PARAMETER (LINSEL:) TO DEFINE WHICH LINES TO
                                TEST. THE TEST SEQUENCE IS AS FOLLOWS:

                                        1. SELECT A LINE # TO TEST
                                        2. LOAD THE SELECTED LOCATION WITH 177777
                                        3. READ IT BACK TO VERIFY ALL BITS SET
                                        4. LOAD THE SELECTED LOCATION WITH 000000
                                        5. READ IT BACK TO VERIFY ALL BITS CLEARED
                                        6. REPEAT STEPS 1 THRU 5 UNTIL ALL SELECTED LINES ARE TESTED.

                                ALL ERRORS ARE REPORTED AND THEN THE TEST RESUMES WITH THE NEXT
                                LINE # IN SEQUENCE AS DEFINED BY "LINSEL".

                                ERRORS:
                                ********

                                1.)  ERROR  7  IS CALLED TO REPORT ALL DATA COMPARE ERRORS

                                SYNC:
                                *****

                                1.) WRITE 1'S:  M7277   SH4     LOAD SSR LOW BYTE H     CR1

                                2.) WRITE 0'S:  M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                                DEBUG:  (REFER TO TEST 14)
                                ******

                                KEY LOGIC:      (REFER TO TEST 14)
                                **********

                                %
005144  010102                          MOV     R1,R2           ;COPY IT INTO R2
005146  062702  000006                  ADD     #CAR,R2         ;R2 GETS CAR ADDRESS
005152  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE NO.
005156  000443                          BR      TST17           ;;BR IF DONE ALL SELECTED LINES
005160  012704  177777                  MOV     #-1,R4          ;RESULT IN CAR S/B = 177777
005164  153711  030322                  BISB    LINE,(R1)       ;SELECT A LINE NO.
005170  004537  024636                  JSR     R5,SUNUM        ;GO SET UP LINE NO. IN MSG BUFFER
005174  030322                          LINE
005176  031155                          EM7+47

005200  112761  000000  000016  2$:     MOVB    #0,SSR(R1)      ;SCOPE SYNC
005206  010412                          MOV     R4,(R2)         ;LOAD A CAR WITH ALL ONES
005210  011203                          MOV     (R2),R3         ;GET THE WAS DATA FROM THE CAR
005212  020403                          CMP     R4,R3           ;DID IT CONTAIN ALL ONES ??
```

```
 4178  005214  001406                          BEQ     3$              ;;BR IF ALL 1'S
 4179
 4180  005216  004737  024412                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
 4181  005222  012737  005200  001110          MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
 4182  005230  104007                          ERROR   7               ;FAILED TO SET ALL 1'S IN SELECTED CAR
 4183
 4184  005232  005004                  3$:     CLR     R4              ;RESULT IN CAR S/B = 000000
 4185  005234  112761  000000  000017          MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
 4186  005242  010412                          MOV     R4,(R2)         ;CLEAR SELECTED CAR
 4187  005244  011203                          MOV     (R2),R3         ;GET THE WAS DATA
 4188  00524o  001741                          BEQ     1$              ;BR IF CAR GOT CLEARED
 4189
 4190  005250  004737  024412                  JSR     PC,SUER2        ;GO SET UP FOR ERROR CALL
 4191  005254  012737  005232  001110          MOV     #3$,$LPERR      ;SET UP ERROR LOOP RETURN
 4192  005262  104007                          ERROR   7               ;FAILED TO CLR ALL BITS IN SELECTED CAR
 4193  005264  000732                          BR      1$              ;GO TEST NEXT LINE
```

```
                                ;;*****************************************************************
                                ;*TEST 17       "BCR" REGISTER TEST - ALL 1'S / ALL 0'S - ALL LINES
                                ;;*****************************************************************
005266  000004                  TST17:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THE ABILITY TO SET AND CLEAR ALL BITS IN
                                ALL THE SELECTED LOCATIONS (LINES) OF THE BYTE COUNT MEMORY.
                                IT USES THE CONFIGURATION PARAMETER (LINSEL:) TO DEFINE WHICH LINES TO
                                TEST. THE TEST SEQUENCE IS AS FOLLOWS:

                                        1. SELECT A LINE # TO TEST
                                        2. LOAD THE SELECTED LOCATION WITH 177777
                                        3. READ IT BACK TO VERIFY ALL BITS SET
                                        4. LOAD THE SELECTED LOCATION WITH 000000
                                        5. READ IT BACK TO VERIFY ALL BITS CLEARED
                                        6. REPEAT STEPS 1 THRU 5 UNTIL ALL SELECTED LINES ARE TESTED.

                                ALL ERRORS ARE REPORTED AND THEN THE TEST RESUMES WITH THE NEXT
                                LINE # IN SEQUENCE AS DEFINED BY "LINSEL".

                                ERRORS:
                                ********

                                1.)  ERROR  10  IS CALLED TO REPORT ALL DATA COMPARE ERRORS

                                SYNC:
                                *****

                                1.) WRITE 1'S:  M7277   SH4     LOAD SSR LOW BYTE H     CR1

                                2.) WRITE 0'S:  M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                                DEBUG:  (REFER TO TEST 15)
                                ******

                                KEY LOGIC:      (REFER TO TEST 15)
                                **********

                                %
005270  010102                          MOV     R1,R2           ;COPY IT INTO R2
005272  062702  000010                  ADD     #BCR,R2         ;R2 GETS BCR ADDRESS
005276  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE NO.
005302  000443                          BR      TST20           ;;BR IF DONE ALL SELECTED LINES
005304  012704  177777                  MOV     #-1,R4          ;RESULT IN BCR S/B = 177777
005310  153711  030322                  BISB    LINE,(R1)       ;SELECT A LINE NO.
005314  004537  024636                  JSR     R5,SUNUM        ;GO SET UP LINE NO. IN MSG BUFFER
005320  030322                          LINE
005322  031224                          EM10+44

005324  112761  000000  000016  2$:     MOVB    #0,SSR(R1)      ;SCOPE SYNC
005332  010412                          MOV     R4,(R2)         ;LOAD A BCR WITH ALL ONES
005334  011203                          MOV     (R2),R3         ;GET THE WAS DATA FROM THE BCR
005336  020403                          CMP     R4,R3           ;DID IT CONTAIN ALL ONES ??
```

```
 4250  005340  001406                          BEQ     3$              ;;BR IF ALL 1'S
 4251
 4252  005342  004737  024412                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
 4253  005346  012737  005324  001110          MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
 4254  005354  104010                          ERROR   10              ;FAILED TO SET ALL 1'S IN SELECTED BCR
 4255
 4256  005356  005004                  3$:     CLR     R4              ;RESULT IN BCR S/B = 000000
 4257  005360  112761  000000  000017          MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
 4258  005366  010412                          MOV     R4,(R2)         ;CLEAR SELECTED BCR
 4259  005370  011203                          MOV     (R2),R3         ;GET THE WAS DATA
 4260  005372  001741                          BEQ     1$              ;BR IF BCR GOT CLEARED
 4261
 4262  005374  004737  024412                  JSR     PC,SUER2        ;GO SET UP FOR ERROR CALL
 4263  005400  012737  005356  001110          MOV     #3$,$LPERR      ;SET UP ERROR LOOP RETURN
 4264  005406  104010                          ERROR   10              ;FAILED TO CLR ALL BITS IN SELECTED BCR
 4265  005410  000732                          BR      1$              ;GO TEST NEXT LINE
```

```
                                ;;*****************************************************************
                                ;*TEST 20       "CAR" MEMORY PATTERNS TEST / 0'S DISTURB
                                ;;*****************************************************************
005412  000004                  TST20:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THAT WHEN A TEST PATTERN IS WRITTEN INTO
                                LOCATION "N" OF THE "CAR" MEMORY, IT DOES NOT DISTURB ANY BITS IN
                                ANY OTHER LOCATIONS. THERE ARE THREE TEST PATTERNS USED* (177777,
                                125252, 052525) FOR EACH LOCATION SELECTED BY THE CONFIGURATION PAR-
                                AMETER "LINSEL". THE TEST SEQUENCE IS AS FOLLOWS:

                                        1. SELECT A TEST PATTERN
                                        2. SELECT A LINE # TO TEST
                                        3. CLEAR ALL 16. LOCATIONS IN THE MEMORY
                                        4. WRITE THE TEST PATTERN INTO THE SELECTED LOCATION
                                        5. VERIFY THAT THE PATTERN WAS WRITTEN CORRECTLY AND THAT
                                           NO OTHER LOCATIONS WERE DISTURBED.
                                        6. REPEAT 2 THRU 5 UNTIL ALL SELECTED LINES TESTED
                                        7. REPEAT 1 THRU 6 UNTIL ALL THREE PATTERNS TESTED

                                ALL ERRORS ARE REPORTED AND THEN THE TEST RESUMES WITH CHECKING THE
                                NEXT LINE IN SEQUENCE.

                                ERRORS:
                                *******

                                1.)  ERROR  46  IS CALLED TO REPORT ANY ERROR DETECTED. THE INFORM-
                                    ATION PRINTED INCLUDES THE LINE # WRITTEN, THE LINE # BEING CHECKED,
                                    AND THE PATTERN USED.

                                SYNC*
                                ******

                                1.) WRITE LINE: M7277   SH4     LOAD SSR LOW BYTE H     CR1

                                2.) READ CHECK: M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                                DEBUG:  (REFER TO TEST 14)
                                ******

                                KEY LOGIC:      (REFER TO TEST 14)
                                **********
                                %
005414  010102                          MOV     R1,R2           ;SET UP REGADR
005416  062702  000006                  ADD     #CAR,R2
005422  012705  027330                  MOV     #PATRNA,R5      ;SET UP POINTER TO DATA PATTERNS
005426  012537  001204          1$:     MOV     (R5)+,$TMP1     ;GET A DATA TEST PATTERN
005432  001472                          BEQ     TST21           ;;BR IF DONE THREE PATTERNS
005434  004737  024544          11$:    JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
005440  000772                          BR      1$              ;BR IF DONE ALL SELECTED LINES
005442  113737  030322  030324          MOVB    LINE,LINEA      ;SAVE THE LINE NO. FOR ERROR LOOPING

005450  105037  001210          2$:     CLRB    $TMP3           ;INIT LINE COUNTER
```

```
 4322  005454  113711  001210          3$:     MOVB    $TMP3,(R1)      ;SELECT A LINE TO CLEAR
 4323  005460  005012                          CLR     (R2)            ;CLR CAR FOR THAT LINE
 4324  005462  105237  001210                  INCB    $TMP3           ;GENERATE NEW LINE NO.
 4325  005466  123727  001210  000020          CMPB    $TMP3,#20       ;DONE CLEARING ALL LINES ?
 4326  005474  001367                          BNE     3$              ;BR IF NOT
 4327
 4328  005476  113711  030324                  MOVB    LINEA,(R1)      ;SET LINE SELECT BITS
 4329  005502  112761  000000  000016          MOVB    #0,SSR(R1)      ;SCOPE SYNC
 4330  005510  013712  001204                  MOV     $TMP1,(R2)      ;LOAD CAR WITH TEST PATTERN
 4331
 4332  005514  105037  001206                  CLRB    $TMP2           ;INIT A LINE COUNTER
 4333  005520  013704  001204          4$:     MOV     $TMP1,R4        ;SET UP S/B DATA
 4334  005524  113711  001206                  MOVB    $TMP2,(R1)      ;SET LINE SELECT IN SCR
 4335  005530  112761  000000  000017          MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
 4336  005536  011203                          MOV     (R2),R3         ;GET WAS DATA
 4337  005540  123737  001206  030322          CMPB    $TMP2,LINE      ;IS THIS THE LINE WITH THE TEST PATTERN
 4338  005546  001401                          BEQ     5$              ;BR IF IT IS
 4339  005550  005004                          CLR     R4              ;MAKE S/B DATA = 000000
 4340  005552  020304          5$:     CMP     R3,R4           ;CORRECT DATA IN CAR ?
 4341  005554  001412                          BEQ     6$              ;BR IF YES
 4342
 4343  005556  004737  024500                  JSR     PC,SUER4        ;GO SET UP ERROR IN FO
 4344  005562  004537  024636                  JSR     R5,SUNUM        ;GO SET UP LINE NO. IN MSG BUFFER
 4345  005566  001206                          $TMP2
 4346  005570  033776                          EM46+63
 4347  005572  012737  005450  001110          MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
 4348  005600  104046                          ERROR   46              ;INCORRECT DATA READ FROM CAR
 4349
 4350  005602  105237  001206          6$:     INCB    $TMP2           ;GENERATE NEXT LINE NO.
 4351  005606  122737  000020  001206          CMPB    #20,$TMP2       ;DONE ALL LINES ?
 4352  005614  001707                          BEQ     11$             ;BR IF YES
 4353  005616  000740                          BR      4$              ;GO CHECK NEXT LINE
```

```
                        ;;*******************************************************************
                        ;*TEST 21       "BCR" MEMORY PATTERNS TEST / 0'S DISTURB
                        ;;*******************************************************************
005620  000004          TST21:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        ***************

                                THIS TEST VERIFIES THAT WHEN A TEST PATTERN IS WRITTEN INTO
                        LOCATION "N" OF THE "BCR" MEMORY, IT DOES NOT DISTURB ANY BITS IN
                        ANY OTHER LOCATIONS. THERE ARE THREE TEST PATTERNS USED* (177777,
                        125252, 052525) FOR EACH LOCATION SELECTED BY THE CONFIGURATION PAR-
                        AMETER "LINSEL". THE TEST SEQUENCE IS AS FOLLOWS:

                                1. SELECT A TEST PATTERN
                                2. SELECT A LINE # TO TEST
                                3. CLEAR ALL 16. LOCATIONS IN THE MEMORY
                                4. WRITE THE TEST PATTERN INTO THE SELECTED LOCATION
                                5. VERIFY THAT THE PATTERN WAS WRITTEN CORRECTLY AND THAT
                                   NO OTHER LOCATIONS WERE DISTURBED.
                                6. REPEAT 2 THRU 5 UNTIL ALL SELECTED LINES TESTED
                                7. REPEAT 1 THRU 6 UNTIL ALL THREE PATTERNS TESTED

                        ALL ERRORS ARE REPORTED AND THEN THE TEST RESUMES WITH CHECKING THE
                        NEXT LINE IN SEQUENCE.

                        ERRORS:
                        *******

                        1.)  ERROR  47  IS CALLED TO REPORT ANY ERROR DETECTED. THE INFORM-
                            ATION PRINTED INCLUDES THE LINE # WRITTEN, THE LINE # BEING CHECKED,
                            AND THE PATTERN USED.

                        SYNC*
                        ******

                        1.) WRITE LINE: M7277   SH4     LOAD SSR LOW BYTE H     CR1

                        2.) READ CHECK: M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                        DEBUG:  (REFER TO TEST 15)
                        ******

                        KEY LOGIC:      (REFER TO TEST 15)
                        **********
                        %
005622  010102                          MOV     R1,R2           ;SET UP REGADR
005624  062702  000010                  ADD     #BCR,R2
005630  012705  027330                  MOV     #PATRNA,R5      ;SET UP POINTER TO DATA PATTERNS
005634  012537  001204          1$:     MOV     (R5)+,$TMP1     ;GET A DATA TEST PATTERN
005640  001472                  BEQ     TST22           ;;BR IF DONE THREE PATTERNS
005642  004737  024544          11$:    JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
005646  000772                  BR      1$              ;BR IF SELECTED ALL LINES
005650  113737  030322  030324          MOVB    LINE,LINEA      ;SAVE THE LINE NO. FOR ERROR LOOP

005656  105037  001210          2$:     CLRB    $TMP3           ;INIT LINE COUNTER
```

```
4410  005662  113711  001210          3$:   MOVB   $TMP3,(R1)       ;SELECT A LINE TO CLEAR
4411  005666  005012                        CLR    (R2)             ;CLR BCR FOR THAT LINE
4412  005670  105237  001210                INCB   $TMP3            ;GENERATE NEW LINE NO.
4413  005674  123727  001210  000020        CMPB   $TMP3,#20        ;DONE CLEARING ALL LINES ?
4414  005702  001367                        BNE    3$               ;BR IF NOT
4415
4416  005704  113711  030324                MOVB   LINEA,(R1)       ;SET LINE SELECT BITS
4417  005710  112761  000000  000016        MOVB   #0,SSR(R1)       ;SCOPE SYNC
4418  005716  013712  001204                MOV    $TMP1,(R2)       ;LOAD BCR WITH TEST PATTERN
4419
4420  005722  105037  001206                CLRB   $TMP2            ;INIT A LINE COUNTER
4421  005726  013704  001204          4$:   MOV    $TMP1,R4         ;SET UP S/B DATA
4422  005732  113711  001206                MOVB   $TMP2,(R1)       ;SELECT A LINE TO CHECK
4423  005736  112761  000000  000017        MOVB   #0,SSR+1(R1)     ;SCOPE SYNC
4424  005744  011203                        MOV    (R2),R3          ;GET WAS DATA
4425  005746  123737  001206  030322        CMPB   $TMP2,LINE       ;IS THIS THE LINE WITH THE TEST PATTERN
4426  005754  001401                        BEQ    5$               ;BR IF IT IS
4427  005756  005004                        CLR    R4               ;MAKE S/B DATA = 000000
4428  005760  020304          5$:   CMP    R3,R4            ;CORRECT DATA IN BCR ?
4429  005762  001412                        BEQ    6$               ;BR IF YES
4430
4431  005764  004737  024500                JSR    PC,SUER4         ;GO SET UP ERROR IN FO
4432  005770  004537  024636                JSR    R5,SUNUM         ;GO SET UP LINE NO.IN MSG BUFFER
4433  005774  001206                        $TMP2
4434  005776  034176                        EM47+56
4435  006000  012737  005656  001110        MOV    #2$,$LPERR       ;SET UP ERROR LOOP RETURN
4436  006006  104047                        ERROR  47               ;INCORRECT DATA READ FROM BCR
4437
4438  006010  105237  001206          6$:   INCB   $TMP2            ;GENERATE NEXT LINE NO.
4439  006014  122737  000020  001206        CMPB   #20,$TMP2        ;DONE ALL LINES ?
4440  006022  001707                        BEQ    11$              ;BR IF YES
4441  006024  000740                        BR     4$               ;GO CHECK NEXT LINE
```

```
                                ;;*******************************************************************
                                ;*TEST 22       "CAR" MEMORY PATTERNS TEST / 1'S DISTURB
                                ;;*******************************************************************
006026  000004                  TST22:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST VERIFIES THAT WHEN ALL ZEROS ARE WRITTEN INTO LINE "N"
                                IN THE "CAR" MEMORY, IT DOES NOT CLEAR ANY BITS IN ANY OTHER LOCATIONS.
                                ONLY THE LINES SELECTED BY "LINSEL" ARE TESTED. THE TEST SEQUENCE IS
                                AS FOLLOWS:

                                        1. SELECT A LINE TO TEST
                                        2. SET ALL ONES (177777) INTO ALL MEMORY LOCATIONS
                                        3. CLEAR THE SELECTED LINE
                                        4. VERIFY THAT ONLY THE SELECTED LINE WAS CLEARED
                                           AND ALL OTHER LINES STILL CONTAIN 177777
                                        5. REPEAT STEPS 1 THRU 4 UNTIL ALL SELECTED LINES ARE TESTED

                                ALL ERRORS ARE REPORTED AND THEN THE TEST RESUMES CHECKING THE NEXT
                                LINE IN SEQUENCE.

                                ERRORS:
                                *******

                                1.)  ERROR  46  IS CALLED TO REPORT ALL ERRORS. THE INFORMATION PRINTED
                                    INCLUDES THE LINE # WRITTEN, THE LINE # BEING CHECKED, AND THE
                                    PATTERN USED.

                                SYNC:
                                *****

                                1.) WRITE LINE: M7277   SH4     LOAD SSR LOW BYTE H     CR1

                                2.) CHECK LINE: M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                                DEBUG:  (REFER TO TEST 14)
                                ******

                                KEY LOGIC:      (REFER TO TEST 14)
                                **********
                                %
006030  010102                          MOV     R1,R2           ;SET UP REGADR
006032  062702  000006                  ADD     #CAR,R2
006036  012705  177777                  MOV     #-1,R5          ;TEST PATERRN IN R5 = 177777
006042  010537  001204                  MOV     R5,$TMP1        ;SAVE FOR ERROR REPORTING
006046  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
006052  000465                  BR      TST23           ;;BR IF DONE ALL LINES
006054  113737  030322  030324         MOVB    LINE,LINEA      ;SAVE THE LINE NO. FOR ERROR LOOP

006062  105037  001210          2$:     CLRB    $TMP3           ;INIT LINE COUNTER
006066  113711  001210          3$:     MOVB    $TMP3,(R1)      ;SELECT A LINE TO CLEAR
006072  010512                  MOV     R5,(R2)         ;LOAD CAR WITH 177777
006074  105237  001210                  INCB    $TMP3           ;GENERATE NEW LINE NO.
006100  123727  001210  000020         CMPB    $TMP3,#20       ;DONE SETTING ALL LINES TO 177777 ?
```

```
4498  006106  001367                        BNE     3$              ;BR IF NOT
4499
4500  006110  113711  030324                MOVB    LINEA,(R1)      ;SET LINE SELECT IN SCR
4501  006114  112761  000000  000016        MOVB    #0,SSR(R1)      ;SCOPE SYNC
4502  006122  005012                        CLR     (R2)            ;CLEAR THE CAR UNDER TEST
4503
4504  006124  105037  001206                CLRB    $TMP2           ;INIT A LINE COUNTER
4505  006130  005004                4$:     CLR     R4              ;MAKE S/B DATA = 000000
4506  006132  113711  001206                MOVB    $TMP2,(R1)      ;SELECT A LINE TO CHECK
4507  006136  112761  000000  000017        MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
4508  006144  011203                        MOV     (R2),R3         ;GET WAS DATA
4509  006146  123737  001206  030322        CMPB    $TMP2,LINE      ;IS THIS THE LINE WITH THE TEST PATTERN
4510  006154  001401                        BEQ     5$              ;BR IF IT IS
4511  006156  010504                        MOV     R5,R4           ;MAKE S/B DATA = 177777
4512  006160  020304                5$:     CMP     R3,R4           ;CORRECT DATA IN CAR ?
4513  006162  001412                        BEQ     6$              ;BR IF YES
4514
4515  006164  004737  024500                JSR     PC,SUER4        ;GO SET UP ERROR IN FO
4516  006170  004537  024636                JSR     R5,SUNUM        ;GO SET UP LINE NO. IN MSG BUFFER
4517  006174  001206                        $TMP2
4518  006176  033776                        EM46+63
4519  006200  012737  006062  001110        MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
4520  006206  104046                        ERROR   46              ;INCORRECT DATA READ FROM CAR
4521
4522  006210  105237  001206                INCB    $TMP2           ;GENERATE NEXT LINE NO.
4523  006214  122737  000020  001206        CMPB    #20,$TMP2       ;DONE ALL LINES ?
4524  006222  001711                        BEQ     1$              ;BR IF YES
4525  006224  000741                        BR      4$              ;GO CHECK NEXT LINE
```

```
                        ;;*****************************************************************
                        ;*TEST 23       "BCR" MEMORY PATTERNS TEST / 1'S DISTURB
                        ;;*****************************************************************
006226  000004          TST23:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        ***************

                                THIS TEST VERIFIES THAT WHEN ALL ZEROS ARE WRITTEN INTO LINE "N"
                        IN THE "BCR" MEMORY, IT DOES NOT CLEAR ANY BITS IN ANY OTHER LOCATIONS.
                        ONLY THE LINES SELECTED BY "LINSEL" ARE TESTED. THE TEST SEQUENCE IS
                        AS FOLLOWS:

                                1. SELECT A LINE TO TEST
                                2. SET ALL ONES (177777) INTO ALL MEMORY LOCATIONS
                                3. CLEAR THE SELECTED LINE
                                4. VERIFY THAT ONLY THE SELECTED LINE WAS CLEARED
                                   AND ALL OTHER LINES STILL CONTAIN 177777
                                5. REPEAT STEPS 1 THRU 4 UNTIL ALL SELECTED LINES ARE TESTED

                        ALL ERRORS ARE REPORTED AND THEN THE TEST RESUMES CHECKING THE NEXT
                        LINE IN SEQUENCE.

                        ERRORS:
                        *******

                        1.)  ERROR  47  IS CALLED TO REPORT ALL ERRORS. THE INFORMATION PRINTED
                            INCLUDES THE LINE # WRITTEN, THE LINE # BEING CHECKED, AND THE
                            PATTERN USED.

                        SYNC:
                        *****

                        1.) WRITE LINE: M7277   SH4     LOAD SSR LOW BYTE H     CR1

                        2.) CHECK LINE: M7277   SH4     LOAD SSR HIGH BYTE H    CP2

                        DEBUG:  (REFER TO TEST 15)
                        ******

                        KEY LOGIC:      (REFER TO TEST 15)
                        **********
                        %
006230  010102                          MOV     R1,R2           ;SET UP REGADR
006232  062702  000010                  ADD     #BCR,R2
006236  012705  177777                  MOV     #-1,R5          ;TEST PATERRN IN R5 = 177777
006242  010537  001204                  MOV     R5,$TMP1        ;SAVE IT FOR ERROR REPORTING
006246  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
006252  000465                  BR      TST24           ;;BR IF DONE ALL LINES
006254  113737  030322  030324          MOVB    LINE,LINEA      ;SAVE THE LINE NO.

006262  105037  001210          2$:     CLRB    $TMP3           ;INIT LINE COUNTER
006266  113711  001210          3$:     MOVB    $TMP3,(R1)      ;SELECT A LINE TO INIT
006272  010512                  MOV     R5,(R2)         ;LOAD BCR WITH 177777
006274  105237  001210                  INCB    $TMP3           ;GENERATE NEW LINE NO.
006300  123727  001210  000020          CMPB    $TMP3,#20       ;DONE SETTING ALL LINES TO 177777 ?
```

```
4582  006306  001367                        BNE     3$              ;BR IF NOT
4583
4584  006310  113711  030324                MOVB    LINEA,(R1)      ;SET LINE SELECT BITS
4585  006314  112761  000000  000016        MOVB    #0,SSR(R1)      ;SCOPE SYNC
4586  006322  005012                        CLR     (R2)            ;CLEAR THE BCR UNDER TEST
4587
4588  006324  105037  001206                CLRB    $TMP2           ;INIT A LINE COUNTER
4589  006330  005004                4$:     CLR     R4              ;MAKE S/B DATA = 000000
4590  006332  113711  001206                MOVB    $TMP2,(R1)      ;SELECT A LINE TO CHECK
4591  006336  112761  000000  000017        MOVB    #0,SSR+1(R1)    ;SCOPE SYNC
4592  006344  011203                        MOV     (R2),R3         ;GET WAS DATA
4593  006346  123737  001206  030322        CMPB    $TMP2,LINE      ;IS THIS THE LINE WITH THE TEST PATTERN
4594  006354  001401                        BEQ     5$              ;BR IF IT IS
4595  006356  010504                        MOV     R5,R4           ;MAKE S/B DATA = 177777
4596  006360  020304                5$:     CMP     R3,R4           ;CORRECT DATA IN BCR ?
4597  006362  001412                        BEQ     6$              ;BR IF YES
4598
4599  006364  004737  024500                JSR     PC,SUER4        ;GO SET UP ERROR IN FO
4600  006370  004537  024636                JSR     R5,SUNUM        ;GO SET UP LINE NO. IN MSG BUFFER
4601  006374  001206                        $TMP2
4602  006376  034176                        EM47+56
4603  006400  012737  006262  001110        MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
4604  006406  104047                        ERROR   47              ;INCORRECT DATA READ FROM BCR
4605
4606  006410  105237  001206                INCB    $TMP2           ;GENERATE NEXT LINE NO.
4607  006414  122737  000020  001206        CMPB    #20,$TMP2       ;DONE ALL LINES ?
4608  006422  001711                        BEQ     1$              ;BR IF YES
4609  006424  000741                        BR      4$              ;GO CHECK NEXT LINE
```

```
                        ;;*****************************************************************
                        ;*TEST 24       TEST THAT "CAR" MEMORY EXT BITS SET/CLR PROPERLY
                        ;;*****************************************************************
006426  000004          TST24:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        **************

                                THIS TEST VERIFIES THAT THE "EXT MEM" BITS (CAR<17:16> CAN
                        BE SET AND CLEARED IN ALL "CAR" MEMORY LOCATIONS. IT WRITES THE
                        BINARY TEST PATTERNS (11, 01, AND 10) INTO BITS<17:16> TO CHECK
                        EVERY MEMORY LOCATION. THE TEST SEQUENCE IS AS FOLLOWS:

                                1. SELECT A TEST PATTERN TO USE
                                2. CLEAR ALL 18 BITS IN ALL 16 LOCATIONS
                                3. SELECT A LINE TO TEST
                                4. WRITE THE TEST PATTERN INTO <17:16> OF THE
                                   SELECTED LOCATION
                                5. READ CHECK ALL LOCATIONS TO VERIFY THAT ONLY THE
                                   SELECTED LOCATION CONTAINS THE PATTERN
                                6. REPEAT STEPS 3 THRU 5 UNTIL ALL SELECTED LINES TESTED
                                7. REPEAT STEPS 1 THRU 6 UNTIL ALL PATTERNS USED

                        ALL ERRORS ARE REPORTED AND THEN THE TEST RESUMES CHECKING THE NEXT
                        LINE IN SEQUENCE.

                                NOTES:  1.) BITS<05:04> IN THE "SCR" ARE USED TO WRITE THE
                                            EXT MEM BITS
                                        2.) BITS<07:06> IN THE "SSR" ARE USED TO CHECK BITS<17:16>

                        ERRORS:
                        *******

                        1.)  ERROR  7  IS CALLED TO REPORT ALL ERRORS

                        SYNC:
                        ******

                        1.) WRITE CAR:  M7277   SH4     LOAD LPR H      EP2

                        2.) READ CAR:   M7277   SH4     LOAD BCR H      FU2

                        DEBUG:
                        ******

                        1.) ASSUMING THAT THE PREVIOUS "CAR" MEMORY TESTS RAN ERROR FREE, THE
                            PROBLEM IS EITHER THE M7277 OR THE M7278
                        2.) SET UP SCOPE ERROR LOOP AND START BACKTRACKING THROUGH THE LOGIC
                            STARTING WITH THE KEY SIGNALS BELOW.

                        KEY LOGIC:
                        **********

                                M7277   SH5     SCR05 H         CD2
                                                SCR04 H         CE1
                                                SSR07 H         CF1
```

```
                                                    SSR06 H         CH1

                                            M7278   SH7     74151 MUX CHIPS E66 AND E58 (INPUT PIN 12)

                                            NOTE:   THER MAY BE A PRINT ERROR ON SH7 OF THE M7278. THE
                                                    SIGNALS INTO THE MUX CHIPS E66 AND E58 COME FROM THE
                                                    M7277 SH5 RATHER FROM M7279 SH3.

                                    %
006430  010102                            MOV     R1,R2           ;SET UP REGADR
006432  062702  000016                    ADD     #SSR,R2
006436  012705  027340                    MOV     #PATRNB,R5      ;SET UP POINTER TO DATA PATTERNS
006442  012537  001204          1$:       MOV     (R5)+,$TMP1     ;GET THE PATTERNS
006446  012537  001206                    MOV     (R5)+,$TMP2
006452  001505                            BEQ     TST25           ;;BR IF DONE ALL PATTERNS

006454  105037  001210          2$:       CLRB    $TMP3           ;INIT A LINE COUNTER
006460  142711  000017          3$:       BICB    #17,(R1)        ;INIT LINE SELECT BITS IN "SCR"
006464  153711  001210                    BISB    $TMP3,(R1)      ;SELECT A LINE IN SCR
006470  142711  000060                    BICB    #60,(R1)        ;SO WE CLEAR ALL THE MEM EXT BITS
006474  005061  000006                    CLR     CAR(R1) ;CLEAR A CAR
006500  105237  001210                    INCB    $TMP3           ;GENERATE NXT LINE NO.
006504  122737  000020  001210            CMPB    #20,$TMP3       ;CLEARED THE WHOLE THING ?
006512  001362                            BNE     3$              ;BR IF NOT

006514  004737  024544          4$:       JSR     PC,SELINE       ;GO SELECT A LINE NO.
006520  000750                            BR      1$              ;BR IF DONE ALL LINES
006522  153711  030322                    BISB    LINE,(R1)       ;SET UP LINE SELECT BITS
006526  153711  001204                    BISB    $TMP1,(R1)      ;SET UP MEM EXT BIT PATTERN
006532  012761  000000  000004            MOV     #0,LPR(R1)      ;SCOPE SYNC
006540  012761  000000  000006            MOV     #0,CAR(R1)      ;WRITE EXT BITS IN THIS LOCATION

006546  105037  001212                    CLRB    $TMP4           ;INIT A LINE COUNTER
006552  013704  001206          5$:       MOV     $TMP2,R4        ;SET UP S/B DATA
006556  142711  000017                    BICB    #17,(R1)        ;INIT SELECT BITS IN "SCR"
006562  153711  001212                    BISB    $TMP4,(R1)      ;SET SELECT BITS IN SCR
006566  012761  000000  000014            MOV     #0,BKR(R1)      ;SCOPE SYNC
006574  016103  000006                    MOV     CAR(R1),R3      ;READ THE SELECTED "CAR"
006600  011203                            MOV     (R2),R3         ;GET THE WAS DATA
006602  042703  177477                    BIC     #177477,R3      ;CLEAR JUNK BITS
006606  123737  030322  001212            CMPB    LINE,$TMP4      ;LINE UNDER TEST ??
006614  001401                            BEQ     6$              ;BR IF YES
006616  005004                            CLR     R4              ;MAKE S/B DATA = 000000
006620  020304                  6$:       CMP     R3,R4           ;WERE MEM EXT BITS CORRECT ?
006622  001412                            BEQ     7$              ;BR IF YES

006624  004737  024412                    JSR     PC,SUER2        ;GO SET UP ERROR INFO
006630  004537  024636                    JSR     R5,SUNUM        ;GO SET LINE NO. IN MSG BUFFER
006634  001212                            $TMP4
006636  031155                            EM7+47
006640  012737  006454  001110            MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
006646  104007                            ERROR   7               ;MEM EXT BITS READ INCORRECTLY

006650  105237  001212          7$:       INCB    $TMP4           ;GENERATE NXT LINE NO.
006654  122737  000020  001212            CMPB    #20,$TMP4       ;DONE ALL LINES
006662  001674                            BEQ     2$              ;BR IF YES
```

```
 4722  006664  000732                    BR      5$              ;GO CHECK NEXT LINE
```

```
                                ;;*****************************************************************
                                ;*TEST 25       TEST INTR. ENAB. BITS - INTR. CONDITION DISABLED
                                ;;*****************************************************************
006666  000004                  TST25:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST VERIFIES THAT NO TRANSMITTER OR RECEIVER INTERRUPT
                                OCCURS WHEN THE ENABLE BIT IS SET WITH OUT THE INTERRUPTING CONDITION
                                ACTIVE. A BIT MASK (INTMSK:  030100) IS UESED TO DEFINE THE I.E. BITS.
                                IN THE "SCR" (BITS 13, 12, AND 06). THE TEST SEQUENCE IS AS
                                FOLLOWS:

                                        1. SET UP THE XMIT AND RCVR VECTORS
                                        2. SELECT AN I.E. BIT TO TEST
                                        3. INIT THE SP AND LOCK OUT INTERRUPTS
                                        4. SET THE SELECTED BIT IN THE "SCR"
                                        5. CLEAR THE PSW TO ALLOW INTRS
                                        6. IF NO INTR:  REPEAT 2 THRU 5 UNTIL ALL BITS TESTED
                                        7. IF INTR:     REPORT ERROR AND CONTINUE WITH NEXT BIT TO TEST

                                ALL ERRORS ARE REPORTED AND THEN THE TEST RESUMES WITH THE NEXT BIT
                                IN SEQUENCE .

                                ERRORS:
                                *******

                                1.)  ERROR  11  IS CALLED TO REPORT RCVR INTR FAULTS

                                2.)  ERROR  12  IS CALLED TO REPORT XMITTR INTR FAULTS

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1.) PROBLEM IS MOST LIKELY THE M7289 MODULE IF THIS IS THE
                                    FIRST TEST TO FAIL.
                                2.) SET UP SCOPE ERROR LOOP AND BACKTRACK THROUGH THE LOGIC
                                    STARTING WITH THE KEY LOGIC BELOW.

                                KEY LOGIC:
                                ***********

                                        M7289   SH6     XMIT INT REQ H  FM1
                                                        RCV INT REQ H   DP1
                                %
006670  012737  006746  001110            MOV     #3$,$LPERR      ;SET UP THE ERROR LOOP RETURN
006676  010102                            MOV     R1,R2           ;MAKE IT REGADR TOO
006700  013703  027304                    MOV     DHVCT,R3        ;GET FIRST VECTOR ADDRESS
006704  012723  006776                    MOV     #4$,(R3)+       ;GO TO 3$ IF RCVR INTRS
006710  113723  030316                    MOVB    DHRLVL,(R3)+
006714  105723                            TSTB    (R3)+           ;UPDATE POINTER
006716  012723  007020                    MOV     #5$,(R3)+       ;GO TO 5$ IF XMITTR INTRS
```

```
 4779  006722  113713  030317              MOVB    DHTLVL,(R3)
 4780  006726  012705  000001              MOV     #1,R5           ;INIT BIT TEST MARKER
 4781  006732  030537  027676      1$:     BIT     R5,INTMSK       ;TEST THIS BIT ??
 4782  006736  001003                      BNE     3$              ;BR IF YES
 4783  006740  006305              2$:     ASL     R5              ;SHIFT THE MARKER
 4784  006742  001437                      BEQ     6$              ;BR IF TESTED ALL REQUIRED BITS
 4785  006744  000772                      BR      1$              ;GO TEST FOR THIS ONE
 4786
 4787  006746  012706  001100      3$:     MOV     #STACK,SP       ;RESET SP FOR ERROR LOOPING
 4788  006752  004737  027164              JSR     PC,CHPS2        ;GO LOCK OUT INTRS
 4789  006756  012711  004000              MOV     #BIT11,(R1)     ;CLEAR THE DH11 INTERFACE
 4790  006762  010504                      MOV     R5,R4           ;SET UP S/B DATA
 4791  006764  050511                      BIS     R5,(R1)         ;SET THE TEST I.E. BIT
 4792  006766  004737  027150              JSR     PC,CHPS1        ;GO CLEAR PSW
 4793  006772  000240                      NOP                     ;WAIT A BIT TO ALLOW INTR
 4794  006774  000761                      BR      2$              ;OK - GO DO NEXT I.E. BIT
 4795
 4796  006776  004737  027200      4$:     JSR     PC,SAPS         ;SAVE THE ERROR PSW
 4797  007002  011103                      MOV     (R1),R3         ;GET THE WAS DATA
 4798  007004  004737  024416              JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 4799  007010  104011                      ERROR   11              ;DH11 RCVR SHOULD NOT HAVE INTERRUPTED
 4800  007012  012716  006740              MOV     #2$,(SP)        ;SET UP TO RETURN
 4801  007016  000002                      RTI                     ;RETURN TO TEST NEXT BIT
 4802
 4803  007020  004737  027200      5$:     JSR     PC,SAPS         ;SAVE THE ERROR PSW
 4804  007024  011103                      MOV     (R1),R3         ;GET THE WAS DATA
 4805  007026  004737  024416              JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 4806  007032  104012                      ERROR   12              ;XMITTER SHOULD NOT HAVE INTERRUPTED
 4807  007034  012716  006740              MOV     #2$,(SP)        ;SET UP TO RETURN
 4808  007040  000002                      RTI                     ;RETURN TO TEST NEXT BIT
 4809
 4810  007042  012706  001100      6$:     MOV     #STACK,SP       ;RESET THE SP JUST IN CASE
 4811  007046  004737  026770              JSR     PC,RESTRP       ;GO RESTORE TRAP CATCHER IN VECTOR
```

```
                                ;;*****************************************************************
                                ;*TEST 26       TEST CHAR. AVAIL. I.E.  WITH INTR. CONDITION ACTIVE
                                ;;*****************************************************************
007052  000004                 TST26:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST USES MAINT. MODE (SCR09=1) TO SET THE CHAR AVAIL
                                BIT (SCR7) TO GENERATE A RCVR INTERRUPT THROUGH THE PROPER VECTOR.
                                THE TEST SEQUENCE IS AS FOLLOWS:

                                        1. SET UP THE VECTORS
                                        2. ISSUE DH11 "MASTER CLR",RESET THE SP, AND LOCK OUT INTRS
                                        3. PRIMT THE DH11 TO GENERATE A RCVR INTR
                                        4. CLEAR THE PSW TO ALLOW INTRS
                                        5. REPORT NO RCVR INTR OR FALSE XMITTR INTR.

                                ALL ERRORS ARE REPORTED AND THEN THE TEST RESETS THE VECTOR AND SP
                                AND CONTINUES TO THE NEXT TEST IN THE PROGRAM.

                                ERRORS:
                                ********

                                1.)  ERROR  13  IS CALLED TO REPORT RCVR INTR FAULTS
                                2.)  ERROR  12  IS CALLED TO REPORT XMITTR INTR FAULTS

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                *******

                                1.) IF NO RCVR INTR OCCURRED THE PROBLEM IS EITHER SECTION "A" OF THE
                                    M7821 OR THE M7289 - SH6.
                                2.) IF A FALSE XMIT INTR OCCURRED THE PROBLEM IS MOST LIKELY THE
                                    M7821 GENERATING AN INCORRECT VECTOR ADDRESS.

                                KEY LOGIC:
                                **********

                                        M7289   SH6     E31-12

                                        M7821   SEC "A" BUS A BR L      U2
                                                        BUS SACK L      T2
                                                        BUS BG IN H     B1
                                                        "A" MASTER L    N1
                                                        VECTOR BIT 02 H D2

                                        NOTE:   REMEMBER THAT PROBLEMS IN THIS AREA COULD BE CAUSED
                                                BY ANY DEVICE IN THE SYSTEM INCLUDING THE "CPU".
                                                SYSTEM RE-CONFIGURATION TO ISOLATE THE FAULTY SUB-
                                                SYSTEM MAY BE REQUIRED.
                                %
007054  012737  007112  001110            MOV     #1$,$LPERR      ;SET UP THE ERROR LOOP RETURN
007062  010102                           MOV     R1,R2           ;MAKE IT REGADR TOO
```

```
 4868  007064  013703  027304            MOV     DHVCT,R3        ;GET FIRST VECTOR ADDR
 4869  007070  012723  007222            MOV     #3$,(R3)+       ;GO TO 3$ IF RCVR INTRS
 4870  007074  113723  030316            MOVB    DHRLVL,(R3)+
 4871  007100  105723                    TSTB    (R3)+           ;UPDATE POINTER
 4872  007102  012723  007176            MOV     #2$,(R3)+       ;GO TO 3$ ON XMITTR INTR
 4873  007106  113713  030317            MOVB    DHTLVL,(R3)
 4874  007112  012711  004000      1$:   MOV     #BIT11,(R1)     ;CLR THE DH11
 4875  007116  012706  001100            MOV     #STACK,SP       ;RESET THE SP FOR ERROR LOOPS
 4876  007122  004737  027164            JSR     PC,CHPS2        ;GO LOCK OUT INTRS
 4877  007126  012711  001000            MOV     #BIT09,(R1)     ;SET MAINT MODE BIT
 4878  007132  052711  000100            BIS     #BIT06,(R1)     ;SET CHAR AVAILABLE I.E. BIT
 4879  007136  052711  000200            BIS     #BIT07,(R1)     ;SET THE CHAR AVAIL BIT TO FORCE INTR
 4880  007142  004737  027150            JSR     PC,CHPS1        ;GO CLEAR PSW
 4881  007146  000240                    NOP                     ;GIVE IT A LITTLE TIME
 4882
 4883  007150  004737  027200            JSR     PC,SAPS         ;SAVE THE ERROR PSW
 4884  007154  011103                    MOV     (R1),R3         ;GET THE WAS DATA
 4885  007156  005011                    CLR     (R1)            ;CLEAR OUT THE SCR
 4886  007160  005011                    CLR     (R1)
 4887  007162  012704  001300            MOV     #1300,R4        ;SET UP S/B DATA
 4888  007166  004737  024416            JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 4889  007172  104013                    ERROR   13              ;TIMED OUT AWAITING CHAR AVAIL INTR
 4890  007174  000412                    BR      3$              ;GO EXIT TEST
 4891
 4892  007176  004737  027200      2$:   JSR     PC,SAPS         ;SAVE THE ERROR PSW
 4893  007202  011103                    MOV     (R1),R3         ;GET WAS DATA
 4894  007204  012704  001300            MOV     #1300,R4        ;SET UP S/B DATA
 4895  007210  005011                    CLR     (R1)            ;CLR OUT SCR REG
 4896  007212  005011                    CLR     (R1)
 4897  007214  004737  024416            JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 4898  007220  104012                    ERROR   12              ;UNEXPECTED XMITTR INTR
 4899
 4900  007222  012706  001100      3$:   MOV     #STACK,SP       ;RESET THE SP
 4901  007226  004737  026770            JSR     PC,RESTRP       ;GO RESTORE TRAP CATCHER
```

```
                                ;;*****************************************************************
                                ;*TEST 27       TEST SILO OVFLW.  I.E.  WITH INTR. CONDITION ACTIVE
                                ;;*****************************************************************
007232  000004                TST27:  SCOPE
                                .REM    %
                                TEST ABSTRACT
                                **************

                                        THIS TEST USES MAINT. MODE (SCR09=1) TO ENABLE SILO FULL
                                INTERRUPT. THE TEST SEQUENCE IS AS FOLLOWS:

                                        1.  SET UP XMIT AND RCVR VECTORS
                                        2.  RESET THE DH11 AND S.P. - THE LOCK OUT INTRS.
                                        3.  PRIME DH11 TO GENERATE SILO FULL INTR. - ALLOW INTRS.
                                        4.  REPORT ERROR IF NO RCVR. INTR OCCURS OR
                                            A FALSE XMIT INTR. DOES OCCUR
                                        5.  AFTER REPORTING ANY ERRORS DETECTED RESET
                                            THE SP AND VECTORS THEN GO TO TEST 30

                                ERRORS:
                                *******

                                1.   ERROR 43  IS CALLED TO REPORT NO RCVR INTR OCCURRED
                                2.   ERROR 12  IS CALLED TO REPORT FALSE TRANSMITTER INTR.

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1.  IF THE RECEIVER INTR FAILED TO INTERRUPT PROBLEM IS MOST LIKELY
                                    THE M7289 MODULE
                                2.  IF A FALSE XMITTR INTR OCCURRED PROBLEM IS MOST LIKELY THE M7281 MODULE

                                KEY LOGIC:
                                **********

                                        M7289   SHG     E35,E50, OR E31
                                                        SCR 14 H (STORAGE) DS1

                                        M7821   "B" SECTION

                                %
007234  012737  007272  001110          MOV     #1$,$LPERR      ;SET UP THE ERROR LOOP RETURN
007242  010102                          MOV     R1,R2           ;MAKE IT REGADR TOO
007244  013703  027304                  MOV     DHVCT,R3        ;GET FIRST VECTOR ADDR
007250  012723  007402                  MOV     #3$,(R3)+       ;GO TO 3$ IF RCVR INTRS
007254  113723  030316                  MOVB    DHRLVL,(R3)+
007260  105723                          TSTB    (R3)+           ;UPDATE POINTER
007262  012723  007356                  MOV     #2$,(R3)+       ;GO TO 2$ ON XMITTR INTRS
007266  113713  030317                  MOVB    DHTLVL,(R3)
007272  012711  004000          1$:     MOV     #BIT11,(R1)     ;CLR THE DH11
007276  012706  001100                  MOV     #STACK,SP       ;RESET THE SP FOR ERROR LOOPS
007302  004737  027164                  JSR     PC,CHPS2        ;GO LOCK OUT INTRS
007306  012711  001000                  MOV     #BIT09,(R1)     ;SET MAINT MODE BIT
```

```
 4958  007312  052711  040000              BIS     #BIT14,(R1)     ;SET SILO OVFLW I.E. BIT
 4959  007316  052711  010000              BIS     #BIT12,(R1)     ;SET THE SILO FULL BIT TO FORCE INTR
 4960  007322  004737  027150              JSR     PC,CHPS1        ;GO CLEAR PSW
 4961  007326  000240                      NOP                     ;GIVE IT A LITTLE TIME
 4962
 4963  007330  004737  027200              JSR     PC,SAPS         ;SAVE THE ERROR PSW
 4964  007334  011103                      MOV     (R1),R3         ;GET THE WAS DATA
 4965  007336  005011                      CLR     (R1)            ;CLEAR OUT THE SCR
 4966  007340  005011                      CLR     (R1)
 4967  007342  012704  051000              MOV     #51000,R4       ;SET UP S/B DATA
 4968  007346  004737  024416              JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 4969  007352  104043                      ERROR   43              ;TIMED OUT AWAITING SILO OVFLW INTR
 4970  007354  000412                      BR      3$              ;GO EXIT TEST
 4971
 4972  007356  004737  027200      2$:     JSR     PC,SAPS         ;SAVE THE ERROR PSW
 4973  007362  011103                      MOV     (R1),R3         ;GET WAS DATA
 4974  007364  012704  051000              MOV     #51000,R4       ;SET UP S/B DATA
 4975  007370  005011                      CLR     (R1)            ;CLR OUT SCR REG
 4976  007372  005011                      CLR     (R1)
 4977  007374  004737  024416              JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 4978  007400  104012                      ERROR   12              ;UNEXPECTED XMITTR INTR
 4979
 4980  007402  012706  001100      3$:     MOV     #STACK,SP       ;RESET THE SP
 4981  007406  004737  026770              JSR     PC,RESTRP       ;GO RESTORE TRAP CATCHER
```

```
                                ;;*****************************************************************
                                ;*TEST 30       TEST NON EX MEM I.E.  WITH INTR. CONDITION ACTIVE
                                ;;*****************************************************************
007412  000004                  TST30:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THAT THE NON-EX-MEM BIT (SCR10) CAN CAUSE A
                                TRANSMITTER INTERRUPT VIA THE PROPER VECTOR. THE TEST SEQUENCE IS AS
                                FOLLOWS:

                                        1.  SET UP XMIT AND RCVR VECTORS
                                        2.  CLEAR THE DH11, RESET SP, AND LOCK OUT INTRS
                                        3.  PRIME DH11 TO GENERATE XMIT INTR IN MAINT. MODE
                                        4.  ALLOW INTRS.
                                        5.  REPORT ERROR IF NO XMIT INTR OCCURS OR IF
                                            A FALSE RCVR INTR OCCURS
                                        6.  REST SP AND VECTORS THEN GO TO TEST 31

                                ERRORS:
                                *******

                                1.   ERROR 44  IS CALLED IF NON-EX-MEM FAILS TO GENERATE XMIT INTR
                                2.   ERROR 11  IS CALLED IF FALSE RCVR INTR OCCURS

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1.  IF THE NON-EX-MEM INTERRUPT FAILS TO OCCUR PROBLEM IS MOST LIKELY
                                    THE M7289 MODULE
                                2.  IF A FALSE RCVR INTR OCCURS PROBLEM IS MOST LIKELY THE M7289 OR
                                    THE M7281 MODULES.

