TS11

TS11 DATA RELIAB

CZTSHB0

AH E455B MC

FICHE 1 OF 2

NOV 1979

MADE IN USA

TS11

TS11 DATA RELIAB
CZTSHB0

AH E455B MC

FICHE 2 OF 2

NOV 1979
digital
MADE IN USA

IDENTIFICATION

PRODUCT CODE: AC-E454B-MC

PRODUCT NAME: CZTSHB0 TS11 DATA RELIAB

PRODUCT DATE: 15-AUG-79

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: BOB WERY

USER DOCUMENTATION

USER DOCUMENTATION TABLE OF CONTENTS

6.0 DEVICE INFORMATION

GLOSSARY

SEQ 0005

ACT	AUTOMATED COMPUTER TEST SYSTEM
APT	AUTOMATED PRODUCT TEST SYSTEM
BYTE/RECORD/FILE COUNT BRF	IS STORED IN THE 4TH WORD OF THE COMMAND PACKET AND IT'S USE BY THE TS04 DEPENDS ON THE TYPE OF COMMAND.
CMD	TS04 COMMAND (SEE 2.3.14.1 FOR LIST OF COMMANDS)
COMMAND PACKET CMDPKT	FOUR WORD PACKET IN THE CPU MEMORY WHICH CONTAINS ALL INFORMATION NEEDED BY THE TS04 TO EXECUTE A COMMAND.
EXTENDED STATUS	FOUR WORDS OF TS04 STATUS WHICH ARE TRANSFERRED AS PART OF THE MESSAGE PACKET AT THE COMPLETION OF A COMMAND.
MESSAGE PACKET	SEVEN WORD PACKET IN THE CPU MEMORY INTO WHICH THE TS04 STORES STATUS AT THE COMPLETION OF A COMMAND.
PC	PROGRAM COUNTER
PSW	PROCESSOR STATUS WORD
RESIDUAL FRAME COUNT RFC	THIS COUNT IS PART OF THE MESSAGE PACKET AND CONTAINS THE NUMBER OF BYTES/RECORDS /FILES REMAINING TO BE PROCESSED AT THE COMPLETION OF A COMMAND.
SPECIAL CONDITION SPEC COND	TSS4 BIT15. WHEN SET, INDICATES THAT THE LAST COMMAND DID NOT COMPLETE WITH-OUT INCIDENT.
TERMINATION CLASS CODE TCC	THREE BIT CODE IN THE TSSR WHICH INDI-CATES THE TYPE OF COMMAND TERMINATION.
TSBA	TAPE SYSTEM BUS ADDRESS REGISTER.
TSDB	TAPE SYSTEM DATA BUFFER REGISTER.
TSSR	TAPE SYSTEM STATUS REGISTER.
XST0	EXTENDED STATUS REGISTER 0
XST1	EXTENDED STATUS REGISTER 1
XST2	EXTENDED STATUS REGISTER 2
XST3	EXTENDED STATUS REGISTER 3
XXDP+	XXDP+ IS A "CATCH-ALL" NAME FOR A GROUP OF PDP-11 DIAGNOSTIC PACKAGES AVAILABLE ON MULTIMEDIA.

1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

1.1.1 FUNCTIONAL DESCRIPTION

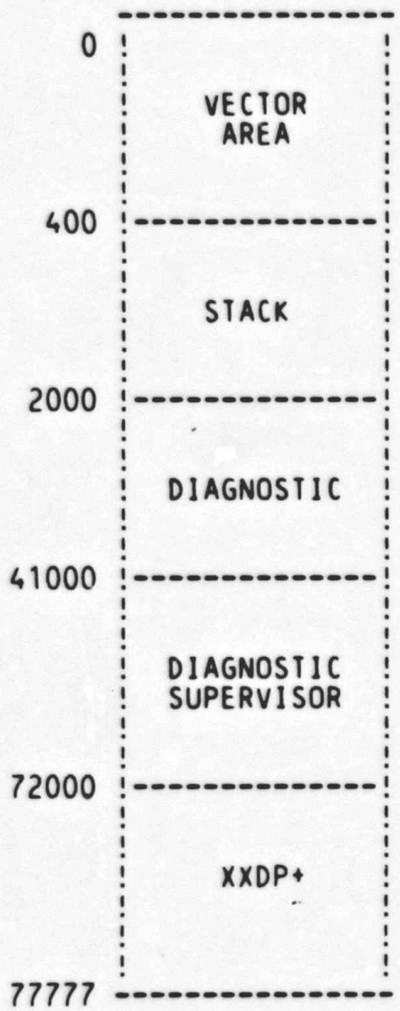
THIS PROGRAM CAN BE USED AS A BASIC FUNCTION TEST, A DATA RELIABILITY TEST, A COMPATABILITY TEST, OR TO EXECUTE A SEQUENCE OF OPERATOR SELECTED COMMANDS.

1.1.2 STRUCTURE OF PROGRAM

THIS DIAGNOSTIC IS A SINGLE PROGRAM FROM THE STANDPOINT OF THE DIAGNOSTIC USER, BUT IT CONTAINS A CONTROL MODULE RELEASED INDEPENDENTLY AS A DIAGNOSTIC SUPERVISOR.

1.1.3 MEMORY MAP

SEQ 0007



FREE MEMO SPACE FOR WR/RD BFRS OR OTHER PUROSES
IS ALLOCATED BY THE SUPERVISOR ON REQUEST OR CHOOSEN
BY PROGRAMMER TO RESIDE BETWEEN THE DIAG AND THE
SUPERVISOR.

1.1.4 DIAGNOSTIC INFORMATION

THIS DIAGNOSTIC CAN TEST UP TO 4 UNITS SIMULTANEOUSLY. THE 4 UNITS ARE ASSIGNED LOGICAL UNIT NUMBERS 0 - 3 BY THE DIAGNOSTIC.

THERE ARE 5 TESTS IN THIS PROGRAM:

TEST 1 - BASIC FUNCTIONS.
TEST 2 - DATA RELIABILITY.
TEST 3 - WRITE COMPATABILITY/WRITE UTILITY.
TEST 4 - READ COMPATABILITY/READ UTILITY.
TEST 5 - OPERATOR SELECTED SEQUENCE.

ERROR RECOVERY IS PERFORMED ON READ, WRITE AND WRITE TAPE MARK ERRORS UNLESS RECOVERY IS INHIBITED BY THE OPERATOR. THE WRITE AND WRITE TAPE MARK RETRY LIMIT IS 16. THE READ FORWORD/READ REVERSE RETRY LIMIT IS 16 (8 IN THE SAME DIRECTION AND 8 IN THE OPPOSITE DIRECTION). FOR MORE INFORMATION ON ERROR RECOVERY PROCEDURES, SEE SECTION 3.0 (ERROR REPORTING).

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE REQUIREMENTS

PDP-11 PROCESSOR WITH 16K OR MORE OF MEMORY
CONSOLE DEVICE (LA30,LA36,VT50,ETC.)
PROGRAM LOAD DEVICE

1.2.2 SOFTWARE REQUIREMENTS

DIAGNOSTIC SUPERVISOR - REVISION D

1.3 RELATED DOCUMENTS AND STANDARDS

SEQ 0009

XXDP+ USERS MANUAL MD-11-CHQUS
DIAGNOSTIC SUPERVISOR PROGRAM LISTING
PDP-11 DIAGNOSTIC SUPERVISOR INTERFACE SPECIFICATION.
PDP-11 DIAGNOSTIC SUPERVISOR PROGRAMMER'S GUIDE.
TS11/TSO4 PROGRAMMING SPECIFICATION.
TS11/TSO4 ENGINEERING SPECIFICATION.
TS11/TSO4 COMMAND PACKET SPECIFICATION.

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

ORDER OF HOST CPU DIAGNOSTIC USAGE:

1) CONTROL LOGIC PROGRAM - ALL TESTS.

2) DATA RELIABILITY PROGRAM:

   A) BASIC FUNCTION TEST.
   B) DATA RELIABILITY TEST.

1.5 ASSUMPTIONS

THE HARDWARE OTHER THAN THE SUBSYSTEM BEING TESTED IS ASSUMED TO WORK PROPERLY. FALSE ERRORS MAY BE REPORTED IF THE PROCESSOR, MEMORY, ETC., DO NOT FUNCTION PROPERLY.

1.6 DIAGNOSTIC HISTORY

SEQ 0010

REVISION A - OCT 1978
- ORIGINAL RELEASE

REVISION B - FEB 1979
- CORRECTED END OF TAPE PROBLEMS IN TESTS 3-5.
- CHANGED DEFAULT VECTOR ADDRESS FROM 150 TO 224.
- DECREASED MAXIMUM RECORD LENGTH FROM 4096 TO 2048 BYTES.

REVISION B - AUG 1979
-DO NOT PRINT RECOVERABLE ERRORS UNLESS REQUESTED BY OPERATOR
-WARN OPERATOR OF UNIT(S) BEING NOT READY OR OFF-LINE.
 DROP UNIT(S) LEFT NOT READY OR OFF-LINE FOR 3.5 MINUTES.
-IMPROVE BEHAVIOR AT EOT
 -IN TEST 2, FREEZE UNITS REACHING EOT UNTIL OTHERS
  CATCH-UP INSTEAD OF ALLOWING THEM TO SHUTTLE AT EOT
 -WHEN ALL UNITS REACH EOT, WRITE ONE RECORD BEYOND EOT.
  IN TEST 5, READ REV THAT EXTRA RECORD TO POSITION TAPE
  SO THAT THE NEXT COMMAND REQUESTED CAN BE EXECUTED.
  THAT EXTRA RECORD SHALL LEAVE A CLEAN IRG GAP AND A VALID
  RECORD TO READ WHEN SHORTER READ STOP DISTANCE MIGHT CAUSE
  UNIT TO FLAG EOT ON THAT EXTRA RECORD INSTEAD OF THE
  PREVIOUS ONE. THIS SHOULD ELIMINATE MANY READ ERRORS AT
  EOT AND TAPES RUNNING OFF THE WHEELS.
-WRITE RECORD COUNT ON TAPE.
 PRINT RECORD COUNT READ FROM TAPE IN READ ERROR PRINTS TO
 INDICATE IF POSITION WAS LOST.

* CAUTION *

INTERPRET THAT "RECORD READ" COUNT WITH CAUTION.
IF VERY DIFFERENT FROM RECORD COUNT TRACKED BY THE DIAGNOSTIC,
POSITION IS NOT NECESSARELY LOST. ERRORS IN READING THAT
RECORD MIGHT HAVE CAUSED RECORD COUNT TO BE ERRONEOUSLY
READ FROM TAPE.
IN TEST 2, IF DIAGNOSTIC IS RESTARTED OR CONTINUED, RECORD COUNT
IS RESET TO ZERO ALTHOUGH TAPE WAS NOT REWOUND. THIS IS
NECESSARY BECAUSE THERE IS NO ACCURATE WAY TO DETERMINE
ON WHAT RECORD COUNT OF WHAT UNIT THE DIAGNOSTIC WAS HALTED
BEFORE RESTARTING OR CONTINUING.
IT IS SUGGESTED THAT A "PRINT" BE REQUESTED WHEN HALTING DIAG
TO GET A PRINT OF THE RECORD COUNT WHEN HALTED.

-VERIFY RECORD OF 4000 BYTES INSTEAD OF 22 BYTES.
-WHEN COMPARING DATA, CHECK AND PRINT IF NO DATA WAS READ
 OR RECORD WAS LONGER THAN EXPECTED.
-FREEZE TSSR REG WHEN A COMMAND IS COMPLETED TO AVOID DIFFERENCES
 BETWEEN TSSR AND TCC FETCHED AT DIFFERENT TIMES.
-WHEN DROPPING A UNIT, FLAG SECOND PRINT OF EXTENDED STATUS AS BEING
 THE RESULT OF A GET STATUS COMMAND.
 WAIT FOR SSR UP BEFORE PRINTING THAT STATUS.
-ADJUST "PASS" COUNT OF DIAG TO MATCH "EOP" PASS COUNT OF SUPERVISOR.
-INCREASE NUMBER OF SELECTABLE COMMANDS IN TEST 5 FROM
 4 TO 7. DEFAULT COMMAND 6 IS NOW REWIND.
-CONVERT DIAG TO REV C OF SUPERVISOR.
 ADD SEVERAL SECTIONS:
   PROTECT TABLE
   AUTO-DROP CODE
   HARD CODED PARAMETER TABLE

2.0 OPERATING INSTRUCTIONS

FOR OPERATING INSTRUCTIONS, PLEASE SEE CHAPTER 5 OF XXDP+ OPERATOR''S MANUAL.

2.1 HARDWARE PARAMETERS

ON A ''N'' RESPONSE TO ''CHANGE HW?'', THE DIAG SHALL RUN ASSUMING ONE UNIT AT TSSR = 177522 WITH A VECTOR = 224.

ON A ''Y'' RESPONSE TO ''CHANGE HW?'' QUESTION,THEN THE FOLLOWING QUESTIONS WILL BE ASKED ON A START COMMAND. THE VALUE LOCATED TO THE LEFT OF THE QUESTION MARK IS THE DEFAULT VALUE THAT WILL BE TAKEN ON A CARRIAGE RETURN RESPONCE.

TSSR ADDRESS (172522) ?,

VECTOR (224) ?

THE VALIDITY OF THESE PARAMETERS CAN BE CHECKED BEFORE RUNNING THE TESTS BY SETTING THE FLAG ''ADR'' ON A STA, RES OR CON COMMAND. THE SO CALLED AUTO DROP CODE SHALL THEN BE EXECUTED AFTER THE INIT CODE AND BEFORE THE HARDWARE TESTS ARE RUN. THAT CODE FIRST TESTS THE ADRRESS OF THE TSSR(S). IF NO RESPONSE, IT DROPS THE UNIT(S) IMMEDIATELY WITH THE FOLLOWING MESSAGE:

```
BUS TRAP AT XXXXXX              ( XXXXXX = TSSR AD )
INTERFACE BAD OR NOT SET TO ABOVE AD.
```

ON A RESPONSE FROM THE INTERFACE, THE UNITS THAT ARE NOT READY OR NOT ON-LINE ARE DROPPED IMMEDIATELY. THE HARDWARE TESTS SHALL THEN BE RUN ON RESPONDING UNITS.

IF THE ''ADR'' FLAG IS NOT SET, THE READY AND OFF-LINE STATUS OF THE UNITS ARE CHECKED. A MESSAGE SHALL BE PRINTED EVERY SO OFTEN TO WARN THE OPERATOR OF UNITS BEING NOT READY OR OFF-LINE. THESE UNITS SHALL BE DROPPED AFTER A REASONABLE AMOUNT OF TIME (3 MIN ON A 11/70).

2.2 SOFTWARE PARAMETERS

SEQ 0012

THE FOLLOWING QUESTIONS ARE ASKED IF REQUESTED ON A START, RESTART, OR CONTINUE. THEY ALLOW FLEXABILITY IN THE WAY THE PROGRAM BEHAVES.

```
CLEAR COUNTERS (L) Y ?

RESET RANDOM VARIABLES (L) N ?

HALT AFTER EACH CMD (L) N ?

PRINT RECOVERABLE ERRORS  (L) N ?

DISABLE INTERRUPTS (L) N ?

INHIBIT RECOVERY (L) N ?

CHANGE CMD SEQUENCE (L) N ?
```

NOTE: THIS QUESTION SHOULD BE ANSWERED (N) UNLESS AN OPERATOR SELECTED SEQUENCE IS TO BE EXECUTED. IF THIS QUESTION WAS ANSWERED (N), NO MORE QUESTIONS WILL BE ASKED. IF THIS QUESTION WAS ANSWERED Y, THE FOLLOWING QUESTIONS MUST BE ANSWERED OR DEFAULTED WITH A <CR> ONLY:

```
INHIBIT RFC ERROR REPORTS (L) N ?
CHARACTERISTICS CODE (O) 40 ?   (0,20,40,200) (OCTAL)
CMD/2 (D) 13 ?                  (1-27)    (DECIMAL)
BRF COUNT (D) 1 ?               (1-2K)    (DECIMAL)
# OF OPERATIONS (D) 1 ?         (1-32K)   (DECIMAL)
PATTERN (D) 7 ?                 (0-8)     (DECIMAL)
CMD/3 (D) 4 ?                   (1-27)    (DECIMAL)
BRF COUNT (D) 2048 ?            (1-2K)    (DECIMAL)
# OF OPERATIONS (D) 32000 ?     (1-32K)   (DECIMAL)
PATTERN (D) 7 ?                 (0-8)     (DECIMAL)
CMD/4 (D) 3 ?                   (1-27)    (DECIMAL)
BRF COUNT (D) 2048 ?            (1-2K)    (DECIMAL)
# OF OPERATIONS (D) 32000 ?     (1-32K)   (DECIMAL)
PATTERN (D) 7 ?                 (0-8)     (DECIMAL)
CMD/5 (D) 2 ?                   (1-27)    (DECIMAL)
BRF COUNT (D) 2048 ?            (1-2K)    (DECIMAL)
# OF OPERATIONS (D) 32000 ?     (1-32K)   (DECIMAL)
PATTERN (D) 7 ?                 (0-8)     (DECIMAL)
CMD/6 (D) 13. ?                 (1-27)    (DECIMAL)
BRF COUNT (D) 1 ?               (1-2K)    (DECIMAL)
# OF OPERATIONS (D) 1 ?         (1-32K)   (DECIMAL)
PATTERN (D) 7 ?                 (0-8)     (DECIMAL)
CMD/7 (D) 27. ?                 (1-27)    (DECIMAL)
BRF COUNT (D) 2048 ?            (1-2K)    (DECIMAL)
# OF OPERATIONS (D) 32000 ?     (1-32K)   (DECIMAL)
PATTERN (D) 7 ?                 (0-8)     (DECIMAL)
CMD/8 (D) 27. ?                 (1-27)    (DECIMAL)
BRF COUNT (D) 2048 ?            (1-2K)    (DECIMAL)
# OF OPERATIONS (D) 32000 ?     (1-32K)   (DECIMAL)
PATTERN (D) 7 ?                 (0-8)     (DECIMAL)
```

NOTE: THE PROGRAM AUTOMATICALLY INSERTS AN CHARACTERISTIC 40 AS THE FIRST COMMAND IN THE SEQUENCE TABLE. IF A

DIFFERENT CHARACTERISTIC IS DESIRED, THE OPERATOR SHOULD
ENTER THAT CHARACTERISTIC CODE. A TOTAL OF 7 COMMANDS
MAY BE ENTERED IN ADDITION TO THE SET CHARACTERISTICS
COMMAND. IF THE OPERATOR WISHES TO USE LESS THAN 7
COMMANDS, AN END COMMAND MUST BE ENTERED AND THEN A
CONTROL Z (^Z) CAN BE ENTERED TO TERMINATE SOFTWARE DIALOGUE.

2.2.1 COMMAND LIST FOR USE IN SOFTWARE DIALOGUE.

SEQ 0014

CODE	COMMAND	DESCRIPTION
1 =	DRI	DRIVE INITIATE.
2 =	RDF	READ FORWARD.
3 =	RDR	READ REVERSE.
4 =	WRT	WRITE.
5 =	WTV	WRITE/VERIFY. IE. WRITE N RECORDS; READ REVERSE AND CHECK N RECORDS OF DATA; READ FORWARD AND CHECK N RECORDS.
6 =	SRF	SPACE RECORDS FORWARD.
7 =	SRR	SPACE RECORDS REVERSE.
8 =	RNR	READ NEXT REVERSE, IE. SPACE FWD, READ REV.
9 =	RNF	READ NEXT FORWARD, IE. READ FWD, SPACE REV.
10 =	RPF	READ PREVIOUS FWD, IE. SPACE REV, READ FWD.
11 =	RPR	READ PREVIOUS REV, IE. READ REV, SPACE FWD.
12 =	WRR	WRITE RETRY.
13 =	RWD	REWIND.
14 =	MBR	MESSAGE BUFFER RELEASE.
15 =	WTM	WRITE TAPE MARK.
16 =	WTR	WRITE TAPE MARK RETRY.
17 =	SFF	SPACE FILES FORWARD.
18 =	SFR	SPACE FILES REVERSE.
19 =	GES	GET EXTENDED STATUS.
20 =	ERS	ERASE 3 INCHES OF TAPE.
21 =	UNL	UNLOAD.
22 =	CLN	CLEAN TAPE
23 =	SCH	SET DEVICE CHARACTERISTIC. WHERE BRF=200, 40, 20, 0. 200 = ENABLE SKIP TAPE MARKS STOP (STOP AT LOGICAL EOT) 40 = ENABLE ATTENTION INTERRUPTS. 20 = ENABLE MESSAGE BUFFER RELEASE INTERRUPTS. SEE TS11/TS04 PROGRAMMING SPECIFICATION FOR DESCRIPTION.
24 =	DIA	DIAGNOSTICS. SEE TS11/TS04 PROGRAMMING SPECIFICATION FOR DESCRIPTION. ODT MUST BE USED TO LOAD DIAGNOSTIC DATA INTO THE WRITE BUFFER BEFORE THIS CMD IS ISSUED.
25 =	JMP	JUMP TO THE NTH COMMAND IN THE COMMAND SEQUENCE TABLE, WHERE N IS DEFINED IN THE BRF FIELD.
26 =	DLY	DELAY "N" MILISECONDS WHERE N IS DEFINED IN THE # OF OPERATIONS.
27 =	END	END OF COMMAND SEQUENCE.

2.2.2 DATA PATTERN LIST FOR USE IN SOFTWARE DIALOGUE.

PATTERN #	DESCRIPTION.
0	INCREMENTING PATTERN. 0 - 377.
1	ALL "1"'S PATTERN.
2	ALL "0"'S PATTERN.
3	"1" BIT WALKING FROM R TO L IN A FIELD OF "0"'S.
4	"0" BIT WALKING FROM R TO L IF A FIELD OF "1"'S.
5	ALTERNATING "1" AND "0" BITS WITH ALTERNATE BYTES COMPLIMENTED. (125/252)
6	ALTERNATING BYTES OF 000 AND 377.
7	RANDOM DATA PATTERN.
8	NO PATTERN GENERATION.

2.3 EXAMPLES OF SOFTWARE DIALOGUE

2.3.1 BASIC FUNCTION AND DATA RELIABILITY WITH ALL ERROR REPORTING ENABLED

A) RECEIVE PROMPT (DR>)
B) ENTER STA/TES:1-2<CR>
C) ANSWER HARDWARE QUESTIONS.
D) PROCEED WITH THE FOLLOWING DIALOGUE:

CHANGE SW (L) ?	Y<CR>
CLEAR COUNTERS (L) N ?	Y<CR>
RESET RANDOM VARIABLES (L) N ?	N<CR>
HALT AFTER EACH CMD (L) N ?	N<CR>
PRINT RECOVERABLE ERRORS (L) N ?	Y<CR>
DISABLE INTERRUPTS (L) N ?	N<CR>
INHIBIT RECOVERY (L) N ?	N<CR>
CHANGE CMD SEQUENCE (L) N ?	N<CR>

2.3.2 TO SET UP A SCOPE LOOP FOR A FAILURE IN BASIC FUNCTIONS.

SEQ 0016

A) RECEIVE PROMPT (DR>)
B) ENTER STA/TES:1/FLA:LOE:IER:ISR:IDU<CR>
C) ANSWER HARDWARE QUESTIONS.
D) PROCEED WITH THE FOLLOWING DIALOGUE:

```
CHANGE SW (L) ?                          Y<CR>
CLEAR COUNTERS (L) N ?                   Y<CR>
RESET RANDOM VARIABLES (L) N ?           N<CR>
HALT AFTER EACH CMD (L) N ?              N<CR>
PRINT RECOVERABLE ERRORS  (L) N ?        N<CR>
DISABLE INTERRUPTS (L) N ?               N<CR>
INHIBIT RECOVERY (L) N ?                 N<CR>
CHANGE CMD SEQUENCE (L) N ?              N<CR>
```

2.3.3 TO SET UP A SCOPE LOOP FOR A FAILURE IN DATA RELIABILITY

A) RECEIVE PROMPT (DR>)
B) ENTER STA/TES:5/FLA:IER:ISR:IDU/EOP:1000<CR>
C) ANSWER HARDWARE QUESTIONS.
D) PROCEED WITH THE FOLLOWING DIALOGUE:

```
CHANGE SW (L) ?                          Y<CR>
CLEAR COUNTERS (L) N ?                   Y<CR>
RESET RANDOM VARIABLES (L) N ?           N<CR>
HALT AFTER EACH CMD (L) N ?              N<CR>
PRINT RECOVERABLE ERRORS  (L) N ?        N<CR>
DISABLE INTERRUPTS (L) N ?               Y<CR>
INHIBIT RECOVERY (L) N ?                 Y<CR>
CHANGE CMD SEQUENCE (L) N ?              Y<CR>
INHIBIT RFC ERROR REPORTS (L) N ?        Y<CR>
CHARACTERISTICS CODE (O) 40 ?           40<CR>
CMD/2 (D) 5 ?                           13<CR>   (REWIND) (COULD BE ANY COMMAND)
BRF COUNT (D) 2048 ?                     1<CR>
# OF OPERATIONS (D) 10 ?                1<CR>
PATTERN (D) 7 ?                          1<CR>
CMD/3 (D) 5 ?                            4<CR>   (WRITE) (COULD BE ANY COMMAND)
BRF (D) 2048 ?                        1000<CR>
# OF OPERATIONS (D) 10 ?               10000<CR>
PATTERN (D) 7 ?                          1<CR>
CMD/4 (D) 5 ?                           27<CR>   (END)   (COULD BE ANY COMMAND)
BRF (D) 2048 ?                          <^Z>
```

2.4 EXECUTION TIMES

SEQ 0017

2.4.1 SYSTEM CONFIGURATION

PDP11/34
MOS MEMORY
LA36
TS11/TS04

2.4.2 TEST EXECUTION TIMES

TEST 1 - BASIC FUNCTIONS - 30 SECONDS PER PASS.
TEST 2 - DATA RELIABILITY - 45 MINUTES PER PASS.
TEST 3 - WRITE COMPATABILITY - 20 MINUTES PER PASS.
TEST 4 - READ COMPATABILITY - 20 MINUTES PER PASS.
TEST 5 - OPERATOR SELECTED SEQUENCE - DEPENDS ON SEQUENCE SELECTED.

NOTE: ALL EXECUTION TIMES ARE SHOWN FOR ONE UNIT OEPRATION.
APPROXIMATELY 10% WILL BE ADDED TO ALL EXECUTION TIMES
FOR EACH ADDITIONAL UNIT.

3.0 ERROR INFORMATION

3.1 ERROR REPORTING

ALL ERROR REPORTS EXCEPT FOR ERRORS #1 AND #17 INCLUDE A DUMP
OF THE FOLLOWING INFORMATION:

ERROR #, TEST #, SUBTEST #, PROGRAM COUNTER, UNIT #,
COMMAND, PREVIOUS COMMAND, PASS COUNT, # OF
RECORDS FROM BOT, RECORD READ COUNT, THE COMMAND PACKET, TSSR,
TCC, TSBA, RFC, AND THE EXTENDED STATUS REGISTERS
(SEE 2.3.14.1 FOR LIST OF COMMANDS).

STANDARD ERROR REPORT FORMAT:

```
CZTSH SFT ERR XXXXX  TST XXX  SUB XXX  PC: XXXXXX
(ASCII ERROR MESSAGE)
XXX CMD FAILED - UNIT X  PASS: XXXXX  RECORD: XXXXX
PREVIOUS CMD WAS  XXX          * RECORD READ: XXXXX *
CMDPKT  TSBA    RFC     TSSR    TCC
XXXXXX  XXXXXX  XXXXXX  XXXXXX  X
XXXXXX
XXXXXX
XXXXXX
XST0    XST1    XST2    XST3
XXXXXX  XXXXXX  XXXXXX  XXXXXX
```

* CAUTION *

INTERPRET THAT "RECORD READ" COUNT WITH CAUTION.
IF VERY DIFFERENT FROM RECORD COUNT TRACKED BY THE DIAGNOSTIC,
POSITION IS NOT NECESSARELY LOST. ERRORS IN READING THAT
RECORD MIGHT HAVE CAUSED RECORD COUNT TO BE ERRONEOUSLY
READ FROM TAPE.
IN TEST 2, IF DIAGNOSTIC IS RESTARTED OR CONTINUED, RECORD COUNT
IS RESET TO ZERO ALTHOUGH TAPE WAS NOT REWOUND. THIS IS
NECESSARY BECAUSE THERE IS NO ACCURATE WAY TO DETERMINE
ON WHAT RECORD COUNT OF WHAT UNIT THE DIAGNOSTIC WAS HALTED
BEFORE RESTARTING OR CONTINUING.
IT IS SUGGESTED THAT A "PRINT" BE REQUESTED WHEN HALTING DIAG
TO GET A PRINT OF THE RECORD COUNT WHEN HALTED.

EXAMPLE OF AN ERROR REPORT:

```
CZTSH SFT ERR 00009  TST 002  SUB 000  PC: 010606
RECOVERABLE ERROR
WRT CMD FAILED - UNIT 2  PASS:     2  RECORD:   254
PREVIOUS CMD WAS  WRT
CMDPKT  TSBA    RFC     TSSR    TCC
100005  002324  000000  100210  4
051766
000000
000371
XST0    XST1    XST2    XST3
000350  000002  100004  000000
```

3.1.1 ERROR #1 - COMMAND PACKET ADDRESS NOT ON A MODULO 4 BOUNDRY:

IF THIS ERROR IS REPORTED, THE PROGRAM DID NOT LOAD PROPERLY. THIS IS A SYSTEM FATAL ERROR AND THE PROGRAM MUST BE RELOADED TO CORRECT IT.

3.1.2 ERROR #2 - TS04 NOT READY:

BEFORE ANY COMMAND IS ISSUED TO THE TS04, THE SUBSYSTEM READY BIT IN THE TSS4 IS CHECKED. IF THE SSR IS NOT SET, THE PROGRAM REPORTS THE NOT READY ERROR. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST SEQUENCE UNLESS THE IDU OPTION IS USED.

3.1.3 ERROR #3 - NO RESPONSE ERROR:

ONCE THE TSDB IS LOADED, THE TS04 HAS ONE MILLISECOND TO RESPOND OR THE PROGRAM REPORTS A NO RESPONSE ERROR. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST SEQUENCE UNLESS THE IDU OPTION IS USED.

3.1.4 ERROR #4 - NO INTERRUPT ERROR:

COMMAND WAS ISSUED AND NO INTERRUPT RECEIVED. THE PROGRAM REPORTS THAT NO INTERRUPT OCCURRED. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.5 SPECIAL CONDITION ERRORS:

IF, DURING EXECUTION, AN INCIDENT OCCURS FORCING THE TSSR SPECIAL CONDITION BIT TO SET, THE PROGRAM WILL SELECT ONE OF 8 ERROR HANDLING ROUTINES, DEPENDING ON THE TERMINATION CLASS CODE.

THE TERMINATION CLASS CODES IN THE TSSR ARE PROCESSED AS FOLLOWS WHEN SPECIAL CONDITION IS SET:

3.1.5.1 ERROR #5 - TERMINATION CLASS CODE 0, UNDEFINED SPECIAL CONDITION

THE ERROR IS REPORTED, A HARD ERROR IS LOGGED AND THE PROGRAM PROCEEDS NORMALLY.

3.1.5.2 ERROR #6 - TERMINATION CLASS CODE 1, ATTENTION CONDITION

THIS TCC INDICATES THAT THE DRIVE HAS UNDERGONE A STATUS CHANGE SUCH AS GOING OFFLINE OR COMING ONLINE. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.5.3 ERROR #7 - TERMINATION CLASS CODE 2, TAPE STATUS ALERT

A STATUS CONDITION HAS BEEN ENCOUNTERED THAT MAY HAVE SIGNIFICANCE TO THE PROGRAM. BITS OF INTEREST INCLUDE TMK, RLS, LET, RLL, EOT. ACTION TAKEN DEPENDS ON THE TEST BEING EXECUTED. IF THE CONDITION IS UNEXPECTED, THE ERROR IS REPORTED AND A HARD ERROR IS LOGGED. THE PROGRAM PROCEEDS NORMALLY.

3.1.5.4 ERROR #8 - TERMINATION CLASS CODE 3, FUNCTION REJECT

THE SPECIFIED FUNCTION WAS NOT INITIATED. BITS OF INTEREST ARE RMR, OFL, VCK, BOT, ILC, WLE, ILA, AND NBA. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

31.5.5 ERROR #9 - TERMINATION CLASS CODE 4, RECOVERABLE ERROR

TAPE POSITION IS ONE RECORD BEYOND WHAT ITS POSITION WAS WHEN THE FUNCTION WAS INITIATED. RECOVERY PROCEDURE IS TO LOG THE ERROR AND ISSUE THE APPROPRIATE RETRY COMMAND. IF RETRY LIMIT IS REACHED BEFORE THE ERROR IS RECOVERED, RETRY LIMIT EXCEEDED IS REPORTED AS DESCRIBED IN ERROR #14 BELOW.

3.1.5.6 ERROR #10 - TERMINATION CLASS CODE 5, RECOVERABLE ERROR

TAPE POSITION HAS NOT CHANGED. RECOVERY PROCEDURE IS TO LOG THE ERROR AND RE-ISSUE THE ORIGINAL COMMAND. IF RETRY LIMIT IS REACHED BEFORE THE ERROR IS RECOVERED, RETRY LIMIT EXCEEDED IS REPORTED AS DESCRIBED IN ERROR #14 BELOW.

3.1.5.7 ERROR #11 - TERMINATION CLASS CODE 6, UNRECOVERABLE ERROR

TAPE POSITION HAS BEEN LOST. THE ONLY VALID RECOVERY PROCEDURE IS TO REWIND AND START OVER AT BOT UNLESS THE TAPE HAS LABELS OR SEQUENCE NUMBERS. IF DENSITY CHECK IS SET THIS DIAGNOSTIC WILL REWIND AND RETRY THE COMMAND, OTHERWISE THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.5.8 ERROR #12 - TERMINATION CLASS CODE 7, FATAL SUBSYSTEM ERROR

THE SUBSYSTEM IS INCAPABLE OF PROPERLY PERFORMING COMMANDS OR AT LEAST ITS INTEGRITY IS SERIOUSLY QUESTIONABLE. REFER TO THE FATAL CLASS CODE FIELD IN THE TSSR REGISTER FOR ADDITIONAL INFORMATION ON THE TYPE OF FATAL ERROR. THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.6 ERROR #13 - RFC NON-ZERO ERROR:

IF, AFTER EXECUTION, THE RESIDUAL FRAME COUNT IS NON-ZERO, THE ERROR IS REPORTED AND A HARD ERROR IS LOGGED. THE PROGRAM THEN PROCEEDS NORMALLY. THE REPORTING AND LOGGING OF THESE ERRORS IS OPTIONAL.

3.1.7 ERROR #14 - RETRY LIMIT EXCEEDED:

ON A WRITE COMMAND THIS IS A FATAL DEVICE ERROR AND THE DEVICE
WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

ON A READ COMMAND THIS ERROR IS LOGGED AS A HARD ERROR AND
THE PROGRAM PROCEEDS NORMALLY.

3.1.8 ERROR #15 - TOO MANY INTERRUPTS:

IF MORE THAN ONE INTERRUPT OCCURS PER COMMAND, THIS ERROR IS REPORTED.
THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM
THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.9 ERROR #16 - CAPSTAN RUNAWAY:

CAPSTAN DID NOT STOP WITHIN ACCEPTABLE WINDOW AFTER LAST
COMMAND. THE PROGRAM WILL ISSUE A GET STATUS COMMAND BEFORE REPORTING
THE ERROR SO THAT THE DEAD TRACK FIELD IN EXTENDED STATUS REGISTER 2
WILL CONTAIN THE TACH COUNT WHEN THE TAPE STOPPED.
THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM
THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.10 ERROR #17 - DATA COMPARE ERROR:

IF A DATA VALIDATION ERROR OCCURS DURING A WRITE/VERIFY COMMAND,
THE PROGRAM PRINTS WHAT THE DATA SHOULD HAVE BEEN AND WHAT THE
DATA WAS, AND PRINTS THE BYTE AND RECORD NUMBER THE ERROR OCCURRED
ON. ONLY THE FIRST 10 BYTES IN ERROR PER RECORD ARE PRINTED.
THE TOTAL # OF BYTES IN ERROR PER RECORD IS ALSO PRINTED. A
HARD ERROR IS LOGGED AND THE PROGRAM PROCEEDS NORMALLY.

3.2 ERROR HALTS

ERROR HALTS ARE SUPPORTED PER DESCRIBED IN THE PREVIOUS SECTION
WITH /FLAG:HOE. THERE ARE NO OTHER HALTS.

4.0 PERFORMANCE REPORT

SEQ 0022

UNIT X PASS:XXXXX RECORD:XXXXX
BYTES WRITTEN XXX,XXX,XXX,XXX
BYTES READ REV XXX,XXX,XXX,XXX
BYTES READ FWD XXX,XXX,XXX,XXX

	WRT	RDR	RDF
RECOVERABLE ERRORS	XXXXX	XXXXX	XXXXX
UNRECOVERABLE ERRORS	XXXXX	XXXXX	XXXXX

SPEC COND	HARD	FATAL	COMPARE
XXXXX	XXXXX	XXXXX	XXXXX

5.0 TEST SUMMARIES

5.1 TEST 1 - BASIC FUNCTIONS.

EXECUTES AND VERIFIES CORRECT COMPLETION OF ALL TS04 FUNCTIONS.

SUBTEST 1 - SET CHAR, DRIVE INIT, GET STATUS.
+ SET CHARACTERISTIC 200.
+ DRIVE INITIATE.
+ SET CHARACTERISTIC 20.
+ GET STATUS
+ SET CHARACTERISTIC 40.
+ PRINT TS04 MICROCODE LEVEL (PASS 1 ONLY)

SUBTEST 2 - REWIND.
+ REWIND.
+ REWIND AT BOT.

SUBTEST 3 - WRITE/VERIFY.
+ WRITE/VERIFY PATTERN 1.
+ WRITE/VERIFY PATTERN 2.
+ WRITE/VERIFY PATTERN 3.
+ WRITE/VERIFY PATTERN 4.
+ WRITE/VERIFY PATTERN 5.
+ WRITE/VERIFY PATTERN 6.
+ WRITE/VERIFY PATTERN 0.

SUBTEST 4 - WRITE TAPE MARK, ERASE.
+ WRITE TAPE MARK.
+ WRITE 10 RECORDS
+ ERASE 10 TIMES
+ WRITE TAPE MARK.
+ WRITE TAPE MARK RETRY.

SUBTEST 5 - SPACE FILES.
+ SPACE 2 FILES REVERSE.
+ SPACE 2 FILES FORWARD.
+ SPACE 2 FILES REVERSE.
+ SPACE 2 FILES FORWARD.

SUBTEST 6 - SPACE RECORDS.

```
                + REWIND.
                + SPACE 7 RECORDS FORWARD.
                + SPACE 7 RECORDS REVERSE.
                + SPACE 7 RECORDS FORWARD.
                + SPACE 7 RECORDS REVERSE.

SUBTEST 7  - WRITE RETRY.
                + REWIND.
                + WRITE DATA.
                + WRITE RETRY.

SUBTEST 8  - READ REV RETRY.
                + READ REVERSE.
                + READ NEXT REVERSE.
                + READ NEXT FORWARD.

SUBTEST 9  - READ FWD RETRY.
                + READ FORWARD.
                + READ PREVIOUS FORWARD.
                + READ PREVIOUS REVERSE.

SUBTEST 10 - CLEAN.
                + CLEAN.
                + REWIND.

SUBTEST 11  - WRITE/VERIFY SWAPPED DATA BYTES.
                + WRITE/VERIFY EVEN LENGTH (RECORD 1).
                + WRITE/VERIFY ODD LENGTH (RECORD 2).
                + SET DATA BYTE SWAP.
                + WRITE/VERIFY EVEN LENGTH (RECORD 3).
                + WRITE/VERIFY ODD LENGTH (RECORD 4).
                + CLEAR DATA BYTE SWAP.

SUBTEST 12  - READ SWAPPED DATA BYTES.
                + READ REV RECORD 4.
                + READ REV RECORD 3.
                + SET DATA BYTE SWAP.
                + READ REV RECORD 2.
                + READ REV RECORD 1.
                + READ FWD RECORD 1.
                + READ FWD RECORD 2.
                + CLEAR DATA BYTE SWAP.
                + READ FWD RECORD 3.
                + READ FWD RECORD 4.
```

5.2 TEST 2 - DATA RELIABILITY.

1. THE TAPE IS INITIATED WITH THE FOLLOWING COMMANDS:
   SET CHARACTERISTIC 40
   REWIND
   WRITE/VERIFY 31 RECORDS OF RANDOM LENGTH AND DATA
2. WRITE AND READ COMMANDS ARE SELECTED AT RANDOM AND ARE EXECUTED A RANDOM NUMBER OF TIMES WITH RANDOM LENGTHS AND RANDOM PATTERN UNTIL END OF TAPE IS REACHED.
3. AT THE END OF EACH PASS, A REWIND COMMAND IS ISSUED AND A PERFORMANCE REPORT IS PRINTED.

NOTE: IF A RESTART COMMAND IS USED TO INITIATE TEST 1, THE INITIAL REWIND COMMAND IS NOT ISSUED.

5.3 TEST 3 - WRITE COMPATABILITY/WRITE UTILITY.

REWINDS AND WRITES RECORDS OF RANDOM LENGTHS AND RANDOM DATA FROM BOT TO EOT.

5.4 TEST 4 - READ COMPATABILITY/READ UTILITY.

REWINDS AND READS ENTIRE TAPE, FORWARD AND REVERSE.

5.5 TEST 5 - EXECUTE OPERATOR SELECTED COMMAND SEQUENCE.

THE SEQUENCE OF COMMANDS ENTERED BY THE OPERATOR IS EXECUTED. IF NO COMMANDS WERE ENTERED, A DEFAULT SEQUENCE OF REWIND/WRITE/READ REV/READ FWD/REWIND OF ENTIRE TAPE IS EXECUTED WITH RANDOM PATTERN AND RECORD LENGTH OF 2048 BYTES.

6.0 DEVICE INFORMATION TABLES

6.1 GENERAL

THE TS04 TAPE SUBSYSTEM CONSISTS OF A TS11 UNIBUS TO SERIAL BUS CONTROLLER CONNECTED TO A TS04 DRIVE. FROM A SOFTWARE VIEWPOINT THIS CONFIGURATION IS UNIQUE (FOR A UNIBUS DEVICE) IN A NUMBER OF WAYS:

A. ONLY ONE REGISTER MAY BE WRITTEN - TSDB (TAPE SYSTEM DATA BUFFER),

B. TWO REGISTERS MAY BE READ - TSSR AND TSBA (TAPE SYSTEM STATUS REGISTER AND TAPE SYSTEM BUS ADDRESS REGISTER),

C. COMMANDS ARE NOT WRITTEN TO THE DRIVE; RATHER, COMMAND POINTERS ARE WRITTEN WHICH POINT TO COMMAND PACKETS SOMEWHERE IN CPU MEMORY. THE COMMAND POINTER IS USED BY THE TS04 SUBSYSTEM TO FETCH THE WORD(S) WITHIN THE COMMAND PACKET. THE WORDS WITHIN THE COMMAND PACKET ARE:

1. COMMAND WORD
2. LOW ORDER BUFFER ADDRESS
3. HIGH ORDER BUFFER ADDRESS
4. BYTE COUNT

D. THE TSSR CONTAINS ALL THE INFORMATION WHICH WILL BE NECESSARY TO DETERMINE WHETHER:
   1. THE DRIVE IS READY TO ACCEPT ANOTHER COMMAND,
   2. THE PREVIOUS COMMAND WAS EXECUTED WITHOUT ERROR.

IF EITHER OF THE ABOVE CONDITIONS IS UNTRUE AT "JOB DONE" OR "COMMAND INITIATION" TIME,IT MAY BE NECESSARY TO GET THE EXTENDED STATUS REGISTERS TO DETERMINE WHAT ACTION IS TO BE TAKEN AND/OR LOG THE ERROR INFORMATION.

E. EXTENDED STATUS REGISTERS ARE NOT READ DIRECTLY FROM DRIVE REGISTERS; RATHER, A "GET STATUS" COMMAND IS ISSUED WHICH WILL CAUSE THE TS04 TO TRANSFER EXTENDED STATUS INFORMATION TO THE MEMORY AREA POINTED TO BY THE BUFFER ADDRESS OF THE "GET STATUS" COMMAND. THERE ARE FOUR EXTENDED STATUS REGISTERS. SEE 6.3.

F. THE TSDB MUST BE WRITTEN WITH A DATO INSTRUCTION TO PROPERLY WRITE THE COMMAND POINTER. A DATOB WILL CAUSE A MAINTENANCE FUNCTION. A DATO TO THE TSSR WILL CAUSE SUBSYSTEM INIT.

G. COMMAND PACKETS MUST RESIDE ON DIVIDE BY FOUR MEMORY BOUNDARIES (AS OPPOSED TO DIVIDE BY 2 OR WORD BOUNDARIES) .

6.2 UNIBUS INTERFACE SPECIFICATIONS

TS11/ TS04	INT. VECTOR	UNIBUS ADDRESS	REGISTER
FIRST	224	772520	TSBA/TSDB
		772522	TSSR
SECOND	154	772524	TSBA/TSDB
		772526	TSSR
THIRD	160	772530	TSBA/TSDB
		772532	TSSR
FOURTH	164	772534	TSBA/TSDB
		772536	TSSR

6.3 BIT DEFINITIONS FOR TS11/TS04 REGISTERS

6.3.1 TS11/TS04 REGISTER SUMMARY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
TSBA	A15	A14	A13	A12	A11	A10	A09	A08	A07	A06	A05	A04	A03	A02	A01	A00
TSDB	P15	P14	P13	P12	P11	P10	P09	P08	P07	P06	P05	P04	P03	P02	P17	P16
TSSR	SC	UPE	SPE	RMR	NXM	NBA	A17	A16	SSR	OFL	FC1	FC0	TC2	TC1	TC0	
XST0	TMK	RLS	LET	RLL	WLE	NEF	ILC	ILA	MOT	ONL	IE	VCK	PED	WLK	BOT	EOT
XST1	DLT		COR	CRS	TIG	DBF NZO	SCK		IPR	SYN DRP	IPO ITM	IED LCO	POS NZN	POL LRC	UNC CRC	MTE VPE
XST2	OPM	SIP	BPE	CAF		WCF		DTP	DT7	DT6	DT5	DT4	DT3	DT2	DT1	DT0
XST3	MICRO DIAGNOSTIC ERROR CODE								LMX	OPI	REV	CRF	DCK	NOI	LXS	RIB

TERMINATION CLASS CODES (TSSR TC0-TC2):

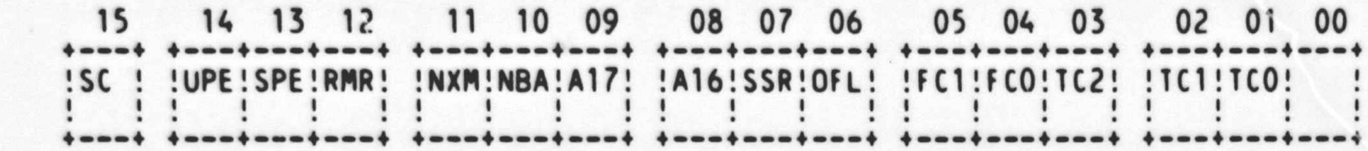
0 = NORMAL TERMINATION
1 = ATTENTION CONDITION
2 = TAPE STATUS ALERT
3 = FUNCTION REJECT
4 = RECOVERABLE ERROR - TAPE POSITION = ONE RECORD DOWN TAPE FROM START OF FUNCTION
5 = RECOVERABLE ERROR - TAPE NOT MOVED
6 = UNRECOVERABLE ERROR - TAPE POSITION LOST
7 = FATAL CONTROLLER ERROR

FATAL CLASS CODES (TSSR FC0-FC1):

0 = MICRO DIAGNOSTIC FAILURE (DISPLAYED IN TS04 OPERATOR PANEL AND XST3).
1 = I/O SEQUENCER CROM PARITY ERROR.
2 = MICROPROCESSOR CROM PARITY ERROR.
SILO PARITY ERROR.
SERIAL BUS PARITY ERROR DETECTED AT TS11 (SPE).
SERIAL BUS PARITY ERROR DETECTED AT TS04 (BPE).
FATAL ERROR HALTS 1750-1777 IN TS04 PROGRAM COUNTER DISPLAY.
3 = LOSS OF AC POWER HAS BEEN DETECTED.

6.3.2 TS11 STATUS REGISTER (TSSR)

UNIBUS ADDRESS + 2 - READ ONLY



BIT	NAME	TCC	DEFINITION
15	SC	S	SPECIAL CONDITION. WHEN SET, INDICATES THAT THE LAST COMMAND DID NOT COMPLETE WITHOUT INCIDENT. SPECIFICALLY, EITHER AN ERROR WAS DETECTED OR AN EXCEPTION CONDITION OCCURRED. EXCEPTION CONDITIONS CAN BE TAPE MARKS ON READ COMMANDS, REVERSE MOTION AND AT BOT, EOT WHILE WRITING, ETC. MAY ALSO BE SET BY THE ERROR BITS CONTAINED IN THE TSSR REGISTER: UPE, SPE, RMR, AND NXM. THE TERMINATION CLASS BITS ARE SOMETHING OTHER THAN 0 (UNLESS RMR IS THE ONLY ERROR - SEE RMR).
14	UPE	4/5	UNIBUS PARITY ERROR. SET BY THE TS11 WHEN IT DETECTS A PARITY ERROR ON THE UNIBUS DATA WHEN TRANSFERRING TO OR FROM THE CPU'S MEMORY.
13	SPE	7	SERIAL BUS PARITY ERROR. THIS BIT IS SET BY THE TS11 WHEN IT DETECTS A SERIAL BUS PARITY ERROR ON DATA RECEIVED FROM THE TS04.
12	RMR	S	REGISTER MODIFICATION REFUSED. SET BY THE TS11 WHEN A COMMAND POINTER IS LOADED INTO TSDB AND SUB-SYSTEM READY (SSR) IS NOT SET. NOTE THAT THIS BIT CAUSES SPECIAL CONDITION BUT NO TERMINATION CLASS (IN FACT, THE TS04 NEVER SEES THIS ERROR) BECAUSE ON A SYSTEM WITH NO BUGS, THIS BIT MAY COME UP ON AN ATTENTION MESSAGE. IF ATTNS ARE NOT ENABLED, THIS BIT COMING UP IS AN INDICATION OF EITHER A FATAL CONTROLLER ERROR OR A SOFTWARE BUG.
11	NXM	4/5	NON-EXISTENT MEMORY. SET BY THE TS11 WHEN TRYING TO TRANSFER TO OR FROM A MEMORY LOCATION WHICH DOES NOT EXIST. MAY OCCUR WHEN FETCHING THE COMMAND PACKET, FETCHING OR STORING DATA, OR STORING THE MESSAGE PACKET.
10	NBA	S	NEED BUFFER ADDRESS. WHEN SET, INDICATES THAT THE TS04 NEEDS A MESSAGE BUFFER ADDRESS. THIS BIT IS CLEARED DURING THE SET CHARACTERISTICS COMMAND (IF A GOOD ADDRESS WAS GIVEN).
09	A17	S	BUS ADDRESS BIT 17. A17 AND A16 (BIT 08) TRACK

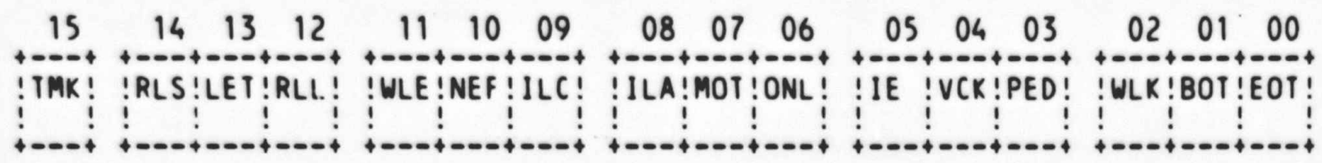
THE VALUES OF BITS 17 AND 16 OF THE TSBA REGISTER.

08	A16	S	BUS ADDRESS BIT 16. SEE A17 (BIT 09).
07	SSR	S	SUB-SYSTEM READY. WHEN SET, INDICATES THAT THE TS11/TS04 SUBSYSTEM IS NOT BUSY AND IS READY TO ACCEPT A NEW COMMAND POINTER.
06	OFL	S,1,3	OFF-LINE. WHEN SET, INDICATES THAT THE TS04 IS OFF-LINE AND UNAVAILABLE FOR ANY TAPE MOTION COMMANDS. THIS BIT CAN CAUSE A TERMINATION CLASS OF 1 (ON ATTN INTERRUPT) OR 3 (RESULTS IN NEF).
05	FC1	7	FATAL TERMINATION CLASS 01. FC1 AND FC0 (BIT 04) ARE USED TO INDICATE THE TYPE OF FATAL ERROR WHICH HAS OCCURRED ON THE TS04. THESE BITS ARE VALID ONLY WHEN SC IS SET AND THE TERMINATION CLASS CODE BITS ARE ALL SET (111).
04	FC0	7	FATAL TERMINATION CLASS 00. SEE FC1 (BIT 05).
03	TC2	S	TERMINATION CLASS BIT 02. THIS BIT, ALONG WITH THE TC1 AND TC0 BITS, ACT AS AN OFFSET VALUE WHENEVER AN ERROR OR EXCEPTION CONDITION OCCURS ON A COMMAND. EACH OF THE EIGHT POSSIBLE VALUES OF THIS FIELD REPRESENT A PARTICULAR CLASS OF ERRORS OR EXCEPTIONS. THE CONDITIONS IN EACH CLASS HAVE SIMILAR SIGNIFICANCE AND, AS APPLICABLE, RECOVERY PROCEDURES. THE CODE PROVIDED IN THIS FIELD IS EXPECTED TO BE UTILIZED AS AN OFFSET INTO A DISPATCH TABLE FOR HANDLING OF THE CONDITION.
02	TC1	S	TERMINATION CLASS BIT 01. SEE TC2 (BIT 03).
01	TC0	S	TERMINATION CLASS BIT 00. SEE TC2 (BIT 03).
00	-	-	NOT USED.

UNIBUS ADDRESS + 2 - WRITE ONLY

SUBSYSTEM INITIALIZE

6.3.3 EXTENDED STATUS REGISTER 0 (XSTAT0)

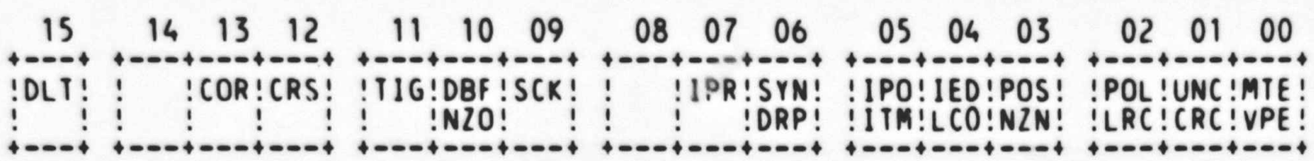


BIT	NAME	TCC	DEFINITION
15	TMK	S,2	TAPE MARK DETECTED. SET WHENEVER A TAPE MARK WAS DETECTED DURING A READ, SPACE, OR SKIP COMMAND AND AS A RESULT OF THE WRITE TAPE MARK OR WITE TAPE MARK RETRY COMMANDS.
14	RLS	2	RECORD LENGTH SHORT. THIS BIT INDICATES THAT EITHER THE RECORD'S LENGTH WAS SHORTER THAN THE BYTE COUNT ON READ OPERATIONS, A SPACE RECORD OPERATION ENCOUNTERED A TAPE MARK OR BOT BEFORE THE POSITION COUNT WAS EXHAUSTED, OR A SKIP TAPE MARKS COMMAND WAS TERMINATED BY ENCOUNTERING BOT OR A DOUBLE TAPE MARK (IF THAT OPERATIONAL MODE IS ENABLED, SEE LET) PRIOR TO EXHAUSTING THE POSITION COUNTER.
13	LET	2	LOGICAL END OF TAPE. SET ONLY ON THE SKIP TAPE MARKS COMMAND WHEN EITHER TWO CONTIGUOUS TAPE MARKS ARE DETECTED OR WHEN MOVING OFF OF BOT AND THE FIRST RECORD ENCOUNTERED IS A TAPE MARK. THE SETTING OF THIS BIT WILL NOT OCCUR UNLESS THIS MODE OF TERMINATION IS ENABLED THROUGH USE OF THE SET CHARACTERISTICS COMMAND.
12	RLL	2	RECORD LENGTH LONG. WHEN SET, THIS BIT INDICATES THAT THE RECORD READ WAS LONGER THAN THE BYTE COUNT SPECIFIED.
11	WLE	3,6	WRITE LOCK ERROR. WHEN SET, INDICATES THAT A WRITE OPERATION WAS ISSUED BUT THE MOUNTED TAPE DID NOT CONTAIN A WRITE ENABLE RING OR THE WRT LOCK SWITCH ACTIVATED DURING THE OPERATION.
10	NEF	3	NON-EXECUTABLE FUNCTION. WHEN SET, INDICATES THAT THE COMMAND COULD NOT BE EXECUTED DUE TO ONE OF THE FOLLOWING CONDITIONS: - THE COMMAND SPECIFIED REVERSE TAPE DIRECTION BUT THE TAPE WAS ALREADY POSITIONED AT BOT. - THE ISSUING OF ANY COMMAND, EXCEPT REWIND,

UNLOAD, OR A COMMAND WITH THE CLEAR VOLUME CHECK (CVC) BIT SET, WHEN THE VOLUME CHECK BIT IS SET.
- ANY COMMAND, EXCEPT GET STATUS OR DRIVE INITIALIZE, WHEN THE TS04 IS OFF-LINE.
- ANY WRITE COMMAND WHEN THE TAPE DOES NOT CONTAIN A WRITE ENABLE RING (WRITE LOCK STATUS - WLS).