                                KEY LOGIC:
                                **********

                                        M7289   SH6     SCR 10 H (NO EX MEM)     FL1
                                                        E35, E41, OR E48

                                %
007414  012737  007452  001110          MOV     #1$,$LPERR      ;SET UP THE ERROR LOOP RETURN
007422  010102                          MOV     R1,R2           ;MAKE IT REGADR TOO
007424  013703  027304                  MOV     DHVCT,R3        ;GET FIRST VECTOR ADDR
007430  012723  007536                  MOV     #2$,(R3)+       ;GO TO 2$ IF RCVR INTRS
007434  113723  030316                  MOVB    DHRLVL,(R3)+
007440  105723                          TSTB    (R3)+           ;UPDATE POINTER
007442  012723  007562                  MOV     #3$,(R3)+       ;GO TO 3$ ON XMITTR INTRS
007446  113713  030317                  MOVB    DHTLVL,(R3)
007452  012711  004000          1$:     MOV     #BIT11,(R1)     ;CLR THE DH11
007456  012706  001100                  MOV     #STACK,SP       ;RESET THE SP FOR ERROR LOOPS
007462  004737  027164                  JSR     PC,CHPS2        ;GO LOCK OUT INTRS
007466  012711  001000                  MOV     #BIT09,(R1)     ;SET MAINT MODE BIT
```

```
5038  007472  052711  020000              BIS     #BIT13,(R1)     ;SET XMITTR I.E. BIT
5039  007476  052711  002000              BIS     #BIT10,(R1)     ;SET THE NON EX MEM BIT TO FORCE INTR
5040  007502  004737  027150              JSR     PC,CHPS1        ;GO CLEAR PSW
5041  007506  000240                      NOP                     ;GIVE IT A LITTLE TIME
5042
5043  007510  004737  027200              JSR     PC,SAPS         ;SAVE THE ERROR PSW
5044  007514  011103                      MOV     (R1),R3         ;GET THE WAS DATA
5045  007516  005011                      CLR     (R1)            ;CLEAR OUT THE SCR
5046  007520  005011                      CLR     (R1)
5047  007522  012704  023000              MOV     #23000,R4       ;SET UP S/B DATA
5048  007526  004737  024416              JSR     PC,SUER2A       ;GO SET UP ERROR INFO
5049  007532  104044                      ERROR   44              ;TIMED OUT AWAITING NON EX MEM INTR
5050  007534  000412                      BR      3$              ;GO EXIT TEST
5051
5052  007536  004737  027200      2$:     JSR     PC,SAPS         ;SAVE THE ERROR PSW
5053  007542  011103                      MOV     (R1),R3         ;GET WAS DATA
5054  007544  012704  023000              MOV     #23000,R4       ;SET UP S/B DATA
5055  007550  005011                      CLR     (R1)            ;CLR OUT SCR REG
5056  007552  005011                      CLR     (R1)
5057  007554  004737  024416              JSR     PC,SUER2A       ;GO SET UP ERROR INFO
5058  007560  104011                      ERROR   11              ;UNEXPECTED RCVR INTR
5059
5060  007562  012706  001100      3$:     MOV     #STACK,SP       ;RESET THE SP
5061  007566  004737  026770              JSR     PC,RESTRP       ;GO RESTORE TRAP CATCHER
```

```
                                ;;*****************************************************************
                                ;*TEST 31       TEST XMITTR DONE I.E.  WITH INTR. CONDITION ACTIVE
                                ;;*****************************************************************
007572  000004                  TST31:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THAT XMIT DONE (SCR15) CAN BE SET IN MAINT.
                                MODE TO CAUSE A XMITTR INTR VIA THE PROPER VECTOR. THE TEST SEQUENCE
                                IS AS FOLLOWS:

                                        1.  SET UP XMIT AND RCVR VECTORS
                                        2.  CLEAR THE DH11, RESET SP, AND LOCK OUT INTRS
                                        3.  PRIME DH11 TO GENERATE "XMIT DONE" INTR
                                        4.  CLEAR PSW TO ALLOW INTRS
                                        5.  REPOT ERROR IF XMITTR FAILS TO INTR OR A
                                            FALSE RCVR INTR OCCURS

                                ERRORS:
                                *******

                                1.   ERROR 45  IS CALLED TO REPORT "XMIT DONE" INTR FAILED TO OCCUR
                                2.   ERROR 11  IS CALLED TO REPORT FALSE RCVR INTRS

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1.  IF NO XMIT INTR OCCURS PROBLEM IS MOST LIKELY THE M7289 MODULE
                                2.  IF A FALSE RCVR INTR. OCCURS PROBLEM IS MOST LIKELY THE M7821 MODULE.


                                KEY LOGIC:
                                **********

                                        M7289   SH6     SCR 15 H (XMIT) FR2
                                                        E48, E50

                                %
007574  012737  007632  001110          MOV     #1$,$LPERR      ;SET UP THE ERROR LOOP RETURN
007602  010102                          MOV     R1,R2           ;MAKE IT REGADR TOO
007604  013703  027304                  MOV     DHVCT,R3        ;GET FIRST VECTOR ADDR
007610  012723  007716                  MOV     #2$,(R3)+       ;GO TO 2$ IF RCVR INTRS
007614  113723  030316                  MOVB    DHRLVL,(R3)+
007620  105723                          TSTB    (R3)+           ;UPDATE POINTER
007622  012723  007742                  MOV     #3$,(R3)+       ;GO TO 3$ ON XMITTR INTRS
007626  113713  030317                  MOVB    DHTLVL,(R3)
007632  012711  004000          1$:     MOV     #BIT11,(R1)     ;CLR THE DH11
007636  012706  001100                  MOV     #STACK,SP       ;RESET THE SP FOR ERROR LOOPS
007642  004737  027164                  JSR     PC,CHPS2        ;GO LOCK OUT INTRS
007646  012711  001000                  MOV     #BIT09,(R1)     ;SET MAINT MODE BIT
007652  052711  020000                  BIS     #BIT13,(R1)     ;SET XMIT DONE I.E. BIT
007656  052711  100000                  BIS     #BIT15,(R1)     ;SET THE XMITTR DONE BIT TO FORCE INTR
```

```
5118  007662  004737  027150            JSR     PC,CHPS1        ;GO CLEAR PSW
5119  007666  000240                    NOP                     ;GIVE IT A LITTLE TIME
5120
5121  007670  004737  027200            JSR     PC,SAPS         ;SAVE THE ERROR PSW
5122  007674  011103                    MOV     (R1),R3         ;GET THE WAS DATA
5123  007676  005011                    CLR     (R1)            ;CLEAR OUT THE SCR
5124  007700  005011                    CLR     (R1)
5125  007702  012704  121000            MOV     #121000,R4      ;SET UP S/B DATA
5126  007706  004737  024416            JSR     PC,SUER2A       ;GO SET UP ERROR INFO
5127  007712  104045                    ERROR   45              ;TIMED OUT AWAITING XMIT DONE INTR
5128  007714  000412                    BR      3$              ;GO EXIT TEST
5129
5130  007716  004737  027200    2$:     JSR     PC,SAPS         ;SAVE THE ERROR PSW
5131  007722  011103                    MOV     (R1),R3         ;GET WAS DATA
5132  007724  012704  121000            MOV     #121000,R4      ;SET UP S/B DATA
5133  007730  005011                    CLR     (R1)            ;CLR OUT SCR REG
5134  007732  005011                    CLR     (R1)
5135  007734  004737  024416            JSR     PC,SUER2A       ;GO SET UP ERROR INFO
5136  007740  104011                    ERROR   11              ;UNEXPECTED RCVR INTR
5137
5138  007742  012706  001100    3$:     MOV     #STACK,SP       ;RESET THE SP
5139  007746  004737  026770            JSR     PC,RESTRP       ;GO RESTORE TRAP CATCHER
```

```
                                ;;*****************************************************************
                                ;*TEST 32       BASIC TRANSMITTER "NPR" LOGIC TEST 1
                                ;;*****************************************************************
007752  000004                  TST32:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST TRANSMITS A SINGLE BYTE FROM LOCATION 0 ON ALL SELECTED
                                LINES (AS SELECTED BY THE CONFIGURATION PARAMETER "LINSEL:") ONE AT A TIME.
                                THE TEST SEQUENCE IS AS FOLLOWS:

                                        1.  SET UP THE XMITTR VECTOR
                                        2.  SELECT A LINE # TO TEST
                                        3.  RESET THE SP
                                        4.  CLEAR ALL LOCATIONS IN "CAR" AND "BCR" MEMORIES
                                        5.  LOCK OUT INTRS AND CLEAR THE DH11
                                        6.  PRIME DH11 TO XMIT ONE CHAR FROM LOCATION 0
                                             9600 BAUD, 5-BITS, 1 STOP BIT
                                        7.  ACTIVATE SELECTED XMITTR AND ENABLE XMIT DONE INTR
                                        8.  CLEAR PSW TO ALLOW INTR.
                                        9.  ACTIVATE TIMER TO WAIT FOR XMIT DONE INTR
                                        10. IF TIMEOUT OCCURS REPORT ERROR AND RESTART AT STEP 2
                                        11. IF XMIT INTERRUPT OCCURS CHECK THE FOLLOWING CONDITIONS
                                            AND REPORT ANY ERRORS:

                                                A.  XMIT DONE (SCR15=1) SET
                                                B.  "BAR" BIT GOT CLEARED
                                                C.  "CAR" REGISTER GOT INCREMENTED TO +1
                                                D.  "BCR" REGISTER GO INCREMENTED TO 0

                                            12. REPEAT STEP 2 THRU 11 UNTIL ALL SELECTED LINES TESTED
                                            13. AFTER TESTING ALL LINES CLEAR THE DH11, RESET THE VECTOR
                                                CLEAR PSW, RESET SP, AND GO TO TEST 33.

                                ERRORS:
                                *******

                                1.   ERROR 15  IS CALLED IF XMIT DONE FAILS TO INTR ON TIME
                                2.   ERROR 14  IS CALLED IF XMIT DONE NOT SET
                                3.   ERROR 14  IS CALLED IF "BAR" BIT FAILED TO CLEAR
                                4.   ERROR 14  IS CALLED IF "CAR" NOT INCREMENTED PROPERLY
                                5.   ERROR 14  IS CALLED IF "BCR" NOT INCREMENTED PROPERLY

                                    ALL ERROR MESSAGE HEADERS INCLUDE THE LINE NO. OF THE FAILING
                                    LINE.

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****
                                        (NOTE: USE SR09=1 TO LOCK ON FAILING LINE AND SR13=1 TO
                                         INHIBIT ERROR PRINTOUT TO MINIMIZE SCOPE LOOP.)

                                DEBUG:
                                ******

                                1.  IF ALL LINES FAIL TO INTERRUPT ON TIME, SUSPECT LOSS OF 9600 BAUD
```

```
                        CLOCK SIGNAL OR BYTE COUNT DECODER ON M7278 SH3 (XMIT FINISHED PULSE L)
                    2.  IF GROUP OF 8 LINES <15:08> OR <07:00> FAIL TO INTERRUPT ON TIME, SUSPECT
                        THE BUFFERED CLOCK SIGNALS (TOP AND BOT) ON THE M7288 SH3
                    3.  IF ONLY ONE LINE FAILS TO INTERRUPT ON TIME, SUSPECT LOSS OF CLOCK IN
                        LINE MULTIPLEXORS M7288 SH4-SH11.
                    4.  IF LINE INTERRUPTED OK BUT "SCR", "BAR", "CAR", OR "BCR" WAS INCORRECT
                        REFER TO KEY LOGIC SIGNALS BELOW.


                    KEY LOGIC:
                    **********

                    XMIT DONE FAILED TO SET:

                            M7289   SH6     SCR15 H FR2
                            M7278   SH3     XMIT FINISHED PULSE L   AR1

                    "BAR" BIT FAILED TO CLEAR:

                            M7278   SH3     CLR BAR <15:00> L
                                    SH5     BAR <15:12> H   E54, E55 (7474)
                                    SH6     BAR <11:08> H   E62, E63 (7474)
                                    SH7     BAR <07:04> H   E70, E71 (7474)
                                    SH8     BAR <03:00> H   E78, E79 (7474)

                    "CAR" REG NOT INCREMENTED:

                            M7277   SH6     END CYCLE PULSE DLY H   FL2
                                    SH5 AND SH6 "CAR" MEMORY LOGIC
                            M796            END CYCLE H P2

                    "BCR" REG NOT INCREMENTED:

                            M796    END CYCLE L     N2
                            M7278   SH3 AND SH4 "BCR" MEMORY LOGIC

                    %
007754  012737  010010  001110        MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
007762  013703  027304                MOV     DHVCT,R3        ;GET THE FIRST VECTOR ADDRESS
007766  062703  000004                ADD     #4,R3           ;POINT TO XMITTR ENTRY
007772  012723  010154                MOV     #4$,(R3)+       ;GO TO 4$ ON XMITTR INTR
007776  113713  030317                MOVB    DHTLVL,(R3)
010002  004737  024544        1$:     JSR     PC,SELINE       ;GO SELECT A LINE NO. TO TEST
010006  000552                        BR      8$              ;BR IF TESTED ALL SELECTED LINES

010010  012706  001100        2$:     MOV     #STACK,SP       ;RESET SP FOR ERROR LOOPS
010014  010102                        MOV     R1,R2           ;SET UP REGADR
010016  012704  120000                MOV     #120000,R4      ;SET UP S/B DATA
010022  153704  030322                BISB    LINE,R4
010026  004737  024716                JSR     PC,CLCABC       ;GO CLEAR CAR AND BCR MEMORIES
010032  004737  027164                JSR     PC,CHPS2        ;GO LOCK OUT INTRS
010036  012711  004000                MOV     #BIT11,(R1)     ;CLEAR THE DH11 INTERFACE
010042  153711  030322                BISB    LINE,(R1)       ;SELECT A LINE NO.
010046  012761  177777  000010        MOV     #-1,BCR(R1)     ;SET BYTE COUNT TO -1
010054  012761  033500  000004        MOV     #33500,LPR(R1)  ;SET UP LINE PARAMETERS
010062  053761  027314  000012        BIS     LINMSK,BAR(R1)  ;ACTIVATE SELECTED LINE
```

```
5252  010070  052711  020000                BIS     #BIT13,(R1)     ;ENABLE INTERRUPT ON XMIT DONE
5253  010074  004737  027150                JSR     PC,CHPS1        ;GO CLEAR PSW
5254
5255  010100  012737  000001  030350        MOV     #1,TIMEA        ;INIT TIMER A
5256  010106  005037  030352                CLR     TIMEB           ;INIT TIMER B
5257  010112  000240                3$:     NOP                     ;DO NOTHING WAIT
5258  010114  004737  027016                JSR     PC,TIMEIT       ;CALL TIMER
5259  010120  000774                        BR      3$              ;TIMER ROUTINE WILL MOVE RETURN PC AROUND
5260                                                                ;THIS BRANCH IF TIMEOUT OCCURS
5261
5262  010122  004737  027200                JSR     PC,SAPS         ;SAVE THE ERROR PSW
5263  010126  011103                        MOV     (R1),R3         ;GET THE WAS DATA
5264  010130  042703  000200                BIC     #BIT07,R3       ;WE'RE NOT INTERESTED IN THIS BIT
5265  010134  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
5266  010140  004537  024636                JSR     R5,SUNUM        ;GO SET LINE NO. IN ERROR MSG
5267  010144  030322                        LINE
5268  010146  031522                        EM15+43
5269  010150  104015                        ERROR   15              ;TIMEOUT WHILE AWAITING XMIT INTR
5270  010152  000713                        BR      1$              ;GO TEST NEXT LINE
5271
5272  010154  005711                4$:     TST     (R1)            ;DID XMIT DONE SET ??
5273  010156  100411                        BMI     5$              ;BR IF YES
5274
5275  010160  004737  027200                JSR     PC,SAPS         ;SAVE THE ERROR PSW
5276  010164  011103                        MOV     (R1),R3         ;GET THE WAS DATA
5277  010166  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
5278  010172  004737  010372                JSR     PC,9$           ;GO SET UP  SOME ERROR STUFF
5279  010176  104014                        ERROR   14              ;XMIT DONE FAILED TO SET
5280  010200  000700                        BR      1$              ;GO TEST NEXT LINE
5281
5282  010202  016103  000012        5$:     MOV     BAR(R1),R3      ;GET WAS DATA FROM "BAR"
5283  010206  001413                        BEQ     6$              ;BR IF BAR BIT GOT CLEARED
5284
5285  010210  004737  027200                JSR     PC,SAPS         ;SAVE THE ERROR PSW
5286  010214  062702  000012                ADD     #BAR,R2         ;SET UP REGADR
5287  010220  005004                        CLR     R4              ;SET UP S/B DATA
5288  010222  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
5289  010226  004737  010372                JSR     PC,9$           ;GO SET UP SOME ERROR STUFF
5290  010232  104014                        ERROR   14              ;BAR BIT FAILED TO CLEAR
5291  010234  000662                        BR      1$              ;GO TEST NEXT LINE
5292
5293  010236  016103  000006        6$:     MOV     CAR(R1),R3      ;GET THE WAS DATA FROM CAR
5294  010242  022703  000001                CMP     #1,R3           ;DID IT GET INCREMENTED ?
5295  010246  001414                        BEQ     7$              ;BR IF YES
5296
5297  010250  004737  027200                JSR     PC,SAPS         ;SAVE THE ERROR PSW
5298  010254  012704  000001                MOV     #1,R4           ;SET UP S/B DATA
5299  010260  062702  000006                ADD     #CAR,R2         ;SET UP REGADR
5300  010264  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
5301  010270  004737  010372                JSR     PC,9$           ;GO SET UP SOME ERROR STUFF
5302  010274  104014                        ERROR   14              ;CAR REG NOT  INCREMENTED PROPERLY
5303  010276  000641                        BR      1$              ;GO TEST NEXT LINE
5304
5305  010300  016103  000010        7$:     MOV     BCR(R1),R3      ;GET WAS DATA FROM BCR
5306  010304  001636                        BEQ     1$              ;BR IF BCR GOT INCREMENTED TO 000000
5307
```

```
 5308  010306  004737  027200            JSR     PC,SAPS         ;SAVE THE ERROR PSW
 5309  010312  005004                    CLR     R4              ;SET UP S/B DATA
 5310  010314  062702  000010            ADD     #BCR,R2         ;SET UP REGADR
 5311  010320  004737  024416            JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 5312  010324  004737  010372            JSR     PC,9$           ;GO SET UP SOME ERROR STUFF
 5313  010330  104014                    ERROR   14              ;BCR REG NOT INCREMENTED PROPERLY
 5314  010332  000623                    BR      1$              ;GO TEST NEXT LINE
 5315
 5316  010334  012711  004000      8$:   MOV     #BIT11,(R1)     ;CLEAR THE DH11
 5317  010340  013703  027304            MOV     DHVCT,R3        ;GET THE VECTOR ADDR
 5318  010344  062703  000004            ADD     #4,R3           ;POINT TO XMIT VECTOR
 5319  010350  010313                    MOV     R3,(R3)         ;RESTORE TRAP CATCHER
 5320  010352  062723  000002            ADD     #2,(R3)+
 5321  010356  005013                    CLR     (R3)
 5322  010360  004737  027150            JSR     PC,CHPS1        ;GO CLEAR PSW
 5323  010364  012706  001100            MOV     #STACK,SP       ;RESET THE STACK POINTER
 5324  010370  000405                    BR      TST33           ;;GO TO NEXT TEST
 5325
 5326  010372  004537  024636      9$:   JSR     R5,SUNUM        ;GO SET UP LINE NO. IN MSG.
 5327  010376  030322                    LINE
 5328  010400  031454                    EM14+44
 5329  010402  000207                    RTS     PC              ;RETURN TO REPORT ERROR
```

```
                                ;;*****************************************************************
                                ;*TEST 33       TRANSMITTR NPR LOGIC TEST 2
                                ;;*****************************************************************
010404  000004                  TST33:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST IS SIMILAR TO TEST 32 EXCEPT THAT ALL LOCATIONS IN THE "BCR"
                                AND "CAR" MEMORIES ARE TESTED TO VERIFY THAT TRANSMISSION ON THE SELECTED
                                LINE DID NOT DISTURB ANY UNSELECTED LOCATIONS IN THE MEMORIES. IF ALSO OPERATES
                                IN "FLAG" MODE RATHER THAN USING INTERRUPTS. THE TEST SEQUENCE IS AS
                                FOLLOWS:

                                        1.  SELECT A LINE # TO TEST (AS DEFINED BY "LINSEL:")
                                        2.  CLEAR BOTH THE "CAR" AND "BCR" MEMORIES
                                        3.  LOAD THE "BCR" MEMORY WITH ALL ONES (BYTE COUNT = -1)
                                        4.  ACTIVATE THE XMITTER ON THE SELECTED LINE
                                        5.  ACTIVATE TIMER TO WAIT FOR "XMIT DONE"
                                        6.  IF "XMIT DONE" FAILS TO SET ON TIME - REPORT ERROR AND
                                            REPEAT 1 THRU 5 UNTIL ALL SELECTED LINES TESTED
                                        7.  IF "XMIT DONE" SETS CHECK ALL LOCATIONS IN THE "BCR" MEMORY
                                            REPORT ANY UNSELECTED LINES NOT CONTAINING -1 AND THE SELECTED
                                            LINE IF IT DOES NOT CONTAIN 0
                                        8.  CHECK ALL LOCATIONS IN THE "CAR" MEMORY AND REPORT ANY UNSELECTED
                                            LOCATIONS NOT CONTAINING 0 AND THE SELECTED LINE IF IT DOES NOT
                                            CONTAIN +1.
                                        9.  REPEAT STEPS 1 THRU 8 UNTIL ALL SELECTED LINES TESTED.

                                ERRORS:
                                *******

                                1.   ERROR 50  CALLED IF XMIT DONE TIMEOUT ERROR DETECTED.
                                2.   ERROR 51  CALLED IF "BCR" MEMORY ERROR DETECTED
                                3.   ERROR 51  CALLED IF "CAR" MEMORY ERROR DETECTED

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1.  ASSUMING TEST 32 RAN ERROR FREE THE PROBLEM IS MOST LIKELY THE:
                                        M7278 MODULE IF "BCR" ERRORS
                                        M7277 MODULE IF "CAR" ERRORS

                                KEY LOGIC:      (SAME AS TEST 32)
                                **********

                                %
010406  012737  010422  001110          MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
010414  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
010420  000544                  2$:     BR      TST34           ;;BR IF DONE ALL SELECTED LINES
010422  052711  004000                  BIS     #BIT11,(R1)     ;CLEAR THE DH11
010426  004737  024716                  JSR     PC,CLCABC       ;GO CLEAR "CAR" AND "BCR" MEMORIES
010432  004737  024760                  JSR     PC,LDBCR        ;GO LOAD "BCR" MEMORY WITH ALL ONES
```

```
5386  010436  153711  030322                BISB    LINE,(R1)          ;SELECT THE LINE
5387  010442  012761  033500  000004        MOV     #33500,LPR(R1)     ;SET UP PARAMETERS
5388  010450  013761  027314  000012        MOV     LINMSK,BAR(R1)     ;ACTIVATE XMIT ON SELECTED LINE
5389
5390  010456  012737  000001  030350        MOV     #1,TIMEA           ;INIT TIMER A
5391  010464  005037  030352                CLR     TIMEB              ;INIT TIMER B
5392  010470  005711                3$:     TST     (R1)               ;XMITTR DONE YET
5393  010472  100423                        BMI     4$                 ;BR IF YES
5394  010474  004737  027016                JSR     PC,TIMEIT          ;CALL THE TIMER
5395  010500  000773                        BR      3$                 ;TIMER ROUTINE WILL MOVE RETURN PC
5396                                                                   ;AROUND THIS BRANCH IF TIME OUT OCCURS
5397
5398  010502  004737  027200                JSR     PC,SAPS            ;SAVE THE ERROR PSW
5399  010506  011103                        MOV     (R1),R3            ;GET THE WAS DATA
5400  010510  012704  100000                MOV     #BIT15,R4          ;SET UP S/B DATA
5401  010514  153704  030322                BISB    LINE,R4
5402  010520  010102                        MOV     R1,R2              ;MAKE REGADR = DEVADR
5403  010522  004737  024416                JSR     PC,SUER2A          ;GO SET UP ERROR INFO
5404  010526  004537  024636                JSR     R5,SUNUM           ;SET LINE NO. IN MSG
5405  010532  030322                        LINE
5406  010534  034254                        EM50+53
5407  010536  104050                        ERROR   50                 ;TIMED OUT AWAITING XMIT DONE ON SEL LINE
5408  010540  000725                        BR      1$                 ;GO TRY THE NEXT LINE
5409
5410  010542  005037  001220          4$:   CLR     $TMP7              ;INIT A LINE COUNTER
5411  010546  113711  001220          5$:   MOVB    $TMP7,(R1)         ;SELECT LINE NO. IN "SCR"
5412  010552  012704  177777                MOV     #-1,R4             ;SET UP S/B DATA
5413  010556  016103  000010                MOV     BCR(R1),R3         ;GET THE WAS BYTE COUNT
5414  010562  123737  030322  001220        CMPB    LINE,$TMP7         ;WAS THIS THE ACTIVE LINE ??
5415  010570  001001                        BNE     6$                 ;BR IF NOT
5416  010572  005004                        CLR     R4                 ;CHANGE S/B DATA TO 000000
5417  010574  020304                6$:     CMP     R3,R4              ;WAS BYTE COUNT CORRECT ??
5418  010576  001416                        BEQ     7$                 ;BR IF YES
5419
5420  010600  005037  001202                CLR     $TMP0              ;SAVE THE ACTIVE LINE NO.
5421  010604  113737  030322  001202        MOVB    LINE,$TMP0
5422  010612  013737  001220  001204        MOV     $TMP7,$TMP1        ;SAVE THE LINE NO. BEING CHECKED
5423  010620  010102                        MOV     R1,R2              ;SET UP REGADR = BCR REG ADDR
5424  010622  062702  000010                ADD     #BCR,R2
5425  010626  004737  024500                JSR     PC,SUER4           ;GO SET UP ERROR INFO
5426  010632  104051                        ERROR   51                 ;BYTE COUNT INCORRECT
5427
5428  010634  005004                7$:     CLR     R4                 ;SET UP S/B DATA
5429  010636  016103  000006                MOV     CAR(R1),R3         ;GET THE WAS DATA
5430  010642  123737  030322  001220        CMPB    LINE,$TMP7         ;IS THIS THE ACTIVE LINE
5431  010650  001001                        BNE     8$                 ;BR IF NOT
5432  010652  005204                        INC     R4                 ;BUMP THE CAR ADDRESS FOR ACTIVE LINE
5433  010654  020304                8$:     CMP     R3,R4              ;CAR CONTENTS CORRECT ??
5434  010656  001416                        BEQ     9$                 ;BR IF YES
5435
5436  010660  005037  001202                CLR     $TMP0              ;SET UP ACT LINE NO.
5437  010664  113737  030322  001202        MOVB    LINE,$TMP0
5438  010672  013737  001220  001204        MOV     $TMP7,$TMP1        ;SAVE THE LINE NO. BEING CHECKED
5439  010700  010102                        MOV     R1,R2              ;SET UP REGADR
5440  010702  062702  000006                ADD     #CAR,R2
5441  010706  004737  024500                JSR     PC,SUER4           ;SET UP THE ERROR INFO
```

```
 5442  010712  104051                          ERROR   51              ;CAR REG INCORRECT
 5443
 5444  010714  005237  001220          9$:     INC     $TMP7           ;GENERATE NEW LINE NO.
 5445  010720  022737  000020  001220          CMP     #20,$TMP7       ;TESTED ALL LINES
 5446  010726  001707                          BEQ     5$              ;BR IF NOT
 5447  010730  000631                          BR      1$              ;GO SELECT NEXT ACTIVE LINE
```

```
                        ;;*****************************************************************
                        ;*TEST 34       TEST THAT CHARACTER AVAILABLE CAN CAUSE RCVR INTERRUPT
                        ;;*****************************************************************
010732  000004          TST34:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        **************

                                THIS TEST VERIFIES THAT WHEN "CHAR AVAIL" (BIT07 IN "SCR") SETS
                        AS A RESULT OF XMITTING AND RECEIVING ONE CHARACTER (USING SILO MAINT MODE)
                        IT CAUSES A RCVR INTR VIA THE PROPER VECTOR. THE TEST SEQUENCE IS AS
                        FOLLOWS:

                                1.  SET UP THE RCVR VECTOR
                                2.  LOCK OUT INTRS, RESET SP, AND CLEAR DH11
                                3.  USE MAINT MODE TO LOAD A CHAR INTO THE SILO (DATA=125252)
                                4.  CLEAR PSW TO ALLOW INTERRUPTS
                                5.  ACTIVATE TIMER TO WAIT FOR INTR TO OCCUR
                                6.  IF NO RCVR INTR OCCURS REPORT ERROR AND GO TO STEP 9
                                7.  WHEN RCVR INTRS - CHECK SILO DATA FOR 125252 - IF NOT
                                    CORRECT REPORT ERROR AND GO TO STEP 9
                                8.  CHECK THAT SILO FILL LEVEL=1 - IF NOT REPORT ERROR
                                9.  RESET SP, CLEAR PSW, RESET VECTOR, AND GO TO TEST 35

                        ERRORS:
                        *******

                        1.   ERROR 13  IS CALLED TO REPORT RCVR TIMEOUT ERROR
                        2.   ERROR 52  IS CALLED TO REPORT SILO DATA INCORRECT
                        3.   ERROR  6  IS CALLED TO REPORT INCORRECT SILO FILL COUNT

                        SYNC:   M7277   SH3     INIT A H        EF2
                        *****

                        DEBUG:
                        ******

                        1.  IF NOT RCVR INTR OCCURS SUSPECT THE M7277, M7281, OR M7279 MODULES
                        2.  IF SILO DATA OR FILL-ERRORS SUSPECT THE M7279 MODULE

                        KEY LOGIC:
                        **********

                                M7279   SH1     SILO DATA MUX'S (74157'S)
                                                SSR15 H         CR1

                                        SH2     DATA READY L            DV1
                                                NRC 15 H                DL1
                                                SILO MEMORY             (E13,E17,E8,E3)  3341'S
                                                LOAD SILO L             DJ2
                                                5.068 MHZ (CLOCK)       DN1
                                                SSR <13:00> H           (E20,E24)

                                M7289   SH6     RCV INT REQ H           DP1

                                M7278   SH8     SSR <03:00> H
```

```
5504                                                    SH7     SSR <07:00> H
5505
5506                                    %
5507
5508  010734  012737  010756  001110            MOV     #1$,$LPERR      ;SET UP THE ERROR LOOP RETURN
5509  010742  013703  027304                    MOV     DHVCT,R3        ;GET FIRST VECTOR ADDR
5510  010746  012723  011042                    MOV     #3$,(R3)+       ;GO TO 3$ ON RCVR INTERRUPT
5511  010752  113713  030316                    MOVB    DHRLVL,(R3)
5512  010756  004737  027164            1$:    JSR     PC,CHPS2        ;GO LOCK OUT INTRS
5513  010762  012706  001100                    MOV     #STACK,SP       ;RESET SP FOR ERROR LOOPS
5514  010766  012711  004000                    MOV     #BIT11,(R1)     ;CLEAR THE DH11
5515  010772  052761  100000  000016            BIS     #BIT15,SSR(R1)  ;SET SILO MAINT. BIT TO LOAD SILO
5516  011000  012711  000100                    MOV     #BIT06,(R1)     ;ENABLE CHAR. AVAIL INTERRUPT
5517  011004  004737  027150                    JSR     PC,CHPS1        ;GO CLEAR PSW
5518  011010  012703  001000                    MOV     #1000,R3        ;INIT TIMER
5519  011014  005303                    2$:     DEC     R3              ;DEC TIMER
5520  011016  001376                            BNE     2$              ;BR IF NO TIMEOUT
5521
5522  011020  004737  027200                    JSR     PC,SAPS         ;SAVE THE ERROR PSW
5523  011024  011103                            MOV     (R1),R3         ;GET THE WAS DATA
5524  011026  012704  000300                    MOV     #300,R4         ;SET UP S/B DATA
5525  011032  004737  024416                    JSR     PC,SUER2A       ;GO SET UP ERROR INFO
5526  011036  104013                            ERROR   13              ;CHAR AVAIL FAILED TO SET ON TIME
5527  011040  000436                            BR      5$              ;ESCAPE FROM THIS TEST - CATASTROPHIC ERROR
5528
5529  011042  016105  000016            3$:    MOV     SSR(R1),R5      ;SAVE THE SILO STATUS REG.
5530  011046  016103  000002                    MOV     NRC(R1),R3      ;GET THE WAS DATA
5531  011052  012704  125252                    MOV     #125252,R4      ;SET UP S/B DATA
5532  011056  020304                            CMP     R3,R4           ;WAS = S/B = 125252 ??
5533  011060  001410                            BEQ     4$              ;BR IF IT IS
5534
5535  011062  004737  027200                    JSR     PC,SAPS         ;SAVE THE ERROR PSW
5536  011066  062702  000002                    ADD     #NRC,R2         ;SET  UP REGADR
5537  011072  004737  024416                    JSR     PC,SUER2A       ;GO SET UP  ERROR INFO
5538  011076  104052                            ERROR   52              ;DATA COMPARE ERROR
5539  011100  000416                            BR      5$              ;GET OUT
5540
5541  011102  010503            4$:    MOV     R5,R3           ;NOW GET THW SILO STATUS REG AGAIN
5542  011104  042703  140377                    BIC     #140377,R3      ;CLR OUT JUNK
5543  011110  012704  000400                    MOV     #400,R4         ;SET UP S/B DATA
5544  011114  020304                            CMP     R3,R4           ;SSR CHAR COUNT = 1 ??
5545  011116  001407                            BEQ     5$              ;BR IF IT IS
5546
5547  011120  004737  027200                    JSR     PC,SAPS         ;SAVE THE ERROR PSW
5548  011124  062702  000016                    ADD     #SSR,R2         ;SET UP REGADR
5549  011130  004737  024416                    JSR     PC,SUER2A       ;SET UP ERROR INFO
5550  011134  104006                            ERROR   6               ;SSR COUNT NOT CORRECT
5551
5552  011136  012706  001100            5$:    MOV     #STACK,SP       ;RESET THE STACK POINTER
5553  011142  004737  027150                    JSR     PC,CHPS1        ;GO CLEAR PSW
5554  011146  005011                            CLR     (R1)            ;RESET I.E. BIT
5555  011150  013703  027304                    MOV     DHVCT,R3        ;GET FIRST VECTOR ADDR
5556  011154  010313                            MOV     R3,(R3)         ;RESTORE TRAP CATCHER
5557  011156  062723  000002                    ADD     #2,(R3)+
5558  011162  005013                            CLR     (R3)
5559
```

```
                        ;;*******************************************************************
                        ;*TEST 35       TEST THAT THE SILO STATUS REG COUNTS UP CORRECTLY
                        ;;*******************************************************************
011164  000004          TST35:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        **************

                                THIS TEST VERIFIES THAT THE SILO FILL LEVEL COUNTS UP CORRECTLY
                        WHEN ALL COUNTS (0-77) ARE TESTED BY LOADING THE SILO USING
                        MAINT MODE. THE TEST SEQUENCE IS AS FOLLOWS:

                                1.  INIT "$TMP7" TO START WITH A COUNT=01
                                2.  CLEAR THE DH11
                                3.  LOAD THE SILO WITH 125252'S IN MAINT MODE
                                    UNTIL # OF WORDS INDICATED BY THE COUNT ARE LOADED
                                4.  AFTER LOADING REQUIRED COUNT CHECK THAT FILL LEVEL
                                    BITS (SSR<13:08>) EQUAL COUNT - IF NOT REPORT ERROR
                                5.  INCREMENT COUNT IN "$TMP7" AND REPEAT 1 THRU 4
                                    UNTIL ALL COUNTS (01-77) HAVE BEEN TESED

                        ERRORS:
                        *******

                        1.   ERROR 6  IS CALLED TO REPORT SILO FILL LEVEL ERRORS

                        SYNC:   M7277   SH3     INIT A H        EF2
                        *****

                        DEBUG:
                        ******

                        1.  FAILURES IN THIS TEST MOST LIKELY INDICATE A BAD M7279 MODULE

                        KEY LOGIC:
                        **********

                                M7279   SH2     SSR <13:08>
                                                LOAD SILO L DJ2
                                                5.068 MHZ (CLOCK) DN1
                                                DATA READY L DV1

                        %
011166  010102                  MOV     R1,R2           ;MAKE REGADR = SSR
011170  062702  000016          ADD     #SSR,R2
011174  012737  000001  001220  MOV     #1,$TMP7        ;START WITH COUNT OF 1
011202  012711  004000  1$:     MOV     #BIT11,(R1)     ;CLEAR THE DH11
011206  013705  001220          MOV     $TMP7,R5        ;SAVE CHARACTER COUNT BEING TESTED
011212  005004                  CLR     R4              ;INIT A CHAR COUNTER
011214  052712  100000  2$:     BIS     #BIT15,(R2)     ;SET THE SILO MAINT BIT
011220  012703  001000          MOV     #1000,R3        ;INIT A TIMER
011224  005303  3$:     DEC     R3              ;STALL TO ALLOW TIME TO LOAD SILO
011226  001376                  BNE     3$
011230  042712  100000          BIC     #BIT15,(R2)     ;CLEAR SILO MAINT. BIT
011234  005204                  INC     R4              ;COUNT A CHAR LOADED
011236  005305                  DEC     R5              ;DECREMENT TEST COUNT
```

```
 5616  011240  001365                        BNE     2$              ;BR UNTIL WE'VE LOADED THE TEST COUNT
 5617
 5618  011242  011203                        MOV     (R2),R3         ;SET THE WAS COUNT
 5619  011244  042703  140377                BIC     #140377,R3      ;CLR JUNK BITS
 5620  011250  000304                        SWAB    R4              ;SET UP S/B DATA
 5621  011252  020304                        CMP     R3,R4           ;TEST COUNT = SILO COUNTER ?
 5622  011254  001406                        BEQ     4$              ;BR IF YES
 5623
 5624  011256  004737  024412          JSR   PC,SUER2                ;GO SET UP ERROR INFO
 5625  011262  012737  011202  001110        MOV     #1$,$LPERR      ;SET UP ERROR LOOP RETURN
 5626  011270  104006                        ERROR   6               ;SSR FAILED TO UP-COUNT CORRECTLY
 5627
 5628  011272  005237  001220          4$:   INC     $TMP7           ;INCREMENT TO NEXT COUNT TO TEST
 5629  011276  022737  000100  001220        CMP     #100,$TMP7      ;MAXIMUM COUNT ??
 5630  011304  001336                        BNE     1$              ;BR IF NOT
 5631
```

```
                                ;;*****************************************************************
                                ;*TEST 36       TEST THAT SILO STATUS REGISTER DOWN COUNTS CORRECTLY
                                ;;*****************************************************************
011306  000004                  TST36:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THAT THE SILO FILL LEVEL COUNTS DOWN PROPERLY
                                WHEN WORDS ARE READ FROM THE SILO. ALL COUNTS FROM 77-00 ARE
                                TESTED. THE TEST SEQUENCE IS AS FOLLOWS:

                                        1.  INIT "$TMP7" TO START WITH A COUNT OF 1
                                        2.  CLEAR THE DH11 AND FILL SILO WITH 64. WORDS
                                        3.  READ THE NO. OF WORDS SPECIFIED BY COUNT
                                        4.  CHECK THAT FILL LEVEL=64. MINUS  COUNT  - REPORT ERRORS
                                        5.  INCREMENT "$TMP7" AND REPEAT 2 THRU 4 UNTIL ALL
                                            COUNTS TESTED.

                                ERRORS:
                                *******

                                1.   ERROR 6  IS CALLED TO REPORT SILO FILL LEVEL ERRORS

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:          (REFER TO TEST 35)
                                ******

                                KEY LOGIC:      (REFER TO TEST 35)
                                **********

                                %
011310  010102                          MOV     R1,R2           ;SET UP REGADR
011312  062702  000016                  ADD     #SSR,R2
011316  012737  000001  001220          MOV     #1,$TMP7        ;START WITH COUNT = 1
011324  012711  004000          1$:     MOV     #BIT11,(R1)     ;CLR THE DH11
011330  012705  000100                  MOV     #100,R5         ;TEST COUNT SHOULD BE 64(10) MINUS
011334  163705  001220                  SUB     $TMP7,R5        ;THE NO. OF CHARS READ
011340  012703  000100                  MOV     #100,R3         ;COUNTER USED TO FILL SILO
011344  012704  001000          2$:     MOV     #1000,R4        ;INIT TIMER
011350  052712  100000                  BIS     #BIT15,(R2)     ;SET SILO MAINT. BIT
011354  005304                  3$:     DEC     R4              ;STALL TO ALLOW SILO TO LOAD
011356  001376                          BNE     3$
011360  042712  100000                  BIC     #BIT15,(R2)     ;CLEAR THE SILO MAINT BIT
011364  005303                          DEC     R3              ;COUNT ONE CHAR LOADED
011366  001366                          BNE     2$              ;BR UNTIL ALL LOADED

011370  013703  001220                  MOV     $TMP7,R3        ;INIT COUNTER FOR READING SILO
011374  012704  001000          4$:     MOV     #1000,R4        ;INIT TIMER
011400  005761  000002                  TST     NRC(R1)         ;READ THE SILO
011404  005304                  5$:     DEC     R4              ;GIVE IT TIME TO SETTLE
011406  001376                          BNE     5$
011410  005303                          DEC     R3              ;COUNT ONE READ
011412  001370                          BNE     4$              ;BR UNTIL WE'VE READ TEST COUNT
```

```
5688
5689  011414  011203                          MOV     (R2),R3         ;GET THE WAS DATA
5690  011416  042703  140377                  BIC     #140377,R3      ;CLR JUNK BITS
5691  011422  010504                          MOV     R5,R4           ;SET UP S/B DATA
5692  011424  000304                          SWAB    R4
5693  011426  020304                          CMP     R3,R4           ;DID IT DOWN COUNT OK ??
5694  011430  001406                          BEQ     6$              ;BR IF YES
5695
5696  011432  004737  024412                  JSR     PC,SUER2        ;GO SET UP ERROR INFO
5697  011436  012737  011324  001110          MOV     #1$,$LPERR      ;SET UP ERROR LOOP RETURN
5698  011444  104006                          ERROR   6               ;SILO STATUS REG. DOWN-COUNTED INCORRECTLY
5699
5700  011446  005237  001220          6$:     INC     $TMP7           ;UPDATE COUNT
5701  011452  022737  000101  001220          CMP     #101,$TMP7      ;TESTED ALL COUNTS ??
5702  011460  001321                          BNE     1$              ;BR IF NOT
5703
5704
```

```
                                ;;*****************************************************************
                                ;*TEST 37       TEST SILO ALARM LEVEL FOR  COUNTS 0,1,2,4,8,16, AND 32
                                ;;*****************************************************************
011462  000004                  TST37:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THAT THE SILO ALARM LEVEL WORKS PROPERLY FOR
                                INTEGRAL POWER OF 2 COUNTS (0, 1, 2, 4, 8, 16, AND 32). THE TEST SEQUENCE
                                IS AS FOLLOWS:

                                        1.  INIT "$TMP7" TO START WITH ALARM LEVEL OF 000
                                        2.  CLEAR THE DH11 AND LOAD THEN SILO WITH THAT NO. OF WORDS
                                            THAT IS ONE GREATER THAN THE ALARM LEVEL.
                                        3.  VERIFY THAT "DATA READY" DOES NOT SET UNTIL THE FILL
                                            LEVEL EXCEEDS THE ALARM LEVEL.
                                        4.  REPORT ERRORS IF:
                                            A.  "READY" SETS TOO SOON
                                            B.  "READY" SETS TOO LATE
                                        5.  SHIFT "$TMP7" LEFT TO GENERATE NEXT POWER OF 2 LEVEL
                                        6.  REPEAT 2 THRU 5 UNTIL ALL 7 TEST LEVELS CHECKED

                                        NOTE:   FOR (A) ABOVE IF "READY" SETS JUST ONE WORD TOO
                                                SOON, IT IS ALLOWED, BUT ANYTHING GREATER RESULTS IN
                                                AN ERROR MESSAGE.

                                ERRORS:
                                *******

                                1.   ERROR 6  IS CALLED TO REPORT BOTH TYPES OF ERRORS OUTLINED
                                    IN 4(A,B) ABOVE

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1.  ERRORS IN THIS TEST ONLY INDICATE BAD COMPARATOR CHIP (E23 OR E19)
                                    ON THE M7279 - SH2

                                KEY LOGIC:
                                **********

                                        M7279   SH2     E19 - PIN 5 (COMPARATOR)
                                        ALSO SAME LOGIC AS TEST 35

                                %
011464  012737  011504  001110          MOV     #1$,$LPERR      ;SET UP THE ERROR LOOP RETURN
011472  010102                          MOV     R1,R2           ;SET UP REGADR
011474  062702  000016                  ADD     #SSR,R2
011500  005037  001220                  CLR     $TMP7           ;START WITH LEVEL 00
011504  012711  004000          1$:     MOV     #BIT11,(R1)     ;CLEAR THE DH11
011510  013705  001220                  MOV     $TMP7,R5        ;SAVE IT IN R5
011514  010512                          MOV     R5,(R2)         ;SET ALARM LEVEL IN SSR
```

```
 5761  011516  005205                          INC     R5              ;LOAD ONE MORE THAN FILL LEVEL
 5762  011520  052712  100000          2$:     BIS     #BIT15,(R2)     ;SET SILO MAINT. TO LOAD A CHAR
 5763  011524  012703  001000                  MOV     #1000,R3        ;INIT STALL TIMER
 5764  011530  005303                  3$:     DEC     R3              ;WAIT FOR SILO TO SETTLE
 5765  011532  001376                          BNE     3$              ;BR TIL R3 GOES TO 000000
 5766  011534  042712  100000                  BIC     #BIT15,(R2)     ;CLR THE SILO MAINT BIT
 5767  011540  005305                          DEC     R5              ;COUNT ONE LOADED
 5768  011542  105711                          TSTB    (R1)            ;CHAR AVAIL SET YET
 5769  011544  100412                          BMI     4$              ;BR IF IT IS
 5770  011546  005705                          TST     R5              ;SHOULD IT BE ??
 5771  011550  001363                          BNE     2$              ;BR IF NOT
 5772
 5773  011552  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
 5774  011556  004737  011624                  JSR     PC,5$           ;GO SET UP S/B DATA
 5775  011562  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 5776  011566  104006                          ERROR   6               ;SILO ALARM LEVEL FAILED AT SELECTED COUNT
 5777  011570  000426                          BR      6$              ;GO CHECK NEXT COUNT
 5778
 5779  011572  005705                  4$:     TST     R5              ;SHOULD IT HAVE BEEN SET (CHAR AVAIL)
 5780  011574  001424                          BEQ     6$              ;BR IF YES
 5781
 5782  011576  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
 5783  011602  022705  000001                  CMP     #1,R5           ;IS IT OFF BY ONLY ONE ??
 5784  011606  001417                          BEQ     6$              ;BR IF YES - WE'LL ALLOW HIM THIS
 5785  011610  004737  011624                  JSR     PC,5$           ;GO SET UP S/B DATA
 5786  011614  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 5787  011620  104006                          ERROR   6               ;SILO ALARM LEVEL FAILED
 5788  011622  000411                          BR      6$              ;GO CHECK NEXT COUNT
 5789
 5790  011624  011203                  5$:     MOV     (R2),R3         ;GET WAS DATA
 5791  011626  013704  001220                  MOV     $TMP7,R4        ;SET UP THE S/B DATA
 5792  011632  005204                          INC     R4
 5793  011634  000304                          SWAB    R4
 5794  011636  105004                          CLRB    R4
 5795  011640  153704  001220                  BISB    $TMP7,R4
 5796  011644  000207                          RTS     PC              ;RETURN TO SET UP AND REPORT ERROR
 5797
 5798  011646  005737  001220          6$:     TST     $TMP7           ;COUNT AT ZERO
 5799  011652  001002                          BNE     7$              ;BR IF NOT
 5800  011654  000261                          SEC                     ;SET THE "C" BIT
 5801  011656  000401                          BR      8$              ;GO SET UP COUNT
 5802  011660  000241                  7$:     CLC                     ;CLEAR THE "C" BIT
 5803  011662  006137  001220          8$:     ROL     $TMP7           ;SHIFT POWER OF TWO BIT
 5804  011666  032737  000100  001220          BIT     #BIT6,$TMP7     ;DONE ALL POWERS ??
 5805  011674  001703                          BEQ     1$              ;BR IF NOT
 5806
 5807
 5808
 5809
```

```
                                ;;*****************************************************************
                                ;*TEST 40       TRANSMITTER TIMING TEST - ALL SELECTED LINES - ALL SPEEDS
                                ;;*****************************************************************
011676  000004                  TST40:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST PERFORMA A "RELATIVE" TIMING TEST FOR ALL BAUD RATES
                                ON ALL SELECTED LINES. IT DOES NOT MEASURE ABSOLUTE TIMES BUT
                                SIMPLY VERIFIES THAT EACH SUCCESSIVE SPEED FROM 50 TO 9600
                                BAUD IS FASTER THAN THE PREVIOUS SPEED. THE TEST SEQUENCE IS AS
                                FOLLOWS:

                                        1.  SELECT A LINE # TO TEST (AS DEFINED BY "LINSEL:")
                                        2.  INIT "$TMP7" TO START WITH 50 BAUD AND A RELATIVE
                                            TIMER "TIMEC" TO -1 (177777)
                                        3.  CLEAR THE DH11 AND ACTIVATE SELECTED LINE TO TRANSMIT
                                            THREE CHARS.
                                        4.  ACTIVATE TIMER TO UPDATE "TIMEB" THE LINE SPEED TIMER
                                        5.  IF "XMIT DONE" FAILS TO SET ON TIME - REPORT ERROR
                                            AND REPEAT 3 THRU 4 UNTIL ALL SPEEDS CHECKED - THEN
                                            REPEAT 1 THRU 5 UNTIL ALL LINES CHECKED
                                        6.  IF "XMIT DONE" SETS VERIFY  TIMEB  LESS THAN  TIMEC
                                            IF NOT REPORT ERROR - MAKE  TIMEC = TIMEB  AND
                                            REPEAT 3 THRU 5 UNTIL ALL SPEEDS CHECKED
                                        7.  REPEAT 1 THRU 6 FOR ALL SELECTED LINES.

                                ERRORS:
                                *******

                                1.   ERROR 53  IS CALLED TO REPORT XMIT TIMEOUT ERRORS
                                2.   ERROR 17  IS CALLED TO REPORT TIMING ERRORS

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1.  IF ALL LINES FAIL ON ALL SPEEDS SUSPECT THE CLOCK MODULE M4540
                                2.  IF ALL LINES FAIL ON JUST ONE SPEED (THE SAME ONE) SUPECT EITHER THE
                                    CLOCK MODULE OR THE M7288 MODULE (TIMING SELECT MUXES)
                                3.  IF JUST ONE LINE FAILS SUSPECT EITHER THE UART MODULE (M7280)
                                    EITHER FOR LINES <15:08> OR <07:00> OR THE M7288 MODULE

                                KEY LOGIC:
                                **********

                                        M4540   SH2             <9600:50> BAUD SIGNALS
                                        M7288   SH3             BOT AND TOP BUF CLOCK SIGNALS
                                                SH4,6,8,OR 10   TX CLOCK NN L SIGNALS
                                        M7280   TBMT LINE "N" SIGNALS ON UART PIN 22
                                                TX CLOCK LINE "N" SIGNALS ON UART PIN 40

                                %
```

```
 5866  011700  012737  011730  001110          MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
 5867  011706  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
 5868  011712  000534                          BR      TST41           ;;BR IF TESTED ALL SELECTED LINES
 5869  011714  012737  002100  001220          MOV     #2100,$TMP7     ;INIT TI START WITH LOWEST SPEED
 5870  011722  012737  177777  030354          MOV     #-1,TIMEC       ;INIT RELATIVE TIME CHECKER
 5871  011730  012711  004000          2$:     MOV     #BIT11,(R1)     ;CLEAR THE DH11
 5872  011734  153711  030322          3$:     BISB    LINE,(R1)       ;SELECT IT IN THE SCR
 5873  011740  012761  177775  000010          MOV     #-3,BCR(R1)     ;SET BYTE COUNT TO XFER 3 CHARS
 5874  011746  005061  000006                  CLR     CAR(R1)         ;GET TEST DATA STARTING AT LOC. 0
 5875  011752  013761  001220  000004          MOV     $TMP7,LPR(R1)   ;SELECT A XMIT SPEED
 5876  011760  013761  027314  000012          MOV     LINMSK,BAR(R1)  ;ACTIVATE THE TRANSMITTER
 5877
 5878  011766  012737  000001  030350          MOV     #1,TIMEA        ;INIT TIMER A
 5879  011774  005037  030352                  CLR     TIMEB           ;INIT TIMER B
 5880  012000  005711                  4$:     TST     (R1)            ;XMITTR DONE SET YET ?
 5881  012002  100437                          BMI     5$              ;BR IF YES
 5882  012004  004737  027016                  JSR     PC,TIMEIT       ;CALL THE TIMER
 5883  012010  000773                          BR      4$              ;TIMER ROUTINE WILL MOVE RETURN PC
 5884                                                                  ;AROUND THIS BRANCH IF TIME OUT OCCURS
 5885
 5886  012012  013737  001220  001202          MOV     $TMP7,$TMP0     ;SAVE AND SET UP THE SPEED CODE
 5887  012020  000337  001202                  SWAB    $TMP0
 5888  012024  006237  001202                  ASR     $TMP0
 5889  012030  006237  001202                  ASR     $TMP0
 5890  012034  042737  177760  001202          BIC     #177760,$TMP0
 5891  012042  011103                          MOV     (R1),R3         ;GET THE WAS DATA
 5892  012044  042703  000200                  BIC     #BIT07,R3       ;CLEAR UNINTERESTING BITS
 5893  012050  010102                          MOV     R1,R2           ;MAKE REGADR = DEVADR
 5894  012052  012704  100000                  MOV     #BIT15,R4       ;SET UP S/B DATA
 5895  012056  153704  030322                  BISB    LINE,R4
 5896  012062  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 5897  012066  004537  024636                  JSR     R5,SUNUM        ;GO SET LINE NO. IN MSG
 5898  012072  030322                          LINE
 5899  012074  034254                          EM50+53
 5900  012076  104053                          ERROR   53              ;TIMED OUT WAITING FOR XMIT DONE
 5901  012100  000426                          BR      8$              ;GO TEST NEXT SPEED
 5902
 5903  012102  013703  030352          5$:     MOV     TIMEB,R3        ;GET THE WAS COUNT
 5904  012106  013704  030354                  MOV     TIMEC,R4        ;GET LASTR CHECK COUNT
 5905  012112  020304                          CMP     R3,R4           ;COMPARE RELATIVE TIMES
 5906  012114  103420                          BLO     8$              ;BR IF THIS SPEED FASTER THAN LAST
 5907                                                                  ;SPEED TESTED
 5908
 5909  012116  004737  027200          7$:     JSR     PC,SAPS         ;SAVE THE ERROR PSW
 5910  012122  013702  001220                  MOV     $TMP7,R2        ;GET SPEED CODE AND RIGHT JUSTIFY
 5911  012126  000302                          SWAB    R2
 5912  012130  006202                          ASR     R2
 5913  012132  006202                          ASR     R2
 5914  012134  042702  177760                  BIC     #177760,R2      ;STRIP AWAY ALL JUNK
 5915  012140  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 5916  012144  004537  024636                  JSR     R5,SUNUM        ;GO PUT LINE NO. IN MSG
 5917  012150  030322                          LINE
 5918  012152  031617                          EM17+41
 5919  012154  104017                          ERROR   17              ;TRANSMITTER SPEED INCORRECT
 5920
 5921  012156  013737  030352  030354  8$:     MOV     TIMEB,TIMEC     ;SET UP NEW CHECK TIMER COUNT
```

```
 5922  012164  062737  002100  001220          ADD     #2100,$TMP7     ;GENERATE NEXT SPEED
 5923  012172  022737  035600  001220          CMP     #35600,$TMP7    ;DONE ALL SPEEDS ?
 5924  012200  001253                          BNE     2$              ;BR IF NOT
 5925  012202  000641                          BR      1$              ;GO TEST NEXT LINE
 5926
```

```
                                ;;*****************************************************************
                                ;*TEST 41       RECEIVER TIMING TEST - ALL SELECTED LINES - ALL SPEEDS
                                ;;*****************************************************************
012204  000004                  TST41:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST IS IDENTICAL TO TEST 40 EXCEPT IT WAITS FOR "DATA READY"
                                TO CHECK RECEIVER TIMING. THE SEQUENCE IS SIMILAR AND THE SAME TIMERS
                                ARE USED FOR ERROR CHECKING.

                                ERRORS:
                                *******

                                1.   ERROR 54  IS CALLED TO REPORT RCVR TIMEOUT ERRORS
                                2.   ERROR 20  IS CALLED TO REPORT RCVR TIMING ERRORS

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:          (SAME AS TEST 42)
                                ******

                                KEY LOGIC:      (SAME AS TEST 42 PLUS)
                                **********

                                        M7288   SH5,7,9,11       RX CLOCK NN L SIGNALS
                                        M7280   BUF DA LINE "N" UART PIN 19
                                                RX CLOCK LINE "N" UART PIN 17

                                %
012206  012737  012236  001110          MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
012214  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
012220  000534                  BR      TST42                   ;;BR IF TESTED ALL SELECTED LINES
012222  012737  002100  001220          MOV     #2100,$TMP7     ;INIT TO START WITH LOWEST SPEED
012230  012737  177777  030354          MOV     #-1,TIMEC       ;INIT RELATIVE TIME CHECKER
012236  012711  004000          2$:     MOV     #BIT11,(R1)     ;CLEAR THE DH11
012242  012711  001000                  MOV     #BIT9,(R1)      ;SET MAINTENANCE MODE ENABLE
012246  153711  030322          3$:     BISB    LINE,(R1)       ;SELECT IT IN THE SCR
012252  012761  177777  000010          MOV     #-1,BCR(R1)     ;SET BYTE COUNT TO XFER 1 CHAR
012260  005061  000006                  CLR     CAR(R1)         ;GET TEST DATA STARTING AT LOC. 0
012264  013761  001220  000004          MOV     $TMP7,LPR(R1)   ;SELECT A XMIT SPEED
012272  013761  027314  000012          MOV     LINMSK,BAR(R1)  ;ACTIVATE THE TRANSMITTER

012300  012737  000001  030350          MOV     #1,TIMEA        ;INIT TIMER A
012306  005037  030352                  CLR     TIMEB           ;INIT TIMER B
012312  105711                  4$:     TSTB    (R1)            ;RCVR DONE YET ??
012314  100435                  BMI     5$                      ;BR IF YES
012316  004737  027016          JSR     PC,TIMEIT               ;CALL THE TIMER
012322  000773                  BR      4$                      ;TIMER ROUTINE WILL MOVE RETURN PC
                                                                ;AROUND THIS BRANCH IF TIME OUT OCCURS

012324  013737  001220  001202          MOV     $TMP7,$TMP0     ;SAVE AND SET UP THE SPEED CODE
012332  006337  001202                  ASL     $TMP0
012336  006337  001202                  ASL     $TMP0
```

```
 5983  012342  000337  001202                    SWAB    $TMP0
 5984  012346  042737  177760  001202            BIC     #177760,$TMP0
 5985  012354  011103                            MOV     (R1),R3          ;GET THE WAS DATA
 5986  012356  010102                            MOV     R1,R2            ;MAKE REGADR = DEVADR
 5987  012360  012704  100200                    MOV     #BIT15+BIT07,R4  ;SET UP S/B DATA
 5988  012364  153704  030322                    BISB    LINE,R4
 5989  012370  004737  024416                    JSR     PC,SUER2A        ;GO SET UP ERROR INFO
 5990  012374  004537  024636                    JSR     R5,SUNUM         ;GO SET LINE NO. IN MSG
 5991  012400  030322                            LINE
 5992  012402  032076                            EM22+51
 5993  012404  104054                            ERROR   54               ;TIMED OUT WAITING FOR CHAR AVAIL
 5994  012406  000426                            BR      8$               ;GO TEST NEXT SPEED
 5995
 5996  012410  013703  030352          5$:       MOV     TIMEB,R3         ;GET THE WAS COUNT
 5997  012414  013704  030354                    MOV     TIMEC,R4         ;GET THE CHECK COUNT
 5998  012420  020304                            CMP     R3,R4            ;COMPARE RELATIVE TIMES
 5999  012422  103420                            BLO     8$               ;BR IF TIME INDICATES THIS SPEED FASTER
 6000                                                                     ;THAN LAST SPEED
 6001
 6002  012424  004737  027200          7$:       JSR     PC,SAPS          ;SAVE THE ERROR PSW
 6003  012430  013702  001220                    MOV     $TMP7,R2         ;GET SPEED CODE AND RIGHT JUSTIFY
 6004  012434  006302                            ASL     R2
 6005  012436  006302                            ASL     R2
 6006  012440  000302                            SWAB    R2
 6007  012442  042702  177760                    BIC     #177760,R2       ;STRIP AWAY ALL JUNK
 6008  012446  004737  024416                    JSR     PC,SUER2A        ;GO SET UP ERROR INFO
 6009  012452  004537  024636                    JSR     R5,SUNUM         ;GO PUT LINE NO. IN MSG
 6010  012456  030322                            LINE
 6011  012460  031756                            EM20+36
 6012  012462  104020                            ERROR   20               ;RECEIVER SPEED INCORRECT
 6013
 6014  012464  013737  030352  030354  8$:       MOV     TIMEB,TIMEC      ;SET UP NEW CHECK TIMER COUNT
 6015  012472  062737  002100  001220            ADD     #2100,$TMP7      ;GENERATE NEXT SPEED
 6016  012500  022737  035600  001220            CMP     #35600,$TMP7     ;DONE ALL SPEEDS ?
 6017  012506  001253                            BNE     2$               ;BR IF NOT
 6018  012510  000641                            BR      1$               ;GO TEST NEXT LINE
 6019
```

```
 6020
```

```
                                ;;*****************************************************************
                                ;*TEST 42       VERIFY STORAGE OVERFLOW - NON MAINT. MODE - ALL SELECTED LINES
                                ;;*****************************************************************
012512  000004                  TST42:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THAT THE STORAGE OVERFLOW BIT (SCR14) SETS
                                AND CLEARS PROPERLY FOR ALL SELECTED LINES. THE TEST SEQUENCE IS AS
                                FOLLOWS:

                                        1. SET UP THE ERROR RETURN
                                        2. SELECT A LINE NUMBER TO TEST - GO TO NEXT TEST IF ALL
                                           SELECTED LINES HAVE BEEN TESTED.
                                        3. PRIME THE SELECTED LINE TO XMIT 65(10) CHARS.
                                        4. ACTIVATE THE SELECTED LINE AND WAIT FOR STORAGE OVERFLOW
                                           TO SET (SCR14=1)
                                        5. IF SCR14 FAILS TO SET ON TIME - REPORT ERROR AND THEN
                                           CONTINUE WITH THE NEXT LINE (STEP 2).
                                        6. IF IT SETS OK - READ THE "NRC" REG TWICE TO EMPTY TWO
                                           WORDS FROM THE SILO.
                                        7. AFTER A BRIEF STALL, VERIFY THAT SCR14 HAS CLEARED -
                                           IF NOT REPORT ERROR AND CONTINUE WITH NEXT LINE (STEP2)
                                        8. IF IT CLEARS OK, VERIFY THAT THE FILL COUNT (SSR<15:08>)
                                           CONTAINS A 77(8) - IF NOT REPORT ERROR AND CONTINUE
                                           WITH NEXT LINE  (STEP 2).
                                        9. REPEAT STEPS 2 THRU 8 UNTIL ALL SELECTED LINES HAVE BEEN
                                           TESTED.

                                ERRORS:
                                *******

                                1.  ERROR  57  IS CALLED TO REPORT ALL ERRORS DETECTED.


                                SYNC:   M7277   SH3     INIT A  H       EF2
                                *****

                                DEBUG:
                                ******

                                1. PROBLEM CAN VERY LIKELY BE THAT NO TEST CONNECTOR IS PRESENT.
                                   BE SURE YOU HAVE ONE ON FOR THIS TEST.

                                2. PROBLEM IS POSSIBLY ON THE M7289 MODULE (SH4) OR SOME
                                   SIGNAL FEEDING THIS LOGIC.

                                KEY LOGIC:
                                **********

                                        M7289   SH4     STORAGE OVERFLOW L      E43-12
                                                        READY IN PULSE H        E40-11
                                                        UC1 MASTER DA H         BH2
                                                        UC2 MASTER DA H         BD2
```

```
 6077                                       %
 6078  012514  012737  012530  001110        MOV     #2$,$LPERR      ;SET UP ERROR RETURN
 6079  012522  004737  024544          1$:   JSR     PC,SELINE       ;GO SELECT A LINE NO. TO TEST
 6080  012526  000535                        BR      TST43           ;;BR IF DONE ALL SELECTED LINES
 6081  012530  012711  004000          2$:   MOV     #BIT11,(R1)     ;CLEAR THE DH11
 6082  012534  010102                        MOV     R1,R2           ;MAKE REGADR = DEVADR
 6083  012536  113711  030322                MOVB    LINE,(R1)       ;SELECT A LINE
 6084  012542  005061  000006                CLR     CAR(R1)         ;SET UP CURRENT ADDRESS
 6085  012546  012761  177677  000010        MOV     #-65.,BCR(R1)   ;SET UP BYTE COUNT
 6086  012554  012761  033500  000004        MOV     #33500,LPR(R1)  ;SET UP LPR: 9600 BAUD,5 BIT CHARS
 6087  012562  013761  027314  000012        MOV     LINMSK,BAR(R1)  ;ACTIVATE THE SELECTED LINE
 6088
 6089  012570  012737  000001  030350        MOV     #1,TIMEA        ;INIT TIMERS
 6090  012576  005037  030352                CLR     TIMEB
 6091  012602  032711  040000          3$:   BIT     #BIT14,(R1)     ;STOREGE OVERFLOW YET ??
 6092  012606  001024                        BNE     4$              ;BR IF YES YOU SHOULD GET IT
 6093  012610  004737  027016                JSR     PC,TIMEIT       ;CALL TIMER
 6094  012614  000772                        BR      3$              ;BR IF NO TIME OUT
 6095
 6096  012616  004737  027200                JSR     PC,SAPS         ;GO SAVE PSW
 6097  012622  012704  040000                MOV     #BIT14,R4       ;SET UP S/B DATA
 6098  012626  153704  030322                BISB    LINE,R4
 6099  012632  011103                        MOV     (R1),R3         ;SET UP WAS DATA
 6100  012634  042703  137760                BIC     #137760,R3      ;CLEAR UNINTERESTING BITS
 6101  012640  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 6102  012644  004537  024636                JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
 6103  012650  030322                        LINE
 6104  012652  034741                        EM57+44
 6105  012654  104057                        ERROR   57              ;STORAGE OVERFLOW FAILED TO SET
 6106  012656  000721                        BR      1$              ;GO TRY NEXT LINE
 6107
 6108  012660  016137  000002  001220  4$:   MOV     NRC(R1),$TMP7   ;READ THE SILO
 6109  012666  016137  000002  001220        MOV     NRC(R1),$TMP7   ;READ IT AGAIN
 6110  012674  012705  001000                MOV     #1000,R5        ;INIT STALL COUNTER
 6111  012700  005305                  41$:  DEC     R5              ;COUNT TIMER
 6112  012702  001376                        BNE     41$             ;BR IF NO TIMEOUT
 6113  012704  032711  040000                BIT     #BIT14,(R1)     ;DID OVERFLOW GO AWAY ?
 6114  012710  001420                        BEQ     5$              ;BR IF YES
 6115
 6116  012712  004737  027200                JSR     PC,SAPS         ;GO SAVE THE PSW
 6117  012716  005004                        CLR     R4              ;SET UP S/B DATA
 6118  012720  153704  030322                BISB    LINE,R4
 6119  012724  011103                        MOV     (R1),R3         ;SET UP WAS DATA
 6120  012726  042703  137760                BIC     #137760,R3      ;CLEAR UNINTERESTING BITS
 6121  012732  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 6122  012736  004537  024636                JSR     R5,SUNUM        ;PUT LINE NO. IN MSG
 6123  012742  030322                        LINE
 6124  012744  034741                        EM57+44
 6125  012746  104057                        ERROR   57              ;STORAGE BIT FAILED TO CLEAR
 6126  012750  000664                        BR      1$              ;GO TRY NEXT LINE
 6127
 6128  012752  122761  000077  000017  5$:   CMPB    #77,SSR+1(R1)   ;WAS IT REALLY 65. ??
 6129  012760  001660                        BEQ     1$
 6130
 6131  012762  004737  027200                JSR     PC,SAPS         ;GO SAVE PSW
 6132  012766  012704  037400                MOV     #37400,R4       ;SET UP S/B DATA
```

```
 6133  012772  062702  000016          ADD     #SSR,R2          ;SET UP REGADR
 6134  012776  016103  000016          MOV     SSR(R1),R3       ;SAVE WAS DATA
 6135  013002  004737  024416          JSR     PC,SUER2A        ;GO SET UP ERROR INFO
 6136  013006  004537  024636          JSR     R5,SUNUM         ;PUT LINE NO. IN MSG
 6137  013012  030322                  LINE
 6138  013014  034741                  EM57+44
 6139  013016  104057                  ERROR   57               ;READING SILO FAILED TO DEC SSR OR
 6140                                                           ;STORAGE OVFL SET AT WRONG COUNT
 6141  013020  000640                  BR      1$               ;GO TRY NEXT LINE
```

```
                        ;;*****************************************************************
                        ;*TEST 43       BASIC DATA TEST - ALL SELECTED LINES/ALL CHAR LENGTHS
                        ;;*****************************************************************
013022  000004          TST43:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        **************

                                THIS TEST VERIFIES THAT A SINGLE ALL ONES CHAR. CAN BE TRANS-
                        MITTED AND RECEIVED ON ALL SELECTED LINES AT ALL FOUR CHAR LENGTHS
                        (5, 6, 7, AND 8 BITS). THE TEST SEQUENCE IS AS FOLLOWS:

                                1. SET UP THE ERROR LOOP RETURN
                                2. SELECT A LINE NO. TO TEST - GO TO THE NEXT TEST IF DONE ALL
                                   SELECTED LINES.
                                3. GET A TEST CHARACTER FROM THE DATA TABLE AND UPDATE THE
                                   TABLE POINTER.
                                4. CLEAR THE DH11
                                5. PRIME THE SELECTED LINE TO XMIT ONE CHAR AT 9600 BAUD
                                6. WAIT FOR "CHAR AVAIL" TO SET - IF TIMEOUT REPORT ERROR AND
                                   RESTART AT STEP 8.
                                7. IF NO TIMEOUT - CHECK DATA AND REPORT ANY ERRORS
                                8. INCREMENT "SCR" REG TO CHANGE CHAR LENGTH - IF DONE
                                   ALL FOUR GO TO STEP 2 - IF NOT THEN STEP 4.

                        ERRORS:
                        ******

                        1.  ERROR  55  IS CALLED TO REPORT RCVR TIMEOUT.
                        2.  ERROR  23  IS CALLED TO REPORT DATA COMPARE ERRORS

                        SYNC:   M7277   SH3     INIT A H        EF2
                        *****

                        DEBUG:
                        ******

                        1. IF FAULT AFFECTS ONLY ONE LINE AT ALL CHAR LENGTHS, SUSPECT A
                           BAD UART MODULE M7280.

                        2. IF FAULT AFFECTS ONLY ONE BIT ON ALL LINES, SUSPECT THE
                            THE M7279 MODULE.
                        3. IF FAULT AFFECTS ONLY CERTAIN CHAR LENGTHS, SUSPECT EITHER THE M7278
                           OR THE UART MODULE M7280.

                        KEY LOGIC:
                        **********

                                M7280'S UART CHIPS PINS <12:05>

                                M7279   SH1     E1,E2,E6, OR E7

                                M7278   SH8     NB2 LPR 01 H    FH1
                                                NB1 LPR 00 H    FH2
                        %
013024  012737  013052  001110          MOV     #3$,$LPERR      ;SET UP ERROR LOOP RETURN
```

```
6198  013032  004737  024544          1$:   JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
6199  013036  000511                        BR      TST44           ;;BR IF DONE ALL SELECTED LINES
6200  013040  012705  030336                MOV     #TDATA2,R5      ;GET POINTER TO DATA TABLE
6201  013044  005002                        CLR     R2              ;INIT R2 TO START AT CHAR LENGTH OF 5 BITS
6202  013046  012537  001220          2$:   MOV     (R5)+,$TMP7     ;PUT TEST CHAR IN XMIT BUFFER
6203  013052  012711  004000          3$:   MOV     #BIT11,(R1)     ;CLEAR THE DH11
6204  013056  153711  030322                BISB    LINE,(R1)       ;SELECT THE LINE
6205  013062  012761  177777  000010        MOV     #-1,BCR(R1)     ;SET BYTE COUNT TO -1
6206  013070  012761  001220  000006        MOV     #$TMP7,CAR(R1)  ;SET CURRENT ADDRESS REG
6207  013076  012761  033500  000004        MOV     #33500,LPR(R1)  ;SET BAUD RATE TO 9600
6208  013104  050261  000004                BIS     R2,LPR(R1)      ;SELECT CHAR LENGTH
6209  013110  053761  027314  000012        BIS     LINMSK,BAR(R1)  ;ACTIVATE THE SELECTED LINE
6210
6211  013116  012737  000001  030350        MOV     #1,TIMEA        ;INIT TIMER A
6212  013124  005037  030352                CLR     TIMEB           ;INIT TIMER B
6213  013130  105711                  4$:   TSTB    (R1)            ;RCVR DONE YET ??
6214  013132  100424                        BMI     5$              ;BR IF YES
6215  013134  004737  027016                JSR     PC,TIMEIT       ;CALL THE TIMER
6216  013140  000773                        BR      4$              ;TIMER ROUTINE WILL MOVE RETURN PC
6217                                                                ;AROUND THIS BRANCH IF TIME OUT OCCURS
6218
6219  013142  004737  027200                JSR     PC,SAPS         ;SAVE THE ERROR PSW
6220  013146  011103                        MOV     (R1),R3         ;GET THE SCR
6221  013150  042703  177560                BIC     #177560,R3      ;CLEAR UNINTERESTING BITS
6222  013154  012704  000200                MOV     #200,R4         ;SET UP S/B DATA
6223  013160  153704  030322                BISB    LINE,R4
6224  013164  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
6225  013170  004537  024636                JSR     R5,SUNUM        ;GO SET LINE NO. IN MSG
6226  013174  030322                        LINE
6227  013176  032076                        EM22+51
6228  013200  104055                        ERROR   55              ;CHAR AVAIL FAILED TO SET ON TIME
6229  013202  000422                        BR      6$              ;GO TEST NEXT CHAR LENGTH
6230
6231  013204  016103  000002          5$:   MOV     NRC(R1),R3      ;GET THE WAS DATA
6232  013210  012704  000200                MOV     #200,R4         ;SET UP THE S/B DATA IN R4
6233  013214  153704  030322                BISB    LINE,R4
6234  013220  000304                        SWAB    R4
6235  013222  153704  001220                BISB    $TMP7,R4
6236  013226  020304                        CMP     R3,R4           ;WAS THE RCVD DATA CORRECT ??
6237  013230  001407                        BEQ     6$              ;BR IF YES
6238
6239  013232  004737  024412                JSR     PC,SUER2        ;GO SET UP THE ERROR INFO
6240  013236  004537  024636                JSR     R5,SUNUM        ;GO PUT LINE NO. IN MSG
6241  013242  030322                        LINE
6242  013244  032137                        EM23+36
6243  013246  104023                        ERROR   23              ;DATA COMPARE ERROR
6244
6245  013250  005202                  6$:   INC     R2              ;DO NEXT CHAR LENGTH ON SELECTED LINE
6246  013252  022702  000004                CMP     #4,R2           ;HAVE WE DONE ALL FOUR CHAR LENGTHS ??
6247  013256  001273                        BNE     2$              ;BR IF NOT
6248  013260  000664                        BR      1$              ;GO DO NEXT LINE
```

```
                        ;;*****************************************************************
                        ;*TEST 44       SINGLE LINE DATA TEST - ALL SELECTED LINES
                        ;;*****************************************************************
013262  000004          TST44:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        **************

                                THIS TEST TRANSMITS AND RECEIVES A BINARY COUNT PATTERN
                        (000 - 377) ON ALL SELECTED LINES. THE TEST SEQUENCE IS AS
                        FOLLOWS:

                                1. SET UP THE ERROR LOOP RETURN
                                2. GO SELECT A LINE NO. TO TEST - IF DONE ALL SELECTED
                                   LINES THEN GO TO THE NEXT TEST .
                                3. CLEAR THE DH11 AND PRIME THE SELECTED LINE TO XMIT
                                   TO XMIT 256. CHARS AT 9600. BAUD - 8 BIT CHARS.
                                4. SET UP R5 TO POINT TO RCVR CORE BUFFER.
                                5. ACTIVATE THE SELECTED XMITTER.
                                6. WAIT FOR "CHAR AVAIL" TO SET BEFORE READING THE SILO.
                                   IF RCVR TIMEOUT REPORT ERROR AND RESTART AT STEP 2.
                                7. IF NO TIMEOUT READ THE SILO AND STORE THE WORD IN THE RCVR
                                   CORE BUFFER - WHEN THE BUFFER IS FULL GO TO STEP8 IF NOT
                                   THEN GO TO STEP 6.
                                8. COMPARE THE XMIT AND RCVR CORE IMAGE BUFFERS AND REPORT
                                   ALL DATA COMPARE ERRORS.
                                9. CHECK THE "BAR", "BCR", AND "CAR" REGISTERS FOR CORRECT
                                   CONTENTS - REPORT ALL ERRORS.
                                10.GO TO STEP 2


                        ERRORS:
                        *******

                        1.  ERROR  22  IS CALLED TO REPORT "DATA AVAIL" TIMEOUT
                        2.  ERROR  37  "        "        " DATA COMPARE ERRORS
                        3.  ERROR  40  "        "        " "BAR" REG NOT CLEARED
                        4.  ERROR  10  "        "        " "BCR" REG NOT ALL ZEROES
                        5.  ERROR   7  "        "        " "CAR" REG NOT UPDATED CORRECTLY

                        SYNC:   M7277   SH3     INIT A H        EF2
                        *****

                        DEBUG:
                        *******

                        1. IF THE FAULT AFFECTS ONE OR MORE LINES IN AN 8 LINE GROUP <15:08>
                           OR <07:00>, SWAP THE M7280 MODULES. IF THE FAULT SHIFTS SO THAT
                           THE ERROR INDICATES DIFFERENT LINES THE PROBLEM IS MOST LIKELY
                           THE M7280 THE SYMPTOM SHIFTED TO.

                        2. IF THE FAULT GIVES DATA ERRORS BUT AFFECTS ONLY CERTAIN PATTERNS ON
                           ONE LINE THE FAULT IS MOST LIKELY A "UART" CHIP.

                        3. IF THE FAULT GIVES DATA ERRORS BUT AFFECTS ONLY CERTAIN PATTERNS
                           ON ALL LINES SUSPECT THE DATA PATHS EXTERNAL TO, THE M7280 MODULES.
```

```
                                        4. IF THE FAULT CAUSES NO DATA ERRORS BUT GIVES "BAR", "BCR", OR "CAR" ERRORS
                                           SUSPECT THE M7278 OR M7277 MODULES.

                                        KEY LOGIC       (REFER TO TEST 43)
                                        ***********

                                        %
013264  012737  013306  001110            MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
013272  004737  024544            1$:     JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
013276  000401                            BR      11$             ;;BR IF ALL SELECTED LINES DONE
013300  000402                            BR      2$              ;GO TEST IT
013302  000137  013732            11$:    JMP     8$              ;EXIT TEST
013306  013701  027302            2$:     MOV     DHADR,R1        ;RESET DEVADR
013312  012711  004000                    MOV     #BIT11,(R1)     ;CLEAR THE DH11
013316  153711  030322                    BISB    LINE,(R1)       ;SET SELECT BITS IN SCR
013322  012761  037312  000006            MOV     #TBUF,CAR(R1)   ;SET UP BUS ADDRESS REG
013330  012761  177400  000010            MOV     #-400,BCR(R1)   ;SET UP BYTE COUNT
013336  012761  033503  000004            MOV     #33503,LPR(R1)  ;SET LINE PARAMETERS
013344  012705  036312                    MOV     #RBUF,R5        ;SET UP POINTER TO INPUT DATA BUFFER
013350  052711  001000                    BIS     #BIT09,(R1)     ;SET MAINT MODE BIT
013354  013761  027314  000012            MOV     LINMSK,BAR(R1)  ;ACTIVATE THE SELECTED LINE

013362  012737  000002  030350            MOV     #2,TIMEA        ;INIT TIMER A
013370  005037  030352                    CLR     TIMEB           ;INIT TIMER B
013374  105711                    3$:     TSTB    (R1)            ;RCVR DONE YET ??
013376  100425                            BMI     4$              ;BR IF YES
013400  004737  027016                    JSR     PC,TIMEIT       ;CALL THE TIMER
013404  000773                            BR      3$              ;TIMER ROUTINE WILL MOVE RETURN PC
                                                                    ;AROUND THIS BRANCH IF TIME OUT OCCURS

013406  004737  027200                    JSR     PC,SAPS         ;SAVE THE ERROR PSW
013412  010102                            MOV     R1,R2           ;SET UP REGADR
013414  011203                            MOV     (R2),R3         ;GET THE WAS DATA
013416  042703  176400                    BIC     #176400,R3      ;CLEAR JUNK BITS
013422  012704  001200                    MOV     #1200,R4        ;SET UP S/B DATA
013426  153704  030322                    BISB    LINE,R4
013432  004737  024416                    JSR     PC,SUER2A       ;GO SET UP ERROR INFO
013436  004537  024636                    JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
013442  030322                            LINE
013444  032076                            EM22+51
013446  104022                            ERROR   22              ;CHAR AVAIL TIMEOUT
013450  000710                            BR      1$              ;GO TRY NEXT LINE

013452  016125  000002            4$:     MOV     NRC(R1),(R5)+   ;SAVE THE RECEIVED DATA
013456  022705  037312                    CMP     #RBUF+1000,R5   ;INPUT BUFFER FULL ??
013462  001344                            BNE     3$              ;BR IF NOT

013464  012702  037312                    MOV     #TBUF,R2        ;SET UP POINTER TO OUTPUT BUFFER
013470  012701  036312                    MOV     #RBUF,R1        ;SET UP POINTER TO INPUT BUFFER
013474  111204                    5$:     MOVB    (R2),R4         ;SET UP S/B DATA IN R4
013476  042704  177400                    BIC     #177400,R4
013502  000304                            SWAB    R4
013504  153704  030322                    BISB    LINE,R4
013510  152704  000200                    BISB    #200,R4
013514  000304                            SWAB    R4
```

```
 6361  013516  011103                        MOV     (R1),R3         ;GET THE WAS DATA
 6362  013520  020304                        CMP     R3,R4           ;DATA CORRECT ??
 6363  013522  001407                        BEQ     6$              ;BR IF YES
 6364
 6365  013524  004737  024412                JSR     PC,SUER2        ;GO SET UP ERROR INFO
 6366  013530  004537  024636                JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
 6367  013534  030322                        LINE
 6368  013536  033354                        EM37+33
 6369  013540  104037                        ERROR   37              ;DATA COMPARE ERROR
 6370
 6371
 6372  013542  005202                6$:     INC     R2              ;UPDATE DATA BUFFER POINTERS
 6373  013544  062701  000002                ADD     #2,R1           ;
 6374  013550  022701  037312                CMP     #RBUF+1000,R1   ;COMPARED ALL 256. CHARS ??
 6375  013554  001347                        BNE     5$              ;BR IF NOT
 6376
 6377  013556  013701  027302                MOV     DHADR,R1        ;RESET DEVADR
 6378  013562  010102                        MOV     R1,R2           ;SET UP REGADR
 6379  013564  062702  000012                ADD     #BAR,R2
 6380  013570  005712                        TST     (R2)            ;WAS THE "BAR" ALL ZEROES ??
 6381  013572  001413                        BEQ     7$              ;BR IF YES
 6382
 6383  013574  004737  027200                JSR     PC,SAPS         ;SAVE THE ERROR PSW
 6384  013600  011203                        MOV     (R2),R3         ;GET THE WAS DATA
 6385  013602  005004                        CLR     R4              ;SET UP S/B DATA
 6386  013604  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 6387  013610  004537  024636                JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
 6388  013614  030322                        LINE
 6389  013616  033417                        EM40+40
 6390  013620  104040                        ERROR   40              ;"BAR" REG NOT ALL ZEROES
 6391
 6392  013622  010102                7$:     MOV     R1,R2           ;SET UP REGADR
 6393  013624  062702  000010                ADD     #BCR,R2
 6394  013630  005712                        TST     (R2)            ;BYTE COUNT REG ALL ZEROES ?
 6395  013632  001413                        BEQ     71$             ;;BR IF BYTE COUNT ZERO
 6396
 6397  013634  004737  027200                JSR     PC,SAPS         ;SAVE THE ERROR PSW
 6398  013640  011203                        MOV     (R2),R3         ;GET THE WAS DATA
 6399  013642  005004                        CLR     R4              ;SET UP THE S/B DATA
 6400  013644  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 6401  013650  004537  024636                JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
 6402  013654  030322                        LINE
 6403  013656  031224                        EM10+44
 6404  013660  104010                        ERROR   10              ;BYTE COUNT NOT ALL ZEROES
 6405
 6406  013662  010102                71$:    MOV     R1,R2           ;SET UP REGADR
 6407  013664  062702  000006                ADD     #CAR,R2
 6408  013670  022712  037712                CMP     #TBUF+400,(R2)  ;DID "CAR" INCREMENT PROPERLY ?
 6409  013674  001414                        BEQ     72$             ;BR IF YES
 6410
 6411  013676  004737  027200                JSR     PC,SAPS         ;SAVE THE ERROR PSW
 6412  013702  011203                        MOV     (R2),R3         ;GET THE WAS DATA
 6413  013704  012704  037712                MOV     #TBUF+400,R4    ;SET UP S/B DATA
 6414  013710  004737  024416                JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 6415  013714  004537  024636                JSR     R5,SUNUM        ;GO PUT LINE NO IN MESSAGE
 6416  013720  030322                        LINE
```

```
 6417  013722  031155                        EM7+47
 6418  013724  104007                        ERROR   7               ;"CAR" NOT UPDATED CORRECTLY
 6419
 6420  013726  000137  013272          72$:  JMP     1$              ;GO DO NEXT LINE
 6421
 6422  013732  000240                  8$:   NOP                     ;EXIT POINT
```

```
                                ;;*********************************************************************
                                ;*TEST 45       BASIC PARITY LOGIC TEST - ALL SELECTED LINES - ODD PARITY
                                ;;*********************************************************************
013734  000004                  TST45:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ****************

                                        THIS TEST VERIFIES THE ODD PARITY FUNCTION FOR ALL SELECTED
                                LINES USING THE "BREAK" FUNCTION TO FORCE PARITY ERRORS. REFER TO
                                THE FLOW CHARTS IN THE PROGRAM DOCUMENTATION FOR TEST SEQUENCES.

                                ERRORS:
                                *******

                                1.  ERROR  22  IS CALLED TO REPORT RCVR TIMEOUT
                                2.  ERROR  33  IS CALLED TO REPORT DATA/PARITY ERRORS

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1. IF FAULT AFFECTS ALL LINES SUSPECT THE M7278 MODULE.

                                2. IF IT AFFECTS ONLY ONE LINE SUSPECT THE "UART" MODULE FOR THAT LINE.


                                KEY LOGIC:
                                **********

                                        M7278   SH7     PEN LPR04 L     FF2
                                                        PEV LPR05 L     FN1

                                %
013736  012737  013752  001110          MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
013744  004737  024544          1$:     JSR     PC,SELINE       ;GO SELECT A LINE NO.
013750  000506                  BR      TST46           ;;BR IF ALL SELECTED LINES DONE
013752  012711  004000          2$:     MOV     #BIT11,(R1)     ;CLEAR OUT THE DH11
013756  012704  000260          MOV     #260,R4         ;SET UP THE S/B DATA IN R4
013762  153704  030322          BISB    LINE,R4
013766  000304                  SWAB    R4
013770  153711  030322          BISB    LINE,(R1)       ;SET LINE NO. IN SCR
013774  012737  000377  030334  MOV     #377,TDATA1     ;LOAD XMIT BUFFER WITH TEST CHARACTER
014002  012761  073563  000004  MOV     #73563,LPR(R1)  ;SET UP THE LINE PARAMETERS
014010  012761  177777  000010  MOV     #-1,BCR(R1)     ;LOAD THE BYTE COUNT REG
014016  012761  030334  000006  MOV     #TDATA1,CAR(R1) ;LOAD THE BUS ADDR REG
014024  013761  027314  000014  MOV     LINMSK,BKR(R1)  ;SET BREAK BIT FOR SELECTED LINE
014032  013761  027314  000012  MOV     LINMSK,BAR(R1)  ;ACTIVATE THE XMITTR

014040  012737  000001  030350  MOV     #1,TIMEA        ;INIT TIMER A
014046  005037  030352          CLR     TIMEB           ;INIT TIMER B
014052  105711          3$:     TSTB    (R1)            ;RCVR DONE YET ??
014054  100423                  BMI     4$              ;BR IF YES
014056  004737  027016          JSR     PC,TIMEIT       ;CALL THE TIMER
014062  000773                  BR      3$              ;TIMER ROUTINE WILL MOVE RETURN PC
```

```
 6479                                                   ;AROUND THIS BRANCH IF TIME OUT OCCURS
 6480
 6481  014064  004737  027200            JSR     PC,SAPS          ;SAVE THE ERROR PSW
 6482  014070  011103                    MOV     (R1),R3          ;GET THE WAS DATA
 6483  014072  012704  100200            MOV     #100200,R4       ;SET UP THE S/B DATA
 6484  014076  153704  030322            BISB    LINE,R4
 6485  014102  010102                    MOV     R1,R2            ;SET UP REGADR
 6486  014104  004737  024416            JSR     PC,SUER2A        ;GO SET UP ERROR INFO
 6487  014110  004537  024636            JSR     R5,SUNUM         ;PUT LINE NO. IN MESSAGE
 6488  014114  030322                    LINE
 6489  014116  032076                    EM22+51
 6490  014120  104022                    ERROR   22               ;TIMED OUT WAITING FOR DATA AVAIL
 6491  014122  000710                    BR      1$               ;GO TEST NEXT LINE
 6492
 6493  014124  016103  000002      4$:   MOV     NRC(R1),R3       ;GET THE WAS DATA
 6494  014130  020304                    CMP     R3,R4            ;CORRECT DATA RECEIVED ??
 6495  014132  001704                    BEQ     1$               ;BR IF YES
 6496
 6497  014134  004737  027200            JSR     PC,SAPS          ;SAVE THE ERROR PSW
 6498  014140  010102                    MOV     R1,R2            ;SET UP THE REGADR
 6499  014142  062702  000002            ADD     #NRC,R2
 6500  014146  004737  024416            JSR     PC,SUER2A        ;GO SET UP ERROR INFO -
 6501  014152  004537  024636            JSR     R5,SUNUM         ;PUT LINE NO. IN MESSAGE
 6502  014156  030322                    LINE
 6503  014160  033070                    EM33+40
 6504  014162  104033                    ERROR   33               ;INCORRECT DATA OR PARITY ERROR
 6505  014164  000667                    BR      1$               ;GO TEST NEXT LINE
```

```
                        ;;*****************************************************************
                        ;*TEST 46       MULTI-LINE PARITY DATA TEST - ALL SELECTED LINES
                        ;;*****************************************************************
014166  000004          TST46:  SCOPE
                        .REM    %
                        TEST ABSTRACT:
                        **************

                                THIS TEST VERIFIES ALL SELECTED LINES CAN TRANSMIT AND RECEIVE
                        A BINARY COUNT PATTERN WHEN RUN CONCURRENTLY. ALL CHAR LENGTHS (5, 6, 7,
                        AND 8 BITS) ARE TESTED WITH BOTH EVEN AND ODD PARITY CHECKING SPECIFIED.
                        THE TEST ACTUALLY INCLUDES EIGHT SUB-TESTS - THE PARAMETERS FOR EACH
                        SUB-TEST RETRIEVED FROM A TABLE TAGGED "PRTYTB:".  REFER TO THIS TABLE
                        TO DETERMINE THE TEST SEQUENCE.