09	ILC	3	ILLEGAL COMMAND. SET WHEN A COMMAND IS ISSUED AND EITHER ITS COMMAND FIELD OR ITS COMMAND MODE FIELD CONTAINS CODES WHICH ARE NOT SUPPORTED BY THE TS04.
08	ILA	3	ILLEGAL ADDRESS. (MORE THAN 18 BITS OR ODD WHEN AN EVEN ADDRESS IS REQUIRED.)
07	MOT	S	TAPE IS MOVING.
06	ONL	S	ON LINE. WHEN SET, INDICATES THAT THE TS04 IS ON-LINE AND OPERABLE.
05	IE	S	INTERRUPT ENABLE. REFLECTS THE STATE OF THE INTERRUPT ENABLE BIT SUPPLIED ON THE LAST COMMAND.
04	VCK	S	VOLUME CHECK. WHEN SET, INDICATES THAT THE DRIVE HAS BEEN EITHER POWERED DOWN OR TURNED OFF-LINE. CLEARED BY THE CLEAR VOLUME CHECK (CVC) BIT IN THE COMMAND HEADER WORD. THIS BIT CAN CAUSE A TERMINATION CLASS OF 3.
03	PED	S	PHASE ENCODED DRIVE. WHEN SET, INDICATES THAT THE TS04 IS CAPABLE OF READING AND WRITING ONLY 1600 BPI PHASE ENCODED DATA. WHEN RESET, INDICATES THAT THE TS04 HAS ONLY 800 BPI NRZI DATA CAPABILITIES.
02	WLK	S,3	WRITE LOCKED. WHEN SET, INDICATES THAT THE MOUNTED REEL OF TAPE DOES NOT HAVE A WRITE-ENABLE RING INSTALLED. THE TAPE IS, THEREFORE, WRITE PROTECTED.
01	BOT	S,3	BEGINNING OF TAPE. WHEN SET, INDICATES THAT THE TAPE IS POSITIONED AT THE LOAD POINT AS DENOTED BY THE BOT REFLECTIVE STRIP ON THE TAPE.
00	EOT	S,2	END OF TAPE. THIS BIT IS SET WHENEVER THE TAPE IS POSITIONED AT OR BEYOND THE END OF TAPE REFLECTIVE STRIP. DOES NOT RESET UNTIL THE TAPE PASSES OVER THE REFLECTIVE STRIP IN THE REVERSE DIRECTION UNDER PROGRAM CONTROL.

6.3.4 EXTENDED STATUS REGISTER 1 (XSTAT1)

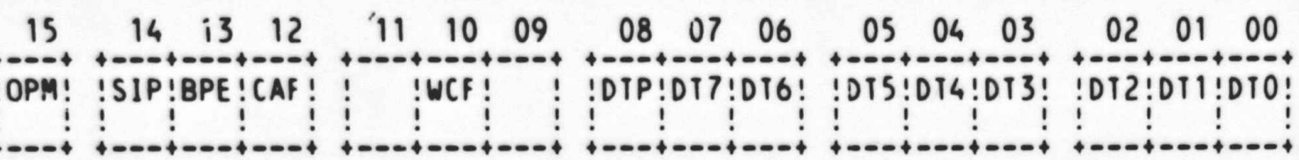


BIT	NAME	TCC	DEFINITION
15	DLT	4	DATA LATE. SET WHEN THE I/O SILO IS FULL ON A READ OR EMPTY ON A WRITE. THESE CONDITIONS OCCUR WHENEVER THE UNIBUS LATENCY EXCEEDS THE DATA TRANSFER RATE OF THE TS04.
14	-	-	NOT USED.
13	COR	S	CORRECTABLE DATA. IN PHASE ENCODED MODE, A CORRECTABLE DATA ERROR HAS BEEN ENCOUNTERED.
12	CRS	4	CREASE DETECTED. FOR NRZI, ALL DATA TRACKS DROPPED OUT FOR MORE THAN THREE CHARACTER TIMES BUT FOR LESS THAN .1 INCHES OF TAPE. FOR PE, EIGHT OUT OF NINE DATA TRACKS WENT DEAD FOR LESS THAN .1 INCHES BEFORE A VALID POSTAMBLE WAS DETECTED.
11	TIG	4	TRASH IN THE GAP. NON-ERASED DATA WAS DETECTED IN A GAP DURING A READ, WRITE, WRITE TAPE MARK, OR ERASE COMMAND.
10	DBF	4	DESKEW BUFFER FAIL. ONE OF THE DESKEW BUFFERS FAILED TO ASSERT "OUTPUT READY" WITHIN 20 MICROSECONDS AFTER BEING ENABLED. THE DEAD TRACK BITS WILL INDICATE ON WHICH TRACKS THIS FAILURE OCCURRED. THIS ERROR IS PROBABLY A RESULT OF A BROKEN FORMATTER.
	NZO	4	NRZ FIFO OVERRUN.
09	SCK	4	SPEED CHECK. TAPE SPEED WAS OFF BY MORE THAN 5% DURING A WRITE DATA OPERATION. NOTE THAT SPEED AVERAGED OVER 8 TICKS AND THE AVERAGE MUST BE OFF 5% TO CAUSE THIS ERROR.
08	-	-	NOT USED.
07	IPR	S,4	INVALID PREAMBLE. SET ON A PE DRIVE IF THE PREAMBLE APPEARS TO BE SHORTER THAN 36 CHARACTERS OR LONGER THAN 44 CHARACTERS. ALSO SET IF THE PREAMBLE IS INCORRECTLY ENCODED BEYOND THE FIFTEENTH CHARACTER IN READ OR THE TENTH CHARCTER IN READ-AFTER-WRITE.

06	SYN	4	SYNCH FAILURE. SET ON A PE DRIVE IF THE FORMATTER WAS UNABLE TO ACHIEVE SYNCHRONIZATION IN THE PREAMBLE.
	DRP	4	NRZ RECORD DROPPED A CHARACTER (THE NEXT CHARACTER WAS TO BE CONSIDERED CRC).
05	IPO	S,4	INVALID POSTAMBLE. SET ON A PE DRIVE DURING READ OR WRITE IF ANY OF THE FIRST 39 CHARACTERS OF THE POSTAMBLE ARE NOT READ CORRECTLY.
	ITM	S,4	ILLEGAL TAPE MARK FOR NRZ.
04	IED	4	INVALID END DATA. FOR PE, EIGHT OUT OF NINE TRACKS WENT DEAD BEFORE THE POSTAMBLE WAS DETECTED.
	LRO	4	FOR NRZI, DATA WAS NOT DETECTED IN EITHER THE LRCC OR CRCC WINDOWS. (LRC WAS ZERO)
03	POS	S,4	POSTAMBLE SHORT. SET ON PE DRIVES DURING A READ OR WRITE WHEN LESS THAN 38 ALL-ZEROES CHARACTERS ARE READ FOLLOWING THE ALL-ONES CHARACTER.
	NZN	S,4	NRZ NOISE RECORD (FEWER THAN 13(10) FRAMES).
02	POL	4	POSTAMBLE LONG. SET ON PE DRIVES DURING READ OR WRITE OPERATIONS WHEN THE POSTAMBLE EXCEEDS 42 CHARACTERS.
	LRC	4	LRC ERROR. SET ON NRZI DRIVES WHEN THE LRCC CHARACTER WAS FOUND IN ERROR.
01	UNC	4	UNCORRECTABLE DATA. SET ON PE DRIVES WHEN A PARITY ERROR OCCURRED WITHOUT A CORRESPONDING DEAD TRACK INDICATION.
	CRC	4	CRC ERROR. SET ON NRZI DRIVES WHEN THE CRC CHARACTER WAS FOUND TO BE IN ERROR.
00	MTE	4	MULTI-TRACK ERROR. SET ON PE DRIVES WHEN MORE THAN ONE DEAD TRACK OCCURRED IN THE PREAMBLE OR IN THE DATA FIELD.
	VPE	4	VERTICAL PARITY ERROR. SET ON NRZI DRIVES WHEN A CHARACTER DID NOT CONTAIN AN ODD NUMBER OF ONE BITS.

SEQ 0033

6.3.5 EXTENDED STATUS REGISTER 2 (XSTAT2)

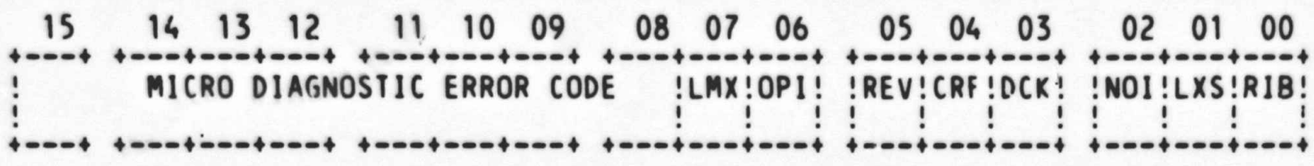


BIT	NAME	TCC	DEFINITION
15	OPM	S	OPERATION IN PROGRESS. (TAPE MOVING)
14	SIP	7,F2	SILO PARITY ERROR. CAUSES FATAL CLASS 2 BECAUSE THE ERROR MIGHT HAVE OCCURRED DURING THE TRANSMISSION OF THE MESSAGE PACKET.
13	BPE	7,F2	SERIAL BUS PARITY ERROR AT DRIVE. SET BY THE TS04 WHEN A PARITY ERROR IS DETECTED ON DATA TRANSMITTED FROM THE TS11 TO THE TS04. CAUSES FATAL CLASS 2 BECAUSE THE ERROR MIGHT HAVE OCCURRED DURING THE TRANSMISSION OF THE MESSAGE PACKET.
12	CAF	7	CAPSTAN ACCELERATION FAIL. AFTER ACCELERATING TAPE FOR .2 INCHES, THE TAPE SPEED WAS CHECKED AND FOUND TO BE OUT OF TOLERANCE BY MORE THAN 10%.
11	-	-	NOT USED.
10	WCF	7	THE WRITE BOARD IS NOT EMPTYING THE I/O SILO AT THE PROPER RATE. THIS ERROR CAN BE THE RESULT OF THE WRITE BOARD CLOCK NOT BEING TURNED ON (BROKEN HARDWARE).
09	-	-	NOT USED.
08	DTP	S	DEAD TRACK PARITY. THE BITS DTP THROUGH DT0 INDICATE WHICH TRACK(S) WENT DEAD, IF ANY, DURING THE LAST DATA TRANSFER OPERATION. IF DESKEW BUFFER FAIL (DBF) IS SET, THESE BITS INDICATE WHICH CHANNEL FAILED.
07	DT7	S	DEAD TRACK 7. SEE DTP.
06	DT6	S	DEAD TRACK 6. SEE DTP.
05	DT5	S	DEAD TRACK 5. SEE DTP.
04	DT4	S	DEAD TRACK 4. SEE DTP.
03	DT3	S	DEAD TRACK 3. SEE DTP.
02	DT2	S	DEAD TRACK 2. SEE DTP.
01	DT1	S	DEAD TRACK 1. SEE DTP.

00 DTO S DEAD TRACK 0. SEE DTP. SEQ 0035

NOTE: ON A SET CHARACTERISTICS COMMAND, THE UCODE LEVEL IS RETURNED IN DT7 THRU DT0. ON A GET STATUS COMMAND, THE RESIDUAL CAPSTAN TICK COUNT (INTERNALLY R7) IS RETURNED IN DT7 THRU DT0.

6.3.6 EXTENDED STATUS REGISTER 3 (XSTAT3)



BIT	NAME	TCC	DEFINITION
15 TO 08			MICRO DIAGNOSTIC ERROR CODE. (SEE LIST OF CODES BELOW). ALL ERROR CODES IN THE TABLE WILL BE DISPLAYED ON THE TS04 CONTROL PANEL BUT ONLY CODES HIGHER THAN 110 WILL BE AVAILABLE TO CPU DIAGNOSTICS FOR PRINTOUT IN THE MICRO DIAGNOSTIC ERROR CODE FIELD OF XSTAT3. THIS ERROR CODE FIELD IS VALID ONLY WHEN THE TERMINATION CLASS CODE IN THE TSSR EQUALS 7 AND THE FATAL CLASS CODE IN THE TSSR EQUALS 0, INDICATING AN INTERNAL DIAGNOSTIC FAILURE.
07	NTL	6	LIMIT EXCEEDED. SET WHEN THE TAPE TENSION ARMS HAVE EXCEEDED THEIR ALLOWABLE TRAVEL AND HAVE CAUSED THE ACTIVITATION OF THE LIMIT SWITCHES. NO TENSION EXISTS ON THE MOUNTED TAPE.
06	OPI	6	OPERATION INCOMPLETE. SET WHEN A READ, SPACE, OR SKIP OPERATION HAS MOVED 25 FEET OF TAPE WITHOUT DETECTING ANY DATA ON THE TAPE.
05	REV	S	DIRECTION OF CURRENT OPERATION WAS REVERSE (BUT IS 0 IF REWIND OR FORWARD)
04	CRF	7	CAPSTAN RESPONSE FAILURE. A MOTION COMMAND WAS GIVEN TO THE CAPSTAN BUT WE DID NOT GET A TICK BACK WITHIN A REASONABLE AMOUNT OF TIME.
03	DCK	S,6	DENSITY CHECK. SET ON PE DRIVES WHEN A PE IDENTIFICATION BURST WAS NOT DETECTED WHEN MOVING OFF OF BOT. SET ON NRZI DRIVES WHEN A NON-NRZI IDENTIFICATION BURST WAS FOUND WHEN MOVING OFF OF BOT.
02	NOI	6	NOISE RECORD. SET DURING A READ OR SPACE OPERATION WHEN A BURST OF FLUX CHANGES, WHICH DO NOT QUALIFY AS A RECORD (BUT TOO MANY TO IGNORE), ARE DETECTED: NRZI: AT LEAST TWO CHARACTERS IN A ROW BUT LESS THAN TWELVE, FOLLOWED BY A CHARACTER IN EITHER THE CRCC OR LRCC WINDOWS. PE: AT LEAST 24 CHARACTERS IN A ROW THAT DO NOT QUALIFY AS A TAPE MARK OR A DATA PREAMBLE.

01	LXS	S	LIMIT EXCEEDED STATICALLY. THIS BIT IS SET ANY TIME THE LIMIT SWITCHES ARE EXCEEDED. THIS BIT CAN ONLY BE CLEARED BY MANUALLY LOADING THE TAPE.
00	RIB	2	REVERSE INTO BOT. A READ, SPACE, OR SKIP COMMAND ALREADY IN PROGRESS HAS ENCOUNTERED THE BOT MARKER WHEN MOVING TAPE IN THE REVERSE DIRECTION. TAPE MOTION WILL BE HALTED AT BOT.

MICRO DIAGNOSTIC ERROR CODES

FOLLOWING IS A LIST OF THE ERRORS WHICH ARE DISPLAYED IN THE MICRO DIAGNOSTIC ERROR CODE (XSTAT3 BITS 15 - 08) AND ALSO IN THE LIGHTS ON THE TS04 CONTROL PANEL, DUE TO FAILURES ON THE CAPSTAN BOARD, I/O BOARDS, WRITE BOARD, READ BOARD, OR FORMATTER BOARD. THE MICRO WILL BE IN A TIGHT LOOP IN THE DISPM PROGRAM, WAITING FOR OPERATOR OR CPU INTERVENTION WHILE THE ERROR IS BEING DISPLAYED IN THE CONSOLE LIGHTS. IT IS APPARENT THAT AN ERROR IS BEING DISPLAYED IF THE "UOK" LIGHT IS NOT LIGHTED, THE PROCESSOR IS NOT STOPPED, AND AN OCTAL NUMBER (100-377) IS BEING DISPLAYED IN THE LIGHTS. TO SCOPE LOOP THESE TESTS, ENTER MAINTENANCE MODE (ON-LINE SWITCH TO "OFF" POSITION, MAINTENANCE SWITCH UP, PRESS RESET), ENTER THE OFF-LINE TEST NUMBER (SEE SCOPE LOOP COLUMN BELOW) IN THE OPERATOR CONSOLE LIGHTS (ENTER ONES WITH LEFT-MOST SWITCH, ENTER ZEROES WITH RIGHT-MOST SWITCH), AND PRESS ON-LINE BUTTON. TEST WILL LOOP UNTIL ON-LINE SWITCH IS RETURNED TO OFF-LINE POSITION, ERRORS WILL BE DISPLAYED CONTINUOUSLY.

ERROR (DISPLAY)	PROGRAM	ERROR DESCRIPTION	LIKELY MODULE	SCOPE LOOP
337	OPERATIONAL CODE	CAPSTAN RUNAWAY ERROR (H3.RNY). CAPSTAN DIDN'T STOP WITHIN ACCEPTABLE WINDOW AFTER LAST COMMAND.		
100	IOTSM	BASIC I/O MICRO FAILURE (PARITY ERROR, IOATN, HANDSHAKING, AND DATA WINDOW TEST BETWEEN THE I/O AND MAIN MICROS. NOTE: CAN ALSO BE CAUSED BY THE SERIAL BUS .SHIN (SHIFT IN) STUCK ASSERTED.	M8967	14
101	IOTSM	ERROR IN I/O CONTROL REGISTER TEST	M8966 M8967	15
102	IOTSM	FAILURE OF FRAME COUNTER TEST	M8966	15
103	IOTSM	FAILURE OF I/O SILO NON-PARITY ERROR DATA TEST OR THE WRITE FLAG.	M8966 M8963	16
104	IOTSM	FAILURE OF I/O SILO PARITY ERROR TEST OR DATA LATE TEST.	M8966	17

105	IOTSM	FAILURE OF SHIFT LOOP WITH ZEROES.	M8965	20	SEQ 0038
106	IOTSM	FAILURE OF SHIFT LOOP WITH ONES.	M8965	21	
107	IOTSM	FAILURE OF SHIFT LENGTH MUX.	M8965	22	
110	IOTSM	FAILURE TO RECEIVE CORRECT OP-CODE FROM TS11 WHEN WE SENT DATA OVER THE SERIAL BUS.	M8965 TS11 MOTHER BD SBUS CABLE	47	
111	CATSM	FAILURE OF 1 KHZ CLOCK TEST. TSTS TAC SYNC FLOP AND ATTN, TOO.	G159 CBUS CABLE M8963	2	
112	CATSM	LIGHT REGISTER CHANGED WHEN MOTION REGISTER WAS CLEARED.	G159	3,4	
113	CATSM	FWD OR MVG BITS WRONG AFTER 1 TICK OF SIMULATED COMMAND AND TACH PULSES.	G159	3,4	
114	CATSM	FAILURE OF SIMULATED CAPSTAN SPEED TEST. THE CAPSTAN SPEED COUNTER WAS OUT OF RANGE WHEN TAPE MOTION AT SPEED WAS SIMULATED.	G159	3,4	
115	CATSM	FAILURE OF SIMULATED SLOW CAPSTAN TEST. SPEED COUNTER DID NOT LATCH UP WITH MAX COUNT WHEN SLOW TACH TICKS WERE SIMULATED.	G159	3,4	
116	CATSM	FAILURE OF SIMULATED CAPSTAN DECEL TEST. COUNTER NOT ZERO FOR FORWARD OR 377 FOR REVERSE WHILE DECELERATING, OR MVG BIT NOT 1.	G159	3,4	
117	CATSM	FAILURE OF MOVING FLOP TO GO TO ZERO AFTER STOPPING (DIRECTION REVERSAL FOR ONE TACH TICK).	G159	3,4	
120	PETSM	FAILURE OF WRITE BOARD TO TURN ON AND EMPTY THE SILO, OR DATA LATE BIT DOESN'T WORK.	M8929 M8966	23	
121	PETSM	FAILURE OF WRITE BOARD TO EMPTY SILO AT CORRECT SPEED.	M8929	23	
124	PETSM	FORMATTER FLAG DOESN'T WORK ON THE M8922.	M8922	24	
125	PETSM	FORMATTER SILO FILLING AND DATA ERROR	M8922 M8923 M8924	24	
126	PETSM	PEAK SHIFT TEST ERROR	M8922 M8923 M8924	25	

127	PETSM	FORMATTER TABLE LOOKUP ROM CHECKSUM TEST ERROR	N 3 M8922 M8923 M8924	26	SEQ 0039

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```
      1
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```
                        .TITLE PROGRAM HEADER AND TABLES
                        .SBTTL  PROGRAM HEADER

                                .ENABL  ABS,AMA
002000                  .       =       2000
002000                          BGNMOD

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

002000                          POINTER BGNRPT,BGNSW,BGNSFT,BGNAU,BGNDU,BGNSETUP


002000                          HEADER  CZTSH,B,0,5000,1,#INTPRI
002000                  L$NAME::                ;DIAGNOSTIC NAME
002000  103                                                     .ASCII /C/
002001  132                                                     .ASCII /Z/
002002  124                                                     .ASCII /T/
002003  123                                                     .ASCII /S/
002004  110                                                     .ASCII /H/
002005  000                                                     .BYTE   0
002006  000                                                     .BYTE   0
002007  000                                                     .BYTE   0
002010                  L$REV::                 ;REVISION LEVEL
002010  102                                                     .ASCII  /B/
002011                  L$DEPO::                ;0
002011  060                                                     .ASCII  /0/
002012                  L$UNIT::                ;NUMBER OF UNITS
002012  000001                                                  .WORD   T$PTHV
002014                  L$TIML::                ;LONGEST TEST TIME
002014  005000                                                  .WORD   5000
002016                  L$HPCP::                ;POINTER TO H.W. QUES.
002016  022616                                                  .WORD   L$HARD
002020                  L$SPCP::                ;POINTER TO S.W. QUES.
002020  022670                                                  .WORD   L$SOFT
002022                  L$HPTP::                ;PTR. TO DEF. H.W. PTABLE
002022  002174                                                  .WORD   L$HW
002024                  L$SPTP::                ;PTR. TO S.W. PTABLE
002024  002202                                                  .WORD   L$SW
002026                  L$LADP::                ;DIAG. END ADDRESS
002026  024236                                                  .WORD   L$LAST
002030                  L$STA::                 ;RESERVED FOR APT STATS
002030  000000                                                  .WORD   0
002032                  L$CO::
002032  000000                                                  .WORD   0
002034                  L$DTYP::                ;DIAGNOSTIC TYPE
002034  000001                                                  .WORD   1
002036                  L$APT::                 ;APT EXPANSION
002036  000000                                                  .WORD   0
002040                  L$DTP::                 ;PTR. TO DISPATCH TABLE
002040  002124                                                  .WORD   L$DISPATCH
002042                  L$PRIO::                ;DIAGNOSTIC RUN PRIORITY
002042  000340                                                  .WORD   #INTPRI
002044                  L$EXP1::                ;EXPANSION WORDS
```

```
                                                                                .WORD   0
                        L$EXP2::
                                                                                .WORD   0
                        L$MREV::        ;SVC REV AND EDIT #
                                                                                .BYTE   C$REVISION
                                                                                .BYTE   C$EDIT
                        L$EF::          ;DIAG. EVENT FLAGS
                                                                                .WORD   0
                                                                                .WORD   0
                        L$SPC::
                                                                                .WORD   0
                        L$DEVP::        ; POINTER TO DEVICE TYPE LIST
                                                                                .WORD   L$DVTYP
                        L$REPP::        ;PTR. TO REPORT CODE
                                                                                .WORD   L$RPT
                        L$EXP4::
                                                                                .WORD   0
                        L$EXP5::
                                                                                .WORD   0
                        L$AUT::         ;PTR. TO ADD UNIT CODE
                                                                                .WORD   L$AU
                        L$DUT::         ;PTR. TO DROP UNIT CODE
                                                                                .WORD   L$DU
                        L$LUN::         ; LUN FOR EXERCISERS TO FILL
                                                                                .WORD   0
                        L$DESP::        ; POINTER TO DIAG. DESCRIPTION
                                                                                .WORD   L$DESC
                        L$LOAD::        ;GENERATE SPECIAL AUTOLOAD EMT
                                                                                EMT     E$LOAD
                        L$ETP::         ;POINTER TO ERRTBL
                                                                                .WORD   0
                        L$ICP::         ;PTR. TO INIT CODE
                                                                                .WORD   L$INIT
                        L$CCP::         ;PTR. TO CLEAN-UP CODE
                                                                                .WORD   L$CLEAN
                        L$ACP::         ;PTR. TO AUTO CODE
                                                                                .WORD   L$AUTO
                        L$PRT::         ;PTR. TO PROTECT TABLE
                                                                                .WORD   L$PROT
                        L$TEST::        ;TEST NUMBER
                                                                                .WORD   0
                        L$DLY::         ;DELAY COUNT
                                                                                .WORD   0
                        L$HIME::        ;PTR. TO HIGH MEM
                                                                                .WORD   0
```

```
                                .SBTTL  DISPATCH TABLE

                                ;++
                                ; THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
                                ; IT IS USED BY THE SUPERV!SOR TO DISPATCH TO EACH TEST.
                                ;--

002122                                  DISPATCH 5
002122  000005                                                 .WORD   5
002124                          L$DISPATCH::
002124  017410                                                  .WORD   T1
002126  020776                                                  .WORD   T2
002130  021454                                                  .WORD   T3
002132  021622                                                  .WORD   T4
002134  021754                                                  .WORD   T5

                                .SBTTL  DESCRIPTIVE TEXT

                                ;++
                                ;2 LINES OF TEXT PRINTED TO THE OPERATOR TO IDENTIFY THE DIAGNOSTIC AND THE DEVICE UNDER
                                ;--

002136                                  DESCRIPT        <DATA RELIABILITY TEST>
002136                          L$DESC::
002136  040504  040524  051040                                  .ASCIZ  /DATA RELIABILIT
002144  046105  040511  044502
002152  044514  054524  052040
002160  051505  000124
                                                                .EVEN
002164                                  DEVTYP          <TS11>
002164                          L$DVTYP::
002164  051524  030461  000                                     .ASCIZ  /TS11/
        002172                                                  .EVEN
```

```
                        .SBTTL  DEFAULT HARDWARE P-TABLE

                        ;++
                        ; THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
                        ; THE TEST-DEVICE PARAMETERS.  THE STRUCTURE OF THIS TABLE
                        ; IS IDENTICAL TO THE STRUCTURE OF THE RUN-TIME P-TABLE.
                        ;--

002172                          BGNHW   DFPTBL
002172  000002                                                  .WORD   L10000-L$HW/2
002174                  L$HW::
002174                  DFPTBL::

002174  172522          172522          ;TSSR ADDRESS.
002176  000224          224             ;VECTOR ADDRESS.

002200                          ENDHW
002200                  L10000:
```

```
                                .SBTTL  SOFTWARE P-TABLE

                                ;++
                                ; THE SOFTWARE P-TABLE CONTAINS THE VALUES OF THE PROGRAM
                                ; PARAMETERS THAT CAN BE CHANGED BY THE OPERATOR.
                                ;--

002200                                  BGN$W   SFPTBL
002200  000043                                                         .WORD   L10001-L$SW/2
002202                          L$SW::
002202                          SFPTBL::

002202  001                     CLRFLG:: .BYTE  1               ;CLEAR COUNTERS FLAG.
002203  000                     RRANV::  .BYTE  0               ;RESET RANDOM VARIABLES EACH PASS FLAG.
002204  000                     HAE::    .BYTE  0               ;HALT AFTER EACH COMMAND FLAG.
002205  000                     ERCVER:: .BYTE  0               ;ENABLE RECOVERABLE ERROR PRINTS FLAG.
002206  000                              .BYTE  0               ;SPARE.
002207  000                              .BYTE  0               ;SPARE
002210  000                     DINT::   .BYTE  0               ;DISABLE INTERRUPTS FLAG.
002211  000                     IREC::   .BYTE  0               ;INHIBIT ERROR RECOVERY FLAG.
002212  000                     CHGFLG:: .BYTE  0               ;CHANGE CMD SEQ TABLE FLAG.
002213  000                              .BYTE  0               ;SPARE.
002214  000                     PIRE::   .BYTE  0               ;INHIBIT RESIDUAL FRAMECOUNT ERROR REPORT FLAG.
002215  000                              .BYTE  0               ;SPARE.
002216  000040                  CHAR::   CH.EAI                 ;CHARACTERISTICS CODE (DEFAULT = 40).
002220  000015                  CMDD::   .WORD  13.             ;COMMAND 2 (DEFAULT = REWIND).
002222  000001                           .WORD  1               ;BYTE COUNT
002224  000001                           .WORD  1               ;NUMBER OF OPERATIONS
002226  000007                           .WORD  RANP            ;PATTERN
002230  000004                           .WORD  4               ;COMMAND 3  (DEFAULT = WRITE)
002232  004000                           .WORD  DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
002234  076400                           .WORD  32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32000).
002236  000007                           .WORD  RANP            ;PATTERN (DEFAULT = RANDOM).
002240  000003                           .WORD  3               ;COMMAND 4 (DEFAULT = READ REV).
002242  004000                           .WORD  DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
002244  076400                           .WORD  32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32,000).
002246  000007                           .WORD  RANP            ;PATTERN (DEFAULT = RANDOM).
002250  000002                           .WORD  2               ;COMMAND 5 (DEFAULT = READ FWD).
002252  004000                           .WORD  DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
002254  076400                           .WORD  32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32,000).
002256  000007                           .WORD  RANP            ;PATTERN (DEFAULT = RANDOM).
002260  000015                           .WORD  13.             ;COMMAND 6 (DEFAULT = REWIND).
002262  000001                           .WORD  1               ;BYTE COUNT
002264  000001                           .WORD  1               ;NUMBER OF OPERATIONS
002266  000007                           .WORD  RANP            ;PATTERN
002270  000033                           .WORD  27.             ;END OF CMD SEQ TABLE CODE (DEF) OR CMD 7
002272  004000                           .WORD  DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
002274  076400                           .WORD  32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32000).
002276  000007                           .WORD  RANP            ;PATTERN (DEFAULT = RANDOM).
002300  000033                           .WORD  27.             ;END OF CMD SEQ TABLE CODE (DEF) OR CMD 8
002302  004000                           .WORD  DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
002304  076400                           .WORD  32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32000).
002306  000007                           .WORD  RANP            ;PATTERN (DEFAULT = RANDOM).

002310                                  ENDSW
002310                          L10001:
```

```
213
214  002310                          ENDMOD
```

```
                                .TITLE GLOBAL AREAS
                                .SBTTL  GLOBAL EQUATES SECTION

002310                                  BGNMOD

                                ;++
                                ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
                                ; ARE USED IN MORE THAN ONE TEST.
                                ;--

002310                                  EQUALS
                                ;
                                ; BIT DIFINITIONS
                                ;
100000                          BIT15== 100000
040000                          BIT14== 40000
020000                          BIT13== 20000
010000                          BIT12== 10000
004000                          BIT11== 4000
002000                          BIT10== 2000
001000                          BIT09== 1000
000400                          BIT08== 400
000200                          BIT07== 200
000100                          BIT06== 100
000040                          BIT05== 40
000020                          BIT04== 20
000010                          BIT03== 10
000004                          BIT02== 4
000002                          BIT01== 2
000001                          BIT00== 1
                                ;
001000                          BIT9==  BIT09
000400                          BIT8==  BIT08
000200                          BIT7==  BIT07
000100                          BIT6==  BIT06
000040                          BIT5==  BIT05
000020                          BIT4==  BIT04
000010                          BIT3==  BIT03
000004                          BIT2==  BIT02
000002                          BIT1==  BIT01
000001                          BIT0==  BIT00
                                ;
                                ; EVENT FLAG DEFINITIONS
                                ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
                                ;
000040                          EF.START==      32.             ; START COMMAND WAS ISSUED
000037                          EF.RESTART==    31.             ; RESTART COMMAND WAS ISSUED
000036                          EF.CONTINUE==   30.             ; CONTINUE COMMAND WAS ISSUED
000035                          EF.NEW==        29.             ; A NEW PASS HAS BEEN STARTED
000034                          EF.PWR==        28.             ; A POWER-FAIL/POWER-UP OCCURRED
                                ;
                                ;
                                ; PRIORITY LEVEL DEFINITIONS
                                ;
000340                          PR07== 340
```

```
                        PR106== 300
                        PR105== 240
                        PR104== 200
                        PR103== 140
                        PR102== 100
                        PR101== 40
                        PR100== 0
                        ;
                        ;OPERATOR FLAG BITS
                        ;
                        EVL==        4
                        LOT==       10
                        ADR==       20
                        IDU==       40
                        ISR==      100
                        UAM==      200
                        BOE==      400
                        PNT==     1000
                        PRI==     2000
                        IXE==     4000
                        IBE==    10000
                        IER==    20000
                        LOE==    40000
                        HOE==   100000


                        ; REGISTER USAGE.
                        ;
                        ;       R0 - PASSES PARAMETERS TO/FROM DIAGNOSTIC SUPERVISOR.
                        ;       R1 - COMMAND SEQUENCE TABLE POINTER.
                        ;       R2 - GENERAL PURPOSE REGISTER.
                        ;       R3 - GENERAL PURPOSE REGISTER.
                        ;       R4 - GENERAL PURPOSE REGISTER.
                        ;       R5 - CURRENT LOGICAL DEVICE NUMBER X 2.
                        ;       R6 - STACK POINTER.
                        ;       R7 - PROGRAM COUNTER.

                        ;THE FOLLOWING ARE BIT DEFINITIONS FOR THE TSSR REGISTERS.

100000                  TS.SC==100000                   ;SPECIAL CONDITION BIT.
040000                  TS.UPE==40000                   ;UNIBUS PARITY ERROR
020000                  TS.SPE==20000                   ;SERIAL BUS PARITY ERROR.
010000                  TS.RMR==10000                   ;REGISTER MODIFICATION REFUSED.
004000                  TS.NXM==4000                    ;NON-EXISTENT MEMORY.
002000                  TS.NBA==2000                    ;NEED BUFFER ADDRESS.
001000                  TS.A17==1000                    ;BUS ADDRESS BIT 17.
000400                  TS.A16==400                     ;BUS ADDRESS BIT 16.
000200                  TS.SSR==200                     ;UNIT READY BIT.
000100                  TS.OFL==100                     ;OFF LINE.
177717                  TSC.FCC==177717                 ;FATAL CLASS CODE MASK.
177761                  TSC.TCC==177761                 ;TERMINATION CLASS CODE MASK.
```

```
                        ;THE FOLLOWING ARE BIT DEFINITIONS FOR THE COMMAND WORD

100000                  ACK.C==100000                   ;ACKNOWLEDGE BIT
040000                  CVC.C==40000                    ;CLEAR VOLUME CHECK.
020000                  OPP.C==20000                    ;OPPOSITE BIT
010000                  SWB.C==10000                    ;SWAP BYTE BIT
004000                  MOD.C3==4000                    ;MODE BIT 3
004000                  BRF.C==4000                     ;BYTE/RECORD/FILE COUNT FLAG BIT.  NOT USED
                                                        ;BY TS04 BUT USED INTERNALLY BY THIS PROGRAM ONLY.
002000                  MOD.C2==2000                    ;MODE BIT 2
001000                  MOD.C1==1000                    ;MODE BIT 1
000400                  MOD.C0==400                     ;MODE BIT 0
000200                  IE.C==200                       ;INTERRUPT ENABLE
000100                  FMT.C1==100                     ;FORMAT BIT 1
000100                  VFY.C==100                      ;WRITE VERIFY FLAG BIT.  INTERNAL USE ONLY.
                                                        ;NOT USED BY TS04.
000040                  FMT.C0==40                      ;FORMAT BIT 0.
000040                  JMP.C==40                       ;JUMP BIT-TO DIRECT THIS PROGRAM TO JUMP TO
                                                        ;A CERTAIN LOCATION IN THE COMMAND SEQUENCE
                                                        ;TABLE.  INTERNAL USE ONLY.
000020                  CMD.C4==20                      ;COMMAND BIT 4
000020                  DLY.C==20                       ;INSERT DELAY. INTERNAL USE ONLY.
000010                  CMD.C3==10                      ;COMMAND BIT 3
000004                  CMD.C2==4                       ;COMMAND BIT 2
000002                  CMD.C1==2                       ;COMMAND BIT 1
000001                  CMD.C0==1                       ;COMMAND BIT 0

                        ;       BIT DEFINITIONS FOR DEVICE CHARACTERISTICS.

000200                  CH.ESS==200                     ;ENABLE SKIP TAPE MARKS STOP (STOP AT LOGICAL EOT).
000040                  CH.EAI==40                      ;ENABLE ATTENTION INTERRUPTS.
000020                  CH.ERI==20                      ;ENABLE MESSAGE BUFFER RELEASE INTERRUPTS.
000040                  DFTSCH==CH.EAI                  ;DEFAULT CHARACTERISTICS CODE.

                        ;THE FOLLOWING INDICATES THE RELATIVE POSITIONS OF THE STATUS WORDS
                        ;IN THE MESSAGE BUFFER.

000004                  MS.RFC==4                       ;RESIDUAL FRAME COUNT.
000006                  MS.XS0==6                       ;EXT STATUS REG 0
000010                  MS.XS1==10                      ;EXT STATUS REG 1
000012                  MS.XS2==12                      ;EXT STATUS REG 2
000014                  MS.XS3==14                      ;EXT STATUS REG 3

                        ;THE FOLLOWING ARE BIT DEFINITIONS FOR EXTENDED STATUS REGISTER 0.

100000                  X0.TMK==100000                  ;TAPE MARK.
040000                  X0.RLS==40000                   ;RECORD LENGTH SHORT.
020000                  X0.LET==20000                   ;LOGICAL EOT.
010000                  X0.RLL==10000                   ;RECORD LENGTH LONG.
000100                  X0.ONL==100                     ;ON LINE BIT.
000002                  X0.BOT==2                       ;BOT BIT.
000001                  X0.EOT==1                       ;EOT BIT.

                        ;THE FOLLOWING ARE BIT DEFINITIONS FOR EXTENDED STATUS REGISTER 2.

100000                  X2.OPM==100000                  ;OPERATION IN PROGRESS, TAPE MOVING
```

```
                        ;THE FOLLOWING ARE BIT DEFINITIONS FOR EXTENDED STATUS REGISTER 3.

000010                  X3.DCK==10                      ;DENSITY CHECK.
157400                  X3.RNY==157400                  ;CAPSTAN RUNAWAY UDIAG ERROR CODE.

                        ;THE FOLLOWING DEFINITIONS SHOW THE RELATIVE POSITIONS OF THE COMMAND
                        ;PACKET ENTRIES.

000000                  CP.CMD==0                       ;CMDPKT+0==TS04 COMMAND.
000002                  CP.ADL==2                       ;CMDPKT+2==BUFFER ADDRESS LOW.
000004                  CP.ADH==4                       ;CMDPKT+4==BUFFER ADDRESS HIGH.
000006                  CP.CNT==6                       ;CKDPKT+6==BYTE/FILE/RECORD COUNT

                        ;       MISCELLANEOUS DEFINITIONS.

000340                  INTPRI==PR107                   ;PRIORITY TO BE USED IN INTERRUPT STATE.
002452                  TSBA==TSDB                      ;DATA BUFFER ADDRESS REGISTER.
000010                  SCHCNT==10                      ;ARBITRARY BYTE LENGTH FOR CHARACTERISTIC
                                                        ;BUFFER LENGTH. (EVEN #)
000016                  MSGCNT==16                      ;MESSAGE BUFFER LENGTH IN BYTES. (EVEN #)
003044                  DIABLK==DATAWT                  ;WRITE BUFFER ALSO USED FOR DIAG CMD.
000020                  DIACNT==20                      ;DIAGNOSTIC COMMAND BUFFER EXTENT.
004000                  DATCNT==2048.                   ;MAXIMUM RECORD LENGTH IN BYTES,
                                                        ;THIS COUNT SHOULD BE A MULTIPLE OF 256 TO INSURE
                                                        ;PROPER READ/WRITE BUFFER ALLOCATION BY THE SUPER.
000270                  CNTLEN==CNTEND-CNTBGN           ;LENGTH OF STATISTICAL COUNTER AREA.
177740                  RNOPSC==177740                  ;RANDOM # OF OPERATIONS MASK.
000007                  RANP==7                         ;CODE TO SELECT RANDOM PATTERN.
000020                  RRECL==16.                      ;READ RECOVERY ATTEMPT LIMIT.
000020                  WRECL==16.                      ;WRITE RECOVERY ATTEMPT LIMIT.
153624                  RANBC==153624                   ;CONSTANT USED TO RESET RANDOM # GENERATOR BASE.
032561                  RANSC==32561                    ;CONSTANT USED TO RESET RANDOM # SAVE LOCATION.
177774                  NINUSE==177774                  ;NOT IN USE CODE FOR DEVICE STATE TABLE.
177740                  NCMD.C==ACK.C!CVC.C!OPP.C!SWB.C!MOD.C3!MOD.C2!MOD.C1!MOD.C0!IE.C!FMT.C1!FMT.C0
                                                        ;NOT "COMMAND" BITS.

                        ;THE FOLLOWING DEFINES THE COMMAND WORD FOR EACH TS04 COMMAND.

100013                  DRI==   ACK.C!CMD.C3!CMD.C1!CMD.C0
                                                        ;DRIVE INIT.

104001                  RDF==   ACK.C!BRF.C!CMD.C0
                                                        ;READ FORWARD

104401                  RDR==   ACK.C!BRF.C!MOD.C0!CMD.C0
                                                        ;READ REVERSE

104005                  WRT==   ACK.C!BRF.C!CMD.C0!CMD.C2
                                                        ;WRITE COMMAND

104105                  WTV==   ACK.C!BRF.C!VFY.C!CMD.C0!CMD.C2
                                                        ;WRITE VERIFY

104010                  SRF==   ACK.C!BRF.C!CMD.C3
                                                        ;SPACE RECORD FORWARD
```

```
434
435          104410                  SRR==   ACK.C!BRF.C!MOD.C0!CMD.C3
436                                                                  ;SPACE RECORD REVERSE
437
438          105401                  RNR==   ACK.C!BRF.C!MOD.C1!MOD.C0!CMD.C0
439                                          ;READ REV RETRY1 - REREAD NEXT REVERSE, IE. SPACE FWD, READ REVERSE
440
441          125401                  RNF==   ACK.C!BRF.C!OPP.C!MOD.C1!MOD.C0!CMD.C0
442                                          ;READ REV RETRY2 - REREAD NEXT FORWARD, IE.READ FORWARD, SPACE REVERSE
443
444          105001                  RPF==   ACK.C!BRF.C!MOD.C1!CMD.C0
445                                          ;READ FWD RETRY1 - REREAD PREVIOUS FORWARD, IE. SPACE REVERSE, READ FORW
446
447          125001                  RPR==   ACK.C!BRF.C!OPP.C!MOD.C1!CMD.C0
448                                          ;READ FWD RETRY2 - REREAD PREVIOUS REVERSE, IE. READ REVERSE, SPACE FORW
449
450          105005                  WRR==   ACK.C!MOD.C1!BRF.C!CMD.C2!CMD.C0
451                                                                  ;WRITE RETRY
452
453          102010                  RWD==   ACK.C!MOD.C2!CMD.C3
454                                                                  ;REWIND COMMAND
455
456          100012                  MBR==   ACK.C!CMD.C3!CMD.C1
457                                                                  ;MESSAGE BUFFER RELEASE
458
459          100011                  WTM==   ACK.C!CMD.C3!CMD.C0
460                                                                  ;WRITE TAPE MARK.
461
462          101011                  WTR==   ACK.C!MOD.C1!CMD.C3!CMD.C0
463                                                                  ;WRITE TAPE MARK RETRY.
464
465          105010                  SFF==   ACK.C!BRF.C!MOD.C1!CMD.C3
466                                                                  ;SPACE FILE FORWARD
467
468          105410                  SFR==   ACK.C!BRF.C!MOD.C0!MOD.C1!CMD.C3
469                                                                  ;SPACE FILE REVERSE
470
471          100017                  GES==   ACK.C!CMD.C0!CMD.C1!CMD.C2!CMD.C3
472                                                                  ;GET EXTENDED STATUS
473
474          100411                  ERS==   ACK.C!MOD.C0!CMD.C3!CMD.C0
475                                                                  ;ERASE 3 INCHES OF TAPE
476
477          100412                  UNL==   ACK.C!MOD.C0!CMD.C3!CMD.C1
478                                                                  ;UNLOAD COMMAND
479
480          101012                  CLN==   ACK.C!MOD.C1!CMD.C3!CMD.C1
481                                                                  ;ERASE TAPE.
482
483          140004                  SCH==   ACK.C!CVC.C!CMD.C2      ;SET DEVICE CHARACTERISTICS.
484
485          100006                  DIA==   ACK.C!CMD.C2!CMD.C1     ;DIAGNOSTICS.
486
487          000040                  JMP==   JMP.C                   ;JUMP TO "N"TH COMMAND
488
489          000020                  DLY==   DLY.C                   ;DELAY "N" MS.
```

```
  490
  491          177777                  END==   177777                  ;END OF COMMAND SEQUENCES
```

```
                        .SBTTL  GLOBAL DATA SECTION

                        ;++
                        ; THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
                        ; IN MORE THAN ONE TEST.
                        ;--


                        ;       COMMAND PACKET.

        002310          .       =       .+3&177774      ;MUST BE ON MOD 4 BOUNDRY.
002310  000000          CMDPKT:: 0                      ;1ST WORD IS TS04 COMMAND.
002312  000000                   0                      ;2ND WORD IS THE BUFFER LOW ADDRESS.
002314  000000                   0                      ;3RD WORD IS THE BUFFER HIGH ADDRESS.
002316  000000                   0                      ;4TH WORD IS THE BYTE/RECORD/FILE COUNT.


                        ;       GET STATUS COMMAND PACKET.

        002320          .       =       .+3&177774      ;MUST BE ON MOD 4 BOUNDRY.
002320  100017          GSCPK:: .WORD   GES


                        ;       MESSAGE BUFFER RELEASE COMMAND PACKET.

        002324          .       =       .+3&177774      ;MUST BE ON MOD 4 BOUNDRY.
002324  100012          BRCPK:: .WORD   MBR


                        ;       REWIND COMMAND PACKET (USED IN ERROR RECOVERY ONLY)

        002330          .       =       .+3&177774      ;MUST BE ON A MODULE 4 BOUNDARY.
002330  102010          RWCPK:: .WORD   RWD
002332  000001                  .WORD   1


                        ;       WORK AREA FOR ANALYSIS OF MESSAGE PACKET CONTENTS.

002334  000007          MSGPKT:: .BLKW  7               ;1ST WORD:: MESSAGE TYPE.
                                                        ;2ND WORD:: DATA FIELD LENGTH.
                                                        ;3RD WORD:: RESIDUAL FRAME COUNT.
                                                        ;4TH WORD:: XSTAT0
                                                        ;5TH WORD:: XSTAT1
                                                        ;6TH WORD:: XSTAT2
                                                        ;7TH WORD:: XSTAT3
```

```
                        ;       MESSAGE PACKETS.
                        ;
002352  000007          MSGPK0:: .BLKW  7               ;MESSAGE PACKET FOR DEVICE #0
002370  000007          MSGPK1:: .BLKW  7               ;MESSAGE PACKET FOR DEVICE #1
002406  000007          MSGPK2:: .BLKW  7               ;MESSAGE PACKET FOR DEVICE #2
002424  000007          MSGPK3:: .BLKW  7               ;MESSAGE PACKET FOR DEVICE #3
                        ;
                        ;       SET CHARACTERISTIC BLOCK.
                        ;
002442  002352          SCHBK:: MSGPK0                  ;1ST WORD:: MSGPKT ADDR LO(SET UP BY EXCUTE ROUTINE).
002444  000000                  0                       ;2ND WORD:: MSGPKT ADDR HI.
002446  000016                  MSGCNT                  ;3RD WORD:: MSG BUFFER LENGTH (BYTES)
002450  000040                  CH.EAI                  ;4TH WORD:: CHARACTERISTICS WORD(SET BY SETUP ROUTINE).
                        ;
                        ;       TS04 REGISTER ADDRESSES.
                        ;
002452  000004          TSDB:: .BLKW    4               ;TS04 DATA BUFFER ADDRESSES.
002462  000004          TSSR:: .BLKW    4               ;TS04 STATUS REGISTER ADDRESSES.
002472  000004          TSVCT:: .BLKW   4               ;TS04 VECTOR ADDRESSES.
                        ;
                        ;       ADDRESSES OF MESSAGE PACKETS.
                        ;
002502  002352          MSGPKA:: MSGPK0                 ;DEVICE 0.
002504  002370                  MSGPK1                  ;DEVICE 1.
002506  002406                  MSGPK2                  ;DEVICE 2.
002510  002424                  MSGPK3                  ;DEVICE 3.
                        ;
                        ;       ADDRESSES OF INTERRUPT HANDLING ROUTINES.
                        ;
002512  006012          TS4INT:: TS4IN0                 ;DEVICE 0.
002514  006020                  TS4IN1                  ;DEVICE 1.
002516  006026                  TS4IN2                  ;DEVICE 2.
002520  006034                  TS4IN3                  ;DEVICE 3.
                        ;
                        ;       TS04 CODE LEVELS, WILL BE STORED AFTER SCH CMD IN BASIC FUNCTION TEST
                        ;
002522  000000          TS4CL:: 0                       ;DEVICE 0
002524  000000                  0                       ;DEVICE 1
002526  000000                  0                       ;DEVICE 2
002530  000000                  0                       ;DEVICE 3
                        ;
                        ;       UNIT NUMBERS OF ALL DEVICES BEING TESTED(1-4).
                        ;       WHEN DEVICE IS NOT IN USE, IT,S LOCATION WILL = -3.
                        ;       R5 WILL ALWAYS CONTAIN THE PRESENT LOGICAL UNIT NUMBER X 2.
                        ;
002532  177774          DEVTBL:: .WORD  NINUSE
002534  177774                  .WORD   NINUSE
002536  177774                  .WORD   NINUSE
002540  177774                  .WORD   NINUSE
002542  177777                  .WORD   END
```

```
                                ;       COUNTER AREA.
                                ;
            002544              CNTBGN=.
002544  000020                  WRBC:: .BLKW    20              ;BYTES WRITTEN.
002604  000020                  RRBC:: .BLKW    20              ;BYTES READ REV.
002644  000020                  RFBC:: .BLKW    20              ;BYTES READ FWD.
002704  000004                  WRREC:: .BLKW   4               ;RECOVERABLE WRITE ERRORS.
002714  000004                  WRUNR:: .BLKW   4               ;UNRECOVERABLE WRITE ERRORS.
002724  000004                  RRREC:: .BLKW   4               ;RECOVERABLE READ REV ERRORS.
002734  000004                  RRUNR:: .BLKW   4               ;UNRECOVERABLE READ REV ERRORS.
002744  000004                  RFREC:: .BLKW   4               ;RECOVERABLE READ FWDERRORS.
002754  000004                  RFUNR:: .BLKW   4               ;UNRECOVERABLE READ FWD ERRORS.
002764  000004                  PASCNT:: .BLKW  4               ;PASS COUNT.
002774  000004                  SCCNT:: .BLKW   4               ;SPECIAL CONDITION COUNT.
003004  000004                  VFYCNT:: .BLKW  4               ;COUNT OF TS04 DATA COMPARE ERRORS.
003014  000004                  HRDCNT:: .BLKW  4               ;COUNT OF HARD ERRORS.
003024  000004                  FTLCNT:: .BLKW  4               ;COUNT OF FATAL ERRORS.
            003034              CNTEND=.                        ;END OF STATICTICAL COUNTERS.
003034  000004                  RECCNT:: .BLKW  4               ;NUMBER OF RECORDS FROM BOT(CLEARED ONLY ON REWIND).

                                ;       THE FOLLOWING ARE THE DEFINITIONS OF VARIABLES
                                ;       USED BY THE PROGRAM.

003044  000000                  DATAWT:: .WORD  0               ;WRITE BUFFER ADDRESS.
003046  000000                  DATARD:: .WORD  0               ;READ BUFFER ADDRESS.
003050  000000                  NCNT:: .WORD    0               ;STORAGE FOR VALUE OF N.
003052  000000                  NCNT1:: .WORD   0               ;TEMP STORAGE FOR VALUE OF N.
003054  000000                  BRFCNT:: .WORD  0               ;STORAGE FOR BPCR VALUE.
003056  177777                  CMDWRD:: .WORD  END             ;CONTAINS COMMAND WORD BEING EXECUTED PRESENTLY.
003060  177777                  CMDSAV:: .WORD  END             ;SAVE LOCATION FOR CMD WORD DURING ERROR RECOVERY
003062  177777                  PCMDWD:: .WORD  END             ;CONTAINS PREVOUS COMMAND WORD.
003064  000000                  CMDLG:: .WORD   0               ;CURRENT COMMAND LOGGING CODE.
003066  000000                  LENMSK:: .WORD  0               ;RANDOM WRITE LENGTH MASK, TO BE SET UP BY TESTS
003070  153624                  RANB:: .WORD    153624          ;RANDOM # GENERATOR BASE.
003072  032561                  RANS:: .WORD    32561           ;RANDOM # SAVE LOCATION.
003074  000000                  TIME1:: .WORD   0               ;TIME COUNT 1.
003076  000000                  TIME2:: .WORD   0               ;TIME COUNT 2.
003100  000000                  JLOOP:: .WORD   0               ;JMP COMMAND LOOP COUNT.
003102  000000                  JLOC::  .WORD   0               ;JMP COMMAND LOCATION COUNT.
003104  000000                  PATERN:: .WORD  0               ;PATTERN SELECT CODE.
003106  000000                  CTCC:: .WORD    0               ;CURRENT TERMINATION CLASS CODE.
003110  000000                  R5SAVE:: .WORD  0               ;LOCATION FOR SAVING CURRENT DEVICE POINTER.
003112  000000                  TSSREG:: .WORD  0               ;CURRENT STATUS REGISTER.
```

```
                                ;       ERROR FLAG AREA, THESE FLAGS ARE CLEARED DURING INITIALIZATION AND
                                ;       AFTER EACH COMMAND IS COMPLETED.

                        003114  BGNFLG=.
003114  000000                  RETRYC:: .WORD  0               ;# OF RECOVERY ATTEMPTS EXECUTED.
003116     000                  RECLOG:: .BYTE  0               ;RECORD COUNT HAS BEEN UPDATED FOR THIS RECORD.
003117     000                  ERLOG:: .BYTE   0               ;DATA BYTES AND ERRORS HAVE BEEN LOGGED FOR THIS RECORD.
003120     000                  RWERR:: .BYTE   0               ;READ/WRITE ERROR HAS OCCURED.
003121     000                  UNREC:: .BYTE   0               ;UNRECOVERABLE ERROR HAS OCCURED.
003122     000                  ERRREC:: .BYTE  0               ;ERROR RECOVERY MODE.
                        003124          .EVEN
                        003124  ENDERF=.

                                ;       ADDITIONAL FLAGS, THESE FLAGS ARE CLEARED DURING INITIALIZATION.

003124  000004                  INTFLG:: .BLKW  4               ;INTERRUPT OCCURRED FLAGS FOR EACH DEVICE.
003134  000004                  EOTFLG:: .BLKW  4               ;EOT/BOT FLAGS FOR EACH DEVICE (XSTAT0).
003144     000                  EXPBOT:: .BYTE  0               ;BOT IS EXPECTED, DO NOT ABORT ON BOT/FUNC RTI.
003145     000                  RANDOM:: .BYTE  0               ;RANDOM EVERYTHING FLAG.
003146     000                  VFYFLG:: .BYTE  0               ;SET DURING WRITE/VERIFY COMMAND.
003147     000                  RPTFLG:: .BYTE  0               ;PERFORMANCE REPORT HAS BEEN REQUESTED.
003150     000                  SWBFLG:: .BYTE  0               ;ENABLES SWAP BYTE FUNCTION WHEN NOT EQUAL TO ZERO.
003151     000                  IRE::   .BYTE   0               ;INHIBIT RESIDUAL FRAME COUNT ERROR REPORT.
003152     000                  DROPED:: .BYTE  0               ;CURRENT UNIT HAS BEEN DROPPED
003153     000                  T1SWB::  .BYTE  0               ;TEST1 SWAP BYTES FLAG
003154     000                  ALLEOT:: .BYTE  0               ;ALL UNITS  @ EOT FLAG
                        003156          .EVEN
                        003156  ENDFLG=.

                                ;       ADDITIONAL FLAGS, THESE FLAGS ARE CLEARED ONLY AFTER BEING CHECKED.

003156     000                  STAFLG:: .BYTE  0               ;START FLAG - SET BY INIT CODE IF STARTING.
003157     000                  PWRFLG:: .BYTE  0               ;POWER FAILURE FLAG - SET ONLY DURING INIT.
003160     000                  TRAPD4:: .BYTE  0               ;TRAPED AT 4 FLAG
003161     000                  SPAFLG:: .BYTE  0               ;SPARE FLAG

                                ;       OPERATOR FLAG SETTINGS PASSED BY DIAG. SUPERVISOR IN A 16 BIT WORD
                                ;       SEE GLOBAL EQUATES SECTION FOR FLAG BIT LIST

003162  000000                  OPFLAG:: .WORD  0       ;READ ONLY OPERATOR FLAG WORD
                                .EVEN
```

```
                                        ;THE FOLLOWING IS THE COMMAND SEQUENCE TABLE.  THE TABLE
                                        ;HAS DEFAULT VALUES AT PROGRAM LOAD AS SHOWN.  THESE VALUES
                                        ;CAN BE UPDATED BY A TEST OR BY OPERATOR INPUT.