                        ERRORS:
                        ********

                        1.  ERROR  41  IS CALLED TO REPORT FALSE RECEIVER INTRS.
                        2.  ERROR  42  IS CALLED TO REPORT SILO OVERFLOW ERRORS
                        3.  ERROR  34  IS CALLED TO REPORT PARITY/DATA ERRORS
                        4.  ERROR  35  IS CALLED TO REPORT TEST TIMEOUTS

                        SYNC:   (NONE)
                        *****

                        DEBUG:  (REFER TO TEST 45)
                        ******

                        KEY LOGIC:      (REFER TO TEST 45)
                        ***********

                        %
014170  012737  014206  001110          MOV     #1$,$LPERR      ;SET UP THE ERROR LOOP RETURN
014176  012705  027364                  MOV     #PRTYTB+4,R5    ;SET UP POINTER TO TEST PARAMETERS
014202  005037  001220                  CLR     $TMP7           ;START WITH SUB TEST #00
014206  162705  000004          1$:     SUB     #4,R5           ;RESET POINTER FOR ERROR LOOPS
014212  005337  001220                  DEC     $TMP7           ;RESET SUB TEST # FOR ERROR LOOP
014216  022705  027420          2$:     CMP     #PRTYTB+40,R5   ;DONE ALL 8. SUB TESTS ??
014222  001456                  BEQ     21$             ;;BR IF YES
014224  012706  001100                  MOV     #STACK,SP       ;RESET STACK POINTER FOR ERROR LOOPS
014230  013701  027302                  MOV     DHADR,R1        ;RESET DEVADR FOR ERROR LOOPS
014234  012537  001216                  MOV     (R5)+,$TMP6     ;GET THE BYTE COUNT PARAMETER
014240  012537  001214                  MOV     (R5)+,$TMP5     ;GET THE LINE PARAMETERS
014244  005237  001220                  INC     $TMP7           ;GENERATE NEW SUB-TEST NO.
014250  012711  004000                  MOV     #BIT11,(R1)     ;CLEAR THE DH11
014254  004737  025020                  JSR     PC,SUPPAR       ;GO SET UP PARAMETERS
014260  016137  000004  001202          MOV     LPR(R1),$TMP0   ;SAVE CURRENT LINE PARAMETERS
014266  013737  027312  001210          MOV     LINSEL,$TMP3    ;SAVE SELECTED LINES PARAMETER
014274  004737  027164                  JSR     PC,CHPS2        ;GO LOCK OUT INTRS
014300  013702  027304                  MOV     DHVCT,R2        ;SET UP THE VECTOR
014304  012722  014376                  MOV     #3$,(R2)+       ;GO TO 3$ ON RCVR INTERRUPT
014310  113712  030316                  MOVB    DHRLVL,(R2)
014314  012711  000100                  MOV     #100,(R1)       ;ENABLE CHAR AVAIL INTERRUPTS
014320  013737  027312  027560          MOV     LINSEL,LINACT   ;FLAG ALL SELECTED LINES ACTIVE
```

```
6562  014326  013761  027312  000012          MOV     LINSEL,BAR(R1)  ;ACTIVATE ALL SELECTEDLINES
6563  014334  113737  001102  001206          MOVB    $TSTNM,$TMP2    ;SAVE THE TEST NO.
6564  014342  042737  177400  001206          BIC     #177400,$TMP2
6565  014350  004737  027150                  JSR     PC,CHPS1        ;GO CLEAR PSW
6566  014354  000137  014616                  JMP     7$              ;GO WAIT FOR INTERRUPTS
6567
6568  014360  012706  001100          21$:    MOV     #STACK,SP       ;RESTORE THE SP
6569  014364  004737  027150                  JSR     PC,CHPS1        ;GO CLEAR PSW
6570  014370  004737  026770                  JSR     PC,RESTRP       ;RESTORE TRAP CATCHER
6571  014374  000556                          BR      TST47           ;;GO TO NEXT TEST
6572
6573                          ;RECEIVER INTERRUPT SERVICE ROUTINE
6574
6575  014376  005037  001212          3$:     CLR     $TMP4
6576  014402  105711                          TSTB    (R1)            ;CHAR AVAIL SET
6577  014404  100404                          BMI     4$              ;BR IF YES
6578
6579  014406  012711  004000                  MOV     #BIT11,(R1)     ;CLEAR OUT THE DH11
6580  014412  104041                          ERROR   41              ;RCVR FALSE INTERRUPT - CHAR AVAIL NOT SET
6581  014414  000700                          BR      2$              ;GO TRY NEXT SUB TEST
6582
6583  014416  032711  040000          4$:     BIT     #BIT14,(R1)     ;SILO OVERFLOW ??
6584  014422  001404                          BEQ     5$              ;BR IF NOT
6585
6586  014424  012711  004000                  MOV     #BIT11,(R1)     ;CLEAR OUT THE DH11
6587  014430  104042                          ERROR   42              ;SILO OVERFLOW ERROR
6588  014432  000671                          BR      2$              ;GO TRY NEXT SUB TEST
6589
6590  014434  016103  000002          5$:     MOV     NRC(R1),R3      ;GET THE WAS DATA
6591  014440  010302                          MOV     R3,R2           ;EXTRACT AND SAVE LINE NO.
6592  014442  000302                          SWAB    R2
6593  014444  042702  177760                  BIC     #177760,R2
6594  014450  006302                          ASL     R2              ;GENERATE TABLE OFFSETR
6595  014452  005237  001212                  INC     $TMP4
6596  014456  022737  000101  001212          CMP     #101,$TMP4
6597  014464  001744                          BEQ     3$
6598  014466  036237  030246  027312          BIT     $LNSEL(R2),LINSEL       ;IS THIS ONE OF THE SELECTED LINES?
6599  014474  001002                          BNE     51$             ;IF SO,GO ANALYZE THE CHARACTER
6600  014476  104000                          ERROR                   ;INDICATE SOME KIND OF ERROR
6601  014500  000755                          BR      5$              ;CHECK THE NEXT SILO ENTRY
6602  014502  010237  001212          51$:    MOV     R2,$TMP4
6603  014506  006237  001212                  ASR     $TMP4
6604  014512  026203  036312                  CMP     RBUF(R2),R3     ;CORRECT DATA RECEIVED ??
6605  014516  001426                          BEQ     6$              ;BR IF YES
6606
6607  014520  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
6608  014524  012711  004000                  MOV     #BIT11,(R1)     ;CLEAR OUT THE DH11
6609  014530  016204  036312                  MOV     RBUF(R2),R4     ;SET UP S/B DATA
6610  014534  062701  000002                  ADD     #NRC,R1         ;SET UP WAS ADDRESS
6611  014540  062702  036312                  ADD     #RBUF,R2        ;SET UP S/B ADDRESS
6612  014544  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
6613  014550  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
6614  014554  001212                          $TMP4
6615  014556  033144                          EM34+51
6616  014560  004537  024636                  JSR     R5,SUNUM        ;PUT SUBTEST NO. IN MESSAGE
6617  014564  001220                          $TMP7
```

```
 6618  014566  033162                        EM34+67
 6619  014570  104034                        ERROR   34              ;PARITY DATA COMPARE ERROR
 6620  014572  000611                        BR      2$              ;GO TRY NEXT SUBTEST
 6621
 6622  014574  105262  036312          6$:   INCB    RBUF(R2)        ;GENERATE NEW RCVD DATA
 6623  014600  005262  027562                INC     MULPTB(R2)      ;COUNT ONE BYTES RECEIVED
 6624  014604  001003                        BNE     61$             ;BR IF NOT DONE
 6625  014606  046237  027520  027560        BIC     LINBIT(R2),LINACT ;FLAG THIS LINE DONE
 6626  014614  000002              61$:      RTI                     ;RETURN TO WAIT ROUTINE
 6627
 6628                                ;WAIT ROUTINE
 6629
 6630  014616  012737  000002  030350  7$:   MOV     #2,TIMEA        ;INIT TIMER A
 6631  014624  005037  030352                CLR     TIMEB           ;INIT TIMER B
 6632  014630  005761  000012          8$:   TST     BAR(R1)         ;ALL LINES DONE XMITTING ??
 6633  014634  001413                        BEQ     9$              ;BR IF YES
 6634  014636  004737  027016                JSR     PC,TIMEIT       ;CALL THE TIMER
 6635  014642  000772                        BR      8$              ;TIMER ROUTINE WILL MOVE RETURN PC
 6636                                                                ;AROUND THIS BRANCH IF TIME OUT OCCURS
 6637
 6638  014644  016137  000012  001210        MOV     BAR(R1),$TMP3   ;SAVE THE ACTIVE LINES FLAG
 6639  014652  012711  004000                MOV     #BIT11,(R1)     ;CLEAR OUT THE DH11
 6640  014656  104035                        ERROR   35              ;TIMED OUT WAITING FOR TRANSMITTERS TO FINISH
 6641  014660  000137  014216                JMP     2$              ;GO TRY NEXT SUBTEST
 6642
 6643
 6644  014664  012737  000001  030350  9$:   MOV     #1,TIMEA        ;INIT TIMER A
 6645  014672  005037  030352                CLR     TIMEB           ;INIT TIMER B
 6646  014676  005737  027560         10$:   TST     LINACT          ;ALL CHARS RECEIVED ?
 6647  014702  001411                        BEQ     11$             ;BR IF YES
 6648  014704  004737  027016                JSR     PC,TIMEIT       ;CALL THE TIMER
 6649  014710  000772                        BR      10$             ;TIMER ROUTINE WILL MOVE RETURN PC
 6650                                                                ;AROUND THIS BRANCH IF TIME OUT OCCURS
 6651
 6652  014712  013737  027560  001210        MOV     LINACT,$TMP3    ;SET UP ACTIVE LINE PARAMETER
 6653  014720  012711  004000                MOV     #BIT11,(R1)     ;CLEAR OUT THE DH11
 6654  014724  104035                        ERROR   35              ;SILO EMPTY TIMEOUT
 6655  014726  000137  014216         11$:   JMP     2$              ;GO TRY NEXT SUB TEST
```

```
                                ;;*****************************************************************
                                ;*TEST 47       AUTO ECHO TEST 1 - ALL SELECTED LINES
                                ;;*****************************************************************
014732  000004                  TST47:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THAT ALL SELECTED LINES CAN TURN AROUND
                                A SINGLE TEST CHARACTER (377) AND (000) IN AUTO ECHO MODE. THE TEST SEQUENCE
                                IS AS FOLLOWS:

                                        1. SET UP THE ERROR LOOP RETURN
                                        2. RETRIEVE THE AUTO-ECHO TEST DATA FROM "AETAB:" AND
                                           UPDATE THE POINTER.
                                        3. GO SELECT A LINE NO. TO TEST - GO TO STEP 10 IF DONE
                                           ALL SELECTED LINES.
                                        4. CLEAR THE "CAR" AND "BCR" MEMORIES.
                                        5. PRIME THE SELECTED LINE TO XMIT ONE CHAR WITH A.E. ENABLED.
                                        6. ACTIVATE THE SELECTED TRANSMITTER.
                                        7. WAIT FOR "CHAR AVAIL" - IF TIMEOUT REPORT ERROR AND RESTART
                                           AT STEP 2.
                                        8. IF NO TIMEOUT - READ SILO AND COMPARE AUTO ECHO DATA RECEIVED
                                           REPORT DATA COMPARE ERRORS AND RESTART AT STEP 2
                                        9. IF NO ERRORS REPEAT STEPS 7 AND 8 SIXTY-FOUR TIMES THEN TURN
                                           OFF A.E. ENABLE AND READ LAST CHAR FROM SILO.. CHECK LAST
                                           CHAR FOR DATA COMPARE ERRORS - REPORT ERRORS IF ANY - AND RE-
                                           START AT STEP 2.
                                        10.CHANGE A.E. TABLE POINTER TO POINT TO "AETAB0:" (0'S DATA)
                                           AND REPEAT STEPS 2 THRU 9.

                                ERRORS:
                                ********

                                1.  ERROR 24  IS CALLED TO REPORT ALL ERRORS

                                SYNC:   M7277   SH4     LOAD BAR LB+HB L        CN2
                                *****

                                DEBUG:
                                ******

                                1. IF ALL LINES FAIL, SUSPECT EITHER THE M7277 OR M7289

                                2. IF ONLY ONE LINE FAILS SUSPECT THE M7288

                                3. LOOP ON THE FAILING LINE AND TRACK BACK THROUGH THE KEY LOGIC.


                                KEY LOGIC:
                                ************

                                        M7277   SH3     AE GO L         CS2
                                                        7402 "OR" GATE CHIPS E38 OR E41
                                                        74157 MUX CHIPS  E39 OR 342
                                                SH4     E35 - PIN 2 STUCK LOW
```

```
6712
6713                                        M7289   SH3     AE GO L          EK1
6714                                                        AE SCAN MUX  E22 PIN 10
6715                                                SH4     SAMPLE STATUS H E21-12
6716
6717                                        M7288   SH5, 7, 9, 11
6718                                                        AE ENABLE "NN" H CONTROL FLOPS
6719                                                        74174 CHIPS PIN 15
6720
6721                                    %
6722  014734  012737  015016  001110            MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
6723  014742  005037  001210                    CLR     $TMP3           ;INIT I/O DATA FLAG
6724  014746  012711  004000                    MOV     #BIT11,(R1)     ;CLEAR THE DH11
6725  014752  012705  027420                    MOV     #AETAB,R5       ;GET POINTER TO AUTO ECHO DATA TABLE
6726  014756  005037  027316            7$:     CLR     LMSK1           ;INIT BIT TEST MARKER
6727  014762  000261                            SEC                     ;SET "C" BIT FOR MARKER
6728  014764  000401                            BR      13$             ;GO SHIFT MASK
6729  014766  000241                    1$:     CLC                     ;INIT THE "C" BIT
6730  014770  006137  027316            13$:    ROL     LMSK1           ;SHIFT BIT MARKER
6731  014774  001407                            BEQ     12$             ;BR IF DONE ALL LINES
6732  014776  012504                            MOV     (R5)+,R4        ;SET UP THE S/B DATA
6733  015000  033737  027316  027312            BIT     LMSK1,LINSEL    ;TEST THIS LINE ?
6734  015006  001767                            BEQ     1$              ;BR IF NOT
6735  015010  004737  024544            11$:    JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
6736  015014                            12$:
6737  015014  000522                            BR      6$              ;;BR IF ALL SELECTED LINES TESTED
6738  015016  004737  024716            2$:     JSR     PC,CLCABC       ;GO CLEAR "CAR" AND "BCR" MEMORIES
6739  015022  113711  030322                    MOVB    LINE,(R1)       ;SET SELECT BITS IN SCR REG
6740  015026  012761  177777  000010            MOV     #-1,BCR(R1)     ;SET UP TO XFER ONE CHAR
6741  015034  010561  000006                    MOV     R5,CAR(R1)      ;SET UP THE BUS ADDRESS REG
6742  015040  162761  000002  000006            SUB     #2,CAR(R1)      ;CORRECT BUS ADDRESS
6743  015046  012737  000100  001220            MOV     #100,$TMP7      ;COUNT 64 CHARS TO BE RECEIVED IN AUTO ECHO
6744  015054  005037  001216                    CLR     $TMP6           ;INIT CHAR COUNTER
6745  015060  012761  133503  000004            MOV     #133503,LPR(R1) ;SET UP LINE PARAMETER REG
6746  015066  013761  027314  000012            MOV     LINMSK,BAR(R1)  ;ACTIVATE THE LINE
6747
6748  015074  012737  000002  030350            MOV     #2,TIMEA        ;INIT TIMER A
6749  015102  005037  030352                    CLR     TIMEB           ;INIT TIMERB
6750  015106  105711                    3$:     TSTB    (R1)            ;CHAR AVAIL SET ??
6751  015110  100427                            BMI     4$              ;BR IF YES
6752  015112  004737  027016                    JSR     PC,TIMEIT       ;CALL THE TIMER
6753  015116  000773                            BR      3$              ;TIMER ROUTINE WILL MOVE RETURN PC
6754                                                                    ;AROUND THIS BRANCH IF TIME OUT OCCURS
6755
6756  015120  004737  027200                    JSR     PC,SAPS         ;SAVE THE ERROR PSW
6757  015124  005061  000004                    CLR     LPR(R1)         ;TURN OFF AUTO ECHO MODE
6758  015130  010102                            MOV     R1,R2           ;MAKE REGADR = DEVADR
6759  015132  011103                            MOV     (R1),R3         ;GET THE WAS DATA
6760  015134  042703  100000                    BIC     #BIT15,R3       ;CLEAR JUNK BIT
6761  015140  012704  000200                    MOV     #200,R4         ;SET UP S/B DATA
6762  015144  153704  030322                    BISB    LINE,R4
6763  015150  004737  024416                    JSR     PC,SUER2A       ;GO SET UP ERROR INFO
6764  015154  004537  024636                    JSR     R5,SUNUM        ;GO SET LINE NO. IN MSG
6765  015160  030322                            LINE
6766  015162  032274                            EM24+35
6767  015164  104024                            ERROR   24              ;DATA AVAIL FAILED TO SET ON TIME
```

```
 6768  015166  000677                          BR      1$              ;GO TRY NEXT LINE
 6769
 6770  015170  005237  001216          4$:     INC     $TMP6           ;COUNT ONE CHAR RECVD
 6771  015174  016103  000002                  MOV     NRC(R1),R3      ;GET THE WAS DATA
 6772  015200  020304                          CMP     R3,R4           ;WAS CHAR AUTO ECHOED CORRECTLY ?
 6773  015202  001417                          BEQ     5$              ;BR IF YES
 6774
 6775  015204  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
 6776  015210  005061  000004                  CLR     LPR(R1)         ;DISABLE AUTO ECHO
 6777  015214  010102                          MOV     R1,R2           ;SET UP REGADR
 6778  015216  062702  000002                  ADD     #NRC,R2
 6779  015222  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 6780  015226  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO. IN ERROR MSG
 6781  015232  030322                          LINE
 6782  015234  032274                          EM24+35
 6783  015236  104024                          ERROR   24              ;CHAR AUTO ECHOED INCORRECTLY
 6784  015240  000652                          BR      1$              ;GO TRY NEXT LINE
 6785
 6786  015242  005337  001220          5$:     DEC     $TMP7           ;COUNT ONE CHAR READ OUT OF 64
 6787  015246  003317                          BGT     3$              ;BR IF NOT LAST ONE
 6788  015250  100646                          BMI     1$              ;;BR IF LAST ONE READ
 6789  015252  042761  100000  000004          BIC     #BIT15,LPR(R1)  ;DISABLE AUTO ECHO
 6790  015260  000712                          BR      3$              ;GO READ LAST CHAR
 6791
 6792  015262  005137  001210          6$:     COM     $TMP3           ;TOGGLE I/O FLAG
 6793  015266  001406                          BEQ     TST50           ;;BR IF DONE BOTH I/O DATA
 6794  015270  005037  030322                  CLR     LINE            ;INIT LINE NO TO 00
 6795  015274  012705  027460                  MOV     #AETAB0,R5      ;SET POINTER TO 0'S TABLE
 6796  015300  000137  014756                  JMP     7$              ;REPEAT TEST FOR ZERO PATTERNS
 6797
```

```
                                ;;*****************************************************************
                                ;*TEST 50       AUTO ECHO TEST 2 - ALL SELECTED LINES
                                ;;*****************************************************************
015304  000004                  TST50:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST IS SIMILAR TO TEST 47 EXCEPT ALL SELECTED LINES OTHER
                                THAN THE A.E. TEST LINE ARE ACTIVELY TURNING AROUND A BINARY COUNT
                                TEST PATTERN IN NON-AUTO ECHO MODE AND THE A.E. TEST LINE IS TESTED
                                FOR ALL 1'S DATA ONLY.

                                ERRORS:
                                ********

                                1.  ERROR  32  IS CALLED TO REPORT A.E. TEST TIMEOUTS
                                2.  ERROR  31  IS CALLED TO REPORT ALL DATA COMPARE ERRORS

                                SYNC:   M7277   SH4     LOAD BAR LB+HB L        CN2
                                *****

                                DEBUG:
                                ******

                                        REFER TO TEST 47

                                KEY LOGIC:
                                **********

                                        REFER TO TEST 47

                                %
015306  012737  015362  001110          MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
015314  012705  027420                  MOV     #AETAB,R5       ;SET POINTER TO A.E. TEST DATA TABLE
015320  005037  027316                  CLR     LMSK1           ;INIT BIT TEST MASK
015324  000261                          SEC                     ;GENERATER MARKER BIT IN "C"
015326  000401                          BR      12$             ;GO SHIFT MASK
015330  000241                  1$:     CLC                     ;INIT THE "C" BIT
015332  006137  027316          12$:    ROL     LMSK1           ;SHIFT TEST BIT
015336  001410                          BEQ     11$             ;BR IF TESTED ALL LINES
015340  012537  001220                  MOV     (R5)+,$TMP7     ;GET THE A.E. TEST DATA FOR THIS LINE
015344  033737  027316  027312          BIT     LMSK1,LINSEL    ;TEST THIS LINE ?
015352  001766                          BEQ     1$              ;BR IF NOT
015354  004737  024544                  JSR     PC,SELINE       ;GO SELECT A LINE
015360                  11$:
015360  000575                          BR      TST51           ;;BR IF DONE ALL SELECTED LINES

015362  013701  027302          2$:     MOV     DHADR,R1        ;RESET DEVADR IN CASE OF ERROR LOOP
015366  012711  004000                  MOV     #BIT11,(R1)     ;CLEAR OUT THE DH11
015372  004737  027040                  JSR     PC,SETALL       ;GO SET UP FOR BINARY COUNT XFER ON
                                                                ;ALL LINES OTHER THAN THE SELECTED ONE
015376  153711  030322                  BISB    LINE,(R1)       ;SELECT THE LINE FOR A.E. TEST
015402  010561  000006                  MOV     R5,CAR(R1)      ;SET BUS ADDR TO XMIT TEST CHAR
015406  162761  000002  000006          SUB     #2,CAR(R1)      ;CORRECT THE ADDRESS
015414  012761  177777  000010          MOV     #-1,BCR(R1)     ;XMIT ONE CHAR ON THIS LINE
```

```
 6854  015422  012761  133503  000004          MOV     #133503,LPR(R1) ;DO IT AT 9600 BAUD/8 BITS
 6855  015430  113737  001102  001206          MOVB    $TSTNM,$TMP2    ;SAVE THE TEST NO.
 6856  015436  042737  177400  001206          BIC     #177400,$TMP2
 6857  015444  043737  027314  027560          BIC     LINMSK,LINACT   ;MAKE THIS LINE APPEAR INACTIVE
 6858  015452  013761  027312  000012          MOV     LINSEL,BAR(R1)  ;ACTIVATE ALL SELECTED TRANSMITTERS
 6859
 6860  015460  012737  000002  030350  21$:    MOV     #2,TIMEA        ;INIT TIMER A
 6861  015466  005037  030352                  CLR     TIMEB           ;INIT TIMER B
 6862  015472  016103  000002          3$:     MOV     NRC(R1),R3      ;GET THE WAS DATA
 6863  015476  100414                          BMI     4$              ;BR IF YES
 6864  015500  004737  027016                  JSR     PC,TIMEIT       ;CALL THE TIMER
 6865  015504  000772                          BR      3$              ;TIMER ROUTINE WILL MOVE RETURN PC
 6866                                                                  ;AROUND THIS BRANCH IF TIME OUT OCCURS
 6867
 6868  015506  016137  000004  001202          MOV     LPR(R1),$TMP0   ;SAVE THE CURRENT "LPR"
 6869  015514  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
 6870  015520  030322                          LINE
 6871  015522  032765                          EM32+35
 6872  015524  104032                          ERROR   32              ;AUTO ECHO TIMEOUT
 6873  015526  000700                          BR      1$              ;GO TRY NEXT LINE
 6874
 6875  015530  010304                  4$:     MOV     R3,R4           ;EXTRACT LINE NUMBER OF RCVD CHAR
 6876  015532  000304                          SWAB    R4
 6877  015534  042704  177760                  BIC     #177760,R4
 6878  015540  010402                          MOV     R4,R2           ;SAVE IT IN R2
 6879  015542  006302                          ASL     R2              ;GENERATE TABLE INDEX IN R2
 6880  015544  123704  030322                  CMPB    LINE,R4         ;IS THIS THE A.E. TEST LINE ??
 6881  015550  001432                          BEQ     5$              ;BRANCH IF YES.
 6882  015552  036237  030246  027312          BIT     $LNSEL(R2),LINSEL
 6883  015560  001737                          BEQ     21$
 6884
 6885  015562  026203  036312                  CMP     RBUF(R2),R3     ;RECVD DATA CORRECT ??
 6886  015566  001447                          BEQ     6$              ;BR IF IT WAS
 6887
 6888  015570  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
 6889  015574  010437  001214                  MOV     R4,$TMP5        ;SAVE THE LINE NUMBER
 6890  015600  016204  036312                  MOV     RBUF(R2),R4     ;SET UP S/B DATA
 6891  015604  062702  036312                  ADD     #RBUF,R2        ;SET UP S/B ADDRESS
 6892  015610  012701  177703                  MOV     #177703,R1      ;SET UP THE WAS ADDRESS
 6893  015614  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 6894  015620  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
 6895  015624  001214                          $TMP5
 6896  015626  032630                          EM31+45
 6897  015630  104031                          ERROR   31              ;NON-ECHO DATA COMPARE ERROR
 6898  015632  000137  015330                  JMP     1$              ;GO TRY NEXT LINE
 6899
 6900
 6901  015636  020337  001220          5$:     CMP     R3,$TMP7        ;CHAR ECHOED OK ??
 6902  015642  001427                          BEQ     7$              ;BR IF YES
 6903
 6904  015644  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
 6905  015650  012702  001220                  MOV     #$TMP7,R2       ;SAVE THE S/B ADDRESS
 6906  015654  013704  001220                  MOV     $TMP7,R4        ;SAVE THE S/B DATA
 6907  015660  012701  177703                  MOV     #177703,R1      ;SAVE THE WAS ADDRESS
 6908  015664  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 6909  015670  004537  024636                  JSR     R5,SUNUM        ;GO SET UP LINE NO. IN MESSAGE
```

```
 6910  015674  030322                          LINE
 6911  015676  032630                          EM31+45
 6912  015700  104031                          ERROR   31              ;AUTO ECHO LINE DATA ERROR
 6913  015702  000137  015330                  JMP     1$              ;GO TRY NEXT LINE
 6914
 6915  015706  105262  036312          6$:     INCB    RBUF(R2)        ;GENERATE NEXT EXPECTED DATA ON THIS LINE
 6916  015712  001262                          BNE     21$             ;BR IF ITS NOT BACK TO 000
 6917  015714  046237  027520  027560          BIC     LINBIT(R2),LINACT       ;INDICATE THIOS LINE DONE 256 BYTES
 6918  015722  005737  027560          7$:     TST     LINACT          ;ALL LINES INACTIVE
 6919  015726  001254                          BNE     21$             ;BR IF NOT
 6920  015730  042761  100000  000004          BIC     #BIT15,LPR(R1)  ;TURN OFF THE A.E. BIT
 6921  015736  105761  000017                  TSTB    SSR+1(R1)       ;SILO EMPTY ??
 6922  015742  001002                          BNE     8$              ;BR IF NOT
 6923  015744  000137  015330                  JMP     1$              ;GO TEST NEXT LINE
 6924  015750  000137  015460          8$:     JMP     21$             ;GO EMPTY IT
```

```
                                ;;*****************************************************************
                                ;*TEST 51       AUTO ECHO TEST 3 - ALL SELECTED LINES
                                ;;*****************************************************************
015754  000004                TST51:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST IS IDENTICAL TO TEST 47 EXCEPT ALL SELECTED LINES
                                ARE ACTIVATED CONCURRENTLY RATHER THAN ONE AT A TIME AND ONLY
                                THE ALL 1'S DATA IS USED.

                                ERRORS:
                                *******

                                1.  ERROR  36  IS CALLED TO REPORT ''DATA AVAIL'' TIMEOUTS
                                2.  ERROR  31  IS CALLED TO REPORT A.E. DATA ERRORS

                                SYNC:   M7277   SH4 LOAD BAR LB+HB L    CN2
                                *****

                                DEBUG:
                                ******

                                        REFER TO TEST 47

                                KEY LOGIC:
                                **********

                                        REFER TO TEST 47

                                %
015756  012737  015764  001110          MOV     #1$,$LPERR      ;SET UP THE ERROR LOOP RETURN
015764  012711  004000          1$:     MOV     #BIT11,(R1)     ;CLEAR OUT THE DH11
015770  012705  000020                  MOV     #20,R5          ;INIT COUNTER TO SET UP 16. LINES
015774  012702  027420                  MOV     #AETAB,R2       ;SET UP POINTER TO AUTO ECXHO TEST DATA
016000  012703  036252                  MOV     #RCNT,R3        ;R3 POINTS TO TABLE OF CHAR COUNTERS
016004  010261  000006          2$:     MOV     R2,CAR(R1)      ;SET UP BUS ADDRESS REG
016010  012761  177777  000010          MOV     #-1,BCR(R1)     ;SET UP BYTE COUNT REG
016016  012761  131403  000004          MOV     #131403,LPR(R1) ;SET UP LINE PARAMETERS
016024  005023                          CLR     (R3)+           ;CLEAR A COUNTER
016026  062702  000002                  ADD     #2,R2           ;UPDATE POINTERS
016032  005211                          INC     (R1)            ;SELECT NEXT LINE
016034  005305                          DEC     R5              ;COUNT ONE DONE
016036  001362                          BNE     2$              ;BR TILL 16. DONE
016040  113737  001102  001206          MOVB    $TSTNM,$TMP2    ;SAVE THE TEST NO.
016046  042737  177400  001206          BIC     #177400,$TMP2
016054  013737  027312  027560          MOV     LINSEL,LINACT   ;SET FLAG TO INDICATE ALL 16. ACTIVE
016062  013761  027312  000012          MOV     LINSEL,BAR(R1)  ;ACTIVATE ALL XMITTERS

016070  012737  000002  030350          MOV     #2,TIMEA        ;INIT TIMER A
016076  005037  030352                  CLR     TIMEB           ;INIT TIMERB
016102  005037  001212          3$:     CLR     $TMP4
016106  105711                          TSTB    (R1)            ;CHAR AVAIL SET YET ?
016110  100410                          BMI     4$              ;BR IF YES
016112  004737  027016                  JSR     PC,TIMEIT       ;CALL THE TIMER
```

```
 6981  016116  000771                          BR      3$              ;TIMER ROUTINE WILL MOVE RETURN PC
 6982                                                                  ;AROUND THIS BRANCH IF TIME OUT OCCURS
 6983
 6984  016120  016137  000004  001202          MOV     LPR(R1),$TMP0   ;SAVE THE "LPR" REG
 6985  016126  104036                          ERROR   36              ;DATA AVAILABLE TIMEOUT
 6986  016130  000467                          BR      TST52           ;;EXIT TEST ON ERROR
 6987
 6988  016132  016103  000002          4$:     MOV     NRC(R1),R3      ;GET THE WAS DATA
 6989  016136  010302                          MOV     R3,R2           ;BUILD AND SAVE LINE NO.
 6990  016140  000302                          SWAB    R2
 6991  016142  042702  177760                  BIC     #177760,R2
 6992  016146  010237  001216                  MOV     R2,$TMP6        ;SAVE THE LINE NO.
 6993  016152  006302                          ASL     R2              ;GENERATE TABLE OFFSET
 6994  016154  005237  001212                  INC     $TMP4
 6995  016160  022737  000101  001212          CMP     #101,$TMP4
 6996  016166  001745                          BEQ     3$
 6997  016170  036237  030246  027312          BIT     $LNSEL(R2),LINSEL  ;IS THIS ONE OF THE SELECTED LINES?
 6998  016176  001002                          BNE     41$             ;IF SO,GO ANALYZE THE CHARACTER
 6999  016200  104000                          ERROR                   ;INDICATE SOME KIND OF  ERROR
 7000  016202  000753                          BR      4$              ;GO GET THE NEXT CHARACTER
 7001  016204  005262  036252          41$:    INC     RCNT(R2)        ;COUNT THE CHARACTER
 7002  016210  020362  027420                  CMP     R3,AETAB(R2)    ;IS THE DATA CORRECT ??
 7003  016214  001420                          BEQ     5$              ;BR IF YES
 7004
 7005  016216  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
 7006  016222  016204  027420                  MOV     AETAB(R2),R4    ;GET THE S/B DATA
 7007  016226  062702  027420                  ADD     #AETAB,R2       ;GENERATE S/B ADDRESS
 7008  016232  062701  000002                  ADD     #NRC,R1         ;GENERATE THE WAS ADDRESS
 7009  016236  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
 7010  016242  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
 7011  016246  001216                          $TMP6
 7012  016250  032630                          EM31+45
 7013  016252  104031                          ERROR   31              ;DATA COMPARE ERROR
 7014  016254  000415                          BR      TST52           ;;EXIT TEST ON ERROR
 7015
 7016  016256  022762  000100  036252  5$:     CMP     #100,RCNT(R2)   ;DONE 64. CHARS ON THIS LINE ?
 7017  016264  001306                          BNE     3$              ;BR IF NOT
 7018  016266  013711  001216                  MOV     $TMP6,(R1)      ;SELECT LINE IN SCR REG
 7019  016272  042761  100000  000004          BIC     #BIT15,LPR(R1)  ;TURN OFF A.E. BIT
 7020  016300  046237  027520  027560          BIC     LINBIT(R2),LINACT       ;ALL LINES INACTIVE ??
 7021  016306  001275                          BNE     3$              ;BR IF NOT
```

```
                                ;;*****************************************************************
                                ;*TEST 52       BREAK BIT TEST - ALL SELECTED LINES
                                ;;*****************************************************************
016310  000004                  TST52:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                **************

                                        THIS TEST VERIFIES THAT THE "BREAK" FEATURE WORKS PROPERLY
                                FOR ALL SELECTED LINES. THE TEST SEQUENCE IS AS FOLLOWS:

                                        1. SET UP THE ERROR LOOP RETURN
                                        2. RETRIEVE THE CORRECT S/B DATA FROM THE "BREAK" DATA
                                           TABLE AND UPDATE THE POINTER.
                                        3. GO SELECT A LINE TO TEST - GO TO THE NEXT TEST IF DONE ALL
                                           SELECTED LINES
                                        4. RESET THE DH11 AND CLEAR THE "CAR" AND "BCR" MEMORIES.
                                        5. PRIME SELECTED LINE TO OUTPUT TWO "NULL" CHARS TO CLEAR UART
                                        6. ACTIVATE THE SELECTED LINE
                                        7. WAIT FOR SILO TO RECEIVE TWO NULLS - IF TIMEOUT REPORT ERROR
                                           AND RESTART AT STEP 2
                                        8. IF NO TIMEOUT CLEAR THE SELECTED DH11 AND RESELECT LINE NO.
                                        9. PRIME SELECTED LINE TO OUT PUT 256. CHARS.
                                        10.SET THE SELECTED LINE'S BREAK BIT
                                        11.ACTIVATE THE SELECTED LINE
                                        12.WAIT FOR "BAR" REG TO CLEAR -F TIMEOUT REPORT ERROR AND
                                           RESTART AT STEP 2
                                        13.IF NO TIMEOUT VERIFY THAT THE SILO RECEIVED ONLY ONE CHAR-
                                           IF NOT REPORT ERROR AND RESTART AT STEP 2
                                        14.IF SILO RECEIVED ONLY ONE CHAR VERIFY THAT IT WAS A "BREAK"
                                           CHAR - IF NOT REPORT ERROR - AND RESTART AT STEP 2

                                ERRORS:
                                ********

                                1.  ERROR  25  IS CALLED TO REPORT ALL ERRORS

                                SYNC:   M7277   SH4     LOAD BCR H      FU1
                                *****

                                DEBUG:
                                *******

                                1. IF ALL LINES FAILED SUSPECT THAT THE M7277 IS NOT GENERATING THE
                                   BREAK CONTROL REG LOAD SIGNAL.

                                2. IF ONLY ONE LINE FAILS SUSPECT THE BREAK CONTROL LOGIC ON THE M7278

                                KEY SIGNALS:
                                ************

                                        M7277   SH4     LOAD BCR H      FU1

                                        M7278   SH5 THRU SH8

                                                        74175 REGISTER CHIPS E51, E38, E67, E60
```

```
7078                                                    7400 DRIVERS    E45, E46, E75, E76
7079
7080                                    %
7081  016312  012737  016372  001110            MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
7082  016320  012705  027622                    MOV     #BRKTAB,R5      ;SET UP POINTER TO BREAK DATA TABLE
7083  016324  005037  027316                    CLR     LMSK1           ;INIT BIT TEST MASK
7084  016330  000261                            SEC                     ;SET BIT MARKER IN "C"
7085  016332  000401                            BR      12$             ;GO SHIFT MASK
7086  016334  000241                    1$:     CLC                     ;INIT THE "C" BIT
7087  016336  006137  027316            12$:    ROL     LMSK1           ;SHIFT TEST MARKER
7088  016342  001411                            BEQ     11$             ;BR IF ALL LINES DONE
7089  016344  012504                            MOV     (R5)+,R4        ;GET TEST DATA FOR THIS LINE
7090  016346  033737  027316  027312            BIT     LMSK1,LINSEL    ;LINE SELECTED ?
7091  016354  001767                            BEQ     1$              ;BR IF NOT
7092  016356  004737  024544                    JSR     PC,SELINE       ;GO SELECT A LINE TO TEST
7093  016362  000401                            BR      11$             ;;BR IF DONE ALL SELECTED LINES
7094  016364  000402                            BR      2$              ;GO TEST THE SELECTED LINE
7095  016366  000137  017046            11$:    JMP     9$              ;GO EXIT TEST
7096  016372  012711  004000            2$:     MOV     #BIT11,(R1)     ;CLEAR THE DH11
7097  016376  004737  024716                    JSR     PC,CLCABC       ;GO CLR THE "CAR" AND "BCR" MEMORIES
7098  016402  113711  030322                    MOVB    LINE,(R1)       ;SELECT THE LINE
7099
7100  016406  012761  030356  000006            MOV     #TNULL,CAR(R1)  ;SET UP TO OUTPUT TWO NULL CHARS
7101  016414  012761  177776  000010            MOV     #-2,BCR(R1)     ;SET BYTE COUNT TO 2
7102  016422  012761  033503  000004            MOV     #33503,LPR(R1)  ;SET UP LINE PARAMETERS
7103  016430  013761  027314  000012            MOV     LINMSK,BAR(R1)  ;ACTIVATE SELECTED LINE
7104
7105  016436  012737  000001  030350            MOV     #1,TIMEA        ;INIT TIMER A
7106  016444  005037  030352                    CLR     TIMEB           ;INIT TIMER B
7107  016450  122761  000002  000017    3$:     CMPB    #2,SSR+1(R1)    ;TWO CHARS RECEIVED ??
7108  016456  001432                            BEQ     4$              ;BR IF YES
7109  016460  004737  027016                    JSR     PC,TIMEIT       ;CALL THE TIMER
7110  016464  000771                            BR      3$              ;TIMER ROUTINE WILL MOVE RETURN PC
7111                                                                    ;AROUND THIS BRANCH IF TIME OUT OCCURS
7112
7113  016466  004737  027200                    JSR     PC,SAPS         ;SAVE THE ERROR PSW
7114  016472  010437  001204                    MOV     R4,$TMP1        ;SAVE S/B DATA
7115  016476  010102                            MOV     R1,R2           ;SET UP REGADR
7116  016500  062702  000016                    ADD     #SSR,R2
7117  016504  011203                            MOV     (R2),R3         ;GET THE WAS DATA
7118  016506  042703  100377                    BIC     #100377,R3      ;CLEAR JUNK
7119  016512  012704  000002                    MOV     #2,R4           ;SET UP S/B DATA
7120  016516  000304                            SWAB    R4
7121  016520  004737  024416                    JSR     PC,SUER2A       ;GO SET UP ERROR INFO
7122  016524  004537  024636                    JSR     R5,SUNUM        ;GO PUT LINE NO. IN MESSAGE
7123  016530  030322                            LINE
7124  016532  032333                            EM25+34
7125  016534  013704  001204                    MOV     $TMP1,R4        ;RESTORE S/B DATA
7126  016540  104025                            ERROR   25              ;TIMED OUT WAITING FOR TWO NULLS
7127  016542  000674                            BR      1$              ;GO TRY NEXT LINE
7128
7129  016544  012711  004000            4$:     MOV     #BIT11,(R1)     ;CLEAR THE INTERFACE
7130  016550  113711  030322                    MOVB    LINE,(R1)       ;SELECT THE LINE
7131  016554  012761  037312  000006            MOV     #TBUF,CAR(R1)   ;SET UP BUS ADDRESS REG FOR XMITTR
7132  016562  012761  177400  000010            MOV     #-400,BCR(R1)   ;SET BYTE COUNT TO XMIT 256(10) CHARS
7133  016570  012761  033503  000004            MOV     #33503,LPR(R1)  ;SET UP LINE PARAMETERS
```

```
7134  016576  013761  027314  000014          MOV     LINMSK,BKR(R1)  ;SET BREAK BIT FOR ACTIVE LINE
7135  016604  013761  027314  000012          MOV     LINMSK,BAR(R1)  ;ACTIVATE THE SELECTED LINE
7136
7137  016612  012737  000005  030350          MOV     #5,TIMEA        ;INIT TIMER A
7138  016620  005037  030352                  CLR     TIMEB           ;INIT TIMER B
7139  016624  005761  000012          5$:     TST     BAR(R1)         ;BAR BIT CLEARED ??
7140  016630  001426                          BEQ     6$              ;BR IFD YES
7141  016632  004737  027016                  JSR     PC,TIMEIT       ;CALL THE TIMER
7142  016636  000772                          BR      5$              ;TIMER ROUTINE WILL MOVE RETURN PC
7143                                                                  ;AROUND THIS BRANCH IF TIME OUT OCCURS
7144
7145  016640  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
7146  016644  010437  001204                  MOV     R4,$TMP1        ;SAVE THE S/B DATA
7147  016650  010102                          MOV     R1,R2           ;SET UP REGADR
7148  016652  062702  000012                  ADD     #BAR,R2
7149  016656  011203                          MOV     (R2),R3         ;GET THE WAS DATA
7150  016660  005004                          CLR     R4              ;SET UP S/B DATA
7151  016662  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
7152  016666  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO IN MESSAGE
7153  016672  030322                          LINE
7154  016674  032333                          EM25+34
7155  016676  013704  001204                  MOV     $TMP1,R4        ;RESTORE THE S/B DATA
7156  016702  104025                          ERROR   25              ;BAR BIT FAILED TO CLEAR
7157  016704  000613                          BR      1$              ;GO TRY NEXT LINE
7158
7159  016706  122761  000001  000017  6$:     CMPB    #1,SSR+1(R1)    ;ONE CHAR RECEIVED ?
7160  016714  001430                          BEQ     7$              ;BR IF YES
7161
7162  016716  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
7163  016722  010437  001204                  MOV     R4,$TMP1        ;SAVE THE S/B DATA
7164  016726  010102                          MOV     R1,R2           ;SET UP REGADR
7165  016730  062702  000016                  ADD     #SSR,R2
7166  016734  011203                          MOV     (R2),R3         ;GET THE WAS DATA
7167  016736  042703  100377                  BIC     #100377,R3      ;CLEAR JUNK
7168  016742  012704  000001                  MOV     #1,R4           ;SET UP S/B DATA
7169  016746  000304                          SWAB    R4
7170  016750  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
7171  016754  004537  024636                  JSR     R5,SUNUM        ;GO PUT LINE NO. IN MESSAGE
7172  016760  030322                          LINE
7173  016762  032333                          EM25+34
7174  016764  013704  001204                  MOV     $TMP1,R4        ;RESTORE THE S/B DATA
7175  016770  104025                          ERROR   25              ;FAILED TO RECEIVE THE ONE CHAR
7176  016772  000137  016334                  JMP     1$              ;GO TRY NEXT LINE
7177
7178
7179  016776  016103  000002          7$:     MOV     NRC(R1),R3      ;GET THE WAS DATA
7180  017002  020304                          CMP     R3,R4           ;WAS IT A BREAK CHAR ?
7181  017004  001002                          BNE     8$              ;BR IF NOT CORRECT
7182  017006  000137  016334                  JMP     1$              ;GO TEST NEXT LINE
7183
7184  017012  004737  027200          8$:     JSR     PC,SAPS         ;SAVE THE ERROR PSW
7185  017016  010102                          MOV     R1,R2           ;SET UP REGADR
7186  017020  062702  000002                  ADD     #NRC,R2
7187  017024  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
7188  017030  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO IN MESSAGE
7189  017034  030322                          LINE
```

```
 7190  017036  032333                        EM25+34
 7191  017040  104025                        ERROR   25              ;INCORRECT DATA RECEIVED
 7192  017042  000137  016334                JMP     1$              ;GO TRY NEXT LINE
 7193  017046  000240                9$:     NOP                     ;EXIT THIS TEST
 7194
```

```
                                ;;*****************************************************************
                                ;*TEST 53       HALF DUPLEX TEST - ALL SELECTED LINES
                                ;;*****************************************************************
017050  000004                  TST53:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                *************

                                        THIS TEST VERIFIES THAT THE RECEIVERS ON ALL SELECTED LINES ARE
                                "BLINDED" WHEN THE HALF-DUPLEX MODE IS ENABLED. THE TEST
                                SEQUENCE IS AS FOLLOWS:

                                        1. SET UP THE ERROR LOOP RETURN
                                        2. GO SELECT A LINE NO. TO TEST
                                        3. IF DONE ALL SELECTED LINES - GO TO THE NEXT TEST
                                        4. RESET THE DH11 AND CLEAR THE "CAR" AND "BCR" MEMORIES
                                        5. PRIME THE SELECTED DH11 TO XMIT 256. CHARS IN HALF-
                                           DUPLEX MODE.
                                        6. ACTIVATE THE SELECTED LINE AND WAIT FOR THE "BAR" REG TO CLEAR
                                        7. IF TIMEOUT - REPORT ERROR AND GO TO STEP 2
                                        8. IF NO TIMEOUT VERIFY THE "CHAR AVAIL" DID NOT SET (RECEIVER
                                           BLINDED) - IF ERROR REPORT IT AND GO TO STEP2 - IF NO ERROR
                                            GO TO STEP 2

                                ERRORS:
                                *******

                                1.  ERROR  26  IS CALLED TO REPORT ALL ERRORS

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1. SUSPECT EITHER THE M7289 OR THE M7288 MODULES

                                KEY LOGIC:
                                ************

                                        M7289   SH5     HALF DUPLEX <15:00> H SIGNALS
                                                        END OF CHAR <15:00> SIGNALS

                                        M7288   SH5     HALF DUPLEX <03:00> H SIGNALS
                                                SH7      ''      ''   <07:00> H SIGNALS
                                                SH9      ''      ''   <11:08> H SIGNALS
                                                SH11     ''      ''   <15:12> H SIGNALS

                                .               %
017052  012737  017066  001110                MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
017060  004737  024544          1$:           JSR     PC,SELINE
017064  000477                                BR      TST54           ;;BR IF ALL LINES TESTED
017066  012711  004000          2$:           MOV     #BIT11,(R1)     ;CLEAR THE INTERFACE
017072  004737  024716                        JSR     PC,CLCABC       ;GO CLR THE "CAR" AND "BCR" MEMORIES
017076  153711  030322                        BISB    LINE,(R1)       ;SELECT THE LINE
017102  012761  037312  000006                MOV     #TBUF,CAR(R1)   ;POINT TO XMIT BUFFER
```

```
 7251  017110  012761  177400  000010          MOV     #-400,BCR(R1)   ;XMIT 256(10) CHARS
 7252  017116  012761  073503  000004          MOV     #73503,LPR(R1)  ;SET UP THE LINE PARAMETERS
 7253  017124  013761  027314  000012          MOV     LINMSK,BAR(R1)  ;ACTIVATE THE SELECTED LINE
 7254
 7255  017132  012737  000001  030350          MOV     #1,TIMEA        ;INIT TIME A
 7256  017140  005037  030352                  CLR     TIMEB           ;INIT TIME B
 7257  017144  005761  000012          3$:     TST     BAR(R1)         ;WAIT FOR XMITTR TO FINISH
 7258  017150  001423                          BEQ     4$              ;BR IF XMITTR FINISHED
 7259  017152  004737  027016                  JSR     PC,TIMEIT       ;CALL TIMER
 7260  017156  000772                          BR      3$              ;TIMER WILL MOVE RETURN PC AROUND
 7261                                                                  ;THIS BRANCH IF TIMEOUT OCCURS
 7262
 7263  017160  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
 7264  017164  016103  000012                  MOV     BAR(R1),R3      ;GET THE WAS DATA
 7265  017170  010102                          MOV     R1,R2           ;SET UP REGADR
 7266  017172  062702  000012                  ADD     #BAR,R2
 7267  017176  005004                          CLR     R4              ;SET UP NEW S/B DATA
 7268  017200  004737  024416                  JSR     PC,SUER2A       ;GO SET UP THE ERROR INFO
 7269  017204  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE
 7270  017210  030322                          LINE
 7271  017212  032376                          EM26+37
 7272  017214  104026                          ERROR   26              ;BAR BIT FAILED TO CLEAR ON TIME
 7273  017216  000720                          BR      1$              ;GO TRY NEXT LINE
 7274
 7275  017220  105711                  4$:     TSTB    (R1)            ;CHAR AVAIL SET ??
 7276  017222  100316                          BPL     1$              ;BR IF NOT IT SHOULDN'T BE
 7277
 7278  017224  004737  027200                  JSR     PC,SAPS         ;SAVE THE ERROR PSW
 7279  017230  010102                          MOV     R1,R2           ;SET UP REGADR
 7280  017232  011103                          MOV     (R1),R3         ;GET WAS DATA
 7281  017234  042703  100000                  BIC     #BIT15,R3       ;CLEAR JUNK BIT
 7282  017240  113704  030322                  MOVB    LINE,R4         ;SET UP S/B DATA
 7283  017244  004737  024416                  JSR     PC,SUER2A       ;GO SETUP ERROR INFO
 7284  017250  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO. IN MSG
 7285  017254  030322                          LINE
 7286  017256  032376                          EM26+37
 7287  017260  104026                          ERROR   26              ;HALF DUPLEX FAILED TO BLIND RECVR
 7288  017262  000676                          BR      1$              ;GO SELECT NEXT LINE
```

```
                                ;;*****************************************************************
                                ;*TEST 54       VERIFY THAT OVERRUN CAN SET PROPERLY - ALL SELECTED LINES
                                ;;*****************************************************************
017264  000004                  TST54:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST VERIFIES THAT "OVERRUN" SETS PROPERLY FOR ALL LINES
                                THAT ARE SELECTED FOR TEST WHEN THE OVERRUN CONDITION IS FORCED BY THE
                                PROGRAM. THE TEST SEQUENCE IS AS FOLLOWS:

                                        1. SET UP THE ERROR LOOP RETURN
                                        2. SELECT A LINE NO. TO TEST - IF DONE ALL LINES GO TO
                                           THE NEXT TEST.
                                        3. PRIME THE SELECTED LINE TO XMIT 68. CHARS
                                        4. ACTIVATE THE SELECTED LINE
                                        5. WAIT FOR "XMIT DONE" TO SET - IF TIMEOUT REPORT ERROR
                                           AND RESTART AT STEP 2
                                        6. IF NO TIMEOUT READ 65. CHARS FROM THE SILO AND VERIFY THAT
                                           "OVERRUN" IS SET ON THE LAST WORD READ
                                        7. IF NOT REPORT ERROR AND RESTART AT STEP 2

                                ERRORS:
                                ********

                                1.  ERROR  50  IS CALLED TO REPORT "XMIT DONE " TIMEOUTS
                                2.  ERROR  56  IS CALLEDT TO REPORT "OVERRUN" ERROR

                                SYNC:   M7277   SH3     INIT A H        EF2
                                *****

                                DEBUG:
                                ******

                                1. I  FAULT APPEARS ON ONLY ONE LINE SUSPECT UART MODULE
                                   FOR THE APPROPRIATE LINE IN QUESTION.

                                2. IF FAULT APPEARS ON ALL LINES SUSPECT THE M7279 MODULE

                                KEY LOGIC:
                                ***********

                                        M7279   SH1     MASTER OR H     E12-9
                                                SH2     MEMORY CHIP (3341) E13-11

                                        M7280   SH2     UC1 OR 2 MASTER OR      EN2
                                                SH2-5   UART PIN 15 (BUF OR LINE NN)

                                %

017266  012737  017302  001110        MOV     #2$,$LPERR      ;SET UP ERROR LOOP RETURN
017274  004737  024544        1$:     JSR     PC,SELINE       ;GO SELECT A LINE # TO TEST
017300  000512                        BR      TST55           ;;BR IF DONE ALL SELECTED LINES
017302  012711  004000        2$:     MOV     #BIT11,(R1)     ;CLEAR OUT THE DH11
017306  113711  030322                MOVB    LINE,(R1)       ;SELECT THE LINE TO TEST
```

```
7345  017312  012761  037312  000006          MOV     #TBUF,CAR(R1)   ;SET UP CURRENT ADDRESS
7346  017320  012761  177674  000010          MOV     #-68.,BCR(R1)   ;SET UP BYTE COUNT REG
7347  017326  012761  033503  000004          MOV     #33503,LPR(R1)  ;DO IT AT 9600 BAUD - 8 BITS
7348  017334  013761  027314  000012          MOV     LINMSK,BAR(R1)  ;ACTIVATE THE SELECTED LINE
7349
7350  017342  012737  000001  030350          MOV     #1,TIMEA        ;INIT TIMERS A AND B
7351  017350  005037  030352                  CLR     TIMEB
7352  017354  005711                  3$:     TST     (R1)            ;TRANSMITTER DONE ??
7353  017356  100425                          BMI     4$              ;BR IF YES
7354  017360  004737  027016                  JSR     PC,TIMEIT       ;CALL TIMER
7355  017364  000773                          BR      3$              ;BR IF NO TIMEOUT
7356
7357  017366  004737  027200                  JSR     PC,SAPS         ;GO SAVE PSW
7358  017372  011103                          MOV     (R1),R3         ;GET THE WAS DATA
7359  017374  042703  077760                  BIC     #77760,R3       ;CLEAR UNINTERESTING BITS
7360  017400  113704  030322                  MOVB    LINE,R4         ;SET UP S/B DATA
7361  017404  052704  100000                  BIS     #BIT15,R4
7362  017410  010102                          MOV     R1,R2           ;SET UP REGADR
7363  017412  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
7364  017416  004537  024636                  JSR     R5,SUNUM        ;PUT LINE NO. IN MESSAGE HEADER
7365  017422  030322                          LINE
7366  017424  034254                          EM50+53
7367  017426  104050                          ERROR   50              ;REPORT XMIT DONE TIME OUT
7368  017430  000721                          BR      1$              ;GO TRY NEXT LINE
7369
7370  017432  012737  000101  001204  4$:     MOV     #65.,$TMP1      ;SET UP TO READ 65. WORDS FROM SILO
7371  017440  113704  030322                  MOVB    LINE,R4         ;SET UP S/B DATA
7372  017444  000304                          SWAB    R4
7373  017446  152704  000101                  BISB    #65.,R4
7374  017452  052704  140000                  BIS     #BIT15+BIT14,R4 ;PUT IN OVERRUN AND VALID DATA BITS
7375  017456  016103  000002          5$:     MOV     NRC(R1),R3      ;GET WAS DATA FROM SILO
7376  017462  005337  001204                  DEC     $TMP1           ;COUNT ONE WORD READ
7377  017466  001373                          BNE     5$              ;BR TIL 65. READ
7378  017470  020304                          CMP     R3,R4           ;WAS DATA AND OVERRUN CORRECT ??
7379  017472  001700                          BEQ     1$              ;BR IF YES TRY NEXT SELECTED LINE
7380
7381  017474  004737  027200                  JSR     PC,SAPS         ;GO SAVE PSW
7382  017500  010102                          MOV     R1,R2           ;SET UP REGADR
7383  017502  062702  000002                  ADD     #NRC,R2
7384  017506  004737  024416                  JSR     PC,SUER2A       ;GO SET UP ERROR INFO
7385  017512  004537  024636                  JSR     R5,SUNUM        ;GO PUT LINE NO. IN MSG HDR
7386  017516  030322                          LINE
7387  017520  034672                          EM56+42
7388  017522  104056                          ERROR   56              ;OVERRUN OR DATA INCORRECT
7389  017524  000663                          BR      1$              ;GO TEST NEXT SELECTED LINE
7390
```

```
                                ;;*****************************************************************
                                ;*TEST 55       ABBREVIATED MODEM CONTROL DIAGNOSTIC
                                ;;*****************************************************************
017526  000004                  TST55:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THE FOLLOWING 4 TESTS ARE EXTRACTED FROM DZDHK DIAGNOSTIC
                                AND ARE INSERTED HERE SO THAT ALL LEVEL CONVERTERS AND CABLES CAN
                                BE CHECKED WITH JUST ONE PROGRAM (RATHER THAN TWO) USING THE H315
                                TURNAROUND CONNECTOR.

                                        THIS TEST VERIFIES THAT THE LINE ENABLE FUNCTION FLIP-FLOP
                                CAN BE SET AND CLEARED FOR THE SELECTED LINE.

                                ERRORS
                                ******

                                        IF ANY ERRORS OCCUR IN THE FOLLOWING TESTS, THEN DZDHK,
                                THE  MODEM CONTROL DIAGNOSTIC SHOULD BE RUN IN
                                ITS ENTIRETY FOR A MORE COMPLETE MODEM CONTROL CHECKOUT.


                                %

017530  032777  002000  161402          BIT     #BIT10,@SWR             ;CHECK MODEM CONTROL?
017536  001402                        BEQ     2$                      ;BRANCH IF YES.
017540  000137  020576                JMP     ENDA                    ;OTHERWISE, GET OUT.
017544  012700  030144          2$:   MOV     #DMADRS,R0              ;R0 POINTS TO BEGINNING OF DM ADDRESS TABLE.
017550  013737  030320  001202        MOV     DHNUM,$TMP0
017556  006337  001202                ASL     $TMP0                   ;DOUBLE TMP0
017562  063700  001202                ADD     $TMP0,R0                ;CREATE AN OFFSET.
017566  011037  030310                MOV     (R0),DHMCSR             ;MOVE THE DM ADDRESS INTO DHMCSR.
017572  013737  030310  030312        MOV     DHMCSR,DHMLSR
017600  062737  000002  030312        ADD     #2,DHMLSR               ;SAVE LINE STATUS REGISTER ADDRESS.
017606  005737  030310                TST     DHMCSR                  ;IS THERE A MODEM CONTROL HERE?
017612  001004                        BNE     DOIT11                  ;BRANCH IF YES.
017614  104401                        TYPE
017616  036216                        MSG5                            ;NO MODEM CONTROL FOUND.
017620  000137  020576                JMP     ENDA                    ;GET OUTTA HERE.
017624  004737  024544          DOIT11: JSR     PC,SELINE               ;GO SELECT A LINE.
017630  000473                        BR      TST56           ;;BR IF DONE ALL SELECTED LINES
                                
017632  005077  010452          MUX11:  CLR     @DHMCSR                 ;CLEAR CONTROL STATUS REGISTER
017636  013737  030310  001202        MOV     DHMCSR,$TMP0            ;SAVE DEVICE REGISTER FOR ERROR MESSAGE
017644  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
017652  113701  030322                MOVB    LINE,R1
017656  010137  001206                MOV     R1,$TMP2                ;SAVE LINE NUMBER FOR ERROR MESSAGE
017662  012777  002000  010420  MUX11A: MOV    #CLRMUX,@DHMCSR
017670  012702  000020                MOV     #16.,R2
017674  010177  010410                MOV     R1,@DHMCSR              ;SELECT LINE TO BE TESTED
017700  012777  000001  010404        MOV     #LINENA,@DHMLSR         ;SET LINE ENABLE FUNCTION FLIP-FLOP
017706  005077  010376                CLR     @DHMCSR                 ;THE STEP BIT WILL BE USED TO FIND RIGHT LINE
017712  005005                  MUX11B: CLR     R5
017714  017704  010372                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
```

```
 7447  017720  117703  010364                MOVB    @DHMCSR,R3          ;READ CONTROL STATUS REGISTER
 7448  017724  042703  177760                BIC     #177760,R3          ;CLEAR UNWANTED BITS
 7449  017730  020103                       CMP     R1,R3               ;IF LINE NUMBER=SELECTED LINE NUMBER,
 7450  017732  001002                       BNE     MUX11C              ;EXCEPT LINE ENABLE FUNCTION FLIP FLOP
 7451  017734  012705  000001              MOV     #LINENA,R5
 7452                                                                    ;TO BE SET
 7453  017740  020504              MUX11C: CMP     R5,R4               ;COMPARE EXPECTED AND RECEIVED
 7454  017742  001403                       BEQ     MUX11D              ;RESULTS
 7455  017744  030504                       BIT     R5,R4               ;TEST TO SEE IF THE LINE ENABLE BIT WAS SET
 7456  017746  001001                       BNE     MUX11D              ;IF SO, EVERYTHING IS OK
 7457  017750  104060                       ERROR   60                  ;INDICATE A MODEM CONTROL ERROR
 7458  017752  052777  000400  010330  MUX11D: BIS     #STEP,@DHMCSR       ;EXAMINE NEXT LINE
 7459  017760  005302                       DEC     R2
 7460  017762  001353                       BNE     MUX11B
 7461  017764  005005                       CLR     R5
 7462  017766  010177  010316          MUX11E: MOV     R1,@DHMCSR
 7463  017772  010103                       MOV     R1,R3               ;SET LINE COUNTER TO SELECTED LINE
 7464  017774  005077  010312              CLR     @DHMLSR             ;CLEAR LINE ENABLE FLIP FLOP
 7465  020000  105227  000000              INCB    #0                  ;DELAY FOR CABLE
 7466  020004  001375                       BNE     .-4                 ;DITTO
 7467  020006  017704  010300              MOV     @DHMLSR,R4          ;READ LINE STATUS REGISTER
 7468                                                                    ;WAS LINE ENABLE FUNCTION FLIP FLOP
 7469  020012  001704                       BEQ     DOIT11              ;CLEARED
 7470  020014  104060                       ERROR   60                  ;MODEM CONRTROL ERROR
 7471  020016  000702                       BR      DOIT11              ;DO THE NEXT LINE THAT IS SELECTED
 7472
```

```
                                ;;*******************************************************************
                                ;*TEST 56       MODEM CONTROL DIAGNOSTIC CONTINUED
                                ;;*******************************************************************
020020  000004                  TST56:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST VERIFIES THAT CLEAR TO SEND AND CARRIER ARE SET
                                IF  "LINE ENABLE" AND TERMINAL ARE SET FOR THE SELECTED LINE.

                                ERRORS:
                                ********

                                        IF ANY ERRORS OCCUR, RUN THE  MODEM CONTROL DIAGNOSTIC,
                                 DZDHK.

                                %
020022  005077  010264          DOIT15: CLR     @DHMLSR                 ;CLEAR LINE STATUS REGISTER
020026  004737  024544                  JSR     PC,SELINE               ;GO SELECT A LINE.
020032  000471                          BR      TST57           ;;BR IF DONE ALL SELECTED LINES
020034  005077  010250          MUX15:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
020040  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
020046  113701  030322                MOVB    LINE,R1
020052  012777  002000  010230        MOV     #CLRMUX,@DHMCSR         ;RESET ALL THE LINE STATUS REGISTERS
020060  010137  001206                MOV     R1,$TMP2                ;SAVE LINE NBUMBER FOR ERROR MESSAGE
020064  012702  000020          MUX15A: MOV     #16.,R2                 ;16 LINES
020070  010177  010214                MOV     R1,@DHMCSR              ;SELECT A LINE
020074  012777  000003  010210        MOV     #LINENA+TRMRDY,@DHMLSR  ;SET LINE ENABLE +TRMRDY
020102  005077  010202                CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
020106  005005                  MUX15B: CLR     R5                      ;CLEAR EXPECTED RESULT
020110  017704  010176                MOV     @DHMLSR,R4              ;READ LINE STATUS
020114  117703  010170                MOVB    @DHMCSR,R3              ;READ LINE NUMBER
020120  042703  177760                BIC     #177760,R3              ;CLEAR UNWANTED BITS
020124  020103                        CMP     R1,R3                   ;IF RECEIVED LINE=SELECTED LINE
020126  001002                        BNE     MUX15C                  ;EXPECT LINE ENABLE AND
020130  012705  000143                MOV     #LINENA+TRMRDY+CO+CS,R5
                                                                        ;CLEAR TO SEND AND CARRIER ARE SET
020134  020405                  MUX15C: CMP     R4,R5                   ;COMPARE EXPECTED AND
020136  001401                        BEQ     MUX15D                  ;RECEIVED RESULTS
020140  104060                        ERROR   60                      ;MODEM CONTROL ERROR
020142  052777  000400  010140  MUX15D: BIS     #STEP,@DHMCSR           ;UPDATE LINE COUNTER
020150  005302                        DEC     R2                      ;CONTINUE IF ALL CHECKS
020152  001355                        BNE     MUX15B                  ;ARE NOT DONE FOR THIS LINE
020154  012705  000001                MOV     #LINENA,R5              ;EXPECT LINE ENABLE
020160  010103                  MUX15E: MOV     R1,R3                   ;ON SELECTED LINE
020162  010177  010122                MOV     R1,@DHMCSR              ;SELECT LINE
020166  042777  000002  010116        BIC     #TRMRDY,@DHMLSR         ;CLEAR TERMINAL
020174  105227  000000                INCB    #0                      ;DELAY FOR CABLE
020200  001375                        BNE     .-4                     ;DITTO
020202  017704  010104                MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
020206  020504                        CMP     R5,R4                   ;ONLY LINE ENABLE SHOULD BE
020210  001704                        BEQ     DOIT15                  ;SET ON THIS LINE
020212  104060                        ERROR   60                      ;MODEM COMNTROL ERROR
020214  000702                        BR      DOIT15                  ;GO DO THE NEXT LINE

```

```
7529                                    ;;*****************************************************************
7530                                    ;*TEST 57       MODEM CONTROL DIAGNOSTIC CONTINUED
7531                                    ;;*****************************************************************
7532  020216  000004                    TST57:  SCOPE
7533                                    .REM    %
7534                                    TEST ABSTRACT:
7535                                    ****************
7536
7537                                            THIS TEST VERIFIES THAT RING IS SET IF "LINE ENABLE" AND
7538                                    REQUEST TO SEND ARE SET FOR THE SELECTED LINE.
7539
7540                                    ERRORS:
7541                                    *********
7542
7543                                            IF ANY ERRORS OCCUR, RUN THE  MODEM CONTROL DIAGNOSTIC,
7544                                     DZDHK.
7545
7546                                    %
7547  020220  005077  010066            DOIT16: CLR     @DHMLSR                 ;CLEAR LINE STATUS REGISTER
7548  020224  004737  024544                    JSR     PC,SELINE               ;GO SELECT A LINE.
7549  020230  000466                            BR      TST60           ;;BR IF DONE ALL SELECTED LINES
7550  020232  005077  010052            MUX16:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
7551  020236  042737  000340  177776            BIC     #340,PS                 ;ENABLE INTERRUPTS
7552  020244  113701  030322                    MOVB    LINE,R1
7553  020250  010137  001206                    MOV     R1,$TMP2                ;SAVE LINE NBUMBER FOR ERROR MESSAGE
7554  020254  012702  000020            MUX16A: MOV     #16.,R2                 ;16 LINES
7555  020260  010177  010024                    MOV     R1,@DHMCSR              ;SELECT A LINE
7556  020264  012777  000005  010020            MOV     #LINENA+RS,@DHMLSR      ;SET LINE ENABLE +RS
7557  020272  005077  010012                    CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
7558  020276  005005                    MUX16B: CLR     R5                      ;CLEAR EXPECTED RESULT
7559  020300  017704  010006                    MOV     @DHMLSR,R4              ;READ LINE STATUS
7560  020304  117703  010000                    MOVB    @DHMCSR,R3              ;READ LINE NUMBER
7561  020310  042703  177760                    BIC     #177760,R3              ;CLEAR UNWANTED BITS
7562  020314  020103                            CMP     R1,R3                   ;IF RECEIVED LINE=SELECTED LINE
7563  020316  001002                            BNE     MUX16C                  ;EXPECT LINE ENABLE AND
7564  020320  012705  000205                    MOV     #LINENA+RS+RING,R5
7565                                                                            ;RING IS SET
7566  020324  020405                    MUX16C: CMP     R4,R5                   ;COMPARE EXPECTED AND
7567  020326  001401                            BEQ     MUX16D                  ;RECEIVED RESULTS
7568  020330  104060                            ERROR   60                      ;MODEM CONTROL ERROR
7569  020332  052777  000400  007750    MUX16D: BIS     #STEP,@DHMCSR           ;UPDATE LINE COUNTER
7570  020340  005302                            DEC     R2                      ;CONTINUE IF ALL CHECKS
7571  020342  001355                            BNE     MUX16B                  ;ARE NOT DONE FOR THIS LINE
7572  020344  012705  000001                    MOV     #LINENA,R5              ;EXPECT LINE ENABLE
7573  020350  010103                    MUX16E: MOV     R1,R3                   ;ON SELECTED LINE
7574  020352  010177  007732                    MOV     R1,@DHMCSR              ;SELECT LINE
7575  020356  042777  000004  007726            BIC     #RS,@DHMLSR             ;CLEAR REQUEST TO SEND
7576  020364  105227  000000                    INCB    #0                      ;DELAY FOR CABLE
7577  020370  001375                            BNE     .-4                     ;DITTO
7578  020372  017704  007714                    MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
7579  020376  020504                            CMP     R5,R4                   ;ONLY LINE ENABLE SHOULD BE
7580  020400  001707                            BEQ     DOIT16                  ;SET ON THIS LINE
7581  020402  104060                            ERROR   60                      ;MODEM CONTROL ERROR
7582  020404  000705                            BR      DOIT16                  ;GO DO THE NEXT LINE
7583
```

```
                                ;;*****************************************************************
                                ;*TEST 60       MODEM CONTROL DIAGNOSTIC CONTINUED
                                ;;*****************************************************************
020406  000004                  TST60:  SCOPE
                                .REM    %
                                TEST ABSTRACT:
                                ***************

                                        THIS TEST VERIFIES THAT SECONDARY RECEIVE IS SET IF "LINE
                                ENABLE" AND SECONDARY TRANSMIT ARE SET FOR THE SELECTED LINE.

                                ERRORS:
                                *********

                                        IF ANY ERRORS OCCUR, RUN THE  MODEM CONTROL DIAGNOSTIC,
                                 DZDHK.

                                %
020410  005077  007676          DOIT17: CLR     @DHMLSR                 ;CLEAR LINE STATUS REGISTER.
020414  004737  024544                  JSR     PC,SELINE               ;GO SELECT A LINE.
020420  000466                          BR      ENDA
020422  005077  007662          MUX17:  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
020426  042737  000340  177776        BIC     #340,PS                 ;ENABLE INTERRUPTS
020434  113701  030322                  MOVB    LINE,R1
020440  010137  001206                  MOV     R1,$TMP2                ;SAVE LINE NBUMBER FOR ERROR MESSAGE
020444  012702  000020          MUX17A: MOV     #16.,R2                 ;16 LINES
020450  010177  007634                  MOV     R1,@DHMCSR              ;SELECT A LINE
020454  012777  000011  007630        MOV     #LINENA+SECTX,@DHMLSR   ;SET LINE ENABLE +SECTX
020462  005077  007622                  CLR     @DHMCSR                 ;CLEAR CONTROL REGISTER
020466  005005                  MUX17B: CLR     R5                      ;CLEAR EXPECTED RESULT
020470  017704  007616                  MOV     @DHMLSR,R4              ;READ LINE STATUS
020474  117703  007610                  MOVB    @DHMCSR,R3              ;READ LINE NUMBER
020500  042703  177760                  BIC     #177760,R3              ;CLEAR UNWANTED BITS
020504  020103                          CMP     R1,R3                   ;IF RECEIVED LINE=SELECTED LINE
020506  001002                          BNE     MUX17C                  ;EXPECT LINE ENABLE AND
020510  012705  000031                  MOV     #LINENA+SECTX+SECRX,R5
                                                                        ;SECONDARY RECEIVE IS SET
020514  020405          MUX17C: CMP     R4,R5                   ;COMPARE EXPECTED AND
020516  001401                  BEQ     MUX17D                  ;RECEIVED RESULTS
020520  104060                  ERROR   60                      ;MODEM CONTROL ERROR
020522  052777  000400  007560  MUX17D: BIS     #STEP,@DHMCSR           ;UPDATE LINE COUNTER
020530  005302                  DEC     R2                      ;CONTINUE IF ALL CHECKS
020532  001355                  BNE     MUX17B                  ;ARE NOT DONE FOR THIS LINE
020534  012705  000001                  MOV     #LINENA,R5              ;EXPECT LINE ENABLE
020540  010103          MUX17E: MOV     R1,R3                   ;ON SELECTED LINE
020542  010177  007542                  MOV     R1,@DHMCSR              ;SELECT LINE
020546  042777  000010  007536        BIC     #SECTX,@DHMLSR          ;CLEAR SECONDARY TRANSMIT
020554  105227  000000                  INCB    #0                      ;DELAY FOR CABLE
020560  001375                          BNE     .-4                     ;DITTO
020562  017704  007524                  MOV     @DHMLSR,R4              ;READ LINE STATUS REGISTER
020566  020504                          CMP     R5,R4                   ;ONLY LINE ENABLE SHOULD BE
020570  001707                          BEQ     DOIT17                  ;SET ON THIS LINE
020572  104060                          ERROR   60                      ;MODEM CONTROL ERROR
020574  000705                          BR      DOIT17                  ;GO DO THE NEXT LINE
```

```
 7640  020576  000004                    ENDA:   SCOPE
 7641  020600  012737  000240  020662            MOV     #240,$EOP       ;NOP THE SCOPE AT THE BEGINNING OF EOP
 7642  020606  005237  030320            INC     DHNUM           ;GENERATE NEW DH11 NUMBER
 7643  020612  062737  000002  030326    ADD     #2,ADPTR        ;UPDATE THE TABLE POINTERS
 7644  020620  062737  000002  030330    ADD     #2,VCPTR
 7645  020626  062737  000002  030332    ADD     #2,BRPTR
 7646  020634  006337  027306            ASL     SELMSK          ;SHIFT MARKER TO TEST NEXT DH11
 7647  020640  001410                    BEQ     $EOP            ;BR IF TESTED ALL SELECTED DH11'S
 7648  020642  033737  027306  027310    BIT     SELMSK,DHSEL    ;IS THIS DH11 SELECTED ?
 7649  020650  001752                    BEQ     ENDA            ;BR IF NOT
 7650  020652  105037  001102            CLRB    $TSTNM          ;INIT TEST NUMBER
 7651  020656  000137  002744            JMP     RSTRTA          ;GO TEST THIS DH11
 7652                          .SBTTL  END OF PASS ROUTINE
 7653
 7654                          ;;**************************************************************************
 7655                          ;*INCREMENT THE PASS NUMBER ($PASS)
 7656                          ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
 7657                          ;*IF THERES A MONITOR GO TO IT
 7658                          ;*IF THERE ISN'T JUMP TO START2
 7659
 7660  020662                  $EOP:
 7661  020662  000004                    SCOPE
 7662  020664  005037  001102            CLR     $TSTNM          ;;ZERO THE TEST NUMBER
 7663  020670  005037  001222            CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
 7664  020674  005237  001240            INC     $PASS           ;;INCREMENT THE PASS NUMBER
 7665  020700  042737  100000  001240    BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
 7666  020706  005327                    DEC     (PC)+           ;;LOOP?
 7667  020710  000001          $EOPCT: .WORD   1
 7668  020712  003022                    BGT     $DOAGN          ;;YES
 7669  020714  012737                    MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
 7670  020716  000001          $ENDCT: .WORD   1
 7671  020720  020710                    $EOPCT
 7672  020722  104401  020767            TYPE    ,$ENDMG         ;;TYPE "END PASS #"
 7673  020726  013746  001240            MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
 7674  020732  104405                    TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 7675  020734  104401  020764            TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
 7676  020740  013700  000042  $GET42:  MOV     @#42,R0         ;;GET MONITOR ADDRESS
 7677  020744  001405                    BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
 7678  020746  000005                    RESET                   ;;CLEAR THE WORLD
 7679  020750  004710          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
 7680  020752  000240                    NOP                     ;;SAVE ROOM
 7681  020754  000240                    NOP                     ;;FOR
 7682  020756  000240                    NOP                     ;;ACT11
 7683  020760                  $DOAGN:
 7684  020760  000137                    JMP     @(PC)+          ;;RETURN
 7685  020762  002640          $RTNAD: .WORD   START2
 7686  020764     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
 7687  020767     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
 7688  020774  050040  051501  020123
 7689  021002  000043
 7690                          .SBTTL  SCOPE HANDLER ROUTINE
 7691
 7692                          ;;**************************************************************************
 7693                          ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
 7694                          ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
 7695                          ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
```

```
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW14=1         LOOP ON TEST
                                ;*SW11=1         INHIBIT ITERATIONS
                                ;*SW09=1         LOOP ON ERROR
                                ;*SW08=1         LOOP ON TEST IN SWR<7:0>
                                ;*CALL
                                ;*      SCOPE            ;;SCOPE=IOT

021004                          $SCOPE:
021004  104407                          CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
021006  005037  030322                  CLR     LINE            ;INIT THE LINE NO. TO ZERO
021012  013701  027302                  MOV     DHADR,R1        ;SET UP DEVADR IN R1
021016  032777  040000  160114  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
021024  001114                          BNE     $OVER           ;;YES IF SW14=1
                                ;#####START OF CODE FOR THE XOR TESTER#####
021026  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
021030  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
021034  012737  021054  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
021042  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
021046  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
021052  000463                          BR      $SVLAD          ;;GO TO THE NEXT TEST
021054  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
021056  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
021062  000423                          BR      7$              ;;LOOP ON THE PRESENT TEST
021064                          6$:;#####END OF CODE FOR THE XOR TESTER#####
021064  032777  000400  160046          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
021072  001404                          BEQ     2$              ;;BR IF NO
021074  127737  160040  001102          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
021102  001465                          BEQ     $OVER           ;;BR IF YES
021104  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
021110  001421                          BEQ     3$              ;;BR IF NO
021112  123737  001115  001103          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
021120  101015                          BHI     3$              ;;BR IF NO
021122  032777  001000  160010          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
021130  001404                          BEQ     4$              ;;BR IF NO
021132  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
021140  000446                          BR      $OVER
021142  105037  001103          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
021146  005037  001222                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
021152  000415                          BR      1$              ;;ESCAPE TO THE NEXT TEST
021154  032777  004000  157756  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
021162  001011                          BNE     1$              ;;BR IF YES
021164  005737  001240                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
021170  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
021172  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
021176  023737  001222  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
021204  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
021206  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
021214  013737  021272  001222          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
021222  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
021226  113737  001102  00123б          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
021234  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
021240  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
021244  005037  001224                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
021250  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
```

```
 7752  021256  013777  001102  157656  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
 7753  021264  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
 7754  021270  000002                          RTI                     ;;FIXES PS
 7755  021272  000010                  $MXCNT: 10                      ;;MAX. NUMBER OF ITERATIONS
 7756                                  .SBTTL  ERROR HANDLER ROUTINE
 7757
 7758                                  ;;**************************************************************
 7759                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 7760                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 7761                                  ;*AND GO TO $ERRTYP ON ERROR
 7762                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 7763                                  ;*SW15=1        HALT ON ERROR
 7764                                  ;*SW13=1        INHIBIT ERROR TYPEOUTS
 7765                                  ;*SW09=1        LOOP ON ERROR
 7766                                  ;*CALL
 7767                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
 7768
 7769  021274                          $ERROR:
 7770  021274  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 7771  021276  105237  001103          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
 7772  021302  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
 7773  021304  013777  001102  157630          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
 7774  021312  005237  001112                  INC     $ERTTL          ;;INC THE ERROR COUNT
 7775  021316  011637  001116                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
 7776  021322  162737  000002  001116          SUB     #2,$ERRPC
 7777  021330  117737  157562  001114          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
 7778  021336  032777  020000  157574          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
 7779  021344  001004                          BNE     20$             ;;SKIP TYPEOUTS
 7780  021346  004737  021460                  JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
 7781  021352  104401  001227                  TYPE    ,$CRLF
 7782  021356                          20$:
 7783  021356  122737  000001  001252          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 7784  021364  001007                          BNE     2$              ;;NO,SKIP APT ERROR REPORT
 7785  021366  113737  001114  021400          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
 7786  021374  004737  022566                  JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
 7787  021400     000                  21$:    .BYTE   0
 7788  021401     000                          .BYTE   0
 7789  021402  000777                  22$:    BR      22$             ;;APT ERROR LOOP
 7790  021404  005777  157530          2$:     TST     @SWR            ;;HALT ON ERROR
 7791  021410  100002                          BPL     3$              ;;SKIP IF CONTINUE
 7792  021412  000000                          HALT                    ;;HALT ON ERROR!
 7793  021414  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
 7794  021416  032777  001000  157514  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
 7795  021424  001402                          BEQ     4$              ;;BR IF NO
 7796  021426  013716  001110                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
 7797  021432  005737  001224          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
 7798  021436  001402                          BEQ     5$              ;;BR IF NONE
 7799  021440  013716  001224                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
 7800  021444                          5$:
 7801  021444  022737  020750  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
 7802  021452  001001                          BNE     6$              ;;BRANCH IF NO
 7803  021454  000000                          HALT                    ;;YES
 7804  021456                          6$:
 7805  021456  000002                          RTI                     ;;RETURN
 7806                                  .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
 7807
```

```
                        ;;*****************************************************************
                        ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
                        ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
                        ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

021460                  $ERRTYP:
021460  104401  001227          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
021464  010046                  MOV     R0,-(SP)        ;;SAVE R0
021466  005000                  CLR     R0              ;;PICKUP THE ITEM INDEX
021470  153700  001114          BISB    @#$ITEMB,R0
021474  001004                  BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                        ;;TYPE THE PC OF THE ERROR
021476  013746  001116          MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                        ;;ERROR ADDRESS
021502  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
021504  000426                  BR      6$              ;;GET OUT
021506  005300          1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
021510  006300                  ASL     R0              ;;      WORK FOR THE ERROR TABLE
021512  006300                  ASL     R0
021514  006300                  ASL     R0
021516  062700  001356          ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
021522  012037  021532          MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
021526  001404                  BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
021530  104401                  TYPE                    ;;TYPE THE "ERROR MESSAGE"
021532  000000          2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
021534  104401  001227          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
021540  012037  021550  3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
021544  001404                  BEQ     5$              ;;SKIP TYPEOUT IF 0
021546  104401                  TYPE                    ;;TYPE THE "DATA HEADER"
021550  000000          4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
021552  104401  001227          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
021556  011000          5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
021560  001004                  BNE     7$              ;;GO TYPE THE DATA
021562  012600          6$:     MOV     (SP)+,R0        ;;RESTORE R0
021564  104401  001227          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
021570  000207                  RTS     PC              ;;RETURN
021572                  7$:
021572  013046                  MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
021574  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
021576  005710                  TST     (R0)            ;;IS THERE ANOTHER NUMBER?
021600  001770                  BEQ     6$              ;;BR IF NO
021602  104401  021610          TYPE    ,8$             ;;TYPE TWO(2) SPACES
021606  000771                  BR      7$              ;;LOOP
021610  020040    000   8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
021614                          .EVEN
                        .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

                        ;;*****************************************************************
                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                        ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                        ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                        ;*CALL:
                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                        ;*      TYPOS                   ;;CALL FOR TYPEOUT
                        ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                        ;*      .BYTE   M               ;;M=1 OR 0
```

```
                                ;*                                      ;;1=TYPE LEADING ZEROS
                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
                                ;*
                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                ;*$TYPOS OR $TYPOC
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPON                   ;;CALL FOR TYPEOUT
                                ;*
                                ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOC                   ;;CALL FOR TYPEOUT

021614  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
021620  116637  000001  022037          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
021626  112637  022041                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
021632  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
021636  000406                          BR      $TYPON
021640  112737  000001  022037  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
021646  112737  000006  022041          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
021654  112737  000005  022036  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
021662  010346                          MOV     R3,-(SP)        ;;SAVE R3
021664  010446                          MOV     R4,-(SP)        ;;SAVE R4
021666  010546                          MOV     R5,-(SP)        ;;SAVE R5
021670  113704  022041                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
021674  005404                          NEG     R4
021676  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
021702  110437  022040                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
021706  113704  022037                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
021712  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
021716  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
021720  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
021722  000404                          BR      3$              ;;GO DO MSB
021724  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
021726  006105                          ROL     R5
021730  006105                          ROL     R5
021732  010503                          MOV     R5,R3
021734  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
021736  105337  022040                  DECB    $OMODE          ;;TYPE THIS DIGIT?
021742  100016                          BPL     7$              ;;BR IF NO
021744  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
021750  001002                          BNE     4$              ;;TEST FOR 0
021752  005704                          TST     R4              ;;SUPPRESS THIS 0?
021754  001403                          BEQ     5$              ;;BR IF YES
021756  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
021760  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
021764  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
021770  110337  022034                  MOVB    R3,8$           ;;SAVE FOR TYPING
021774  104401  022034                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
022000  105337  022036          7$:     DECB    $OCNT           ;;COUNT BY 1
022004  003347                          BGT     2$              ;;BR IF MORE TO DO
022006  002402                          BLT     6$              ;;BR IF DONE
022010  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
022012  000744                          BR      2$              ;;GO DO THE LAST DIGIT
022014  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
```

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 7920  022016  012604                          MOV     (SP)+,R4        ;;RESTORE R4
 7921  022020  012603                          MOV     (SP)+,R3        ;;RESTORE R3
 7922  022022  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 7923  022030  012616                          MOV     (SP)+,(SP)
 7924  022032  000002                          RTI                     ;;RETURN
 7925  022034     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 7926  022035     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 7927  022036     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 7928  022037     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 7929  022040  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 7930                                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
 7931
 7932                                  ;;**********************************************************************
 7933                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
 7934                                  ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
 7935                                  ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
 7936                                  ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
 7937                                  ;*REPLACED WITH SPACES.
 7938                                  ;*CALL:
 7939                                  ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
 7940                                  ;*      TYPDS                   ;;GO TO THE ROUTINE
 7941
 7942  022042                          $TYPDS:
 7943  022042  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 7944  022044  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 7945  022046  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 7946  022050  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 7947  022052  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 7948  022054  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 7949  022060  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 7950  022064  100004                          BPL     1$              ;;BR IF INPUT IS POS.
 7951  022066  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 7952  022070  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 7953  022076  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 7954  022100  012703  022256                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 7955  022104  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 7956  022110  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
 7957  022112  016001  022246                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 7958  022116  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
 7959  022120  002402                          BLT     4$              ;;BR IF DONE
 7960  022122  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
 7961  022124  000774                          BR      3$
 7962  022126  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
 7963  022130  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
 7964  022132  001002                          BNE     5$              ;;FALL THROUGH IF 0
 7965  022134  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
 7966  022136  100407                          BMI     7$              ;;BR IF YES
 7967  022140  106316                  5$:     ASLB    (SP)            ;;MSD?
 7968  022142  103003                          BCC     6$              ;;BR IF NO
 7969  022144  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
 7970  022152  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
 7971  022156  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
 7972  022162  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
 7973  022164  005720                          TST     (R0)+           ;;JUST INCREMENTING
 7974  022166  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
 7975  022172  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
```

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 7976  022174  003002                          BGT     8$              ;;GO TO EXIT
 7977  022176  010502                          MOV     R5,R2           ;;GET THE LSD
 7978  022200  000764                          BR      6$              ;;GO CHANGE TO ASCII
 7979  022202  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
 7980  022204  100003                          BPL     9$              ;;BR IF NO
 7981  022206  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
 7982  022214  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
 7983  022216  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
 7984  022220  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
 7985  022222  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
 7986  022224  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 7987  022226  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 7988  022230  104401  022256                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
 7989  022234  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
 7990  022242  012616                          MOV     (SP)+,(SP)
 7991  022244  000002                          RTI                     ;;RETURN TO USER
 7992  022246  023420                  $DTBL:  10000.
 7993  022250  001750                          1000.
 7994  022252  000144                          100.
 7995  022254  000012                          10.
 7996  022256  000004                  $DBLK:  .BLKW   4
 7997                                  .SBTTL  TYPE ROUTINE
 7998
 7999                                  ;;**********************************************************************
 8000                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 8001                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 8002                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 8003                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 8004                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 8005                                  ;*
 8006                                  ;*CALL:
 8007                                  ;*1) USING A TRAP INSTRUCTION
 8008                                  ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 8009                                  ;*OR
 8010                                  ;*      TYPE
 8011                                  ;*      MESADR
 8012                                  ;*
 8013
 8014  022266  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 8015  022272  100002                          BPL     1$              ;;BR IF YES
 8016  022274  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
 8017  022276  000430                          BR      3$              ;;LEAVE
 8018  022300  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
 8019  022302  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 8020  022306  122737  000001  001252          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
 8021  022314  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
 8022  022316  132737  000100  001253          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
 8023  022324  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
 8024  022326  010037  022336                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
 8025  022332  004737  022556                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
 8026  022336  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
 8027  022340  132737  000040  001253  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
 8028  022346  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
 8029  022350  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 8030  022352  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 8031  022354  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
```

```
 8032  022356  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
 8033  022360  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 8034  022364  000002                          RTI                     ;;RETURN
 8035  022366  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 8036  022372  001430                          BEQ     8$
 8037  022374  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 8038  022400  001006                          BNE     5$
 8039  022402  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
 8040  022404  104401                          TYPE                    ;;TYPE A CR AND LF
 8041  022406  001227                          $CRLF
 8042  022410  105037  022544                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 8043  022414  000755                          BR      2$              ;;GET NEXT CHARACTER
 8044  022416  004737  022500          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 8045  022422  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 8046  022426  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
 8047  022430  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
 8048                                                                  ;;AND THE NULL CHAR.
 8049  022434  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 8050  022440  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 8051  022442  004737  022500                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
 8052  022446  105337  022544                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
 8053  022452  000770                          BR      7$              ;;LOOP
 8054
 8055                                  ;HORIZONTAL TAB PROCESSOR
 8056
 8057  022454  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
 8058  022460  004737  022500          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
 8059  022464  132737  000007  022544          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
 8060  022472  001372                          BNE     9$              ;;TAB STOP
 8061  022474  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
 8062  022476  000724                          BR      2$              ;;GET NEXT CHARACTER
 8063  022500  105777  156444          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
 8064  022504  100375                          BPL     $TYPEC
 8065  022506  116677  000002  156436          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 8066  022514  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
 8067  022522  001003                          BNE     1$              ;;BRANCH IF NO
 8068  022524  105037  022544                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
 8069  022530  000406                          BR      $TYPEX          ;;EXIT
 8070  022532  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
 8071  022540  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
 8072  022542  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
 8073  022544  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
 8074  022546  000207          $TYPEX: RTS     PC
 8075
 8076                                  .SBTTL  APT COMMUNICATIONS ROUTINE
 8077
 8078                                  ;;**************************************************************************
 8079  022550  112737  000001  023014  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
 8080  022556  112737  000001  023012  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
 8081  022564  000403                          BR      $ATYC
 8082  022566  112737  000001  023014  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
 8083  022574                          $ATYC:
 8084  022574  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 8085  022576  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 8086  022600  105737  023012                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
 8087  022604  001450                          BEQ     5$              ;;IF NOT:  BR
```

```
 8088  022606  122737  000001  001252          CMPB    #APTENV,$ENV     ;;OPERATING UNDER APT?
 8089  022614  001031                          BNE     3$               ;;IF NOT:  BR
 8090  022616  132737  000100  001253          BITB    #APTSPOOL,$ENVM  ;;SHOULD SPOOL MESSAGES?
 8091  022624  001425                          BEQ     3$               ;;IF NOT:  BR
 8092  022626  017600  000004                  MOV     @4(SP),R0        ;;GET MESSAGE ADDR.
 8093  022632  062766  000002  000004          ADD     #2,4(SP)                 ;;BUMP RETURN ADDR.
 8094  022640  005737  001232          1$:     TST     $MSGTYPE         ;;SEE IF DONE W/ LAST XMISSION?
 8095  022644  001375                          BNE     1$               ;;IF NOT:  WAIT
 8096  022646  010037  001246                  MOV     R0,$MSGAD        ;;PUT ADDR IN MAILBOX
 8097  022652  105720                  2$:     TSTB    (R0)+            ;;FIND END OF MESSAGE
 8098  022654  001376                          BNE     2$
 8099  022656  163700  001246                  SUB     $MSGAD,R0        ;;SUB START OF MESSAGE
 8100  022662  006200                          ASR     R0               ;;GET MESSAGE LNGTH IN WORDS
 8101  022664  010037  001250                  MOV     R0,$MSGLGT       ;;PUT LENGTH IN MAILBOX
 8102  022670  012737  000004  001232          MOV     #4,$MSGTYPE      ;;TELL APT TO TAKE MSG.
 8103  022676  000413                          BR      5$
 8104  022700  017637  000004  022724  3$:     MOV     @4(SP),4$        ;;PUT MSG ADDR IN JSR LINKAGE
 8105  022706  062766  000002  000004          ADD     #2,4(SP)                 ;;BUMP RETURN ADDRESS
 8106  022714  013746  177776                  MOV     177776,-(SP)     ;;PUSH 177776 ON STACK
 8107  022720  004737  022266                  JSR     PC,$TYPE         ;;CALL TYPE MACRO
 8108  022724  000000                  4$:     .WORD   0
 8109  022726                          5$:
 8110  022726  105737  023014          10$:    TSTB    $FFLG            ;;SHOULD REPORT FATAL ERROR?
 8111  022732  001416                          BEQ     12$              ;;IF NOT:  BR
 8112  022734  005737  001252                  TST     $ENV             ;;RUNNING UNDER APT?
 8113  022740  001413                          BEQ     12$              ;;IF NOT:  BR
 8114  022742  005737  001232          11$:    TST     $MSGTYPE         ;;FINISHED LAST MESSAGE?
 8115  022746  001375                          BNE     11$              ;;IF NOT:  WAIT
 8116  022750  017637  000004  001234          MOV     @4(SP),$FATAL    ;;GET ERROR #
 8117  022756  062766  000002  000004          ADD     #2,4(SP)                 ;;BUMP RETURN ADDR.
 8118  022764  005237  001232                  INC     $MSGTYPE         ;;TELL APT TO TAKE ERROR
 8119  022770  105037  023014          12$:    CLRB    $FFLG            ;;CLEAR FATAL FLAG
 8120  022774  105037  023013                  CLRB    $LFLG            ;;CLEAR LOG FLAG
 8121  023000  105037  023012                  CLRB    $MFLG            ;;CLEAR MESSAGE FLAG
 8122  023004  012601                          MOV     (SP)+,R1         ;;POP STACK INTO R1
 8123  023006  012600                          MOV     (SP)+,R0         ;;POP STACK INTO R0
 8124  023010  000207                          RTS     PC               ;;RETURN
 8125  023012     000          $MFLG:  .BYTE   0                ;;MESSG. FLAG
 8126  023013     000          $LFLG:  .BYTE   0                ;;LOG FLAG
 8127  023014     000          $FFLG:  .BYTE   0                ;;FATAL FLAG
 8128          023016                  .EVEN
 8129          000200          APTSIZE=200
 8130          000001          APTENV=001
 8131          000100          APTSPOOL=100
 8132          000040          APTCSUP=040
 8133                          .SBTTL  TTY INPUT ROUTINE
 8134
 8135                          ;;**********************************************************************
 8136                          .ENABL  LSB
 8137
 8138                          ;;**********************************************************************
 8139                          ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
 8140                          ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
 8141                          ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
 8142                          ;*WHEN OPERATING IN TTY FLAG MODE.
 8143  023016  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR       ;;IS THE SOFT-SWR SELECTED?
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```
 8144  023024  001074                          BNE     15$             ;;BRANCH IF NO
 8145  023026  105777  156112                  TSTB    @$TKS           ;;CHAR THERE?
 8146  023032  100071                          BPL     15$             ;;IF NO, DON'T WAIT AROUND
 8147  023034  117746  156106                  MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
 8148  023040  042716  177600                  BIC     # C177,(SP)     ;;STRIP-OFF THE ASCII
 8149  023044  022726  000007                  CMP     #7,(SP)+        ;;IS IT A CONTROL G?
 8150  023050  001062                          BNE     15$             ;;NO, RETURN TO USER
 8151  023052  123727  001134  000001          CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
 8152  023060  001456                          BEQ     15$             ;;BRANCH IF YES
 8153
 8154  023062  104401  023671                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G ( G)
 8155  023066  104401  023676          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
 8156  023072  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
 8157  023076  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 8158  023100  104401  023707                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
 8159  023104  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
 8160  023106  005046                          CLR     -(SP)           ;;THE NEW SWR
 8161  023110  105777  156030          7$:     TSTB    @$TKS           ;;CHAR THERE?
 8162  023114  100375                          BPL     7$              ;;IF NOT TRY AGAIN
 8163
 8164  023116  117746  156024                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 8165  023122  042716  177600                  BIC     # C177,(SP)     ;;MAKE IT 7-BIT ASCII
 8166
 8167
 8168
 8169  023126  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 8170  023132  001005                          BNE     10$             ;;BRANCH IF NOT
 8171  023134  104401  023664                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U ( U)
 8172  023140  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 8173  023144  000757                          BR      19$             ;;LET'S TRY IT AGAIN
 8174
 8175
 8176  023146  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
 8177  023152  001022                          BNE     16$             ;;BRANCH IF NO
 8178  023154  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 8179  023160  001403                          BEQ     11$             ;;BRANCH IF YES
 8180  023162  016677  000002  155750          MOV     2(SP),@SWR      ;;SAVE NEW SWR
 8181  023170  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
 8182  023174  104401  001227          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 8183  023200  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 8184  023206  001003                          BNE     15$             ;;BRANCH IF NOT
 8185  023210  012777  000100  155726          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
 8186  023216  000002                  15$:    RTI                     ;;RETURN
 8187  023220  004737  022500          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
 8188  023224  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
 8189  023230  002420                          BLT     18$             ;;BRANCH IF YES
 8190  023232  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
 8191  023236  003015                          BGT     18$             ;;BRANCH IF YES
 8192  023240  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 8193  023244  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
 8194  023250  001403                          BEQ     17$             ;;BRANCH IF YES
 8195  023252  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
 8196  023254  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
 8197  023256  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
 8198  023260  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 8199  023264  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
```

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 8200  023270  000707                          BR      7$              ;;GET THE NEXT ONE
 8201  023272  104401  001226          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 8202  023276  000720                          BR      20$             ;;SIMULATE CONTROL-U
 8203                                  .DSABL  LSB
 8204
 8205
 8206                                  ;;*****************************************************************
 8207                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
 8208                                  ;*CALL:
 8209                                  ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
 8210                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
 8211                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
 8212                                  ;
 8213
 8214  023300  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
 8215  023302  016666  000004  000002  MOV     4(SP),2(SP)     ;;SAVE THE PS
 8216  023310  105777  155630  1$:     TSTB    @$TKS           ;;WAIT FOR
 8217  023314  100375                  BPL     1$              ;;A CHARACTER
 8218  023316  117766  155624  000004  MOVB    @$TKB,4(SP)     ;;READ THE TTY
 8219  023324  042766  177600  000004  BIC     # C<177>,4(SP) ;;GET RID OF JUNK IF ANY
 8220  023332  026627  000004  000023  CMP     4(SP),#23       ;;IS IT A CONTROL-S?
 8221  023340  001013                  BNE     3$              ;;BRANCH IF NO
 8222  023342  105777  155576  2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
 8223  023346  100375                  BPL     2$              ;;LOOP UNTIL ITS THERE
 8224  023350  117746  155572          MOVB    @$TKB,-(SP)     ;;GET CHARACTER
 8225  023354  042716  177600          BIC     # C177,(SP)     ;;MAKE IT 7-BIT ASCII
 8226  023360  022627  000021          CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
 8227  023364  001366                  BNE     2$              ;;IF NOT DISCARD IT
 8228  023366  000750                  BR      1$              ;;YES, RESUME
 8229  023370  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
 8230  023376  002407                  BLT     4$              ;;BRANCH IF YES
 8231  023400  026627  000004  000175  CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
 8232  023406  003003                  BGT     4$              ;;BRANCH IF YES
 8233  023410  042766  000040  000004  BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
 8234  023416  000002          4$:     RTI                     ;;GO BACK TO USER
 8235                                  ;;*****************************************************************
 8236                                  ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
 8237                                  ;*CALL:
 8238                                  ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
 8239                                  ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
 8240                                  ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
 8241
 8242  023420  010346          $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
 8243  023422  005046                  CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
 8244  023424  012703  023654  1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
 8245  023430  022703  023664  2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
 8246  023434  101456                  BLOS    4$              ;;BR IF YES
 8247  023436  104410                  RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
 8248  023440  112613                  MOVB    (SP)+,(R3)      ;;GET CHARACTER
 8249  023442  122713  000177  10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
 8250  023446  001022                  BNE     5$              ;;BR IF NO
 8251  023450  005716                  TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
 8252  023452  001007                  BNE     6$              ;;BR IF NO
 8253  023454  112737  000134  023652  MOVB    #' ,9$          ;;TYPE A BACK SLASH
 8254  023462  104401  023652          TYPE    ,9$
 8255  023466  012716  177777          MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
```

```
8256  023472  005303                  6$:   DEC     R3              ;;BACKUP BY ONE
8257  023474  020327  023654              CMP     R3,#$TTYIN      ;;STACK EMPTY?
8258  023500  103434                      BLO     4$              ;;BR IF YES
8259  023502  111337  023652              MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
8260  023506  104401  023652              TYPE    ,9$             ;;GO TYPE
8261  023512  000746                      BR      2$              ;;GO READ ANOTHER CHAR.
8262  023514  005716                  5$:   TST     (SP)            ;;RUBOUT KEY SET?
8263  023516  001406                      BEQ     7$              ;;BR IF NO
8264  023520  112737  000134  023652      MOVB    #' ,9$          ;;TYPE A BACK SLASH
8265  023526  104401  023652              TYPE    ,9$
8266  023532  005016                      CLR     (SP)            ;;CLEAR THE RUBOUT KEY
8267  023534  122713  000025          7$:   CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
8268  023540  001003                      BNE     8$              ;;BR IF NO
8269  023542  104401  023664              TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
8270  023546  000726                      BR      1$              ;;GO START OVER
8271  023550  122713  000022          8$:   CMPB    #22,(R3)        ;;IS CHARACTER A " R"?
8272  023554  001011                      BNE     3$              ;;BRANCH IF NO
8273  023556  105013                      CLRB    (R3)            ;;CLEAR THE CHARACTER
8274  023560  104401  001227              TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
8275  023564  104401  023654              TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
8276  023570  000717                      BR      2$              ;;GO PICKUP ANOTHER CHACTER
8277  023572  104401  001226          4$:   TYPE    ,$QUES          ;;TYPE A '?'
8278  023576  000712                      BR      1$              ;;CLEAR THE BUFFER AND LOOP
8279  023600  111337  023652          3$:   MOVB    (R3),9$         ;;ECHO THE CHARACTER
8280  023604  104401  023652              TYPE    ,9$
8281  023610  122723  000015              CMPB    #15,(R3)+       ;;CHECK FOR RETURN
8282  023614  001305                      BNE     2$              ;;LOOP IF NOT RETURN
8283  023616  105063  177777              CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
8284  023622  104401  001230              TYPE    ,$LF            ;;TYPE A LINE FEED
8285  023626  005726                      TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
8286  023630  012603                      MOV     (SP)+,R3        ;;RESTORE R3
8287  023632  011646                      MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
8288  023634  016666  000004  000002      MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
8289  023642  012766  023654  000004      MOV     #$TTYIN,4(SP)
8290  023650  000002                      RTI                     ;;RETURN
8291  023652     000              9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
8292  023653     000                      .BYTE   0               ;;TERMINATOR
8293  023654  000010              $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
8294  023664  052536  005015  000  $CNTLU: .ASCIZ  / U/<15><12>    ;;CONTROL "U"
8295  023671     136  006507  000012 $CNTLG: .ASCIZ  / G/<15><12>    ;;CONTROL "G"
8296  023676  005015  053523  020122 $MSWR:  .ASCIZ  <15><12>/SWR = /
8297  023704  020075     000
8298  023707     040  047040  053505 $MNEW:  .ASCIZ  /  NEW = /
8299  023714  036440  000040
8300                              .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
8301
8302                              ;;**********************************************************************
8303                              ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
8304                              ;*CHANGE IT TO BINARY.
8305                              ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
8306                              ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
8307                              ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
8308                              ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
8309                              ;*CALL:
8310                              ;*      RDOCT                   ;;READ AN OCTAL NUMBER
8311                              ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
```

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                        ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT

023720  011646          $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
022722  016666  000004  000002        MOV     4(SP),2(SP)     ;;INPUT NUMBER
023730  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
023732  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
023734  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
023736  104411                1$:     RDLIN                   ;;READ AN ASCIZ LINE
023740  012600                        MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
023742  010037  024046                MOV     R0,5$           ;;AND SAVE IT
023746  005001                        CLR     R1              ;;CLEAR DATA WORD
023750  005002                        CLR     R2
023752  112046                2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
023754  001420                        BEQ     3$              ;;IF ZERO GET OUT
023756  122716  000060                CMPB    #'0,(SP)        ;;MAKE SURE THIS CHARACTER
023762  003026                        BGT     4$              ;;IS AN OCTAL DIGIT
023764  122716  000067                CMPB    #'7,(SP)
023770  002423                        BLT     4$
023772  006301                        ASL     R1              ;;*2
023774  006102                        ROL     R2
023776  006301                        ASL     R1              ;;*4
024000  006102                        ROL     R2
024002  006301                        ASL     R1              ;;*8
024004  006102                        ROL     R2
024006  042716  177770                BIC     # C7,(SP)       ;;STRIP THE ASCII JUNK
024012  062601                        ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
024014  000756                        BR      2$              ;;LOOP
024016  005726                3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
024020  010166  000012                MOV     R1,12(SP)       ;;SAVE THE RESULT
024024  010237  024056                MOV     R2,$HIOCT
024030  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
024032  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
024034  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
024036  000002                        RTI                     ;;RETURN
024040  005726                4$:     TST     (SP)+           ;;CLEAN PARTIAL FROM STACK
024042  105010                        CLRB    (R0)            ;;SET A TERMINATOR
024044  104401                        TYPE                    ;;TYPE UP THRU THE BAD CHAR.
024046  000000                5$:     .WORD   0
024050  104401  001226                TYPE    ,$QUES          ;;"?" "CR" & "LF"
024054  000730                        BR      1$              ;;TRY AGAIN
024056  000000                $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
                            .SBTTL  TRAP DECODER

                            ;;**************************************************************
                            ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
                            ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                            ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                            ;*GO TO THAT ROUTINE.