003164  140004          CMDSEQ:: .WORD  SCH             ;SET CHARACTERISTICS.
003166  000040                   .WORD  CH.EAI
003170  000001                   .WORD  1
003172  000000                   .WORD  0
003174  102010          CMDSE2:: .WORD  RWD             ;REWIND.
003176  000001                   .WORD  1               ;BYTE COUNT.
003200  000001                   .WORD  1               ;ONCE.
003202  000007                   .WORD  RANP            ;PATTERN.
003204  104005                   .WORD  WRT             ;WRITE.
003206  004000                   .WORD  DATCNT          ;MAX BUFFER LENGTH.
003210  076400                   .WORD  32000.          ;32,000 RECORDS.
003212  000007                   .WORD  RANP            ;RANDOM PATTERN.
003214  104401                   .WORD  RDR             ;READ REV.
003216  004000                   .WORD  DATCNT          ;MAX BUFFER LENGTH.
003220  076400                   .WORD  32000.          ;32,000 RECORDS
003222  000007                   .WORD  RANP            ;RANDOM PATTERN.
003224  104001                   .WORD  RDF             ;READ FWD.
003226  004000                   .WORD  DATCNT          ;MAX BUFFER LENGTH.
003230  076400                   .WORD  32000.          ;32,000 RECORDS.
003232  000007                   .WORD  RANP            ;RANDOM PATTERN.
003234  102010                   .WORD  RWD             ;REWIND.
003236  000001                   .WORD  1               ;BYTE COUNT.
003240  000001                   .WORD  1               ;ONCE.
003242  000007                   .WORD  RANP            ;PATTERN.
003244  000004                   .BLKW  4               ;EXTENSTION TO HOLD 1 MORE CMD.
003254  177777          SEQEND:: .WORD  END             ;SOFT END OF SEQUENCE TABLE.
003256  177777                   .WORD  END
003260  177777                   .WORD  END
003262  177777                   .WORD  END
003264  177777                   .WORD  END             ;HARD END OF SEQUENCE TABLE.
```

```
                                        ;THE FOLLOWING IS THE TS04 COMMAND TABLE

003266  100013          CMDTBL:: .WORD  DRI      ;DRIVE INIT.
003270  104001                   .WORD  RDF      ;READ FORWARD.
003272  104401                   .WORD  RDR      ;READ REVERSE.
003274  104005                   .WORD  WRT      ;WRITE
003276  104105                   .WORD  WTV      ;WRITE/VERIFY.  (WRITE ALL RECORDS, RDR AND
                                                 ;CHECK DATA ON ALL RECORDS, RDF AND
                                                 ;CHECK DATA ON ALL RECORDS.)
003300  104010                   .WORD  SRF      ;SPACE "N" RECORDS FORWARD.
003302  104410                   .WORD  SRR      ;SPACE "N" RECORDS REVERSE.
003304  105401                   .WORD  RNR      ;READ NEXT REVERSE. I.E., SPACE FWD, READ REVERSE.
003306  125401                   .WORD  RNF      ;READ NEXT FORWARD, I.E., READ FORWARD, SPACE REVERSE.
003310  105001                   .WORD  RPF      ;READ PREVIOUS FORWARD. I.E., SPACE REVERSE, READ FORWAR
003312  125001                   .WORD  RPR      ;READ PREVIOUS REVERSE. I.E., READ REVERSE, SPACE FORWAR
003314  105005                   .WORD  WRR      ;WRITE RETRY.
003316  102010                   .WORD  RWD      ;REWIND.
003320  100012                   .WORD  MBR      ;MESSAGE BUFFER RELEASE
003322  100011                   .WORD  WTM      ;WRITE TAPE MARK
003324  101011                   .WORD  WTR      ;WRITE TAPE MARK RETRY.
003326  105010                   .WORD  SFF      ;SPACE "N" FILES FORWARD.
003330  105410                   .WORD  SFR      ;SPACE "N" FILES REVERSE.
003332  100017                   .WORD  GES      ;GET EXTENDED STATUS.
003334  100411                   .WORD  ERS      ;ERASE 3 INCHES OF TAPE.
003336  100412                   .WORD  UNL      ;REWIND AND UNLOAD.
003340  101012                   .WORD  CLN      ;CLEAR TAPE.
003342  140004                   .WORD  SCH      ;SET CHARACTERISTICS.
003344  100006                   .WORD  DIA      ;DIAGNOSTIC COMMAND.
003346  000040                   .WORD  JMP      ;JUMP TO THE NTH COMMAND IN THE SEQUENCE.
003350  000020                   .WORD  DLY      ;DELAY "N" MS.
003352  177777                   .WORD  END      ;END OF COMMAND TABLE
```

```
                                ;       THE FOLLOWING TABLE CONTAINS THE ASCII FOR EACH COMMAND.

003354  051104    111         CMDASC:: .ASCII /DRI/          ;DRIVE INIT.
003357    122   043104               .ASCII  /RDF/          ;READ FORWARD.
003362  042122    122               .ASCII  /RDR/          ;READ REVERSE.
003365    127   052122               .ASCII  /WRT/          ;WRITE
003370  052127    126               .ASCII  /WTV/          ;WRITE/VERIFY.  (WRITE ALL RECORDS, RDR AND CHECK DATA
                                                           ;ON ALL RECORDS, RDF AND CHECK DATA ON ALL RECORDS.)
003373    123   043122               .ASCII  /SRF/          ;SPACE "N" RECORDS FORWARD.
003376  051123    122               .ASCII  /SRR/          ;SPACE "N"  RECORDS REVERSE.
003401    122   051116               .ASCII  /RNR/          ;READ NEXT REVERSE. I.E., SPACE FWD READ REVERSE.
003404  047122    106               .ASCII  /RNF/          ;READ NEXT FORWARD, !.E., READ FORWARD, SPACE REVERSE.
003407    122   043120               .ASCII  /RPF/          ;READ PREVIOUS FORWARD. IE., SPACE REVERSE, READ FORWARD
003412  050122    122               .ASCII  /RPR/          ;READ PREVIOUS REVERSE. IE., READ REVERSE, SPACE FORWARD
003415    127   051122               .ASCII  /WRR/          ;WRITE RETRY.
003420  053522    104               .ASCII  /RWD/          ;REWIND.
003423    115   051102               .ASCII  /MBR/          ;MESSAGE BUFFER RELEASE
003426  052127    115               .ASCII  /WTM/          ;WRITE TAPE MARK
003431    127   051124               .ASCII  /WTR/          ;WRITE TAPE MARK RETRY.
003434  043123    106               .ASCII  /SFF/          ;SPACE "N" FILES FORWARD.
003437    123   051106               .ASCII  /SFR/          ;SPACE "N" FILES REVERSE.
003442  042507    123               .ASCII  /GES/          ;GET EXTENDED STATUS.
003445    105   051522               .ASCII  /ERS/          ;ERASE 3 INCHES OF TAPE.
003450  047125    114               .ASCII  /UNL/          ;REWIND AND UNLOAD.
003453    103   047114               .ASCII  /CLN/          ;CLEAN TAPE.
003456  041523    110               .ASCII  /SCH/          ;SET CHARACTERISTICS.  WHERE BRF=200, 40, 20, 0.
                                                           ;SEE TS11/TS04 PROGRAMMING SPECIFICATION FOR DESCRIPTION
003461    104   040511               .ASCII  /DIA/          ;DIAGNOSTICS.  SEE TS11/TS04 PROGRAMMING SPECIFICATION
                                                           ;FOR DESCRIPTION.  ODT MUST BE USED TO LOAD DIAGNOSTIC D
                                                           ;INTO THE WRITE BUFFER BEFORE THIS CMD IS ISSUED.
003464  046512    120               .ASCII  /JMP/          ;JUMP TO THE NTH COMMAND IN THE COMMAND
                                                           ;SEQUENCE TABLE, WHERE N IS DEFINED IN
                                                           ;THE # OF OPERATIONS.
003467    104   054514               .ASCII  /DLY/          ;DELAY "N" MS, WHERE N IS DEFINED IN
                                                           ;THE # OF OPERATIONS.
003472  047105    104               .ASCII  /END/          ;END OF COMMAND SEQUENCE.
        003476                      .EVEN
```

```
                        .SBTTL  GLOBAL TEXT SECTION

                        ;++
                        ; THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
                        ; MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
                        ; MORE THAN ONE TEST.
                        ;--


                        ;
                        ; FORMAT STATEMENTS USED IN PRINT CALLS
                        ;

                                .NLIST  BEX

003476  047045  040445  047125  CODELM:: .ASCIZ /%N%AUNIT %D1%A TS11 CODE LEVEL P%03%N%N/
                                .EVEN
003546  054130  020130  046503  HALTM:: .ASCIZ  /XXX CMD - TYPE <CR> TO CONTINUE/
003606  046503  020104  040520  CMDPKM:: .ASCIZ /CMD PACKET ADR NOT ON MODULO 4 BOUNDARY: RELOAD!/
        003670                  .EVEN
003670  040504  040524  041440  WTVERM:: .ASCIZ /DATA COMPARE ERROR/
003713     116  020117  051524  TOERM:: .ASCIZ  /NO TS11 RESPONSE/
003734  047125  042504  044506  SCERM:: .ASCIZ  /UNDEFINED SPEC COND/
003760  043122  020103  047516  RFCERM:: .ASCIZ /RFC NON ZERO/
003775     124  030523  020061  NSSRM:: .ASCIZ  /TS11 NOT READY/
004014  042522  051124  020131  RLEXM:: .ASCIZ  /RETRY LIMIT EXCEEDED/
004041     125  044516  020124  ATTNM:: .ASCIZ  /UNIT OFF LINE/
004057     106  047125  052103  FUNRM:: .ASCIZ  /FUNCTION REJECT/
004077     106  052101  046101  FATSM:: .ASCIZ  /FATAL SUBSYSTEM ERROR/
004125     116  020117  047111  NOINTM:: .ASCIZ /NO INTERRUPT/
004142  040524  042520  051440  TSAM::  .ASCIZ  /TAPE STATUS ALERT/
004164  047524  020117  040515  TOOMM:: .ASCIZ  /TOO MANY INTERRUPTS/
004210  040503  051520  040524  RNYM::  .ASCIZ  /CAPSTAN RUNAWAY-GET STATUS RESULTS:/
004254  042522  047503  042526  RERM::  .ASCIZ  /RECOVERABLE ERROR/
004276  047125  042522  047503  URERM:: .ASCIZ  /UNRECOVERABLE ERROR/
004322  047045  040445  051104  DROPDM:: .ASCIZ /%N%ADROPPED UNIT %D1%N/
004351     045  022516  040501  AUDRPM:: .ASCIZ /%N%AALL UNITS DROPPED%N%N/
004403     045  022516  041101  DTAER2:: .ASCIZ "%N%ABYTE:%D4%S2%AWAS:%B8%S2%AS/B:%B8%N"
004452  042045  022464  020101  DTAER3:: .ASCIZ "%D4%A BYTES IN ERROR OUT OF %D4%N"
004514  040445  047516  042040  DTAER4:: .ASCIZ /%ANO DATA READ%N/
004535     045  051101  041505  DTAER5:: .ASCIZ /%ARECORD TOO LONG: >%04%A BYTES%N/
004577     045  051101  041505  NURTY1:: .ASCIZ /%ARECOVERED ON RETRY #%D2%N/
004633     045  052501  044516  OFLINM:: .ASCIZ /%AUNIT %D1%A OFF LINE%N/
004663     045  043501  052105  GETSTM:: .ASCIZ /%AGET STATUS CMD RESULTS:%N/
                                .LIST   BEX
004720                          .EVEN
```

```
                        .SBTTL  GLOBAL ERROR REPORT SECTION

                        ;++
                        ; THE GLOBAL ERROR REPORT SECTION CONTAINS THE PRINTB AND PRINTX CALLS
                        ; THAT ARE USED IN MORE THAN ONE TEST.  IT ALSO INCLUDES THE ASCII MESSAGES
                        ; THAT ARE USED BY THE PRINTB AND PRINTX CALLS..
                        ;--


004720                          BGNMSG  DTAERM
004720                  DTAERM::
004720                          PRINTB  #STAER1,DEVTBL(R5),PASCNT(R5),RECCNT(R5)
004720  016546  003034                                                  MOV     RECCNT(R5),-(SP)
004724  016546  002764                                                  MOV     PASCNT(R5),-(SP)
004730  016546  002532                                                  MOV     DEVTBL(R5),-(SP)
004734  012746  005400                                                  MOV     #STAER1,-(SP)
004740  012746  000004                                                  MOV     #4,-(SP)
004744  010600                                                          MOV     SP,R0
004746  104414                                                          TRAP    C$PNTB
004750  062706  000012                                                  ADD     #12,SP
004754                          PRINTB  #STAER7
004754  012746  005472                                                  MOV     #STAER7,-(SP)
004760  012746  000001                                                  MOV     #1,-(SP)
004764  010600                                                          MOV     SP,R0
004766  104414                                                          TRAP    C$PNTB
004770  062706  000004                                                  ADD     #4,SP
004774                          LET RECRED := R2                ;SAVE R2
004774  010237  006006                                                  MOV     R2,RECRED
005000                          LET TIME1 := R3                 ;SAVE R3
005000  010337  003074                                                  MOV     R3,TIME1
005004                          LET TIME2 := R4                 ;SAVE R4
005004  010437  003076                                                  MOV     R4,TIME2
005010  004737  006042          JSR PC,RECTAP                   ;RETRIEVE RECORD READ
005014                          LET R2 := RECRED                ;RESTORE R2
005014  013702  006006                                                  MOV     RECRED,R2
005020                          LET RECRED := R3                ;SAVE RECORD READ
005020  010337  006006                                                  MOV     R3,RECRED
005024                          LET R3 := TIME1                 ;RESTORE R3
005024  013703  003074                                                  MOV     TIME1,R3
005030                          LET R4 := TIME2                 ;RESTORE R4
005030  013704  003076                                                  MOV     TIME2,R4
005034                          PRINTB  #STAER6,RECRED          ;PRINT RECORD READ
005034  013746  006006                                                  MOV     RECRED,-(SP)
005040  012746  005522                                                  MOV     #STAER6,-(SP)
005044  012746  000002                                                  MOV     #2,-(SP)
005050  010600                                                          MOV     SP,R0
005052  104414                                                          TRAP    C$PNTB
005054  062706  000006                                                  ADD     #6,SP
005060                          EXIT    MSG
005060  000167                                                          .WORD   J$JMP
005062  000000                                                          .WORD   L10002-2-.

                        .EVEN

005064                          ENDMSG
005064                  L10002:
005064  104423                                                          TRAP    C$MSG
```

```
                        BGNMSG  STAERM
                STAERM::
                        PRINTB  #STAER1,DEVTBL(R5),PASCNT(R5),RECCNT(R5)
005066  016546  003034                                          MOV     RECCNT(R5),-(SP)
005072  016546  002764                                          MOV     PASCNT(R5),-(SP)
005076  016546  002532                                          MOV     DEVTBL(R5),-(SP)
005102  012746  005400                                          MOV     #STAER1,-(SP)
005106  012746  000004                                          MOV     #4,-(SP)
005112  010600                                                  MOV     SP,R0
005114  104414                                                  TRAP    C$PNTB
005116  062706  000012                                          ADD     #12,SP
005122                  PRINTB  #STAER7
005122  012746  005472                                          MOV     #STAER7,-(SP)
005126  012746  000001                                          MOV     #1,-(SP)
005132  010600                                                  MOV     SP,R0
005134  104414                                                  TRAP    C$PNTB
005136  062706  000004                                          ADD     #4,SP
005142                  LET R2 := CMDPKT CLR.BY #177740
005142  013702  002310                                          MOV     CMDPKT,R2
005146  042702  177740                                          BIC     #177740,R2
005152                  LET R2 := R2 - #1
005152  005302                                                  DEC     R2
005154                  IF R2 EQ #0 THEN                ;IF CMD IS A READ
005154  005702                                                  TST     R2
005156  001016                                                  BNE     50000$
005160  004737  006042    JSR PC,RECTAP                 ;THEN RETRIEVE
005164                    LET RECRED := R3              ;AND
005164  010337  006006                                          MOV     R3,RECRED
005170    PRINTB #STAER6,RECRED         ;TYPE RECORD READ
005170  013746  006006                                          MOV     RECRED,-(SP)
005174  012746  005522                                          MOV     #STAER6,-(SP)
005200  012746  000002                                          MOV     #2,-(SP)
005204  010600                                                  MOV     SP,R0
005206  104414                                                  TRAP    C$PNTB
005210  062706  000006                                          ADD     #6,SP
005214                  ENDIF
005214                                                  50000$:
005214                  PRINTX  #STAER2
005214  012746  005556                                          MOV     #STAER2,-(SP)
005220  012746  000001                                          MOV     #1,-(SP)
005224  010600                                                  MOV     SP,R0
005226  104415                                                  TRAP    C$PNTX
005230  062706  000004                                          ADD     #4,SP
005234          PRINTX  #STAER3,CMDPKT,@TSDB(R5),MSGPKT+MS.RFC,TSSREG,CTCC
005234  013746  003106                                          MOV     CTCC,-(SP)
005240  013746  003112                                          MOV     TSSREG,-(SP)
005244  013746  002340                                          MOV     MSGPKT+MS.RFC,-(
005250  017546  002452                                          MOV     @TSDB(R5),-(SP)
005254  013746  002310                                          MOV     CMDPKT,-(SP)
005260  012746  005635                                          MOV     #STAER3,-(SP)
005264  012746  000006                                          MOV     #6,-(SP)
005270  010600                                                  MOV     SP,R0
005272  104415                                                  TRAP    C$PNTX
005274  062706  000016                                          ADD     #16,SP
005300          PRINTX  #STAER4,CMDPKT+2,CMDPKT+4,CMDPKT+6
```

```
907  005300  013746  002316                                                  MOV     CMDPKT+6,-(SP)
908  005304  013746  002314                                                  MOV     CMDPKT+4,-(SP)
909  005310  013746  002312                                                  MOV     CMDPKT+2,-(SP)
910  005314  012746  005673                                                  MOV     #STAER4,-(SP)
911  005320  012746  000004                                                  MOV     #4,-(SP)
912  005324  010600                                                          MOV     SP,R0
913  005326  104415                                                          TRAP    C$PNTX
914  005330  062706  000012                                                  ADD     #12,SP
915  005334                          PRINTX  #STAER5,MSGPKT+MS.XS0,MSGPKT+MS.XS1,MSGPKT+MS.XS2,MSGPKT+MS.XS3
916  005334  013746  002350                                                  MOV     MSGPKT+MS.XS3,-(
917  005340  013746  002346                                                  MOV     MSGPKT+MS.XS2,-(
918  005344  013746  002344                                                  MOV     MSGPKT+MS.XS1,-(
919  005350  013746  002342                                                  MOV     MSGPKT+MS.XS0,-(
920  005354  012746  005713                                                  MOV     #STAER5,-(SP)
921  005360  012746  000005                                                  MOV     #5,-(SP)
922  005364  010600                                                          MOV     SP,R0
923  005366  104415                                                          TRAP    C$PNTX
924  005370  062706  000014                                                  ADD     #14,SP
925  005374                          EXIT    MSG
926  005374  000167                                                          .WORD   J$JMP
927  005376  000410                                                          .WORD   L10003-2-.
928
929                                     .NLIST  BEX
     005400  040445  054130  020130  STAER1: .ASCIZ  /%AXXX CMD FAILED - UNIT %D1%S3%APASS:%D5%S3%ARECORD:%D5%N/
                                             .EVEN
     005472  040445  051120  053105  STAER7: .ASCIZ  /%APREVIOUS CMD WAS  XXX/
     005522  051445  030461  040445  STAER6: .ASCIZ  /%S11%A* RECORD READ:%D5%A */
     005556  047045  040445  046503  STAER2: .ASCIZ  /%N%ACMDPKT%S2%ATSBA%S4%ARFC%S5%ATSSR%S3%ATCC%N/
     005635     045  033117  051445  STAER3: .ASCIZ  /%06%S2%06%S2%06%S2%06%S2%D1%N/
     005673     045  033117  047045  STAER4: .ASCII  /%06%N/
     005700  047445  022466     116          .ASCII  /%06%N/
     005705     045  033117  047045          .ASCIZ  /%06%N/
     005713     045  054101  052123  STAER5: .ASCII  /%AXST0%S4%AXST1%S4%AXST2%S4%AXST3%N/
     005756  047445  022466  031123          .ASCIZ  /%06%S2%06%S2%06%S2%06%N/
                                             .LIST   BEX
930
931  006006  000000                  RECRED: .WORD   0                       ;RECORD READ FROM TAPE
932
933  006010                                  ENDMSG
934  006010                          L10003:
935  006010  104423                                                          TRAP    C$MSG
```

```
                        .SBTTL  GLOBAL SUBROUTINES SECTION

                        ;++
                        ; THE GLOBAL SUBROUTINES SECTION CONTAINS THE SUBROUTINES
                        ; THAT ARE USED IN MORE THAN ONE TEST.
                        ;--

                        ;       MODULES TO HANDLE TS04 INTERRUPTS.

006012                          BGNSRV  TS41N0                  ;DEVICE 0.
006012                  TS41N0::
006012                          LET INTFLG := INTFLG + #1        ;SET INTERRUPT OCCURRED FLAG.
006012  005237  003124                                                  INC     INTFLG
006016                          ENDSRV
006016                  L10004:
006016  000002                                                          RTI

006020                          BGNSRV  TS41N1                  ;DEVICE 1.
006020                  TS41N1::
006020                          LET INTFLG+2 := INTFLG+2 + #1    ;SET INTERRUPT OCCURRED FLAG.
006020  005237  003126                                                  INC     INTFLG+2
006024                          ENDSRV
006024                  L10005:
006024  000002                                                          RTI

006026                          BGNSRV  TS41N2                  ;DEVICE 2.
006026                  TS41N2::
006026                          LET INTFLG+4 := INTFLG+4 + #1    ;SET INTERRUPT OCCURRED FLAG.
006026  005237  003130                                                  INC     INTFLG+4
006032                          ENDSRV
006032                  L10006:
006032  000002                                                          RTI

006034                          BGNSRV  TS41N3                  ;DEVICE 3.
006034                  TS41N3::
006034                          LET INTFLG+6 := INTFLG+6 + #1    ;SET INTERRUPT OCCURRED FLAG.
006034  005237  003132                                                  INC     INTFLG+6
006040                          ENDSRV
006040                  L10007:
006040  000002                                                          RTI
```

```
                                ;       SUBROUTINE TO RETRIEVE RECORD COUNT READ FROM TAPE FOR ERROR
                                ;       PRINTS.
                                ;       INPUTS:
                                ;       OUTPUTS:  R3 = RECORD COUNT READ
                                ;       REGISTERS:  R2, R3, R4
                                ;       CALLS:

006042                          RECTAP::IF #MOD.CO SETIN CMDWRD THEN    ;READ REV FETCH
006042  032737  000400  003056                                                  BIT     #MOD.CO,CMDWRD
006050  001430                                                                  BEQ     50001$
006052                            LET R2 := MSGPKT+MS.RFC + DATARD ;FIND LAST READ AD.
006052  013702  002340                                                          MOV     MSGPKT+MS.RFC,R2
006056  063702  003046                                                          ADD     DATARD,R2
006062                            IF #BIT00 SETIN R2 THEN       ;ODD AD., REASSEMBLE
006062  032702  000001                                                          BIT     #BIT00,R2
006066  001417                                                                  BEQ     50002$
006070                              LET R2 := R2 + #1           ;REC COUNT STARTING
006070  005202                                                                  INC     R2
006072                              LET R3 :B= (R2) CLR.BY #177400  ;WITH UPPER BYTE FETCH
006072  111203                                                                  MOVB    (R2),R3
006074  142703  177400                                                          BICB    #177400,R3
006100                              LET R3 := SWAP R3           ;
006100  000303                                                                  SWAB    R3
006102                              LET R2 := R2 - #1           ;LOWER BYTE AD.
006102  005302                                                                  DEC     R2
006104                              IFB SWBFLG NE #0 THEN
006104  105737  003150                                                          TSTB    SWBFLG
006110  001401                                                                  BEQ     50003$
006112                                LET R2 := R2 - #1         ;LOWER BYTE AD. ON SWAP
006112  005302                                                                  DEC     R2
006114                              ENDIF
006114                                                                50003$:
006114                              LET R4 :B= (R2) CLR.BY #177400 ;FETCH LOWER BYTE
006114  111204                                                                  MOVB    (R2),R4
006116  142704  177400                                                          BICB    #177400,R4
006122                              LET R3 := R3 OR R4          ;MERGE BYTES
006122  050403                                                                  BIS     R4,R3
006124                            ELSE
006124  000401                                                                  BR      50004$
006126                                                                50002$:
006126                              LET R3 := (R2)              ;EVEN AD. FETCH
006126  011203                                                                  MOV     (R2),R3
006130                            ENDIF
006130                                                                50004$:
006130                          ELSE
006130  000402                                                                  BR      50005$
006132                                                                50001$:
006132                              LET R3 := @DATARD           ;READ FWD FETCH
006132  017703  174710                                                          MOV     @DATARD,R3
006136                          ENDIF
006136                                                                50005$:

006136  000207                  RTS     PC
```

```
                                ;       SUBROUTINE TO STORE A  SET CHARACTERISTIC COMMAND AS
                                ;       THE FIRST ENTRY IN THE SEQUENCE TABLE.
                                ;       INPUTS:
                                ;       OUTPUTS:
                                ;       REGISTERS:
                                ;       CALLS:

006140                          SETCH:: LET R1 := #CMDSEQ               ;INIT COMMAND SEQUENCE TABLE POINTER.
006140  012701  003164                                                          MOV     #CMDSEQ,R1
006144  012721  140004                  MOV     #SCH,(R1)+              ;THIS CODE SETS UP A SET CHARACTERISTIC
006150  012721  000040                  MOV     #DFTSCH,(R1)+           ;COMMAND AS THE FIRST COMMAND IN THE
006154  012721  000001                  MOV     #1,(R1)+                ;SEQUENCE TABLE.
006160  005721                          TST     (R1)+                   ;SKIP PATTERN LOCATION.
006162  000207                          RTS PC


                                ;       SUBROUTINE TO STORE A REWIND COMMAND IN THE SEQUENCE TABLE
                                ;       INPUTS:
                                ;       OUTPUTS:
                                ;       REGISTERS:
                                ;       CALLS:

006164                          SETRW:: LET (R1)+ := #RWD               ;CMD = REWIND.
006164  012721  102010                                                          MOV     #RWD,(R1)+
006170                                  LET (R1)+ := #1                 ;BRF.
006170  012721  000001                                                          MOV     #1,(R1)+
006174                                  LET (R1)+ := #1                 ;# OF OPERATIONS.
006174  012721  000001                                                          MOV     #1,(R1)+
006200  005721                          TST (R1)+                       ;SKIP PATTERN.
006202  000207                          RTS     PC                      ;RETURN
```

```
                        ;       SUBROUTINE TO EXECUTE ALL COMMANDS IN THE SEQUENCE TABLE ON ALL
                        ;       DEVICES.
                        ;       INPUTS:
                        ;       OUTPUTS:        R2 = TERMINATION INDICATOR (0=END OF TABLE,1=EOT)
                        ;       REGISTERS:
                        ;       CALLS:          CMDAC,SETUP,EXSUB,CKHAE,NEXTU,FIRSTU,VFYDAT.

006204                  EXALL:: LET R1 := #CMDSEQ               ;INIT SEQUENCE TABLE POINTER.
006204  012701  003164                                                    MOV     #CMDSEQ,R1
                                WHILE (R1) NE #END DO           ;WHILE THERE ARE CMDS IN THE SEQUENCE TABLE.
006210                                                                  50006$:
006210  021127  177777                                                    CMP     (R1),#END
006214  001527                                                            BEQ     50007$
006216  004737  007114                  JSR   PC,SETUP            ;GO SETUP THE COMMAND BLOCK.
006222                                  WHILE NCNT LT NCNT1 DO    ;WHILE THERE ARE RECORDS REMAINING:
006222                                                                  50010$:
006222  023737  003050  003052                                            CMP     NCNT,NCNT1
006230  002116                                                            BGE     50011$
006232  004737  007006                    JSR PC,CMDAC            ;STORE CMD ASCII IN ERROR MESSAGE.
006236                                    IFB RANDOM NE #0 THEN   ;IF IN RANDOM MODE:
006236  105737  003145                                                    TSTB    RANDOM
006242  001435                                                            BEQ     50012$
006244                                      IF CMDWRD EQ #WRT THEN ;IF CMD IS A WRITE THEN:
006244  023727  003056  104005                                            CMP     CMDWRD,#WRT
006252  001031                                                            BNE     50013$
006254                                        IFB VFYFLG EQ #0 THEN ;IF DATA IS NOT TO BE VERIFIED THEN:
006254  105737  003146                                                    TSTB    VFYFLG
006260  001026                                                            BNE     50014$
006262                                          LET RANB := RANB + RANS  ;GENERATE
006262  063737  003072  003070                                            ADD     RANS,RANB
006270                                          LET RANS := RANS + RANB  ;RANDOM
006270  063737  003070  003072                                            ADD     RANB,RANS
006276                                          LET BRFCNT := RANS       ;LENGTH
006276  013737  003072  003054                                            MOV     RANS,BRFCNT
006304                                        LET BRFCNT := BRFCNT CLR.BY LENMSK  ;MASK RANDOM LENGTH.
006304  043737  003066  003054                                            BIC     LENMSK,BRFCNT
006312                                        IF BRFCNT LT #18. THEN    ;DO NOT ALLOW BYTE COUNT OF LESS THAN 18
006312  023727  003054  000022                                            CMP     BRFCNT,#18.
006320  002003                                                            BGE     50015$
006322                                          LET BRFCNT := #18.  ;CHANGE COUNT OF 0-17 TO 18.
006322  012737  000022  003054                                            MOV     #18.,BRFCNT
006330                                        ENDIF
006330                                                                  50015$:
006330                                        LET CMDPKT+CP.CNT := BRFCNT  ;MOVE BRF TO CMD PACKET.
006330  013737  003054  002316                                            MOV     BRFCNT,CMDPKT+CP
006336                                      ENDIF
006336                                                                  50014$:
006336                                    ENDIF
006336                                                                  50013$:
006336                                  ENDIF
006336                                                                  50012$:
006336  004737  006500                  JSR PC,EXSUB              ;ISSUE CMD TO ALL,AWAIT INTS,CHECK STATUS.
006342  004737  014052                  JSR PC,CKHAE              ;CHECK HALT AFTER EACH CMD FLAG.
006346                                  LET R2 := #1              ;SET ALL UNITS AT BOT/EOT.
006346  012702  000001                                                    MOV     #1,R2
006352  004737  013462                  JSR PC,FIRSTU             ;FIND FIRST UNIT.
```

```
1117  006356                                  WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE UNITS:
1118  006356                                                                      50016$:
1119  006356  026527  002532  177777                                                CMP     DEVTBL(R5),#END
1120  006364  001426                                                              BEQ     50017$
1121  006366                                    IF #MOD.CO SETIN CMDWRD THEN  ;IF CMD IS REVERSE THEN:
1122  006366  032737  000400  003056                                              BIT     #MOD.CO,CMDWRD
1123  006374  001406                                                              BEQ     50020$
1124  006376                                      IF #XO.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT THEN:
1125  006376  032765  000002  003134                                              BIT     #XO.BOT,EOTFLG(R
1126  006404  001001                                                              BNE     50021$
1127  006406                                        LET R2 := #0                ;CLEAR EOT/BOT FLAG.
1128  006406  005002                                                              CLR     R2
1129  006410                                      ENDIF
1130  006410                                                                      50021$:
1131  006410                                    ELSE                      ;ELSE IF CMD IS NOT REVERSE:
1132  006410  000411                                                              BR      50022$
1133  006412                                                                      50020$:
1134  006412                                      IF #XO.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
1135  006412  032765  000001  003134                                              BIT     #XO.EOT,EOTFLG(R
1136  006420  001404                                                              BEQ     50023$
1137  006422  032737  000001  003056                                              BIT     #CMD.CO,CMDWRD
1138  006430  001001                                                              BNE     50024$
1139  006432                                                                      50023$:
1140                                                                    ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
1141  006432                                        LET R2 := #0          ;CLEAR EOT/BOT FLAG.
1142  006432  005002                                                              CLR     R2
1143  006434                                      ENDIF
1144  006434                                                                      50024$:
1145  006434                                    ENDIF
1146  006434                                                                      50022$:
1147  006434  004737  013530                     JSR PC,NEXTU              ;FIND NEXT UNIT
1148  006440                                    ENDDO                       ;
1149  006440  000746                                                              BR      50016$
1150  006442                                                                      50017$:
1151  006442                                    IF R2 EQ #1 THEN            ;IF ALL UNIT ARE AT EOT/BOT THEN:
1152  006442  020227  000001                                                      CMP     R2,#1
1153  006446  001001                                                              BNE     50025$
1154  006450  000412                             BR        EXARTN          ;RETURN WITH R2 = #1.
1155  006452                                    ENDIF
1156  006452                                                                      50025$:
1157  006452                                    LET NCNT := NCNT + #1       ;UPDATE RECORD COUNT.
1158  006452  005237  003050                                                      INC     NCNT
1159  006456                                    LET PCMDWD := CMDWRD        ;SAVE PREVIOUS COMMAND WORD.
1160  006456  013737  003056  003062                                              MOV     CMDWRD,PCMDWD
1161  006464                                  ENDDO
1162  006464  000656                                                              BR      50010$
1163  006466                                                                      50011$:
1164  006466  004737  012450                   JSR   PC,VFYDAT             ;IF LAST CMD WAS A WRITE VERIFY, THEN GO
1165                                                                    ;VERIFY THE LAST N RECORDS OF DATA.
1166  006472                                  ENDDO
1167  006472  000646                                                              BR      50006$
1168  006474                                                                      50007$:
1169  006474                                  LET R2 := #0                ;SET NORMAL RETURN INDICATOR.
1170  006474  005002                                                              CLR     R2
1171  006476  000207                  EXARTN: RTS PC                      ;RETURN.
1172
```

```
1173
1174
1175                                    ;       SUBROUTINE TO ISSUE COMMAND TO ALL DEVICES, WAIT FOR
1176                                    ;       ALL INTERRUPTS, AND CHECK ALL STATUS.
1177                                    ;       INPUTS:
1178                                    ;       OUTPUTS:
1179                                    ;       REGISTERS:
1180                                    ;       CALLS:          EXCUTE,GOWAIT,NEXTU,FIRSTU.
1181
1182  006500  004737  013462            EXSUB::     JSR PC,FIRSTU                   ;SET UP FOR FIRST UNIT.
1183  006504                                        WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE DEVICES:
1184  006504                                                                                  50026$:
1185  006504  026527  002532  177777                                                          CMP     DEVTBL(R5),#END
1186  006512  001450                                                                        BEQ     50027$
1187  006514                                          IF #MOD.CO SETIN CMDWRD THEN  ;IF CMD IS REVERSE THEN:
1188  006514  032737  000400  003056                                                        BIT     #MOD.CO,CMDWRD
1189  006522  001421                                                                        BEQ     50030$
1190  006524                                            IF #XO.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT
1191  006524  032765  000002  003134                                                        BIT     #XO.BOT,EOTFLG(R
1192  006532  001014                                                                        BNE     50031$
1193  006534                                              IF #XO.EOT SETIN EOTFLG(R5) THEN  ;BUT IF AT EOT
1194  006534  032765  000001  003134                                                        BIT     #XO.EOT,EOTFLG(R
1195  006542  001406                                                                        BEQ     50032$
1196  006544                                                IFB ALLEOT NE #0 THEN       ;AND ALL OTHERS AT EOT
1197  006544  105737  003154                                                              TSTB    ALLEOT
1198  006550  001402                                                                      BEQ     50033$
1199  006552  004737  007770                                    JSR PC,EXCUTE           ;THEN EXECUTE REV CMD
1200  006556                                                  ENDIF                     ;IF NOT ALL AT EOT, FREEZE UNIT(S) AT EO
1201  006556                                                                                  50033$:
1202  006556                                              ELSE                        ;IF NOT AT BOT AND
1203  006556  000402                                                                        BR      50034$
1204  006560                                                                                  50032$:
1205  006560  004737  007770                                    JSR PC,EXCUTE           ;NOT AT EOT, EXEC REV CMD
1206  006564                                                  ENDIF
1207  006564                                                                                  50034$:
1208  006564                                            ENDIF
1209  006564                                                                                  50031$:
1210  006564                                          ELSE                        ;ELSE IF CMD IS NOT REVERSE:
1211  006564  000420                                                                        BR      50035$
1212  006566                                                                                  50030$:
1213  006566                                            IF #XO.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
1214  006566  032765  000001  003134                                                        BIT     #XO.EOT,EOTFLG(R
1215  006574  001404                                                                        BEQ     50036$
1216  006576  032737  000001  003056                                                        BIT     #CMD.CO,CMDWRD
1217  006604  001003                                                                        BNE     50037$
1218  006606                                                                                  50036$:
1219                                                  ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
1220  006606  004737  007770                                    JSR PC,EXCUTE           ;ISSUE CMD TO TS04
1221  006612                                            ELSE
1222  006612  000405                                                                        BR      50040$
1223  006614                                                                                  50037$:
1224  006614                                              IFB ALLEOT NE #0 THEN
1225  006614  105737  003154                                                              TSTB    ALLEOT
1226  006620  001402                                                                      BEQ     50041$
1227  006622  004737  007770                                    JSR PC,EXCUTE
1228  006626                                              ENDIF
```

```
1229  006626                                                    50041$:
1230  006626                    ENDIF
1231  006626                                                    50040$:
1232  006626                  ENDIF
1233  006626                                                    50035$:
1234  006626  004737  013530    JSR       PC,NEXTU        ;FIND NEXT UNIT IN TEST CYCLE.
1235  006632                  ENDDO
1236  006632  000724                                              BR      50026$
1237  006634                                                    50027$:
1238  006634                  IFB RPTFLG NE #0 THEN           ;IF REPORT HAS BEEN REQUESTED THEN:
1239  006634  105737  003147                                      TSTB    RPTFLG
1240  006640  001403                                            BEQ     50042$
1241  006642                    LET RPTFLG :B= #0             ;CLR THE FLAG,
1242  006642  105037  003147                                    CLRB    RPTFLG
1243  006646                    DORPT                         ;PRINT THE PERFORMANCE REPORT.
1244  006646  104424                                            TRAP    C$DRPT
1245  006650                  ENDIF                           ;
1246  006650                                                    50042$:
1247  006650  004737  013462  JSR PC,FIRSTU                  ;SET UP FOR FIRST UNIT.
1248  006654                  WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE DEVICES:
1249  006654                                                    50043$:
1250  006654  026527  002532  177777                            CMP     DEVTBL(R5),#END
1251  006662  001450                                            BEQ     50044$
1252  006664                    IF #MOD.CO SETIN CMDWRD THEN  ;IF CMD IS REVERSE THEN:
1253  006664  032737  000400  003056                            BIT     #MOD.CO,CMDWRD
1254  006672  001421                                            BEQ     50045$
1255  006674                      IF #XO.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT
1256  006674  032765  000002  003134                            BIT     #XO.BOT,EOTFLG(R
1257  006702  001014                                            BNE     50046$
1258  006704                        IF #XO.EOT SETIN EOTFLG(R5) THEN      ;BUT IF AT EOT
1259  006704  032765  000001  003134                            BIT     #XO.EOT,EOTFLG(R
1260  006712  001406                                            BEQ     50047$
1261  006714                          IFB ALLEOT NE #0 THEN               ;AND ALL OTHERS AT EOT
1262  006714  105737  003154                                      TSTB    ALLEOT
1263  006720  001402                                            BEQ     50050$
1264  006722  004737  010300          JSR PC,GOWAIT             ;THEN WAIT FOR CMD END
1265  006726                          ENDIF                     ;IF NOT ALL AT EOT, DO NOT WAIT
1266  006726                                                    50050$:
1267  006726                        ELSE                        ;NOT AT BOT, AND NOT AT EOT
1268  006726  000402                                            BR      50051$
1269  006730                                                    50047$:
1270  006730  004737  010300          JSR PC,GOWAIT                     ;WAIT FOR INT,CHECK STAT
1271  006734                        ENDIF
1272  006734                                                    50051$:
1273  006734                      ENDIF
1274  006734                                                    50046$:
1275  006734                  ELSE                        ;ELSE IF CMD IS FORWARD:
1276  006734  000420                                            BR      50052$
1277  006736                                                    50045$:
1278  006736                    IF #XO.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
1279  006736  032765  000001  003134                            BIT     #XO.EOT,EOTFLG(R
1280  006744  001404                                            BEQ     50053$
1281  006746  032737  000001  003056                            BIT     #CMD.CO,CMDWRD
1282  006754  001003                                            BNE     50054$
1283  006756                                                    50053$:
1284                                                        ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
```

```
1285  006756  004737  010300                    JSR PC,GOWAIT          ;WAIT FOR INT,CHECK STATUS.
1286  006762                                  ELSE
1287  006762  000405                                                     BR      50055$
1288  006764                                                          50054$:
1289  006764                                  IFB ALLEOT NE #0 THEN
1290  006764  105737  003154                                           TSTB    ALLEOT
1291  006770  001402                                                   BEQ     50056$
1292  006772  004737  010300                    JSR PC,GOWAIT
1293  006776                                  ENDIF
1294  006776                                                          50056$:
1295  006776                                ENDIF
1296  006776                                                          50055$:
1297  006776                              ENDIF
1298  006776                                                          50052$:
1299  006776  004737  013530                JSR       PC,NEXTU       ;FIND NEXT UNIT IN TEST CYCLE.
1300  007002                              ENDDO
1301  007002  000724                                                   BR      50043$
1302  007004                                                          50044$:
1303  007004  000207                        RTS PC                   ;RETURN.
```

```
1304                                    ;       THIS SUBROUTINE STORES THE ASCII FOR THE CURRENT COMMAND AND PREVIOUS
1305                                    ;       COMMAND IN THE STANDARD ERROR MESSAGE.  ON ENTRY LOCATION CMDWRD
1306                                    ;       CONTAINS CURRENT CMD AND LOCATION PCMDWD CONTAINS PREVIOUS CMD.
1307                                    ;       INPUTS:
1308                                    ;       OUTPUTS:
1309                                    ;       REGISTERS:      R3, R4.
1310                                    ;       CALLS:          GCMDA
1311
1312  007006                            CMDAC:: LET R4 := CMDWRD                ;R4 = CMD BINARY.
1313  007006  013704  003056                                                            MOV     CMDWRD,R4
1314  007012  004737  007060                    JSR     PC,GCMDA                ;GET CMD ASCII.
1315  007016  112337  005402                    MOVB    (R3)+,STAER1+2          ;MOVE CMD ASCII
1316  007022  112337  005403                    MOVB    (R3)+,STAER1+3          ;
1317  007026  111337  005404                    MOVB    (R3),STAER1+4           ;INTO MSG.
1318  007032                                    LET R4 := PCMDWD                ;R4 = PREVIOUS CMD BINARY.
1319  007032  013704  003062                                                            MOV     PCMDWD,R4
1320  007036  004737  007060                    JSR     PC,GCMDA                ;GET CMD ASCII.
1321  007042                                    LET STAER7+24 :B= (R3)+         ;MOVE CMD ASCII
1322  007042  112337  005516                                                            MOVB    (R3)+,STAER7+24
1323  007046                                    LET STAER7+25 :B= (R3)+         ;
1324  007046  112337  005517                                                            MOVB    (R3)+,STAER7+25
1325  007052                                    LET STAER7+26 :B= (R3)          ;INTO MSG.
1326  007052  111337  005520                                                            MOVB    (R3),STAER7+26
1327  007056  000207                            RTS     PC                      ;RETURN. GO EXECUTE NEXT FUNCTION.
1328
1329
1330
1331                                    ;       SUBROUTINE TO FIND THE ASCII EQUIVILENT OF THE COMMAND IN R4.
1332                                    ;       ADDRESS OF ASCII 1ST WORD IS RETURNED IN R3.
1333                                    ;       INPUTS:         R4 = PRESENT COMMAND WORD.
1334                                    ;       OUTPUTS:        R3 = ADDRESS OF PRESENT COMMAND ASCII.
1335                                    ;       REGISTERS:
1336                                    ;       CALLS:
1337
1338  007060                            GCMDA:: LET R3 := #0                    ;INIT CMD TBL POINTER.
1339  007060  005003                                                                    CLR     R3
1340  007062                                    WHILE CMDTBL(R3) NE R4 DO       ;UNTIL CURRENT CMD IS FOUND:
1341  007062                                                                    50057$:
1342  007062  026304  003266                                                            CMP     CMDTBL(R3),R4
1343  007066  001403                                                                    BEQ     50060$
1344  007070                                      LET R3 := R3 + #2             ;SEARCH CMD TABLE.
1345  007070  062703  000002                                                            ADD     #2,R3
1346  007074                                    ENDDO
1347  007074  000772                                                                    BR      50057$
1348  007076                                                                    50060$:
1349  007076                                    LET R4 := R3
1350  007076  010304                                                                    MOV     R3,R4
1351  007100                                    LET R3 := R3 SHIFT -1           ;POINT TO ASCII FOR THAT COMMAND
1352  007100  006203                                                                    ASR     R3
1353  007102  000240                            NOP
1354  007104  060403                            ADD     R4,R3
1355  007106  062703  003354                    ADD     #CMDASC,R3
1356  007112  000207                            RTS     PC                      ;RETURN.
```

```
1357                                    ;       THIS SUBROUTINE LOADS THE TS04 COMMAND PACKET FROM ONE
1358                                    ;       ENTRY IN THE SEQUENCE TABLE.
1359                                    ;       INPUTS:
1360                                    ;       OUTPUTS:
1361                                    ;       REGISTERS:      R2, R3.
1362                                    ;       CALLS:          GENPAT.
1363
1364   007114                           SETUP:: LET CMDLG := #0                 ;CLR CMD LOGGING CODE(DISABLES LOGGING)
1365   007114  005037  003064                                                            CLR     CMDLG
1366   007120  012137  002310                  MOV     (R1)+,CMDPKT           ;LOAD THE COMMAND WORD.
1367   007124  011137  002316                  MOV     (R1),CMDPKT+CP.CNT     ;LOAD THE BYTE/RECORD/FILE COUNT.
1368   007130  011137  003054                  MOV     (R1),BRFCNT            ;SAVE BRF FOR THIS COMMAND.
1369   007134  013702  002310                  MOV     CMDPKT,R2              ;GET CMD.
1370   007140  042702  177740                  BIC     #NCMD.C,R2             ;CLR ALL BUT CMD BITS.
1371   007144  010203                          MOV     R2,R3                  ;SAVE IT TWICE.
1372   007146  162703  000010                  SUB     #CMD.C3,R3             ;POSITION COMMAND?
1373   007152  001003                          BNE     2$                     ;BR IF NOT.
1374   007154  011137  002312                  MOV     (R1),CMDPKT+2          ;MOVE BPCR IN 2ND PKT WORD FOR POSITION CMD.
1375   007160  000461                          BR      3$
1376   007162                           2$:    IF CMDPKT EQ #WTM THEN         ;IF CMD IS A WRITE TAPE MARK THEN:
1377   007162  023727  002310  100011                                                  CMP     CMDPKT,#WTM
1378   007170  001003                                                                  BNE     50061$
1379   007172                                    LET CMDLG := #2               ;WTM LOGGING CODE IS 2.
1380   007172  012737  000002  003064                                                  MOV     #2,CMDLG
1381   007200                                  ENDIF
1382   007200                                                                                  50061$:
1383   007200  010203                          MOV     R2,R3
1384   007202  162703  000001                  SUB     #CMD.C0,R3             ;IS IT A READ?
1385   007206  001017                          BNE     1$                     ;BR IF NOT.
1386   007210  013737  003046  002312          MOV     DATARD,CMDPKT+CP.ADL   ;IF SO, LOAD THE BUFFER ADDR.
1387   007216                                  IF #MOD.C0 SETIN CMDPKT THEN   ;IF CMD IS A READ REV THEN:
1388   007216  032737  000400  002310                                                  BIT     #MOD.C0,CMDPKT
1389   007224  001404                                                                  BEQ     50062$
1390   007226                                    LET CMDLG := #4               ;LOGGING CODE IS 4.
1391   007226  012737  000004  003064                                                  MOV     #4,CMDLG
1392   007234                                  ELSE                           ;ELSE - IF CMD IS A READ FWD:
1393   007234  000403                                                                  BR      50063$
1394   007236                                                                                  50062$:
1395   007236                                    LET CMDLG := #6               ;LOGGING CODE IS 6.
1396   007236  012737  000006  003064                                                  MOV     #6,CMDLG
1397   007244                                  ENDIF
1398   007244                                                                                  50063$:
1399   007244  000427                          BR      3$                     ;CONTINUE.
1400   007246  010203                   1$:    MOV     R2,R3                  ;IS IT
1401   007250  162703  000004                  SUB     #CMD.C2,R3             ;A SET CHARACTERISTICS CMD?
1402   007254  001011                          BNE     4$                     ;BR IF NOT.
1403   007256                                  LET CMDPKT+CP.ADL := #SCHBK    ;SET UP ADR LO FOR SET CHAR.
1404   007256  012737  002442  002312                                                  MOV     #SCHBK,CMDPKT+CP
1405   007264  012737  000010  002316          MOV     #SCHCNT,CMDPKT+CP.CNT  ;SET BUFFER EXTENT
1406   007272                                  LET SCHBK+6 := (R1)            ;STORE CHARACTERISTIC CODE IN SCH BLOCK.
1407   007272  011137  002450                                                          MOV     (R1),SCHBK+6
1408   007276  000412                          BR      3$                     ;CONTINUE.
1409   007300  010203                   4$:    MOV     R2,R3                  ;IS IT
1410   007302  162703  000006                  SUB     #CMD.C1!CMD.C2,R3      ;A DIAGNOSTIC (DIA) CMD?
1411   007306  001006                          BNE     3$                     ;BR IF NOT.
1412   007310  012737  000020  002316          MOV     #DIACNT,CMDPKT+CP.CNT  ;LOAD BUFFER EXTENT.
```

```
1413  007316  012737  003044  002312          MOV     #DIABLK,CMDPKT+CP.ADL   ;LOAD BUFFER ADR LOW.
1414  007324  005721          3$:             TST     (R1)+                   ;POINT TO N (NUMBER OF TIMES TO EXECUTE THIS INS
1415  007326                                  LET NCNT1 := (R1)+              ;SAVE NUMBER OF OPERATIONS
1416  007326  012137  003052                                                  MOV     (R1)+,NCNT1
1417  007332                                  LET NCNT := #0                  ;CLEAR OPERATION COUNTER.
1418  007332  005037  003050                                                  CLR     NCNT
1419  007336  012137  003104                  MOV     (R1)+,PATERN            ;SAVE PATTERN CODE FOR CURRENT CMD.
1420  007342  010203                          MOV     R2,R3                   ;IS IT
1421  007344  162703  000005                  SUB     #CMD.CO!CMD.C2,R3       ;A WRITE?
1422  007350  001010                          BNE     5$                      ;BR IF NOT.
1423  007352  013737  003044  002312          MOV     DATAWT,CMDPKT+CP.ADL    ;LOAD WRITE BUFFER LO ORDER.
1424  007360  004737  007472                  JSR     PC,GENPAT               ;GO GENERATE THE WRITE PATTERN.
1425  007364                                  LET CMDLG := #2                 ;WRITE LOGGING CODE IS 2.
1426  007364  012737  000002  003064                                          MOV     #2,CMDLG
1427  007372          5$:                     IF #VFY.C SETIN CMDPKT THEN     ;IF DATA VERIFICATION IS REQUIRED:
1428  007372  032737  000100  002310                                          BIT     #VFY.C,CMDPKT
1429  007400  001407                                                         BEQ     50064$
1430  007402                                    LET VFYFLG :B= #1             ;SET VERIFY FLAG.
1431  007402  112737  000001  003146                                          MOVB    #1,VFYFLG
1432  007410  042737  000100  002310            BIC   #VFY.C,CMDPKT           ;CLEAR VERIFY BIT(NOT USED BY HARDWARE).
1433  007416                                  ELSE                            ;IF DATA VERIFICATION IS NOT REQUIRED:
1434  007416  000402                                                         BR      50065$
1435  007420                                                                50064$:
1436  007420                                    LET VFYFLG :B= #0             ;CLR VERIFY FLAG.
1437  007420  105037  003146                                                 CLRB    VFYFLG
1438  007424                                  ENDIF
1439  007424                                                                50065$:
1440  007424                                  LET PCMDWD := CMDWRD            ;SAVE PREVIOUS CMD WORD.
1441  007424  013737  003056  003062                                          MOV     CMDWRD,PCMDWD
1442  007432                                  LET CMDWRD := CMDPKT            ;SAVE PRESENT CMD WORD.
1443  007432  013737  002310  003056                                          MOV     CMDPKT,CMDWRD
1444  007440                                  IFB SWBFLG NE #0 THEN           ;IF SWAP BYTES IS ENABLED:
1445  007440  105737  003150                                                 TSTB    SWBFLG
1446  007444  001403                                                         BEQ     50066$
1447  007446                                    LET CMDPKT := CMDPKT SET.BY #SWB.C  ;SET SWAP BIT IN COMMAND.
1448  007446  052737  010000  002310                                          BIS     #SWB.C,CMDPKT
1449  007454                                  ENDIF
1450  007454                                                                50066$:
1451  007454  042737  004000  002310          BIC     #BRF.C,CMDPKT           ;CLR BRF BIT (INTERNAL ONLY).
1452  007462                                  LET CMDSAV := CMDPKT            ;SAVE 1ST WORD OF COMMAND PACKET.
1453  007462  013737  002310  003060                                          MOV     CMDPKT,CMDSAV
1454  007470  000207                          RTS     PC                      ;RETURN.
```

```
                        ;       THIS SUBROUTINE SETS UP AND CALLS THE APPROPRIATE SUBROUTINE TO GENERATE
                        ;       THE DESIRED PATTERN FOR THE WRITE AND WRITE/VERIFY COMMANDS.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R3, R4.
                        ;       CALLS:          PATR0 - PATR7

007472                  GENPAT:: LET R3 := PATERN SHIFT 1       ;SETUP PATTERN ROUTINE POINTER
007472  013703  003104                                                  MOV     PATERN,R3
007476  006303                                                          ASL     R3
007500
                                LET R4 := BRFCNT + #1   ;SET LENGTH OF WRITE BFR
007500  013704  003054                                                  MOV     BRFCNT,R4
007504  005204                                                          INC     R4
007506
                                LET R4 := R4 CLR.BY #1  ;ROUNDED UP TO NEXT WORD
007506  042704  000001                                                  BIC     #1,R4
007512
                                LET R4 := R4 - #2       ;WITH FIRST WORD RESERVED
007512  162704  000002                                                  SUB     #2,R4
007516
                                LET R2 := DATAWT + #2   ;FOR RECORD COUNT
007516  013702  003044                                                  MOV     DATAWT,R2
007522  062702  000002                                                  ADD     #2,R2
007526  004773  007534            JSR     PC,@PATTBL(R3)  ;GO GENERATE THE APPROPRIATE PATTERN.
007532  000207                    RTS     PC              ;RETURN TO SETUP SUBROUTINE.

                                ;TS04 WRITE PATTERN LOOKUP TABLE.  USED TO JSR TO THE
                                ;CORRECT DATA PATTERN GENERATING ROUTINE.

007534  007556          PATTBL: PATR0
007536  007614                  PATR1
007540  007634                  PATR2
007542  007644                  PATR3
007544  007670                  PATR4
007546  007702                  PATR5
007550  007714                  PATR6
007552  007734                  PATR7
007554  007766                  PATR8


                                ;INCREMENTING PATTERN.  0 - 377.

007556                  PATR0:: LET R3 := #400
007556  012703  000400                                                  MOV     #400,R3
007562
                        1$:     LET R4 := R4 - #2       ;DECREMENT WORD COUNT.
007562  162704  000002                                                  SUB     #2,R4
007566  100411                  BMI     2$              ;BR IF DONE.
007570                          LET (R2)+ := R3         ;STORE DATA WORD.
007570  010322                                                          MOV     R3,(R2)+
007572
                                LET R3 := R3 + #1002    ;UPDATE PATTERN.
007572  062703  001002                                                  ADD     #1002,R3
007576
                                IF R3 EQ #1000 THEN     ;IF PATTERN HAS WRAPPED AROUND THEN:
007576  020327  001000                                                  CMP     R3,#1000
007602  001002                                                          BNE     50067$
007604
                                  LET R3 := #400          ;INIT THE PATTERN AGAIN.
007604  012703  000400                                                  MOV     #400,R3
007610
                                ENDIF
007610                                                          50067$:
                                BR      1$              ;DO IT AGAIN.
007610  000764
```

```
1511  007612  000207              2$:     RTS     PC              ;RETURN.
1512
1513                                      ;ALL ONE'S PATTERN.
1514
1515  007614  012703  177777      PATR1:: MOV     #-1,R3          ;ALL ONES PATTERN;.
1516  007620                      ZROPAT: LET R4 := R4 - #2       ;DECREMENT BYTE COUNT.
1517  007620  162704  000002                                                      SUB     #2,R4
1518  007624  100402                      BMI     1$              ;DONE?,BR IF YES.
1519  007626  010322                      MOV     R3,(R2)+        ;IF NOT LOAD NEXT BYTE WITH PATTERN.
1520  007630  000773                      BR      ZROPAT          ;DO IT AGAIN.
1521
1522  007632  000207              1$:     RTS     PC              ;RETURN.
```

```
                                        ;ALL ZEROES PATTERN.
                                        ;
007634  005003          PATR2:: CLR     R3              ;CLR PATTERN REGISTER.
007636  004737  007620          JSR     PC,ZROPAT       ;GO GENERATE IT.
007642  000207                  RTS     PC              ;RETURN.
                                        ;
                                        ;ONE BIT WALKING FROM R TO L IN A FIELD OF ZEROES.
                                        ;
007644  012703  000401  PATR3:: MOV     #401,R3         ;INIT PATTERN REGISTER.
007650                  WLKZRO: LET R4 := R4 - #2       ;DECREMENT WORD COUNT.
007650  162704  000002                                                  SUB     #2,R4
007654  100404                  BMI     1$              ;BR IF DONE.
007656  010322                  MOV     R3,(R2)+        ;LOAD DATA.
007660  006303                  ASL     R3              ;SHIFT PATTERN.
007662  005503                  ADC     R3              ;ADD CARRY BACK INTO PATTERN.
007664  000771                  BR      WLKZRO          ;DO IT AGAIN.
007666  000207          1$:     RTS     PC              ;RETURN.
                                        ;
                                        ;ZERO BIT WALKING FROM R TO L IN A FIELD OF 1'S.
                                        ;
007670  012703  177376  PATR4:: MOV     #177376,R3      ;INIT PATTERN REGISTER.
007674  004737  007650          JSR     PC,WLKZRO       ;GO GENERATE ;IT.
007700  000207                  RTS     PC              ;RETURN.
                                        ;
                                        ;ALTERNATING ONE AND ZERO BITS WITH ALTERNATE BYTES
                                        ;COMPLEMENTED.
                                        ;
007702  012703  125125  PATR5:: MOV     #125125,R3      ;INIT PATTERN REGISTER.
007706  004737  007620          JSR     PC,ZROPAT       ;GO GENERATE IT.
007712  000207                  RTS     PC              ;RETURN.
                                        ;
                                        ;ALTERNATING BYTES OF 000 AND 377.
                                        ;
007714  012703  177400  PATR6:: MOV     #177400,R3      ;INIT PATTERN REGISTER.
007720                  1$:     LET R4 := R4 - #2       ;DECREMENT WORD COUNT.
007720  162704  000002                                                  SUB     #2,R4
007724  100402                  BMI     2$              ;BR IF DONE.
007726  010322                  MOV     R3,(R2)+        ;LOAD DATA.
007730  000773                  BR      1$              ;DO IT AGAIN.
007732  000207          2$:     RTS     PC              ;RETURN.
                                        ;
                                        ;RANDOM PATTERN GENERATOR
                                        ;
007734                  PATR7:: LET R4 := R4 - #2       ;DECREMENT WORD COUNT
007734  162704  000002                                                  SUB     #2,R4
007740  100411                  BMI     GIT             ;BR IF DONE.
007742  063737  003072  003070          ADD     RANS,RANB
007750  063737  003070  003072          ADD     RANB,RANS       ;GET NEW #.
007756  013722  003072                  MOV     RANS,(R2)+      ;SAVE #.
007762  000764                  BR      PATR7           ;CONTINUE.
007764  000207          GIT:    RTS     PC              ;RETURN
                                        ;
                                        ;       NO PATTERN GENERATION.
                                        ;
007766  000207          PATR8:: RTS     PC              ;RETURN.
```

```
                        ;       THIS SUBROUTINE INITIATES TS04 COMMAND EXECUTION
                        ;       AND CHECKS FOR TS04 RESPONSE.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R3.
                        ;       CALLS:          DROPU, MOVMSG, FIRSTU, NEXTU, WSSR.

007770                  EXCUTE:: LET TIME1 := #-1               ;INIT TIMEOUT COUNTER.
007770  012737  177777  003074                                          MOV     #-1,TIME1
007776                          REPEAT                          ;WAIT -
007776                                                                  50070$:
007776                            LET TIME1 := TIME1 - #1       ;UPDATE TIMEOUT COUNTER.
007776  005337  003074                                                  DEC     TIME1
010002                            IF TIME1 EQ #0 THEN           ;IF TIMED OUT:
010002  005737  003074                                                  TST     TIME1
010006  001011                                                          BNE     50071$
010010  004737  010554              JSR PC,MOVMSG               ;MOVE CURRENT PACKET MSG.
010014                              ERRDF #2,NSSRM,STAERM       ;REPORT TS04 NOT READY
010014  104455                                                          TRAP    C$ERDF
010016  000002                                                          .WORD   2
010020  003775                                                          .WORD   NSSRM
010022  005066                                                          .WORD   STAERM
010024  004737  013560              JSR PC,DROPU                ;DROP THE UNIT.
010030  000522                      BR  EXCRTN                  ;RETURN.
010032                            ENDIF
010032                                                                  50071$:
010032                          UNTIL #TS.SSR SETIN @TSSR(R5)   ;WAIT UNTIL DEVICE IS READY.
010032  032775  000200  002462                                          BIT     #TS.SSR,@TSSR(R5
010040  001756                                                          BEQ     50070$
010042                          IF CMDWRD EQ #SCH THEN          ;IF WE ARE DOING A SET CHAR CMD THEN:
010042  023727  003056  140004                                          CMP     CMDWRD,#SCH
010050  001022                                                          BNE     50072$
010052                            LET R5SAVE := R5                ;SAVE CURRENT DEVICE POINTER.
010052  010537  003110                                                  MOV     R5,R5SAVE
010056  004737  013462            JSR   PC,FIRSTU               ;FIND FIRST UNIT.
010062                            WHILE DEVTBL(R5) NE #END DO
010062                                                                  50073$:
010062  026527  002532  177777                                          CMP     DEVTBL(R5),#END
010070  001405                                                          BEQ     50074$
010072  004737  010520              JSR PC,WSSR                 ;WAIT FOR UNIT READY OR TIME OUT.
010076  004737  013530              JSR PC,NEXTU                ;FIND NEXT UNIT.
010102                            ENDDO
010102  000767                                                          BR      50073$
010104                                                                  50074$:
010104                            LET R5 := R5SAVE              ;RESTORE CURRENT DEVICE POINTER.
010104  013705  003110                                                  MOV     R5SAVE,R5
010110                            LET SCHBK := MSGPKA(R5)       ;SET UP ADR OF MSG PKT IN SCH BLOCK.
010110  016537  002502  002442                                          MOV     MSGPKA(R5),SCHBK
010116                          ENDIF
010116                                                                  50072$:
010116                          LET R3 := MSGPKA(R5)            ;ADR OF THIS UNIT'S MSG PACKET.
010116  016503  002502                                                  MOV     MSGPKA(R5),R3
010122                          LET R2 := #0                    ;CLR COUNTER.
010122  005002                                                          CLR     R2
010124                          WHILE R2 NE #MSGCNT DO          ;WHILE THERE ARE MORE LOCATIONS:
010124                                                                  50075$:
```

```
1634  010124  020227  000016                                                    CMP     R2,#MSGCNT
1635  010130  001405                                                          BEQ     50076$
1636  010132                          LET (R3)+ := #-1            ;INIT THE MSG PACKET WITH ALL 1'S
1637  010132  012723  177777                                                  MOV     #-1,(R3)+
1638  010136                          LET R2 := R2 + #2           ;UPDATE COUNTER.
1639  010136  062702  000002                                                  ADD     #2,R2
1640  010142                        ENDDO
1641  010142  000770                                                          BR      50075$
1642  010144                                                          50076$:
1643  010144  105737  002210        TSTB    DINT                ;ARE INTERRUPTS DISABLED.
1644  010150  001023                BNE     1$                  ;BR IF YES.
1645  010152                        IFB INTFLG(R5) GT #1 THEN    ;IF MORE THAN ONE INTERRUPT HAS OCCURED:
1646  010152  126527  003124  000001                                          CMPB    INTFLG(R5),#1
1647  010160  003412                                                          BLE     50077$
1648  010162                          LET TSSREG := @TSSR(R5)         ;FREEZE THE CURRENT STATUS REG FOR PRINT
1649  010162  017537  002462  003112                                          MOV     @TSSR(R5),TSSREG
1650  010170                          ERRDF #15,TOOMM,STAERM      ;REPORT TOO MANY INTERRUPTS.
1651  010170  104455                                                          TRAP    C$ERDF
1652  010172  000017                                                          .WORD   15
1653  010174  004164                                                          .WORD   TOOMM
1654  010176  005066                                                          .WORD   STAERM
1655  010200  004737  013560          JSR PC,DROPU                ;DROP THE UNIT
1656  010204  000434                  BR  EXCRTN                  ;RETURN - UNIT HAS BEEN DROPPED.
1657  010206                        ENDIF
1658  010206                                                          50077$:
1659  010206                        LET INTFLG(R5) := #0          ;CLR INTERRUPT FLAG FOR THIS DEV.
1660  010206  005065  003124                                                  CLR     INTFLG(R5)
1661  010212  052737  000200  002310        BIS     #IE.C,CMDPKT          ;SET INT ENABLE BIT.
1662  010220                          1$:   IFB ERRREC EQ #0 THEN         ;IF NOT RETRYING
1663  010220  105737  003122                                                  TSTB    ERRREC
1664  010224  001005                                                          BNE     50100$
1665  010226                          LET RECCNT(R5) := RECCNT(R5) + #1
1666  010226  005265  003034                                                  INC     RECCNT(R5)
1667  010232                          LET @DATAWT := RECCNT(R5)     ;THEN UPDATE REC COUNT TO WRITE IT ON TAPE
1668  010232  016577  003034  172604                                          MOV     RECCNT(R5),@DATA
1669  010240                        ENDIF
1670  010240                                                          50100$:
1671  010240  012775  002310  002452        MOV     #CMDPKT,@TSDB(R5)     ;LOAD TSDB WITH CMDPKT ADDRESS
1672                                                                        ;THIS INITIATES COMMAND EXECUTION.
1673  010246                        IF #TS.SSR SETIN @TSSR(R5) THEN ;IF READY DID NOT DROP THEN:
1674  010246  032775  000200  002462                                          BIT     #TS.SSR,@TSSR(R5
1675  010254  001410                                                          BEQ     50101$
1676  010256  004737  010554          JSR   PC,MOVMSG               ;MOVE CURRENT MESSAGE PACKET TO COMMON.
1677  010262                          ERRDF #3,TOERM,STAERM         ;REPORT NO TS04 RESPONSE.
1678  010262  104455                                                          TRAP    C$ERDF
1679  010264  000003                                                          .WORD   3
1680  010266  003713                                                          .WORD   TOERM
1681  010270  005066                                                          .WORD   STAERM
1682  010272  004737  013560          JSR PC,DROPU                ;DROP THE UNIT
1683  010276                        ENDIF
1684  010276                                                          50101$:
1685  010276  000207          EXCRTN: RTS     PC                  ;RETURN.
```

```
                        ;       THIS SUBROUTINE WAITS FOR THE TS04 INERRUPT OR DONE BIT TO SET AND ALLOWS THE
                        ;       OPERATOR TO TRANSFER CONROL TO THE SUPERVISOR.
                        ;       UPON APPEARANCE OF THE INTERRUPT OR DONE, CHECK TSSR FOR STATUS ERRORS,
                        ;       LOG BYTES AND ERRORS AND PERFORM ERROR RECOVERY IF NESSASARY.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R3.
                        ;       CALLS:          DROPU, MOVMSG, RECUD, CHKERR, LOG, CLRERR.

010300                  GOWAIT:: LET TIME1 := #-1               ;INIT TIME OUT COUNTER.
010300  012737  177777  003074                                          MOV     #-1,TIME1
010306                          REPEAT                          ;REPEAT UNTIL INTERRUPT OCCURES:
010306                                                                  50102$:
010306                            BREAK                         ;GO TO THE SUPER TO ALLOW TTY INPUT.
010306  104422                                                          TRAP    C$BRK
010310                            IF CMDWRD EQ #RWD THEN        ;IF COMMAND WAS REWIND THEN:
010310  023727  003056  102010                                          CMP     CMDWRD,#RWD
010316  001014                                                          BNE     50103$
010320                              DELAY 10.                   ;WAIT AN EXTRA MSECS EACH LOOP.
010320  012727  000012                                                  MOV     #10.,(PC)+
010324  000000                                                          .WORD   0
010326  013727  002116                                                  MOV     L$DLY,(PC)+
010332  000000                                                          .WORD   0
010334  005367  177772                                                  DEC     -6(PC)
010340  001375                                                          BNE     .-4
010342  005367  177756                                                  DEC     -22(PC)
010346  001367                                                          BNE     .-20
010350                            ENDIF
010350                                                                  50103$:
010350                            IFB DINT EQ #0 THEN           ;IF INTERRUPTS ARE ENABLED.
010350  105737  002210                                                  TSTB    DINT
010354  001003                                                          BNE     50104$
010356                              LET R2 := INTFLG(R5)        ;FETCH INTERRUPT OCCURRED FLAG.
010356  016502  003124                                                  MOV     INTFLG(R5),R2
010362                            ELSE                          ;IF IN BRUTUS MODE:
010362  000406                                                          BR      50105$
010364                                                                  50104$:
010364                              LET R3 := COMP #TS.SSR      ;SET UP A MASK FOR THE DONE BIT.
010364  012703  000200                                                  MOV     #TS.SSR,R3
010370  005103                                                          COM     R3
010372                              LET R2 := @TSSR(R5) CLR.BY R3  ;FETCH DONE BIT.
010372  017502  002462                                                  MOV     @TSSR(R5),R2
010376  040302                                                          BIC     R3,R2
010400                            ENDIF
010400                                                                  50105$:
010400                            LET TIME1 := TIME1 - #1       ;UPDATE TIMEOUT COUNTER.
010400  005337  003074                                                  DEC     TIME1
010404                            IF TIME1 EQ #0 THEN           ;IF TIME OUT HAS OCCURRED:
010404  005737  003074                                                  TST     TIME1
010410  001016                                                          BNE     50106$
010412                              LET @DATAWT := RECCNT(R5) - #1 ;RE-ADJUST REC COUNT DOWN
010412  016577  003034  172424                                          MOV     RECCNT(R5),@DATA
010420  005377  172420                                                  DEC     @DATAWT
010424  004737  010554                  JSR PC,MOVMSG           ;MOVE CURRENT MSG PACKET TO COMMON AREA.
010430                                  ERRDF #4,NOINTM,STAERM  ;REPORT NO INTERRUPT.
010430  104455                                                          TRAP    C$ERDF
```

```
1742  010432  000004                                                    .WORD   4
1743  010434  004125                                                    .WORD   NOINTM
1744  010436  005066                                                    .WORD   STAERM
1745  010440  004737  013560              JSR PC,DROPU          ;DROP THE UNIT.
1746  010444  000412                      BR  GOWRTN            ;RETURN.
1747  010446                            ENDIF
1748  010446                                                  50106$:
1749  010446                          UNTIL R2 NE #0          ;REPEAT UNTIL INTERRUPT OR READY OCCURES.
1750  010446  005702                                                    TST     R2
1751  010450  001716                                                    BEQ     50102$
1752  010452  004737  010554          JSR     PC,MOVMSG       ;MOVE CURRENT MSG. PACKET TO COMMON AREA.
1753  010456  004737  010640          JSR     PC,RECUD        ;UPDATE THE RECORD COUNT.
1754  010462  004737  011004          JSR     PC,CHKERR       ;CHECK FOR STATUS ERRORS.
1755  010466  004737  012150          JSR     PC,LOG          ;LOG BYTES AND ERRORS.
1756  010472                    GOWRTN: LET R3 := #ENDERF
1757  010472  012703  003124                                                    MOV     #ENDERF,R3
1758  010476  004737  010504          JSR PC,CLRERR           ;CLEAR ALL ERROR FLAGS
1759  010502  000207                  RTS     PC              ;RETURN IF DONE.
```

```
                        ;       SUBROUTINE TO CLEAR FLAGS.
                        ;       INPUTS:         R3 = LWA TO BE CLEARED + 2.
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2
                        ;       CALLS:

010504                  CLRERR:: LET R2 := #BGNFLG
010504  012702  003114                                          MOV     #BGNFLG,R2
010510                          REPEAT
010510                                                      50107$:
010510                            LET (R2)+ := #0
010510  005022                                                 CLR     (R2)+
010512                          UNTIL R2 EQ R3
010512  020203                                                 CMP     R2,R3
010514  001375                                                 BNE     50107$
010516  000207                  RTS PC


                        ;       SUBROUTINE TO WAIT UNTIL CURRENT UNIT IS READY OR UNTIL TIME OUT.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:
                        ;       CALLS:

010520                  WSSR::  LET TIME1 := #-1                ;INIT TIMEOUT COUNTER.
010520  012737  177777  003074                                  MOV     #-1,TIME1
010526                          REPEAT                          ;REPEAT UNTIL DEV READY OR TIMEOUT:
010526                                                      50110$:
010526                            BREAK                           ;BREAK TO THE SUPERVISOR.
010526  104422                                                   TRAP    C$BRK
010530                            LET TIME1 := TIME1 - #1         ;UPDATE TIMEOUT COUNTER.
010530  005337  003074                                          DEC     TIME1
010534                          UNTIL #TS.SSR SETIN @TSSR(R5) OR TIME1 EQ #0
010534  032775  000200  002462                                  BIT     #TS.SSR,@TSSR(R5
010542  001003                                                 BNE     50111$
010544  005737  003074                                          TST     TIME1
010550  001366                                                 BNE     50110$
010552                                                      50111$:
                                                            ;REPEAT UNTIL DEV READY OR TIMEOUT.
010552  000207                  RTS PC                          ;RETURN.


                        ;       SUBROUTINE TO MOVE THE CURRENT MESSAGE PACKET TO THE COMMON AREA AND
                        ;       TO UPDATE THE CURRENT TERMINATION CLASS CODE.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R3.
                        ;       CALLS:

010554                  MOVMSG:: LET TSSREG := @TSSR(R5)        ;FREEZE THE STATUS REG CONTENTS
010554  017537  002462  003112                                  MOV     @TSSR(R5),TSSREG
010562                          LET R2 := TSSREG CLR.BY #TSC.TCC ;EXTRACT THE TERMINATION CLASS CODE.
010562  013702  003112                                          MOV     TSSREG,R2
010566  042702  177761                                          BIC     #TSC.TCC,R2
```

```
1816  010572                          LET CTCC := R2 SHIFT -1         ;AND SAVE IT
1817  010572  010237  003106                                                MOV     R2,CTCC
1818  010576  006237  003106                                                ASR     CTCC
1819  010602                          LET R3 := MSGPKA(R5)            ;ADR OF THIS DEVICE'S MSG.
1820  010602  016503  002502                                                MOV     MSGPKA(R5),R3
1821  010606                          LET R2 := #0                    ;CLR COUNTER.
1822  010606  005002                                                        CLR     R2
1823  010610                          WHILE R2 NE #MSGCNT DO          ;WHILE THERE ARE MORE LOCATIONS:
1824  010610                                                                50112$:
1825  010610  020227  000016                                                CMP     R2,#MSGCNT
1826  010614  001405                                                        BEQ     50113$
1827  010616                            LET MSGPKT(R2) := (R3)+       ;MOVE MSG TO COMMON AREA.
1828  010616  012362  002334                                                MOV     (R3)+,MSGPKT(R2)
1829  010622                            LET R2 := R2 + #2             ;UPDATE COUNTER.
1830  010622  062702  000002                                                ADD     #2,R2
1831  010626                          ENDDO
1832  010626  000770                                                        BR      50112$
1833  010630                                                                50113$:
1834  010630                          LET EOTFLG(R5) := MSGPKT+MS.XS0 ;MOVE XSTAT0 TO EOT FLAG.
1835  010630  013765  002342  003134                                        MOV     MSGPKT+MS.XS0,EO
1836  010636  000207                  RTS     PC
```

```
1837                                ;       SUBROUTINE TO ADJUST THE RECORD COUNT.
1838                                ;       INPUTS:
1839                                ;       OUTPUTS:
1840                                ;       REGISTERS:
1841                                ;       CALLS:
1842
1843  010640                        RECUD:: IFB RECLOG EQ #0 THEN           ;IF RECORD HAS NOT BEEN LOGGED:
1844  010640  105737  003116                                                          TSTB    RECLOG
1845  010644  001056                                                                 BNE     50114$
1846  010646
1847  010646  005365  003034                 LET RECCNT(R5) := RECCNT(R5) - #1       DEC     RECCNT(R5)
1848  010652                                  IF #BITO NOTSETIN CTCC AND #X2.OPM SETIN MSGPKT+MS.XS2 THEN   ;IF TAPE MOVED T
1849  010652  032737  000001  003106                                                  BIT     #BITO,CTCC
1850  010660  001045                                                                 BNE     50115$
1851  010662  032737  100000  002346                                                  BIT     #X2.OPM,MSGPKT+M
1852  010670  001441                                                                 BEQ     50115$
1853  010672
1854  010672  105237  003116                   LET RECLOG :B= RECLOG + #1  ;SET RECORD LOGGED,
                                                                                    INCB    RECLOG
1855  010676
1856  010676  023727  003056  102010           IF CMDWRD EQ #RWD THEN      ;IF THIS IS A REWIND CMD:
                                                                                    CMP     CMDWRD,#RWD
1857  010704  001003                                                                 BNE     50116$
1858  010706
1859  010706  005065  003034                     LET RECCNT(R5) := #0      ;CLEAR RECORD COUNT,
                                                                                    CLR     RECCNT(R5)
1860  010712
1861  010712  000430                           ELSE
                                                                                    BR      50117$
1862  010714                                                                50116$:
1863  010714                                    IF #BRF.C SETIN CMDWRD THEN       ;IF BRF USED, UPDATE RECORD COUNT.
1864  010714  032737  004000  003056                                                BIT     #BRF.C,CMDWRD
1865  010722  001424                                                               BEQ     50120$
1866  010724
1867  010724  032737  000400  003056           IF #MOD.CO NOTSETIN CMDWRD THEN  ;IF A FORWARD CMD:
                                                                                    BIT     #MOD.CO,CMDWRD
1868  010732  001007                                                               BNE     50121$
1869  010734
1870  010734  032737  000400  003062             IF #MOD.CO NOTSETIN PCMDWD THEN  ;IF PREV CMD WAS A FWD ALSO:
                                                                                    BIT     #MOD.CO,PCMDWD
1871  010742  001002                                                               BNE     50122$
1872  010744
1873  010744  005265  003034                       LET RECCNT(R5) := RECCNT(R5) + #1  ;INCREMENT RECORD COUNT.
                                                                                    INC     RECCNT(R5)
1874  010750                                    ENDIF
1875  010750                                                                50122$:
1876  010750                                  ELSE                    ;IF REVERSE CMD:
1877  010750  000411                                                               BR      50123$
1878  010752                                                                50121$:
1879  010752                                    IF #MOD.CO SETIN PCMDWD THEN  ;IF PREVIOUS CMD WAS A REV ALSO:
1880  010752  032737  000400  003062                                                BIT     #MOD.CO,PCMDWD
1881  010760  001405                                                               BEQ     50124$
1882  010762
1883  010762  005765  003034                       IF RECCNT(R5) NE #0 THEN    ;INSURE A POSITIVE COUNT.
                                                                                    TST     RECCNT(R5)
1884  010766  001402                                                               BEQ     50125$
1885  010770
1886  010770  005365  003034                         LET RECCNT(R5) := RECCNT(R5) - #1  ;DECREMENT RECORD COUNT.
                                                                                    DEC     RECCNT(R5)
1887  010774                                      ENDIF
1888  010774                                                                50125$:
1889  010774                                    ENDIF
1890  010774                                                                50124$:
1891  010774                                  ENDIF
1892  010774                                                                50123$:
```

```
1893  010774                                    ENDIF
1894  010774                                                                50120$:
1895  010774                                  ENDIF
1896  010774                                                                50117$:
1897  010774                                ENDIF
1898  010774                                                                50115$:
1899  010774                                LET @DATAWT := RECCNT(R5)
1900  010774  016577  003034  172042                                              MOV     RECCNT(R5),@DATA
1901  011002                              ENDIF
1902  011002                                                                50114$:
1903  011002  000207                     RTS     PC                  ;RETURN.
```

```
1904                                    ;       THIS IS THE ERROR CHECK SUBROUTINE.  AFTER INTERRUPT THIS
1905                                    ;       SUBROUTINE IS CALLED TO CHECK THE TS04 STATUS.
1906                                    ;       IF SPECIAL COND IS SET THEN THE TCC HANDLING SUBROUTINE IS ENTERED.
1907                                    ;       IF THE RFC IS NON ZERO FOR A COMMAND REQUIRING A BPCR,
1908                                    ;       THEN AN ERROR RFC !S REPORTED,
1909                                    ;       INPUTS:
1910                                    ;       OUTPUTS:
1911                                    ;       REGISTERS:      R2, R4.
1912                                    ;       CALLS:          TCC0-TCC7.
1913
1914  011004                            CHKERR:: IF #TS.SC SETIN TSSREG THEN            ;IF SPECIAL COND STATUS IS SET THEN:
1915  011004  032737  100000  003112                                                            BIT     #TS.SC,TSSREG
1916  011012  001441                                                                           BEQ     50126$
1917  011014                                    IF CTCC NE #2 THEN              ;IF TCC IS NOT 2 THEN:
1918  011014  023727  003106  000002                                                           CMP     CTCC,#2
1919  011022  001405                                                                           BEQ     50127$
1920  011024                                      IFB ERRREC EQ #0 THEN           ;IF NOT IN ERROR RECOVERY:
1921  011024  105737  003122                                                                  TSTB    ERRREC
1922  011030  001002                                                                           BNE     50130$
1923  011032  005265  002774                       INC       SCCNT(R5)           ;INC SC COUNTER.
1924  011036                                      ENDIF
1925  011036                                                                    50130$:
1926  011036                                    ENDIF
1927  011036                                                                    50127$:
1928  011036                                    IF #TS.NXM SETIN TSSREG OR #TS.UPE SETIN TSSREG THEN  ;WHEN NON-EXISTANT MEMO
1929  011036  032737  004000  003112                                                           BIT     #TS.NXM,TSSREG
1930  011044  001004                                                                           BNE     50131$
1931  011046  032737  040000  003112                                                           BIT     #TS.UPE,TSSREG
1932  011054  001412                                                                           BEQ     50132$
1933  011056                                                                    50131$:
1934  011056                                      IF #X2.OPM NOTSETIN MSGPKT+MS.XS2 THEN                ;AND TAPE NOT MOVED
1935  011056  032737  100000  002346                                                           BIT     #X2.OPM,MSGPKT+M
1936  011064  001003                                                                           BNE     50133$
1937  011066                                        LET R2 := #5                  ;SET TCC5 INDEX
1938  011066  012702  000005                                                                  MOV     #5,R2
1939  011072                                      ELSE
1940  011072  000402                                                                           BR      50134$
1941  011074                                                                    50133$:
1942  011074                                        LET R2 := #4                ;TAPE MOVED, SET TCC4 INDEX
1943  011074  012702  000004                                                                  MOV     #4,R2
1944  011100                                      ENDIF
1945  011100                                                                    50134$:
1946  011100                                    ELSE
1947  011100  000402                                                                           BR      50135$
1948  011102                                                                    50132$:
1949  011102                                      LET R2 := CTCC                ;SET DETECTED TCC INDEX
1950  011102  013702  003106                                                                  MOV     CTCC,R2
1951  011106                                    ENDIF
1952  011106                                                                    50135$:
1953  011106                                    LET R2 := R2 SHIFT 1  ;CURRENT TCC X 2.
1954  011106  006302                                                                           ASL     R2
1955  011110  004772  011210                   JSR   PC,@TCCRA(R2)             ;GO TO THE TCC HANDLING SUBROUTINE.
1956  011114                                  ELSE
1957  011114  000426                                                                           BR      50136$
1958  011116                                                                    50126$:
1959  011116                                    IF #BRF.C SETIN CMDWRD THEN   ;IF BRF IS USED IN THIS CMD THEN:
```

```
1960  011116  032737  004000  003056                                                  BIT     #BRF.C,CMDWRD
1961  011124  001422                                                                  BEQ     50137$
1962  011126                                  IF MSGPKT+MS.RFC NE #0 THEN   ;IF THERE IS AN RFC THEN:
1963  011126  005737  002340                                                          TST     MSGPKT+MS.RFC
1964  011132  001417                                                                  BEQ     50140$
1965  011134                                    IFB RANDOM EQ #0 ORB VFYFLG NE #0 THEN
1966  011134  105737  003145                                                          TSTB    RANDOM
1967  011140  001403                                                                  BEQ     50141$
1968  011142  105737  003146                                                          TSTB    VFYFLG
1969  011146  001411                                                                  BEQ     50142$
1970  011150                                                                50141$:
1971                                                                ;IF NOT IN RANDOM OR IF CMD IS WTV:
1972  011150                                      IFB IRE EQ #0 THEN          ;IF RFC ERROR REPORTS ARE ALLOWED:
1973  011150  105737  003151                                                          TSTB    IRE
1974  011154  001006                                                                  BNE     50143$
1975  011156                                        LET HRDCNT(R5) := HRDCNT(R5) + #1  ;UPDATE HARD ERROR COUNT
1976  011156  005265  003014                                                          INC     HRDCNT(R5)
1977  011162                                        ERRHRD #13,RFCERM,STAERM      ;REPORT RFC ERROR
1978  011162  104456                                                                  TRAP    C$ERHRD
1979  011164  000015                                                                  .WORD   13
1980  011166  003760                                                                  .WORD   RFCERM
1981  011170  005066                                                                  .WORD   STAERM
1982  011172                                      ENDIF
1983  011172                                                                50143$:
1984  011172                                    ENDIF
1985  011172                                                                50142$:
1986  011172                                  ENDIF
1987  011172                                                                50140$:
1988  011172                                ENDIF
1989  011172                                                                50137$:
1990  011172                                IFB RWERR NE #0 THEN          ;IF A READ/WRITE ERROR HAS OCCURRED THEN:
1991  011172                                                                50136$:
1992  011172
1993  011172  105737  003120                                                          TSTB    RWERR
1994  011176  001403                                                                  BEQ     50144$
1995  011200                                  LET CMDPKT := CMDSAV           ;RESTORE CMD PACKET AFTER ERROR RECOV.
1996  011200  013737  003060  002310                                                  MOV     CMDSAV,CMDPKT
1997  011206                                ENDIF
1998  011206                                                                50144$:
1999  011206  000207                       RTS     PC                    ;RETURN.
2000
2001                                ;       ADDRESSES OF TCC HANDLING ROUTINES FOR TERMINATION CLASS CODES 0 - 7.
2002
2003  011210  011230                TCCRA:  TCC0
2004  011212  011246                        TCC1
2005  011214  011264                        TCC2
2006  011216  011374                        TCC3
2007  011220  011412                        TCC4
2008  011222  011544                        TCC5
2009  011224  011642                        TCC6
2010  011226  012004                        TCC7
```

```
2011                                    ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 0, UNDEFINED SPECIAL
2012                                    ;       CONDITION ERROR.
2013                                    ;       INPUTS:
2014                                    ;       OUTPUTS:
2015                                    ;       REGISTERS:
2016                                    ;       CALLS:
2017
2018  011230                            TCC0::  LET HRDCNT(R5) := HRDCNT(R5) + #1  ;UPDATE HARD ERROR COUNT.
2019  011230  005265  003014                                                        INC     HRDCNT(R5)
2020  011234                                    ERRHRD #5,SCERM,STAERM          ;REPORT SPECIAL CONDITION ERROR.
2021  011234  104456                                                            TRAP    C$ERHRD
2022  011236  000005                                                            .WORD   5
2023  011240  003734                                                            .WORD   SCERM
2024  011242  005066                                                            .WORD   STAERM
2025  011244  000207                            RTS PC                          ;RETURN.
2026
2027
2028
2029
2030
2031                                    ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 1, ATTENTION CONDITION.
2032                                    ;       THIS TCC INDICATES THAT THE DRIVE HAS UNDERGONE A STATUS CHANGE
2033                                    ;       SUCH AS GOING OFFLINE OR COMING ONLINE.
2034                                    ;       INPUTS:
2035                                    ;       OUTPUTS:
2036                                    ;       REGISTERS:      R2,R4
2037                                    ;       CALLS:          DROPU
2038
2039  011246                            TCC1::  ERRDF #6,ATTNM,STAERM           ;REPORT ATTENTION-UNIT OFF LINE.
2040  011246  104455                                                            TRAP    C$ERDF
2041  011250  000006                                                            .WORD   6
2042  011252  004041                                                            .WORD   ATTNM
2043  011254  005066                                                            .WORD   STAERM
2044  011256  004737  013560                    JSR PC,DROPU                    ;DROP THE UNIT.
2045  011262  000207                            RTS PC                          ;RETURN.
```

```
                                ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 2, TAPE STATUS ALERT.
                                ;       A STATUS CONDITION HAS BEEN ENCOUNTERED THAT MAY HAVE SIGNIFICANCE
                                ;       TO THE PROGRAM.  BITS OF INTEREST INCLUDE TMK, RLS, LET, RLL, BOT, EOT.
                                ;       INPUTS:
                                ;       OUTPUTS:
                                ;       REGISTERS:
                                ;       CALLS:

011264                          TCC2::    IF #XO.BOT SETIN MSGPKT+MS.XSO ANDB EXPBOT NE #0 THEN
011264  032737  000002  002342                                                    BIT     #XO.BOT,MSGPKT+M
011272  001404                                                                    BEQ     50145$
011274  105737  003144                                                            TSTB    EXPBOT
011300  001401                                                                    BEQ     50145$
                                                                ;IF AT BOT AND BOT IS EXPECTED:
011302  000433                            BR TC2RTN               ;RETURN-TCC2 CAUSED BY EXPECTED BOT.
011304                                  ENDIF
011304                                                                  50145$:
011304                                  IF #XO.RLS!XO.RLL!XO.TMK!XO.LET!XO.BOT SETIN MSGPKT+MS.XSO THEN
011304  032737  170002  002342                                                    BIT     #XO.RLS!XO.RLL!X
011312  001427                                                                    BEQ     50146$
                                                                ;IF TCC2 CAUSED BY ANYTHING BUT EOT:
011314                                    IFB RANDOM EQ #0 ORB VFYFLG NE #0 THEN
011314  105737  003145                                                            TSTB    RANDOM
011320  001403                                                                    BEQ     50147$
011322  105737  003146                                                            TSTB    VFYFLG
011326  001421                                                                    BEQ     50150$
011330                                                                  50147$:
                                                              ;IF NOT IN RANDOM OR IF CMD IS WTV:
011330                                      IFB IRE EQ #0 THEN      ;IF RFC ERROR REPORTS ARE ALLOWED:
011330  105737  003151                                                            TSTB    IRE
011334  001016                                                                    BNE     50151$
011336
011336  105737  003122                        IFB ERRREC NE #0 THEN       ;IF WE ARE IN ERROR RECOVERY THEN:
                                                                                TSTB    ERRREC
011342  001403                                                                  BEQ     50152$
011344
011344  105237  003121                          LET UNREC :B= UNREC + #1     ;SET UNRECOVERABLE FLAG FOR LOG.
                                                                                INCB    UNREC
011350                                        ELSE                      ;ELSE - IF NOT IN ERROR RECOVERY:
011350  000402                                                                  BR      50153$
011352                                                                  50152$:
011352                                          LET SCCNT(R5) := SCCNT(R5) + #1 ;INCREMENT THE SPEC COND COUNTER.
011352  005265  002774                                                          INC     SCCNT(R5)
011356                                        ENDIF
011356                                                                  50153$:
011356                                          LET HRDCNT(R5) := HRDCNT(R5) + #1   ;UPDATE HARD ERROR COUNT.
011356  005265  003014                                                          INC     HRDCNT(R5)
011362                                          ERRHRD #7,TSAM,STAERM       ;REPORT TAPE STATUS ALERT.
011362  104456                                                                  TRAP    C$ERHRD
011364  000007                                                                  .WORD   7
011366  004142                                                                  .WORD   TSAM
011370  005066                                                                  .WORD   STAERM
011372                                      ENDIF
011372                                                                  50151$:
011372                                    ENDIF
011372                                                                  50150$:
011372                                  ENDIF
011372                                                                  50146$:
```

```
 2102  011372  000207                  TC2RTN:   RTS PC                                ;RETURN.
 2103
 2104
 2105
 2106
 2107
 2108                                    ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 3, FUNCTION REJECT.
 2109                                    ;       THE SPECIFIED FUNCTION WAS NOT INITIATED.  BITS OF INTEREST ARE
 2110                                    ;       RMR, OFL, VCK, BOT, ILC, WLE, ILA, AND NBA.
 2111                                    ;       INPUTS:
 2112                                    ;       OUTPUTS:
 2113                                    ;       REGISTERS:      R2,R4
 2114                                    ;       CALLS:          DROPU
 2115
 2116  011374                            TCC3::  ERRDF #8,FUNRM,STAERM           ;REPORT FUNCTION REJECT.
 2117  011374  104455                                                                  TRAP    C$ERDF
 2118  011376  000010                                                                  .WORD   8
 2119  011400  004057                                                                  .WORD   FUNRM
 2120  011402  005066                                                                  .WORD   STAERM
 2121  011404  004737  013560                  JSR PC,DROPU                   ;DROP THE UNIT.
 2122  011410  000207                          RTS PC                         ;RETURN.
```

```
2123                                    ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 4, RECOVERABLE ERROR.
2124                                    ;       TAPE POSITION IS ONE RECORD BEYOND WHAT ITS POSITION WAS WHEN
2125                                    ;       THE FUNCTION WAS INITIATED.  RECOVERY PROCEDURE IS TO LOG THE
2126                                    ;       ERROR AND ISSUE THE APPROPRIATE RETRY COMMAND.
2127                                    ;       INPUTS:
2128                                    ;       OUTPUTS:
2129                                    ;       REGISTERS:      R2,R4.
2130                                    ;       CALLS:          RTLE, EXCUTE, GOWAIT, DROPU
2131
2132  011412  004737  012022          TCC4::  JSR PC,RTLE                     ;CHECK FOR RETRY LIMIT EXCEEDED.
2133  011416                                  IF CMDLG GT #2 THEN             ;IF READ CMD THEN:
2134  011416  023727  003064  000002                                                  CMP     CMDLG,#2
2135  011424  003411                                                                 BLE     50154$
2136  011426                                    LET R2 := #RRECL SHIFT -1     ;R2=READ RETRY COUNT LIMIT / 2
2137  011426  012702  000020                                                        MOV     #RRECL,R2
2138  011432  006202                                                                ASR     R2
2139  011434                                    IF RETRYC GE R2 THEN          ;IF RETRY COUNT IS MORE THAN HALF LIMIT:
2140  011434  023702  003114                                                        CMP     RETRYC,R2
2141  011440  002403                                                                BLT     50155$
2142  011442                                      LET CMDPKT := CMDPKT SET.BY #OPP.C  ;SET OPPOSITE BIT FOR RETRY2.
2143  011442  052737  020000  002310                                                BIS     #OPP.C,CMDPKT
2144  011450                                    ENDIF
2145  011450                                                                  50155$:
2146  011450                                  ENDIF
2147  011450                                                                  50154$:
2148  011450                                  IF RETRYC EQ #0 ANDB ERCVER NE #0 THEN  ;IF THIS IS THE ORIGINAL ERROR THEN:
2149  011450  005737  003114                                                        TST     RETRYC
2150  011454  001007                                                                BNE     50156$
2151  011456  105737  002205                                                      TSTB    ERCVER
2152  011462  001404                                                                BEQ     50156$
2153  011464                                    ERRSOFT #9,RERM,STAERM        ;REPORT RECOVERABLE ERROR
2154  011464  104457                                                                TRAP    C$ERSOFT
2155  011466  000011                                                                .WORD   9
2156  011470  004254                                                                .WORD   RERM
2157  011472  005066                                                                .WORD   STAERM
2158  011474                                  ENDIF                           ;PROVIDED OPERATOR HAS ENABLED THE REPORT
2159  011474                                                                  50156$:
2160  011474                                  LET RETRYC := RETRYC + #1        ;UPDATE RETRY COUNT.
2161  011474  005237  003114                                                        INC     RETRYC
2162  011500                                  LET CMDPKT := CMDPKT SET.BY #MOD.C1      ;SET RETRY BIT IN CMD PACKET.
2163  011500  052737  001000  002310                                                BIS     #MOD.C1,CMDPKT
2164  011506                                  IFB IREC EQ #0 THEN             ;IF ERROR RECOVERY ENABLED:
2165  011506  105737  002211                                                        TSTB    IREC
2166  011512  001011                                                                BNE     50157$
2167  011514                                    LET ERRREC :B= ERRREC + #1     ;SET ERROR RECOVERY FLAG.
2168  011514  105237  003122                                                        INCB    ERRREC
2169  011520                                    POP R2,R2                     ;POP 2 RTN ADRS FROM STACK.
2170  011520  012602                                                                MOV     (SP)+,R2
2171  011522  012602                                                                MOV     (SP)+,R2
2172  011524  004737  007770                   JSR PC,EXCUTE                 ;GO EXECUTE THE RETRY COMMAND.
2173  011530  000137  010300                   JMP GOWAIT                    ;GO WAIT FOR INTERRUPT + CHECK STATUS.
2174  011534                                  ELSE                            ;ELSE IF ERROR RECOVERY IS NOT ENABLED:
2175  011534  000402                                                                BR      50160$
2176  011536                                                                  50157$:
2177  011536                                    LET UNREC :B= UNREC + #1       ;SET UNRECOVERABLE ERROR FLAG.
2178  011536  105237  003121                                                        INCB    UNREC
```

```
 2179  011542                          ENDIF
 2180  011542                                                  50160$:
 2181  011542  000207                  RTS PC                  ;RETURN
```

```
                        ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 5, RECOVERABLE ERROR.
                        ;       TAPE POSITION HAS NOT CHANGED.  RECOVERY PROCEDURE IS TO LOG THE
                        ;       ERROR AND RE-ISSUE THE ORIGINAL COMMAND.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2,R4.
                        ;       CALLS:          RTLE, EXCUTE, GOWAIT, DROPU.

011544  004737  012022  TCC5::  JSR PC,RTLE                      ;CHECK FOR RETRY LIMIT EXCEEDED
011550                  IF RETRYC EQ #0 THEN                    ;IF THIS IS THE ORIGINAL ERROR THEN:
011550  005737  003114                                                    TST     RETRYC
011554  001004                                                          BNE     50161$
011556                    ERRSOFT #10,RERM,STAERM               ;REPORT RECOVERABLE ERROR.
011556  104457                                                          TRAP    C$ERSOFT
011560  000012                                                          .WORD   10
011562  004254                                                          .WORD   RERM
011564  005066                                                          .WORD   STAERM
011566                  ENDIF
011566                                                                  50161$:
011566                  LET RETRYC := RETRYC + #1               ;UPDATE RETRY COUNTER.
011566  005237  003114                                                  INC     RETRYC
011572                  IFB IREC EQ #0 THEN                     ;IF ERROR RECOVERY IS ENABLED:
011572  105737  002211                                                  TSTB    IREC
011576  001016                                                          BNE     50162$
011600                    LET ERRREC :B= ERRREC + #1            ;SET ERROR RECOVERY FLAG.
011600  105237  003122                                                  INCB    ERRREC
011604                    LET RECCNT(R5) := RECCNT(R5) + #1     ;UPDATE REC COUNT
011604  005265  003034                                                  INC     RECCNT(R5)
011610                    LET @DATAWT := RECCNT(R5)             ;AND INSERT IT INTO WRT BFR
011610  016577  003034  171226                                          MOV     RECCNT(R5),@DATA
011616                    POP R2,R2                             ;POP 2 RTN ADRS FROM STACK.
011616  012602                                                          MOV     (SP)+,R2
011620  012602                                                          MOV     (SP)+,R2
011622  004737  007770            JSR PC,EXCUTE                 ;GO RE-ISSUE THE COMMAND.
011626  000137  010300            JMP GOWAIT                    ;GO WAIT FOR INTERRUPT + CHECK STATUS.
011632                  ELSE                                    ;ELSE IF ERROR RECOVERY IS NOT ENABLED:
011632  000402                                                          BR      50163$
011634                                                                  50162$:
011634                    LET UNREC :B= UNREC + #1              ;SET UNRECOVERABLE ERROR FLAG.
011634  105237  003121                                                  INCB    UNREC
011640                  ENDIF
011640                                                                  50163$:
011640  000207          RTS PC                                  ;RETURN.
```

```
2227                                    ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 6, UNRECOVERABLE ERROR.
2228                                    ;       TAPE POSITION HAS BEEN LOST.  THE ONLY VALID RECOVERY PROCEDURE
2229                                    ;       IS TO REWIND AND START OVER AT BOT UNLESS THE TAPE HAS LABELS OR
2230                                    ;       SEQUENCE NUMBERS.  THIS DIAGNOSTIC WILL REWIND AND RETRY THE
2231                                    ;       COMMAND ONLY IF DENSITY CHECK IS SET, OTHERWISE THE UNIT WILL BE
2232                                    ;       DROPPED FROM THE TEST SEQUENCE.
2233                                    ;       INPUTS:
2234                                    ;       OUTPUTS:
2235                                    ;       REGISTERS:      R2, R4
2236                                    ;       CALLS:          RTLE, WSSR, EXCUTE, GOWAIT, DROPU
2237
2238  011642                            TCC6::  IF X3.DCK NOTSETIN MSGPKT+MS.XS3 THEN
2239  011642  033737  000010  002350                                                    BIT     X3.DCK,MSGPKT+MS
2240  011650  001016                                                                    BNE     50164$
2241                                                                  ;IF THERE IS NO DENSITY CHECK THEN:
2242  011652                              IF CMDLG NE #0 THEN           ;IF CMD IS A READ OR WRITE THEN:
2243  011652  005737  003064                                                          TST     CMDLG
2244  011656  001404                                                                 BEQ     50165$
2245  011660                                LET RWERR :B= RWERR + #1     ;SET RD/WR ERROR FLAG,
2246  011660  105237  003120                                                          INCB    RWERR
2247  011664                                LET UNREC :B= UNREC + #1     ;SET UNRECOVERABLE ERROR FLAG.
2248  011664  105237  003121                                                          INCB    UNREC
2249  011670                              ENDIF                         ;
2250  011670                                                                  50165$:
2251  011670                              ERRDF #11,URERM,STAERM        ;REPORT UNRECOVERABLE ERROR.
2252  011670  104455                                                          TRAP    C$ERDF
2253  011672  000013                                                          .WORD   11
2254  011674  004276                                                          .WORD   URERM
2255  011676  005066                                                          .WORD   STAERM
2256  011700  004737  013560                JSR PC,DROPU                  ;REPORT ERROR + DROP UNIT.
2257  011704                            ELSE                            ;ELSE-IF THERE IS DENSITY CHECK:
2258  011704  000436                                                          BR      50166$
2259  011706                                                                  50164$:
2260  011706  004737  012022                JSR PC,RTLE                   ;CHECK FOR RETRY LIMIT EXCEEDED.
2261  011712                                IF RETRYC EQ #0 THEN          ;IF THIS IS THE ORIGINAL ERROR THEN:
2262  011712  005737  003114                                                          TST     RETRYC
2263  011716  001004                                                                 BNE     50167$
2264  011720                                  ERRSOFT #11,URERM,STAERM      ;REPORT DENSITY CHECK ERROR.
2265  011720  104457                            :                                     TRAP    C$ERSOFT
2266  011722  000013                                                                  .WORD   11
2267  011724  004276                                                                  .WORD   URERM
2268  011726  005066                                                                  .WORD   STAERM
2269  011730                                ENDIF
2270  011730                                                                  50167$:
2271  011730                                LET RETRYC := RETRYC + #1      ;UPDATE RETRY COUNT.
2272  011730  005237  003114                                                          INC     RETRYC
2273  011734                                IFB IRE EQ #0 THEN            ;IF ERROR RECOVERY IS ENABLED THEN:
2274  011734  105737  003151                                                          TSTB    IRE
2275  011740  001016                                                                 BNE     50170$
2276  011742                                  LET ERRREC :B= ERRREC + #1     ;SET ERROR RECOVERY FLAG,
2277  011742  105237  003122                                                          INCB    ERRREC
2278  011746                                  LET @TSDB(R5) := #RWCPK        ;ISSUE A REWIND COMMAND,
2279  011746  012775  002330  002452                                                  MOV     #RWCPK,@TSDB(R5)
2280  011754  004737  010520                  JSR PC,WSSR                   ;WAIT FOR SUBSYSTEM READY,
2281  011760                                  POP R2,R2                     ;POP 2 RTN ADR'S FROM STACK,
2282  011760  012602                                                          MOV     (SP)+,R2
```

```
2283  011762  012602                                                    MOV     (SP)+,R2
2284  011764  004737  007770                    JSR PC,EXCUTE           ;REISSUE THE COMMAND,
2285  011770  000137  010300                    JMP GOWAIT              ;WAIT FOR INTERRUPT
2286  011774                                  ELSE                      ;ELSE-IF ERR REC DISABLED:
2287  011774  000402                                                    BR      50171$
2288  011776                                                          50170$:
2289  011776                                    LET UNREC :B= UNREC + #1 ;SET UNRECOVERABLE ERROR FLAG.
2290  011776  105237  003121                                          INCB    UNREC
2291  012002                                  ENDIF                     ;
2292  012002                                                          50171$:
2293  012002                                ENDIF                     ;
2294  012002                                                          50166$:
2295  012002  000207                        RTS PC                   ;RETURN
```

```
                                ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 7, FATAL SUBSYSTEM
                                ;       ERROR.  THE SUBSYSTEM IS INCAPABLE OF PROPERLY PERFORMING
                                ;       COMMANDS OR AT LEAST ITS INTEGRITY IS SERIOUSLY QUESTIONABLE.
                                ;       REFER TO THE FATAL CLASS CODE FIELD IN THE TSSR REGISTER FOR
                                ;       ADDITIONAL INFORMATION ON THE TYPE OF FATAL ERROR.
                                ;       INPUTS:
                                ;       OUTPUTS:
                                ;       REGISTERS:      R2, R4
                                ;       CALLS:

012004                          1CC7::  ERRDF #12,FATSM,STAERM          ;REPORT FATAL SUBSYSTEM ERROR.
012004  104455                                                                  TRAP    C$ERDF
012006  000014                                                                  .WORD   12
012010  004077                                                                  .WORD   FATSM
012012  005066                                                                  .WORD   STAERM
012014  004737  013560                  JSR PC,DROPU                    ;DROP THE UNIT.
012020  000207                          RTS PC                          ;RETURN.


                                ;       SUBROUTINE TO CHECK FOR RETRY LIMIT EXCEEDED.  PRINTS ERROR MESSAGE
                                ;       IF EXCEEDED AND DROP UNIT UNLESS COMMAND IS A READ.
                                ;       INPUTS:
                                ;       OUTPUTS:
                                ;       REGISTERS:      R2, R4.
                                ;       CALLS:          DROPU

012022                          RTLE::  IF CMDLG EQ #0 THEN             ;IF CMD IS NOT A READ OR WRITE THEN:
012022  005737  003064                                                          TST     CMDLG
012026  001010                                                                  BNE     50172$
012030
012030  104455                    ERRDF #11,URERM,STAERM          ;REPORT UNRECOVERABLE ERROR.
012032  000013                                                                  TRAP    C$ERDF
012034  004276                                                                  .WORD   11
012036  005066                                                                  .WORD   URERM
012040  004737  013560                                                          .WORD   STAERM
                                      JSR PC,DROPU                  ;DROP THE UNIT.
012044                                POP R2
012044  012602                                                                  MOV     (SP)+,R2
012046  000437                      BR RTLRTN                       ;AND RETURN.
012050                              ENDIF
012050                                                                  50172$:
012050                              LET RWERR :B= RWERR + #1         ;SET READ/WRITE ERROR FLAG.
012050  105237  003120                                                          INCB    RWERR
012054                              IF CMDLG EQ #2 THEN             ;IF CMD IS A WRT OR WTM:
012054  023727  003064  000002                                                  CMP     CMDLG,#2
012062  001016                                                                  BNE     50173$
012064
012064  023727  003114  000020        IF RETRYC EQ #WRECL THEN        ;IF RETRY COUNT HAS REACHED LIMIT:
012072  001011                                                                  CMP     RETRYC,#WRECL
012074                                                                          BNE     50174$
012074  105237  003121                  LET UNREC :B= UNREC + #1       ;SET UNRECOVERABLE FLAG
012100                                                                          INCB    UNREC
012100  104455                        ERRDF #14,RLEXM,STAERM          ;REPORT RETRY LIMIT EXCEEDED.
012102  000016                                                                  TRAP    C$ERDF
012104  004014                                                                  .WORD   14
012106  005066                                                                  .WORD   RLEXM
                                                                                .WORD   STAERM
```

```
2352  012110  004737  013560                    JSR PC,DROPU                ;DROP THE UNIT.
2353  012114                                    POP R2
2354  012114  012602                                                        MOV     (SP)+,R2
2355  012116                                  ENDIF
2356  012116                                                              50174$:
2357  012116                                  ELSE                        ;ELSE - CMD IS A READ:
2358  012116  000413                                                        BR      50175$
2359  012120                                                              50173$:
2360  012120                                    IF RETRYC EQ #RRECL THEN  ;IF RETRY COUNT HAS REACHED LIMIT:
2361  012120  023727  003114  000020                                        CMP     RETRYC,#RRECL
2362  012126  001007                                                        BNE     50176$
2363  012130                                      LET UNREC :B= UNREC + #1 ;SET UNRECOVERABLE FLAG
2364  012130  105237  003121                                              INCB    UNREC
2365  012134                                      ERRHRD #14,RLEXM,STAERM ;REPORT RECOVERABLE ERROR.
2366  012134  104456                                                        TRAP    C$ERHRD
2367  012136  000016                                                        .WORD   14
2368  012140  004014                                                        .WORD   RLEXM
2369  012142  005066                                                        .WORD   STAERM
2370  012144                                      POP R2
2371  012144  012602                                                        MOV     (SP)+,R2
2372  012146                                    ENDIF
2373  012146                                                              50176$:
2374  012146                                  ENDIF
2375  012146                                                              50175$:
2376  012146  000207                  RTLRTN: RTS PC                      ;RETURN
```

```
                        ;       SUBROUTINE TO LOG BYTES READ/WRITTEN.
                        ;       ALSO UPDATES READ/WRITE ERROR COUNTERS.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R3, R4.
                        ;       CALLS:

012150                  LOG::   IFB ERLOG EQ #0 THEN            ;IF DATA AND ERRORS HAVE NOT BEEN LOGGED THEN:
012150  105737  003117                                                  TSTB    ERLOG
012154  001126                                                         BNE     50177$
012156                          LET ERLOG :B= ERLOG + #1         ;SET LOG DONE FLAG.
012156  105237  003117                                                  INCB    ERLOG
012162                          LET R4 := CMDLG                  ;GET CURRENT CMD LOGGING CODE.
012162  013704  003064                                                  MOV     CMDLG,R4
012166                          IF R4 NE #0 THEN                 ;IF THERE IS A CODE THEN:
012166  005704                                                          TST     R4
012170  001520                                                         BEQ     50200$
012172                            LET R4 := R4 - #2              ;ADJUST THE CODE FOR TABLE INDEX.
012172  162704  000002                                                  SUB     #2,R4
012176                            LET R2 := R5 + BINC(R4) + #CNTBGN  ;R2 = ADR OF BYTE COUNT LSW.
012176  010502                                                          MOV     R5,R2
012200  066402  012434                                                  ADD     BINC(R4),R2
012204  062702  002544                                                  ADD     #CNTBGN,R2
012210                            LET (R2) := (R2) + BRFCNT      ;ADD BRF TO LSW.
012210  063712  003054                                                  ADD     BRFCNT,(R2)
012214                            IF MSGPKT+MS.RFC LOS BRFCNT THEN  ;IF THE RFC IS LOWER OR THE SAME AS BRF THEN
012214  023737  002340  003054                                          CMP     MSGPKT+MS.RFC,BR
012222  101002                                                         BHI     50201$
012224                              LET (R2) := (R2) - MSGPKT+MS.RFC  ;SUBTRACT RFC FROM EXPECTED BRF.
012224  163712  002340                                                  SUB     MSGPKT+MS.RFC,(R
012230                          END-IF
012230                                                          50201$:
012230                          LET R3 := R2 + #10               ;R3 = ADR OF 2ND WORD.
012230  010203                                                          MOV     R2,R3
012232  062703  000010                                                  ADD     #10,R3
012236                          WHILE (R2) GT #999. DO
012236                                                          50202$:
012236  021227  001747                                                  CMP     (R2),#999.
012242  003404                                                         BLE     50203$
012244                            LET (R2) := (R2) - #1000.     ;UPDATE BYTE COUNT
012244  162712  001750                                                  SUB     #1000.,(R2)
012250                            LET (R3) := (R3) + #1         ;2ND WORD.
012250  005213                                                          INC     (R3)
012252                          ENDDO
012252  000771                                                         BR      50202$
012254                                                          50203$:
012254                          LET R2 := R3 + #10               ;R2 = ADR OF 3RD WORD.
012254  010302                                                          MOV     R3,R2
012256  062702  000010                                                  ADD     #10,R2
012262                          WHILE (R3) GT #999. DO
012262                                                          50204$:
012262  021327  001747                                                  CMP     (R3),#999.
012266  003404                                                         BLE     50205$
012270                            LET (R3) := (R3) - #1000.     ;UPDATE BYTE COUNT
012270  162713  001750                                                  SUB     #1000.,(R3)
012274                            LET (R2) := (R2) + #1         ;3RD WORD.
```

```
2433  012274  005212                                                    INC     (R2)
2434  012276                                ENDDO
2435  012276  000771                                                    BR      50204$
2436  012300                                                        50205$:
2437  012300                                LET R3 := R2 + #10          ;R3 = ADR OF 4TH WORD.
2438  012300  010203                                                    MOV     R2,R3
2439  012302  062703  000010                                           ADD     #10,R3
2440  012306                                WHILE (R2) GT #999. DO
2441  012306                                                        50206$:
2442  012306  021227  001747                                           CMP     (R2),#999.
2443  012312  003404                                                   BLE     50207$
2444  012314                                  LET (R2) := (R2) - #1000. ;UPDATE BYTE COUNT
2445  012314  162712  001750                                           SUB     #1000.,(R2)
2446  012320                                  LET (R3) := (R3) + #1     ;4TH WORD.
2447  012320  005213                                                   INC     (R3)
2448  012322                                ENDDO
2449  012322  000771                                                   BR      50206$
2450  012324                                                        50207$:
2451  012324                                IFB RWERR NE #0 THEN        ;IF R/W ERROR, UPDATE ERROR COUNT.
2452  012324  105737  003120                                          TSTB    RWERR
2453  012330  001440                                                   BEQ     50210$
2454  012332                                  LET R2 := R5 + EINC(R4) + #WRREC  ;R2 = ADR OF COUNTER.
2455  012332  010502                                                   MOV     R5,R2
2456  012334  066402  012442                                          ADD     EINC(R4),R2
2457  012340  062702  002704                                           ADD     #WRREC,R2
2458  012344                                  IFB UNREC NE #0 THEN      ;IS THE ERROR UNRECOVERABLE?
2459  012344  105737  003121                                          TSTB    UNREC
2460  012350  001404                                                   BEQ     50211$
2461  012352                                    LET R2 := R2 + #10      ;YES, POINT TO NEXT COUNTER.
2462  012352  062702  000010                                          ADD     #10,R2
2463  012356                                    LET (R2) := (R2) + #1   ;UPDATE THE ERROR COUNTER
2464  012356  005212                                                   INC     (R2)
2465  012360                                  ELSE                      ;ELSE - IF ERROR IS RECOVERABLE:
2466  012360  000424                                                   BR      50212$
2467  012362                                                        50211$:
2468  012362                                    LET (R2) := (R2) + #1   ;UPDATE THE ERROR COUNTER
2469  012362  005212                                                   INC     (R2)
2470  012364                                    IFB IREC EQ #0 THEN     ;IF ERROR RECOVERY IS ENABLED:
2471  012364  105737  002211                                          TSTB    IREC
2472  012370  001020                                                   BNE     50213$
2473  012372                                      IFB DROPED EQ #0 ANDB ERCVER NE #0 THEN ;IF UNIT HAS NOT BEEN DROPPED:
2474  012372  105737  003152                                          TSTB    DROPED
2475  012376  001015                                                   BNE     50214$
2476  012400  105737  002205                                          TSTB    ERCVER
2477  012404  001412                                                   BEQ     50214$
2478  012406                                        PRINTB #NURTY1,RETRYC   ;PRINT # OF RETRIES TO RECOVER
2479  012406  013746  003114                                          MOV     RETRYC,-(SP)
2480  012412  012746  004577                                          MOV     #NURTY1,-(SP)
2481  012416  012746  000002                                          MOV     #2,-(SP)
2482  012422  010600                                                   MOV     SP,R0
2483  012424  104414                                                   TRAP    C$PNTB
2484  012426  062706  000006                                          ADD     #6,SP
2485  012432                                      ENDIF                 ;PROVIDED PRINT HAS BEEN ENABLED
2486  012432                                                        50214$:
2487  012432                                    ENDIF
2488  012432                                                        50213$:
```

```
2489  012432                                    ENDIF
2490  012432                                                                    50212$:
2491  012432                                  ENDIF
2492  012432                                                                    50210$:
2493  012432                                ENDIF
2494  012432                                                                    50200$:
2495  012432                                ENDIF
2496  012432                                                                    50177$:
2497  012432  000207                        RTS PC
2498                                ;       INDEXES TO BYTE COUNTERS.
2499  012434  000000                BINC:   0                                 ;WRITE.
2500  012436  000040                        40                                ;READ REV.
2501  012440  000100                        100                               ;READ FWD.
2502                                ;       INDEXES TO READ/WRITE ERROR COUNTERS.
2503  012442  000000                EINC:   0                                 ;WRITE.
2504  012444  000020                        20                                ;READ REV.
2505  012446  000040                        40                                ;READ FWD.
2506
2507
2508
2509
2510                                ;       IF A WRITE/VERIFY COMMAND IS ISSUED, CONTROL IS THEN
2511                                ;       TRANSFERRED TO THIS SUBROUTINE TO READ REVERSE, CHECK DATA,
2512                                ;       READ FORWARD, CHECK DATA, THEN CONTINUE TO NEXT COMMAND.
2513                                ;       INPUTS:
2514                                ;       OUTPUTS:
2515                                ;       REGISTERS:
2516                                ;       CALLS:          VFEXC.
2517
2518  012450                        VFYDAT:: IFB VFYFLG NE #0 THEN            ;IF DATA IS TO BE VERIFIED:
2519  012450  105737  003146                                                                TSTB    VFYFLG
2520  012454  001426                                                                        BEQ     50215$
2521  012456                          LET PCMDWD := CMDWRD                    ;SAVE THE PREVIOUS COMMAND WORD.
2522  012456  013737  003056  003062                                                       MOV     CMDWRD,PCMDWD
2523  012464                          LET CMDWRD := #RDR                      ;COMMAND IS READ REV.
2524  012464  012737  104401  003056                                                       MOV     #RDR,CMDWRD
2525  012472                          LET CMDLG := #4                         ;SET UP CMD LOGGING INDEX.
2526  012472  012737  000004  003064                                                       MOV     #4,CMDLG
2527  012500  004737  012534                 JSR   PC,VFEXC                  ;GO READ ALL THE RECORDS REV.
2528  012504                          LET PCMDWD := CMDWRD                    ;SAVE THE PREVIOUS COMMAND WORD.
2529  012504  013737  003056  003062                                                       MOV     CMDWRD,PCMDWD
2530  012512                          LET CMDWRD := #RDF                      ;COMMAND IS READ FWD.
2531  012512  012737  104001  003056                                                       MOV     #RDF,CMDWRD
2532  012520                          LET CMDLG := #6                         ;SET UP CMD LOGGING INDEX.
2533  012520  012737  000006  003064                                                       MOV     #6,CMDLG
2534  012526  004737  012534                 JSR   PC,VFEXC                  ;GO READ ALL RECORDS FWD.
2535  012532                          ENDIF
2536  012532                                                                    50215$:
2537  012532  000207                        RTS     PC      ;RETURN.
```

```
                        ;       SUBROUTINE TO EXECUTE THE READ AND VERIFY, FORWARD OR REVERSE.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2
                        ;       CALLS:          CMDAC, FIRSTU, VFISU, NEXTU, CKHAE.