024060  010046                $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
024062  016600  000002                MOV     2(SP),R0        ;;GET TRAP ADDRESS
024066  005740                        TST     -(R0)           ;;BACKUP BY 2
024070  111000                        MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
024072  006300                        ASL     R0              ;;POSITION FOR INDEXING
024074  016000  024114                MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
024100  000200                        RTS     R0              ;;GO TO ROUTINE
```

```
 8368
 8369
 8370                                   ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
 8371
 8372  024102  011646                   $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
 8373  024104  016666  000004  000002           MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
 8374  024112  000002                           RTI                     ;;RESTORE THE PSW
 8375
 8376                                   .SBTTL  TRAP TABLE
 8377
 8378                                   ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
 8379                                   ;*BY THE "TRAP" INSTRUCTION.
 8380
 8381                                   ;       ROUTINE
 8382                                   ;       -------
 8383  024114  024102                   $TRPAD: .WORD   $TRAP2
 8384  024116  022266                           $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
 8385  024120  021640                           $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
 8386  024122  021614                           $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
 8387  024124  021654                           $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
 8388  024126  022042                           $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
 8389
 8390  024130  023066                           $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
 8391
 8392  024132  023016                           $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
 8393  024134  023300                           $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
 8394  024136  023420                           $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
 8395  024140  023720                           $RDOCT  ;;CALL=RDOCT    TRAP+12(104412) READ AN OCTAL NUMBER FROM TTY
 8396                                   .SBTTL  POWER DOWN AND UP ROUTINES
 8397
 8398                                   ;;*****************************************************************
 8399                                   ;POWER DOWN ROUTINE
 8400  024142  012737  024306  000024   $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
 8401  024150  012737  000340  000026           MOV     #340,@#PWRVEC+2 ;;PRIO:7
 8402  024156  010046                           MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 8403  024160  010146                           MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 8404  024162  010246                           MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 8405  024164  010346                           MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 8406  024166  010446                           MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 8407  024170  010546                           MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 8408  024172  017746  154742                   MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
 8409  024176  010637  024312                   MOV     SP,$SAVR6       ;;SAVE SP
 8410  024202  012737  024214  000024           MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
 8411  024210  000000                           HALT
 8412  024212  000776                           BR      .-2             ;;HANG UP
 8413
 8414                                   ;;*****************************************************************
 8415                                   ;POWER UP ROUTINE
 8416  024214  012737  024306  000024   $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
 8417  024222  013706  024312                   MOV     $SAVR6,SP       ;;GET SP
 8418  024226  005037  024312                   CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
 8419  024232  005237  024312           1$:     INC     $SAVR6          ;;WAIT FOR THE INC
 8420  024236  001375                           BNE     1$              ;;OF  WORD
 8421  024240  012677  154674                   MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
 8422  024244  012605                           MOV     (SP)+,R5        ;;POP STACK INTO R5
 8423  024246  012604                           MOV     (SP)+,R4        ;;POP STACK INTO R4
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 8424  024250  012603                        MOV     (SP)+,R3          ;;POP STACK INTO R3
 8425  024252  012602                        MOV     (SP)+,R2          ;;POP STACK INTO R2
 8426  024254  012601                        MOV     (SP)+,R1          ;;POP STACK INTO R1
 8427  024256  012600                        MOV     (SP)+,R0          ;;POP STACK INTO R0
 8428  024260  012737  024142  000024        MOV     #$PWRDN,@#PWRVEC  ;;SET UP THE POWER DOWN VECTOR
 8429  024266  012737  000340  000026        MOV     #340,@#PWRVEC+2   ;;PRIO:7
 8430  024274  104401                        TYPE                      ;REPORT THE POWER FAILURE
 8431  024276  024314              $PWRMG:   .WORD   $POWER            ;;POWER FAIL MESSAGE POINTER
 8432  024300  012716                        MOV     (PC)+,(SP)        ;;RESTART AT RSTRTA
 8433  024302  002744              $PWRAD:   .WORD   RSTRTA            ;;RESTART ADDRESS
 8434  024304  000002                        RTI
 8435  024306  000000              $ILLUP:   HALT                      ;;THE POWER UP SEQUENCE WAS STARTED
 8436  024310  000776                        BR      .-2               ;; BEFORE THE POWER DOWN WAS COMPLETE
 8437  024312  000000              $SAVR6:   0                         ;;PUT THE SP HERE
 8438  024314  005015  047520  042527  $POWER:  .ASCIZ  <15><12>"POWER"
 8439  024322  000122
 8440                                        .EVEN
 8441  024324  004737  027244               JSR     PC,DCACHE         ;DISABLE CACHE  ;;++D
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                                ;;*****************************************************************
                                ;COMMON DH11 SERVICE ROUTINES
                                ;;*****************************************************************

                                ;THIS ROUTINE IS CALLED DURING START UP TO LOAD THE XMITTER
                                ;OUTPUT BUFFER WITH A BINARY COUNT TEST PATTERN

024330  012701  037312        LDTBF1: MOV     #TBUF,R1        ;POINT TO START OF BUFFER
024334  005002                        CLR     R2              ;INIT DATA BYTE GENERATOR
024336  110221                1$:     MOVB    R2,(R1)+        ;LOAD ONE CHAR
024340  005202                        INC     R2              ;GENERATE NEXT CHAR
024342  022702  000400                CMP     #400,R2         ;LOADED 256(10) BYTES
024346  001373                        BNE     1$              ;BR IF NOT
024350  000207                        RTS     PC              ;RETURN TO START TESTING

                                ;THIS ROUTINE SETS UP THE ERROR INFORMATION REQUIRED BY ANY TEST
                                ;USING A "DH1" HEADER

024352  004737  027200        SUER1:  JSR     PC,SAPS         ;SAVE THE ERROR PSW
024356  113700  001102                MOVB    $TSTNM,R0       ;SAVE THE TEST NO.
024362  010037  001162                MOV     R0,$REG0        ;SAVE THE TEST NO. FOR ERROR PRINT
024366  010137  001164                MOV     R1,$REG1        ;SAVE THE DH11 ADDR
024372  010237  001166                MOV     R2,$REG2        ;SAVE THE REG ADDRESS
024376  010637  001176                MOV     R6,$REG6        ;SAVE THE SP
024402  062737  000002  001176        ADD     #2,$REG6        ;CORRECT FOR CALLING JSR
024410  000207                        RTS     PC              ;RETURN TO CALLING ROUTINE

                                ;THIS ROUTINE IS CALLED BY THOSE TESTS USING A "DH2" HEADER TO
                                ;SAVE THE ERROR INFORMATION IN "DT2"

024412  004737  027200        SUER2:  JSR     PC,SAPS         ;SAVE THE ERROR PSW
024416  113700  001102        SUER2A: MOVB    $TSTNM,R0       ;GET THE TEST NO.
024422  010037  001162                MOV     R0,$REG0        ;SAVE THE REGISTERS-TEST#
024426  010137  001164                MOV     R1,$REG1        ;SAVE THE DH ADDRESS
024432  010237  001166                MOV     R2,$REG2        ;SAVE THE REGISTER ADDRESS
024436  010337  001170                MOV     R3,$REG3        ;SAVE THE WAS DATA
024442  010437  001172                MOV     R4,$REG4        ;SAVE THE S/B DATA
024446  010637  001176                MOV     R6,$REG6        ;SAVE THE STACK POINTER
024452  062737  000002  001176        ADD     #2,$REG6        ;CORRECT FOR CALLING JSR
024460  000207                        RTS     PC              ;RETURN TO REPORT ERROR

                                ;THIS ROUTINE IS CALLED TO SET UP ERROR INFORMATION FOR THE
                                ;BUS ERROR AND RSVD INSTR ERROR ROUTINES

024462  010037  001162        SUER3:  MOV     R0,$REG0        ;SAVE THE REGS
024466  010137  001164                MOV     R1,$REG1
024472  010237  001166                MOV     R2,$REG2
024476  000207                        RTS     PC              ;RETURN TO REPORT ERROR

                                ;THIS ROUTINE IS CALLED TO SET UP ERROR INFORMATION FOR THE
                                ;CAR/BCR MEMORY PATTERNS TESTS

024500  005037  001202        SUER4:  CLR     $TMP0           ;SAVE THE LINE NO. WRITTEN
024504  113737  030324  001202        MOVB    LINEA,$TMP0
024512  113700  001102                MOVB    $TSTNM,R0       ;SAVE THE TEST NUMBER
024516  010037  001162                MOV     R0,$REG0        ;SAVE THE REGISTER INFORMATION
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 8498  024522  010137  001164                  MOV     R1,$REG1
 8499  024526  010237  001166                  MOV     R2,$REG2
 8500  024532  010337  001170                  MOV     R3,$REG3
 8501  024536  010437  001172                  MOV     R4,$REG4
 8502  024542  000207                          RTS     PC              ;RETURN TO PATTERNS TEST
 8503
 8504                                  ;THIS ROUTINE IS CALLED TO SELECT A NEW LINE NO. BASED ON THE
 8505                                  ;VALUE OF THE LINE SELECTION PARAMETER
 8506
 8507                                          ;CALLING SEQUENCE:
 8508
 8509                                          ;JSR    PC,SELINE       ;CALL THE ROUTINE
 8510                                          ;BR     1$              ;EXIT BRANCH-ROUTINE MOVES THE RETURN
 8511                                                                  ;PC AROUND THIS BR IF MORE LINES ARE
 8512                                                                  ;YET TO BE TESTED
 8513
 8514  024544  105737  030323          SELINE: TSTB    LINE+1          ;FIRST TIME THROUGH FOR ANY TEST ?
 8515  024550  001010                          BNE     1$              ;BR IF NOT
 8516  024552  105137  030323                  COMB    LINE+1          ;SET ENTRY FLAG
 8517  024556  012737  000001  027314          MOV     #1,LINMSK       ;INIT SELECT TEST MASK TO TEST LINE 00
 8518  024564  105037  030322                  CLRB    LINE            ;START WITH LINE #00
 8519  024570  000405                          BR      2$              ;GO TEST FOR LINE #00
 8520  024572  105237  030322          1$:     INCB    LINE            ;GENERATE NEW LINE NO.
 8521  024576  006337  027314                  ASL     LINMSK          ;SHIFT SELECT MASK TO TEST NXT LINE
 8522  024602  001407                          BEQ     3$              ;RETURN TO EXIT BRANCH - ALL LINES DONE
 8523  024604  033737  027314  027312  2$:     BIT     LINMSK,LINSEL   ;IS THE LINE SELECTED FOR TEST ??
 8524  024612  001767                          BEQ     1$              ;BR IF NOT
 8525  024614  062716  000002                  ADD     #2,(SP)         ;MOVE RETURN PC AROUND EXIT BRANCH
 8526  024620  000402                          BR      4$              ;RETURN TO TEST SELECTED LINE
 8527  024622  005037  030322          3$:     CLR     LINE            ;INIT ENTRY FLAG AND LINE NO. TO 000
 8528  024626  142777  000017  002446  4$:     BICB    #17,@DHADR      ;INIT LINE SELECT BITS IN "SCR"
 8529  024634  000207                          RTS     PC              ;RETURN TO CALLING TEST
 8530
 8531                                  ;THIS ROUTINE IS CALLED TO CONVERT EITHER THE "DH" NUMBER OR THE
 8532                                  ;"LINE" NUMBER TO TWO ASCII CHARACTERS AND MOVE THEM INTO A
 8533                                  ;PARTICULAR MESSAGE BUFFER FOR ERROR REPORTING
 8534
 8535                                          ;CALLING SEQUENCE
 8536
 8537                                          ;JSR    R5,SUNUM        ;CALL TO THIS ROUTINE
 8538                                          ;ADDR1                  ;ADDRESS OF THE NUMBER TO BE CONVERTED
 8539                                          ;ADDR2                  ;ADDRESS OF THE MSG BUFFER SLOT
 8540
 8541  024636                          SUNUM:
 8542  024636  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 8543  024640  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 8544  024642  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 8545  024644  012500                          MOV     (R5)+,R0        ;GET ADDRESS OF NUMBER
 8546  024646  012501                          MOV     (R5)+,R1        ;GET MSG BUFFER ADDR
 8547  024650  111000                          MOVB    (R0),R0         ;GET NO. TO BE CONVERTED
 8548  024652  010002                          MOV     R0,R2           ;SAVE IT IN R2
 8549  024654  006202                          ASR     R2              ;SHIFT MSD TO LSD POSITION
 8550  024656  006202                          ASR     R2
 8551  024660  006202                          ASR     R2
 8552  024662  042702  177770                  BIC     #177770,R2      ;CLR JUNK BITS
 8553  024666  062702  000060                  ADD     #60,R2          ;MAKE IT ASCII
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 8554  024672  110221                        MOVB    R2,(R1)+        ;PUT IT IN MSG BUFFER
 8555  024674  042700  177770                BIC     #177770,R0      ;CLR JUNK FROM LSD
 8556  024700  062700  000060                ADD     #60,R0          ;MAKE IT ASCII
 8557  024704  110011                        MOVB    R0,(R1)         ;PUT LSD IN THE BUFFER
 8558  024706  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
 8559  024710  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
 8560  024712  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
 8561  024714  000205                        RTS     R5              ;RETURN TO CALLER
 8562
 8563                                ;THIS ROUTINE IS CALLED TO CLEAR THE "CAR" AND "BCR" MEMORIES
 8564                                ;IT ASSUMES THAT THE ADDRESS OF THE "SCR" IS IN R1
 8565
 8566  024716  005037  001220        CLCABC: CLR     $TMP7           ;INIT A COUNTER
 8567  024722  113711  001220        1$:     MOVB    $TMP7,(R1)      ;SELECT A LINE
 8568  024726  005061  000006                CLR     CAR(R1)         ;CLEAR A CAR LOCATION
 8569  024732  005061  000010                CLR     BCR(R1)         ;CLEAR A BCR LOCATION
 8570  024736  005237  001220                INC     $TMP7           ;GENERATE NEW LINE NO.
 8571  024742  022737  000020  001220        CMP     #20,$TMP7       ;DONE ALL LINES ?
 8572  024750  001364                        BNE     1$              ;BR IF NOT
 8573  024752  142711  000017                BICB    #17,(R1)        ;SET "SCR" TO SELECT LINE 00
 8574  024756  000207                        RTS     PC              ;RETURN TO CALLER
 8575
 8576                                ;THIS ROUTINE IS CALLED TO LOAD THE "BCR" MEMORY WITH ALL ONES
 8577                                ;IT ASSUMES THAT THE ADDRESS OF THE SCR IS IN R1
 8578
 8579  024760  005037  001220        LDBCR:  CLR     $TMP7           ;INIT A COUNTER
 8580  024764  113711  001220        1$:     MOVB    $TMP7,(R1)      ;SELECT A LINE
 8581  024770  012761  177777  000010        MOV     #-1,BCR(R1)     ;LOAD BCR LOC. WITH 177777
 8582  024776  005237  001220                INC     $TMP7           ;GENERATE NEXT LINE NO.
 8583  025002  022737  000020  001220        CMP     #20,$TMP7       ;DONE ALL LINES ?
 8584  025010  001365                        BNE     1$              ;BR IF NOT
 8585  025012  142711  000017                BICB    #17,(R1)        ;SET "SCR" TO SELECT LINE 00
 8586  025016  000207                        RTS     PC              ;RETURN TO CALLER
 8587
 8588                                ;THIS ROUTINE CALLED TO SET UP FOR PARITY TESTS
 8589
 8590  025020  012737  000020  001212  SUPPAR: MOV     #20,$TMP4       ;SET UP FOR 16. LINES
 8591  025026  105011                        CLRB    (R1)            ;INIT SCR TO START AT LINE 00
 8592  025030  005002                        CLR     R2              ;INIT INDEX REGISTER FOR RBUF (EVEN)
 8593  025032  012703  000200                MOV     #200,R3         ;SET UP CONSTANT
 8594  025036  012704  000001                MOV     #1,R4           ;INIT INDEX REG FOR RBUF (ODD)
 8595  025042  012761  037312  000006  1$:     MOV     #TBUF,CAR(R1)   ;LOAD BUS ADDRESS REWG
 8596  025050  013761  001216  000010        MOV     $TMP6,BCR(R1)   ;LOAD BYTE COUNT REG
 8597  025056  013761  001214  000004        MOV     $TMP5,LPR(R1)   ;LOAD LINE PARAMETERS
 8598  025064  105062  036312                CLRB    RBUF(R2)        ;INIT DATA BYTE IN RBUF TO START AT 000
 8599  025070  110364  036312                MOVB    R3,RBUF(R4)     ;SET CONSTANT IN HIGH BYTE
 8600  025074  005211                        INC     (R1)            ;SELECT NEXT LINE
 8601  025076  005203                        INC     R3              ;GENERATE NEW CONSTANT
 8602  025100  062702  000002                ADD     #2,R2           ;UPDATE POINTERS TO RBUF (EVEN/ODD)
 8603  025104  062704  000002                ADD     #2,R4
 8604  025110  005337  001212                DEC     $TMP4           ;COUNT ONE LINE SETUP
 8605  025114  001352                        BNE     1$              ;BR TILL ALL 16. SET UP
 8606  025116  012704  027562                MOV     #MULPTB,R4      ;SET UP TABLE POINTER
 8607  025122  013724  001216        2$:     MOV     $TMP6,(R4)+     ;SET UP BYTE COUNT ENTRY
 8608  025126  022704  027622                CMP     #MULPTB+40,R4   ;SET UP ALL COUNTS ?
 8609  025132  001373                        BNE     2$              ;BR IF NOT
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8610  025134  105011                          CLRB    (R1)            ;INIT SCR TO SELECT LINE 00
8611  025136  000207                          RTS     PC              ;RETURN TO PARITY TEST
8612
8613                                  ;THIS ROUTINE AUTOSIZES THE SYSTEM TO DETERMINE THE ADDRESSES AND
8614                                  ;VECTORS OF THE DH11'S AND MODEM CONTROL'S.
8615
8616  025140  010046                  AUTOSZ: MOV     R0,-(SP)
8617  025142  005003                          CLR     R3
8618  025144  012702  030042                 MOV     #DHADRS,R2      ;POINT TO BEGINNING OF TABLE
8619  025150  005022                  25$:    CLR     (R2)+           ;CLEAR AUTOSIZER TABLES.
8620  025152  005203                          INC     R3
8621  025154  020327  000102                 CMP     R3,#102         ;HAVE WE CLEARED ALL ENTRIES?
8622  025160  001373                          BNE     25$             ;BRANCH IF NOT.
8623  025162  013746  000004                 MOV     @#4,-(SP)       ;SAVE TRAP VECTOR.
8624  025166  012737  025274  000004         MOV     #4$,@#4         ;SETUP FOR NON-EXISTENT MEMORY TRAP.
8625  025174  012703  030144                 MOV     #DMADRS,R3      ;SETUP DM ADDRESS TABLE POINTER.
8626  025200  012702  030042                 MOV     #DHADRS,R2      ;SET UP DH ADDRESS TABLE POINTER.
8627
8628  025204  012701  160020                 MOV     #160020,R1      ;R1=FIRST ADDRESS TO BE TESTED.
8629
8630  025210  005711                  1$:     TST     (R1)            ;SEE IF ADDRESS IN R1 RESPONDS.
8631  025212  005761  000016                 TST     16(R1)          ;CHECK TO SEE IF DEVICE IS MODULO 20.
8632  025216  052711  004000                 BIS     #4000,(R1)      ;IF IT IS, CONTINUE
8633                                                                  ;AND CHECK TO SEE
8634  025222  052711  001000                 BIS     #1000,(R1)      ;IF THIS ADDRESS CONTAINS
8635  025226  052711  002000                 BIS     #2000,(R1)      ;A DH-11.
8636  025232  032711  003000                 BIT     #3000,(R1)      ;CHECK TO INSURE THESE BITS SET.
8637  025236  001410                          BEQ     3$              ;IF NOT, BRANCH.
8638                                                                  ;SET THE MAINTENANCE BIT, THE NON-
8639  025240  052711  000400                 BIS     #400,(R1)       ;EXISTENT MEMORY BIT AND THE CLEAR
8640                                                                  ;NON-EXISTENT MEMORY INTERRUPT BIT.
8641  025244  032711  002400                 BIT     #2400,(R1)      ;IS THIS A DH-11? (BITS 8 AND 10 SHOULD
8642                                                                  ;CLEAR IF THIS IS A DH11.)
8643
8644  025250  001003                          BNE     3$              ;IF NOT, CHECK TO SEE IF THIS IS A MODEM CONTROL.
8645  025252  042711  001000                 BIC     #1000,(R1)      ;CLEAR MAINTENANCE BIT.
8646  025256  010122                          MOV     R1,(R2)+        ;SAVE THE ADDRESS IN THE DH ADR TABLE.
8647
8648
8649  025260  020127  163760          3$:     CMP     R1,#163760      ;HAVE WE REACHED THE TOP OF THE FLOATING ADDRESSES.
8650  025264  001406                          BEQ     5$              ;IF YES, GET OUT.
8651  025266  062701  000020                 ADD     #20,R1          ;IF NOT, UPDATE ADDRESS AND
8652  025272  000746                          BR      1$              ;GO CHECK IT.
8653
8654  025274  012716  025260          4$:     MOV     #3$,(SP)        ;IF DH ADDRESS DOES NOT RESPOND, GO TO 3$.
8655  025300  000002                          RTI
8656
8657                                  ;TEST FOR MODEM CONTROL ADDRESS
8658
8659  025302  012737  025334  000004  5$:     MOV     #6$,@#4         ;SETUP FOR NON-EXISTENT MEMORY TRAP.
8660  025310  012701  170500                 MOV     #170500,R1      ;R1=FIRST ADDRESS TO BE TESTED.
8661  025314  005711                  21$:    TST     (R1)            ;SEE IF ADDRESS RESPONDS.
8662  025316  010123                          MOV     R1,(R3)+        ;IF IT DOES, THIS IS A MODEM CONTROL,
8663                                                                  ;SO SAVE THE ADDRESS.
8664  025320  020127  170670          23$:    CMP     R1,#170670      ;HAVE WE REACHED THE TOP OF THE MODEM ADDRESSES?
8665  025324  001406                          BEQ     22$             ;IF YES, GET OUT.
```

```
 8666  025326  062701  000010            ADD     #10,R1          ;IF NOT, UPDATE ADDRESS AND
 8667  025332  000770                    BR      21$             ;GO CHECK IT.
 8668
 8669  025334  012716  025320      6$:   MOV     #23$,(SP)       ;IF DM ADDRESS DOES NOT RESPOND, GO TO 23$.
 8670  025340  000002                    RTI
 8671
 8672  025342  012637  000004      22$:  MOV     (SP)+,@#4       ;RESTORE TRAP VECTOR.
 8673  025346  162702  030042            SUB     #DHADRS,R2      ;HAVE WE FOUND ANY DH11'S AT ALL?
 8674  025352  001003                    BNE     7$              ;IF YES, BRANCH
 8675  025354  104401  035604            TYPE    ,MSG1           ;NO DH11'S WERE FOUND,
 8676  025360  000000                    HALT
 8677
 8678  025362  006202      7$:   ASR     R2              ;R2 NOW CONTAINS THE NUMBER
 8679  025364  005000            CLR     R0              ;OF DH'S FOUND.
 8680  025366  006100      8$:   ROL     R0              ;FILL R0 WITH 1'S
 8681  025370  005200            INC     R0              ;CORRESPONDING TO
 8682  025372  005302            DEC     R2              ;THE NUMBER OF DH'S
 8683  025374  005702            TST     R2              ;FOUND.
 8684  025376  001373            BNE     8$
 8685  025400  010037  030314    MOV     R0,$DHSEL       ;$DHSEL CONTAINS THE DH SELECTION PARAMETER.
 8686                                                    ;IE. ALL DH'S FOUND WILL BE TESTED.
 8687
 8688                      ;FIND DH VECTOR:
 8689  025404  012702  030042    MOV     #DHADRS,R2      ;SETUP POINTER TO BEGINNING OF DH
 8690  025410  012705  030104    MOV     #DHVEC,R5       ;ADDRESS TABLE AND VECTOR TABLE.
 8691  025414  012737  000340  000022  MOV  #340,@#IOTVEC+2 ;SET IOT TRAP PRIORITY TO 7.
 8692  025422  012737  025532  000020  MOV  #12$,@#IOTVEC  ;SETUP IOT TRAP VECTOR.
 8693  025430  012703  000300    MOV     #300,R3         ;START OF FLOATING VECTORS
 8694  025434  012704  000302    MOV     #302,R4         ;PC OF IOT INSTR.
 8695
 8696  025440  010423      9$:   MOV     R4,(R3)+        ;FILL VECTOR AREA WITH ADDRESS
 8697                                                    ;OF NEXT INSTR (.+2)
 8698  025442  012724  000004    MOV     #4,(R4)+        ;NEXT INSTRUCTION IS AN IOT TRAP.
 8699  025446  022324            CMP     (R3)+,(R4)+     ;UPDATE R3+R4.
 8700  025450  020427  001000    CMP     R4,#1000        ;HAVE WE REACHED TO TOP OF THE
 8701                                                    ;VECTOR SPACE?
 8702  025454  101771            BLOS    9$              ;IF NOT, REPEAT PROCESS.
 8703
 8704  025456  005712      10$:  TST     (R2)            ;HAVE WE CHECK ALL DH'S?
 8705  025460  001441            BEQ     13$             ;IF YES, GET OUT + CHECK FOR MODEM CONTROL'S VECTORS.
 8706
 8707  025462  005037  177776    CLR     PS              ;ZERO CPU PRIORITY.
 8708  025466  052772  001000  000000  BIS  #1000,@(R2)  ;SET MAINTENANCE BIT
 8709  025474  052772  000300  000000  BIS  #300,@(R2)   ;ATTEMPT TO CAUSE RECEIVER
 8710                                                    ;INTERRUPT.
 8711  025502  005000            CLR     R0
 8712
 8713  025504  005200      11$:  INC     R0              ;WAIT...
 8714  025506  001376            BNE     11$
 8715  025510  104401  035634    TYPE    ,MSG2           ;ERROR MSG-NO DH RECEIVER INTERRUPT OCCURRED.
 8716  025514  052772  004000  000000  BIS  #4000,@(R2)  ;DO A MASTER CLEAR
 8717  025522  042772  001000  000000  BIC  #1000,@(R2)  ;CLEAR MAINTENANCE BIT
 8718  025530  000752            BR      10$
 8719
 8720  025532  011601      12$:  MOV     (SP),R1
 8721  025534  042701  000007    BIC     #7,R1           ;CLEAR GARBAGE.
```

```
8722  025540  010125                        MOV     R1,(R5)+        ;SAVE VECTOR ADDRESS.
8723  025542  022626                        CMP     (SP)+,(SP)+     ;POP STACK
8724  025544  012716  025456                MOV     #10$,(SP)       ;SETUP FOR RETURN.
8725  025550  052772  004000  000000        BIS     #4000,@(R2)     ;DO A MASTER CLEAR
8726  025556  042732  001000                BIC     #1000,@(R2)+    ;CLEAR MAINTENANCE BIT.
8727  025562  000002                        RTI
8728
8729                                  ;FIND MODEM CONTROL VECTORS:
8730
8731  025564  012702  030144        13$:    MOV     #DMADRS,R2      ;SET POINTERS TO BEGINNING OF
8732  025570  012705  030206                MOV     #DMVEC,R5       ;ADR TABLE & VECTOR TABLE.
8733  025574  012737  025656  000020        MOV     #16$,@#IOTVEC   ;SET IOT TRAP VECTOR.
8734
8735  025602  005712                14$:    TST     (R2)            ;HAVE WE CHECKED ALL DM'S?
8736  025604  001441                        BEQ     17$             ;IF YES, GET OUT.
8737  025606  005037  177776                CLR     PS              ;ZERO CPU PRIORITY
8738  025612  052772  001000  000000        BIS     #1000,@(R2)     ;SET MAINTENANCE BIT.
8739  025620  052772  000300  000000        BIS     #300,@(R2)      ;ATTEMPT TO CAUSE INTERRUPT.
8740  025626  005000                        CLR     R0
8741
8742  025630  005200                15$:    INC     R0              ;WAIT....
8743  025632  001376                        BNE     15$
8744  025634  104401  035701                TYPE    ,MSG3           ;ERROR MSG - NO MODEM CONTROL INTERRUPT OCCURRED.
8745  025640  052772  004000  000000        BIS     #4000,@(R2)     ;CLEAR BITS PREVIOUSLY SET.
8746  025646  042772  001000  000000        BIC     #1000,@(R2)     ;CLEAR MAINTENANCE BIT.
8747  025654  000752                        BR      14$
8748
8749  025656  011601                16$:    MOV     (SP),R1
8750  025660  162701  000004                SUB     #4,R1           ;CALCULATE VECTOR ADDRESS.
8751  025664  010125                        MOV     R1,(R5)+        ;SAVE VECTOR ADDRESS.
8752  025666  022626                        CMP     (SP)+,(SP)+     ;POP STACK.
8753  025670  012716  025602                MOV     #14$,(SP)       ;SETUP FOR RETURN.
8754  025674  052772  004000  000000        BIS     #4000,@(R2)     ;CLEAR BITS PREVIOUSLY SET.
8755  025702  042732  001000                BIC     #1000,@(R2)+    ;CLEAR MAINTENANCE BIT AND
8756                                                                ;POINT TO NEXT MODEM CONTROL ADDRESS.
8757  025706  000002                        RTI
8758
8759  025710  012737  021004  000020 17$:    MOV     #$SCOPE,@#IOTVEC  ;RESTORE IOT VECTOR FOR SCOPE ROUTINE.
8760  025716  012600                        MOV     (SP)+,R0        ;RESTORE R0.
8761  025720  012703  000300                MOV     #300,R3         ;START OF FLOATING VECTORS.
8762  025724  012704  000302                MOV     #302,R4
8763
8764  025730  010423                18$:    MOV     R4,(R3)+        ;FILL VECTOR AREA WITH ADDRESS OF NEXT
8765                                                                ;INSTRUCTION (.+2).
8766  025732  012724  000000                MOV     #0,(R4)+        ;NEXT INSTRUCTION IS A HALT.
8767  025736  022324                        CMP     (R3)+,(R4)+     ;UPDATE R3 & R4.
8768  025740  020427  001000                CMP     R4,#1000        ;ARE WE DONE?
8769  025744  101771                        BLOS    18$             ;IF NOT, REPEAT UNTIL ADDRESSES
8770                                                                ;377 TO 777 ARE DONE.
8771  025746  013701  030104                MOV     @#DHVEC,R1      ;LET R1 POINT TO 1ST DH VECTOR ADDRESS.
8772  025752  005737  030106                TST     @#DHVEC+2       ;IS THERE MORE THAN ONE VECTOR?
8773  025756  001403                        BEQ     26$             ;BRANCH IF NOT.
8774  025760  163701  030106                SUB     @#DHVEC+2,R1    ;DETERMINE NUMBER OF ADDRESSES
8775                                                                ;BETWEEN DH VECTORS (10(8) OR 20(8)).
8776  025764  005401                        NEG     R1              ;MAKE R1 POSITIVE.
8777  025766  010137  030306        26$:    MOV     R1,ADRVEC       ;SAVE THAT NUMBER.
```

```
 8778  025772  032777  000002  153140          BIT     #BIT1,@SWR      ;SHOULD DEVICE MAP BE TYPED OUT?
 8779  026000  001442                          BEQ     20$             ;IF NOT, RETURN.
 8780  026002  104401                          TYPE                    ;TYPEOUT MAP OF DH & MODEM CONTROL'S
 8781  026004  035754                          DEVMAP                  ;FOUND.
 8782  026006  012701  030042                  MOV     #DHADRS,R1      ;R1=BEGINNING OF DH ADDRESS TABLE.
 8783  026012  012702  030104                  MOV     #DHVEC,R2       ;R2=BEGINNING OF DH VECTOR TABLE.
 8784  026016  012703  030144                  MOV     #DMADRS,R3      ;R3=BEGINNING OF MODEM CONTROL ADDRESS TABLE.
 8785  026022  012704  030206                  MOV     #DMVEC,R4       ;R4=BEGINNING OF MODEM CONTROL VECTOR TABLE.
 8786
 8787  026026  012146                  19$:    MOV     (R1)+,-(SP)     ;MOVE DATA TO BE TYPED
 8788  026030  104403                          TYPOS                   ;TYPE DATA
 8789  026032     006                          .BYTE   6
 8790  026033     001                          .BYTE   1
 8791  026034  012246                          MOV     (R2)+,-(SP)     ;MOVE DATA TO BE TYPED
 8792  026036  104403                          TYPOS                   ;TYPE DATA
 8793  026040     005                          .BYTE   5
 8794  026041     000                          .BYTE   0
 8795  026042  104401  035750                  TYPE    ,SPACE
 8796  026046  012346                          MOV     (R3)+,-(SP)     ;MOVE DATA TO BE TYPED.
 8797  026050  104403                          TYPOS                   ;TYPE DATA.
 8798  026052     006                          .BYTE   6
 8799  026053     001                          .BYTE   1
 8800  026054  104401  035750                  TYPE    ,SPACE
 8801  026060  012446                          MOV     (R4)+,-(SP)     ;MOVE DATA TO BE TYPED.
 8802  026062  104403                          TYPOS                   ;TYPE DATA.
 8803  026064     005                          .BYTE   5
 8804  026065     000                          .BYTE   0
 8805  026066  104401                          TYPE                    ;TYPE A CARRIAGE RETURN & LINE FEED.
 8806  026070  001227                          $CRLF
 8807  026072  005711                          TST     (R1)            ;HAVE WE TYPED ALL DH ENTRIES?
 8808  026074  001354                          BNE     19$             ;IF NOT, DO IT AGAIN.
 8809  026076  005713                          TST     (R3)            ;HAVE WE TYPED ALL DM ENTRIES?
 8810  026100  001352                          BNE     19$             ;IF NOT - ONE MORE TIME.
 8811  026102  104401  001227                  TYPE    ,$CRLF
 8812  026106  000207                  20$:    RTS     PC              ;IF YES, GO BACK TO MAIN PROGRAM.
 8813
 8814                                  ;THIS ROUTINE IS USED TO ACCEPT INPUT PARAMETERS FROM THE CONSOLE
 8815                                  ;TELETYPE
 8816
 8817  026110  104401                  INPARA: TYPE
 8818  026112  035507                          VCWC                    ;"ASK FOR NO. ADDRESSES BETWEEN VECTORS"
 8819  026114  104412                          RDOCT                   ;READ OCTAL NO. FM TTY
 8820  026116  012600                          MOV     (SP)+,R0        ;GET THE NO. HE TYPED
 8821  026120  001407                          BEQ     3$              ;BR IF HE TYPED <CR>
 8822  026122  022700  000010                  CMP     #10,R0          ;10(8) ADDRESSES BETWEEN VECTORS ?
 8823  026126  001406                          BEQ     4$              ;BR IF YES
 8824  026130  022700  000020                  CMP     #20,R0          ;20(8) ADDRESSES BETWEEN VECTORS ??
 8825  026134  001403                          BEQ     4$              ;BR IF YES
 8826  026136  000764                          BR      INPARA          ;ASK ALL OVER AGAIN
 8827  026140  012700  000020          3$:     MOV     #20,R0          ;SET UP CONSTANT FOR 20(8) ADDRESSES
 8828  026144  000207                  4$:     RTS     PC              ;RETURN TO CALLER
 8829
 8830
 8831
 8832  026146  004737  027244          INPARC: JSR     PC,DCACHE       ;DISABLE CACHE  ;;++D
 8833  026152  012700  177777                  MOV     #-1,R0          ;SET FLAG IN R0
```

```
 8834  026156  000137  002164                    JMP     BEGINA          ;GO ASK FOR SELECT PARAMETER
 8835
 8836  026162  004737  027244          INPARX:   JSR     PC,DCACHE       ;DISABLE CACHE  ;;++D
 8837  026166  012737  177777  030000            MOV     #-1,VCFLG       ;SET SETUP FLAG
 8838  026174  000137  002164                    JMP     BEGINA          ;GO START UP
 8839
 8840  026200  013701  030042          INPAR:    MOV     @#DHADRS,R1     ;MOVE ADDRESS OF FIRST DH INTO R1.
 8841  026204  032777  000001  152726            BIT     #BIT0,@SWR      ;ARE PARAMETERS TO BE INPUT MANUALLY?
 8842  026212  001405                            BEQ     2$              ;BRANCH IF NOT.
 8843  026214  104401                  1$:       TYPE                    ;ASK FOR DEVICE ADDRESS
 8844  026216  035064                            INMSG1
 8845  026220  104412                            RDOCT                   ;READ IN WHAT IS TYPED
 8846  026222  012601                            MOV     (SP)+,R1        ;GET THE NO. HE TYPED
 8847  026224  001403                            BEQ     INPAR1          ;BR IF DEFAULT
 8848  026226  004737  026412          2$:       JSR     PC,CHKADR       ;GO CHECK VALIDITY OF THE ADDR
 8849  026232  000770                            BR      1$              ;ERROR BRANCH
 8850
 8851  026234  013701  030104          INPAR1:   MOV     @#DHVEC,R1      ;MOVE FIRST DH VECTOR INTO R1.
 8852  026240  032777  000001  152672            BIT     #BIT0,@SWR      ;ARE PARAMETERS TO BE INPUT MANUALLY?
 8853  026246  001405                            BEQ     2$              ;BRANCH IF NOT.
 8854  026250  104401                  1$:       TYPE                    ;ASK FOR VECTOR ADDRESS
 8855  026252  035130                            INMSG2
 8856  026254  104412                            RDOCT                   ;READ IN WHAT HE TYPES
 8857  026256  012601                            MOV     (SP)+,R1        ;GET THE ADDRESS
 8858  026260  001403                            BEQ     INPAR3          ;BR IF DEFAULT
 8859  026262  004737  026526          2$:       JSR     PC,CHKVCT       ;GO CHECK VALIDITY OF VECTOR
 8860  026266  000770                            BR      1$              ;ERROR BRANCH
 8861
 8862  026270  013701  030314          INPAR3:   MOV     @#$DHSEL,R1     ;MOVE DEVICE SELECTION PARAMETER INTO R1.
 8863  026274  005700                            TST     R0              ;DID WE START AT 210?
 8864  026276  100404                            BMI     2$              ;BRANCH IF YES.
 8865  026300  032777  000001  152632            BIT     #BIT0,@SWR      ;IS PARAMETER TO BE INPUT MANUALLY?
 8866  026306  001405                            BEQ     1$              ;BRANCH IF NOT.
 8867  026310  104401                  2$:       TYPE                    ;ASK FOR DEVICE SELECTION PARAMETER
 8868  026312  035177                            INMSG3
 8869  026314  104412                            RDOCT                   ;READ IN WHAT HE TYPES
 8870  026316  012601                            MOV     (SP)+,R1        ;GET THE SELECT PARAMETER
 8871  026320  001402                            BEQ     INPAR4          ;BR IF  DEFAULT
 8872  026322  010137  027310          1$:       MOV     R1,DHSEL        ;SET UP DH11 SELECTION PARAMETER
 8873
 8874  026326  005700                  INPAR4:   TST     R0              ;DID WE START AT 210?
 8875  026330  100404                            BMI     3$              ;BRANCH IF YES.
 8876  026332  032777  000001  152600            BIT     #BIT0,@SWR      ;IS LINE SELECT PARAMETER TO BE INPUT MANUALLY?
 8877  026340  001410                            BEQ     1$              ;BRANCH IF NO.
 8878  026342  104401                  3$:       TYPE                    ;ASK FOR LINE SELECT PARAMETER
 8879  026344  035375                            INMSG6
 8880  026346  104412                            RDOCT                   ;GET WHAT HE TYPES
 8881  026350  012601                            MOV     (SP)+,R1        ;GET PARAMETER
 8882  026352  001403                            BEQ     1$              ;BR IF DEFAULT
 8883  026354  010137  027312                    MOV     R1,LINSEL       ;SET UP LINE SELECT PARAMETER
 8884  026360  000403                            BR      2$              ;CONTINUE
 8885  026362  012737  177777  027312  1$:       MOV     #-1,LINSEL      ;SET UP DEFAULT (ALL LINES)
 8886  026370  032777  000400  152542  2$:       BIT     #BIT8,@SWR      ;HALT AFTER SET UP ??
 8887  026376  001403                            BEQ     EXPAR           ;BR IF  NOT
 8888  026400  104401                            TYPE                    ;TYPE CONTINUE MESSAGE PRIOR TO HALTING
 8889  026402  035437                            INMSG7
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 8890  026404  000000                        HALT                    ;DEPRESS CONTINUE TO RESUME TESTING
 8891  026406  000137  002640        EXPAR:  JMP     START2          ;GO START UP THE PROGRAM
 8892
 8893
 8894  026412  020127  160020        CHKADR: CMP     R1,#160020      ;IS ADDRESS ABOVE OR EQUAL TO LOW LIMIT
 8895  026416  002001                        BGE     1$              ;BR IF YES
 8896  026420  000437                        BR      4$              ;BR IF NOT
 8897  026422  020127  160420        1$:     CMP     R1,#160420      ;IS IT BELOW THE HIGH LIMIT?
 8898  026426  002401                        BLT     2$              ;BR IF YES
 8899  026430  000433                        BR      4$              ;BR IF NOT
 8900  026432  032701  000017        2$:     BIT     #17,R1          ;CORRECT BOUNDARY ?
 8901  026436  001030                        BNE     4$              ;BR IF NOT
 8902  026440  062716  000002                ADD     #2,(SP)         ;MOVE RETURN PC AROUND ERROR BRANCH
 8903  026444  012702  027700                MOV     #DHADTB,R2      ;POINT TO BEGIN OF ADDR TABLE
 8904  026450  032777  000001  152462        BIT     #BIT0,@SWR      ;ARE WE AUTOSIZING?
 8905  026456  001011                        BNE     3$              ;BRANCH IF NOT.
 8906  026460  012703  030042                MOV     #DHADRS,R3      ;POINT TO BEGINNING OF AUTOSIZER
 8907                                                                ;DH ADDRESS TABLE.
 8908  026464  013704  030314                MOV     $DHSEL,R4
 8909  026470  012322                6$:     MOV     (R3)+,(R2)+     ;MOVE CONTENTS OF AUTOSIZER DH TABLE
 8910                                                                ;TO THE TABLE USED BY PROGRAM.
 8911  026472  006204                        ASR     R4
 8912  026474  005704                        TST     R4              ;HAVE WE MOVED ALL TABLE ENTRIES?
 8913  026476  001374                        BNE     6$              ;BRANCH IF NOT--ONE MORE TIME.
 8914  026500  000411                        BR      5$              ;RETURN TO INPUT ROUTINES.
 8915  026502  010122                3$:     MOV     R1,(R2)+        ;SETR UP A TABLE ENTRY
 8916  026504  062701  000020                ADD     #20,R1          ;GENERATE NEXT DH11 ADDR
 8917  026510  022702  027740                CMP     #DHADTB+40,R2   ;END OF TABLE ?
 8918  026514  001372                        BNE     3$              ;BR IF NOT
 8919  026516  000402                        BR      5$              ;RETURN TO INPUT ROUTINES
 8920  026520  104401                4$:     TYPE                    ;TELL HIM HE GOOFED
 8921  026522  035250                        INMSG4
 8922  026524  000207                5$:     RTS     PC              ;RETURN TO INPUT ROUTINES
 8923
 8924  026526  020127  000300        CHKVCT: CMP     R1,#300         ;IS ADDRESS ABOVE OR EQUAL TO LOW LIMIT
 8925  026532  002001                        BGE     1$              ;BR IF YES
 8926  026534  000436                        BR      4$              ;BR IF NOT
 8927  026536  020127  001000        1$:     CMP     R1,#1000        ;IS IT BELOW THE HIGH LIMIT?
 8928  026542  002401                        BLT     2$              ;BR IF YES
 8929  026544  000432                        BR      4$              ;BR IF NOT
 8930  026546  032701  000007        2$:     BIT     #7,R1           ;CORRECT BOUNDARY ?
 8931  026552  001027                        BNE     4$              ;BR IF NOT
 8932  026554  062716  000002                ADD     #2,(SP)         ;MOVE RETURN PC AROUND ERROR BRANCH
 8933  026560  012702  027740                MOV     #DHVCTB,R2      ;POINT TO BEGIN OF VECTOR TABLE
 8934  026564  032777  000001  152346        BIT     #BIT0,@SWR      ;ARE WE AUTOSIZING?
 8935  026572  001011                        BNE     3$              ;BRANCH IF NOT.
 8936  026574  012703  030104                MOV     #DHVEC,R3       ;POINT TO BEGINING OF AUTOSIZER
 8937                                                                ;DH VECTOR TABLE.
 8938  026600  013704  030314                MOV     $DHSEL,R4
 8939  026604  012322                6$:     MOV     (R3)+,(R2)+     ;MOVE CONTENTS OF AUTOSIZER VECTOR
 8940                                                                ;TABLE TO TABLE USED BY PROGRAM.
 8941  026606  006204                        ASR     R4
 8942  026610  005704                        TST     R4              ;HAVE WE MOVED ALL TABLE ENTRIES?
 8943  026612  001374                        BNE     6$              ;BRANCH IF NOT--ONE MORE TIME.
 8944  026614  000410                        BR      5$              ;RETURN TO INPUT ROUTINES.
 8945  026616  010122                3$:     MOV     R1,(R2)+        ;SETR UP A TABLE ENTRY
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 8946  026620  060001                          ADD     R0,R1           ;GENERATE NEXT DH11 ADDR
 8947  026622  022702  030000                  CMP     #DHVCTB+40,R2   ;END OF TABLE ?
 8948  026626  001373                          BNE     3$              ;BR IF NOT
 8949  026630  000402                          BR      5$              ;RETURN TO INPUT ROUTINES
 8950  026632  104401                  4$:     TYPE                    ;TELL HIM HE GOOFED
 8951  026634  035321                          INMSG5
 8952  026636  000207                  5$:     RTS     PC              ;RETURN TO INPUT ROUTINES
 8953
 8954                                  ;THESE TWO ROUTINES SERVICE UNEXPECTED BUS ERROR AND RSVD INSTR TRAPS
 8955
 8956  026640  012737  000340  001202  BUSER:  MOV     #340,$TMP0      ;SAVE THE PSW
 8957  026646  010637  001176                  MOV     SP,$REG6        ;SAVE THE SP
 8958  026652  012601                          MOV     (SP)+,R1        ;GET THE TRAP PC
 8959  026654  012602                          MOV     (SP)+,R2        ;GET THE TRAP PSW
 8960  026656  113700  001102                  MOVB    $TSTNM,R0       ;GET TEST NO.
 8961  026662  012706  001100                  MOV     #STACK,SP       ;RESET THE STACK POINTER
 8962  026666  004737  024462                  JSR     PC,SUER3        ;GO SET UP ERROR INFO
 8963  026672  012737  026702  001110          MOV     #1$,$LPERR      ;ALWAYS COME BACK TO 1$
 8964  026700  104027                          ERROR   27              ;UNEXPECTED BUS ERROR TRAP
 8965  026702  000005                  1$:     RESET                   ;PREPARE TO RESTART
 8966  026704  004737  027150                  JSR     PC,CHPS1        ;GO CLEAR PSW
 8967  026710  000137  002734                  JMP     REST1           ;GO RESTART THE PROGRAM
 8968
 8969  026714  012737  000340  001202  RESERR: MOV     #340,$TMP0      ;SAVE THE PSW
 8970  026722  010637  001176                  MOV     SP,$REG6        ;SAVE THE SP
 8971  026726  012601                          MOV     (SP)+,R1        ;GET THE TRAP PC
 8972  026730  012602                          MOV     (SP)+,R2        ;GET THE TRAP PSW
 8973  026732  113700  001102                  MOVB    $TSTNM,R0       ;GET TEST NO.
 8974  026736  012706  001100                  MOV     #STACK,SP       ;RESET THE STACK POINTER
 8975  026742  004737  024462                  JSR     PC,SUER3        ;GO SET UP ERROR INFO
 8976  026746  012737  026756  001110          MOV     #1$,$LPERR      ;ALWAYS COME BACK TO 1$
 8977  026754  104030                          ERROR   30              ;UNEXPECTED RSVD INSTR ERROR TRAP
 8978  026756  000005                  1$:     RESET                   ;PREPARE TO RESTART
 8979  026760  004737  027150                  JSR     PC,CHPS1        ;GO CLEAR PSW
 8980  026764  000137  002734                  JMP     REST1           ;GO RESTART THE PROGRAM
 8981
 8982                                  ;THIS ROUTINE IS CALLED WHEN A TEST NEEDS TO RESTORE THE TRAP
 8983                                  ;CATCHER IN THE DH11 VECTOR
 8984
 8985  026770  013703  027304          RESTRP: MOV     DHVCT,R3        ;GET VECTOR ADDRESS
 8986  026774  010313                          MOV     R3,(R3)         ;RESTORE THE TRAP CATCHER
 8987  026776  062723  000002                  ADD     #2,(R3)+
 8988  027002  005023                          CLR     (R3)+
 8989  027004  010313                          MOV     R3,(R3)
 8990  027006  062723  000002                  ADD     #2,(R3)+
 8991  027012  005023                          CLR     (R3)+
 8992  027014  000207                          RTS     PC              ;RETURN TO CALLING TEST
 8993
 8994                                  ;THIS ROUTINE CALLED BY ANY TEST THAT NEEDS A TIMING WAIT LOOP
 8995                                  ;"TIMEA" IS INITIALIZED BY THE CALLING ROUTINE TO THE MINIMUM REQUIRED
 8996                                  ;VALUE AND "TIMEB" IS CLEARED TO 000000. IF A TIME OUT OCCURS THIS
 8997                                  ;ROUTINE WILL MOVE THE RETURN PC AROUND THE "LOOP" BRANCH BACK IN
 8998                                  ;THE ROUTINE THAT CALLED IT TO ALLOW REPORTING AN ERROR MESSAGE
 8999
 9000  027016  005237  030352          TIMEIT: INC     TIMEB           ;COUNT B
 9001  027022  001005                          BNE     1$              ;BR IF NOT ZERO
```