012534                  VFEXC:: LET CMDPKT := CMDWRD CLR.BY #BRF.C  ;COMMAND PACKET = READ REV OR FWD.
012534  013737  003056  002310                                              MOV     CMDWRD,CMDPKT
012542  042737  004000  002310                                              BIC     #BRF.C,CMDPKT
012550                          IFB SWBFLG NE #0 THEN           ;IF BYTES ARE TO BE SWAPPED:
012550  105737  003150                                                      TSTB    SWBFLG
012554  001403                                                              BEQ     50216$
012556                            LET CMDPKT := CMDPKT SET.BY #SWB.C  ;SET SWAB BIT IN CMD PACKET.
012556  052737  010000  002310                                              BIS     #SWB.C,CMDPKT
012564                          ENDIF
012564                                                                  50216$:
012564                          LET CMDSAV := CMDPKT            ;SAVE COMMAND PACKET 1ST WORD.
012564  013737  002310  003060                                              MOV     CMDPKT,CMDSAV
012572  013737  003046  002312          MOV     DATARD,CMDPKT+CP.ADL    ;SAVE BUFFER START ADDRESS.
012600                          LET NCNT := #0                  ;CLEAR NUMBER OF OPERATIONS.
012600  005037  003050                                                      CLR     NCNT
012604                          WHILE NCNT LT NCNT1 DO          ;WHILE THERE ARE RECORDS REMAINING:
012604                                                                  50217$:
012604  023737  003050  003052                                              CMP     NCNT,NCNT1
012612  002062                                                              BGE     50220$
012614  004737  007006            JSR PC,CMDAC                    ;STORE CMD ASCII IN ERROR MSG.
012620  004737  013462            JSR   PC,FIRSTU                 ;SET UP FOR FIRST UNIT.
012624                          WHILE DEVTBL(R5) NE #END DO     ;WHILE THERE ARE DEVICES REMAINING:
012624                                                                  50221$:
012624  026527  002532  177777                                              CMP     DEVTBL(R5),#END
012632  001442                                                              BEQ     50222$
012634                      IF #MOD.CO SETIN CMDWRD THEN  ;IF CMD IS REVERSE THEN:
012634  032737  000400  003056                                              BIT     #MOD.CO,CMDWRD
012642  001421                                                              BEQ     50223$
012644                        IF #X0.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT
012644  032765  000002  003134                                              BIT     #X0.BOT,EOTFLG(R
012652  001014                                                              BNE     50224$
012654                          IF #X0.EOT SETIN EOTFLG(R5) THEN   ;BUT IF AT EOT
012654  032765  000001  003134                                              BIT     #X0.EOT,EOTFLG(R
012662  001406                                                              BEQ     50225$
012664                            IFB ALLEOT NE #0 THEN           ;AND ALL OTHERS AT EOT
012664  105737  003154                                                      TSTB    ALLEOT
012670  001402                                                              BEQ     50226$
012672  004737  012762              JSR PC,VFISU                  ;THEN READ VERIFY
012676                          ENDIF                           ;IF NOT ALL AT EOT, FREEZE UNIT(S)
012676                                                                  50226$:
012676                        ELSE                              ;IF NOT AT BOT AND
012676  000402                                                              BR      50227$
012700                                                                  50225$:
012700  004737  012762              JSR PC,VFISU                  ;NOT AT EOT, READ VFY
012704                          ENDIF
012704                                                                  50227$:
012704                        ENDIF
012704                                                                  50224$:
012704                      ELSE                        ;ELSE IF CMD IS NOT REVERSE:
012704  000412                                                              BR      50230$
```

```
2594  012706                                                                50223$:
2595  012706                          IF #xO.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
2596  012706  032765  000001  003134                                        BIT     #xO.EOT,EOTFLG(R
2597  012714  001404                                                        BEQ     50231$
2598  012716  032737  000001  003056                                        BIT     #CMD.CO,CMDWRD
2599  012724  001002                                                        BNE     50232$
2600  012726                                                                50231$:
2601                                                          ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
2602  012726  004737  012762                  JSR PC,VFISU      ;ISSUE CMD, CHECK STATUS AND DATA.
2603  012732                                  ENDIF
2604  012732                                                                50232$:
2605  012732                              ENDIF
2606  012732                                                                50230$:
2607  012732  004737  013530              JSR PC,NEXTU          ;GO FIND THE NEXT UNIT.
2608  012736                          ENDDO
2609  012736  000732                                                        BR      50221$
2610  012740                                                                50222$:
2611  012740  004737  014052          JSR   PC,CKHAE            ;CHECK FOR HALT AFTER EACH CMD.
2612  012744                          LET NCNT := NCNT + #1     ;UPDATE THE RECORD COUNT.
2613  012744  005237  003050                                                INC     NCNT
2614  012750                          LET PCMDWD := CMDWRD      ;SAVE PREVIOUS COMMAND WORD.
2615  012750  013737  003056  003062                                        MOV     CMDWRD,PCMDWD
2616  012756                      ENDDO
2617  012756  000712                                                        BR      50217$
2618  012760                                                                50220$:
2619  012760  000207          RTS     PC                        ;RETURN.
```

```
2620                                    ;       SUBROUTINE TO ISSUE COMMAND, AWAIT INTERRUPT,
2621                                    ;       CHECK STATUS, CHECK DATA.
2622                                    ;       INPUTS:
2623                                    ;       OUTPUTS:
2624                                    ;       REGISTERS:      R2
2625                                    ;       CALLS:          EXCUTE, GOWAIT, CKDATA.
2626
2627  012762                            VFISU::     LET R2 := DATARD + #8.      ;INIT READ BUFFER POINTER.
2628  012762  013702  003046                                                          MOV     DATARD,R2
2629  012766  062702  000010                                                          ADD     #8.,R2
2630  012772                                      WHILE R2 NE DATARD DO       ;UNTIL 8 BYTES HAVE BEEN SET,
2631  012772                                                                                  50233$:
2632  012772  020237  003046                                                          CMP     R2,DATARD
2633  012776  001403                                                                  BEQ     50234$
2634  013000                                        LET -(R2) := #-1          ;INIT READ BUFFER.
2635  013000  012742  177777                                                          MOV     #-1,-(R2)
2636  013004                                      ENDDO
2637  013004  000772                                                                  BR      50233$
2638  013006                                                                          50234$:
2639  013006  004737  007770                     JSR PC,EXCUTE               ;GO EXECUTE THE COMMAND.
2640  013012                                      IFB DROPED EQ #0 THEN       ;IF UNIT HAS NOT BEEN DROPPED THEN:
2641  013012  105737  003152                                                          TSTB    DROPED
2642  013016  001002                                                                  BNE     50235$
2643  013020  004737  010300                        JSR     PC,GOWAIT       ;GO WAIT FOR DONE BIT.
2644  013024                                      ENDIF
2645  013024                                                                          50235$:
2646  013024                                      IFB DROPED EQ #0 THEN       ;IF UNIT HAS NOT BEEN DROPPED THEN:
2647  013024  105737  003152                                                          TSTB    DROPED
2648  013030  001005                                                                  BNE     50236$
2649  013032                                        IF RECCNT(R5) NE #0 THEN      ;IF RECORD COUNT IS NOT 0 THEN:
2650  013032  005765  003034                                                          TST     RECCNT(R5)
2651  013036  001402                                                                  BEQ     50237$
2652  013040  004737  013046                         JSR     PC,CKDATA       ;GO VERIFY DATA.
2653  013044                                        ENDIF
2654  013044                                                                          50237$:
2655  013044                                      ENDIF
2656  013044                                                                          50236$:
2657  013044  000207                             RTS PC
2658
```

```
2659                                ;       SUBROUTINE TO COMPARE DATA BETWEEN READ AND WRITE BUFFERS
2660                                ;       AND PRINT ERROR MESSAGE ON MISCOMPARE.
2661                                ;       INPUTS:
2662                                ;       OUTPUTS:
2663                                ;       REGISTERS:      R2, R3, R4.
2664                                ;       CALLS:          GCMDA
2665
2666  013046                        CKDATA:: LET R3 := BRFCNT - MSGPKT+MS.RFC ;COMPUTE REC LENGTH READ
2667  013046  013703  003054                                                  MOV     BRFCNT,R3
2668  013052  163703  002340                                                  SUB     MSGPKT+MS.RFC,R3
2669  013056                            IF R3 EQ #0 THEN              ;WHEN NO DATA RECEIVED
2670  013056  005703                                                          TST     R3
2671  013060  001015                                                          BNE     50240$
2672  013062                              ERRHRD 17,WTVERM,DTAERM             ;PRINT ERROR AND EXIT
2673  013062  104456                                                          TRAP    C$ERHRD
2674  013064  000021                                                          .WORD   17
2675  013066  003670                                                          .WORD   WTVERM
2676  013070  004720                                                          .WORD   DTAERM
2677  013072                              PRINTB #DTAER4              ;COMPARE ROUTINE
2678  013072  012746  004514                                                  MOV     #DTAER4,-(SP)
2679  013076  012746  000001                                                  MOV     #1,-(SP)
2680  013102  010600                                                          MOV     SP,R0
2681  013104  104414                                                          TRAP    C$PNTB
2682  013106  062706  000004                                                  ADD     #4,SP
2683  013112                            ELSE
2684  013112  000560                                                          BR      50241$
2685  013114                                                          50240$:
2686  013114                              IF R3 HI BRFCNT THEN        ;WHEN REC READ IS LONGER
2687  013114  020337  003054                                                  CMP     R3,BRFCNT
2688  013120  101417                                                          BLOS    50242$
2689  013122                              ERRHRD 17,WTVERM,DTAERM             ;THAN EXPECTED, PRINT
2690  013122  104456                                                          TRAP    C$ERHRD
2691  013124  000021                                                          .WORD   17
2692  013126  003670                                                          .WORD   WTVERM
2693  013130  004720                                                          .WORD   DTAERM
2694  013132                              PRINTB #DTAER5,CMDPKT+CP.CNT        ;AN ERROR MESSAGE
2695  013132  013746  002316                                                  MOV     CMDPKT+CP.CNT,-(
2696  013136  012746  004535                                                  MOV     #DTAER5,-(SP)
2697  013142  012746  000002                                                  MOV     #2,-(SP)
2698  013146  010600                                                          MOV     SP,R0
2699  013150  104414                                                          TRAP    C$PNTB
2700  013152  062706  000006                                                  ADD     #6,SP
2701  013156                            ELSE                          ;AND EXIT ROUTINE
2702  013156  000536                                                          BR      50243$
2703  013160                                                          50242$:
2704  013160                              LET CKDCNT := R3 - #1               ;SAVE VERIFICATION LENGTH - 1.
2705  013160  010337  013456                                                  MOV     R3,CKDCNT
2706  013164  005337  013456                                                  DEC     CKDCNT
2707  013170  005037  013460             CLR CKDFF                   ;CLEAR # OF BYTES IN ERROR COUNTER.
2708  013174  005002                     CLR R2                      ;INIT BYTE COUNTER
2709  013176                            LET R3 := DATAWT              ;GET WRITE BUFFER ADDRESS.
2710  013176  013703  003044                                                  MOV     DATAWT,R3
2711  013202                            LET R4 := DATARD              ;GET READ BUFFER ADDRESS.
2712  013202  013704  003046                                                  MOV     DATARD,R4
2713  013206                            IFB T1SWB NE #0 THEN          ;WHEN RUNNING TEST1-SUB 12,
2714  013206  105737  003153                                                  TSTB    T1SWB
```

```
2715  013212  001401                                                                    BEQ     50244$
2716  013214  000313                          SWAB (R3)                ;SWAP FIRST WORD OF WRT BFR
2717  013216                                ENDIF                      ;WHICH CONTAINS THE RECORD COUNT
2718  013216                                                                          50244$:
2719  013216                                REPEAT                     ;REPEAT UNTIL ALL DATA IS COMPARED:
2720  013216                                                                          50245$:
2721  013216                                  IF R2 EQ CKDCNT THEN     ;IF THIS IS THE LAST BYTE THEN:
2722  013216  020237  013456                                                          CMP     R2,CKDCNT
2723  013222  001011                                                                  BNE     50246$
2724  013224                                    IFB SWBFLG NE #0 THEN  ;IF BYTE SWAPPING IS ENABLED THEN:
2725  013224  105737  003150                                                        TSTB    SWBFLG
2726  013230  001406                                                                  BEQ     50247$
2727  013232                                      IF #BIT00 NOTSETIN CKDCNT THEN      ;IF RECORD LENGTH IS ODD THEN:
2728  013232  032737  000001  013456                                                BIT     #BIT00,CKDCNT
2729  013240  001002                                                                  BNE     50250$
2730  013242  105723                                 TSTB    (R3)+            ;LAST BYTE WILL BE IN
2731  013244  105724                                 TSTB    (R4)+            ;THE UPPER BYTE.
2732  013246                                      ENDIF
2733  013246                                                                        50250$:
2734  013246                                    ENDIF
2735  013246                                                                        50247$:
2736  013246                                  ENDIF
2737  013246                                                                        50246$:
2738  013246  121314                            CMPB (R3),(R4)           ;ARE THEY EQUAL.
2739  013250  001452                            BEQ     3$                       ;BR IF SO.
2740  013252  005737  013460                    TST CKDFF                ;1 ST TIME THRU?
2741  013256  001010                            BNE     2$                       ;BR IF NOT.
2742  013260  005265  003004                    INC     VFYCNT(R5)               ;INC THE VERIFY ERROR COUNTER.
2743  013264  005265  003014                    INC HRDCNT(R5)           ;INC THE HARD ERROR COUNT.
2744  013270                                    ERRHRD #17,WTVERM,DTAERM ;REPORT WRITE/VERIFY ERROR.
2745  013270  104456                                                                TRAP    C$ERHRD
2746  013272  000021                                                                .WORD   17
2747  013274  003670                                                                .WORD   WTVERM
2748  013276  004720                                                                .WORD   DTAERM
2749  013300                          2$:       LET CKDFF := CKDFF + #1   ;INCREMENT # OF BYTES IN ERROR.
2750  013300  005237  013460                                                        INC     CKDFF
2751  013304  111437  003074                    MOVB (R4),TIME1          ;SAVE WAS DATA FOR TYPOUT.
2752  013310  042737  177400  003074            BIC     #177400,TIME1            ;CLEAR GARBAGE.
2753  013316  111337  003076                    MOVB (R3),TIME2          ;SAVE SHOULD BE DATA FOR TYPOUT.
2754  013322  042737  177400  003076            BIC     #177400,TIME2            ;CLEAR GARBAGE.
2755  013330                                    IF CKDFF LT #11. THEN    ;IF ERROR BYTE COUNT IS LESS THAN 11:
2756  013330  023727  013460  000013                                                CMP     CKDFF,#11.
2757  013336  002017                                                                BGE     50251$
2758  013340                                      PRINTX #DTAER2,R2,<B,TIME1>,<B,TIME2>  ;PRINT EXP + ACT DATA.
2759  013340  005046                                                                CLR     -(SP)
2760  013342  153716  003076                                                        BISB    TIME2,(SP)
2761  013346  005046                                                                CLR     -(SP)
2762  013350  153716  003074                                                        BISB    TIME1,(SP)
2763  013354  010246                                                                MOV     R2,-(SP)
2764  013356  012746  004403                                                        MOV     #DTAER2,-(SP)
2765  013362  012746  000004                                                        MOV     #4,-(SP)
2766  013366  010600                                                                MOV     SP,R0
2767  013370  104415                                                                TRAP    C$PNTX
2768  013372  062706  000012                                                        ADD     #12,SP
2769  013376                                    ENDIF
2770  013376                                                                      50251$:
```

```
2771  013376  105723                3$:     TSTB (R3)+                      ;UPDATE WRITE BUFFER ADDRESS.
2772  013400  105724                        TSTB (R4)+                      ;UPDATE READ BUFFER ADDRESS.
2773  013402  105722                        TSTB (R2)+                      ;UPDATE BYTE COUNTER.
2774  013404                              UNTIL R2 GT CKDCNT          ;END OF DATA COMPARE REPEAT LOOP.
2775  013404  020237  013456                                                  CMP     R2,CKDCNT
2776  013410  003702                                                          BLE     50245$
2777  013412                              LET CKDCNT := CKDCNT + #1   ;CKDCNT EQUALS RECORD LENGTH.
2778  013412  005237  013456                                                  INC     CKDCNT
2779  013416                              IF CKDFF NE #0 THEN         ;IF COMPARE ERROR HAS OCCURED THEN:
2780  013416  005737  013460                                                  TST     CKDFF
2781  013422  001414                                                          BEQ     50252$
2782  013424                                PRINTB #DTAER3,CKDFF,CKDCNT       ;PRINT # OF BYTES IN ERROR.
2783  013424  013746  013456                                                  MOV     CKDCNT,-(SP)
2784  013430  013746  013460                                                  MOV     CKDFF,-(SP)
2785  013434  012746  004452                                                  MOV     #DTAER3,-(SP)
2786  013440  012746  000003                                                  MOV     #3,-(SP)
2787  013444  010600                                                          MOV     SP,R0
2788  013446  104414                                                          TRAP    C$PNTB
2789  013450  062706  000010                                                  ADD     #10,SP
2790  013454                              ENDIF
2791  013454                                                          50252$:
2792  013454                            ENDIF
2793  013454                                                          50243$:
2794  013454                          ENDIF
2795  013454                                                          50241$:
2796  013454  000207                    RTS     PC                  ;OTHERWISE, RETURN.
2797
2798  013456  000000            CKDCNT: .WORD   0                   ;# OF BYTES TO BE VERIFIED -1.
2799  013460  000000            CKDFF:  .WORD   0                   ;# OF BYTES IN ERROR COUNTER.
```

```
2800                                    ;       SUBROUTINE TO FIND THE FIRST DEVICE IN THE TEST SEQUENCE.
2801                                    ;       INPUTS:
2802                                    ;       OUTPUTS:
2803                                    ;       REGISTERS:
2804                                    ;       CALLS:
2805
2806  013462                            FIRSTU:: LET DROPED :B= #0              ;CLR UNIT DROPPED FLAG
2807  013462  105037  003152                                                              CLRB    DROPED
2808  013466                                    LET R5 := #0                    ;CLR DEVICE POINTER.
2809  013466  005005                                                                       CLR     R5
2810  013470                                    WHILE DEVTBL(R5) EQ #NINUSE DO  ;WHILE DEVICES ARE NOT IN USE:
2811  013470                                                                                50253$:
2812  013470  026527  002532  177774                                                       CMP     DEVTBL(R5),#NINU
2813  013476  001003                                                                       BNE     50254$
2814  013500                                      LET R5 := R5 + #2             ;POINT TO NEXT DEVICE.
2815  013500  062705  000002                                                              ADD     #2,R5
2816  013504                                    ENDDO
2817  013504  000771                                                                      BR      50253$
2818  013506                                                                          50254$:
2819  013506                                    IF DEVTBL(R5) EQ #END THEN      ;IF ALL UNITS HAVE BEEN DROPPED THEN:
2820  013506  026527  002532  177777                                                       CMP     DEVTBL(R5),#END
2821  013514  001001                                                                       BNE     50255$
2822  013516                                      DOCLN                           ;DO CLEAN CODE AND TERMINATE PASS.
2823  013516  104444                                                                       TRAP    C$DCLN
2824  013520                                    ENDIF
2825  013520                                                                          50255$:
2826  013520                                    LET L$LUN := DEVTBL(R5)         ;SET UNIT # IN "HEADER" FOR ERROR REPORT
2827  013520  016537  002532  002074                                                       MOV     DEVTBL(R5),L$LUN
2828  013526  000207                                    RTS     PC              ;RETURN WITH 1ST DEVICE IN R5.
2829
2830
2831
2832
2833
2834                                    ;       SUBROUTINE TO FIND THE NEXT UNIT IN THE TEST CYCLE.
2835                                    ;       INPUTS:
2836                                    ;       OUTPUTS:
2837                                    ;       REGISTERS:
2838                                    ;       CALLS:
2839
2840  013530                            NEXTU:: LET DROPED :B= #0               ;CLR UNIT DROPPED FLAG
2841  013530  105037  003152                                                              CLRB    DROPED
2842  013534                                    REPEAT                          ;REPEAT UNTIL THE NEXT DEVICE IS FOUND.
2843  013534                                                                          50256$:
2844  013534                                      LET R5 := R5 + #2             ;UPDATE DEVICE TABLE POINTER.
2845  013534  062705  000002                                                              ADD     #2,R5
2846  013540                                    UNTIL DEVTBL(R5) NE #NINUSE
2847  013540  026527  002532  177774                                                       CMP     DEVTBL(R5),#NINU
2848  013546  001772                                                                       BEQ     50256$
2849  013550                                    LET L$LUN := DEVTBL(R5)         ;SET UNIT # IN "HEADER" FOR ERROR REPORT
2850  013550  016537  002532  002074                                                       MOV     DEVTBL(R5),L$LUN
2851  013556  000207                                    RTS     PC              ;RETURN.
2852
2853
2854
```

```
2855                                    ;       SUBROUTINE TO DROP A DEVICE FROM THE TEST SEQUENCE.
2856                                    ;       INPUTS:
2857                                    ;       OUTPUTS:
2858                                    ;       REGISTERS:
2859                                    ;       CALLS:          MOVMSG, PRXST, LOG
2860
2861  013560                            DROPU:: LET FTLCNT(R5) := FTLCNT(R5) + #1  ;INCREMENT THE FATAL ERROR COUNT.
2862  013560  005265  003024                                                          INC     FTLCNT(R5)
2863  013564                                    LET R4 := MSGPKT+MS.XS3 CLR.BY #377 ;GET UDIAG ERROR CODE FROM XSTAT3.
2864  013564  013704  002350                                                          MOV     MSGPKT+MS.XS3,R4
2865  013570  042704  000377                                                          BIC     #377,R4
2866  013574                                    LET R3 := MSGPKA(R5)           ;ADR OF THIS UNIT'S MSG PACKET.
2867  013574  016503  002502                                                          MOV     MSGPKA(R5),R3
2868  013600                                    LET R2 := #0                   ;CLR COUNTER.
2869  013600  005002                                                                  CLR     R2
2870  013602                                    WHILE R2 NE #MSGCNT DO         ;WHILE THERE ARE MORE LOCATIONS:
2871  013602                                                                                  50257$:
2872  013602  020227  000016                                                          CMP     R2,#MSGCNT
2873  013606  001405                                                                  BEQ     50260$
2874  013610                                      LET (R3)+ := #-1             ;INIT THE MSG PACKET WITH ALL 1'S
2875  013610  012723  177777                                                          MOV     #-1,(R3)+
2876  013614                                      LET R2 := R2 + #2            ;UPDATE COUNTER.
2877  013614  062702  000002                                                          ADD     #2,R2
2878  013620                                    ENDDO
2879  013620  000770                                                                  BR      50257$
2880  013622                                                                                  50260$:
2881  013622                                    LET @TSDB(R5) := #GSCPK        ;INITIATE A GET STATUS COMMAND.
2882  013622  012775  002320  002452                                                  MOV     #GSCPK,@TSDB(R5)
2883  013630  004737  010520                   JSR PC,WSSR                    ;WAIT A WHILE FOR SSR=1
2884  013634  004737  010554                   JSR PC,MOVMSG                  ;MOVE MSG PACKET TO COMMON AREA.
2885  013640                                    IF R4 EQ #X3.RNY THEN          ;IF WE HAVE A CAPSTAN RUNAWAY THEN:
2886  013640  020427  157400                                                          CMP     R4,#X3.RNY
2887  013644  001005                                                                  BNE     50261$
2888  013646                                      ERRDF #16,RNYM,STAERM          ;REPORT CAPSTAN RUNAWAY WITH TACH CNT.
2889  013646  104455                                                                  TRAP    C$ERDF
2890  013650  000020                                                                  .WORD   16
2891  013652  004210                                                                  .WORD   RNYM
2892  013654  005066                                                                  .WORD   STAERM
2893  013656                                    ELSE                           ;ELSE-IF NOT A RUNNAWAY:
2894  013656  000402                                                                  BR      50262$
2895  013660                                                                                  50261$:
2896  013660  004737  013770                     JSR PC,PRXST                 ;PRINT EXTENDED STATUS REGISTERS.
2897  013664                                    ENDIF
2898  013664                                                                                  50262$:
2899  013664                                    IFB RECLOG NE #0 THEN          ;IF THE RECORD HAS BEEN LOGGED THEN:
2900  013664  105737  003116                                                          TSTB    RECLOG
2901  013670  001404                                                                  BEQ     50263$
2902  013672                                      LET DROPED :B= DROPED + #1   ;SET UNIT DROPPED FLAG.
2903  013672  105237  003152                                                          INCB    DROPED
2904  013676  004737  012150                     JSR PC,LOG                   ;LOG DATA BYTES + RD/WR ERRORS.
2905  013702                                    ENDIF
2906  013702                                                                                  50263$:
2907  013702                                    DORPT                          ;PRINT PERFORMANCE REPORT
2908  013702  104424                                                                  TRAP    C$DRPT
2909  013704                                DROPUA: IF PASCNT(R5) NE #0 THEN
2910  013704  005765  002764                                                          TST     PASCNT(R5)
```

```
2911  013710  001402                                                    BEQ     50264$
2912  013712                        LET PASCNT(R5) := PASCNT(R5) - #1
2913  013712  005365  002764                                           DEC     PASCNT(R5)
2914  013716                        ENDIF
2915  013716                                                        50264$:
2916  013716                        LET DROPN := DEVTBL(R5)         ;SAVE # OF UNIT TO BE DROPPED.
2917  013716  016537  002532  013766                                  MOV     DEVTBL(R5),DROPN
2918  013724                        LET R0 := R5 SHIFT -1           ;R0=LOGICAL DEVICE NUMBER
2919  013724  010500                                                  MOV     R5,R0
2920  013726  006200                                                  ASR     R0
2921  013730                        DODU R0                 ;DROP THE UNIT: EXEC BGNDU-ENDDU CODE IF IDU = 0
2922  013730  104451                                                  TRAP    C$DODU
2923  013732                        IF DEVTBL(R5) NE #NINUSE THEN   ;IF UNIT NOT DROPPED
2924  013732  026527  002532  177774                                  CMP     DEVTBL(R5),#NINU
2925  013740  001407                                                  BEQ     50265$
2926  013742                          IFB IREC EQ #0 THEN             ;IF RECOVERY IS ENABLED THEN:
2927  013742  105737  002211                                          TSTB    IREC
2928  013746  001004                                                  BNE     50266$
2929  013750                            LET @TSSR(R5) := #0             ;ISSUE SUBSYSTEM INIT .
2930  013750  005075  002462                                          CLR     @TSSR(R5)
2931  013754                            LET STAFLG :B= STAFLG + #1      ;SET START FLAG TO ENABLE REWIND.
2932  013754  105237  003156                                          INCB    STAFLG
2933  013760                          ENDIF
2934  013760                                                        50266$:
2935  013760                        ENDIF
2936  013760                                                        50265$:
2937  013760                DRORTN: LET DROPED :B= DROPED + #1       ;SET UNIT DROPPED FLAG.
2938  013760  105237  003152                                          INCB    DROPED
2939  013764  000207                        RTS     PC              ;RETURN.
2940
2941  013766  000000                DROPN:  .WORD   0               ;# OF UNIT TO BE DROPPED
```

```
                                        ;       SUBROUTINE TO PRINT EXTENDED STATUS REGISTERS.
                                        ;       INPUTS:
                                        ;       OUTPUTS:
                                        ;       REGISTERS:
                                        ;       CALLS:

013770                                  PRXST:: PRINTX #GETSTM
013770  012746  004663                                          MOV     #GETSTM,-(SP)
013774  012746  000001                                          MOV     #1,-(SP)
014000  010600                                                  MOV     SP,R0
014002  104415                                                  TRAP    C$PNTX
014004  062706  000004                                          ADD     #4,SP
014010                                          PRINTX  #STAER5,MSGPKT+MS.XS0,MSGPKT+MS.XS1,MSGPKT+MS.XS2,MSGPKT+MS.XS3
014010  013746  002350                                          MOV     MSGPKT+MS.XS3,-(
014014  013746  002346                                          MOV     MSGPKT+MS.XS2,-(
014020  013746  002344                                          MOV     MSGPKT+MS.XS1,-(
014024  013746  002342                                          MOV     MSGPKT+MS.XS0,-(
014030  012746  005713                                          MOV     #STAER5,-(SP)
014034  012746  000005                                          MOV     #5,-(SP)
014040  010600                                                  MOV     SP,R0
014042  104415                                                  TRAP    C$PNTX
014044  062706  000014                                          ADD     #14,SP
014050  000207                                  RTS PC

                                        ;       SUBROUTINE TO HALT AFTER EACH COMMAND.
                                        ;       INPUTS:
                                        ;       OUTPUTS:
                                        ;       REGISTERS:      R3, R4
                                        ;       CALLS:

014052                                  CKHAE:: IFB HAE NE #0 THEN              ;IF HALT FLAG IS SET:
014052  105737  002204                                          TSTB    HAE
014056  001422                                                  BEQ     50267$
014060                                    MANUAL                ;IS MANUAL INTERVENTION ALLOWED?
014060  104450                                                  TRAP    C$MANI
014062                                    BNCOMPLETE CKHRTN     ;BR IF NOT.
014062  103020                                                  BCC     CKHRTN
014064                                    LET R4 := CMDWRD      ;COMMAND WORD.
014064  013704  003056                                          MOV     CMDWRD,R4
014070  004737  007060                    JSR   PC,GCMDA        ;FETCH ADR OF CMD ASCII.
014074                                    LET HALTM :B= (R3)+   ;MOVE CMD ASCII
014074  112337  003546                                          MOVB    (R3)+,HALTM
014100                                    LET HALTM+1 :B= (R3)+
014100  112337  003547                                          MOVB    (R3)+,HALTM+1
014104                                    LET HALTM+2 :B= (R3)  ;INTO MESSAGE.
014104  111337  003550                                          MOVB    (R3),HALTM+2
014110                                    GMANIL HALTM,TIME1,1,YES  ;HALT - WAIT FOR AN OEPRATOR INPUT.
014110  104443                                                  TRAP    C$GMAN
014112  000404                                                  BR      10000$
014114  003074                                                  .WORD   TIME1
014116  000130                                                  .WORD   T$CODE
014120  003546                                                  .WORD   HALTM
014122  000001                                                  .WORD   1
```

```
 2998  014124                          10000$:
 2999  014124                                  ENDIF
 3000  014124                                                                  50267$:
 3001  014124  000207                  CKHRTN: RTS     PC                      ;RETURN
 3002                                          .EVEN
 3003
 3004  014126                                  ENDMOD
```

```
                                .TITLE MISCELLANEOUS SECTIONS
                                .SBTTL  REPORT CODING SECTION

014126                                  BGNMOD

                                ;++
                                ; THE REPORT CODING SECTION CONTAINS THE
                                ; "PRINTS" CALLS THAT GENERATE STATISTICAL REPORTS.
                                ;--

014126                                  BGNRPT
014126                          L$RPT::


014126                                  LET     R5SAVE := R5            ;SAVE CURRENT DEVICE POINTER.
014126  010537  003110                                                          MOV     R5,R5SAVE
014132  004737  013462                  JSR     PC,FIRSTU               ;FIND THE FIRST UNIT.
014136                                  WHILE DEVTBL(R5) NE #END DO     ;WHILE THERE ARE MORE DEVICES:
014136                                                                                  50270$:
014136  026527  002532  177777                                                      CMP     DEVTBL(R5),#END
014144  001555                                                                      BEQ     50271$
014146                                    PRINTS        #RPT1A,DEVTBL(R5),PASCNT(R5),RECCNT(R5)
014146  016546  003034                                                              MOV     RECCNT(R5),-(SP)
014152  016546  002764                                                              MOV     PASCNT(R5),-(SP)
014156  016546  002532                                                              MOV     DEVTBL(R5),-(SP)
014162  012746  014510                                                              MOV     #RPT1A,-(SP)
014166  012746  000004                                                              MOV     #4,-(SP)
014172  010600                                                                      MOV     SP,R0
014174  104416                                                                      TRAP    C$PNTS
014176  062706  000012                                                              ADD     #12,SP
014202                          PRINTS        #RPT1B,WRBC+30(R5),WRBC+20(R5),WRBC+10(R5),WRBC(R5)
014202  016546  002544                                                              MOV     WRBC(R5),-(SP)
014206  016546  002554                                                              MOV     WRBC+10(R5),-(SP
014212  016546  002564                                                              MOV     WRBC+20(R5),-(SP
014216  016546  002574                                                              MOV     WRBC+30(R5),-(SP
014222  012746  014565                                                              MOV     #RPT1B,-(SP)
014226  012746  000005                                                              MOV     #5,-(SP)
014232  010600                                                                      MOV     SP,R0
014234  104416                                                                      TRAP    C$PNTS
014236  062706  000014                                                              ADD     #14,SP
014242                          PRINTS        #RPT1C,RRBC+30(R5),RRBC+20(R5),RRBC+10(R5),RRBC(R5)
014242  016546  002604                                                              MOV     RRBC(R5),-(SP)
014246  016546  002614                                                              MOV     RRBC+10(R5),-(SP
014252  016546  002624                                                              MOV     RRBC+20(R5),-(SP
014256  016546  002634                                                              MOV     RRBC+30(R5),-(SP
014262  012746  014636                                                              MOV     #RPT1C,-(SP)
014266  012746  000005                                                              MOV     #5,-(SP)
014272  010600                                                                      MOV     SP,R0
014274  104416                                                                      TRAP    C$PNTS
014276  062706  000014                                                              ADD     #14,SP
014302                          PRINTS        #RPT1D,RFBC+30(R5),RFBC+20(R5),RFBC+10(R5),RFBC(R5)
014302  016546  002644                                                              MOV     RFBC(R5),-(SP)
014306  016546  002654                                                              MOV     RFBC+10(R5),-(SP
014312  016546  002664                                                              MOV     RFBC+20(R5),-(SP
014316  016546  002674                                                              MOV     RFBC+30(R5),-(SP
```

```
3061  014322  012746  014707                                                          MOV     #RPT1D,-(SP)
3062  014326  012746  000005                                                          MOV     #5,-(SP)
3063  014332  010600                                                                 MOV     SP,R0
3064  014334  104416                                                                 TRAP    C$PNTS
3065  014336  062706  000014                                                          ADD     #14,SP
3066  014342                        PRINTS      #RPT1F,WRREC(R5),RRREC(R5),RFREC(R5)
3067  014342  016546  002744                                                          MOV     RFREC(R5),-(SP)
3068  014346  016546  002724                                                          MOV     RRREC(R5),-(SP)
3069  014352  016546  002704                                                          MOV     WRREC(R5),-(SP)
3070  014356  012746  015013                                                          MOV     #RPT1F,-(SP)
3071  014362  012746  000004                                                          MOV     #4,-(SP)
3072  014366  010600                                                                 MOV     SP,R0
3073  014370  104416                                                                 TRAP    C$PNTS
3074  014372  062706  000012                                                          ADD     #12,SP
3075  014376                        PRINTS      #RPT1G,WRUNR(R5),RRUNR(R5),RFUNR(R5)
3076  014376  016546  002754                                                          MOV     RFUNR(R5),-(SP)
3077  014402  016546  002734                                                          MOV     RRUNR(R5),-(SP)
3078  014406  016546  002714                                                          MOV     WRUNR(R5),-(SP)
3079  014412  012746  015064                                                          MOV     #RPT1G,-(SP)
3080  014416  012746  000004                                                          MOV     #4,-(SP)
3081  014422  010600                                                                 MOV     SP,R0
3082  014424  104416                                                                 TRAP    C$PNTS
3083  014426  062706  000012                                                          ADD     #12,SP
3084  014432                        PRINTS      #RPT11,SCCNT(R5),HRDCNT(R5),FTLCNT(R5),VFYCNT(R5)
3085  014432  016546  003004                                                          MOV     VFYCNT(R5),-(SP)
3086  014436  016546  003024                                                          MOV     FTLCNT(R5),-(SP)
3087  014442  016546  003014                                                          MOV     HRDCNT(R5),-(SP)
3088  014446  016546  002774                                                          MOV     SCCNT(R5),-(SP)
3089  014452  012746  015213                                                          MOV     #RPT11,-(SP)
3090  014456  012746  000005                                                          MOV     #5,-(SP)
3091  014462  010600                                                                 MOV     SP,R0
3092  014464  104416                                                                 TRAP    C$PNTS
3093  014466  062706  000014                                                          ADD     #14,SP
3094  014472  004737  013530                JSR     PC,NEXTU            ;FIND THE NEXT UNIT.
3095  014476                        ENDDO
3096  014476  000617                                                                 BR      50270$
3097  014500                                                                                50271$:
3098  014500                        LET R5 := R5SAVE                    ;RESTORE CURRENT DEVICE POINTER.
3099  014500  013705  003110                                                          MOV     R5SAVE,R5
3100  014504                        EXIT    RPT
3101  014504  000167                                                                 .WORD   J$JMP
3102  014506  000540                                                                 .WORD   L10010-2-.
3103
3104
3105                                .NLIST  BEX
      014510  047045  047045  040445  RPT1A:  .ASCIZ  /%N%N%AUNIT %D1%S3%APASS:%D5%S3%ARECORD:%D5%N/
      014565     045  041101  052131  RPT1B:  .ASCIZ  /%ABYTES WRITTEN  %D3%A,%Z3%A,%Z3%A,%Z3%N/
      014636  040445  054502  042524  RPT1C:  .ASCIZ  /%ABYTES READ REV %D3%A,%Z3%A,%Z3%A,%Z3%N/
      014707     045  041101  052131  RPT1D:  .ASCII  /%ABYTES READ FWD %D3%A,%Z3%A,%Z3%A,%Z3%N/
      014757     045  031123  022463          .ASCIZ  /%S23%AWRT%S4%ARDR%S4%ARDF%N/
      015013     045  051101  041505  RPT1F:  .ASCIZ  /%ARECOVERABLE ERRORS   %D5%S2%D5%S2%D5%N/
      015064  040445  047125  042522  RPT1G:  .ASCII  /%AUNRECOVERABLE ERRORS %D5%S2%D5%S2%D5%N%N/
      015136  040445  050123  041505          .ASCIZ  "%ASPEC COND%S3%AHARD%S3%AFATAL%S3%ACOMPARE%N"
      015213     045  031523  042045  RPT11:  .ASCIZ  /%S3%D5%S3%D5%S3%D5%S3%D5%N%N/
                                              .LIST   BEX
3106                                          .EVEN
```

```
  3107
  3108  015250                                  ENDRPT
  3109  015250                          L10010:
  3110  015250  104425                                                                  TRAP    C$RPT
  3111
  3112                                  .SBTTL  LOAD DEVICE PROTECTION TABLE
  3113
  3114                                  ;++
  3115                                  ;TABLE FOR SUPERVISOR TO IDENTIFY THE P-TBL FOR THE LOAD DEV
  3116                                  ;THE SUPERVISOR USES THE TBL TO WARN THE OPERATOR WHEN HE TRIES TO TEST THE LOAD DEV
  3117                                  ;--
  3118
  3119  015252                                  BGNPROT
  3120  015252                          L$PROT::
  3121  015252  000000                            .WORD 0              ;P-TBL OFFSET OF TSSR, THE TS11 CSR
  3122  015254  177777                            .WORD -1             ;P-TBL OFFSET OF MASS BUS UNIT #: -1 = NOT A MASS BUS DE
  3123  015256  177777                            .WORD -1             ;P-TBL OFFSET OF DRIVE #: -1 = NONE, ONE DRIVE PER UNIBU
  3124  015260                                  ENDPROT
```

```
                                       .SBTTL  INITIALIZE SECTION

                                       ;++
                                       ; THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
                                       ; AT THE BEGINNING OF EACH PASS.
                                       ;--

015260                                         BGNINIT
015260                                 L$INIT::

015260                                 INIT10: IF #BIT0!BIT1 SETIN #CMDPKT THEN  ;IF CMD PACKET IS NOT ON MODULO 4 BOUNDRY:
015260  032727  000003  002310                                                      BIT     #BIT0!BIT1,#CMDP
015266  001421                                                                     BEQ     50272$
015270                                           ERRSF #1,CMDPKM                 ;PRINT ERROR MSG,
015270  104454                                                                     TRAP    C$ERSF
015272  000001                                                                     .WORD   1
015274  003606                                                                     .WORD   CMDPKM
015276  000000                                                                     .WORD   0
015300                                           DELAY 2000.                     ;GO TO SUPERVISOR, WAIT 2 SECONDS.
015300  012727  003720                                                             MOV     #2000.,(PC)+
015304  000000                                                                     .WORD   0
015306  013727  002116                                                             MOV     L$DLY,(PC)+
015312  000000                                                                     .WORD   0
015314  005367  177772                                                             DEC     -6(PC)
015320  001375                                                                     BNE     .-4
015322  005367  177756                                                             DEC     -22(PC)
015326  001367                                                                     BNE     .-20
015330  000753                                   BR     INIT10                  ;
015332                                         ENDIF                                                  50272$:
015332
015332                                 IFB CLRFLG NE #0 THEN                   ;IF CLR COUNTERS FLAG SET:
015332  105737  002202                                                             TSTB    CLRFLG
015336  001413                                                                     BEQ     50273$
015340  105037  002202                           CLRB  CLRFLG                    ;INIT CLR FLAG.
015344                                           LET R2 := #0
015344  005002                                                                     CLR     R2
015346                                           WHILE R2 NE #CNTLEN DO                                 50274$:
015346
015346  020227  000270                                                             CMP     R2,#CNTLEN
015352  001405                                                                     BEQ     50275$
015354                                             LET WRBC(R2) := #0            ;CLR ALL STATISTICAL COUNTERS.
015354  005062  002544                                                             CLR     WRBC(R2)
015360                                             LET R2 := R2 + #2
015360  062702  000002                                                             ADD     #2,R2
015364                                           ENDDO
015364  000770                                                                     BR      50274$
015366                                                                                 50275$:
015366                                 ENDIF                                                  50273$:
015366
015366                                 IFB RRANV NE #0 THEN                    ;IF RESET RANDOM VARIABLE FLAG IS SET THEN:
015366  105737  002203                                                             TSTB    RRANV
015372  001406                                                                     BEQ     50276$
015374                                           LET RANB := #RANBC              ;RESET RANDOM BASE #.
015374  012737  153624  003070                                                     MOV     #RANBC,RANB
```

```
3181  015402                          LET RANS := #RANSC              ;RESET RANDOM SAVE LOCATION.
3182  015402  012737  032561  003072                                                MOV     #RANSC,RANS
3183  015410                        ENDIF
3184  015410                                                                    50276$:
3185  015410                        READEF  #EF.START               ;READ START COMMAND EVENT FLAG.
3186  015410  012700  000040                                                    MOV     #EF.START,R0
3187  015414  104447                                                            TRAP    C$REFG
3188  015416                        BNCOMPLETE      INIT15          ;BRANCH IF NOT STARTING.
3189  015416  103026                                                            BCC     INIT15
3190  015420                        LET STAFLG :B= STAFLG + #1       ;SET START COMMAND FLAG.
3191  015420  105237  003156                                                    INCB    STAFLG
3192  015424                        LET R5 := #6
3193  015424  012705  000006                                                    MOV     #6,R5
3194  015430                        REPEAT                          ;INITIATE UNIT NUMBER TABLE
3195  015430                                                                    50277$:
3196  015430                          LET DEVTBL(R5) := #NINUSE     ;BY STORING NOT IN USE IN EACH LOCATION.
3197  015430  012765  177774  002532                                            MOV     #NINUSE,DEVTBL(R
3198  015436                          LET R5 := R5 - #2
3199  015436  162705  000002                                                    SUB     #2,R5
3200  015442                        UNTIL R5 EQ #0
3201  015442  005705                                                            TST     R5
3202  015444  001371                                                            BNE     50277$
3203  015446                        LET R5 := L$UNIT SHIFT 1
3204  015446  013705  002012                                                    MOV     L$UNIT,R5
3205  015452  006305                                                            ASL     R5
3206  015454                        REPEAT                          ;STORE ALL UNIT
3207  015454                                                                    50300$:
3208  015454                          LET R5 := R5 - #2             ;NUMBERS IN DEVTBL.
3209  015454  162705  000002                                                    SUB     #2,R5
3210  015460                          LET DEVTBL(R5) := R5 SHIFT -1
3211  015460  010565  002532                                                    MOV     R5,DEVTBL(R5)
3212  015464  006265  002532                                                    ASR     DEVTBL(R5)
3213  015470                        UNTIL R5 EQ #0
3214  015470  005705                                                            TST     R5
3215  015472  001370                                                            BNE     50300$
3216
3217  015474                        INIT15: READEF #EF.PWR          ;HAS THERE BE A POWER FAILURE?
3218  015474  012700  000034                                                    MOV     #EF.PWR,R0
3219  015500  104447                                                            TRAP    C$REFG
3220  015502                          BNCOMPLETE INIT16             ;BRANCH IF NOT.
3221  015502  103004                                                            BCC     INIT16
3222  015504                          LET STAFLG :B= STAFLG + #1       ;IF SO - SET THE START FLAG.
3223  015504  105237  003156                                                    INCB    STAFLG
3224  015510                          LET PWRFLG :B= PWRFLG + #1     ;IF SO - SET THE POWER FAIL FLAG.
3225  015510  105237  003157                                                    INCB    PWRFLG
3226
3227  015514                        INIT16: RFLAGS  OPFLAG          ;READ AND STORE FLAGS SET BY OPERATOR
3228  015514  104421                                                            TRAP    C$RFLA
3229  015516  010037  003162                                                    MOV     R0,OPFLAG
3230  015522                          LET R3 := #0                  ;CLEAR EVENT FLAG
3231  015522  005003                                                            CLR     R3
3232  015524                            IFB PWRFLG EQ #0 THEN       ;IF POWER FAIL HAS NOT OCCURRED THEN:
3233  015524  105737  003157                                                    TSTB    PWRFLG
3234  015530  001020                                                            BNE     50301$
3235  015532                              READEF #EF.NEW            ;UPDATE PASS COUNT WHEN
3236  015532  012700  000035                                                    MOV     #EF.NEW,R0
```

```
3237  015536  104447                          IFCOND CS THEN              ;SUPERVISOR IS IN NEW PASS
                                                                                    TRAP    C$REFG
3238  015540
3239  015540  103014                            IFB STAFLG EQ #0 THEN      ;AND DIAG WAS NEITHER STARTED
                                                                                    BCC     50302$
3240  015542
3241  015542  105737  003156                                                        TSTB    STAFLG
3242  015546  001010                                                              BNE     50303$
3243  015550
3244  015550  012700  000037                      READEF #EF.RES            ;NOR
                                                                                    MOV     #EF.RES,R0
3245  015554  104447                                                              TRAP    C$REFG
3246  015556
3247  015556  103402                              IFCOND CC THEN            ;RESTARTED
                                                                                    BCS     50304$
3248  015560
3249  015560  005103                                LET R3 := COMP R3       ;DO IT
                                                                                    COM     R3
3250  015562
3251  015562  000401                              ELSE
                                                                                    BR      50305$
                                                                          50304$:
3252  015564
3253  015564                                      LET R3 := R3 + #1         ;SET 1ST PASS IF NEW PASS AND
3254  015564  005203                                                              INC     R3
3255  015566                                      ENDIF                     ;RESTARTING
                                                                          50305$:
3256  015566
3257  015566                                    ELSE
3258  015566  000401                                                              BR      50306$
                                                                          50303$:
3259  015570
3260  015570                                      LET R3 := R3 + #1         ;SET 1ST PASS IF NEW PASS AND
3261  015570  005203                                                              INC     R3
3262  015572                                    ENDIF                       ;STARTING
                                                                          50306$:
3263  015572
3264  015572                                  ENDIF                       ;DO NOT UPDATE IT ON CONTINUE
                                                                          50302$:
3265  015572
3266  015572                                ENDIF                         ;OR ON POWER FAIL
                                                                          50301$:
3267  015572
3268  015572  004737  013462               JSR     PC,FIRSTU             ;INIT DEVICE POINTER.
3269  015576                              LET R2 := #0                    ;INIT DEVICE COUNTER.
3270  015576  005002                                                              CLR     R2
3271  015600                              WHILE DEVTBL(R5) NE #END DO
3272  015600                                                                50307$:
3273  015600  026527  002532  177777                                              CMP     DEVTBL(R5),#END
3274  015606  001450                                                              BEQ     50310$
3275  015610                                LET R2 := R2 + #1
3276  015610  005202                                                              INC     R2
3277  015612                                LET R0 := R5 SHIFT -1
3278  015612  010500                                                              MOV     R5,R0
3279  015614  006200                                                              ASR     R0
3280  015616                                GPHARD  R0,R0                 ;GET HARDWARE P TABLE FROM SUPER.
3281  015616  104442                                                              TRAP    C$GPHRD
3282  015620                                IFCOND CS THEN
3283  015620  103036                                                              BCC     50311$
3284  015622                                  LET TSSR(R5) := (R0)         ;SAVE TSSR ADDRESS.
3285  015622  011065  002462                                                      MOV     (R0),TSSR(R5)
3286  015626                                  LET TSDB(R5) := (R0)+ - #2  ;SAVE TSDB ADDRESS.
3287  015626  012065  002452                                                      MOV     (R0)+,TSDB(R5)
3288  015632  162765  000002  002452                                            SUB     #2,TSDB(R5)
3289  015640                                  LET TSVCT(R5) := (R0)        ;SAVE INTERRUPT VECTOR ADDRESS.
3290  015640  011065  002472                                                      MOV     (R0),TSVCT(R5)
3291  015644                                  SETVEC TSVCT(R5),TS4INT(R5),#INTPRI ;SET UP INTERUPT PROCESSING CONDITIONS.
3292  015644  012746  000340                                                      MOV     #INTPRI,-(SP)
```

```
3293  015650  016546  002512                                                    MOV     TS4INT(R5),-(SP)
3294  015654  016546  002472                                                    MOV     TSVCT(R5),-(SP)
3295  015660  012746  000003                                                    MOV     #3,-(SP)
3296  015664  104437                                                           TRAP    C$SVEC
3297  015666  062706  000010                                                    ADD     #10,SP
3298  015672                        IF R3 NE #0 THEN          ;ACTUAL PASSCOUNT UPDATE PER R3
3299  015672  005703                                                           TST     R3
3300  015674  001410                                                           BEQ     50312$
3301  015676                          IF R3 LT #0 THEN
3302  015676  005703                                                           TST     R3
3303  015700  002003                                                           BGE     50313$
3304  015702                            LET PASCNT(R5) := PASCNT(R5) + #1
3305  015702  005265  002764                                                  INC     PASCNT(R5)
3306  015706                          ELSE
3307  015706  000403                                                           BR      50314$
3308  015710                                                          50313$:
3309  015710                            LET PASCNT(R5) := #1
3310  015710  012765  000001  002764                                          MOV     #1,PASCNT(R5)
3311  015716                          ENDIF
3312  015716                                                          50314$:
3313  015716                        ENDIF
3314  015716                                                          50312$:
3315  015716                      ENDIF
3316  015716                                                          50311$:
3317  015716                      LET RECCNT(R5) := #0      ;CLEAR RECORD COUNT
3318  015716  005065  003034                                                   CLR     RECCNT(R5)
3319  015722  004737  013530              JSR   PC,NEXTU            ;DO IT FOR ALL DEVICES.
3320  015726                            ENDDO
3321  015726  000724                                                           BR      50307$
3322  015730                                                          50310$:
3323
3324  015730                      IF R2 EQ #0 THEN          ;IF THERE ARE NO UNITS:
3325  015730  005702                                                           TST     R2
3326  015732  001026                                                           BNE     50315$
3327  015734                        PRINTF #AUDRPM          ;PRINT ALL UNITS DROPPED.
3328  015734  012746  004351                                                  MOV     #AUDRPM,-(SP)
3329  015740  012746  000001                                                  MOV     #1,-(SP)
3330  015744  010600                                                           MOV     SP,R0
3331  015746  104417                                                           TRAP    C$PNTF
3332  015750  062706  000004                                                  ADD     #4,SP
3333  015754                        DELAY 2000.             ;GO TO SUPERVISOR, WAIT 2 SECONDS.
3334  015754  012727  003720                                                  MOV     #2000.,(PC)+
3335  015760  000000                                                           .WORD   0
3336  015762  013727  002116                                                  MOV     L$DLY,(PC)+
3337  015766  000000                                                           .WORD   0
3338  015770  005367  177772                                                  DEC     -6(PC)
3339  015774  001375                                                           BNE     .-4
3340  015776  005367  177756                                                  DEC     -22(PC)
3341  016002  001367                                                           BNE     .-20
3342  016004                        BREAK                   ;GO TO SUPERVISOR, CHECK TTY.
3343  016004  104422                                                           TRAP    C$BRK
3344  016006                      DOCLN                     ;DO CLEAN CODE + ABORT PASS.
3345  016006  104444                                                           TRAP    C$DCLN
3346  016010                      ENDIF
3347  016010                                                          50315$:
3348
```