```
 9002  027024  005337  030350                 DEC     TIMEA           ;COUNT TIME A
 9003  027030  001002                         BNE     1$              ;BR IF NO TIMEOUT
 9004  027032  062716  000002                 ADD     #2,(SP)         ;MOVE RETURN PC TO ALLOW ERROR REPORT
 9005  027036  000207                 1$:     RTS     PC              ;RETURN TO THE CALLING TEST
 9006
 9007                                 ;THIS ROUTINE CALLED BY THE AUTO ECHO TEST TO SET UP FOR TRANSFERRING
 9008                                 ;A BINARY COUNT TEST PATTERN ON ALL LINES
 9009
 9010  027040  012737  000020  001216 SETALL: MOV     #20,$TMP6       ;SET UP SIXTEEN LINES
 9011  027046  005002                         CLR     R2              ;INIT A TABLE INDEX REG
 9012  027050  012703  000200                 MOV     #200,R3         ;SET UP TO GENERATE HI BYTE OF EXPECTED DATA
 9013  027054  012704  000001                 MOV     #1,R4           ;SET UP INDEX REG TO ODD BYTES
 9014  027060  005011                         CLR     (R1)            ;START WITH LINE 00
 9015  027062  012761  037312  000006 1$:     MOV     #TBUF,CAR(R1)   ;SET UP BUS ADDR REG
 9016  027070  012761  177400  000010         MOV     #-400,BCR(R1)   ;SET UP BYTE COUNT REG
 9017  027076  012761  031403  000004         MOV     #31403,LPR(R1)  ;SET UP FOR 4800 BAUD/8 BIT CHARS
 9018  027104  105062  036312                 CLRB    RBUF(R2)        ;START WITH DATA CHAR OF 000
 9019  027110  110364  036312                 MOVB    R3,RBUF(R4)     ;SET UP HIGH BYTE OF EXPECTED DATA
 9020  027114  005211                         INC     (R1)            ;GEN NEW LINE NO. IN SCR
 9021  027116  005203                         INC     R3              ;UPDATE THE POINTERS AND DATA
 9022  027120  062702  000002                 ADD     #2,R2
 9023  027124  062704  000002                 ADD     #2,R4
 9024  027130  005337  001216                 DEC     $TMP6           ;COUNT ONE LINE DONE
 9025  027134  001352                         BNE     1$              ;BR TIL ALL 16 SET UP
 9026  027136  013737  027312  027560         MOV     LINSEL,LINACT   ;SET SOFTWARE FLAG FOR ALL LINES ACTIVE
 9027  027144  005011                         CLR     (R1)            ;PUT SCR REG BACK TO LINE 00
 9028  027146  000207                         RTS     PC              ;RETURN TO AUTO ECHO TEST
 9029
 9030
 9031                                 ;THIS ROUTINE IS CALLED TO SET PSW PRIORITY TO 000 IN ORDER
 9032                                 ;TO BE LSI11 COMPATIBLE
 9033
 9034  027150  012746  000000         CHPS1:  MOV     #0,-(SP)        ;NEW PSW
 9035  027154  012746  027162'                 MOV     #1$,-(SP)       ;NEW PC
 9036  027160  000002                         RTI                     ;CHANGE PSW
 9037  027162  000207                 1$:     RTS     PC              ;RETURN TO CALLING TEST
 9038
 9039                                 ;THIS ROUTINE DOES THE SAME THING EXCEPT IT SET THE PSW
 9040                                 ;PRIORITY TO 340 (LEVEL 7 ) TO LOCK OUT INTRS
 9041
 9042  027164  012746  000340         CHPS2:  MOV     #340,-(SP)      ;NEW PSW
 9043  027170  012746  027176                 MOV     #1$,-(SP)       ;NEW PC
 9044  027174  000002                         RTI                     ;CHANGE THE PSW
 9045  027176  000207                 1$:     RTS     PC              ;RETURN TO CALLING TEST
 9046
 9047                                 ;THIS ROUTINE IS ALSO FOR LSI11 COMPATIBILITY AND IT IS CALLED
 9048                                 ;TO SAVE THE PSW IN "$TMP0"
 9049
 9050  027200  005046                 SAPS:   CLR     -(SP)           ;TEMP STORAGE TO SAVE PSW
 9051  027202  013746  000034                 MOV     34,-(SP)        ;SAVE TRAP VECTOR POINTER
 9052  027206  012737  027216  000034         MOV     #1$,34          ;GO TO 1$ ON TRAP
 9053  027214  104400                         TRAP                    ;GO TO IT
 9054  027216  016666  000002  000006 1$:     MOV     2(SP),6(SP)     ;GET PSW SAVED
 9055  027224  012716  027232                 MOV     #2$,(SP)        ;GO TO 2$ ON RTI
 9056  027230  000002                         RTI
 9057  027232  012637  000034         2$:     MOV     (SP)+,34        ;RESTORE VECTOR
```

```
 9058  027236  012637  001202                MOV     (SP)+,$TMP0     ;FINALLY SAVE PSW IN $TMP0
 9059  027242  000207                        RTS     PC
 9060
 9061
 9062                                ;SUBROUTINE TO SIZE FOR AN 11/70 CENTRAL PROCESSOR      ;;++D
 9063                                ;       IF IT IS AN 11/70 CPU, CACHE WILL BE DISABLED
 9064                                ;       IF NOT AN 11/70 CPU, NO ACTION TAKEN
 9065                                ;
 9066                                ;CALLED BY              JSR     PC,DCACHE
 9067                                ;                       NO ARGUEMENTS PASSED
 9068                                ;
 9069                                ;
 9070  027244  013746  000004        DCACHE: MOV     @#4,-(SP)       ;SAVE TRAP INFO
 9071  027250  012737  027272  000004        MOV     #1$,@#4         ;SETUP FOR TIMEOUT
 9072  027256  005737  177746                TST     @#177746        ;TEST FOR CACHE
 9073  027262  012737  000014  177746        MOV     #14,@#177746    ;DISABLE CACHE
 9074  027270  000401                        BR      2$              ;EXIT, CACHE DISABLED
 9075  027272  022626                1$:     CMP     (SP)+,(SP)+     ;CLEAN UP STACK
 9076  027274  012637  000004        2$:     MOV     (SP)+,@#4
 9077  027300  000207                        RTS     PC              ;RETURN
 9078
 9079                                ;;*****************************************************************
 9080                                ;ADDITIONAL PROGRAM CONSTANTS AND VARIABLES
 9081                                ;;*****************************************************************
 9082
 9083          000002                        NRC=2           ;INDEX CONST. TO ACCESS NEXT RCVD CHAR REG
 9084          000004                        LPR=4           ;INDEX CONST. TO ACCESS LINE PARAMETER REG.
 9085          000006                        CAR=6           ;INDEX CONST. TO ACCESS CURRENT ADDRESS REG.
 9086          000010                        BCR=10          ;INDEX CONST. TO ACCESS BYTE COUNT REG.
 9087          000012                        BAR=12          ;INDEX CONST. TO ACCESS BUFFER ACTIVE REG.
 9088          000014                        BKR=14          ;INDEX CONST. TO ACCESS BREAK CONTROL REG.
 9089          000016                        SSR=16          ;INDEX CONST. TO ACCESS SILO STATUS REG.
 9090
 9091  027302  000000                DHADR:  0               ;HOLDS THE "SCR" ADDRESS OF THE DH11 UNDER TEST
 9092  027304  000000                DHVCT:  0               ;HOLDS THE 1ST VECTOR ADDRESS OF THE DH11 UNDER TEST
 9093  027306  000000                SELMSK: 0               ;BIT TST MARKER FOR SELECTING DH11'S
 9094  027310  000003                DHSEL:  3               ;SPECIFIES DH11'S SELECTED FOR TEST
 9095  027312  177777                LINSEL: 177777          ;SPECIFIES LINES TO TEST
 9096  027314  000000                LINMSK: 0               ;MARKER USED TO TEST FOR LINES TO TEST
 9097  027316  000000                LMSK1:  0               ;ALTERNATE MARKER TO SUPPORT THE
 9098                                                        ;SELECT LINES FEATURE
 9099  027320  000004                MSTCLR: .BLKW   4       ;FOUR WORD ADDRESS TABLE USED BY THE TEST THAT
 9100                                                        ;CHECKS OPERATION OF "MASTER CLR"
 9101
 9102  027330  177777                PATRNA: 177777          ;BIT PATTERNS USED WITH "CAR" AND "BCR" TESTS
 9103  027332  125252                        125252
 9104  027334  052525                        052525
 9105  027336  000000                        000000          ;TABLE TERMINATOR
 9106
 9107  027340  000060                PATRNB: 60              ;BIT PATTERNS USED IN "CAR" MEM EXT BIT TEST
 9108  027342  000300                        300
 9109  027344  000020                        20
 9110  027346  000100                        100
 9111  027350  000040                        40
 9112  027352  000200                        200
 9113  027354  000000                        0               ;TABLE TERMINATOR
```

```
 9114  027356  000000                        0                ;TABLE TERMINATOR
 9115
 9116                                  ;THIS TABLE STORES THE BYTE COUNT AND LINE PARAMETERS FOR THE
 9117                                  ;8 SUBTESTS IN THE MULTILINE PARITY/DATA TEST
 9118
 9119  027360  177400                  PRTYTB: -400                     ;256 CHARS
 9120  027362  027363                          27363                    ;2400 BAUD - ODD PARITY - 8 BITS
 9121  027364  177400                          -400                     ;256 CHARS
 9122  027366  027323                          27323                    ;2400 BAUD - EVEN PARITY - 8 BITS
 9123  027370  177600                          -200                     ;128 CHARS
 9124  027372  027362                          27362                    ;2400 BAUD - ODD PARITY - 7 BITS
 9125  027374  177600                          -200                     ;128 CHARS
 9126  027376  027322                          27322                    ;2400 BAUD - EVEN PARITY - 7 BITS
 9127  027400  177700                          -100                     ;64 CHARS
 9128  027402  027361                          27361                    ;2400 BAUD - ODD PARITY - 6 BITS
 9129  027404  177700                          -100                     ;64 CHARS
 9130  027406  027321                          27321                    ;2400 BAUD - EVEN PARITY - 6 BITS
 9131  027410  177740                          -40                      ;32 CHARS
 9132  027412  027360                          27360                    ;2400 BAUD - ODD PARITY - 5 BITS
 9133  027414  177740                          -40                      ;32 CHARS
 9134  027416  027320                          27320                    ;2400 BAUD - EVEN PARITY - 5 BITS
 9135
 9136                                  ;THIS 16 WORD TABLE CONTAINS THE TEST DATA USED BY THE AUTO ECHO
 9137                                  ;TEST (ALL 1'S DATA TABLE)
 9138
 9139  027420  100377                  AETAB:  100377           ;TEST DATA FOR LINE 00
 9140  027422  100777                          100777           ;TEST DATA FOR LINE 01
 9141  027424  101377                          101377
 9142  027426  101777                          101777
 9143  027430  102377                          102377
 9144  027432  102777                          102777
 9145  027434  103377                          103377
 9146  027436  103777                          103777
 9147  027440  104377                          104377
 9148  027442  104777                          104777
 9149  027444  105377                          105377
 9150  027446  105777                          105777
 9151  027450  106377                          106377
 9152  027452  106777                          106777
 9153  027454  107377                          107377
 9154  027456  107777                          107777           ;TEST DATA FOR LINE 17
 9155
 9156                                  ;THIS 16 WORD TABLE CONTAINS THE TEST DATA USED BY THE AUTO ECHO
 9157                                  ;TEST (ALL 0'S DATA TABLE)
 9158
 9159  027460  100000                  AETAB0: 100000           ;TEST DATA FOR LINE 00
 9160  027462  100400                          100400           ;TEST DATA FOR LINE 01
 9161  027464  101000                          101000
 9162  027466  101400                          101400
 9163  027470  102000                          102000
 9164  027472  102400                          102400
 9165  027474  103000                          103000
 9166  027476  103400                          103400
 9167  027500  104000                          104000
 9168  027502  104400                          104400
 9169  027504  105000                          105000
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 9170  027506  105400                    105400
 9171  027510  106000                    106000
 9172  027512  106400                    106400
 9173  027514  107000                    107000
 9174  027516  107400                    107400          ;TEST DATA FOR LINE 17
 9175
 9176                                ;THIS TABLE USED BY THE AUTO ECHO TEST 2 TO RESET ACTIVE BIT WHEN A
 9177                                ;LINE IS DONE
 9178
 9179  027520  000001                LINBIT: BIT00                   ;DEACTIVATE LINE 00
 9180  027522  000002                        BIT01                   ;DEACTIVATE LINE 01
 9181  027524  000004                        BIT02
 9182  027526  000010                        BIT03
 9183  027530  000020                        BIT04
 9184  027532  000040                        BIT05
 9185  027534  000100                        BIT06
 9186  027536  000200                        BIT07
 9187  027540  000400                        BIT08
 9188  027542  001000                        BIT09
 9189  027544  002000                        BIT10
 9190  027546  004000                        BIT11
 9191  027550  010000                        BIT12
 9192  027552  020000                        BIT13
 9193  027554  040000                        BIT14
 9194  027556  100000                        BIT15                   ;DEACTIVATE LINE 17
 9195
 9196  027560  000000                LINACT: 0                       ;MAINTAINS STATUS OF ACTIVE LINES
 9197                                                                ;DURING AUTO ECHO TEST 2
 9198
 9199
 9200                                ;THIS TABLE CONTAINS 16. COUNTERS USED BYN THE MULTI-LINE
 9201                                ;PARITY TEST TO KEEP TRACK OF TOTAL CHARS RECEIVED
 9202
 9203  027562  000020                MULPTB: .BLKW   16.             ;SIXTEEN WORD COUNTERS TABLE
 9204
 9205                                ;THIS 16 WORD TABLE CONTAINS THE TEST DATA USED BY THE BREAK BIT
 9206                                ;TEST
 9207
 9208  027622  120000                BRKTAB: 120000          ;TEST DATA FOR LINE 00
 9209  027624  120400                        120400          ;TEST DATA FOR LINE 01
 9210  027626  121000                        121000
 9211  027630  121400                        121400
 9212  027632  122000                        122000
 9213  027634  122400                        122400
 9214  027636  123000                        123000
 9215  027640  123400                        123400
 9216  027642  124000                        124000
 9217  027644  124400                        124400
 9218  027646  125000                        125000
 9219  027650  125400                        125400
 9220  027652  126000                        126000
 9221  027654  126400                        126400
 9222  027656  127000                        127000
 9223  027660  127400                        127400          ;TEST DATA FOR LINE 17
 9224
 9225  027662  131177                RGMSK1: 131177          ;MASK TO SPECIFY R/W BITS FOR NORMAL "SCR" REG TEST
```

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 9226  027664  046600                RGMSK2: 46600           ;MASK TO SPECIFY READ ONLY BITS IN "SCR" FOR NORMAL MODE TEST
 9227  027666  177767                RGMSK3: 177767          ;MASK TO SPECIFY R/W BITS IN "LPR"
 9228  027670  177777                RGMSK4: 177777          ;MASK TO SPECIFY R/W BITS IN "BKR"
 9229  027672  100077                RGMSK5: 100077          ;MASK TO SPECIFY R/W BITS IN "SSR"
 9230  027674  042200                RGMSK6: 42200           ;MASK TO SPECIFY READ ONLY BITS IN "SCR" FOR MAINT. MODE TEST
 9231  027676  030100                INTMSK: 30100           ;MASK USED TO SELECT INTR BITS TO TEST
 9232
 9233                                ;DH11 ADDRESS TABLE - THIS TABLE CONTAINS THE "SCR" ADDRESS FOR UP TO
 9234                                ;SIXTEEN DH11'S
 9235
 9236  027700  160020                DHADTB: 160020          ;ADDRESS OF FIRST DH11
 9237  027702  160040                        160040          ;ADDRESS OF SECOND DH11
 9238  027704  160060                        160060
 9239  027706  160100                        160100
 9240  027710  160120                        160120
 9241  027712  160140                        160140
 9242  027714  160160                        160160
 9243  027716  160200                        160200
 9244  027720  160220                        160220
 9245  027722  160240                        160240
 9246  027724  160260                        160260
 9247  027726  160300                        160300
 9248  027730  160320                        160320
 9249  027732  160340                        160340
 9250  027734  160360                        160360
 9251  027736  160400                        160400          ;ADDRESS OF THE LAST DH11
 9252
 9253                                ;DH11 VECTOR TABLE - THIS TABLE CONTAINS THE VECTOR ADDRESSES FOR UP
 9254                                ;TO SIXTEEN DH11'S
 9255
 9256  027740  000330                DHVCTB: 330             ;ADDRESS OF VECTOR FOR FIRST DH11
 9257  027742  000350                        350             ;ADDRESS OF VECTOR FOR SECOND DH11
 9258  027744  000370                        370
 9259  027746  000410                        410
 9260  027750  000430                        430
 9261  027752  000450                        450
 9262  027754  000470                        470
 9263  027756  000510                        510
 9264  027760  000530                        530
 9265  027762  000550                        550
 9266  027764  000570                        570
 9267  027766  000610                        610
 9268  027770  000630                        630
 9269  027772  000650                        650
 9270  027774  000670                        670
 9271  027776  000710                        710             ;ADDRESS OF VECTOR FOR LAST DH11
 9272
 9273  030000  000000                VCFLG:  0               ;VECTOR SET UP FLAGG
 9274
 9275
 9276                                ;BR PRIORITY LEVEL TABLE - THIS TABLE CONTAINS THE PRIORITY LEVELS
 9277                                ;FOR UP TO SIXTEEN DH11'S - THE RCVR LEVEL IS STORED IN THE LOW BYTE
 9278                                ;AND THE XMTTR LEVEL IN THE HIGH BYTE
 9279
 9280  030002  120240                BRLVL:  120240          ;BRLEVELS FOR FIRST DH11
 9281  030004  120240                        120240          ;BR LEVELS FOR SECOND DH11
```

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 9282  030006  120240                          120240
 9283  030010  120240                          120240
 9284  030012  120240                          120240
 9285  030014  120240                          120240
 9286  030016  120240                          120240
 9287  030020  120240                          120240
 9288  030022  120240                          120240
 9289  030024  120240                          120240
 9290  030026  120240                          120240
 9291  030030  120240                          120240
 9292  030032  120240                          120240
 9293  030034  120240                          120240
 9294  030036  120240                          120240
 9295  030040  120240                          120240          ;BR LEVELS FOR LAST DH11
 9296
 9297                                  ;THIS DH ADDRESS TABLE IS FILLED BY THE AUTOSIZER.
 9298
 9299  030042                          DHADRS:
 9300  030042  000000                  .WORD   0
 9301  030044  000000                  .WORD   0
 9302  030046  000000                  .WORD   0
 9303  030050  000000                  .WORD   0
 9304  030052  000000                  .WORD   0
 9305  030054  000000                  .WORD   0
 9306  030056  000000                  .WORD   0
 9307  030060  000000                  .WORD   0
 9308  030062  000000                  .WORD   0
 9309  030064  000000                  .WORD   0
 9310  030066  000000                  .WORD   0
 9311  030070  000000                  .WORD   0
 9312  030072  000000                  .WORD   0
 9313  030074  000000                  .WORD   0
 9314  030076  000000                  .WORD   0
 9315  030100  000000                  .WORD   0
 9316  030102  000000                  .WORD   0
 9317
 9318                                  ;THIS DH VECTOR TABLE IS FILLED BY THE AUTOSIZER.
 9319
 9320  030104                          DHVEC:
 9321  030104  000000                  .WORD   0
 9322  030106  000000                  .WORD   0
 9323  030110  000000                  .WORD   0
 9324  030112  000000                  .WORD   0
 9325  030114  000000                  .WORD   0
 9326  030116  000000                  .WORD   0
 9327  030120  000000                  .WORD   0
 9328  030122  000000                  .WORD   0
 9329  030124  000000                  .WORD   0
 9330  030126  000000                  .WORD   0
 9331  030130  000000                  .WORD   0
 9332  030132  000000                  .WORD   0
 9333  030134  000000                  .WORD   0
 9334  030136  000000                  .WORD   0
 9335  030140  000000                  .WORD   0
 9336  030142  000000                  .WORD   0
 9337
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 9338                                   ;THIS DM ADDRESS TABLE IS FILLED BY THE AUTOSIZER.
 9339
 9340  030144                           DMADRS:
 9341  030144  000000                   .WORD   0
 9342  030146  000000                   .WORD   0
 9343  030150  000000                   .WORD   0
 9344  030152  000000                   .WORD   0
 9345  030154  000000                   .WORD   0
 9346  030156  000000                   .WORD   0
 9347  030160  000000                   .WORD   0
 9348  030162  000000                   .WORD   0
 9349  030164  000000                   .WORD   0
 9350  030166  000000                   .WORD   0
 9351  030170  000000                   .WORD   0
 9352  030172  000000                   .WORD   0
 9353  030174  000000                   .WORD   0
 9354  030176  000000                   .WORD   0
 9355  030200  000000                   .WORD   0
 9356  030202  000000                   .WORD   0
 9357  030204  000000                   .WORD   0
 9358
 9359                                   ;THIS DM VECTOR TABLE IS FILLED BY THE AUTOSIZER.
 9360
 9361  030206                           DMVEC:
 9362  030206  000000                   .WORD   0
 9363  030210  000000                   .WORD   0
 9364  030212  000000                   .WORD   0
 9365  030214  000000                   .WORD   0
 9366  030216  000000                   .WORD   0
 9367  030220  000000                   .WORD   0
 9368  030222  000000                   .WORD   0
 9369  030224  000000                   .WORD   0
 9370  030226  000000                   .WORD   0
 9371  030230  000000                   .WORD   0
 9372  030232  000000                   .WORD   0
 9373  030234  000000                   .WORD   0
 9374  030236  000000                   .WORD   0
 9375  030240  000000                   .WORD   0
 9376  030242  000000                   .WORD   0
 9377  030244  000000                   .WORD   0
 9378
 9379
 9380  030246                           $LNSEL:
 9381  030246  000001                   .WORD   1
 9382  030250  000002                   .WORD   2
 9383  030252  000004                   .WORD   4
 9384  030254  000010                   .WORD   10
 9385  030256  000020                   .WORD   20
 9386  030260  000040                   .WORD   40
 9387  030262  000100                   .WORD   100
 9388  030264  000200                   .WORD   200
 9389  030266  000400                   .WORD   400
 9390  030270  001000                   .WORD   1000
 9391  030272  002000                   .WORD   2000
 9392  030274  004000                   .WORD   4000
 9393  030276  010000                   .WORD   10000
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 9394  030300  020000                    .WORD   20000
 9395  030302  040000                    .WORD   40000
 9396  030304  100000                    .WORD   100000
 9397
 9398  030306  000000                    ADRVEC: 0               ;ADDRESSES BETWEEN VECTORS - FILLED BY THE AUTOSIZER
 9399  030310  000000                    DHMCSR: 0               ;MODEM CONTROL CONTROL AND STATUS REGISTER.
 9400  030312  000000                    DHMLSR: 0               ;MODEM CONTROL LINE STATUS REGISTER.
 9401  030314  000000                    $DHSEL: 0               ;DEVICE SELECT PARAMETER - FILLLED BY THE AUTOSIZER.
 9402  030316     000                    DHRLVL: .BYTE   0               ;BR LEVEL FOR RCVR
 9403  030317     000                    DHTLVL: .BYTE   0               ;BR LEVEL FOR XMITTER
 9404  030320  000000                    DHNUM:  0               ;CONTAINS NUMBER OF THE DH11 UNDER TEST
 9405  030322  000000                    LINE:   0               ;CONTINES NUMBER OF THE LINE UNDER TEST
 9406  030324  000000                    LINEA:  0               ;LOCATION TO SAVE LINE NUMBER
 9407                                    ;ADDRESS POINTERS TO SET UP TABLES WHEN INPUTTING PARAMETERS
 9408
 9409  030326  000000                    ADPTR:  0                       ;POINTS TO ADDRESS TABLE
 9410  030330  000000                    VCPTR:  0                       ;POINTS TO VECTOR TABLE
 9411  030332  000000                    BRPTR:  0                       ;POINTS TO BR LEVEL TABLE
 9412                                    ;THE FOLLOWING TEN CONSTANTS ARE USED BY THE MODEM CONTROL PORTION OF THIS PROGRAM.
 9413
 9414
 9415          000400                    STEP=400
 9416          000001                    LINENA=1
 9417          000002                    TRMRDY=2
 9418          000004                    RS=4
 9419          000010                    SECTX=10
 9420          000020                    SECRX=20
 9421          000040                    CS=40
 9422          000100                    CO=100
 9423          000200                    RING=200
 9424          002000                    CLRMUX=2000
 9425
 9426  030334  000000                    TDATA1: 0               ;DATA BUFFER FOR BASIC DATA TEST
 9427  030336  000037                    TDATA2: 37              ;TEST DATA FOR FIVE BIT CHAR
 9428  030340  000077                            77              ;TEST DATA FOR SIX BIT CHAR
 9429  030342  000177                            177             ;TEST DATA FOR SEVEN BIT CHAR
 9430  030344  000377                            377             ;TEST DATA FOR EIGHT BIT CHAR
 9431  030346  000000                    TITFLG: 0               ;FLAG TO ALLOW PRINTING TITLE ONLY ONCE
 9432  030350  000000                    TIMEA:  0               ;GENERAL PURPOSE TIMERS
 9433  030352  000000                    TIMEB:  0
 9434  030354  000000                    TIMEC:  0               ;TIMER FOR TIMING TESTS
 9435  030356  000000                    TNULL:  0               ;CONTAINS TWO NULL CHARS USED BY BREAK TEST
 9436
 9437
 9438
```

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                                        ;;*****************************************************************
                                        ;ERROR MESSAGE INFORMATION - MESSAGE BUFFERS AND POINTERS
                                        ;;*****************************************************************

                                        ;INFORMATION FOR MESSAGE 1

030360  044104  030461  051040  EM1:    .ASCIZ  'DH11 REGISTER REFERENCE CAUSED TIMEOUT'
030366  043505  051511  042524
030374  020122  042522  042506
030402  042522  041516  020105
030410  040503  051525  042105
030416  052040  046511  047505
030424  052125     000
030427     040  050050  024503  DH1:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   DEVADR  REGADR'
030434  020040  020040  050050
030442  024523  020040  020040
030450  051450  024520  020040
030456  020040  042524  052123
030464  020040  042040  053105
030472  042101  020122  051040
030500  043505  042101  000122
                                        .EVEN
030506  001116  001202  001176  DT1:    .WORD   $ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,0
030514  001162  001164  001166
030522  000000

                                        ;INFORMATION FOR MESSAGE 2

030524  054523  052123  046505  EM2:    .ASCIZ  'SYSTEM CONTROL REGISTER ERROR'
030532  041440  047117  051124
030540  046117  051040  043505
030546  051511  042524  020122
030554  051105  047522  000122
030562  024040  041520  020051  DH2:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   DEVADR  REGADR   WAS     S/B'
030570  020040  024040  051520
030576  020051  020040  024040
030604  050123  020051  020040
030612  052040  051505  020124
030620  020040  042504  040526
030626  051104  020040  042522
030634  040507  051104  020040
030642  053440  051501  020040
030650  020040  051440  041057
030656     000
        030660
                                        .EVEN
030660  001116  001202  001176  DT2:    .WORD   $ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,$REG3,$REG4,0
030666  001162  001164  001166
030674  001170  001172  000000

                                        ;INFORMATION FOR MESSAGE 3

030702  044104  030461  046440  EM3:    .ASCIZ  'DH11 MASTER CLEAR FAILED TO CLR SPECIFIED REG'
030710  051501  042524  020122
030716  046103  040505  020122
030724  040506  046111  042105
030732  052040  020117  046103
```

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 9495  030740  020122  050123  041505
 9496  030746  043111  042511  020104
 9497  030754  042522  000107
 9498
 9499                              ;INFORMATION FOR MESSAGE 4
 9500
 9501  030760  044514  042516  050040  EM4:    .ASCIZ  'LINE PARAMETER REGISTER ERROR'
 9502  030766  051101  046501  052105
 9503  030774  051105  051040  043505
 9504  031002  051511  042524  020122
 9505  031010  051105  047522  000122
 9506
 9507                              ;INFORMATION FOR MESSAGE 5
 9508
 9509  031016  051102  040505  020113  EM5:    .ASCIZ  'BREAK CONTROL REGISTER ERROR'
 9510  031024  047503  052116  047522
 9511  031032  020114  042522  044507
 9512  031040  052123  051105  042440
 9513  031046  051122  051117     000
 9514
 9515                              ;INFORMATION FOR MESSAGE 6
 9516
 9517  031053     123  046111  020117  EM6:    .ASCIZ  'SILO STATUS REGISTER ERROR'
 9518  031060  052123  052101  051525
 9519  031066  051040  043505  051511
 9520  031074  042524  020122  051105
 9521  031102  047522  000122
 9522
 9523                              ;INFORMATION FOR MESSAGE 7
 9524
 9525  031106  052503  051122  047105  EM7:    .ASCIZ  'CURRENT ADDRESS REGISTER ERROR - LINE #XX'
 9526  031114  020124  042101  051104
 9527  031122  051505  020123  042522
 9528  031130  044507  052123  051105
 9529  031136  042440  051122  051117
 9530  031144  026440  046040  047111
 9531  031152  020105  054043  000130
 9532
 9533                              ;INFORMATION FOR MESSAGE 10
 9534
 9535  031160  054502  042524  041440  EM10:   .ASCIZ  'BYTE COUNTER REGISTER ERROR - LINE #XX'
 9536  031166  052517  052116  051105
 9537  031174  051040  043505  051511
 9538  031202  042524  020122  051105
 9539  031210  047522  020122  020055
 9540  031216  044514  042516  021440
 9541  031224  054130     000
 9542
 9543                              ;INFORMATION FOR MESSAGE 11
 9544
 9545  031227     125  042516  050130  EM11:   .ASCIZ  'UNEXPECTED DH11 RCVR INTERRUPT'
 9546  031234  041505  042524  020104
 9547  031242  044104  030461  051040
 9548  031250  053103  020122  047111
 9549  031256  042524  051122  050125
 9550  031264  000124
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 9551
 9552                                   ;INFORMATION FOR MESSAGE 12
 9553
 9554  031266  047125  054105  042520  EM12:   .ASCIZ  'UNEXPECTED DH11 XMITTR INTERRUPT'
 9555  031274  052103  042105  042040
 9556  031302  030510  020061  046530
 9557  031310  052111  051124  044440
 9558  031316  052116  051105  052522
 9559  031324  052120     000
 9560
 9561                                   ;INFORMATION FOR MESSAGE 13
 9562
 9563  031327     103  040510  020122  EM13:   .ASCIZ  'CHAR AVAILABLE FAILED TO GENERATE RCVR INTERRUPT'
 9564  031334  053101  044501  040514
 9565  031342  046102  020105  040506
 9566  031350  046111  042105  052040
 9567  031356  020117  042507  042516
 9568  031364  040522  042524  051040
 9569  031372  053103  020122  047111
 9570  031400  042524  051122  050125
 9571  031406  000124
 9572
 9573                                   ;INFORMATION FOR MESSAGE 14
 9574
 9575  031410  051124  047101  046523  EM14:   .ASCIZ  'TRANSMITTER NPR LOGIC ERROR - LINE #  '
 9576  031416  052111  042524  020122
 9577  031424  050116  020122  047514
 9578  031432  044507  020103  051105
 9579  031440  047522  020122  020055
 9580  031446  044514  042516  021440
 9581  031454  020040     000
 9582
 9583                                   ;INFORMATION FOR MESSAGE 15
 9584
 9585  031457     130  044515  052124  EM15:   .ASCIZ  'XMITTR FAILED TO INTERRUPT - LINE #  '
 9586  031464  020122  040506  046111
 9587  031472  042105  052040  020117
 9588  031500  047111  042524  051122
 9589  031506  050125  020124  020055
 9590  031514  044514  042516  021440
 9591  031522  020040     000
 9592
 9593                                   ;INFORMATION FOR MESSAGE 16
 9594
 9595  031525     122  053103  020122  EM16:   .ASCIZ  'RCVR FAILED TO INTERRUPT'
 9596  031532  040506  046111  042105
 9597  031540  052040  020117  047111
 9598  031546  042524  051122  050125
 9599  031554  000124
 9600
 9601                                   ;INFORMATION FOR MESSAGE 17
 9602
 9603  031556  051124  047101  046523  EM17:   .ASCIZ  'TRANSMITTER TIMING ERROR - LINE #  '
 9604  031564  052111  042524  020122
 9605  031572  044524  044515  043516
 9606  031600  042440  051122  051117
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 9607  031606  026440  046040  047111
 9608  031614  020105  020043  000040
 9609  031622  024040  041520  020051  DH6:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   DEVADR  SPEED   TIMEB   TIMEC'
 9610  031630  020040  024040  051520
 9611  031636  020051  020040  024040
 9612  031644  050123  020051  020040
 9613  031652  052040  051505  020124
 9614  031660  020040  042504  040526
 9615  031666  051104  020040  050123
 9616  031674  042505  020104  020040
 9617  031702  044524  042515  020102
 9618  031710  020040  044524  042515
 9619  031716  000103
 9620
 9621                          ;INFORMATION FOR MESSAGE 20
 9622
 9623  031720  042522  042503  053111  EM20:   .ASCIZ  'RECEIVER TIMING ERROR - LINE #  '
 9624  031726  051105  052040  046511
 9625  031734  047111  020107  051105
 9626  031742  047522  020122  020055
 9627  031750  044514  042516  021440
 9628  031756  020040     000
 9629
 9630                          ;INFORMATION FOR MESSAGE 21
 9631
 9632  031761     122  053103  020122  EM21:   .ASCIZ  'RCVR FAILED TO INTERRUPT - LINE #  '
 9633  031766  040506  046111  042105
 9634  031774  052040  020117  047111
 9635  032002  042524  051122  050125
 9636  032010  020124  020055  044514
 9637  032016  042516  021440  020040
 9638  032024     000
 9639
 9640                          ;INFORMATION FOR MESSAGE 22
 9641
 9642  032025     103  040510  020122  EM22:   .ASCIZ  'CHAR AVAIL FAILED TO SET ON TIME - LINE #  '
 9643  032032  053101  044501  020114
 9644  032040  040506  046111  042105
 9645  032046  052040  020117  042523
 9646  032054  020124  047117  052040
 9647  032062  046511  020105  020055
 9648  032070  044514  042516  021440
 9649  032076  020040     000
 9650
 9651                          ;INFORMATION FOR MESSAGE 23
 9652
 9653  032101     102  051501  041511  EM23:   .ASCIZ  'BASIC DATA TEST ERROR - LINE #  '
 9654  032106  042040  052101  020101
 9655  032114  042524  052123  042440
 9656  032122  051122  051117  026440
 9657  032130  046040  047111  020105
 9658  032136  020043  000040
 9659  032142  024040  041520  020051  DH7:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   DEVADR  CHRLNG   WAS     S/B'
 9660  032150  020040  024040  051520
 9661  032156  020051  020040  024040
 9662  032164  050123  020051  020040
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 9663  032172  052040  051505  020124
 9664  032200  020040  042504  040526
 9665  032206  051104  020040  044103
 9666  032214  046122  043516  020040
 9667  032222  053440  051501  020040
 9668  032230  020040  051440  041057
 9669  032236     000
 9670
 9671                              ;INFORMATION FOR MESSAGE 24
 9672
 9673  032237     101  052125  020117  EM24:   .ASCIZ  'AUTO ECHO TEST ERROR - LINE #  '
 9674  032244  041505  047510  052040
 9675  032252  051505  020124  051105
 9676  032260  047522  020122  020055
 9677  032266  044514  042516  021440
 9678  032274  020040     000
 9679
 9680                              ;INFORMATION FOR MESSAGE 25
 9681
 9682  032277     102  042522  045501  EM25:   .ASCIZ  'BREAK BIT TEST ERROR - LINE #  '
 9683  032304  041040  052111  052040
 9684  032312  051505  020124  051105
 9685  032320  047522  020122  020055
 9686  032326  044514  042516  021440
 9687  032334  020040     000
 9688
 9689                              ;INFORMATION FOR MESSAGE 26
 9690
 9691  032337     110  046101  026506  EM26:   .ASCIZ  'HALF-DUPLEX TEST ERROR - LINE #  '
 9692  032344  052504  046120  054105
 9693  032352  052040  051505  020124
 9694  032360  051105  047522  020122
 9695  032366  020055  044514  042516
 9696  032374  021440  020040     000
 9697
 9698                              ;INFORMATION FOR MESSAGE 27
 9699
 9700  032401     125  042516  050130  EM27:   .ASCIZ  'UNEXPECTED BUS ERROR TRAP'
 9701  032406  041505  042524  020104
 9702  032414  052502  020123  051105
 9703  032422  047522  020122  051124
 9704  032430  050101     000
 9705  032433     040  050050  024503  DH3:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   TRPPC   TRPPS '
 9706  032440  020040  020040  050050
 9707  032446  024523  020040  020040
 9708  032454  051450  024520  020040
 9709  032462  020040  042524  052123
 9710  032470  020040  052040  050122
 9711  032476  041520  020040  052040
 9712  032504  050122  051520  000040
 9713                              .EVEN
 9714  032512  001116  001202  001176  DT3:    .WORD   $ERRPC,$TMP0,$REG6,$REG0,$REG1,$REG2,0
 9715  032520  001162  001164  001166
 9716  032526  000000
 9717
 9718                              ;INFORMATION    FOR MESSAGE 30
```

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 9719
 9720  032530  047125  054105  042520  EM30:   .ASCIZ  'UNEXPECTED RSVD INSTR TRAP'
 9721  032536  052103  042105  051040
 9722  032544  053123  020104  047111
 9723  032552  052123  020122  051124
 9724  032560  050101     000
 9725
 9726                                  ;INFORMATION FOR MESSAGE 31
 9727
 9728  032563     101  052125  020117  EM31:   .ASCIZ  'AUTO ECHO DATA COMPARE ERROR - LINE #  '
 9729  032570  041505  047510  042040
 9730  032576  052101  020101  047503
 9731  032604  050115  051101  020105
 9732  032612  051105  047522  020122
 9733  032620  020055  044514  042516
 9734  032626  021440  020040     000
 9735  032633     040  050050  024503  DH4:    .ASCIZ  ' (PC)    (PS)    (SP)    TEST   WASADR  SBADR    WAS      S/B'
 9736  032640  020040  020040  050050
 9737  032646  024523  020040  020040
 9738  032654  051450  024520  020040
 9739  032662  020040  042524  052123
 9740  032670  020040  053440  051501
 9741  032676  042101  020122  051440
 9742  032704  040502  051104  020040
 9743  032712  020040  040527  020123
 9744  032720  020040  020040  027523
 9745  032726  000102
 9746
 9747                                  ;INFORMATION FOR MESSAGE 32
 9748
 9749  032730  052501  047524  042440  EM32:   .ASCIZ  'AUTO ECHO TEST TIMEOUT - LINE #  '
 9750  032736  044103  020117  042524
 9751  032744  052123  052040  046511
 9752  032752  047505  052125  026440
 9753  032760  046040  047111  020105
 9754  032766  020043  000040
 9755  032772  024040  041520  020051  DH5:    .ASCIZ  ' (PC)   (LPRG)   TEST'
 9756  033000  020040  046050  051120
 9757  033006  024507  020040  052040
 9758  033014  051505  000124
 9759                                  .EVEN
 9760  033020  001116  001202  001206  DT4:    .WORD   $ERRPC,$TMP0,$TMP2,0
 9761  033026  000000
 9762
 9763                                  ;INFORMATION FOR MESSAGE 33
 9764
 9765  033030  040520  044522  054524  EM33:   .ASCIZ  'PARITY LOGIC TEST ERROR - LINE #  '
 9766  033036  046040  043517  041511
 9767  033044  052040  051505  020124
 9768  033052  051105  047522  020122
 9769  033060  020055  044514  042516
 9770  033066  021440  020040     000
 9771
 9772                                  ;INFORMATION FOR MESSAGE 34
 9773
 9774  033073     115  046125  044524  EM34:   .ASCIZ  'MULTI-LINE PARITY DATA TEST ERROR - LINE #   - SUBTEST #  '
```

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 9775  033100  046055  047111  020105
 9776  033106  040520  044522  054524
 9777  033114  042040  052101  020101
 9778  033122  042524  052123  042440
 9779  033130  051122  051117  026440
 9780  033136  046040  047111  020105
 9781  033144  020043  020040  020055
 9782  033152  052523  052102  051505
 9783  033160  020124  020043  000040
 9784
 9785                          ;INFORMATION FOR MESSAGE 35
 9786
 9787  033166  052515  052114  026511  EM35:   .ASCIZ  'MULTI-LINE PARITY DATA TEST TIMEOUT'
 9788  033174  044514  042516  050040
 9789  033202  051101  052111  020131
 9790  033210  040504  040524  052040
 9791  033216  051505  020124  044524
 9792  033224  042515  052517  000124
 9793  033232  024040  041520  020051  DH14:   .ASCIZ  ' (PC)   (LPRG)  ACTLIN'
 9794  033240  020040  046050  051120
 9795  033246  024507  020040  041501
 9796  033254  046124  047111     000
 9797          033262                  .EVEN
 9798  033262  001116  001202  001210  DT6:    .WORD   $ERRPC,$TMP0,$TMP3,0
 9799  033270  000000
 9800
 9801                          ;INFORMATION FOR MESSAGE 36
 9802
 9803  033272  044103  051101  040440  EM36:   .ASCIZ  'CHAR AVAILABLE TIMEOUT'
 9804  033300  040526  046111  041101
 9805  033306  042514  052040  046511
 9806  033314  047505  052125     000
 9807
 9808                          ;INFORMATION FOR MESSAGE 37
 9809
 9810  033321     104  052101  020101  EM37:   .ASCIZ  'DATA COMPARE ERROR - LINE #  '
 9811  033326  047503  050115  051101
 9812  033334  020105  051105  047522
 9813  033342  020122  020055  044514
 9814  033350  042516  021440  020040
 9815  033356     000
 9816
 9817                          ;INFORMATION FOR MESSAGE 40
 9818
 9819  033357     102  043125  042506  EM40:   .ASCIZ  'BUFFER ACTIVE REG ERROR - LINE #  '
 9820  033364  020122  041501  044524
 9821  033372  042526  051040  043505
 9822  033400  042440  051122  051117
 9823  033406  026440  046040  047111
 9824  033414  020105  020043  000040
 9825
 9826                          ;INFORMATION FOR MESSAGE 41
 9827
 9828  033422  041522  051126  043040  EM41:   .ASCIZ  'RCVR FALSE INTERRUPT'
 9829  033430  046101  042523  044440
 9830  033436  052116  051105  052522
```

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 9831  033444  052120     000
 9832
 9833                              ;INFORMATION FOR MESSAGE 42
 9834
 9835  033447     123  046111  020117  EM42:   .ASCIZ  'SILO OVERFLOW ERROR'
 9836  033454  053117  051105  046106
 9837  033462  053517  042440  051122
 9838  033470  051117     000
 9839
 9840                              ;INFORMATION FOR MESSAGE 43
 9841
 9842  033473     123  046111  020117  EM43:   .ASCIZ  'SILO OVERFLOW FAILED TO GENERATE RCVR INTERRUPT'
 9843  033500  053117  051105  046106
 9844  033506  053517  043040  044501
 9845  033514  042514  020104  047524
 9846  033522  043440  047105  051105
 9847  033530  052101  020105  041522
 9848  033536  051126  044440  052116
 9849  033544  051105  052522  052120
 9850  033552     000
 9851
 9852                              ;INFORMATION FOR MESSAGE 44
 9853
 9854  033553     116  047117  042440  EM44:   .ASCIZ  'NON EX MEMORY FAILED TO GENERATE XMITTR INTERRUPT'
 9855  033560  020130  042515  047515
 9856  033566  054522  043040  044501
 9857  033574  042514  020104  047524
 9858  033602  043440  047105  051105
 9859  033610  052101  020105  046530
 9860  033616  052111  051124  044440
 9861  033624  052116  051105  052522
 9862  033632  052120     000
 9863
 9864                              ;INFORMATION FOR MESSAGE 45
 9865
 9866  033635     130  044515  020124  EM45:   .ASCIZ  'XMIT DONE FAILED TO GENERATE XMITTR INTERRUPT'
 9867  033642  047504  042516  043040
 9868  033650  044501  042514  020104
 9869  033656  047524  043440  047105
 9870  033664  051105  052101  020105
 9871  033672  046530  052111  051124
 9872  033700  044440  052116  051105
 9873  033706  052522  052120     000
 9874
 9875                              ;INFORMATION FOR MESSAGE 46
 9876
 9877  033713     103  051125  042522  EM46:   .ASCIZ  'CURRENT ADDRESS MEMORY PATTERNS TEST ERROR - LINE #  '
 9878  033720  052116  040440  042104
 9879  033726  042522  051523  046440
 9880  033734  046505  051117  020131
 9881  033742  040520  052124  051105
 9882  033750  051516  052040  051505
 9883  033756  020124  051105  047522
 9884  033764  020122  020055  044514
 9885  033772  042516  021440  020040
 9886  034000     000
```

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 9887  034001     040  050050  024503  DH10:   .ASCIZ  ' (PC)   LINEWR  PATTRN   TEST   DEVADR  REGADR   WAS     S/B'
 9888  034006  020040  046040  047111
 9889  034014  053505  020122  050040
 9890  034022  052101  051124  020116
 9891  034030  020040  042524  052123
 9892  034036  020040  042040  053105
 9893  034044  042101  020122  051040
 9894  034052  043505  042101  020122
 9895  034060  020040  040527  020123
 9896  034066  020040  020040  027523
 9897  034074  000102
 9898                          .EVEN
 9899  034076  001116  001202  001204  DT5:    .WORD   $ERRPC,$TMP0,$TMP1,$REG0,$REG1,$REG2,$REG3,$REG4,0
 9900  034104  001162  001164  001166
 9901  034112  001170  001172  000000
 9902
 9903                          ;INFORMATION FOR MESSAGE 47
 9904
 9905  034120  054502  042524  041440  EM47:   .ASCIZ  'BYTE COUNT MEMORY PATTERNS TEST ERROR - LINE #  '
 9906  034126  052517  052116  046440
 9907  034134  046505  051117  020131
 9908  034142  040520  052124  051105
 9909  034150  051516  052040  051505
 9910  034156  020124  051105  047522
 9911  034164  020122  020055  044514
 9912  034172  042516  021440  020040
 9913  034200     000
 9914                          ;INFORMATION FOR MESSAGE 50
 9915
 9916  034201     124  051505  020124  EM50:   .ASCIZ  'TEST TIMEOUT WAITING FOR XMIT DONE - LINE #  '
 9917  034206  044524  042515  052517
 9918  034214  020124  040527  052111
 9919  034222  047111  020107  047506
 9920  034230  020122  046530  052111
 9921  034236  042040  047117  020105
 9922  034244  020055  044514  042516
 9923  034252  021440  020040     000
 9924
 9925                          ;INFORMATION FOR MESSAGE 51
 9926
 9927  034257     116  051120  046040  EM51:   .ASCIZ  'NPR LOGIC TEST 2 ERROR'
 9928  034264  043517  041511  052040
 9929  034272  051505  020124  020062
 9930  034300  051105  047522  000122
 9931  034306  024040  041520  020051  DH11:   .ASCIZ  ' (PC)   LINACT  LINCHK   TEST   DEVADR  REGADR   WAS     S/B'
 9932  034314  020040  044514  040516
 9933  034322  052103  020040  044514
 9934  034330  041516  045510  020040
 9935  034336  052040  051505  020124
 9936  034344  020040  042504  040526
 9937  034352  051104  020040  042522
 9938  034360  040507  051104  020040
 9939  034366  053440  051501  020040
 9940  034374  020040  051440  041057
 9941  034402     000
 9942
```

```
 9943                                   ;INFORMATION FOR MESSAGE 52
 9944
 9945  034403     102  051501  041511  EM52:   .ASCIZ  'BASIC DATA COMPARE ERROR'
 9946  034410  042040  052101  020101
 9947  034416  047503  050115  051101
 9948  034424  020105  051105  047522
 9949  034432  000122
 9950
 9951                                   ;INFORMATION FOR MESSAGE 53
 9952
 9953  034434  024040  041520  020051  DH12:   .ASCIZ  ' (PC)   SPEED    (SP)    TEST   DEVADR  REGADR   WAS     S/B'
 9954  034442  020040  050123  042505
 9955  034450  020104  020040  024040
 9956  034456  050123  020051  020040
 9957  034464  052040  051505  020124
 9958  034472  020040  042504  040526
 9959  034500  051104  020040  042522
 9960  034506  040507  051104  020040
 9961  034514  053440  051501  020040
 9962  034522  020040  051440  041057
 9963  034530     000
 9964
 9965                                   ;INFORMATION FOR MESSAGE 55
 9966
 9967  034531     040  050050  024503  DH13:   .ASCIZ  ' (PC)    (PS)    (SP)    TEST   DEVADR  CHRLNG  SCRWAS  SCRS/B'
 9968  034536  020040  020040  050050
 9969  034544  024523  020040  020040
 9970  034552  051450  024520  020040
 9971  034560  020040  042524  052123
 9972  034566  020040  042040  053105
 9973  034574  042101  020122  041440
 9974  034602  051110  047114  020107
 9975  034610  051440  051103  040527
 9976  034616  020123  051440  051103
 9977  034624  027523  000102
 9978
 9979                                   ;INFORMATIOPN FOR MESSAGE 56
 9980
 9981  034630  053117  051105  052522  EM56:   .ASCIZ  'OVERRUN BIT FAILED TO SET - LINE #  '
 9982  034636  020116  044502  020124
 9983  034644  040506  046111  042105
 9984  034652  052040  020117  042523
 9985  034660  020124  020055  044514
 9986  034666  042516  021440  020040
 9987  034674     000
 9988
 9989                                   ;INFORMATION FOR MESSAGE 57
 9990
 9991  034675     123  047524  040522  EM57:   .ASCIZ  'STORAGE OVERFLOW BIT FAILED - LINE #  '
 9992  034702  042507  047440  042526
 9993  034710  043122  047514  020127
 9994  034716  044502  020124  040506
 9995  034724  046111  042105  026440
 9996  034732  046040  047111  020105
 9997  034740  020043  000040
 9998
```

```
 9999                                   ;INFORMATION FOR MESSAGE 60
10000
10001  034744  020040  024040  041520  DH15:   .ASCIZ  /   (PC)  DEVADR    LINE   /
10002  034752  020051  042040  053105
10003  034760  042101  020122  020040
10004  034766  046040  047111  020105
10005  034774  020040     000
10006          035000                  .EVEN
10007                                  ;MISCELLANEOUS MESSAGES
10008
10009  035000  005015  055103  044104  TITLE:  .ASCIZ  <15><12>'CZDHM-D-0  DH11 DIAGNOSTIC'<15><12>
10010  035006  026515  026504  020060
10011  035014  042040  030510  020061
10012  035022  044504  043501  047516
10013  035030  052123  041511  005015
10014  035036     000
10015  035037     015  052012  051505  TITLE2: .ASCIZ  <15><12>'TESTING DH11 #  '<15><12>
10016  035044  044524  043516  042040
10017  035052  030510  020061  020043
10018  035060  006440  000012
10019  035064  005015  054524  042520  INMSG1: .ASCIZ  <15><12>'TYPE SCR ADDRESS FOR FIRST DH11'<15><12>
10020  035072  051440  051103  040440
10021  035100  042104  042522  051523
10022  035106  043040  051117  043040
10023  035114  051111  052123  042040
10024  035122  030510  006461  000012
10025  035130  005015  054524  042520  INMSG2: .ASCIZ  <15><12>'TYPE VECTOR ADDRESS FOR FIRST DH11'<15><12>
10026  035136  053040  041505  047524
10027  035144  020122  042101  051104
10028  035152  051505  020123  047506
10029  035160  020122  044506  051522
10030  035166  020124  044104  030461
10031  035174  005015     000
10032  035177     015  052012  050131  INMSG3: .ASCIZ  <15><12>'TYPE DH11 DEVICE SELECTION PARAMETER'<15><12>
10033  035204  020105  044104  030461
10034  035212  042040  053105  041511
10035  035220  020105  042523  042514
10036  035226  052103  047511  020116
10037  035234  040520  040522  042515
10038  035242  042524  006522  000012
10039  035250  005015  047111  040526  INMSG4: .ASCIZ  <15><12>'INVALID DH11 SCR ADDRESS - TRY AGAIN'<15><12>
10040  035256  044514  020104  044104
10041  035264  030461  051440  051103
10042  035272  040440  042104  042522
10043  035300  051523  026440  052040
10044  035306  054522  040440  040507
10045  035314  047111  005015     000
10046  035321     015  044412  053116  INMSG5: .ASCIZ  <15><12>'INVALID DH11 VECTOR ADDRESS - TRY AGAIN'<15><12>
10047  035326  046101  042111  042040
10048  035334  030510  020061  042526
10049  035342  052103  051117  040440
10050  035350  042104  042522  051523
10051  035356  026440  052040  054522
10052  035364  040440  040507  047111
10053  035372  005015     000
10054  035375     015  052012  050131  INMSG6: .ASCIZ  <15><12>'TYPE LINE SELECTION PARAMETER'<15><12>
```

```
10055  035402  020105  044514  042516
10056  035410  051440  046105  041505
10057  035416  044524  047117  050040
10058  035424  051101  046501  052105
10059  035432  051105  005015     000
10060  035437     015  042012  050105  INMSG7: .ASCIZ  <15><12>'DEPRESS "CONTINUE" TO START TESTING'<15><12>
10061  035444  042522  051523  021040
10062  035452  047503  052116  047111
10063  035460  042525  020042  047524
10064  035466  051440  040524  052122
10065  035474  052040  051505  044524
10066  035502  043516  005015     000
10067
10068  035507     015  052012  050131  VCWC:   .ASCIZ  <15><12>'TYPE NO. OF ADDRESSES (OCTAL) BETWEEN VECTORS (10 OR 20)'<15><1
10069  035514  020105  047516  020056
10070  035522  043117  040440  042104
10071  035530  042522  051523  051505
10072  035536  024040  041517  040524
10073  035544  024514  041040  052105
10074  035552  042527  047105  053040
10075  035560  041505  047524  051522
10076  035566  024040  030061  047440
10077  035574  020122  030062  006451
10078  035602  000012
10079  035604  047516  042040  030510  MSG1:   .ASCIZ  /NO DH11'S WERE FOUND./<15><12>
10080  035612  023461  020123  042527
10081  035620  042522  043040  052517
10082  035626  042116  006456  000012
10083  035634  047516  042040  020110  MSG2:   .ASCIZ  'NO DH RECEIVER INTERRUPT OCCURRED.'<15><12>
10084  035642  042522  042503  053111
10085  035650  051105  044440  052116
10086  035656  051105  052522  052120
10087  035664  047440  041503  051125
10088  035672  042522  027104  005015
10089  035700     000
10090  035701     116  020117  047515  MSG3:   .ASCIZ  'NO MODEM CONTROL INTERRUPT OCCURRED.'<15><12>
10091  035706  042504  020115  047503
10092  035714  052116  047522  020114
10093  035722  047111  042524  051122
10094  035730  050125  020124  041517
10095  035736  052503  051122  042105
10096  035744  006456  000012
10097  035750  020040  000040          SPACE:  .ASCIZ  '  '
10098  035754  005015  044104  030461  DEVMAP: .ASCII  <15><12>'DH11, MODEM CONTROL DEVICE MAP:'<15><12>
10099  035762  020054  047515  042504
10100  035770  020115  047503  052116
10101  035776  047522  020114  042504
10102  036004  044526  042503  046440
10103  036012  050101  006472     012
10104  036017     015  042012  030510          .ASCII  <15><12>'DH11   DH11   MODEM CONTROL   MODEM CONTROL'
10105  036024  020061  020040  044104
10106  036032  030461  020040  046440
10107  036040  042117  046505  041440
10108  036046  047117  051124  046117
10109  036054  020040  046440  042117
10110  036062  046505  041440  047117
```

```
10111  036070  051124  046117
10112  036074  005015  042101  051522          .ASCIZ  <15><12>'ADRS   VECT    ADRS      VECT'<15><12><15><12>
10113  036102  020040  053040  041505
10114  036110  020124  020040  040440
10115  036116  051104  020123  020040
10116  036124  020040  053040  041505
10117  036132  006524  006412  000012
10118  036140  005015  047515  042504  MSG4:   .ASCIZ  <15><12>'MODEM CONTROL ERROR, RUN DZDHK DIAGNOSTIC'<15><12>
10119  036146  020115  047503  052116
10120  036154  047522  020114  051105
10121  036162  047522  026122  051040
10122  036170  047125  042040  042132
10123  036176  045510  042040  040511
10124  036204  047107  051517  044524
10125  036212  006503  000012
10126  036216  005015  047516  046440  MSG5:   .ASCIZ  <15><12>/NO MODEM CONTROL FOUND/<15><12>
10127  036224  042117  046505  041440
10128  036232  047117  051124  046117
10129  036240  043040  052517  042116
10130  036246  005015     000
10131          036252                  .EVEN
10132                                  ;SIXTEEN CHAR COUNTERS USED BY THE AUTO ECHO TEST #3
10133
10134  036252  000020                  RCNT:   .BLKW   16.
10135
10136                                  ;256. WORD RECEIVER INPUT BUFFER
10137
10138  036312  000400                  RBUF:   .BLKW   256.
10139
10140
10141                                  ;256(10) BYTE TRANSMITTER OUTPUT DATA BUFFER
10142
10143                                  .EVEN
10144  037312  000400                  TBUF:   .BLKB   256.
10145
10146          000001                  .END
```

```
ABASE = 000000           2437    2478
ACDW1 = 000000           2437    2480
ACDW2 = 000000           2437    2481
ACPUOP= 000000           2437    2452
ADDW0 = 000000           2437    2482
ADDW1 = 000000           2437    2483
ADDW10= 000000           2437    2492
ADDW11= 000000           2437    2493
ADDW12= 000000           2437    2494
ADDW13= 000000           2437    2495
ADDW14= 000000           2437    2496
ADDW15= 000000           2437    2497
ADDW2 = 000000           2437    2484
ADDW3 = 000000           2437    2485
ADDW4 = 000000           2437    2486
ADDW5 = 000000           2437    2487
ADDW6 = 000000           2437    2488
ADDW7 = 000000           2437    2489
ADDW8 = 000000           2437    2490
ADDW9 = 000000           2437    2491
ADEVCT= 000000           2437    2443
ADEVM = 000000           2437    2479
ADPTR   030326           2938*   2945*   2953    7643*   9409#
ADRVEC  030306           2927    8777*   9398#
AENV  = 000000           2437    2448
AENVM = 000000           2437    2449
AETAB   027420           6725    6832    6960    7002    7006    7007    9139#
AETABO  027460           6795    9159#
AFATAL= 000000           2437    2440
AMADR1= 000000           2437    2465
AMADR2= 000000           2437    2469
AMADR3= 000000           2437    2472
AMADR4= 000000           2437    2475
AMAMS1= 000000           2437    2459
AMAMS2= 000000           2437    2467
AMAMS3= 000000           2437    2470
AMAMS4= 000000           2437    2473
AMSGAD= 000000           2437    2445
AMSGLG= 000000           2437    2446
AMSGTY= 000000           2437    2439
AMTYP1= 000000           2437    2460
AMTYP2= 000000           2437    2468
AMTYP3= 000000           2437    2471
AMTYP4= 000000           2437    2474
APASS = 000000           2437    2442
APRIOR= 000000           2437
APTCSU= 000040           8027    8132#
APTENV= 000001           7783    8020    8088    8130#
APTSIZ= 000200           2896    8129#
APTSPO= 000100           8022    8090    8131#
ASWREG= 000000           2437    2450
ATESTN= 000000           2437    2441
AUNIT = 000000           2437    2444
AUSWR = 000000           2437    2451
AUTOS.  025140           2922    8616#
AVECT1= 000000           2437    2476
```

```
AVECT2= 000000  2437  2477
BAR   = 000012  5251* 5282  5286  5388* 5876* 5970* 6087* 6209* 6326* 6379  6471* 6562* 6632
                6638  6746* 6858* 6973* 7103* 7135* 7139  7148  7253* 7257  7264  7266  7348*
                9087#
BCR   = 000010  4081  4237  4401  4570  5249* 5305  5310  5413  5424  5873* 5967* 6085* 6205*
                6322* 6393  6468* 6740* 6853* 6963* 7101* 7132* 7251* 7346* 8569* 8581* 8596*
                9016* 9086#
BEGIN   002156  2226  2854#
BEGINA  002164  2856# 8834  8838
BIT0  = 000001  2358# 2920  2925  8841  8852  8865  8876  8904  8934
BIT00 = 000001  2348# 2358  9179
BIT01 = 000002  2347# 2357  9180
BIT02 = 000004  2346# 2356  9181
BIT03 = 000010  2345# 2355  9182
BIT04 = 000020  2344# 2354  9183
BIT05 = 000040  2343# 2353  9184
BIT06 = 000100  2342# 2352  4878  5516  9185
BIT07 = 000200  2341# 2351  4879  5264  5892  5987  9186
BIT08 = 000400  2340# 2350  7722  9187
BIT09 = 001000  2339# 2349  3311  3313  3324  3325  3336  4877  4957  5037  5115  6325  7730
                7794  9188
BIT1  = 000002  2357# 8778
BIT10 = 002000  2338# 5039  7417  9189
BIT11 = 004000  2337# 3089  4789  4874  4954  5034  5112  5247  5316  5383  5514  5606  5669
                5758  5871  5964  6081  6203  6319  6461  6552  6579  6586  6608  6639  6653
                6724  6847  6958  7096  7129  7247  7343  7737  9190
BIT12 = 010000  2336# 4959  9191
BIT13 = 020000  2335# 5038  5116  5252  7778  9192
BIT14 = 040000  2334# 4958  6091  6097  6113  6583  7374  7708  9193
BIT15 = 100000  2333# 5117  5400  5515  5609  5613  5674  5677  5762  5766  5894  5987  6760
                6789  6920  7019  7281  7361  7374  9194
BIT2  = 000004  2356#
BIT3  = 000010  2355#
BIT4  = 000020  2354#
BIT5  = 000040  2353#
BIT6  = 000100  2352# 5804
BIT7  = 000200  2351#
BIT8  = 000400  2350# 8886
BIT9  = 001000  2349# 5965
BKR   = 000014  3080  3486  3593* 3727  3829* 4702* 6470* 7134* 9088#
BPTVEC= 000014  2365#
BRKTAB  027622  7082  9208#
BRLVL   030002  2940  9280#
BRPTR   030332  2940* 2947* 2955  7645* 9411#
BUSER   026640  2911  8956#
CAR   = 000006  3939  4165  4313  4486  4686* 4696* 4703  5293  5299  5429  5440  5874* 5968*
                6084* 6206* 6321* 6407  6469* 6741* 6742* 6851* 6852* 6962* 7100* 7131* 7250*
                7345* 8568* 8595* 9015* 9085#
CHKADR  026412  8848  8894#
CHKVCT  026526  8859  8924#
CHPS1   027150  4792  4880  4960  5040  5118  5253  5322  5517  5553  6565  6569  8966  8979
                9034#
CHPS2   027164  4788  4876  4956  5036  5114  5246  5512  6556  9042#
CKSWR = 104407  7705  7770  7793  8392#
CLCABC  024716  5245  5384  6738  7097  7248  8566#
CLRMUX= 002000  7440  7497  9424#
```

```
CO     = 000100          7509    9422#
CR     = 000015          2273#   8066    8076
CRLF   = 000200          2274#   8037    8076
CS     = 000040          7509    9421#
DCACHE  027244           2854    8441    8832    8836    9070#
DDISP  = 177570          2280#   2401    2884
DEVMAP  035754           8781   10098#
DHADR   027302           2953*   6318    6377    6548    6846    7707    8528*   9091#
DHADRS  030042           8618    8626    8673    8689    8782    8840    8906    9299#
DHADTB  027700           2938    8903    8917    9236#
DHMCSR  030310           7424*   7425    7427    7435*   7436    7440*   7442*   7444*   7447    7458*   7462*   7494*   7497*
                         7500*   7502*   7505    7514*   7519*   7550*   7555*   7557*   7560    7569*   7574*   7605*   7610*
                         7612*   7615    7624*   7629*   9399#
DHMLSR  030312           7425*   7426*   7443*   7446    7464*   7467    7491*   7501*   7504    7520*   7523    7547*   7556*
                         7559    7575*   7578    7602*   7611*   7614    7630*   7633    9400#
DHNUM   030320           2941*   2944*   2957    7421    7642*   9404#
DHRLVL  030316           2955*   4776    4870    4950    5030    5108    5511    6559    9402#
DHSEL   027310           2948    7648    8872*   9094#
DHTLVL  030317           4779    4873    4953    5033    5111    5237    9403#
DHVCT   027304           2954*   4774    4868    4948    5028    5106    5234    5317    5509    5555    6557    8985    9092#
DHVCTB  027740           2939    8933    8947    9256#
DHVEC   030104           8690    8771    8772    8774    8783    8851    8936    9320#
DH1     030427           2520    9452#
DH10    034001           2781    2788    9887#
DH11    034306           2802    9931#
DH12    034434           2816    2823    9953#
DH13    034531           2830    9967#
DH14    033232           2718    9793#
DH15    034744           2850   10001#
DH2     030562           2527    2534    2541    2548    2555    2562    2569    2576    2583    2590    2597    2604    2611
                         2632    2639    2654    2661    2668    2704    2739    2760    2767    2774    2795    2809    2837
                         2844    9472#
DH3     032433           2675    2682    9705#
DH4     032633           2689    2711    2732    9735#
DH5     032772           2696    2725    2746    2753    9755#
DH6     031622           2618    2625    9609#
DH7     032142           2646    9659#
DISPLA  001142           2401#   2884*   2892*   7752*   7773*
DISPRE  000174           2222#   2892
DMADRS  030144           7420    8625    8731    8784    9340#
DMVEC   030206           8732    8785    9361#
DOIT11  017624           7428    7432#   7469    7471
DOIT15  020022           7491#   7525    7527
DOIT16  020220           7547#   7580    7582
DOIT17  020410           7602#   7635    7637
DSWR   = 177570          2279#   2400    2883
DT1     030506           2521    9461#
DT2     030660           2528    2535    2542    2549    2556    2563    2570    2577    2584    2591    2598    2605    2612
                         2619    2626    2633    2640    2647    2655    2662    2669    2690    2705    2712    2733    2740
                         2761    2768    2775    2796    2810    2817    2824    2831    2838    2845    9484#
DT3     032512           2676    2683    9714#
DT4     033020           2697    2726    2747    2754    2851    9760#
DT5     034076           2782    2789    2803    9899#
DT6     033262           2719    9798#
EMTVEC= 000030           2368#   2867*   2868*
EM1     030360           2519    9445#
```

```
EM10    031160          2568    4111    4244    6403    9535#
EM11    031227          2575    9545#
EM12    031266          2582    9554#
EM13    031327          2589    9563#
EM14    031410          2596    5328    9575#
EM15    031457          2603    5268    9585#
EM16    031525          2610    9595#
EM17    031556          2617    5918    9603#
EM2     030524          2526    9467#
EM20    031720          2624    6011    9623#
EM21    031761          2631    9632#
EM22    032025          2638    2822    2829    5992    6227    6345    6489    9642#
EM23    032101          2645    6242    9653#
EM24    032237          2653    6766    6782    9673#
EM25    032277          2660    7124    7154    7173    7190    9682#
EM26    032337          2667    7271    7286    9691#
EM27    032401          2674    9700#
EM3     030702          2533    9490#
EM30    032530          2681    9720#
EM31    032563          2688    6896    6911    7012    9728#
EM32    032730          2695    6871    9749#
EM33    033030          2703    6503    9765#
EM34    033073          2710    6615    6618    9774#
EM35    033166          2717    9787#
EM36    033272          2724    9803#
EM37    033321          2731    6368    9810#
EM4     030760          2540    9501#
EM40    033357          2738    6389    9819#
EM41    033422          2745    9828#
EM42    033447          2752    9835#
EM43    033473          2759    9842#
EM44    033553          2766    9854#
EM45    033635          2773    9866#
EM46    033713          2780    4346    4518    9877#
EM47    034120          2787    4434    4602    9905#
EM5     031016          2547    9509#
EM50    034201          2794    2815    5406    5899    7366    9916#
EM51    034257          2801    9927#
EM52    034403          2808    9945#
EM56    034630          2836    7387    9981#
EM57    034675          2843    6104    6124    6138    9991#
EM6     031053          2554    9517#
EM7     031106          2561    3969    4172    4715    6417    9525#
ENDA    020576          7419    7431    7604    7640#   7649
ERRVEC= 000004          2361#   2881    2882*   2893*   2911*   2912*   3008    3009*   3024*   7713    7714*   7716*   7719*
EXPAR   026406          8887    8891#
GNS   = ****** U        2221    8384    8385    8386    8387    8388    8390    8392    8393    8394    8395
GTSWR = 104406          2907    8390#
HT    = 000011          2271#   8035    8076
INMSG1  035064          8844    10019#
INMSG2  035130          8855    10025#
INMSG3  035177          8868    10032#
INMSG4  035250          8921    10039#
INMSG5  035321          8951    10046#
INMSG6  035375          8879    10054#
INMSG7  035437          8889    10060#
```

```
INPAR   026200            2936    8840#
INPARA  026110            2929    8817#   8826
INPARC  026146            2227    8832#
INPARX  026162            2225    8836#
INPAR1  026234            8847    8851#
INPAR3  026270            2935    8858    8862#
INPAR4  026326            8871    8874#
INTMSK  027676            4781    9231#
IOTVEC= 000020            2366#   2865*   2866*   8691*   8692*   8733*   8759*
LDBCR   024760            5385    8579#
LDTBF1  024330            2961    8449#
LF    = 000012            2272#   8070    8076
LINACT  027560            6561*   6625*   6646    6652    6857*   6917*   6918    6972*   7020*   9026*   9196#
LINBIT  027520            6625    6917    7020    9179#
LINE    030322            3944    3948    3956    3960    3968    3976*   4086    4090    4098    4102    4110    4118*   4169
                          4171    4241    4243    4319    4337    4407    4425    4491    4509    4575    4593    4693    4706
                          5244    5248    5267    5327    5386    5401    5405    5414    5421    5430    5437    5872    5895
                          5898    5917    5966    5988    5991    6010    6083    6098    6103    6118    6123    6137    6204
                          6223    6226    6233    6241    6320    6341    6344    6358    6367    6388    6402    6416    6463
                          6465    6484    6488    6502    6739    6762    6765    6781    6794*   6850    6870    6880    6910
                          7098    7123    7130    7153    7172    7189    7249    7270    7282    7285    7344    7360    7365
                          7371    7386    7438    7496    7552    7607    7706*   8514    8516*   8518*   8520*   8527*   9405#
LINEA   030324            4319*   4328    4407*   4416    4491*   4500    4575*   4584    8495    9406#
LINENA= 000001            7443    7451    7501    7509    7517    7556    7564    7572    7611    7619    7627    9416#
LINMSK  027314            5251    5388    5876    5970    6087    6209    6326    6470    6471    6746    6857    7103    7134
                          7135    7253    7348    8517*   8521*   8523    9096#
LINSEL  027312            3940    3941*   3979*   4082    4083*   4121*   6555    6561    6562    6598    6733    6840    6858
                          6882    6972    6973    6997    7090    8523    8883*   8885*   9026    9095#
LMSK1   027316            6726*   6730*   6733    6833*   6837*   6840    7083*   7087*   7090    9097#
LPR   = 000004            3081    3338*   3402    3582*   3649    3817*   4695*   5250*   5387*   5875*   5969*   6086*   6207*
                          6208*   6323*   6467*   6554    6745*   6757*   6776*   6789*   6854*   6868    6920*   6964*   6984
                          7019*   7102*   7133*   7252*   7347*   8597*   9017*   9084#
MSG1    035604            8675    10079#
MSG2    035634            8715    10083#
MSG3    035701            8744    10090#
MSG4    036140            2849    10118#
MSG5    036216            7430    10126#
MSTCLR  027320            3074    3086    9099#
MULPTB  027562            6623*   8606    8608    9203#
MUX11   017632            7435#
MUX11A  017662            7440#
MUX11B  017712            7445#   7460
MUX11C  017740            7450    7453#
MUX11D  017752            7454    7456    7458#
MUX11E  017766            7462#
MUX15   020034            7494#
MUX15A  020064            7499#
MUX15B  020106            7503#   7516
MUX15C  020134            7508    7511#
MUX15D  020142            7512    7514#
MUX15E  020160            7518#
MUX16   020232            7550#
MUX16A  020254            7554#
MUX16B  020276            7558#   7571
MUX16C  020324            7563    7566#
MUX16D  020332            7567    7569#
```

```
MUX16E  020350          7573#
MUX17   020422          7605#
MUX17A  020444          7609#
MUX17B  020466          7613#   7626
MUX17C  020514          7618    7621#
MUX17D  020522          7622    7624#
MUX17E  020540          7628#
NRC    = 000002         5530    5536    5683    6108    6109    6231    6349    6493    6499    6590    6610    6771    6778
                        6862    6988    7008    7179    7186    7375    7383    9083#
PATRNA  027330          4314    4402    9102#
PATRNB  027340          4677    9107#
PIRQ   = 177772         2278#
PIRQVE= 000240          2372#
PRTYTB  027360          6541    6545    9119#
PR0    = 000000         2295#
PR1    = 000040         2296#
PR2    = 000100         2297#
PR3    = 000140         2298#
PR4    = 000200         2299#
PR5    = 000240         2300#
PR6    = 000300         2301#
PR7    = 000340         2302#
PS     = 177776         2275#   2276    7437*   7495*   7551*   7606*   8707*   8737*
PSW    = 177776         2276#
PWRVEC= 000024          2367#   2871*   2872*   8400*   8401*   8410*   8416*   8428*   8429*
RBUF    036312          6324    6350    6354    6374    6604    6609    6611    6622*   6885    6890    6891    6915*   8598*
                        8599*   9018*   9019*   10138#
RCNT    036252          6961    7001*   7016    10134#
RDCHR  = 104410         8247    8393#
RDLIN  = 104411         8319    8394#
RDOCT  = 104412         8395#   8819    8845    8856    8869    8880
RESERR  026714          2913    8969#
RESTRP  026770          4811    4901    4981    5061    5139    6570    8985#
RESTRT  002676          2944#   2952
REST1   002734          2950#   8967    8980
RESVEC= 000010          2362#   2913*   2914*
RGMSK1  027662          3157    9225#
RGMSK2  027664          3223    9226#
RGMSK3  027666          3404    3651    3657    3661    9227#
RGMSK4  027670          3488    3729    3735    3738    9228#
RGMSK5  027672          3574    3807    3813    3816    9229#
RGMSK6  027674          3304    9230#
RING   = 000200         7564    9423#
RS     = 000004         7556    7564    7575    9418#
RSTRTA  002744          2949    2953#   7651    8433
SAPS    027200          4796    4803    4883    4892    4963    4972    5043    5052    5121    5130    5262    5275    5285
                        5297    5308    5398    5522    5535    5547    5773    5782    5909    6002    6096    6116    6131
                        6219    6336    6383    6397    6411    6481    6497    6607    6756    6775    6888    6904    7005
                        7113    7145    7162    7184    7263    7278    7357    7381    8460    8472    9050#
SECRX  = 000020         7619    9420#
SECTX  = 000010         7611    7619    7630    9419#
SELINE  024544          3942    3954    4084    4096    4166    4238    4317    4405    4489    4573    4691    5238    5381
                        5867    5960    6079    6198    6314    6459    6735    6842    7092    7245    7341    7432    7492
                        7548    7603    8514#
SELMSK  027306          2942*   2948    2950*   7646*   7648    9093#
SETALL  027040          6848    9010#
```

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SPACE   035750          8795    8800    10097#
SSR   = 000016          3079    3166*   3176*   3231*   3314*   3326*   3412*   3422*   3496*   3506*   3572    3659*   3672*
                        3739*   3750*   3805    3949*   3961*   4091*   4103*   4174*   4185*   4246*   4257*   4329*   4335*
                        4417*   4423*   4501*   4507*   4585*   4591*   4676    5515*   5529    5548    5604    5667    5756
                        6128    6133    6134    6921    7107    7116    7159    7165    9089#
STACK = 001100          2266#   2863    4787    4810    4875    4900    4955    4980    5035    5060    5113    5138    5241
                        5323    5513    5552    6547    6568    8961    8974
START1  002500          2911#
START2  002640          2932    2938#   2951    7685    8891
STEP  = 000400          7458    7514    7569    7624    9415#
STKLMT= 177774          2277#
SUER1   024352          3018    8460#
SUER2   024412          3093    3172    3181    3236    3320    3332    3344    3418    3427    3502    3511    3589    3600
                        3667    3678    3745    3756    3824    3836    3966    4108    4180    4190    4252    4262    4712
                        5624    5696    6239    6365    8472#
SUER2A  024416          4798    4805    4888    4897    4968    4977    5048    5057    5126    5135    5265    5277    5288
                        5300    5311    5403    5525    5537    5549    5775    5786    5896    5915    5989    6008    6101
                        6121    6135    6224    6342    6386    6400    6414    6486    6500    6612    6763    6779    6893
                        6908    7009    7121    7151    7170    7187    7268    7283    7363    7384    8473#
SUER3   024462          8486#   8962    8975
SUER4   024500          4343    4431    4515    4599    5425    5441    8494#
SUNUM   024636          2956    3967    4109    4170    4242    4344    4432    4516    4600    4713    5266    5326    5404
                        5897    5916    5990    6009    6102    6122    6136    6225    6240    6343    6366    6387    6401
                        6415    6487    6501    6613    6616    6764    6780    6869    6894    6909    7010    7122    7152
                        7171    7188    7269    7284    7364    7385    8541#
SUPPAR  025020          6553    8590#
SWR     001140          2400#   2861    2883*   2885    2891*   2898*   2905    2920    2925    7417    7708    7722    7724
                        7730    7737    7778    7790    7794    8143    8180*   8408    8421*   8778    8841    8852    8865
                        8876    8886    8904    8934
SWREG   000176          2223#   2891    2905    8143    8156
SW0   = 000001          2330#
SW00  = 000001          2320#   2330
SW01  = 000002          2319#   2329
SW02  = 000004          2318#   2328
SW03  = 000010          2317#   2327
SW04  = 000020          2316#   2326
SW05  = 000040          2315#   2325
SW06  = 000100          2314#   2324
SW07  = 000200          2313#   2323
SW08  = 000400          2312#   2322
SW09  = 001000          2311#   2321
SW1   = 000002          2329#
SW10  = 002000          2310#
SW11  = 004000          2309#
SW12  = 010000          2308#
SW13  = 020000          2307#
SW14  = 040000          2306#
SW15  = 100000          2305#
SW2   = 000004          2328#
SW3   = 000010          2327#
SW4   = 000020          2326#
SW5   = 000040          2325#
SW6   = 000100          2324#
SW7   = 000200          2323#
SW8   = 000400          2322#
SW9   = 001000          2321#
```

```
TBITVE= 000014  2363#
TBUF    037312  6321    6353    6408    6413    7131    7250    7345    8449    8595    9015    10144#
TDATA1  030334  6466*   6469    9426#
TDATA2  030336  6200    9427#
TIMEA   030350  5255*   5390*   5878*   5972*   6089*   6211*   6328*   6473*   6630*   6644*   6748*   6860*   6975*
                7105*   7137*   7255*   7350*   9002*   9432#
TIMEB   030352  5256*   5391*   5879*   5903    5921    5973*   5996    6014    6090*   6212*   6329*   6474*   6631*
                6645*   6749*   6861*   6976*   7106*   7138*   7256*   7351*   9000*   9433#
TIMEC   030354  5870*   5904    5921*   5963*   5997    6014*   9434#
TIMEIT  027016  5258    5394    5882    5976    6093    6215    6332    6477    6634    6648    6752    6864    6980
                7109    7141    7259    7354    9000#
TITFLG  030346  2856*   2915    2919*   9431#
TITLE   035000  2918    10009#
TITLE2  035037  2958    2960    10015#
TKVEC = 000060  2370#
TNULL   030356  7100    9435#
TPVEC = 000064  2371#
TRAPVE= 000034  2369#   2869*   2870*
TRMRDY= 000002  7501    7509    7520    9417#
TRTVEC= 000014  2364#
TST1    003014  2967#
TST10   004014  3491    3517#
TST11   004142  3577    3606#
TST12   004272  3654    3684#
TST13   004422  3732    3762#
TST14   004562  3810    3842#
TST15   004752  3983#
TST16   005142  4125#
TST17   005266  4167    4197#
TST2    003104  3028#
TST20   005412  4239    4269#
TST21   005620  4316    4357#
TST22   006026  4404    4445#
TST23   006226  4490    4529#
TST24   006426  4574    4613#
TST25   006666  4680    4726#
TST26   007052  4815#
TST27   007232  4905#
TST3    003204  3087    3100#
TST30   007412  4985#
TST31   007572  5065#
TST32   007752  5143#
TST33   010404  5324    5333#
TST34   010732  5382    5451#
TST35   011164  5563#
TST36   011306  5635#
TST37   011462  5708#
TST4    003314  3161    3187#
TST40   011676  5813#
TST41   012204  5868    5930#
TST42   012512  5961    6024#
TST43   013022  6080    6145#
TST44   013262  6199    6252#
TST45   013734  6426#
TST46   014166  6460    6509#
TST47   014732  6571    6659#
```

```
TST5     003376            3226    3243#
TST50    015304            6793    6801#
TST51    015754            6844    6928#
TST52    016310            6986    7014    7025#
TST53    017050            7198#
TST54    017264            7246    7292#
TST55    017526            7342    7394#
TST56    020020            7433    7476#
TST57    020216            7493    7532#
TST6     003564            3307    3350#
TST60    020406            7549    7587#
TST7     003700            3407    3433#
TYPDS  = 104405            7674    8388#
TYPE   = 104401            2917    2959    7429    7672    7675    7781    7814    7831    7833    7836    7838    7842    7849
                           7913    7988    8040    8154    8155    8158    8171    8182    8201    8254    8260    8265    8269
                           8274    8275    8277    8280    8284    8348    8350    8384#   8430    8675    8715    8744    8780
                           8795    8800    8805    8811    8817    8843    8854    8867    8878    8888    8920    8950
TYPOC  = 104402            7822    7846    8157    8385#
TYPON  = 104404            8387#
TYPOS  = 104403            8386#   8788    8792    8797    8802
VCFLG    030000            2923    2930*   8837*   9273#
VCPTR    030330            2939*   2946*   2954    7644*   9410#
VCWC     035507            8818   10068#
$APTHD   000214            2248    2254#
$ASTAT=  ****** U          8110    8125
$ATYC    022574            8081    8083#
$ATY1    022550            8079#
$ATY3    022556            8025    8080#
$ATY4    022566            7786    8082#
$AUTOB   001134            2397#   2909*   8151    8300
$BASE    001306            2478#
$BDADR   001122            2392#
$BDDAT   001126            2394#
$CDW1    001312            2480#
$CDW2    001314            2481#
$CHARC   022544            8042*   8052*   8059    8068*   8073#
$CKSWR   023016            8143#   8392
$CMTAG   001100            2380#   2858    2859    2867    2873    2874    2875
$CM1   = 000010            2412#   2413#   2414#   2415#   2416#   2417#   2418#   2419#   2420#
$CM2   = 000020            2412#   2413#   2414#   2415#   2416#   2417#   2418#   2419#   2420#
$CM3   = 000010            2410#   2412
$CM4   = 000010            2420#   2421#   2422#   2423#   2424#   2425#   2426#   2427#   2428#
$CNTLG   023671            8154    8295#
$CNTLU   023664            8171    8269    8294#
$CPUOP   001260            2452#
$CRLF    001227            2431#   7781    7806    7814    7833    7838    7842    8041    8076    8182    8274    8294    8353
                           8806    8811
$DBLK    022256            7954    7988    7996#
$DDW0    001316            2482#
$DDW1    001320            2483#
$DDW10   001342            2492#
$DDW11   001344            2493#
$DDW12   001346            2494#
$DDW13   001350            2495#
$DDW14   001352            2496#
$DDW15   001354            2497#
```

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$DDW2   001322          2484#
$DDW3   001324          2485#
$DDW4   001326          2486#
$DDW5   001330          2487#
$DDW6   001332          2488#
$DDW7   001334          2489#
$DDW8   001336          2490#
$DDW9   001340          2491#
$DEVCT  001242          2443#
$DEVM   001310          2479#
$DHSEL  030314          8685*   8862    8908    8938    9401#
$DOAGN  020760          7668    7677    7683#
$DTBL   022246          7957    7992#
$ENDAD  020750          2235    7679#   7801
$ENDCT  020716          2873    7670#
$ENDMG  020767          7672    7687#
$ENULL  020764          7675    7686#
$ENV    001252          2448#   2903    7783    8020    8088    8112
$ENVM   001253          2449#   2896    8022    8027    8090
$EOP    020662          7641*   7647    7660#
$EOPCT  020710          2873*   7667#   7671
$ERFLG  001103          2383#   7695    7726    7728    7734*   7756    7771*   7806
$ERMAX  001115          2389#   2876*   7728    7751*   7756
$ERROR  021274          2867    7769#
$ERRPC  001116          2390#   7775*   7776*   7777    7806    7820    9461    9484    9714    9760    9798    9899
$ERRTB  001356          2516#   7828
$ERRTY  021460          7780    7813#
$ERTTL  001112          2387#   7774*   7806
$ESCAP  001224          2429#   2875*   7750*   7797    7799    7806
$ETABL  001252          2447#
$ETEND  001356          2260    2500#
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$FFLG   023014          8079*   8082*   8110    8119*   8127#
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$FILLS  001155          2407#   8076
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$ILLUP  024306          8400    8416    8435#
$INTAG  001135          2398#   8183    8300
$ITEMB  001114          2388#   7777*   7785    7806    7817
$LF     001230          2432#   7806    8076    8284    8294    8353
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                        8963*   8976*
$MADR1  001264          2465#
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$MAMS3  001272          2470#
$MAMS4  001276          2473#
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$MFLG   023012          8080*   8086    8121*   8125#
$MNEW   023707          8158    8298#
$MSGAD  001246          2445#   8096*   8099
$MSGLG  001250          2446#   8101*
$MSGTY  001232          2439#   8094    8102*   8114    8118*
$MSWR   023676          8155    8296#
$MTYP1  001263          2460#
$MTYP2  001267          2468#
$MTYP3  001273          2471#
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$MXCNT  021272          7745    7755#
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                        5330#   5448#   5560#   5632#   5705#   5810#   5927#   6021#   6142#   6249#   6423#   6506#   6656#
                        6798#   6925#   7022#   7195#   7289#   7391#   7473#   7529#   7584#
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$OVER   021256          7709    7725    7733    7743    7752#
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$PWRDN  024142          2871    8400#   8428
$PWRMG  024276          8431#
$PWRUP  024214          8410    8416#
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$REG2   001166          2414#   8464*   8476*   8488*   8499*   9461    9484    9714    9899
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$REG4   001172          2416#   8478*   8501*   9484    9899
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                       2877    2878    2968    3029    3101    3188    3244    3351    3434    3518    3607    3685    3763
                       3843    3984    4126    4198    4270    4358    4446    4530    4614    4727    4816    4906    4986
                       5066    5144    5334    5452    5564    5636    5709    5814    5931    6025    6146    6253    6427
                       6510    6660    6802    6929    7026    7199    7293    7395    7477    7533    7588    7657    7663
                       7678    7684    7686    7696    7697    7698    7699    7700    7708    7720    7722    7723    7726
                       7727    7728    7735    7736    7737    7749    7752    7755    7762    7763    7764    7765    7774
                       7778    7790    7794    7806    8434
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$SWRMK= 000000'        2214    2215    7700    7701    7724
$TESTN  001236'        2441#   7747*
$TIMES  001222'        2428#   2874*   7663*   7735*   7742    7745*   7755
$TKB    001146'        2403#   8136    8147    8164    8218    8224
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$TMP0   001202'        2420#   5420*   5421*   5436*   5437*   5886*   5887*   5888*   5889*   5890*   5980*   5981*   5982*
                       5983*   5984*   6554*   6868*   6984*   7421*   7422*   7423    7436*   8494*   8495*   8956*   8969*
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$TMP1   001204'        2421#   4315*   4330    4333    4403*   4418    4421    4488*   4572*   4678*   4694    5422*   5438*
                       7114*   7125    7146*   7155    7163*   7174    7370*   7376*   9899
$TMP2   001206'        2422#   4332*   4334    4337    4345    4350*   4351    4420*   4422    4425    4433    4438*   4439
                       4504*   4506    4509    4517    4522*   4523    4588*   4590    4593    4601    4606*   4607    4679*
                       4699    6563*   6564*   6855*   6856*   6970*   6971*   7439*   7498*   7553*   7608*   9760
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                       9798
$TMP4   001212'        2424#   4698*   4701    4706    4714    4719*   4720    6575*   6595*   6596    6602*   6603*   6614
                       6977*   6994*   6995    8590*   8604*
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$TMP6   001216'        2426#   6549*   6744*   6770*   6992*   7011    7018    8596    8607    9010*   9024*
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                       5605*   5607    5628*   5629    5668*   5671    5681    5700*   5701    5757*   5759    5791    5795
                       5798    5803*   5804    5869*   5875    5886    5910    5922*   5923    5962*   5969    5980    6003
                       6015*   6016    6108*   6109*   6202*   6206    6235    6542*   6544*   6551*   6617    6743*   6786*
                       6839*   6901    6905    6906    8566*   8567    8570*   8571    8579*   8580    8582*   8583
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                       3654    3681    3685#   3732    3759    3763#   3810    3839    3843#   3980    3984#   4122    4126#
                       4167    4194    4198#   4239    4266    4270#   4316    4354    4358#   4404    4442    4446#   4490
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                       4986#   5062    5066#   5140    5144#   5324    5330    5334#   5382    5448    5452#   5560    5564#
                       5632    5636#   5705    5709#   5810    5814#   5868    5927    5931#   5961    6021    6025#   6080
                       6142    6146#   6199    6249    6253#   6423    6427#   6460    6506    6510#   6571    6656    6660#
                       6793    6798    6802#   6844    6925    6929#   6986    7014    7022    7026#   7195    7199#   7246
                       7289    7293#   7342    7391    7395#   7433    7473    7477#   7493    7529    7533#   7549    7584
                       7588#
$TPB    001152'        2405#   8065*   8076
$TPFLG  001157'        2409#   8014    8076
$TPS    001150'        2404#   8063    8076
$TRAP   024060'        2869    8361#
$TRAP2  024102'        8372#   8383
$TRP  = 000013'        8376#   8385#   8386#   8387#   8388#   8389#   8390    8391#   8392    8393#   8394#   8395#   8396#
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                        7806    8461    8473    8496    8960    8973
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$TYPBN= ****** U        8389
$TYPDS  022042          7942#   8388
$TYPE   022266          8014#   8107    8376    8384
$TYPEC  022500          8044    8051    8058    8063#   8064    8187
$TYPEX  022546          8069    8071    8074#
$TYPOC  021640          7883#   8385
$TYPON  021654          7882    7885#   8387
$TYPOS  021614          7878#   8386
$UNIT   001244          2444#
$UNITM  000224          2259#
$USWR   001256          2451#
$VECT1  001302          2476#
$VECT2  001304          2477#
$XTSTR  021026          7711#
$$GET4= 000000          7678#
$OFILL  022037          7879*   7883*   7893    7928#
$40CAT= ****** U        7708    7780
.       = 037712        2217#   2221#   2233    2234#   2236#   2238#   2244    2245#   2247#   2249#   2379#   2433    2862
                        2877    2878    2963    7466    7522    7577    7632    7686    7690    7755    7756    7806    7852#
                        7996#   8076    8128#   8136    8293#   8294    8300    8353    8412    8436    9099#   9203#   9483#
                        9797#   10006#  10131#  10134#  10138#  10144#
.$ASTA= ****** U        8080    8083
.$X   = 000214          2244#   2249


. ABS.  037712      000


 ERRORS DETECTED:  0

 DSKZ:CZDHMD,DSKZ:CZDHMD.SEQ=DSKZ:CZDHMD.SML,DHMMAD.P11,CZDHMD.P11
 RUN-TIME: 32 38 1 SECONDS
 RUN-TIME RATIO: 254/72=3.5
 CORE USED:  49K  (97 PAGES)

 DOCUMENT PAGES:  237
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