```
3349  016010                          SETPRI #PR100                   ;LOWER CPU PRIORITY TO 0
3350  016010  012700  000000                                                MOV     #PR100,R0
3351  016014  104441                                                       TRAP    C$SPRI
3352  016016                          IFB IREC EQ #0 AND #ADR NOTSETIN OPFLAG THEN    ;IF ERROR RECOVERY IS ENABLED
3353  016016  105737  002211                                                TSTB    IREC
3354  016022  001145                                                       BNE     50316$
3355  016024  032737  000020  003162                                       BIT     #ADR,OPFLAG
3356  016032  001141                                                       BNE     50316$
3357  016034  004737  013462            JSR PC,FIRSTU                   ;AND AUTO-DROP NOT CALLED, THEN SET UP FOR FIRST
3358  016040                          WHILE DEVTBL(R5) NE #END DO     ;WHILE THERE ARE MORE DEVICES:
3359  016040                                                        50317$:
3360  016040  026527  002532  177777                                       CMP     DEVTBL(R5),#END
3361  016046  001533                                                       BEQ     50320$
3362  016050                            BEGIN COUNTER                 ;START 3.5 MINUTE COUNTER
3363  016050                              INCR TIME1 FROM #1 TO #25 BY #1
3364  016050  012737  000001  003074                                       MOV     #1,TIME1
3365  016056  000402                                                       BR      50322$
3366  016060                                                        50323$:
3367  016060  005237  003074                                               INC     TIME1
3368  016064                                                        50322$:
3369  016064  023727  003074  000025                                       CMP     TIME1,#25
3370  016072  003106                                                       BGT     50324$
3371  016074                              LET @TSDB(R5) := #GSCPK ;AND GET UNITS STATUS
3372  016074  012775  002320  002452                                       MOV     #GSCPK,@TSDB(R5)
3373  016102                              DELAY 1000.                   ;WAIT 1 SECOND
3374  016102  012727  001750                                               MOV     #1000.,(PC)+
3375  016106  000000                                                       .WORD   0
3376  016110  013727  002116                                               MOV     L$DLY,(PC)+
3377  016114  000000                                                       .WORD   0
3378  016116  005367  177772                                               DEC     -6(PC)
3379  016122  001375                                                       BNE     .-4
3380  016124  005367  177756                                               DEC     -22(PC)
3381  016130  001367                                                       BNE     .-20
3382  016132                          IF #TS.SSR SETIN @TSSR(R5) THEN
3383  016132  032775  000200  002462                                       BIT     #TS.SSR,@TSSR(R5
3384  016140  001420                                                       BEQ     50325$
3385  016142                            IF #TS.OFL NOTSETIN @TSSR(R5) THEN
3386  016142  032775  000100  002462                                       BIT     #TS.OFL,@TSSR(R5
3387  016150  001001                                                       BNE     50326$
3388  016152                              LEAVE COUNTER               ;EXIT COUNTER WHEN UNIT ON LINE
3389  016152  000456                                                       BR      50321$
3390  016154                            ELSE
3391  016154                                                        50326$:
3392  016154                              PRINTF #OFLINM,DEVTBL(R5) ;PRINT UNIT OFF LINE EVERY 10 SEC
3393  016154  016546  002532                                               MOV     DEVTBL(R5),-(SP)
3394  016160  012746  004633                                               MOV     #OFLINM,-(SP)
3395  016164  012746  000002                                               MOV     #2,-(SP)
3396  016170  010600                                                       MOV     SP,R0
3397  016172  104417                                                       TRAP    C$PNTF
3398  016174  062706  000006                                               ADD     #6,SP
3399  016200                            ENDIF
3400  016200                                                        50327$:
3401  016200                          ELSE
3402  016200  000412                                                       BR      50330$
3403  016202                                                        50325$:
3404  016202                            PRINTF #NRDYM,DEVTBL(R5)
```

```
3405  016202  016546  002532                                                    MOV     DEVTBL(R5),-(SP)
3406  016206  012746  017134                                                    MOV     #NRDYM,-(SP)
3407  016212  012746  000002                                                    MOV     #2,-(SP)
3408  016216  010600                                                           MOV     SP,R0
3409  016220  104417                                                           TRAP    C$PNTF
3410  016222  062706  000006                                                   ADD     #6,SP
3411  016226                        ENDIF
3412  016226                                                                  50330$:
3413  016226                        INCR TIME2 FROM #1 TO #13 BY #1
3414  016226  012737  000001  003076                                          MOV     #1,TIME2
3415  016234  000402                                                           BR      50331$
3416  016236                                                                  50332$:
3417  016236  005237  003076                                                   INC     TIME2
3418  016242                                                                  50331$:
3419  016242  023727  003076  000013                                          CMP     TIME2,#13
3420  016250  003016                                                           BGT     50333$
3421  016252                          DELAY 1000.           ;WAIT FOR UNIT TO BE SET ON-LINE
3422  016252  012727  001750                                                   MOV     #1000.,(PC)+
3423  016256  000000                                                           .WORD   0
3424  016260  013727  002116                                                   MOV     L$DLY,(PC)+
3425  016264  000000                                                           .WORD   0
3426  016266  005367  177772                                                   DEC     -6(PC)
3427  016272  001375                                                           BNE     .-4
3428  016274  005367  177756                                                   DEC     -22(PC)
3429  016300  001367                                                           BNE     .-20
3430  016302                          BREAK               ;ALLOW TERMINAL INTERRUPT
3431  016302  104422                                                           TRAP    C$BRK
3432  016304                        ENDINC
3433  016304  000754                                                           BR      50332$
3434  016306                                                                  50333$:
3435  016306                      ENDINC
3436  016306  000664                                                           BR      50323$
3437  016310                                                                  50324$:
3438  016310                    END COUNTER
3439  016310                                                                  50321$:
3440  016310                    IF TIME1 GT #25 THEN        ;IF OFF LINE FOR 3.5 MINUTES
3441  016310  023727  003074  000025                                          CMP     TIME1,#25
3442  016316  003404                                                           BLE     50334$
3443  016320  004737  010554             JSR PC,MOVMSG      ;GET MESSAGE PACKET
3444  016324  004737  011246             JSR PC,TCC1        ;PRINT ERROR AND DROP OFF LINE UNIT
3445  016330                          ENDIF
3446  016330                                                                  50334$:
3447                                                      ;REPEAT UNTIL ON LINE OR TIMED OUT.
3448  016330  004737  013530           JSR PC,NEXTU         ;SET UP FOR NEXT UNIT.
3449  016334                        ENDDO
3450  016334  000641                                                           BR      50317$
3451  016336                                                                  50320$:
3452  016336                  ENDIF
3453  016336                                                                  50316$:
3454  016336                  IFB PWRFLG EQ #0 THEN
3455  016336  105737  003157                                                   TSTB    PWRFLG
3456  016342  001026                                                           BNE     50335$
3457  016344                    MEMORY DATAWT               ;REQUEST MEMORY FROM SUPER FOR RD/WR BUFFERS.
3458  016344  104431                                                           TRAP    C$MEM
3459  016346  010037  003044                                                   MOV     R0,DATAWT
3460  016352                    LET DATARD := DATAWT + #DATCNT        ;SET RD BFR AD
```

```
3461  016352  013737  003044  003046                                          MOV     DATAWT,DATARD
3462  016360  062737  004000  003046                                          ADD     #DATCNT,DATARD
3463  016366                        IF @DATAWT LT #DATCNT THEN    ;WHEN NOT ENOUGH FREE MEMO AVAILABLE
3464  016366  027727  164452  004000                                          CMP     @DATAWT,#DATCNT
3465  016374  002011                                                          BGE     50336$
3466  016376                          PRINTF #MEMOM               ;WARN OPERATOR
3467  016376  012746  016444                                                  MOV     #MEMOM,-(SP)
3468  016402  012746  000001                                                  MOV     #1,-(SP)
3469  016406  010600                                                          MOV     SP,R0
3470  016410  104417                                                          TRAP    C$PNTF
3471  016412  062706  000004                                                  ADD     #4,SP
3472  016416                          DOCLN                       ;AND ABORT PASS
3473  016416  104444                                                          TRAP    C$DCLN
3474  016420                        ENDIF         ;DIAG MUST BE RE-LOADED IN A CPU WITH LARGER MEMO
3475  016420                                                    50336$:
3476  016420                      ENDIF
3477  016420                                                    50335$:
3478
3479  016420                      LET CHGFLG :B= #0              ;CLR CHANGE CMD SEQ TBL FLAG.
3480  016420  105037  002212                                                  CLRB    CHGFLG
3481  016424                      LET R3 := #ENDFLG
3482  016424  012703  003156                                                  MOV     #ENDFLG,R3
3483  016430  004737  010504      JSR     PC,CLRERR             ;CLEAR ALL FLAGS.
3484  016434                      LET PWRFLG :B= #0             ;CLEAR THE POWER FAIL FLAG.
3485  016434  105037  003157                                                  CLRB    PWRFLG
3486
3487  016440                      EXIT    INIT
3488  016440  104432                                                          TRAP    C$EXIT
3489  016442  000104                                                          .WORD   L10012-.
3490  016444  040445  051106  042505  MEMOM:  .ASCII  /%AFREE MEMO TOO SMALL FOR RD-WR BFRS%N/
3491  016452  046440  046505  020117
3492  016460  047524  020117  046523
3493  016466  046101  020114  047506
3494  016474  020122  042122  053455
3495  016502  020122  043102  051522
3496  016510  047045
3497  016512  040445  042522  046055        .ASCIZ  /%ARE-LOAD IN LARGER MEMO%N/
3498  016520  040517  020104  047111
3499  016526  046040  051101  042507
3500  016534  020122  042515  047515
3501  016542  047045     000
3502          016546                      .EVEN
3503
3504  016546                      ENDINIT
3505  016546                  L10012:
3506  016546  104411                                                          TRAP    C$INIT
```

```
                                        .SBTTL  AUTO DROP SECTION

                                        ;++
                                        ;SECTION EXECUTED AFTER THE INIT CODE WHEN "ADR" FLAG IS SET BY OPERATOR
                                        ;SECTION CHEKS FOR A VALID INTERFACE LOCATION.  DROPS UNIT IF NO RESPONSE
                                        ;FROM INTERFACE
                                        ;--

016550                                          BGNAUTO
016550                                  L$AUTO::

016550  004737  013462                          JSR PC,FIRSTU                   ;FIND FIRST UNIT
016554                                          WHILE DEVTBL(R5) NE #END DO     ;
016554                                                                                  50337$:
016554  026527  002532  177777                                                          CMP     DEVTBL(R5),#END
016562  001525                                                                          BEQ     50340$
016564                                            LET TRAPD4 :B= #0             ;
016564  105037  003160                                                                  CLRB    TRAPD4
016570                                            SETVEC #4,#TRAP4,#PR107       ;SET VECTOR 4
016570  012746  000340                                                                  MOV     #PR107,-(SP)
016574  012746  017164                                                                  MOV     #TRAP4,-(SP)
016600  012746  000004                                                                  MOV     #4,-(SP)
016604  012746  000003                                                                  MOV     #3,-(SP)
016610  104437                                                                        TRAP    C$SVEC
016612  062706  000010                                                                  ADD     #10,SP
016616                                            LET R2 := @TSSR(R5)           ;ADDRESS TS11 INTERFACE
016616  017502  002462                                                                  MOV     @TSSR(R5),R2
016622                                            CLRVEC #4                     ;CLEAR VECTOR AT 4
016622  012700  000004                                                                  MOV     #4,R0
016626  104436                                                                        TRAP    C$CVEC
016630                                          IFB TRAPD4 NE #0 THEN
016630  105737  003160                                                                  TSTB    TRAPD4
016634  001423                                                                          BEQ     50341$
016636                                            LET FTLCNT(R5) := FTLCNT(R5) + #1
016636  005265  003024                                                                  INC     FTLCNT(R5)
016642                                            PRINTF #AUTODM,TSSR(R5)       ;PRINT ERROR
016642  016546  002462                                                                  MOV     TSSR(R5),-(SP)
016646  012746  017040                                                                  MOV     #AUTODM,-(SP)
016652  012746  000002                                                                  MOV     #2,-(SP)
016656  010600                                                                          MOV     SP,R0
016660  104417                                                                        TRAP    C$PNTF
016662  062706  000006                                                                  ADD     #6,SP
016666                                            LET DROPN := DEVTBL(R5)               ;SAVE # OF UNIT TO BE DROPPED.
016666  016537  002532  013766                                                          MOV     DEVTBL(R5),DROPN
016674                                            LET R0 := R5 SHIFT -1                 ;R0=LOGICAL DEVICE NUMBER
016674  010500                                                                          MOV     R5,R0
016676  006200                                                                          ASR     R0
016700                                            DODU R0                       ;DROP THE UNIT: EXEC BGNDU-ENDDU CODE IF IDU = 0
016700  104451                                                                        TRAP    C$DODU
016702                                          ELSE
016702  000452                                                                        BR      50342$
016704                                                                                  50341$:
016704                                            LET @TSDB(R5) := #GSCPK       ;SEND GET STATUS COMMAND
016704  012775  002320  002452                                                          MOV     #GSCPK,@TSDB(R5)
016712  004737  010520                            JSR PC,WSSR                   ;WAIT
016716                                            IF #TS.SSR SETIN @TSSR(R5) THEN
```

```
3563  016716  032775  000200  002462                                                  BIT     #TS.SSR,@TSSR(R5
3564  016724  001423                                                                  BEQ     50343$
3565  016726                                  IF #TS.OFL SETIN @TSSR(R5) THEN
3566  016726  032775  000100  002462                                                  BIT     #TS.OFL,@TSSR(R5
3567  016734  001416                                                                  BEQ     50344$
3568  016736                                    LET FTLCNT(R5) := FTLCNT(R5) + #1
3569  016736  005265  003024                                                        INC     FTLCNT(R5)
3570  016742                                    PRINTF #OFLINM,DEVTBL(R5)
3571  016742  016546  002532                                                        MOV     DEVTBL(R5),-(SP)
3572  016746  012746  004633                                                        MOV     #OFLINM,-(SP)
3573  016752  012746  000002                                                        MOV     #2,-(SP)
3574  016756  010600                                                                MOV     SP,R0
3575  016760  104417                                                                TRAP    C$PNTF
3576  016762  062706  000006                                                        ADD     #6,SP
3577  016766  004737  013704                                    JSR PC,DROPUA
3578  016772                                  ENDIF
3579  016772                                                                50344$:
3580  016772                                ELSE
3581  016772  000416                                                                BR      50345$
3582  016774                                                                50343$:
3583  016774                                    LET FTLCNT(R5) := FTLCNT(R5) + #1
3584  016774  005265  003024                                                        INC     FTLCNT(R5)
3585  017000                                    PRINTF #NRDYM,DEVTBL(R5)
3586  017000  016546  002532                                                        MOV     DEVTBL(R5),-(SP)
3587  017004  012746  017134                                                        MOV     #NRDYM,-(SP)
3588  017010  012746  000002                                                        MOV     #2,-(SP)
3589  017014  010600                                                                MOV     SP,R0
3590  017016  104417                                                                TRAP    C$PNTF
3591  017020  062706  000006                                                        ADD     #6,SP
3592  017024  004737  013704                                    JSR PC,DROPUA
3593  017030                                  ENDIF
3594  017030                                                                50345$:
3595  017030                                ENDIF
3596  017030                                                                50342$:
3597  017030  004737  013530                                    JSR PC,NEXTU
3598  017034                                ENDDO
3599  017034  000647                                                                BR      50337$
3600  017036                                                                50340$:
3601
3602  017036                                ENDAUTO
3603  017036                          L10013:
3604  017036  104461                                                                TRAP    C$AUTO
3605
3606  017040  040445  052502  020123  AUTODM: .ASCII  /%ABUS TRAP AT %O6%N/
3607  017046  051124  050101  040440
3608  017054  020124  047445  022466
3609  017062     116
3610  017063     045  044501  052116          .ASCIZ  /%AINTERFACE BAD OR NOT SET TO ABOVE AD%N/
3611  017070  051105  040506  042503
3612  017076  041040  042101  047440
3613  017104  020122  047516  020124
3614  017112  042523  020124  047524
3615  017120  040440  047502  042526
3616  017126  040440  022504  000116
3617  017134  040445  047125  052111  NRDYM:  .ASCIZ  /%AUNIT %D1%A NOT RDY%N/
3618  017142  022440  030504  040445
```

```
 3619  017150  047040  052117  051040
 3620  017156  054504  047045     000
 3621          017164                          .EVEN
 3622
 3623                                  ;       DEVICE BUS TRAP HANDLER
 3624                                  ;       OUTPUT: TRAPD4 BYTE  1: TRAPED AT 4
 3625                                  ;                            0: NO TRAP
 3626
 3627  017164                          TRAP4:: LET TRAPD4 :B= TRAPD4 + #1
 3628  017164  105237  003160                                                          INCB    TRAPD4
 3629  017170  000002                          RTI
 3630
 3631
 3632
```

```
                                .SBTTL  CLEANUP CODING SECTION

                                ;++
                                ; THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
                                ; AT THE END OF EACH PASS.
                                ;--

017172                                  BGNCLN
017172                          L$CLEAN::

017172  004737  013462                  JSR     PC,FIRSTU               ;FIND FIRST UNIT.
017176                                  WHILE DEVTBL(R5) NE #END DO
017176                                                                          50346$:
017176  026527  002532  177777                                                  CMP     DEVTBL(R5),#END
017204  001413                                                                  BEQ     50347$
017206  004737  010520                    JSR PC,WSSR                   ;WAIT FOR UNIT READY OR TIMEOUT,
017212                                    LET @TSDB(R5) := #BRCPK       ;ISSUE MSG BUFFER RELEASE CMD.
017212  012775  002324  002452                                                  MOV     #BRCPK,@TSDB(R5)
017220                                    CLRVEC        TSVCT(R5)       ;RELEASE INTERRUPT VECTORS FOR ALL DEV.
017220  016500  002472                                                          MOV     TSVCT(R5),R0
017224  104436                                                                  TRAP    C$CVEC
017226  004737  013530                    JSR   PC,NEXTU                ;FIND NEXT UNIT.
017232                                  ENDDO
017232  000761                                                                  BR      50346$
017234                                                                  50347$:

017234                                  EXIT    CLN
017234  104432                                                                  TRAP    C$EXIT
017236  000002                                                                  .WORD   L10014-.
                                .EVEN

017240                                  ENDCLN
017240                          L10014:
017240  104412                                                                  TRAP    C$CLEAN
```

```
                                        .SBTTL  DROP UNIT SECTION

                                        ;++
                                        ; THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
                                        ; TO NO LONGER BE TESTED.  THAT CODE SHALL BE EXECUTED WHEN DODU
                                        ;MACRO IS CALLED WHILE IDU FLAG IS NOT SET BY OPERATOR
                                        ;--

017242                                          BGNDU
017242                                  L$DU::

017242                                          LET R5 := R0 SHIFT 1            ;R5 = LOGICAL DEVICE NUMBER X 2.
017242  010005                                                                          MOV     R0,R5
017244  006305                                                                          ASL     R5
017246                                          LET DEVTBL(R5) := #NINUSE       ;SET NOT IN USE FLAG FOR THE DEVICE.
017246  012765  177774  002532                                                        MOV     #NINUSE,DEVTBL(R
017254                                          CLRVEC TSVCT(R5)                ;RELEASE THE INTERRUPT VECTOR.
017254  016500  002472                                                                MOV     TSVCT(R5),R0
017260  104436                                                                      TRAP    C$CVEC
017262                                          PRINTF  #DROPDM,DROPN           ;PRINT DROP DEVICE MESSAGE
017262  013746  013766                                                                MOV     DROPN,-(SP)
017266  012746  004322                                                                MOV     #DROPDM,-(SP)
017272  012746  000002                                                                MOV     #2,-(SP)
017276  010600                                                                        MOV     SP,R0
017300  104417                                                                      TRAP    C$PNTF
017302  062706  000006                                                              ADD     #6,SP

017306                                          EXIT    DU
017306  000167                                                                      .WORD   J$JMP
017310  000000                                                                      .WORD   L10015-2-.

                                        .EVEN

017312                                          ENDDU
017312                                  L10015:
017312  104453                                                                    TRAP    C$DU
```

```
                                .SBTTL  ADD UNIT SECTION

                                ;++
                                ; THE ADD-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
                                ;  TO BE (A) TESTED FOR THE FIRST TIME, OR (B) RESUMED IN TESTING.  IF
                                ;  "EF.AUNIT" IS SET, THE UNIT WILL BE TESTED AS A NEW UNIT.
                                ;--

017314                                  BGNAU
017314                          L$AU::

                                        LET R5 := R0 SHIFT 1            ;R5 = LOGICAL DEVICE NUMBER X 2.
017314  010005                                                                 MOV     R0,R5
017316  006305                                                                 ASL     R5
                                        LET DEVTBL(R5) := R0    ;STORE UNIT # IN DEVICE TABLE.
017320  010065  002532                                                         MOV     R0,DEVTBL(R5)
                                        GPHARD  R0,R0                   ;GET HARDWARE P TABLE FROM SUPER.
017324  104442                                                                 TRAP    C$GPHRD
                                        LET TSSR(R5) := (R0)            ;SAVE TSSR ADDRESS.
017326  011065  002462                                                         MOV     (R0),TSSR(R5)
                                        LET TSDB(R5) := (R0)+ - #2      ;SAVE TSDB ADDRESS.
017332  012065  002452                                                         MOV     (R0)+,TSDB(R5)
017336  162765  000002  002452                                                 SUB     #2,TSDB(R5)
                                        LET TSVCT(R5) := (R0)           ;SAVE INTERRUPT VECTOR ADDRESS.
017344  011065  002472                                                         MOV     (R0),TSVCT(R5)
                                        SETVEC TSVCT(R5),TS4INT(R5),#INTPRI     ;SET UP INTERUPT PROCESSING CONDITIONS.
017350  012746  000340                                                         MOV     #INTPRI,-(SP)
017354  016546  002512                                                         MOV     TS4INT(R5),-(SP)
017360  016546  002472                                                         MOV     TSVCT(R5),-(SP)
017364  012746  000003                                                         MOV     #3,-(SP)
017370  104437                                                                 TRAP    C$SVEC
017372  062706  000010                                                         ADD     #10,SP
                                        LET INTFLG(R5) := #0            ;CLEAR INTERRUPT FLAGS.
017376  005065  003124                                                         CLR     INTFLG(R5)

                                        EXIT    AU
017402  000167                                                                 .WORD   J$JMP
017404  000000                                                                 .WORD   L10016-2-.

                                        .EVEN

                                        ENDAU
017406                          L10016:
017406  104452                                                                 TRAP    C$AU

017410                                  ENDMOD
```

```
                                .TITLE HARDWARE TESTS

                                .SBTTL  TEST 1:  BASIC FUNCTIONS.

                                ;++
                                ; TEST TO EXECUTE ALL TS04 FUNCTIONS.
                                ;--

017410                                  BGNMOD

017410                                  BGNTST
017410                          T1::

017410                                  LET RANDOM :B= #0               ;CLR THE RANDOM OPERATIONS FLAG.
017410  105037  003145                                                          CLRB    RANDOM
017414                                  LET EXPBOT :B= #0               ;CLR EXPECT BOT FLAG.
017414  105037  003144                                                          CLRB    EXPBOT

017420                                  BGNSUB                          ;SUBTEST 1 - SET CHAR, DRIVE INIT, GET STATUS.
017420                          T1.1:
017420  104402                                                          TRAP    C$BSUB

017422                                  LET R2 := #BFSEQ0               ;ADR OF CMD SEQ.
017422  012702  020246                                                  MOV     #BFSEQ0,R2
017426  004737  020222                  JSR     PC,BFSEQ                ;SET UP CMD SEQ.
017432  004737  006204                  JSR     PC,EXALL                ;EXECUTE CMD SEQ ON ALL DEVICES.
017436  004737  013462                  JSR     PC,FIRSTU               ;FIND THE FIRST UNIT.
017442                                  WHILE DEVTBL(R5) NE #END DO     ;WHILE THERE ARE MORE DEVICES:
017442                                                                  50350$:
017442  026527  002532  177777                                          CMP     DEVTBL(R5),#END
017450  001434                                                          BEQ     50351$
017452                                    LET R2 := MSGPKA(R5)          ;GET MSG PACKET ADR,
017452  016502  002502                                                  MOV     MSGPKA(R5),R2
017456                                    LET R2 := R2 + #12            ;GET XSTAT2 ADR,
017456  062702  000012                                                  ADD     #12,R2
017462                                    LET TS4CL(R5) := (R2) CLR.BY #177400  ;STORE CODE LEVEL FROM DTR BYTE,
017462  011265  002522                                                  MOV     (R2),TS4CL(R5)
017466  042765  177400  002522                                          BIC     #177400,TS4CL(R5
017474                                    IF PASCNT(R5) EQ #1 THEN      ;IF THIS IS PASS 1 THEN:
017474  026527  002764  000001                                          CMP     PASCNT(R5),#1
017502  001014                                                          BNE     50352$
017504                                      PRINTF #CODELM,DEVTBL(R5),TS4CL(R5) ;PRINT THE TS04 MICROCODE LEVEL.
017504  016546  002522                                                  MOV     TS4CL(R5),-(SP)
017510  016546  002532                                                  MOV     DEVTBL(R5),-(SP)
017514  012746  003476                                                  MOV     #CODELM,-(SP)
017520  012746  000003                                                  MOV     #3,-(SP)
017524  010600                                                          MOV     SP,R0
017526  104417                                                          TRAP    C$PNTF
017530  062706  000010                                                  ADD     #10,SP
017534                                    ENDIF
017534                                                                  50352$:
017534  004737  013530                    JSR   PC,NEXTU                ;FIND NEXT UNIT.
017540                                  ENDDO
017540  000740                                                          BR      50350$
017542                                                                  50351$:
```

```
3807  017542                          ENDSUB
3808  017542                    L10020:
3809  017542  104403                                                  TRAP    C$ESUB
3810
3811  017544                          BGNSUB                  ;SUBTEST 2 - REWIND.
3812  017544                    T1.2:
3813  017544  104402                                                  TRAP    C$BSUB
3814
3815  017546                          LET R2 := #BFSEQ1       ;ADR OF CMD SEQ.
3816  017546  012702  020320                                          MOV     #BFSEQ1,R2
3817  017552  004737  020222        JSR     PC,BFSEQ        ;SET UP CMD SEQ.
3818  017556  004737  006204        JSR     PC,EXALL        ;EXECUTE CMD SEQ ON ALL DEVICES.
3819  017562                        LET STAFLG :B= #0       ;CLEAR START FLAG
3820  017562  105037  003156                                          CLRB    STAFLG
3821  017566                        ENDSUB
3822  017566                    L10021:
3823  017566  104403                                                  TRAP    C$ESUB
3824
3825  017570                          BGNSUB                  ;SUBTEST 3 - WRITE/VERIFY.
3826  017570                    T1.3:
3827  017570  104402                                                  TRAP    C$BSUB
3828
3829  017572                          LET R2 := #BFSEQ2       ;ADR OF CMD SEQ.
3830  017572  012702  020332                                          MOV     #BFSEQ2,R2
3831  017576  004737  020222        JSR     PC,BFSEQ        ;SET UP CMD SEQ.
3832  017602  004737  006204        JSR     PC,EXALL        ;EXECUTE CMD SEQ ON ALL DEVICES.
3833  017606                        ENDSUB
3834  017606                    L10022:
3835  017606  104403                                                  TRAP    C$ESUB
3836
3837  017610                          BGNSUB                  ;SUBTEST 4 - WRITE TAPE MARK, ERASE.
3838  017610                    T1.4:
3839  017610  104402                                                  TRAP    C$BSUB
3840
3841  017612                          LET R2 := #BFSEQ3       ;ADR OF CMD SEQ.
3842  017612  012702  020424                                          MOV     #BFSEQ3,R2
3843  017616  004737  020222        JSR     PC,BFSEQ        ;SET UP CMD SEQ.
3844  017622  004737  006204        JSR     PC,EXALL        ;EXECUTE CMD SEQ ON ALL DEVICES.
3845  017626                        ENDSUB
3846  017626                    L10023:
3847  017626  104403                                                  TRAP    C$ESUB
3848
3849  017630                          BGNSUB                  ;SUBTEST 5 - SPACE FILES.
3850  017630                    T1.5:
3851  017630  104402                                                  TRAP    C$BSUB
3852
3853  017632                          LET R2 := #BFSEQ4       ;ADR OF CMD SEQ.
3854  017632  012702  020476                                          MOV     #BFSEQ4,R2
3855  017636  004737  020222        JSR     PC,BFSEQ        ;SET UP CMD SEQ.
3856  017642  004737  006204        JSR     PC,EXALL        ;EXECUTE CMD SEQ ON ALL DEVICES.
3857  017646                        ENDSUB
3858  017646                    L10024:
3859  017646  104403                                                  TRAP    C$ESUB
3860
3861  017650                          BGNSUB                  ;SUBTEST 6 - SPACE RECORDS.
3862  017650                    T1.6:
```

```
                                                                        TRAP    C$BSUB
                                        LET R2 := #BFSEQ5               ;ADR OF CMD SEQ.
                                                                        MOV     #BFSEQ5,R2
                                        JSR     PC,BFSEQ                ;SET UP CMD SEQ.
                                        JSR     PC,EXALL                ;EXECUTE CMD SEQ ON ALL DEVICES.
                                        ENDSUB
                                L10025:
                                                                        TRAP    C$ESUB

                                        BGNSUB                          ;SUBTEST 7 - WRITE RETRY.
                                T1.7:
                                                                        TRAP    C$BSUB

                                        LET R2 := #BFSEQ6               ;ADR OF CMD SEQ.
                                                                        MOV     #BFSEQ6,R2
                                        JSR     PC,BFSEQ                ;SET UP CMD SEQ.
                                        JSR     PC,EXALL                ;EXECUTE CMD SEQ ON ALL DEVICES.
                                        ENDSUB
                                L10026:
                                                                        TRAP    C$ESUB

                                        BGNSUB                          ;SUBTEST 8 - READ REV RETRY.
                                T1.8:
                                                                        TRAP    C$BSUB

                                        LET R2 := #BFSEQ7               ;ADR OF CMD SEQ.
                                                                        MOV     #BFSEQ7,R2
                                        JSR     PC,BFSEQ                ;SET UP CMD SEQ.
                                        JSR     PC,EXALL                ;EXECUTE CMD SEQ ON ALL DEVICES.
                                        ENDSUB
                                L10027:
                                                                        TRAP    C$ESUB

                                        BGNSUB                          ;SUBTEST 9 - READ FWD RETRY.
                                T1.9:
                                                                        TRAP    C$BSUB

                                        LET R2 := #BFSEQ8               ;ADR OF CMD SEQ.
                                                                        MOV     #BFSEQ8,R2
                                        JSR     PC,BFSEQ                ;SET UP CMD SEQ.
                                        JSR     PC,EXALL                ;EXECUTE CMD SEQ ON ALL DEVICES.
                                        ENDSUB
                                L10030:
                                                                        TRAP    C$ESUB

                                        BGNSUB                          ;SUBTEST 10- CLEAN.
                                T1.10:
                                                                        TRAP    C$BSUB

                                        LET R2 := #BFSEQ9               ;ADR OF CMD SEQ.
                                                                        MOV     #BFSEQ9,R2
                                        JSR     PC,BFSEQ                ;SET UP CMD SEQ.
                                        JSR     PC,EXALL                ;EXECUTE CMD SEQ ON ALL DEVICES.
                                        ENDSUB
                                L10031:
```

```
3919  017766  104403                                                                  TRAP    C$ESUB
3920
3921  017770                                BGNSUB                          ;SUBTEST 11 - WTV SWAPPED DATA BYTES.
3922  017770                        T1.11:
3923  017770  104402                                                                  TRAP    C$BSUB
3924
3925  017772                                LET R2 := #BFSE10               ;ADR OF CMD SEQ.
3926  017772  012702  020752                                                          MOV     #BFSE10,R2
3927  017776  004737  020222                JSR     PC,BFSEQ                ;SET UP CMD SEQ.
3928  020002  004737  006204                JSR     PC,EXALL                ;WRITE/VERIFY RECORDS 1 AND 2.
3929  020006                                LET SWBFLG :B= #1               ;ENABLE BYTE SWAPPING.
3930  020006  112737  000001  003150                                                MOVB    #1,SWBFLG
3931  020014  004737  006204                JSR     PC,EXALL                ;WRITE/VERIFY RECORDS 3 AND 4.
3932  020020                                LET SWBFLG :B= #0               ;DISABLE BYTE SWAPPING.
3933  020020  105037  003150                                                        CLRB    SWBFLG
3934  020024                                ENDSUB
3935  020024                        L10032:
3936  020024  104403                                                                  TRAP    C$ESUB
3937
3938  020026                                LET R2 := DATAWT + #10.         ;INIT WRITE BUFFER POINTER.
3939  020026  013702  003044                                                          MOV     DATAWT,R2
3940  020032  062702  000012                                                          ADD     #10.,R2
3941  020036                                WHILE R2 NE DATAWT DO   ;UNTIL 10 BYTES HAVE BEEN SWAPPED.
3942  020036                                                                  50353$:
3943  020036  020237  003044                                                          CMP     R2,DATAWT
3944  020042  001402                                                                  BEQ     50354$
3945  020044  000342                          SWAB -(R2)                    ;SWAP DATA BYTES IN WRITE BUFFER.
3946  020046                                ENDDO
3947  020046  000773                                                                  BR      50353$
3948  020050                                                                  50354$:
3949  020050                                LET T1SWB :B= T1SWB + #1        ;SET T1 SWAP BYTES FLAG FOR "CKDATA" SUBR
3950  020050  105237  003153                                                        INCB    T1SWB
3951
3952  020054                                BGNSUB                          ;SUBTEST 12 - READ SWAPPED DATA BYTES.
3953  020054                        T1.12:
3954  020054  104402                                                                  TRAP    C$BSUB
3955
3956  020056                                LET CMDWRD := #RDR              ;CMD IS READ REV.
3957  020056  012737  104401  003056                                                MOV     #RDR,CMDWRD
3958  020064  004737  012534                JSR     PC,VFEXC                ;VERIFY ODD LENGTH SWAP (RECORD 4).
3959  020070                                LET CMDPKT+CP.CNT := #12        ;CHANGE BYTE COUNT TO 10.
3960  020070  012737  000012  002316                                                MOV     #12,CMDPKT+CP.CN
3961  020076  004737  012534                JSR     PC,VFEXC                ;VERIFY EVEN LENGTH SWAP (RECORD 3).
3962  020102                                LET SWBFLG :B= #1               ;ENABLE BYTE SWAPPING.
3963  020102  112737  000001  003150                                                MOVB    #1,SWBFLG
3964  020110                                LET CMDPKT+CP.CNT := #11                ;CHANGE BYTE COUNT TO 9.
3965  020110  012737  000011  002316                                                MOV     #11,CMDPKT+CP.CN
3966  020116  004737  012534                JSR     PC,VFEXC                ;VERIFY ODD LENGTH SWAP (RECORD 2).
3967  020122                                LET CMDPKT+CP.CNT := #12        ;CHANGE BYTE COUNT TO 10.
3968  020122  012737  000012  002316                                                MOV     #12,CMDPKT+CP.CN
3969  020130  004737  012534                JSR     PC,VFEXC                ;VERIFY EVEN LENGTH SWAP (RECORD 1).
3970  020134                                LET CMDWRD := #RDF              ;CMD IS READ FWD.
3971  020134  012737  104001  003056                                                MOV     #RDF,CMDWRD
3972  020142  004737  012534                JSR     PC,VFEXC                ;VERIFY EVEN LENGTH SWAP (RECORD 1).
3973  020146                                LET CMDPKT+CP.CNT := #11                ;CHANGE BYTE COUNT TO 9.
3974  020146  012737  000011  002316                                                MOV     #11,CMDPKT+CP.CN
```

```
 3975  020154  004737  012534                  JSR     PC,VFEXC            ;VERIFY ODD LENGTH SWAP (RECORD 2).
 3976  020160                                  LET SWBFLG :B= #0           ;DISABLE BYTE SWAPPING.
 3977  020160  105037  003150                                              CLRB    SWBFLG
 3978  020164                                  LET CMDPKT+CP.CNT := #12    ;CHANGE BYTE COUNT TO 10.
 3979  020164  012737  000012  002316                                      MOV     #12,CMDPKT+CP.CN
 3980  020172  004737  012534                  JSR     PC,VFEXC            ;VERIFY EVEN LENGTH SWAP (RECORD 3).
 3981  020176                                  LET CMDPKT+CP.CNT := #11    ;CHANGE BYTE COUNT TO 9.
 3982  020176  012737  000011  002316                                      MOV     #11,CMDPKT+CP.CN
 3983  020204  004737  012534                  JSR     PC,VFEXC            ;VERIFY ODD LENGTH SWAP (RECORD 4).
 3984
 3985  020210                                  ENDSUB
 3986  020210                          L10033:
 3987  020210  104403                                                      TRAP    C$ESUB
 3988
 3989  020212                                  LET T1SWB :B= #0            ;CLEAR T1 SWAP BYTES FLAG
 3990  020212  105037  003153                                              CLRB    T1SWB
 3991
 3992
 3993  020216                                  EXIT    TST
 3994  020216  104432                                                      TRAP    C$EXIT
 3995  020220  000554                                                      .WORD   L10017-.
```

```
                        ;       SUBROUTINE TO MOVE A COMMAND SEQUENCE TO THE SEQUENCE TABLE.
                        ;       INPUTS:         R2 = FWA OF COMMAND SEQUENCE.
                        ;       OUTPUTS:
                        ;       REGISTERS:
                        ;       CALLS:

020222                  BFSEQ:  LET R1 := #CMDSEQ               ;INIT SEQ TABLE ADDRESS.
020222  012701  003164                                                    MOV     #CMDSEQ,R1
                                WHILE (R2) NE #END DO           ;WHILE THERE ARE MORE COMMANDS:
020226                                                                  50355$:
020226  021227  177777                                                    CMP     (R2),#END
020232  001402                                                            BEQ     50356$
                                  LET (R1)+ := (R2)+            ;MOVE COMMANDS TO SEQ TABLE.
020234  012221                                                            MOV     (R2)+,(R1)+
                                ENDDO
020236  000773                                                            BR      50355$
020240                                                                  50356$:
                                LET (R1) := #END                ;STORE END OF SEQUENCE CODE.
020240  012711  177777                                                    MOV     #END,(R1)
020244  000207                  RTS     PC                      ;RETURN.


                        ;       BASIC FUNCTION COMMAND SEQUENCE

020246  140004          BFSEQ0: .WORD   SCH                     ;SET CHAR. 200.         (1)
020250  000200                          200
020252  000001                          1
020254  000000                          0
020256  100013                          DRI                     ;DRIVE INIT.            (2)
020260  000001                          1
020262  000001                          1
020264  000000                          0
020266  140004                          SCH                     ;SET CHAR. 20           (3)
020270  000020                          20
020272  000001                          1
020274  000000                          0
020276  100017                          GES                     ;GET STATUS.            (4)
020300  000001                          1
020302  000001                          1
020304  000000                          0
020306  140004                          SCH                     ;SET CHAR. 40.          (5)
020310  000040                          40
020312  000001                          1
020314  000000                          0
020316  177777                  .WORD   END

020320  102010          BFSEQ1:         RWD                     ;REWIND TWICE.          (6)
020322  000001                          1
020324  000002                          2
020326  000000                          0
020330  177777                  .WORD   END

020332  104105          BFSEQ2:         WTV                     ;WRITE/VERIFY PAT 1.    (7)
020334  004000                          DATCNT
020336  000001                          1
```

```
4052  020340  000001                                  1
4053  020342  104105                                  WTV             ;WTV PAT 2.     (8)
4054  020344  004000                                  DATCNT
4055  020346  000001                                  1
4056  020350  000002                                  2
4057  020352  104105                                  WTV             ;WTV PAT 3.     (9)
4058  020354  004000                                  DATCNT
4059  020356  000001                                  1
4060  020360  000003                                  3
4061  020362  104105                                  WTV             ;WTV PAT 4.     (10)
4062  020364  004000                                  DATCNT
4063  020366  000001                                  1
4064  020370  000004                                  4
4065  020372  104105                                  WTV             ;WTV PAT 5.     (11)
4066  020374  004000                                  DATCNT
4067  020376  000001                                  1
4068  020400  000005                                  5
4069  020402  104105                                  WTV             ;WTV PAT 6.     (12)
4070  020404  004000                                  DATCNT
4071  020406  000001                                  1
4072  020410  000006                                  6
4073  020412  104105                                  WTV             ;WTV PAT 0.     (13)
4074  020414  004000                                  DATCNT
4075  020416  000001                                  1
4076  020420  000000                                  0
4077  020422  177777                      .WORD       END
4078
4079  020424  100011                BFSEQ3:           WTM             ;WRITE TAPE MARK.       (14)
4080  020426  000001                                  1
4081  020430  000001                                  1
4082  020432  000000                                  0
4083  020434  104005                                  WRT             ;WRITE 10 RECORDS.      (15)
4084  020436  004000                                  DATCNT
4085  020440  000010                                  10
4086  020442  000001                                  1
4087  020444  100411                                  ERS             ;ERASE 10 TIMES.        (16)
4088  020446  000001                                  1
4089  020450  000010                                  10
4090  020452  000000                                  0
4091  020454  100011                                  WTM             ;WRITE TAPE MARK.       (17)
4092  020456  000001                                  1
4093  020460  000001                                  1
4094  020462  000000                                  0
4095  020464  101011                                  WTR             ;WTM RETRY              (18)
4096  020466  000001                                  1
4097  020470  000001                                  1
4098  020472  000000                                  0
4099  020474  177777                      .WORD       END
4100
4101  020476  105410                BFSEQ4:           SFR             ;SPACE 2 FILES REV.     (19)
4102  020500  000002                                  2
4103  020502  000001                                  1
4104  020504  000000                                  0
4105  020506  105010                                  SFF             ;SPACE 2 FILES FWD.     (20)
4106  020510  000002                                  2
4107  020512  000001                                  1
```

```
 4108  020514  000000                                  0
 4109  020516  105410                                  SFR                     ;SPACE 2 FILES REV.     (21)
 4110  020520  000001                                  1
 4111  020522  000002                                  2
 4112  020524  000000                                  0
 4113  020526  105010                                  SFF                     ;SPACE 2 FILES FWD.     (22)
 4114  020530  000001                                  1
 4115  020532  000002                                  2
 4116  020534  000000                                  0
 4117  020536  177777                          .WORD   END
 4118
 4119  020540  102010                  BFSEQ5:         RWD                     ;REWIND.                (23)
 4120  020542  000001                                  1
 4121  020544  000001                                  1
 4122  020546  000000                                  0
 4123  020550  104010                                  SRF                     ;SPACE 7 RECORDS FWD.   (24)
 4124  020552  000007                                  7
 4125  020554  000001                                  1
 4126  020556  000000                                  0
 4127  020560  104410                                  SRR                     ;SPACE 7 RECORDS REV.   (25)
 4128  020562  000007                                  7
 4129  020564  000001                                  1
 4130  020566  000000                                  0
 4131  020570  104010                                  SRF                     ;SPACE 7 RECORDS FWD.   (26)
 4132  020572  000001                                  1
 4133  020574  000007                                  7
 4134  020576  000000                                  0
 4135  020600  104410                                  SRR                     ;SPACE 7 RECORDS REV.   (27)
 4136  020602  000001                                  1
 4137  020604  000007                                  7
 4138  020606  000000                                  0
 4139  020610  177777                          .WORD   END
 4140
 4141  020612  102010                  BFSEQ6:         RWD                     ;REWIND.                (28)
 4142  020614  000001                                  1
 4143  020616  000001                                  1
 4144  020620  000000                                  0
 4145  020622  104005                                  WRT                     ;WRITE.                 (29)
 4146  020624  004000                                  DATCNT
 4147  020626  000001                                  1
 4148  020630  000001                                  1
 4149  020632  105005                                  WRR                     ;WRITE RETRY.           (30)
 4150  020634  004000                                  DATCNT
 4151  020636  000001                                  1
 4152  020640  000001                                  1
 4153  020642  177777                          .WORD   END
 4154
 4155  020644  104401                  BFSEQ7:         RDR                     ;READ REV.              (31)
 4156  020646  004000                                  DATCNT
 4157  020650  000001                                  1
 4158  020652  000001                                  1
 4159  020654  105401                                  RNR                     ;READ NEXT REV.         (32)
 4160  020656  004000                                  DATCNT
 4161  020660  000001                                  1
 4162  020662  000001                                  1
 4163  020664  125401                                  RNF                     ;READ NEXT FWD.         (33)
```

```
 4164  020666  004000                          DATCNT
 4165  020670  000001                          1
 4166  020672  000001                          1
 4167  020674  177777                  .WORD   END
 4168
 4169  020676  104001          BFSEQ8:         RDF             ;READ FWD.              (34)
 4170  020700  004000                          DATCNT
 4171  020702  000001                          1
 4172  020704  000001                          1
 4173  020706  105001                          RPF             ;READ PREVIOUS FWD.     (35)
 4174  020710  004000                          DATCNT
 4175  020712  000001                          1
 4176  020714  000001                          1
 4177  020716  125001                          RPR             ;READ PREVIOUS REV.     (36)
 4178  020720  004000                          DATCNT
 4179  020722  000001                          1
 4180  020724  000001                          1
 4181  020726  177777                  .WORD   END
 4182
 4183  020730  101012          BFSEQ9: .WORD   CLN             ;CLEAN.                 (37)
 4184  020732  000001                          1
 4185  020734  000001                          1
 4186  020736  000000                          0
 4187  020740  102010                          RWD             ;REWIND                 (38)
 4188  020742  000001                          1
 4189  020744  000001                          1
 4190  020746  000000                          0
 4191  020750  177777                  .WORD   END             ;END OF SEQUENCE.
 4192
 4193  020752  104105          BFSE10:         WTV             ;WRITE/VERIFY EVEN LENGTH.  (39)
 4194  020754  000012                          12
 4195  020756  000001                          1
 4196  020760  000000                          0
 4197  020762  104105                          WTV             ;WRITE/VERIFY ODD LENGTH.   (40)
 4198  020764  000011                          11
 4199  020766  000001                          1
 4200  020770  000000                          0
 4201  020772  177777                  .WORD   END
 4202                                  .EVEN
 4203
 4204  020774                          ENDTST
 4205  020774          L10017:
 4206  020774  104401                                  TRAP    C$ETST
```

```
                                .SBTTL  TEST 2: DATA RELIABILITY.

                                ;++
                                ; TEST TO CHECK THE DATA RELIABILITY OF THE TS04.
                                ;--
020776                                  BGNTST
020776                          T2::

020776                                  LET RANDOM :B= #1               ;SET THE RANDOM OPERATIONS FLAG.
020776  112737  000001  003145                                                  MOVB    #1,RANDOM
021004                                  LET EXPBOT :B= #0               ;CLEAR EXPECT BOT FLAG.
021004  105037  003144                                                          CLRB    EXPBOT
021010                                  LET R2 := #DATCNT - #1          ;SET UP THE RECORD LENGTH MASK,
021010  012702  004000                                                          MOV     #DATCNT,R2
021014  005302                                                                  DEC     R2
021016                                  LET LENMSK := COMP R2           ;ALLOW MAXIMUM BUFFER.
021016  010237  003066                                                          MOV     R2,LENMSK
021022  005137  003066                                                          COM     LENMSK
021026  004737  006140                  JSR PC,SETCH                    ;CMD 1 = SET CHARACTERISTIC.
021032                                  IFB STAFLG NE #0 THEN           ;IF STARTING THEN:
021032  105737  003156                                                          TSTB    STAFLG
021036  001404                                                                  BEQ     50357$
021040  004737  006164                    JSR   PC,SETRW                ;CMD2=REWIND
021044                                    LET STAFLG :B= #0             ;CLR START FLAG.
021044  105037  003156                                                          CLRB    STAFLG
021050                                  ENDIF
021050                                                                  50357$:
021050                                  LET (R1)+ := #WTV               ;CMD3 = WRITE/ VERIFY.
021050  012721  104105                                                          MOV     #WTV,(R1)+
021054                                  LET (R1)+ := #DATCNT            ;SET BRF TO MAX FOR PATTERN GENERATION.
021054  012721  004000                                                          MOV     #DATCNT,(R1)+
021060                                  LET R2 := COMP #RNOPSC
021060  012702  177740                                                          MOV     #RNOPSC,R2
021064  005102                                                                  COM     R2
021066                                  LET (R1)+ := R2                 ;31 OPERATIONS.
021066  010221                                                                  MOV     R2,(R1)+
021070                                  LET (R1)+ := #RANP              ;RANDOM PATTERN.
021070  012721  000007                                                          MOV     #RANP,(R1)+
021074                                  REPEAT                          ;REPEAT TO EOT:
021074                                                                  50360$:
021074                                    WHILE R1 LT #SEQEND DO        ;FILL SEQ TBL WITH RANDOM CMDS.
021074                                                                  50361$:
021074  020127  003254                                                          CMP     R1,#SEQEND
021100  002012                                                                  BGE     50362$
021102                                      LET RANS := RANS + RANB
021102  063737  003070  003072                                                  ADD     RANB,RANS
021110                                      LET R2 := RANS CLR.BY #177741  ;R2 = RANDOM # (0 - 36).
021110  013702  003072                                                          MOV     RANS,R2
021114  042702  177741                                                          BIC     #177741,R2
021120  004772  021260                      JSR PC,@RANCMD(R2)          ;SET UP A RANDOM CMD + BRF.
021124                                    ENDDO
021124  000763                                                                  BR      50361$
021126                                                                  50362$:
021126                                  LET (R1) := #END                ;STORE END OF SEQUENCE CODE IN TABLE.
021126  012711  177777                                                          MOV     #END,(R1)
021132  004737  006204                  JSR   PC,EXALL                  ;GO EXECUTE ALL CMDS IN SEQUENCE TABLE.
```

```
4263  021136                                  LET R1 := #CMDSEQ           ;INIT CMD SEQ TBL POINTER,
4264  021136  012701  003164                                                    MOV     #CMDSEQ,R1
4265  021142                                  UNTIL R2 NE #0              ;REPEAT UNTIL EOT IS REACHED
4266  021142  005702                                                            TST     R2
4267  021144  001753                                                            BEQ     50360$
4268  021146                                  LET ALLEOT :B= ALLEOT + #1  ;FLAG ALL UNITS @ EOT
4269  021146  105237  003154                                                    INCB    ALLEOT
4270  021152  000240                         NOP
4271  021154  000240                         NOP
4272  021156  004737  006500                JSR     PC,EXSUB            ;WRITE ONE RECORD BEYOND EOT ON ALL UNITS
4273  021162  004737  014052                JSR     PC,CKHAE            ;SO THAT SHORTER READ STOP DISTANCE
4274                                                                      ;SHALL POSITION HEAD IN CLEAN IRG GAP
4275  021166  004737  021320                JSR     PC,RANRD            ;SET UP READ REV/FWD CMDS,
4276  021172                                  LET CMDSEQ+4 := COMP #RNOPSC ;# OF RECORDS FOR READ REV.
4277  021172  012737  177740  003170                                           MOV     #RNOPSC,CMDSEQ+4
4278  021200  005137  003170                                                    COM     CMDSEQ+4
4279  021204                                  LET CMDSEQ+14 := CMDSEQ+4   ;# OF RECORDS FOR READ FORWARD.
4280  021204  013737  003170  003200                                           MOV     CMDSEQ+4,CMDSEQ+
4281  021212                                  LET (R1) := #END            ;STORE END OF SEQUENSE CODE IN SEQ TABLE.
4282  021212  012711  177777                                                    MOV     #END,(R1)
4283  021216  004737  006204                JSR     PC,EXALL            ;GO EXECUTE READ REV/FWD OF LAST N RECORDS.
4284  021222                                  LET ALLEOT :B= #0           ;CLEAR ALL UNITS @ EOT FLAG
4285  021222  105037  003154                                                    CLRB    ALLEOT
4286  021226                                  LET RPTFLG :B= #1           ;REQUEST PERFORMANCE REPORT DURING REWIND.
4287  021226  112737  000001  003147                                           MOVB    #1,RPTFLG
4288  021234                                  LET R1 := #CMDSEQ           ;INIT SEQ TBL POINTER,
4289  021234  012701  003164                                                    MOV     #CMDSEQ,R1
4290  021240  004737  006164                JSR PC,SETRW                ;STORE REWIND IN SEQ TBL,
4291  021244                                  LET (R1) := #END            ;STORE END IN SEQ TBL,
4292  021244  012711  177777                                                    MOV     #END,(R1)
4293  021250  004737  006204                JSR PC,EXALL                ;EXECUTE REWIND CMD ON ALL UNITS
4294
4295  021254                                  EXIT    TST
4296  021254  104432                                                            TRAP    C$EXIT
4297  021256  000174                                                            .WORD   L10034-.
4298
```

```
4299                                    ;       ADDRESSES OF SUBROUTINES USED TO SET UP RANDOM OPERATIONS IN
4300                                    ;       THE DATA RELIABILITY TEST.
4301
4302  021260  021406                    RANCMD: RANWV                   ;WRITE/VERIFY.
4303  021262  021374                            RANWR                   ;WRITE.
4304  021264  021374                            RANWR                   ;WRITE.
4305  021266  021374                            RANWR                   ;WRITE.
4306  021270  021374                            RANWR                   ;WRITE.
4307  021272  021374                            RANWR                   ;WRITE.
4308  021274  021374                            RANWR                   ;WRITE.
4309  021276  021374                            RANWR                   ;WRITE.
4310  021300  021320                            RANRD                   ;READ.
4311  021302  021320                            RANRD                   ;READ.
4312  021304  021320                            RANRD                   ;READ.
4313  021306  021320                            RANRD                   ;READ.
4314  021310  021320                            RANRD                   ;READ.
4315  021312  021320                            RANRD                   ;READ.
4316  021314  021320                            RANRD                   ;READ.
4317  021316  021320                            RANRD                   ;READ.
4318
4319
4320
4321
4322
4323                                    ;       SUBROUTINE TO SET UP READ COMMANDS IN SEQUENCE TABLE.
4324                                    ;       INPUTS:
4325                                    ;       OUTPUTS:
4326                                    ;       REGISTERS:      R2
4327                                    ;       CALLS:
4328
4329  021320                            RANRD:  LET (R1)+ := #RDR               ;STORE READ REV CMD.
4330  021320  012721  104401                                                            MOV     #RDR,(R1)+
4331  021324                                    LET (R1)+ := #DATCNT          ;SET BRF TO MAX FOR READ RANDOM LENGTHS.
4332  021324  012721  004000                                                            MOV     #DATCNT,(R1)+
4333  021330                                    LET RANB := RANB + RANS
4334  021330  063737  003072  003070                                                    ADD     RANS,RANB
4335  021336                                    LET R2 := RANB CLR.BY #RNOPSC
4336  021336  013702  003070                                                            MOV     RANB,R2
4337  021342  042702  177740                                                            BIC     #RNOPSC,R2
4338  021346                                    LET (R1)+ := R2               ;SET RANDOM # OF OPERATIONS.
4339  021346  010221                                                                    MOV     R2,(R1)+
4340  021350                                    LET (R1)+ := #RANP            ;RANDOM PATTERN.
4341  021350  012721  000007                                                            MOV     #RANP,(R1)+
4342  021354                                    LET (R1)+ := #RDF             ;STORE READ FWD CMD.
4343  021354  012721  104001                                                            MOV     #RDF,(R1)+
4344  021360                                    LET (R1)+ := #DATCNT          ;SET BRF TO MAX TO READ RANDOM LENGTHS.
4345  021360  012721  004000                                                            MOV     #DATCNT,(R1)+
4346  021364                                    LET (R1)+ := R2               ;SET RANDOM # OF OPERATIONS.
4347  021364  010221                                                                    MOV     R2,(R1)+
4348  021366                                    LET (R1)+ := #RANP            ;RANDOM PATTERN.
4349  021366  012721  000007                                                            MOV     #RANP,(R1)+
4350  021372  000207                            RTS PC
```

```
                                        ;       SUBROUTINE TO SET UP A WRITE COMMAND IN THE SEQUENCE TABLE.
                                        ;       INPUTS:
                                        ;       OUTPUTS:
                                        ;       REGISTERS:
                                        ;       CALLS:

021374                                  RANWR:  LET (R1)+ := #WRT               ;STORE WRITE CMD.
021374  012721  104005                                                                  MOV     #WRT,(R1)+
021400  004737  021420                          JSR PC,RANW                     ;STORE BRF, # OF OPERATIONS, PATTERN.
021404  000207                                  RTS PC


                                        ;       SUBROUTINE TO SET UP A WRITE/VERIFY COMMAND IN THE SEQUENCE TABLE.
                                        ;       INPUTS:
                                        ;       OUTPUTS:
                                        ;       REGISTERS:
                                        ;       CALLS:

021406                                  RANWV:  LET (R1)+ := #WTV               ;STORE WRITE/VERIFY CMD.
021406  012721  104105                                                                  MOV     #WTV,(R1)+
021412  004737  021420                          JSR PC,RANW                     ;STORE BRF, # OF OPERATIONS, PATTERN.
021416  000207                                  RTS     PC


                                        ;       SUBROUTINE TO STORE BRF, # OF OPERATIONS, PATTERN IN COMMAND
                                        ;       SEQUENCE TABLE FOR WRITE AND WRITE/VERIFY COMMANDS.
                                        ;       INPUTS:
                                        ;       OUTPUTS:
                                        ;       REGISTERS:      R2
                                        ;       CALLS:

021420                                  RANW:   LET (R1)+ := #DATCNT            ;SET BRF TO MAX FOR PATTERN GENERATION.
021420  012721  004000                                                                  MOV     #DATCNT,(R1)+
                                                                                ;RANDOM BRF WILL BE GENERATED FOR EACH RECORD.
021424                                          LET RANB := RANB + RANS
021424  063737  003072  003070                                                          ADD     RANS,RANB
021432                                          LET R2 := RANB CLR.BY #RNOPSC
021432  013702  003070                                                                  MOV     RANB,R2
021436  042702  177740                                                                  BIC     #RNOPSC,R2
021442                                          LET (R1)+ := R2                 ;SET RANDOM # OF OPERATIONS.
021442  010221                                                                          MOV     R2,(R1)+
021444                                          LET (R1)+ := #RANP              ;RANDOM PATTERN.
021444  012721  000007                                                                  MOV     #RANP,(R1)+
021450  000207                                  RTS PC                          ;RETURN.


                                                .EVEN

                                                ENDTST
021452                                  L10034:
021452  104401                                                                          TRAP    C$ETST
```

```
4407
```

```
                        .SBTTL  TEST 3: WRITE COMPATABILITY/WRITE UTILITY.

                        ;++
                        ; TEST TO WRITE RECORDS FROM BOT TO EOT.
                        ;--

                            BGNTST
                        T3::

                            LET RANDOM :B= #1               ;SET THE RANDOM OPERATIONS FLAG.
021454  112737  000001  003145                                    MOVB    #1,RANDOM
                            LET EXPBOT :B= #0               ;CLEAR EXPECT BOT FLAG.
021462  105037  003144                                          CLRB    EXPBOT
                            LET R2 := #DATCNT - #1          ;SET UP THE RECORD LENGTH MASK.
021466  012702  004000                                          MOV     #DATCNT,R2
021472  005302                                                  DEC     R2
                            LET LENMSK := COMP R2           ;ALLOW MAXIMUM BUFFER.
021474  010237  003066                                          MOV     R2,LENMSK
021500  005137  003066                                          COM     LENMSK
021504  004737  006140        JSR PC,SETCH                    ;CMD 1 = SET CHARACTERISTIC.
021510  004737  006164        JSR PC,SETRW                    ;CMD2=REWIND
                            LET STAFLG :B= #0               ;CLEAR START FLAG
021514  105037  003156                                          CLRB    STAFLG
                            REPEAT                          ;REPEAT TO EOT.
                                                        50363$:
                              WHILE R1 LT #SEQEND DO        ;WHILE THERE IS MORE ROOM IN SEQ TABLE:
                                                        50364$:
021520  020127  003254                                          CMP     R1,#SEQEND
021524  002003                                                  BGE     50365$
021526  004737  021374          JSR PC,RANWR                ;STORE A WRITE CMD IN SEQUENCE TABLE.
                              ENDDO
021532
021532  000772                                                BR      50364$
                                                        50365$:
                              LET (R1) := #END          ;STORE END OF SEQUENCE CODE IN TABLE.
021534  012711  177777                                          MOV     #END,(R1)
021540  004737  006204          JSR   PC,EXALL            ;EXECUTE ALL CMDS IN SEQ TBL ON UNITS.
                              LET R1 := #CMDSEQ         ;INIT SEQ TBL POINTER.
021544  012701  003164                                          MOV     #CMDSEQ,R1
                            UNTIL R2 NE #0              ;REPEAT UNTIL EOT IS REACHED
021550  005702                                                  TST     R2
021552  001762                                                  BEQ     50363$
                            LET ALLEOT :B= ALLEOT + #1          ;SET ALL UNITS @ EOT FLAG
021554  105237  003154                                          INCB    ALLEOT
                            NOP
021560  000240
                            NOP
021562  000240
021564  004737  006500          JSR     PC,EXSUB            ;WRITE ONE RECORD BEYOND EOT ON ALL UNITS
021570  004737  014052          JSR     PC,CKHAE            ;SO THAT SHORTER READ STOP DISTANCE
                                                            ;SHALL POSITION HEAD IN CLEAN IRG GAP
                            LET ALLEOT :B= #0           ;CLEAR ALL UNITS @ EOT FLAG
021574  105037  003154                                          CLRB    ALLEOT
021600  004737  006164        JSR PC,SETRW                ;STORE REWIND IN SEQ TBL.
                            LET (R1) := #END            ;STORE END IN SEQ TBL.
021604  012711  177777                                          MOV     #END,(R1)
021610  004737  006204        JSR PC,EXALL                ;EXECUTE REWIND CMD ON ALL UNITS

021614                      EXIT    TST
```

```
4464  021614  104432                                          TRAP    C$EXIT
4465  021616  000002                                          .WORD   L10035-.
4466
4467                                      .EVEN
4468
4469  021620                              ENDTST
4470  021620                          L10035:
4471  021620  104401                                          TRAP    C$ETST
4472
```

```
4473
4474                                    .SBTTL  TEST 4:  READ COMPATABILITY/READ UTILITY.
4475
4476                                    ;++
4477                                    ; TEST TO READ ENTIRE TAPE FORWARD AND REVERSE.
4478                                    ;--
4479
4480  021622                                    BGNTST
4481  021622                            T4::
4482
4483  021622                                    LET RANDOM :B= #1             ;SET THE RANDOM OPERATIONS FLAG.
4484  021622  112737  000001  003145                                                MOVB    #1,RANDOM
4485  021630                                    LET EXPBOT :B= #1             ;SET EXPECT BOT FLAG.
4486  021630  112737  000001  003144                                                MOVB    #1,EXPBOT
4487  021636  004737  006140                    JSR PC,SETCH                  ;CMD 1 = SET CHARACTERISTIC.
4488  021642  004737  006164                    JSR PC,SETRW                  ;CMD2=REWIND.
4489  021646                                    LET STAFLG :B= #0             ;CLEAR START FLAG
4490  021646  105037  003156                                                CLRB    STAFLG
4491  021652                                    LET (R1)+ := #RDF             ;CMD3 = READ FORWARD.
4492  021652  012721  104001                                                MOV     #RDF,(R1)+
4493  021656                                    LET (R1)+ := #DATCNT          ;SET LENGTH TO MAX FOR UNKNOWN LENGTHS.
4494  021656  012721  004000                                                MOV     #DATCNT,(R1)+
4495  021662                                    LET (R1)+ := #77777           ;SET RECORD COUNT TO MAX FOR WHOLE TAPE.
4496  021662  012721  077777                                                MOV     #77777,(R1)+
4497  021666                                    LET (R1)+ := #RANP            ;PATTERN = RANDOM.
4498  021666  012721  000007                                                MOV     #RANP,(R1)+
4499  021672                                    LET (R1) := #END              ;STORE END OF SEQUENCE CODE IN TABLE.
4500  021672  012711  177777                                                MOV     #END,(R1)
4501  021676  004737  006204                    JSR     PC,EXALL              ;EXECUTE ALL CMDS IN SEQ TBL ON ALL UNITS.
4502  021702                                    LET ALLEOT :B= ALLEOT + #1    ;FLAG TO ALLOW ALL UNITS AT EOT TO READ REV
4503  021702  105237  003154                                                INCB    ALLEOT
4504  021706                                    LET R1 := #CMDSEQ             ;INIT CMD SEQ TBL POINTER.
4505  021706  012701  003164                                                MOV     #CMDSEQ,R1
4506  021712                                    LET (R1)+ := #RDR             ;CMD1 = READ REVERSE.
4507  021712  012721  104401                                                MOV     #RDR,(R1)+
4508  021716                                    LET (R1)+ := #DATCNT          ;SET LENGTH TO MAX FOR UNKNOWN LENGTHS.
4509  021716  012721  004000                                                MOV     #DATCNT,(R1)+
4510  021722                                    LET (R1)+ := #77777           ;RECORD COUNT = MAX FOR WHOLE TAPE.
4511  021722  012721  077777                                                MOV     #77777,(R1)+
4512  021726                                    LET (R1)+ := #RANP            ;PATTERN = RANDOM.
4513  021726  012721  000007                                                MOV     #RANP,(R1)+
4514  021732                                    LET (R1) := #END              ;STORE END OF SEQUENCE CODE IN TABLE.
4515  021732  012711  177777                                                MOV     #END,(R1)
4516  021736  004737  006204                    JSR     PC,EXALL              ;GO EXECUTE READ REV. OF ENTIRE TAPE.
4517  021742                                    LET ALLEOT :B= #0             ;CLEAR ALL UNITS @ EOT FLAG
4518  021742  105037  003154                                                CLRB    ALLEOT
4519
4520  021746                                    EXIT    TST
4521  021746  104432                                                        TRAP    C$EXIT
4522  021750  000002                                                        .WORD   L10036-.
4523
4524                                    .EVEN
4525
4526  021752                                    ENDTST
4527  021752                            L10036:
4528  021752  104401                                                        TRAP    C$ETST
```

```
                                .SBTTL  TEST 5: EXECUTE OPERATOR SELECTED COMMAND SEQUENCE.

                                ;++
                                ; TEST TO EXECUTE  OPERATOR SELECTED COMMAND SEQUENCE.
                                ;--

021754                                  BGNTST
021754                          T5::

021754                                  LET RANDOM :B= #0               ;CLEAR RAMDOM MODE FLAG.
021754  105037  003145                                                          CLRB    RANDOM
021760                                  LET EXPBOT :B= #1               ;SET EXPECT BOT FLAG.
021760  112737  000001  003144                                                  MOVB    #1,EXPBOT
021766                                  LET IRE :B= PIRE                ;MOVE INHIBIT RFC ERROR REPORT FLAG.
021766  113737  002214  003151                                                  MOVB    PIRE,IRE
021774  004737  006140                  JSR PC,SETCH                    ;CMD 1 = SET CHARACTERISTIC.
022000                                  LET CMDSEQ+2 := CHAR            ;MOVE CHAR CODE FROM P TBL TO SEQ TBL.
022000  013737  002216  003166                                                  MOV     CHAR,CMDSEQ+2
022006                                  LET R2 := #CMDD                 ;R2 POINTS TO CMD2 IN SOFT P TABLE.
022006  012702  002220                                                          MOV     #CMDD,R2
022012  004737  022464                  JSR     PC,PTCMDS               ;MOVE CMD 2 FROM P TBL TO SEQ TBL.
022016  004737  022464                  JSR     PC,PTCMDS               ;MOVE CMD 3 FROM P TBL TO SEQ TBL.
022022  004737  022464                  JSR     PC,PTCMDS               ;MOVE CMD 4 FROM P TBL TO SEQ TBL.
022026  004737  022464                  JSR     PC,PTCMDS               ;MOVE CMD 5 FROM P TBL TO SEQ TBL.
022032  004737  022464                  JSR     PC,PTCMDS               ;MOVE CMD 6 FROM P TBL TO SEQ TBL.
022036  004737  022464                  JSR     PC,PTCMDS               ;MOVE CMD 7 FROM P TBL TO SEQ TBL.
022042  004737  022464                  JSR     PC,PTCMDS               ;MOVE END CMD FROM P TBL TO SEQ TBL.
022046                                  LET JLOOP := #0                 ;CLEAR JMP CMD LOOP COUNT.
022046  005037  003100                                                          CLR     JLOOP
022052                                  LET STAFLG := #0                ;CLEAR START FLAG
022052  005037  003156                                                          CLR     STAFLG
022056                                  LET R1 := #CMDSEQ               ;INIT SEQUENCE TABLE POINTER.
022056  012701  003164                                                          MOV     #CMDSEQ,R1
022062                          3$:     WHILE (R1) NE #END DO           ;WHILE THERE ARE CMDS LEFT IN SEQUENCE TBLE:
022062                                                                                  50366$:
022062  021127  177777                                                          CMP     (R1),#END
022066  001574                                                                  BEQ     50367$
022070  022711  000040                    CMP   #JMP.C,(R1)               ;IS THIS A JUMP CMD?
022074  001024                            BNE   6$                        ;BR IF NOT.
022076                                    LET R1 := R1 + #2               ;POINT TO BRF.
022076  062701  000002                                                          ADD     #2,R1
022102  012137  003102                    MOV   (R1)+,JLOC                ;SAVE BRF (LOCATION).
022106  022137  003100                    CMP (R1)+,JLOOP                 ;HAS LOOP COUNT BE SATISFIED?
022112  001003                            BNE   1$                        ;IF NOT, JMP AGAIN.
022114                                    LET R1 := R1 + #2               ;IF SO, ADJUST SEQ POUNTER
022114  062701  000002                                                          ADD     #2,R1
022120  000760                            BR    3$                        ;AND GO TO NEXT COMMAND.
022122                          1$:       LET JLOOP := JLOOP + #1         ;UPDATE THE LOOP COUNT.
022122  005237  003100                                                          INC     JLOOP
022126                                    LET R1 := #CMDSEQ               ;INIT CMD SEQ TABLE POINTER.
022126  012701  003164                                                          MOV     #CMDSEQ,R1
022132  005337  003102          2$:       DEC   JLOC                      ;DECR LOCATION COUNTER.
022136  001751                            BEQ   3$                        ;IF THIS IS THE RIGHT LOCATION TO JMP TO, GO SET
022140                                    LET R1 := R1 + #10              ;IF NOT, UPDATE SEQ POINTER TO NEXT CMD.
022140  062701  000010                                                          ADD     #10,R1
022144  000772                            BR    2$                        ;DO IT AGAIN.
```

```
 4585  022146  022711  000020          6$:     CMP   #DLY.C,(R1)            ;DELAY?
 4586  022152  001026                          BNE   4$                      ;BR IF NOT.
 4587  022154                                  LET R1 := R1 + #4              ;R1 = LOCATION OF N COUNT.
 4588  022154  062701  000004                                                         ADD     #4,R1
 4589  022160                                  LET TIME2 := (R1)              ;SAVE N COUNT.
 4590  022160  011137  003076                                                         MOV     (R1),TIME2
 4591  022164                                  7$:     DELAY 10.              ;GO TO SUPER-WAIT 1 MSEC.
 4592  022164  012727  000012                                                         MOV     #10.,(PC)+
 4593  022170  000000                                                                 .WORD   0
 4594  022172  013727  002116                                                         MOV     L$DLY,(PC)+
 4595  022176  000000                                                                 .WORD   0
 4596  022200  005367  177772                                                         DEC     -6(PC)
 4597  022204  001375                                                                 BNE     .-4
 4598  022206  005367  177756                                                         DEC     -22(PC)
 4599  022212  001367                                                                 BNE     .-20
 4600  022214  005337  003076                  DEC   TIME2
 4601  022220  001361                          BNE   7$
 4602  022222                                  LET R1 := R1 + #4              ;POINT TO NEXT CMD.
 4603  022222  062701  000004                                                         ADD     #4,R1
 4604  022226  000715                          BR    3$                       ;GO CHECK NEXT CMD.
 4605  022230  004737  007114          4$:     JSR   PC,SETUP                 ;GO SETUP THE COMMAND BLOCK.
 4606  022234                                  WHILE NCNT LT NCNT1 DO         ;WHILE THERE ARE RECORDS REMAINING:
 4607  022234                                                                                 50370$:
 4608  022234  023737  003050  003052                                                         CMP     NCNT,NCNT1
 4609  022242  002103                                                                         BGE     50371$
 4610  022244  004737  007006                    JSR PC,CMDAC                 ;STORE CMD ASCII IN ERROR MSG.
 4611  022250  004737  006500                    JSR PC,EXSUB                 ;ISSUE CMD TO ALL,AWAIT INTS,CHECK STATUS.
 4612  022254                                    IF CMDWRD EQ #GES THEN       ;IF CMD IS GET STATUS THEN:
 4613  022254  023727  003056  100017                                                         CMP     CMDWRD,#GES
 4614  022262  001002                                                                       BNE     50372$
 4615  022264  004737  013770                      JSR PC,PRXST               ;PRINT EXTENDED STATUS REGISTERS.
 4616  022270                                    ENDIF
 4617  022270                                                                                 50372$:
 4618  022270  004737  014052                    JSR PC,CKHAE                 ;CHECK HALT AFTER EACH CMD FLAG.
 4619  022274                                    LET R2 := #1                 ;SET ALL UNITS AT BOT/EOT.
 4620  022274  012702  000001                                                                 MOV     #1,R2
 4621  022300  004737  013462                    JSR PC,FIRSTU                ;FIND FIRST UNIT.
 4622  022304                                    WHILE DEVTBL(R5) NE #END DO  ;WHILE THERE ARE MORE UNITS:
 4623  022304                                                                                 50373$:
 4624  022304  026527  002532  177777                                                         CMP     DEVTBL(R5),#END
 4625  022312  001426                                                                       BEQ     50374$
 4626  022314                                      IF #MOD.CO SETIN CMDWRD THEN  ;IF CMD IS REVERSE THEN:
 4627  022314  032737  000400  003056                                                         BIT     #MOD.CO,CMDWRD
 4628  022322  001406                                                                       BEQ     50375$
 4629  022324                                        IF #X0.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT THEN:
 4630  022324  032765  000002  003134                                                         BIT     #X0.BOT,EOTFLG(R
 4631  022332  001001                                                                       BNE     50376$
 4632  022334                                          LET R2 := #0                 ;CLEAR EOT/BOT FLAG.
 4633  022334  005002                                                                       CLR     R2
 4634  022336                                        ENDIF
 4635  022336                                                                                 50376$:
 4636  022336                                      ELSE                         ;ELSE IF CMD IS NOT REVERSE:
 4637  022336  000411                                                                       BR      50377$
 4638  022340                                                                                 50375$:
 4639  022340                                        IF #X0.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
 4640  022340  032765  000001  003134                                                         BIT     #X0.EOT,EOTFLG(R
```

```
4641  022346  001404                                                          BEQ     50400$
4642  022350  032737  000001  003056                                          BIT     #CMD.CO,CMDWRD
4643  022356  001001                                                          BNE     50401$
4644  022360                                                              50400$:
4645                                                          ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
4646  022360                    LET R2 := #0                    ;CLEAR EOT/BOT FLAG.
4647  022360  005002                                                          CLR     R2
4648  022362                  ENDIF
4649  022362                                                              50401$:
4650  022362                ENDIF
4651  022362                                                              50377$:
4652  022362  004737  013530    JSR PC,NEXTU                  ;FIND NEXT UNIT
4653  022366                  ENDDO                           ;
4654  022366  000746                                                          BR      50373$
4655  022370                                                              50374$:
4656  022370                IF R2 EQ #1 THEN                ;IF ALL UNIT ARE AT EOT/BOT THEN:
4657  022370  020227  000001                                                  CMP     R2,#1
4658  022374  001016                                                          BNE     50402$
4659  022376                  LET NCNT1 := NCNT + #1        ;FORCE TERMINATION OF COMMAND.
4660  022376  013737  003050  003052                                          MOV     NCNT,NCNT1
4661  022404  005237  003052                                                  INC     NCNT1
4662  022410                  LET ALLEOT :B= ALLEOT + #1 ;FLAG ALL UNITS AT EOT/BOT TO ALLOW VERIFY OF D
4663  022410  105237  003154                                                  INCB    ALLEOT
4664  022414                  IF CMDLG EQ #2 THEN           ;WHEN WRITING IS CURRENT COMMAND
4665  022414  023727  003064  000002                                          CMP     CMDLG,#2
4666  022422  001002                                                          BNE     50403$
4667  022424  004737  022506      JSR PC,T5WEOT             ;GO WRITE/READ REV ONE RECORD BEYOND EOT
4668  022430                    ENDIF
4669  022430                                                              50403$:
4670  022430                  ELSE
4671  022430  000402                                                          BR      50404$
4672  022432                                                              50402$:
4673  022432                    LET ALLEOT :B= #0 ;WHEN NOT ALL @EOT, CLEAR FLAG
4674  022432  105037  003154                                                  CLRB    ALLEOT
4675  022436                  ENDIF
4676  022436                                                              50404$:
4677  022436                  LET NCNT := NCNT + #1         ;UPDATE RECORD COUNT.
4678  022436  005237  003050                                                  INC     NCNT
4679  022442                  LET PCMDWD := CMDWRD          ;SAVE PREVIOUS COMMAND WORD.
4680  022442  013737  003056  003062                                          MOV     CMDWRD,PCMDWD
4681  022450                ENDDO
4682  022450  000671                                                          BR      50370$
4683  022452                                                              50371$:
4684  022452  004737  012450    JSR   PC,VFYDAT               ;IF LAST CMD WAS A WRITE VERIFY, THEN GO
4685                                                          ;VERIFY THE LAST N RECORDS OF DATA.
4686  022456                ENDDO
4687  022456  000601                                                          BR      50366$
4688  022460                                                              50367$:
4689
4690  022460                EXIT    TST
4691  022460  104432                                                          TRAP    C$EXIT
4692  022462  000130                                                          .WORD   L10037-.
4693
4694
4695
4696
```

```
                        ;       SUBROUTINE TO MOVE A COMMAND FROM THE SOFTWARE P TABLE TO
                        ;       THE COMMAND SEQUENCE TABLE.
                        ;       INPUTS:         R2 = POINTER TO SOFT "P" TABLE
                        ;       OUTPUTS:
                        ;       REGISTERS:      R3.
                        ;       CALLS:

022464                  PTCMDS: LET R3 := (R2)+ - #1 SHIFT +1   ;R3 = COMMAND TABLE INDEX.
022464  012203                                                          MOV     (R2)+,R3
022466  005303                                                          DEC     R3
022470  006303                                                          ASL     R3
022472                          LET (R1)+ := CMDTBL(R3)         ;MOVE COMMAND WORD.
022472  016321  003266                                                  MOV     CMDTBL(R3),(R1)+
022476                          LET (R1)+ := (R2)+              ;MOVE # OF BYTES.
022476  012221                                                          MOV     (R2)+,(R1)+
022500                          LET (R1)+ := (R2)+              ;MOVE # OF OPERATIONS.
022500  012221                                                          MOV     (R2)+,(R1)+
022502                          LET (R1)+ := (R2)+              ;MOVE PATTERN CODE.
022502  012221                                                          MOV     (R2)+,(R1)+
022504  000207                  RTS PC

                        ;       SUBROUTINE TO WRITE THEN READ REVERSE ONE RECORD BEYOND EOT
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:
                        ;       CALLS:          CMDAC,EXSUB,CKHAE

022506  000240          T5WEOT: NOP
022510  000240                  NOP
022512  004737  006500          JSR PC,EXSUB            ;WRITE ONE RECORD BEYOND EOT
022516  004737  014052          JSR PC,CKHAE            ;SO THAT READ SHORTER STOP DISTANCE
                                                        ;SHALL POSITION HEAD IN CLEAN IRG GAP
022522                          LET PCMDWD := CMDWRD    ;REPOSITION TAPE
022522  013737  003056  003062                                          MOV     CMDWRD,PCMDWD
022530                          LET CMDWRD := #RDR      ;BEFORE EXTRA RECORD
022530  012737  104401  003056                                          MOV     #RDR,CMDWRD
022536                          LET CMDLG := #4         ;BY READING REVERSE
022536  012737  000004  003064                                          MOV     #4,CMDLG
022544                          LET CMDPKT := CMDWRD CLR.BY #BRF.C
022544  013737  003056  002310                                          MOV     CMDWRD,CMDPKT
022552  042737  004000  002310                                          BIC     #BRF.C,CMDPKT
022560                          LET CMDSAV := CMDPKT    ;THAT RECORD TO ALLOW
022560  013737  002310  003060                                          MOV     CMDPKT,CMDSAV
022566                          LET CMDPKT+CP.ADL := DATARD     ;NEXT COMMAND IN THE
022566  013737  003046  002312                                          MOV     DATARD,CMDPKT+CP
022574  004737  007006          JSR PC,CMDAC            ;TABLE TO BE EXECUTED
022600  004737  006500          JSR PC,EXSUB
022604  004737  014052          JSR PC,CKHAE
022610  000207                  RTS PC


                                .EVEN

022612                          ENDTST
```

```
 4753  022612                          L10037:
 4754  022612  104401                                                TRAP    C$ETST
 4755
 4756  022614                                  ENDMOD
```

```
                                .TITLE PARAMETER CODING

                                .SBTTL  HARDWARE PARAMETER CODING SECTION

022614                                  BGNMOD

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

022614                                  BGNHRD
022614  000024                                                          .WORD L10040-L$HARD/2
022616                          L$HARD::

022616                                  GPRMA   TS4ADR,0,0,160002,177564,YES
022616  000031                                                          .WORD   T$CODE
022620  022642                                                          .WORD   TS4ADR
022622  160002                                                          .WORD   T$LOLIM
022624  177564                                                          .WORD   T$HILIM
022626                                  GPRMD   TS4VCT,2,0,777,60,776,YES
022626  001032                                                          .WORD   T$CODE
022630  022657                                                          .WORD   TS4VCT
022632  000777                                                          .WORD   777
022634  000060                                                          .WORD   T$LOLIM
022636  000776                                                          .WORD   T$HILIM

022640                                  EXIT HRD
022640  013004                                                          .WORD   T$CODE

                                        .NLIST  BEX
022642  051524  051123  040440  TS4ADR: .ASCIZ  /TSSR ADDRESS/
022657     126  041505  047524  TS4VCT: .ASCIZ  /VECTOR/
                                        .LIST   BEX
                                        .EVEN

022666                                  ENDHRD
                                                                        .EVEN
022666                          L10040:
```

```
                                .SBTTL  SOFTWARE PARAMETER CODING SECTION

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

022666                                  BGNSFT
022666  000461                                                  .WORD L10041-L$SOFT/2
022670                          L$SOFT::

022670                                  GPRML   CLRM,0,1,YES
022670  000130                                                  .WORD   T$CODE
022672  023422                                                  .WORD   CLRM
022674  000001                                                  .WORD   1
022676                                  GPRML   RRVM,0,400,YES
022676  000130                                                  .WORD   T$CODE
022700  023441                                                  .WORD   RRVM
022702  000400                                                  .WORD   400
022704                                  GPRML   HAEM,2,1,YES
022704  001130                                                  .WORD   T$CODE
022706  023470                                                  .WORD   HAEM
022710  000001                                                  .WORD   1
022712                                  GPRML   RCVERM,2,400,YES
022712  001130                                                  .WORD   T$CODE
022714  023514                                                  .WORD   RCVERM
022716  000400                                                  .WORD   400
022720                                  GPRML   DINTM,6,1,YES
022720  003130                                                  .WORD   T$CODE
022722  023545                                                  .WORD   DINTM
022724  000001                                                  .WORD   1
022726                                  GPRML   IRECM,6,400,YES
022726  003130                                                  .WORD   T$CODE
022730  023570                                                  .WORD   IRECM
022732  000400                                                  .WORD   400
022734                                  GPRML   CHGM,10,1,YES
022734  004130                                                  .WORD   T$CODE
022736  023611                                                  .WORD   CHGM
022740  000001                                                  .WORD   1
022742                                  XFERF   ENDSP1
022742  132044                                                  .WORD   T$CODE
022744                                  GPRML   IREM,12,1,YES
022744  005130                                                  .WORD   T$CODE
022746  023635                                                  .WORD   IREM
022750  000001                                                  .WORD   1
022752                                  GPRMD   CHARM,14,0,377,0,200,YES
022752  006032                                                  .WORD   T$CODE
022754  023666                                                  .WORD   CHARM
022756  000377                                                  .WORD   377
022760  000000                                                  .WORD   T$LOLIM
022762  000200                                                  .WORD   T$HILIM
```

```
4853  022764                    GPRMD   CMD2M,16,D,37,1,33,YES
4854  022764  007052                                          .WORD   T$CODE
4855  022766  023713                                          .WORD   CMD2M
4856  022770  000037                                          .WORD   37
4857  022772  000001                                          .WORD   T$LOLIM
4858  022774  000033                                          .WORD   T$HILIM
4859  022776                    GPRMD   BPCRM,20,D,-1,1,DATCNT,YES
4860  022776  010052                                          .WORD   T$CODE
4861  023000  023721                                          .WORD   BPCRM
4862  023002  177777                                          .WORD   -1
4863  023004  000001                                          .WORD   T$LOLIM
4864  023006  004000                                          .WORD   T$HILIM
4865  023010                    GPRMD   NUMBM,22,D,-1,1,77777,YES
4866  023010  011052                                          .WORD   T$CODE
4867  023012  023733                                          .WORD   NUMBM
4868  023014  177777                                          .WORD   -1
4869  023016  000001                                          .WORD   T$LOLIM
4870  023020  077777                                          .WORD   T$HILIM
4871  023022                    GPRMD   PATTM,24,D,17,0,10,YES
4872  023022  012052                                          .WORD   T$CODE
4873  023024  023753                                          .WORD   PATTM
4874  023026  000017                                          .WORD   17
4875  023030  000000                                          .WORD   T$LOLIM
4876  023032  000010                                          .WORD   T$HILIM
4877  023034                    GPRMD   CMD3M,26,D,37,1,33,YES
4878  023034  013052                                          .WORD   T$CODE
4879  023036  023766                                          .WORD   CMD3M
4880  023040  000037                                          .WORD   37
4881  023042  000001                                          .WORD   T$LOLIM
4882  023044  000033                                          .WORD   T$HILIM
4883  023046                    GPRMD   BPCRM,30,D,-1,1,DATCNT,YES
4884  023046  014052                                          .WORD   T$CODE
4885  023050  023721                                          .WORD   BPCRM
4886  023052  177777                                          .WORD   -1
4887  023054  000001                                          .WORD   T$LOLIM
4888  023056  004000                                          .WORD   T$HILIM
4889  023060                    GPRMD   NUMBM,32,D,-1,1,77777,YES
4890  023060  015052                                          .WORD   T$CODE
4891  023062  023733                                          .WORD   NUMBM
4892  023064  177777                                          .WORD   -1
4893  023066  000001                                          .WORD   T$LOLIM
4894  023070  077777                                          .WORD   T$HILIM
4895  023072                    GPRMD   PATTM,34,D,17,0,10,YES
4896  023072  016052                                          .WORD   T$CODE
4897  023074  023753                                          .WORD   PATTM
4898  023076  000017                                          .WORD   17
4899  023100  000000                                          .WORD   T$LOLIM
4900  023102  000010                                          .WORD   T$HILIM
4901  023104                    GPRMD   CMD4M,36,D,37,1,33,YES
4902  023104  017052                                          .WORD   T$CODE
4903  023106  023774                                          .WORD   CMD4M
4904  023110  000037                                          .WORD   37
4905  023112  000001                                          .WORD   T$LOLIM
4906  023114  000033                                          .WORD   T$HILIM
4907  023116                    GPRMD   BPCRM,40,D,-1,1,DATCNT,YES
4908  023116  020052                                          .WORD   T$CODE
```

```
 4909  023120  023721                                                    .WORD   BPCRM
 4910  023122  177777                                                    .WORD   -1
 4911  023124  000001                                                    .WORD   T$LOLIM
 4912  023126  004000                                                    .WORD   T$HILIM
 4913  023130                      GPRMD   NUMBM,42,D,-1,1,77777,YES
 4914  023130  021052                                                    .WORD   T$CODE
 4915  023132  023733                                                    .WORD   NUMBM
 4916  023134  177777                                                    .WORD   -1
 4917  023136  000001                                                    .WORD   T$LOLIM
 4918  023140  077777                                                    .WORD   T$HILIM
 4919  023142                      GPRMD   PATTM,44,D,17,0,10,YES
 4920  023142  022052                                                    .WORD   T$CODE
 4921  023144  023753                                                    .WORD   PATTM
 4922  023146  000017                                                    .WORD   17
 4923  023150  000000                                                    .WORD   T$LOLIM
 4924  023152  000010                                                    .WORD   T$HILIM
 4925  023154                      GPRMD   CMD5M,46,D,37,1,33,YES
 4926  023154  023052                                                    .WORD   T$CODE
 4927  023156  024002                                                    .WORD   CMD5M
 4928  023160  000037                                                    .WORD   37
 4929  023162  000001                                                    .WORD   T$LOLIM
 4930  023164  000033                                                    .WORD   T$HILIM
 4931  023166                      GPRMD   BPCRM,50,D,-1,1,DATCNT,YES
 4932  023166  024052                                                    .WORD   T$CODE
 4933  023170  023721                                                    .WORD   BPCRM
 4934  023172  177777                                                    .WORD   -1
 4935  023174  000001                                                    .WORD   T$LOLIM
 4936  023176  004000                                                    .WORD   T$HILIM
 4937  023200                      GPRMD   NUMBM,52,D,-1,1,77777,YES
 4938  023200  025052                                                    .WORD   T$CODE
 4939  023202  023733                                                    .WORD   NUMBM
 4940  023204  177777                                                    .WORD   -1
 4941  023206  000001                                                    .WORD   T$LOLIM
 4942  023210  077777                                                    .WORD   T$HILIM
 4943  023212                      GPRMD   PATTM,54,D,17,0,10,YE@
 4944  023212  026052                                                    .WORD   T$CODE
 4945  023214  023753                                                    .WORD   PATTM
 4946  023216  000017                                                    .WORD   17
 4947  023220  000000                                                    .WORD   T$LOLIM
 4948  023222  000010                                                    .WORD   T$HILIM
 4949  023224                      XFER    ENDSP2
 4950  023224  002004                                                    .WORD   T$CODE
 4951  023226              ENDSP1: XFER    ENDSP
 4952  023226  075004                                                    .WORD   T$CODE
 4953  023230              ENDSP2: GPRMD   CMD6M,56,D,37,1,33,YES
 4954  023230  027052                                                    .WORD   T$CODE
 4955  023232  024010                                                    .WORD   CMD6M
 4956  023234  000037                                                    .WORD   37
 4957  023236  000001                                                    .WORD   T$LOLIM
 4958  023240  000033                                                    .WORD   T$HILIM
 4959  023242                      GPRMD   BPCRM,60,D,-1,1,DATCNT,YES
 4960  023242  030052                                                    .WORD   T$CODE
 4961  023244  023721                                                    .WORD   BPCRM
 4962  023246  177777                                                    .WORD   -1
 4963  023250  000001                                                    .WORD   T$LOLIM
 4964  023252  004000                                                    .WORD   T$HILIM
```

```
 4965  023254                GPRMD   NUMBM,62,D,-1,1,77777,YES
 4966  023254  031052                                          .WORD   T$CODE
 4967  023256  023733                                          .WORD   NUMBM
 4968  023260  177777                                          .WORD   -1
 4969  023262  000001                                          .WORD   T$LOLIM
 4970  023264  077777                                          .WORD   T$HILIM
 4971  023266                GPRMD   PATTM,64,D,17,0,10,YES
 4972  023266  032052                                          .WORD   T$CODE
 4973  023270  023753                                          .WORD   PATTM
 4974  023272  000017                                          .WORD   17
 4975  023274  000000                                          .WORD   T$LOLIM
 4976  023276  000010                                          .WORD   T$HILIM
 4977  023300                GPRMD   CMD7M,66,D,37,1,33,YES
 4978  023300  033052                                          .WORD   T$CODE
 4979  023302  024016                                          .WORD   CMD7M
 4980  023304  000037                                          .WORD   37
 4981  023306  000001                                          .WORD   T$LOLIM
 4982  023310  000033                                          .WORD   T$HILIM
 4983  023312                GPRMD   BPCRM,70,D,-1,1,DATCNT,YES
 4984  023312  034052                                          .WORD   T$CODE
 4985  023314  023721                                          .WORD   BPCRM
 4986  023316  177777                                          .WORD   -1
 4987  023320  000001                                          .WORD   T$LOLIM
 4988  023322  004000                                          .WORD   T$HILIM
 4989  023324                GPRMD   NUMBM,72,D,-1,1,77777,YES
 4990  023324  035052                                          .WORD   T$CODE
 4991  023326  023733                                          .WORD   NUMBM
 4992  023330  177777                                          .WORD   -1
 4993  023332  000001                                          .WORD   T$LOLIM
 4994  023334  077777                                          .WORD   T$HILIM
 4995  023336                GPRMD   PATTM,74,D,17,0,10,YES
 4996  023336  036052                                          .WORD   T$CODE
 4997  023340  023753                                          .WORD   PATTM
 4998  023342  000017                                          .WORD   17
 4999  023344  000000                                          .WORD   T$LOLIM
 5000  023346  000010                                          .WORD   T$HILIM
 5001  023350                GPRMD   CMD8M,76,D,37,1,33,YES
 5002  023350  037052                                          .WORD   T$CODE
 5003  023352  024024                                          .WORD   CMD8M
 5004  023354  000037                                          .WORD   37
 5005  023356  000001                                          .WORD   T$LOLIM
 5006  023360  000033                                          .WORD   T$HILIM
 5007  023362                GPRMD   BPCRM,100,D,-1,1,DATCNT,YES
 5008  023362  040052                                          .WORD   T$CODE
 5009  023364  023721                                          .WORD   BPCRM
 5010  023366  177777                                          .WORD   -1
 5011  023370  000001                                          .WORD   T$LOLIM
 5012  023372  004000                                          .WORD   T$HILIM
 5013  023374                GPRMD   NUMBM,102,D,-1,1,77777,YES
 5014  023374  041052                                          .WORD   T$CODE
 5015  023376  023733                                          .WORD   NUMBM
 5016  023400  177777                                          .WORD   -1
 5017  023402  000001                                          .WORD   T$LOLIM
 5018  023404  077777                                          .WORD   T$HILIM
 5019  023406                GPRMD   PATTM,104,D,17,0,10,YES
 5020  023406  042052                                          .WORD   T$CODE
```

```
 5021  023410  023753                                          .WORD   PATTM
 5022  023412  000017                                          .WORD   17
 5023  023414  000000                                          .WORD   T$LOLIM
 5024  023416  000010                                          .WORD   T$HILIM
 5025  023420                        ENDSP:
 5026  023420                                XFER    JMPMSG
 5027  023420  162004                                          .WORD   T$CODE
```

```
5028
5029                                                    .NLIST  BEX
      023422  046103  040505  020122  CLRM:     .ASCIZ  /CLEAR COUNTERS/
      023441     122  051505  052105  RRVM:     .ASCIZ  /RESET RANDOM VARIABLES/
      023470  040510  052114  040440  HAEM:     .ASCIZ  /HALT AFTER EACH CMD/
      023514  051120  047111  020124  RCVERM:   .ASCIZ  /PRINT RECOVERABLE ERRORS/
      023545     104  051511  041101  DINTM:    .ASCIZ  /DISABLE INTERRUPTS/
      023570  047111  044510  044502  IRECM:    .ASCIZ  /INHIBIT RECOVERY/
      023611     103  040510  043516  CHGM:     .ASCIZ  /CHANGE CMD SEQUENCE/
      023635     111  044116  041111  IREM:     .ASCIZ  /INHIBIT RFC ERROR REPORT/
      023666  044103  051101  041501  CHARM:    .ASCIZ  /CHARACTERISTICS CODE/
      023713     103  042115  031057  CMD2M:    .ASCIZ  "CMD/2"
      023721     102  043122  041440  BPCRM:    .ASCIZ  /BRF COUNT/
      023733     043  047440  020106  NUMBM:    .ASCIZ  /# OF OPERATIONS/
      023753     120  052101  042524  PATTM:    .ASCIZ  /PATTERN/
                                                 .LIST   BEX
5030            023764                           .EVEN
5031
5032  023764                            JMPMSG:
5033  023764                                    EXIT SFT
5034  023764  023004                                                    .WORD   T$CODE
5035
5036                                                    .NLIST  BEX
      023766  046503  027504  000063  CMD3M:    .ASCIZ  "CMD/3"
      023774  046503  027504  000064  CMD4M:    .ASCIZ  "CMD/4"
      024002  046503  027504  000065  CMD5M:    .ASCIZ  "CMD/5"
      024010  046503  027504  000066  CMD6M:    .ASCIZ  "CMD/6"
      024016  046503  027504  000067  CMD7M:    .ASCIZ  "CMD/7"
      024024  046503  027504  000070  CMD8M:    .ASCIZ  "CMD/8"
                                                 .LIST   BEX
5037                                             .EVEN
5038
5039  024032                                    ENDSFT
5040                                                                    .EVEN
5041  024032                            L10041:
5042
5043                                    ;*****************************************************************************
5044                                    ;*****************************************************************************
5045                                    ;       PATCH AREA
5046
5047  024032  000100                    PATCH:: .BLKW   64.
5048                                    ;*****************************************************************************
5049                                    ;*****************************************************************************
5050
5051  024232                                    LASTAD
5052                                                                    .EVEN
5053  024232  024254                                                    .WORD T$FREE
5054  024234  000007                                                    .WORD T$SIZE
5055  024236                            L$LAST::
5056  024236                                    ENDMOD
```

```
                        .SBTTL  HARD CODED P-TBL

                        ;++
                        ;DIAG IS PRE-PARAMETERIZED PER TBL
                        ;--

                                BGNSETUP 1
                                  BGNPTAB
024236  000000                                                  .WORD   0
024240  000000                                                  .WORD   0
024242  000000                                                  .WORD   0
024244  000000                                                  .WORD   0
024246  000002                                                  .WORD   L10044-./2-1
024250                  L10042:
024250  172522                    172522
024252  000224                    224
024254                          ENDPTAB
024254                  L10044:
024254                          ENDSETUP

        000001          .END
```

```
ACK.C = 100000 G    324#   412   417   420   423   426   429   432   435   438   441   444   447
                    450    453   456   459   462   465   468   471   474   477   480   483   485
ADR   = 000020 G    283#  3355
ALLEOT  003154 G    658#  1197  1225  1262  1290  2579  4269* 4285* 4450* 4457* 4503* 4518* 4663*
                   4674*
ASSEMB= 000010        4
ATTNM   004041 G    793#  2042
AUDRPM  004351 G    793#  3328
AUTODM  017040     3544   3606#
BFSEQ   020222     3776   3817  3831  3843  3855  3867  3879  3891  3903  3915  3927  4002#
BFSEQ0  020246     3775   4021#
BFSEQ1  020320     3816   4043#
BFSEQ2  020332     3830   4049#
BFSEQ3  020424     3842   4079#
BFSEQ4  020476     3854   4101#
BFSEQ5  020540     3866   4119#
BFSEQ6  020612     3878   4141#
BFSEQ7  020644     3890   4155#
BFSEQ8  020676     3902   4169#
BFSEQ9  020730     3914   4183#
BFSE10  020752     3926   4193#
BGNFLG= 003114      636#  1767
BINC    012434     2398   2499#
BIT0  = 000001 G    256#  1849  3136
BIT00 = 000001 G    245#   256   990  2728
BIT01 = 000002 G    244#   255
BIT02 = 000004 G    243#   254
BIT03 = 000010 G    242#   253
BIT04 = 000020 G    241#   252
BIT05 = 000040 G    240#   251
BIT06 = 000100 G    239#   250
BIT07 = 000200 G    238#   249
BIT08 = 000400 G    237#   248
BIT09 = 001000 G    236#   247
BIT1  = 000002 G    255#  3136
BIT10 = 002000 G    235#
BIT11 = 004000 G    234#
BIT12 = 010000 G    233#
BIT13 = 020000 G    232#
BIT14 = 040000 G    231#
BIT15 = 100000 G    230#
BIT2  = 000004 G    254#
BIT3  = 000010 G    253#
BIT4  = 000020 G    252#
BIT5  = 000040 G    251#
BIT6  = 000100 G    250#
BIT7  = 000200 G    249#
BIT8  = 000400 G    248#
BIT9  = 001000 G    247#
BOE   = 000400 G    287#
BPCRM   023721     4861   4885  4909  4933  4961  4985  5009  5029#
BRCPK   002324 G    519#  3651
BRFCNT  003054 G    617#  1094* 1096* 1098  1101* 1105  1368* 1466  2401  2403  2667  2687
BRF.C = 004000 G    329#   420   423   426   429   432   435   438   441   444   447   450   465
                    468   1451  1864  1960  2546  4739
CHAR    002216 G    181#  4546
```

```
CHARM   023666          4849    5029#
CHGFLG  002212 G         177#   3480*
CHGM    023611          4839    5029#
CHKERR  011004 G        1754    1914#
CH.EAI= 000040 G         181     352#    354     551     679
CH.ERI= 000020 G         353#
CH.ESS= 000200 G         351#
CKDATA  013046 G        2652    2666#
CKDCNT  013456          2705*   2706*   2722    2728    2775    2778*   2783    2798#
CKDFF   013460          2707*   2740    2750*   2756    2780    2784    2799#
CKHAE   014052 G        1113    2611    2975#   4273    4454    4618    4729    4746
CKHRTN  014124          2981    3001#
CLN   = 101012 G         480#    733    4183
CLRERR  010504 G        1758    1766#   3483
CLRFLG  002202 G         169#   3157    3159*
CLRM    023422          4815    5029#
CMDAC   007006 G        1079    1312#   2563    4610    4744
CMDASC  003354 G         742#   1355
CMDD    002220 G         182#   4548
CMDLG   003064 G         621#   1365*   1380*   1391*   1396*   1426*   2134    2243    2324    2340    2390    2526*   2533*
                        4665    4736*
CMDPKM  003606 G         793#   3141
CMDPKT  002310 G         504#    870     900     907     908     909    1105*   1366*   1367*   1369    1374*   1377    1386*
                        1388    1404*   1405*   1412*   1413*   1423*   1428    1432*   1443    1448*   1451*   1453    1661*
                        1671    1996*   2143*   2163*   2545*   2546*   2551*   2555    2556*   2695    3136    3960*   3965*
                        3968*   3974*   3979*   3982*   4738*   4739*   4741    4743*
CMDSAV  003060 G         619#   1453*   1996    2555*   4741*
CMDSEQ  003164 G         678#   1037    1069    4003    4264    4277*   4278*   4280*   4289    4445    4505    4546*   4561
                        4579
CMDSE2  003174 G         682#
CMDTBL  003266 G         710#   1342    4711
CMDWRD  003056 G         618#    984    1084    1122    1137    1160    1188    1216    1253    1281    1313    1441    1443*
                        1608    1702    1856    1864    1867    1960    2522    2524*   2529    2531*   2545    2570    2598
                        2615    2983    3957*   3971*   4613    4627    4642    4680    4732    4734*   4738
CMD.CO= 000001 G         347#    417     420     423     426     429     438     441     444     447     450     459     462
                         471     474    1137    1216    1281    1384    1421    2598    4642
CMD.C1= 000002 G         346#    417     456     471     477     480     485    1410
CMD.C2= 000004 G         345#    426     429     450     471     483     485    1401    1410    1421
CMD.C3= 000010 G         344#    417     432     435     453     456     459     462     465     468     471     474     477
                         480    1372
CMD.C4= 000020 G         342#
CMD2M   023713          4855    5029#
CMD3M   023766          4879    5036#
CMD4M   023774          4903    5036#
CMD5M   024002          4927    5036#
CMD6M   024010          4955    5036#
CMD7M   024016          4979    5036#
CMD8M   024024          5003    5036#
CNTBGN= 002544           404     591#   2399
CNTEND= 003034           404     606#
CNTLEN= 000270 G         404#   3164
CODELM  003476 G         793#   3796
COUNTE= 050321          3363#   3389    3439
CP.ADH= 000004 G         389#
CP.ADL= 000002 G         388#   1386*   1404*   1413*   1423*   2556*   4743*
CP.CMD= 000000 G         387#
```

```
CP.CNT= 000006 G   390#  1105*  1367*  1405*  1412*  2695  3960*  3965*  3968*  3974*  3979*  3982*
CTCC    003106 G   630#   896   1817*  1818*  1849   1918  1950
CVC.C = 040000 G   325#   412    483
C$AU  = 000052       4#  3747
C$AUTO= 000061       4#  3604
C$BRK = 000022       4#  1700   1790   3343   3431
C$BSEG= 000004       4#
C$BSUB= 000002       4#  3772   3813   3827   3839   3851   3863   3875   3887   3899   3911   3923   3954
C$CEFG= 000045       4#
C$CLCK= 000062       4#
C$CLEA= 000012       4#  3667
C$CLOS= 000035       4#
C$CLP1= 000006       4#
C$CVEC= 000036       4#  3536   3654   3686
C$DCLN= 000044       4#  2823   3345   3473
C$DODU= 000051       4#  2922   3555
C$DRPT= 000024       4#  1244   2908
C$DU  = 000053       4#  3702
C$EDIT= 000002       4#    63
C$ERDF= 000055       4#  1596   1651   1678   1741   2040   2117   2252   2307   2327   2348   2889
C$ERHR= 000056       4#  1978   2021   2092   2366   2673   2690   2745
C$ERRO= 000060       4#
C$ERSF= 000054       4#  3139
C$ERSO= 000057       4#  2154   2195   2265
C$ESCA= 000010       4#
C$ESEG= 000005       4#
C$ESUB= 000003       4#  3809   3823   3835   3847   3859   3871   3883   3895   3907   3919   3936   3987
C$ETST= 000001       4#  4206   4406   4471   4528   4754
C$EXIT= 000032       4#  3488   3661   3994   4296   4464   4521   4691
C$GETB= 000026       4#
C$GETW= 000027       4#
C$GMAN= 000043       4#  2992
C$GPHR= 000042       4#  3281   3721
C$GPLO= 000030       4#
C$GPRI= 000040       4#
C$INIT= 000011       4#  3506
C$INLP= 000020       4#
C$MANI= 000050       4#  2979
C$MEM = 000031       4#  3458
C$MSG = 000023       4#   850    935
C$OPEN= 000034       4#
C$PNTB= 000014       4#   813    819    841    861    867    885   2483   2681   2699   2788
C$PNTF= 000017       4#  3331   3397   3409   3470   3547   3575   3590   3692   3799
C$PNTS= 000016       4#  3034   3044   3054   3064   3073   3082   3092
C$PNTX= 000015       4#   893    904    913    923   2767   2952   2962
C$QIO = 000377       4#
C$RDBU= 000007       4#
C$REFG= 000047       4#  3187   3219   3237   3245
C$RESE= 000033       4#
C$REVI= 000003       4#    62
C$RFLA= 000021       4#  3228
C$RPT = 000025       4#  3110
C$SEFG= 000046       4#
C$SPRI= 000041       4#  3351
C$SVEC= 000037       4#  3296   3530   3734
C$TPRI= 000013       4#
```

```
DATARD  003046 G   614#  988  1024  1386  2556  2628  2632  2712  3461* 3462* 4743
DATAWT  003044 G   399   613#  1423  1473  1668* 1737* 1738* 1900* 2211* 2710  3459* 3461  3464
                   3939  3943
DATCNT= 004000 G   187   191   195   203   207   401#  687   691   695   3462  3464  4050  4054
                   4058  4062  4066  4070  4074  4084  4146  4150  4156  4160  4164  4170  4174
                   4178  4220  4237  4332  4345  4389  4422  4494  4509  4860  4884  4908  4932
                   4960  4984  5008
DEVTBL  002532 G   584#  809   857   1119  1185  1250  1615  2567  2812  2820  2827  2847  2850
                   2917  2924  3025  3030  3197* 3211* 3212* 3273  3360  3393  3405  3521  3550
                   3571  3586  3647  3683* 3719* 3781  3795  4624
DFPTBL  002174 G   149#
DFTSCH= 000040 G   354#  1039
DIA   = 100006 G   485#  735
DIABLK= 003044 G   399#  1413
DIACNT= 000020 G   400#  1412
DIAGMC= 000000       4
DINT    002210 G   175#  1643  1716
DINTM   023545     4831  5029#
DLY   = 000020 G   489#  737
DLY.C = 000020 G   343#  489   4585
DRI   = 100013 G   417#  710   4025
DROPDM  004322 G   793#  3689
DROPED  003152 G   656#  2474  2641  2647  2807* 2841* 2903* 2938*
DROPN   013766     2917* 2941#  3550* 3688
DROPU   013560 G   1600  1655  1682  1745  2044  2121  2256  2311  2331  2352  2861#
DROPUA  013704     2909#  3577  3592
DRORTN  013760     2937#
DTAERM  004720 G   805#  2676  2693  2748
DTAER2  004403 G   793#  2764
DTAER3  004452 G   793#  2785
DTAER4  004514 G   793#  2678
DTAER5  004535 G   793#  2696
EF.CON= 000036 G   263#
EF.NEW= 000035 G   264#  3236
EF.PWR= 000034 G   265#  3218
EF.RES= 000037 G   262#  3244
EF.STA= 000040 G   261#  3186
EINC    012442     2456  2503#
END   = 177777 G   491#  588   618   619   620   703   704   705   706   707   738   1072  1119
                   1185  1250  1615  2567  2820  3025  3273  3360  3521  3647  3781  4006  4014
                   4041  4047  4077  4099  4117  4139  4153  4167  4181  4191  4201  4261  4282
                   4292  4442  4460  4500  4515  4564  4624
ENDERF= 003124     644#  1757
ENDFLG= 003156     660#  3482
ENDSP   023420     4952  5025#
ENDSP1  023226     4842  4951#
ENDSP2  023230     4950  4953#
EOTFLG  003134 G   649#  1125  1135  1191  1194  1214  1256  1259  1279  1835* 2573  2576  2596
                   4630  4640
ERCVER  002205 G   172#  2151  2476
ERLOG   003117 G   639#  2385  2388*
ERRREC  003122 G   642#  1663  1921  2078  2168* 2207* 2277*
ERS   = 100411 G   474#  731   4087
EVL   = 000004 G   281#
EXALL   006204 G   1068#  3777  3818  3832  3844  3856  3868  3880  3892  3904  3916  3928  3931
                   4262  4283  4293  4443  4461  4501  4516
```

```
EXARTN  006476          1154    1171#
EXCRTN  010276          1601    1656    1685#
EXCUTE  007770 G        1199    1205    1220    1227    1585#   2172    2215    2284    2639
EXPBOT  003144 G         650#   2057    3768*   4218*   4420*   4486*   4541*
EXSUB   006500 G        1112    1182#   4272    4453    4611    4728    4745
E$END = 002100             4#
E$LOAD= 000035             4#      86
FATSM   004077 G         793#   2309
FIRSTU  013462 G        1116    1182    1247    1612    2564    2806#   3022    3268    3357    3518    3644    3778    4621
FMT.C0= 000040 G         338#    412
FMT.C1= 000100 G         335#    412
FTLCNT  003024 G         605#   2862*   3086    3541*   3569*   3584*
FUNRM   004057 G         793#   2119
F$AU  = 000015             4#   3712    3746
F$AUTO= 000020             4#   3516    3603
F$BGN = 000040             4#      8     215     220     805     846     853     928     946     954     962     970    3005
                        3010    3017    3103    3120    3133    3488    3516    3641    3661    3677    3698    3712    3742
                        3750    3761    3763    3771    3808    3812    3822    3826    3834    3838    3846    3850    3858
                        3862    3870    3874    3882    3886    3894    3898    3906    3910    3918    3922    3935    3953
                        3986    3994    4205    4213    4296    4405    4415    4464    4470    4481    4521    4527    4536
                        4691    4753    4757    4762    4773    4789    4809    5034    5057    5064    5065    5074    5076
F$CLEA= 000007             4#   3641    3666
F$DU  = 000016             4#   3677    3701
F$END = 000041             4#      8     215     220     844     851     926     936     952     960     968     976    3005
                        3010    3101    3111    3488    3507    3605    3661    3668    3696    3703    3740    3748    3750
                        3761    3763    3771    3808    3810    3812    3822    3824    3826    3834    3836    3838    3846
                        3848    3850    3858    3860    3862    3870    3872    3874    3882    3884    3886    3894    3896
                        3898    3906    3908    3910    3918    3920    3922    3935    3937    3953    3986    3988    3994
                        4205    4207    4213    4296    4405    4407    4415    4464    4470    4472    4481    4521    4527
                        4529    4536    4691    4753    4755    4757    4762    4789    4797    5034    5042    5057    5064
                        5065    5074    5076
F$HARD= 000004             4#   4773    4789    4795    4842    4950    4952    5027    5034
F$HW  = 000013             4#    147     156
F$INIT= 000006             4#   3133    3505
F$JMP = 000050             4#    844     926    3101    3488    3661    3696    3740    3994    4296    4464    4521    4691
                        4789    5034
F$MOD = 000000             4#      8     215     220    3005    3010    3750    3761    4757    4762    5057
F$MSG = 000011             4#    805     849     853     934
F$PROT= 000021             4#   3120    3125
F$PWR = 000017             4#
F$RPT = 000012             4#   3017    3109
F$SEG = 000003             4#
F$SOFT= 000005             4#   4809    4842    4950    4952    5027    5034    5040
F$SRV = 000010             4#    946     950     954     958     962     966     970     974
F$SUB = 000002             4#   3772    3808    3813    3822    3827    3834    3839    3846    3851    3858    3863    3870
                        3875    3882    3887    3894    3899    3906    3911    3918    3923    3935    3954    3986
F$SW  = 000014             4#    165     212
F$TEST= 000001             4#   3764    4205    4214    4405    4416    4470    4482    4527    4537    4753
GCMDA   007060 G        1314    1320    1338#   2984
GENPAT  007472 G        1424    1462#
GES   = 100017 G         471#    513     730    4033    4613
GETSTM  004663 G         793#   2949
GIT     007764          1568    1573#
GOWAIT  010300 G        1264    1270    1285    1292    1695#   2173    2216    2285    2643
GOWRTN  010472          1746    1756#
GSCPK   002320 G         513#   2882    3372    3560
```

```
G$CNTO= 000200          4#
G$DISP= 000003          4#
G$EXCP= 000400          4#
G$HILI= 000002          4#
G$LOLI= 000001          4#
G$NO  = 000000          4#
G$OFFS= 000400          4#  2995  4777  4782  4814  4818  4822  4826  4830  4834  4838  4844  4848
                     4854  4860  4866  4872  4878  4884  4890  4896  4902  4908  4914  4920  4926
                     4932  4938  4944  4954  4960  4966  4972  4978  4984  4990  4996  5002  5008
                     5014  5020
G$OFSI= 000376          4#  2995  4777  4782  4814  4818  4822  4826  4830  4834  4838  4844  4848
                     4854  4860  4866  4872  4878  4884  4890  4896  4902  4908  4914  4920  4926
                     4932  4938  4944  4954  4960  4966  4972  4978  4984  4990  4996  5002  5008
                     5014  5020
G$PRMA= 000001          4#  4777
G$PRMD= 000002          4#  4782  4848  4854  4860  4866  4872  4878  4884  4890  4896  4902  4908
                     4914  4920  4926  4932  4938  4944  4954  4960  4966  4972  4978  4984  4990
                     4996  5002  5008  5014  5020
G$PRML= 000000          4#  2995  4814  4818  4822  4826  4830  4834  4838  4844
G$RADA= 000140          4#
G$RADB= 000000          4#
G$RADD= 000040          4#  4854  4860  4866  4872  4878  4884  4890  4896  4902  4908  4914  4920
                     4926  4932  4938  4944  4954  4960  4966  4972  4978  4984  4990  4996  5002
                     5008  5014  5020
G$RADL= 000120          4#  2995  4814  4818  4822  4826  4830  4834  4838  4844
G$RADO= 000020          4#  4777  4782  4848
G$XFER= 000004          4#  4789  4842  4950  4952  5027  5034
G$YES = 000010          4#  2995  4777  4782  4814  4818  4822  4826  4830  4834  4838  4844  4848
                     4854  4860  4866  4872  4878  4884  4890  4896  4902  4908  4914  4920  4926
                     4932  4938  4944  4954  4960  4966  4972  4978  4984  4990  4996  5002  5008
                     5014  5020
HAE     002204 G     171#  2976
HAEM    023470      4823  5029#
HALTM   003546 G     793#  2986*  2988*  2990*  2996
HELP  = 000000         2#     4     16    104    120    151    169    296    789    806   3019   3104   3135
                     3490  3643  3663  3679  3698  3714  3742  4776  4791  4812  5029
HOE   = 100000 G     294#
HRDCNT  003014 G     604#  1976*  2019*  2090*  2743*  3087
IBE   = 010000 G     291#
IDU   = 000040 G     284#
IER   = 020000 G     292#
IE.C  = 000200 G     334#   412   1661
INIT10  015260      3135#  3152
INIT15  015474      3189   3217#
INIT16  015514      3221   3227#
INTFLG  003124 G     648#   948*   956*   964*   972*  1646  1660*  1719  3737*
INTPRI= 000340 G      56    394#  3292  3730
IRE     003151 G     655#  1973  2075  2274  4543*
IREC    002211 G     176#  2165  2204  2471  2927  3353
IRECM   023570      4835  5029#
IREM    023635      4845  5029#
ISR   = 000100 G     285#
IXE   = 004000 G     290#
I$AU  = 000041          4#  3712#  3748#
I$AUTO= 000041          4#  3516#  3605#
I$CLN = 000041          4#  3641#  3661  3668#
```

```
I$DU  = 000041          4#   3677#   3703#
I$HRD = 000041       4773#   4797#
I$INIT= 000041          4#   3133#   3488    3507#
I$MOD = 000041          4#      8#    215#    220#   3005#   3010#   3750#   3761#   4757#   4762#   5057#
I$MSG = 000041          4#    805#    851#    853#    936#
I$PROT= 000040          4#   3120#
I$PTAB= 000041          4#   5065#   5074#
I$PWR = 000041          4#
I$RPT = 000041          4#   3017#   3111#
I$SEG = 000041          4#   3763    3771    3812    3826    3838    3850    3862    3874    3886    3898    3910    3922
                     3953    4213    4415    4481    4536
I$SETU= 000041          4#   5064#   5065    5076#
I$SFT = 000041       4809#   5042#
I$SRV = 000041          4#    946#    952#    954#    960#    962#    968#    970#    976#
I$SUB = 000041          4#   3763    3771#   3808#   3810#   3812#   3822#   3824#   3826#   3834#   3836#   3838#   3846#
                     3848#   3850#   3858#   3860#   3862#   3870#   3872#   3874#   3882#   3884#   3886#   3894#   3896#
                     3898#   3906#   3908#   3910#   3918#   3920#   3922#   3935#   3937#   3953#   3986#   3988#   4213
                     4415    4481    4536
I$TST = 000041          4#   3763#   3771    3812    3826    3838    3850    3862    3874    3886    3898    3910    3922
                     3953    3994    4205#   4207#   4213#   4296    4405#   4407#   4415#   4464    4470#   4472#   4481#
                     4521    4527#   4529#   4536#   4691    4753#   4755#
JLOC    003102 G     628#   4570*   4580*
JLOOP   003100 G     627#   4557*   4571    4577*
JMP   = 000040 G     487#    736
JMPMSG  023764      5027    5032#
JMP.C = 000040 G     339#    487    4566
J$JMP = 000167          4#    844    926    3101    3696    3740
LENMSK  003066 G     622#   1096   4223*   4224*   4425*   4426*
LOE   = 040000 G     293#
LOG     012150 G    1755    2384#   2904
LOT   = 000010 G     282#
L$ACP   002110 G      93#
L$APT   002036 G      51#
L$AU    017314 G      78    3712#
L$AUT   002070 G      77#
L$AUTO  016550 G      94    3516#
L$CCP   002106 G      91#
L$CLEA  017172 G      92    3641#
L$CO    002032 G      47#
L$DEPO  002011 G      29#
L$DESC  002136 G      84     128#
L$DESP  002076 G      83#
L$DEVP  002060 G      69#
L$DISP  002124 G      54     113#
L$DLY   002116 G      99#   1707    3146    3336    3376    3424    4594
L$DTP   002040 G      53#
L$DTYP  002034 G      49#
L$DU    017242 G      80    3677#
L$DUT   002072 G      79#
L$DVTY  002164 G      70     135#
L$EF    002052 G      64#
L$ETP   002102 G      87#
L$EXP1  002044 G      57#
L$EXP2  002046 G      59#
L$EXP4  002064 G      73#
L$EXP5  002066 G      75#
```

```
L$HARD  022616 G    36    4773    4774#
L$HIME  002120 G   101#
L$HPCP  002016 G    35#
L$HPTP  002022 G    39#
L$HW    002174 G    40     147     148#
L$ICP   002104 G    89#
L$INIT  015260 G    90    3133#
L$LADP  002026 G    43#
L$LAST  024236 G    44    5055#   5076
L$LOAD  002100 G    85#
L$LUN   002074 G    81#   2827*   2850*
L$MREV  002050 G    61#
L$NAME  002000 G    18#
L$PRIO  002042 G    55#
L$PROT  015252 G    96    3120#
L$PRT   002112 G    95#
L$REPP  002062 G    71#
L$REV   002010 G    27#
L$RPT   014126 G    72    3017#
L$SOFT  022670 G    38    4809    4810#
L$SPC   002056 G    67#
L$SPCP  002020 G    37#
L$SPTP  002024 G    41#
L$STA   002030 G    45#
L$SW    002202 G    42     165     166#
L$TEST  002114 G    97#
L$TIML  002014 G    33#
L$UNIT  002012 G    31#   3204
L10000  002200     147     156#
L10001  002310     165     212#
L10002  005064     845     849#
L10003  006010     927     934#
L10004  006016     950#
L10005  006024     958#
L10006  006032     966#
L10007  006040     974#
L10010  015250    3102    3109#
L10012  016546    3489    3505#
L10013  017036    3603#
L10014  017240    3662    3666#
L10015  017312    3697    3701#
L10016  017406    3741    3746#
L10017  020774    3995    4205#
L10020  017542    3808#
L10021  017566    3822#
L10022  017606    3834#
L10023  017626    3846#
L10024  017646    3858#
L10025  017666    3870#
L10026  017706    3882#
L10027  017726    3894#
L10030  017746    3906#
L10031  017766    3918#
L10032  020024    3935#
L10033  020210    3986#
L10034  021452    4297    4405#
```

```
L10035  021620            4465    4470#
L10036  021752            4522    4527#
L10037  022612            4692    4753#
L10040  022666            4773    4789    4796#
L10041  024032            4809    5034    5041#
L10042  024250            5070#
L10044  024254            5069    5074#
MBR    = 100012 G          456#    519     725
MEMOM   016444            3467    3490#
MOD.C0= 000400 G            333#    412     423     435     438     441     468     474     477     984    1122    1188    1253
                           1388    1867    1870    1880    2570    4627
MOD.C1= 001000 G            332#    412     438     441     444     447     450     462     465     468     480    2163
MOD.C2= 002000 G            331#    412     453
MOD.C3= 004000 G            328#    412
MOVMSG  010554 G           1594    1676    1739    1752    1811#   2884    3443
MSGCNT= 000016 G            398#    550    1634    1825    2872
MSGPKA  002502 G            561#   1625    1629    1820    2867    3784
MSGPKT  002334 G            532#    898     916     917     918     919     987    1828*   1835    1851    1935    1963    2055
                           2064    2239    2403    2406    2668    2864    2955    2956    2957    2958
MSGPK0  002352 G            541#    548     561
MSGPK1  002370 G            542#    562
MSGPK2  002406 G            543#    563
MSGPK3  002424 G            544#    564
MS.RFC= 000004 G            359#    898     987    1963    2403    2406    2668
MS.XS0= 000006 G            360#    919    1835    2055    2064    2958
MS.XS1= 000010 G            361#    918    2957
MS.XS2= 000012 G            362#    917    1851    1935    2956
MS.XS3= 000014 G            363#    916    2239    2864    2955
NCMD.C= 177740 G            412#   1370
NCNT    003050 G            615#   1077    1158*   1418*   2558*   2561    2613*   4608    4660    4678*
NCNT1   003052 G            616#   1077    1416*   2561    4608    4660*   4661*
NEXTU   013530 G           1147    1234    1299    1618    2607    2840#   3094    3319    3448    3597    3655    3803    4652
NINUSE= 177774 G            411#    584     585     586     587    2812    2847    2924    3197    3683
NOINTM  004125 G            793#   1743
NRDYM   017134             3406    3587    3617#
NSSRM   003775 G            793#   1598
NUMBM   023733             4867    4891    4915    4939    4967    4991    5015    5029#
NURTY1  004577 G            793#   2480
OFLINM  004633 G            793#   3394    3572
ONEFIL= 000001                2#      5     215#    218    3005#   3008    3751    3752#   4757    4758#   4760
OPFLAG  003162 G            672#   3229*   3355
OPP.C  = 020000 G           326#    412     441     447    2143
O$APTS= 000000                4#     45
O$AU   = 000001               4#     15#     77
O$BGNR= 000001                4#     15#     71
O$BGNS= 000001                4#     15#     37
O$DU   = 000001               4#     15#     79
O$ERRT= 000000                4#     87
O$GNSW= 000001                4#     15#     41
O$POIN= 000001                4#     15#    103
O$SETU= 000001                4#     15#     31    5053
PASCNT  002764 G            601#    808     856    2910    2913*   3029    3305*   3310*   3791
PATCH   024032 G           5047#
PATERN  003104 G            629#   1419*   1463
PATR0   007556 G           1481    1494#
PATR1   007614 G           1482    1515#
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PATR2   007634 G    1483   1525#
PATR3   007644 G    1484   1531#
PATR4   007670 G    1485   1543#
PATR5   007702 G    1486   1550#
PATR6   007714 G    1487   1556#
PATR7   007734 G    1488   1566#  1572
PATR8   007766 G    1489   1577#
PATTBL  007534      1475   1481#
PATTM   023753      4873   4897   4921   4945   4973   4997   5021   5029#
PCMDWD  003062 G     620#  1160*  1319   1441*  1870   1880   2522*  2529*  2615*  4680*  4732*
PIRE    002214 G     179#  4543
PNT   = 001000 G     288#
PRI   = 002000 G     289#
PRI00 = 000000 G     277#  3350
PRI01 = 000040 G     276#
PRI02 = 000100 G     275#
PRI03 = 000140 G     274#
PRI04 = 000200 G     273#
PRI05 = 000240 G     272#
PRI06 = 000300 G     271#
PRI07 = 000340 G     270#   394   352o
PRXST   013770 G    2896   2948#  4615
PTCMDS  022464      4549   4550   4551   4552   4553   4554   4555   4706#
PWRFLG  003157 G     665#  3225*  3233   3455   3485*
RANB    003070 G     623#  1090*  1092   1569*  1570   3180*  4252   4334*  4336   4392*  4394
RANBC = 153624 G     409#  3180
RANCMD  021260      4256   4302#
RANDOM  003145 G     651#  1081   1966   2068   3766*  4216*  4418*  4484*  4539*
RANP  = 000007 G     185    189    193    197    201    205    209    406#   685    689    693    697    701
                    4244   4341   4349   4399   4498   4513
RANRD   021320      4275   4310   4311   4312   4313   4314   4315   4316   4317   4329#
RANS    003072 G     624#  1090   1092*  1094   1569   1570*  1571   3182*  4252*  4254   4334   4392
RANSC = 032561 G     410#  3182
RANW    021420      4359   4374   4388#
RANWR   021374      4303   4304   4305   4306   4307   4308   4309   4357#  4437
RANWV   021406      4302   4372#
RCVERM  023514      4827   5029#
RDF   = 104001 G     420#   694    711   2531   3971   4169   4343   4492
RDR   = 104401 G     423#   690    712   2524   3957   4155   4330   4507   4734
RECCNT  003034 G     607#   807    855   1666*  1668   1737   1847*  1859*  1873*  1883   1886*  1900   2209*
                    2211   2650   3028   3318*
RECLOG  003116 G     638#  1844   1854*  2900
RECRED  006006       822*   829    831*   837    879*   881    931#
RECTAP  006042 G     827    877    983#
RECUD   010640 G    1753   1843#
RERM    004254 G     793#  2156   2197
RETRYC  003114 G     637#  2140   2149   2161*  2192   2202*  2262   2272*  2343   2361   2479
RFBC    002644 G     594#  3057   3058   3059   3060
RFCERM  003760 G     793#  1980
RFREC   002744 G     599#  3067
RFUNR   002754 G     600#  3076
RLEXM   004014 G     793#  2350   2368
RNF   = 125401 G     441#   720   4163
RNOPSC= 177740 G     405#  4239   4277   4337   4395
RNR   = 105401 G     438#   719   4159
RNYM    004210 G     793#  2891
```

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RPF    = 105001 G    444#   721   4173
RPR    = 125001 G    447#   722   4177
RPTFLG   003147 G    653#  1239   1242*  4287*
RPT1A    014510      3031  3105#
RPT1B    014565      3041  3105#
RPT1C    014636      3051  3105#
RPT1D    014707      3061  3105#
RPT1F    015013      3070  3105#
RPT1G    015064      3079  3105#
RPT1I    015213      3089  3105#
RRANV    002203 G     170#  3177
RRBC     002604 G     593#  3047   3048   3049   3050
RRECL  = 000020 G     407#  2137   2361
RRREC    002724 G     597#  3068
RRUNR    002734 G     598#  3077
RRVM     023441      4819  5029#
RTLE     012022 G    2132  2190   2260   2323#
RTLRTN   012146      2334  2376#
RWCPK    002330 G     526#  2279
RWD    = 102010 G     453#   526    682    698    724   1054   1702   1856   4043   4119   4141   4187
RWERR    003120 G     640#  1993   2246*  2338*  2452
R5SAVE   003110 G     631#  1611*  1623   3021*  3099
SCCNT    002774 G     602#  1923*  2086*  3088
SCERM    003734 G     793#  2023
SCH    = 140004 G     483#   678    734   1038   1608   4021   4029   4037
SCHBK    002442 G     548#  1404   1407*  1625*
SCHCNT=  000010 G     396#  1405
SEQEND   003254 G     703#  4249   4435
SETCH    006140 G    1036#  4225   4427   4487   4544
SETRW    006164 G    1053#  4229   4290   4428   4458   4488
SETUP    007114 G    1074   1364#  4605
SFF    = 105010 G     465#   728   4105   4113
SFPTBL   002202 G     167#
SFR    = 105410 G     468#   729   4101   4109
SPAFLG   003161 G     667#
SRF    = 104010 G     432#   717   4123   4131
SRR    = 104410 G     435#   718   4127   4135
STAERM   005066 G     853#  1599   1654   1681   1744   1981   2024   2043   2095   2120   2157   2198   2255
                     2268  2310   2330   2351   2369   2892
STAER1   005400       810   858    929#  1315*  1316*  1317*
STAER2   005556       890   929#
STAER3   005635       901   929#
STAER4   005673       910   929#
STAER5   005713       920   929#  2959
STAER6   005522       838   882    929#
STAER7   005472       816   864    929#  1322*  1324*  1326*
STAFLG   003156 G     664#  2932*  3191*  3223*  3241   3820*  4227   4231*  4430*  4490*  4559*
SVCGBL=  000000        4#    18     19     27     28     29     30     31     32     33     34     35     36
                      37    38     39     40     41     42     43     44     45     46     47     48     49
                      50    51     52     53     54     55     56     57     58     59     60     61     62
                      64    65     67     68     69     70     71     72     73     74     75     76     77
                      78    79     80     81     82     83     84     85     86     87     88     89     90
                      91    92     93     94     95     96     97     98     99    100    101    102    113
                     114   128    129    135    136    148    149    150    166    167    168    805    806
                     853   854    946    947    954    955    962    963    970    971   3017   3018   3120
                    3121  3133   3134   3516   3517   3641   3642   3677   3678   3712   3713   4774   4775
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4810 4811 5055# 5056

SVCINS= 000001

4# 19 20 21 22 23 24 25 26 28 30 32 34
36 38 40 42 44 46 48 50 52 54 56 58 60
62 63 65 66 68 70 72 74 76 78 80 82 84
86 88 90 92 94 96 98 100 102 112 114 115 116
117 118 129 133 136 137 147 165 807 808 809 810 811
812 813 814 816 817 818 819 820 837 838 839 840 841
842 844 845 850 855 856 857 858 859 860 861 862 864
865 866 867 868 881 882 883 884 885 886 890 891 892
893 894 896 897 898 899 900 901 902 903 904 905 907
908 909 910 911 912 913 914 916 917 918 919 920 921
922 923 924 926 927 935 951 959 967 975 1244 1596 1597
1598 1599 1651 1652 1653 1654 1678 1679 1680 1681 1700 1705 1706
1707 1708 1709 1710 1711 1712 1741 1742 1743 1744 1790 1978 1979
1980 1981 2021 2022 2023 2024 2040 2041 2042 2043 2092 2093 2094
2095 2117 2118 2119 2120 2154 2155 2156 2157 2195 2196 2197 2198
2252 2253 2254 2255 2265 2266 2267 2268 2307 2308 2309 2310 2327
2328 2329 2330 2348 2349 2350 2351 2366 2367 2368 2369 2479 2480
2481 2482 2483 2484 2673 2674 2675 2676 2678 2679 2680 2681 2682
2690 2691 2692 2693 2695 2696 2697 2698 2699 2700 2745 2746 2747
2748 2759 2760 2761 2762 2763 2764 2765 2766 2767 2768 2783 2784
2785 2786 2787 2788 2789 2823 2889 2890 2891 2892 2908 2922 2949
2950 2951 2952 2953 2955 2956 2957 2958 2959 2960 2961 2962 2963
2979 2981 2992 2993 2994 2995 2996 2997 3028 3029 3030 3031 3032
3033 3034 3035 3037 3038 3039 3040 3041 3042 3043 3044 3045 3047
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3062 3063 3064 3065 3067 3068 3069 3070 3071 3072 3073 3074 3076
3077 3078 3079 3080 3081 3082 3083 3085 3086 3087 3088 3089 3090
3091 3092 3093 3101 3102 3110 3139 3140 3141 3142 3144 3145 3146
3147 3148 3149 3150 3151 3186 3187 3189 3218 3219 3221 3228 3229
3236 3237 3244 3245 3281 3292 3293 3294 3295 3296 3297 3328 3329
3330 3331 3332 3334 3335 3336 3337 3338 3339 3340 3341 3343 3345
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3734 3735 3740 3741 3747 3772 3794 3795 3796 3797 3798 3799 3800
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3887 3895 3899 3907 3911 3919 3923 3936 3954 3987 3994 3995 4206
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4596 4597 4598 4599 4691 4692 4754 4773 4777 4778 4779 4780 4782
4783 4784 4785 4786 4789 4795 4809 4814 4815 4816 4818 4819 4820
4822 4823 4824 4826 4827 4828 4830 4831 4832 4834 4835 4836 4838
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4918 4920 4921 4922 4923 4924 4926 4927 4928 4929 4930 4932 4933
4934 4935 4936 4938 4939 4940 4941 4942 4944 4945 4946 4947 4948
4950 4952 4954 4955 4956 4957 4958 4960 4961 4962 4963 4964 4966
4967 4968 4969 4970 4972 4973 4974 4975 4976 4978 4979 4980 4981
4982 4984 4985 4986 4987 4988 4990 4991 4992 4993 4994 4996 4997

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                    4998    4999    5000    5002    5003    5004    5005    5006    5008    5009    5010    5011    5012
                    5014    5015    5016    5017    5018    5020    5021    5022    5023    5024    5027    5034    5040
                    5052    5053    5054    5065    5066    5067    5068    5069
SVCSUB= 000000       4#    3771    3772    3812    3813    3826    3827    3838    3839    3850    3851    3862    3863
                    3874    3875    3886    3887    3898    3899    3910    3911    3922    3923    3953    3954
SVCTAG= 000000       4#     156     157     212     213     849     850     934     935     950     951     958     959
                     966     967     974     975    2998    2999    3109    3110    3505    3506    3603    3604    3666
                    3667    3701    3702    3746    3747    3808    3809    3822    3823    3834    3835    3846    3847
                    3858    3859    3870    3871    3882    3883    3894    3895    3906    3907    3918    3919    3935
                    3936    3986    3987    4205    4206    4405    4406    4470    4471    4527    4528    4753    4754
                    4796    4797    5041    5042    5070    5071    5074    5075
SVCTST= 000000       4#    3763    3764    4213    4214    4415    4416    4481    4482    4536    4537
SWBFLG  003150 G    654#    1002    1445    2548    2725    3930*   3933*   3963*   3977*
SWB.C = 010000 G    327#     412    1448    2551
S$LSYM= 010000       4#     157#    213#    850#    935#    951#    959#    967#    975#    2993    2998    2999#   3110#
                    3506#   3604#   3667#   3702#   3747#   3809#   3823#   3835#   3847#   3859#   3871#   3883#   3895#
                    3907#   3919#   3936#   3987#   4206#   4406#   4471#   4528#   4754#   4797#   5042#
TCCRA   011210      1955    2003#
TCC0    011230 G    2003    2018#
TCC1    011246 G    2004    2039#   3444
TCC2    011264 G    2005    2054#
TCC3    011374 G    2006    2116#
TCC4    011412 G    2007    2132#
TCC5    011544 G    2008    2190#
TCC6    011642 G    2009    2238#
TCC7    012004 G    2010    2306#
TC2RTN  011372      2060    2102#
TIME1   003074 G     625#    824*    833    1586*   1590*   1592    1696*   1732*   1734    1786*   1792*   1796    2751*
                    2752*   2762    2994    3364*   3367*   3369    3441
TIME2   003076 G     626#    826*    835    2753*   2754*   2760    3414*   3417*   3419    4590*   4600*
TOERM   003713 G     793#    1680
TOOMM   004164 G     793#    1653
TRAPD4  003160 G     666#    3524*   3538    3628*
TRAP4   017164 G    3527     3627#
TSAM    004142 G     793#    2094
TSBA  = 002452 G     395#
TSC.FC= 177717 G     320#
TSC.TC= 177761 G     321#    1815
TSDB    002452 G     395     555#    899    1671*   2279*   2882*   3287*   3288*   3372*   3560*   3651*   3725*   3726*
TSSR    002462 G     556#    1605    1649    1674    1727    1794    1812    2930*   3285*   3383    3386    3533    3543
                    3563    3566    3723*
TSSREG  003112 G     632#     897    1649*   1812*   1814    1915    1929    1931
TSVCT   002472 G     557#    3290*   3294    3653    3685    3728*   3732
TS.A16= 000400 G     317#
TS.A17= 001000 G     316#
TS.NBA= 002000 G     315#
TS.NXM= 004000 G     314#    1929
TS.OFL= 000100 G     319#    3386    3566
TS.RMR= 010000 G     313#
TS.SC = 100000 G     310#    1915
TS.SPE= 020000 G     312#
TS.SSR= 000200 G     318#    1605    1674    1724    1794    3383    3563
TS.UPE= 040000 G     311#    1931
TS4ADR  022642      4778     4791#
TS4CL   002522 G     575#    3788*   3789*   3794
TS4INT  002512 G     568#    3293    3731
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TS4IN0  006012 G      568    946#
TS4IN1  006020 G      569    954#
TS4IN2  006026 G      570    962#
TS4IN3  006034 G      571    970#
TS4VCT  022657       4783   4791#
T$ARGC= 000003         19#    20#    21#    22#    23#    24#   807#   814   816#   820   837#   842   855#
                      862    864#   868    881#   886    890#   894    896#   905    907#   914    916#   924
                     2479#  2484   2678#  2682   2695#  2700   2759#  2768   2783#  2789   2949#  2953   2955#
                     2963   3028#  3035   3037#  3045   3047#  3055   3057#  3065   3067#  3074   3076#  3083
                     3085#  3093   3328#  3332   3393#  3398   3405#  3410   3467#  3471   3543#  3548   3571#
                     3576   3586#  3591   3688#  3693   3794#  3800
T$CODE= 023004       2995#  4777#  4782#  4789#  4814#  4818#  4822#  4826#  4830#  4834#  4838#  4842#  4844#
                     4848#  4854#  4860#  4866#  4872#  4878#  4884#  4890#  4896#  4902#  4908#  4914#  4920#
                     4926#  4932#  4938#  4944#  4950#  4952#  4954#  4960#  4966#  4972#  4978#  4984#  4990#
                     4996#  5002#  5008#  5014#  5020#  5027#  5034#
T$ERRN= 000001          4#  1597#  1652#  1679#  1742#  1979#  2022#  2041#  2093#  2118#  2155#  2196#  2253#
                     2266#  2308#  2328#  2349#  2367#  2674#  2691#  2746#  2890#  3140#
T$EXCP= 000000       4777#  4781   4782#  4787   4848#  4853   4854#  4859   4860#  4865   4866#  4871   4872#
                     4877   4878#  4883   4884#  4889   4890#  4895   4896#  4901   4902#  4907   4908#  4913
                     4914#  4919   4920#  4925   4926#  4931   4932#  4937   4938#  4943   4944#  4949   4954#
                     4959   4960#  4965   4966#  4971   4972#  4977   4978#  4983   4984#  4989   4990#  4995
                     4996#  5001   5002#  5007   5008#  5013   5014#  5019   5020#  5025
T$FLAG= 000041        844#   846    926#   928   3101#  3103   3488#  3661#  3696#  3698   3740#  3742   3994#
                     4296#  4464#  4521#  4691#  4789#  5034#
T$FREE= 024254       5053   5076#
T$GMAN= 000000          4#
T$HILI= 000010       4777#  4780   4782#  4786   4848#  4852   4854#  4858   4860#  4864   4866#  4870   4872#
                     4876   4878#  4882   4884#  4888   4890#  4894   4896#  4900   4902#  4906   4908#  4912
                     4914#  4918   4920#  4924   4926#  4930   4932#  4936   4938#  4942   4944#  4948   4954#
                     4958   4960#  4964   4966#  4970   4972#  4976   4978#  4982   4984#  4988   4990#  4994
                     4996#  5000   5002#  5006   5008#  5012   5014#  5018   5020#  5024
T$LAST= 000001          4#  5053#  5064
T$LOLI= 000000       4777#  4779   4782#  4785   4848#  4851   4854#  4857   4860#  4863   4866#  4869   4872#
                     4875   4878#  4881   4884#  4887   4890#  4893   4896#  4899   4902#  4905   4908#  4911
                     4914#  4917   4920#  4923   4926#  4929   4932#  4935   4938#  4941   4944#  4947   4954#
                     4957   4960#  4963   4966#  4969   4972#  4975   4978#  4981   4984#  4987   4990#  4993
                     4996#  4999   5002#  5005   5008#  5011   5014#  5017   5020#  5023
T$LSYM= 010000          4#   157    213    850    935    951    959    967    975   3110   3506   3604   3667
                     3702   3747   3809   3823   3835   3847   3859   3871   3883   3895   3907   3919   3936
                     3987   4206   4406   4471   4528   4754   4797   5042
T$LTNO= 000005       5056#
T$NEST= 177777          4#     8#   147#   156#   165#   212#   215#   220#   805#   849#   853#   934#   946#
                      950#   954#   958#   962#   966#   970#   974#  3005#  3010#  3017#  3109#  3120#  3125#
                     3133#  3505#  3516#  3603#  3641#  3666#  3677#  3701#  3712#  3746#  3750#  3761#  3764#
                     3772#  3808#  3813#  3822#  3827#  3834#  3839#  3846#  3851#  3858#  3863#  3870#  3875#
                     3882#  3887#  3894#  3899#  3906#  3911#  3918#  3923#  3935#  3954#  3986#  4205#  4214#
                     4405#  4416#  4470#  4482#  4527#  4537#  4753#  4757#  4762#  4773#  4789   4795#  4809#
                     4842   4950   4952   5027   5034   5040#  5057#
T$NS0 = 000000          8#   215    220#  3005   3010#  3750   3761#  4757   4762#  5057
T$NS1 = 000005        147#   156    165#   212    805#   849    853#   934    946#   950    954#   958    962#
                      966    970#   974   3017#  3109   3120#  3125   3133#  3505   3516#  3603   3641#  3666
                     3677#  3701   3712#  3746   3764#  4205   4214#  4405   4416#  4470   4482#  4527   4537#
                     4753   4773#  4789   4795   4809#  4842   4950   4952   5027   5034   5040
T$NS2 = 000002       3772#  3808   3813#  3822   3827#  3834   3839#  3846   3851#  3858   3863#  3870   3875#
                     3882   3887#  3894   3899#  3906   3911#  3918   3923#  3935   3954#  3986
T$PCNT= 000000       5064#  5065#
```

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T$PTAB= 010043          5065#   5071
T$PTHV= 000001            32    5076#
T$PTNU= 000001            4#    5071#   5076
T$SAVL= 177777            4#
T$SEGL= 177777            4#
T$SIZE= 000007          5054    5076#
T$SUBN= 000000            4#    3763#   3771#   3812#   3826#   3838#   3850#   3862#   3874#   3886#   3898#   3910#   3922#
                        3953#   4213#   4415#   4481#   4536#
T$TAGL= 177777            4#
T$TAGN= 010045            4#     147#    165#    805#    853#    946#    954#    962#    970#   3017#   3120#   3133#   3516#
                        3641#   3677#   3712#   3764#   3772#   3813#   3827#   3839#   3851#   3863#   3875#   3887#   3899#
                        3911#   3923#   3954#   4214#   4416#   4482#   4537#   4773#   4809#   5064#   5065#   5069#
T$TEMP= 000000           114#    115#    116#    117#    118#    119#    156#    212#    215#    844#    845     849#    926#
                         927     934#    950#    958#    966#    974#   2995#   3005#   3101#   3102    3109#   3125#   3488#
                        3489    3505#   3603#   3661#   3662    3666#   3696#   3697    3701#   3740#   3741    3746#   3750#
                        3808#   3822#   3834#   3846#   3858#   3870#   3882#   3894#   3906#   3918#   3935#   3986#   3994#
                        3995    4205#   4296#   4297    4405#   4464#   4465    4470#   4521#   4522    4527#   4691#   4692
                        4753#   4757#   4777#   4782#   4789#   4795#   4814#   4818#   4822#   4826#   4830#   4834#   4838#
                        4844#   4848#   4854#   4860#   4866#   4872#   4878#   4884#   4890#   4896#   4902#   4908#   4914#
                        4920#   4926#   4932#   4938#   4944#   4954#   4960#   4966#   4972#   4978#   4984#   4990#   4996#
                        5002#   5008#   5014#   5020#   5034#   5040#   5057#
T$TEST= 000005            4#   3763#   3771    3812    3826    3838    3850    3862    3874    3886    3898    3910    3922
                        3953    4213#   4415#   4481#   4536#   5056
T$TSTM= 177777            4#    813     819     841     850     861     867     885     893     904     913     923     935
                        1244    1596    1651    1678    1700    1741    1790    1978    2021    2040    2092    2117    2154
                        2195    2252    2265    2307    2327    2348    2366    2483    2673    2681    2690    2699    2745
                        2767    2788    2823    2889    2908    2922    2952    2962    2979    2992    3034    3044    3054
                        3064    3073    3082    3092    3110    3139    3187    3219    3228    3237    3245    3281    3296
                        3331    3343    3345    3351    3397    3409    3431    3458    3470    3473    3488    3506    3530
                        3536    3547    3555    3575    3590    3604    3654    3661    3667    3686    3692    3702    3721
                        3734    3747    3772    3799    3809    3813    3823    3827    3835    3839    3847    3851    3859
                        3863    3871    3875    3883    3887    3895    3899    3907    3911    3919    3923    3936    3954
                        3987    3994    4206    4296    4406    4464    4471    4521    4528    4691    4754
T$TSTS= 000001            4#   3764#   4214#   4416#   4482#   4537#
T$$AU = 010016          3712#   3740    3746
T$$AUT= 010013          3516#   3603
T$$CLE= 010014          3641#   3661    3666
T$$DAT= 010044          5069#   5074
T$$DU = 010015          3677#   3696    3701
T$$HAR= 010040          4773#   4789    4796
T$$HW = 010000           147#    156
T$$INI= 010012          3133#   3488    3505
T$$MSG= 010003           805#    844     849    853#    926     934
T$$PC = 000001          5064#   5076
T$$PRO= 010011          3120#
T$$PTA= 010043          5064#   5070    5071#
T$$RPT= 010010          3017#   3101    3109
T$$SOF= 010041          4809#   5034    5041
T$$SRV= 010007           946#    950     954#    958     962#    966     970#    974
T$$SUB= 010033          3772#   3808    3813#   3822    3827#   3834    3839#   3846    3851#   3858    3863#   3870    3875#
                        3882    3887#   3894    3899#   3906    3911#   3918    3923#   3935    3954#   3986
T$$SW = 010001           165#    212
T$$TES= 010037          3764#   3994    4205    4214#   4296    4405    4416#   4464    4470    4482#   4521    4527    4537#
                        4691    4753
T1      017410 G         114    3763#
T1SWB   003153 G         657#   2714    3950*   3990*
```

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T1.1     017420            3771#
T1.10    017750            3910#
T1.11    017770            3922#
T1.12    020054            3953#
T1.2     017544            3812#
T1.3     017570            3826#
T1.4     017610            3838#
T1.5     017630            3850#
T1.6     017650            3862#
T1.7     017670            3874#
T1.8     017710            3886#
T1.9     017730            3898#
T2       020776 G           115    4213#
T3       021454 G           116    4415#
T4       021622 G           117    4481#
T5       021754 G           118    4536#
T5WEOT   022506              4667   4726#
UAM   =  000200 G            286#
UNL   =  100412 G            477#    732
UNREC    003121 G            641#   2081*  2178*  2221*  2248*  2290*  2346*  2364*  2459
URERM    004276 G            793#   2254   2267   2329
VFEXC    012534 G           2527    2534   2544#  3958   3961   3966   3969   3972   3975   3980   3983
VFISU    012762 G           2581    2587   2602   2627#
VFYCNT   003004 G            603#   2742*  3085
VFYDAT   012450 G           1164    2518#  4684
VFYFLG   003146 G            652#   1087   1431*  1437*  1968   2070   2519
VFY.C =  000100 G            336#    429   1428   1432
WLKZRO   007650             1532#   1538   1544
WRBC     002544 G            592#   3037   3038   3039   3040   3167*
WRECL =  000020 G            408#   2343
WRR   =  105005 G            450#    723   4149
WRREC    002704 G            595#   2457   3069
WRT   =  104005 G            426#    686    713   1084   4083   4145   4358
WRUNR    002714 G            596#   3078
WSSR     010520 G           1617    1785#  2280   2883   3561   3649
WTM   =  100011 G            459#    726   1377   4079   4091
WTR   =  101011 G            462#    727   4095
WTV   =  104105 G            429#    714   4049   4053   4057   4061   4065   4069   4073   4193   4197   4235   4373
WTVERM   003670 G            793#   2675   2692   2747
X$ALWA=  000000                4#   4789   4950   4952   5027   5034
X$FALS=  000040                4#   4842
X$OFFS=  000400                4#   4789   4842   4950   4952   5027   5034
X$TRUE=  000020                4#
XO.BOT=  000002 G            372#   1125   1191   1256   2055   2064   2573   4630
XO.EOT=  000001 G            373#   1135   1194   1214   1259   1279   2576   2596   4640
XO.LET=  020000 G            369#   2064
XO.ONL=  000100 G            371#
XO.RLL=  010000 G            370#   2064
XO.RLS=  040000 G            368#   2064
XO.TMK=  100000 G            367#   2064
X2.OPM=  100000 G            377#   1851   1935
X3.DCK=  000010 G            381#   2239
X3.RNY=  157400 G            382#   2886
ZROPAT   007620             1516#   1520   1526   1551
$BGNLE=  177777                4#
$ERFLG=  000400                4#    822#    823    824#    825    826#    827    829#    830    831#    832    833#    834
```

835# 836 870# 871# 872 873# 874 879# 880 948# 949 956# 957
964# 965 972# 973 987# 988# 989 993# 994 995# 996# 997 998#
999 1000# 1001 1005# 1006 1009# 1010# 1011 1012# 1013 1017# 1018 1024#
1025 1037# 1038 1054# 1055 1056# 1057 1058# 1059 1069# 1070 1090# 1091
1092# 1093 1094# 1095 1096# 1097 1101# 1102 1105# 1106 1115# 1116 1128#
1129 1142# 1143 1158# 1159 1160# 1161 1170# 1171 1242# 1243 1313# 1314
1319# 1320 1322# 1323 1324# 1325 1326# 1327 1339# 1340 1345# 1346 1350#
1351 1352# 1353 1365# 1366 1380# 1381 1391# 1392 1396# 1397 1404# 1405
1407# 1408 1416# 1417 1418# 1419 1426# 1427 1431# 1432 1437# 1438 1441#
1442 1443# 1444 1448# 1449 1453# 1454 1463# 1464# 1465 1466# 1467# 1468
1469# 1470 1471# 1472 1473# 1474# 1475 1495# 1496 1497# 1498 1500# 1501
1502# 1503 1507# 1508 1517# 1518 1533# 1534 1558# 1559 1567# 1568 1586#
1587 1590# 1591 1611# 1612 1623# 1624 1625# 1626 1629# 1630 1631# 1632
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1835# 1836 1847# 1848 1854# 1855 1859# 1860 1873# 1874 1886# 1887 1900#
1901 1938# 1939 1943# 1944 1950# 1951 1954# 1955 1976# 1977 1996# 1997
2019# 2020 2081# 2082 2086# 2087 2090# 2091 2137# 2138# 2139 2143# 2144
2161# 2162 2163# 2164 2168# 2169 2178# 2179 2202# 2203 2207# 2208 2209#
2210 2211# 2212 2221# 2222 2246# 2247 2248# 2249 2272# 2273 2277# 2278
2279# 2280 2290# 2291 2338# 2339 2346# 2347 2364# 2365 2388# 2389 2390#
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4419 4420# 4421 4422# 4423# 4424 4425# 4427 4430# 4431 4442# 4443 4445#

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$F$AND= 000310        4#  877  986  992  1004  1074  1079  1083  1086  1089  1100  1121  1124
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                    1869  1872  1882  1885  1917  1920  1923  1931  1937  1962  1965  1968  1975
                    1995  2057  2066  2070  2077  2080  2136  2142  2151  2167  2194  2206  2241
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                    4251    4252    4254    4261    4264    4269    4277    4280    4282    4285    4287    4289    4292
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                    4392    4394    4397    4399    4418    4420    4422    4425    4430    4437    4442    4445    4450
                    4457    4460    4484    4486    4490    4492    4494    4496    4498    4500    4503    4505    4507
                    4509    4511    4513    4515    4518    4539    4541    4543    4546    4548    4557    4559    4561
                    4566    4569    4574    4577    4579    4583    4588    4590    4603    4610    4615    4620    4626
                    4629    4632    4633    4645    4647    4659    4660    4663    4667    4674    4678    4680    4707
                    4709    4711    4713    4715    4717    4732    4734    4736    4738    4741    4743
$F$BLA= 000170        4#    3440
$F$CAS= 000150        4#
$F$DEC= 000220        4#
$F$DO = 000340        4#    1074    1079    1121    1187    1252    1344    1617    1636    1827    2416    2430    2444
                    2563    2569    2634    2814    2874    3027    3166    3275    3362    3523    3649    3783    3945
                    4008    4251    4437    4566    4610    4626
$F$FAL= 000405        4#
$F$GOO= 000400        4#     822     823     824     825     826     827     829     830     831     832     833     834
                     835     836     870     871     872     873     874     875     879     880     948     949     956
                     957     964     965     972     973     984     987     988     989     990     993     994     995
                     996     997     998     999    1000    1001    1002    1005    1006    1009    1010    1011    1012
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                    1069    1070    1071    1072    1076    1077    1081    1084    1087    1090    1091    1092    1093
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1964 1965# 1967 1969 1970 1971# 1974 1975# 1994 1995# 2056 2058 2059#
2065 2066# 2069 2071 2072 2073# 2076 2077# 2079 2080# 2083 2085# 2135
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1447# 1450 1506# 1509 1589# 1605 1610# 1627 1634# 1641 1648# 1658 1665#
1670 1676# 1684 1699# 1750 1770# 1773 1789# 1794 1825# 1832 1846# 1902
1917# 1958 1959# 1991 1995# 1998 2059# 2062 2066# 2101 2136# 2147 2153#
2159 2167# 2176 2177# 2180 2194# 2200 2206# 2219 2220# 2223 2241# 2259
2260# 2294 2326# 2336 2342# 2359 2360# 2375 2387# 2496 2521# 2536 2550#
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3179# 3184 3196# 3201 3208# 3214 3235# 3267 3273# 3321 3327# 3347 3357#
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4229# 4233 4247# 4266 4433# 4447 4564# 4687

$TSK1 = 050367
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1827# 1832 1853# 1898 1920# 1927 1934# 1948 1949# 1952 1962# 1989 2073#

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                    3275#  3321   3360#  3450   3466#  3475   3523#  3599   3649#  3657   3783#  3805   3945#
                    3947   4008#  4011   4249#  4258   4435#  4439   4566#  4687
$TSK2 = 050370      1004#  1007   1077#  1162   1190#  1212   1213#  1233   1255#  1277   1278#  1298   1617#
                    1620   1858#  1862   1863#  1896   1923#  1925   1937#  1941   1942#  1945   1965#  1987
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                    3284#  3316   3362#  3450   3540#  3558   3559#  3596   3793#  3802   4251#  4258   4437#
                    4439   4608#  4682
$TSK3 = 050371      1079#  1162   1193#  1209   1219#  1223   1224#  1231   1258#  1274   1284#  1288   1289#
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                    3583#  3594   4610#  4682
$TSK4 = 050404      1083#  1111   1119#  1149   1154#  1156   1196#  1204   1205#  1207   1227#  1229   1261#
                    1269   1270#  1272   1292#  1294   1869#  1878   1879#  1892   1975#  1983   2473#  2488
                    2572#  2594   2595#  2606   2727#  2735   3304#  3308   3309#  3312   3371#  3436   3568#
                    3579   4615#  4617   4624#  4654   4659#  4672   4673#  4676
$TSK5 = 050403      1086#  1109   1121#  1149   1199#  1201   1264#  1266   1872#  1875   1882#  1890   2478#
                    2486   2575#  2591   2601#  2604   2730#  2733   3385#  3403   3404#  3412   3416#  3418
                    3421#  3434   4626#  4654   4667#  4669
$TSK6 = 050377      1089#  1107   1124#  1133   1134#  1146   1885#  1888   2578#  2586   2587#  2589   3388#
                    3391   3392#  3400   3421#  3433   4629#  4638   4639#  4651
$TSK7 = 050401      1100#  1103   1127#  1130   1140#  1144   2581#  2583   4632#  4635   4645#  4649
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$$DST = 000000        4#
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2977	2978	3026	3027	3102	3137	3138	3149	3151	3158	3159	3165	3166
3178	3179	3202	3203	3215	3216	3234	3235	3239	3240	3242	3243	3247
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BGNHRD      2#      4#   4772
BGNHW       2#      4#    146
BGNINI      2#      4#   3132
BGNMOD      2#      4#      7    219   3009   3760   4761
BGNMSG      2#      4#    804    852
BGNPRO      2#      4#   3119
BGNPTA      2#      4#   5064
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BGNSFT      2#      4#   4808
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BGNSUB      2#      4#   3770   3811   3825   3837   3849   3861   3873   3885   3897   3909   3921   3952
BGNSW       2#      4#    164
BGNTST      2#      4#   3762   4212   4414   4480   4535
BNCOMP      2#      4#   2980   3188   3220
BNERRO      2#      4#
BREAK       2#      4#   1699   1789   3342   3430
BRESET      2#      4#
CALL        2#
CASE        2#
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CLOCK       2#      4#
CLOSE       2#      4#
CLRVEC      2#      4#   3534   3652   3684
COMMEN      2#      4#
DEALLO      2#
DECLAR      2#
DECR        2#
DECRU       2#
DEFAUL      2#
DELAY       2#      4#   1704   3143   3333   3373   3421   4591
DESCRI      2#      4#    127
DEVTYP      2#      4#    134
DISPAT      2#      4#    111
DISPLA      2#      4#
DOCLN       2#      4#   2822   3344   3472
DODU        2#      4#   2921   3554
DORPT       2#      4#   1243   2907
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END         2#   3438
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ENDAUT      2#      4#   3602
ENDCLN      2#      4#   3665
ENDCOM      2#      4#
ENDDEC      2#
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       4681  4686
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ENDSW     2#    4#   211
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ERRHRD    2#    4#  1977  2020  2091  2365  2672  2689  2744
ERROR     2#    4#
ERRSF     2#    4#  3138
ERRSOF    2#    4#  2153  2194  2264
ERRTBL    2#    4#
ESCAPE    2#    4#
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EXIFB     2#
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GPHARD    2#    4#  3280  3720
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       2669    2686   2721    2727    2755    2779    2819    2885    2909    2923    3135    3298    3301    3324    3382
       3385    3440   3463    3562    3565    3790    4612    4626    4629    4639    4656    4664
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       2547    2578   2640    2646    2713    2724    2899    2926    2975    3156    3176    3232    3240    3352    3454
       3537    4226
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IF.NO.    2#
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INCRU     2#
INLINE    2#
INLOOP    2#      4#
IOSETU    2#      4#
IOSTAR    2#      4#
KT11      2#      4#
LASTAD    2#      4#   5051
LEAVE     2#    3388
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       1648    1659   1665    1667    1695    1718    1723    1726    1731    1736    1756    1766    1770    1785    1791
       1811    1813   1816    1819    1821    1827    1829    1834    1846    1853    1858    1872    1885    1899    1937
       1942    1949   1953    1975    1995    2018    2080    2085    2089    2136    2142    2160    2162    2167    2177
       2201    2206   2208    2210    2220    2245    2247    2271    2276    2278    2289    2337    2345    2363    2387
       2389    2394   2396    2399    2400    2405    2409    2416    2418    2423    2430    2432    2437    2444    2446
       2454    2457   2461    2463    2468    2521    2523    2525    2528    2530    2532    2544    2550    2554    2557
       2612    2614   2627    2634    2666    2704    2709    2711    2749    2777    2806    2808    2814    2826    2840
       2844    2849   2861    2863    2866    2868    2874    2876    2881    2902    2912    2916    2918    2929    2931
       2937    2982   2985    2987    2989    3020    3098    3160    3166    3168    3179    3181    3190    3192    3196
       3198    3203   3208    3210    3222    3224    3230    3248    3253    3260    3269    3275    3277    3284    3286
       3289    3304   3309    3317    3371    3460    3479    3481    3484    3523    3532    3540    3549    3551    3559
       3568    3583   3627    3650    3679    3682    3715    3718    3722    3724    3727    3736    3765    3767    3774
       3783    3785   3787    3815    3819    3829    3841    3853    3865    3877    3889    3901    3913    3925    3929
       3932    3938   3949    3956    3959    3962    3964    3967    3970    3973    3976    3978    3981    3989    4002
       4008    4013   4215    4217    4219    4222    4230    4234    4236    4238    4241    4243    4251    4253    4260
       4263    4268   4276    4279    4281    4284    4286    4288    4291    4329    4331    4333    4335    4338    4340
       4342    4344   4346    4348    4357    4372    4388    4391    4393    4396    4398    4417    4419    4421    4424
       4429    4441   4444    4449    4456    4459    4483    4485    4489    4491    4493    4495    4497    4499    4502
       4504    4506   4508    4510    4512    4514    4517    4538    4540    4542    4545    4547    4556    4558    4560
       4568    4573   4576    4578    4582    4587    4589    4602    4619    4632    4646    4659    4662    4673    4677
       4679    4706   4709    4710    4712    4714    4716    4731    4733    4735    4737    4740    4742
LOCAL     2#
LOOP      2#
MANUAL    2#      4#   2978
MEMORY    2#      4#   3457
```

```
M$BYTE     2#     4#    18#    24     25     26
M$CHEC     2#     4#   844#   926#  3101#  3488#  3661#  3696#  3740#  3994#  4296#  4464#  4521#  4691#  4789#
        5034#
M$CNTO     2#     4#  2995#  4777#  4782#  4814#  4818#  4822#  4826#  4830#  4834#  4838#  4844#  4848#  4854#
        4860#  4866#  4872#  4878#  4884#  4890#  4896#  4902#  4908#  4914#  4920#  4926#  4932#  4938#  4944#
        4954#  4960#  4966#  4972#  4978#  4984#  4990#  4996#  5002#  5008#  5014#  5020#
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        3543#  3571#  3586#  3688#  3794#
M$DATA     2#     4#    18#    27     29     31     33     35     37     39     41     43     45     47     49
          51     53     55    57#     59     61     64     67     69     71     73     75     77     79     81
          83     85     87     89     91     93     95     97     99    101   128#   135#
M$DECR     2#     4#   156#   212#   215#   849#   934#   950#   958#   966#   974#  3005#  3109#  3125#  3505#
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        3935#  3986#  4205#  4405#  4470#  4527#  4753#  4757#  4795#  5040#  5057#  5065#
M$DEFA     2#     4#  2995#  4777#  4782#  4814#  4818#  4822#  4826#  4830#  4834#  4838#  4844#  4848#  4854#
        4860#  4866#  4872#  4878#  4884#  4890#  4896#  4902#  4908#  4914#  4920#  4926#  4932#  4938#  4944#
        4954#  4960#  4966#  4972#  4978#  4984#  4990#  4996#  5002#  5008#  5014#  5020#
M$ENDE     2#     4#   156#   212#   215#   849#   934#   950#   958#   966#   974#  3005#  3109#  3505#  3603#
        3666#  3701#  3746#  3750#  3808#  3822#  3834#  3846#  3858#  3870#  3882#  3894#  3906#  3918#  3935#
        3986#  4205#  4405#  4470#  4527#  4753#  4757#  4795#  5040#  5057#
M$ERRI     2#     4#  1596#  1651#  1678#  1741#  1978#  2021#  2040#  2092#  2117#  2154#  2195#  2252#  2265#
        2307#  2327#  2348#  2366#  2673#  2690#  2745#  2889#  3139#
M$ESCA     2#     4#
M$ESCS     2#     4#
M$EXCP     2#     4#  4777#  4782#  4848#  4854#  4860#  4866#  4872#  4878#  4884#  4890#  4896#  4902#  4908#
        4914#  4920#  4926#  4932#  4938#  4944#  4954#  4960#  4966#  4972#  4978#  4984#  4990#  4996#  5002#
        5008#  5014#  5020#
M$EXIT     2#     4#   844#   926#  3101#  3488#  3489   3661#  3662   3696#  3740#  3994#  3995   4296#  4297
        4464#  4465   4521#  4522   4691#  4692   4789#  5034#
M$EXSE     2#     4#   844#   926#  3101#  3488#  3661#  3696#  3740#  3994#  4296#  4464#  4521#  4691#  4789#
        5034#
M$EXTJ     2#     4#   844#   845    926#   927   3101#  3102   3488#  3661#  3696#  3697   3740#  3741   3994#
        4296#  4464#  4521#  4691#  4789#  5034#
M$GEN      2#     4#    18#    27#    29#    31#    33#    35#    37#    39#    41#    43#    45#    47#    49#
          51#    53#    55#    57#    59#    61#    64#    67#    69#    71#    73#    75#    77#    79#    81#
          83#    85#    87#    89#    91#    93#    95#    97#    99#   101#   113#   128#   135#   148#   149#
         156#   166#   167#   212#   805#   849#   853#   934#   946#   950#   954#   958#   962#   966#   970#
         974#  2998#  3017#  3109#  3120#  3133#  3505#  3516#  3603#  3641#  3666#  3677#  3701#  3712#  3746#
        3763#  3771#  3808#  3812#  3822#  3826#  3834#  3838#  3846#  3850#  3858#  3862#  3870#  3874#  3882#
        3886#  3894#  3898#  3906#  3910#  3918#  3922#  3935#  3953#  3986#  4205#  4213#  4405#  4415#  4470#
        4481#  4527#  4536#  4753#  4774#  4796#  4810#  5041#  5055#  5070#  5074#
M$GENB     2#     4#  2992#  2993
M$GETS     2#     4#   156#   212#   215#   849#   934#   950#   958#   966#   974#  3005#  3109#  3125#  3505#
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        5040#  5057#
M$GETT     2#     4#   844#   926#  3101#  3488#  3661#  3696#  3740#  3994#  4296#  4464#  4521#  4691#  4789#
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M$GNGB     2#     4#     8#    18#    27#    29#    31#    33#    35#    37#    39#    41#    43#    45#    47#
          49#    51#    53#    55#    57#    59#    61#    64#    67#    69#    71#    73#    75#    77#    79#
          81#    83#    85#    87#    89#    91#    93#    95#    97#    99#   101#   112#   113    128#   135#
         147#   148    149    165#   166    167    220#   805#   853#   946#   954#   962#   970#  3010#  3017#
        3120#  3133#  3516#  3641#  3677#  3712#  3761#  4762#  4773#  4774   4809#  4810   5052#  5055
M$GNIN     2#     4#    18#    19     20     21     22     23     24#    25#    26#    27#    28     29#    30
          31#    32    33#    34    35#    36    37#    38    39#    40    41#    42    43#    44    45#
```

```
                46     47#    48     49#    50     51#    52     53#    54     55#    56     57#    58     59#    60
                61#    62     63     64#    65     66#    67#    68     69#    70     71#    72     73#    74     75#
                76     77#    78     79#    80     81#    82     83#    84     85#    86     87#    88     89#    90
                91#    92     93#    94     95#    96     97#    98     99#    100    101#   102    112#   114#   115#
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M$GNLS          2#     4#  2992#  2998
M$GNSU          2#     4#  3771#  3812#  3826#  3838#  3850#  3862#  3874#  3886#  3898#  3910#  3922#  3953#
M$GNTA          2#     4#   156#   212#   849#   934#   950#   958#   966#   974#  3109#  3505#  3603#  3666#  3701#
             3746#  3808#  3822#  3834#  3846#  3858#  3870#  3882#  3894#  3906#  3918#  3935#  3986#  4205#  4405#
```

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M$HAPT       2#     4#    18#
M$HNAP       2#     4#    18#    57
M$INCR       2#     4#     8#   147#   165#   220#   805#   813#   819#   841#   850#   853#   861#   867#   885#
           893#   904#   913#   923#   935#   946#   954#   962#   970#  1244#  1596#  1651#  1678#  1700#  1741#
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          4521#  4528#  4536#  4537#  4691#  4754#  4762#  4773#  4809#  5064#  5065#  5069   5071
M$IOSE       2#     4#
M$LDRO       2#     4#  2922#  3186#  3218#  3236#  3244#  3281#  3350#  3535#  3555#  3653#  3685#  3721#
M$MASK       2#     4#
M$MCHI       2#     4#
M$MCLO       2#     4#
M$MSK1       2#     4#
M$POP        2#     4#   156#   212#   215#   849#   934#   950#   958#   966#   974#  3005#  3109#  3125#  3505#
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          3543#  3571#  3586#  3688#  3794#
M$PUSH       2#     4#     8#   147#   165#   220#   805#   853#   946#   954#   962#   970#  3010#  3017#  3120#
          3133#  3516#  3641#  3677#  3712#  3761#  3763#  3764   3771#  3772   3812#  3813   3826#  3827   3838#
          3839   3850#  3851   3862#  3863   3874#  3875   3886#  3887   3898#  3899   3910#  3911   3922#  3923
          3953#  3954   4213#  4214   4415#  4416   4481#  4482   4536#  4537   4762#  4773#  4809#
M$PUT        2#     4#   807#   816#   837#   855#   864#   881#   890#   896#   907#   916#  2479#  2678#  2695#
          2759#  2783#  2949#  2955#  3028#  3037#  3047#  3057#  3067#  3076#  3085#  3292#  3328#  3393#  3405#
          3467#  3526#  3543#  3571#  3586#  3688#  3730#  3794#
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           858    859    864#   865    881#   882    883    890#   891    896#   897    898    899    900    901
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PUSH              2#
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$$SETT    2#

. ABS.  024254     000

 ERRORS DETECTED:  0

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 RUN-TIME: 126 138 11 SECONDS
 RUN-TIME RATIO: 311/277=1.1
 CORE USED:  32K  (64 PAGES)
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