TU80

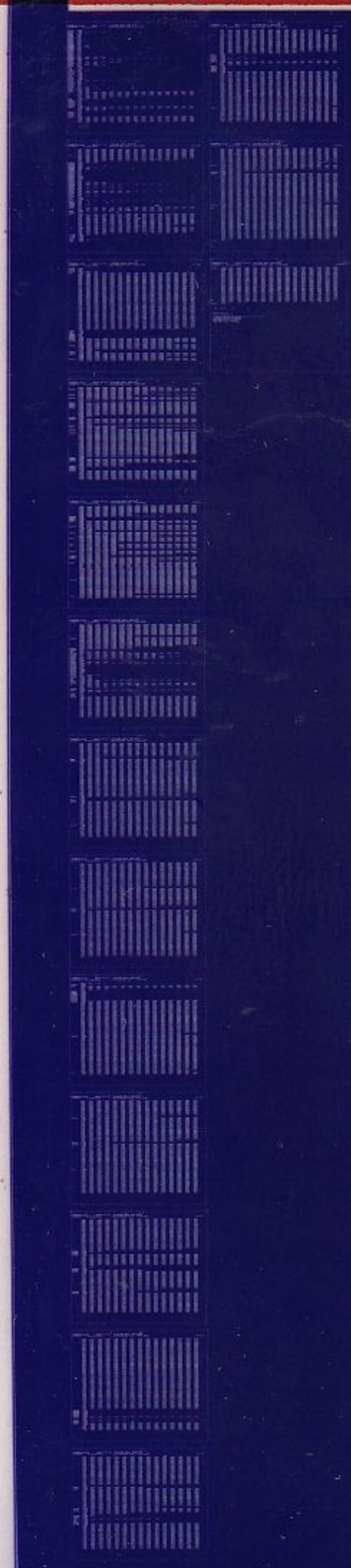
TU80 DATA RELIAB
CZTUVBO

AH-T264B-MC
FICHE 1 OF 2

TU80

TU80 DATA RELIAB
CZTUVBO

AH-T264B-MC
FICHE 2 OF 2



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                        IDENTIFICATION
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PRODUCT CODE:   AC-T263B-MC

PRODUCT NAME:   CZTUVB0 TU80 DATA RELIABILITY TEST

PRODUCT DATE:   11 - JULY - 1983

MAINTAINER:     TAPE DIAGNOSTIC ENGINEERING

AUTHOR:         ROBERT F. WERY/JACK RICHARDSON/TERRENCE REILLY
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GLOSSARY

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 TU80 DEPENDS ON THE TYPE OF COMMAND.
CMD	TU80 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 TU80 TO EXECUTE A COMMAND.
EXTENDED STATUS	FOUR WORDS OF TU80 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 TU80 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 WITHOUT INCIDENT.
TERMINATION CLASS CODE TCC	THREE BIT CODE IN THE TSSR WHICH INDICATES 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-1 DIAGNOSTIC PACKAGES AVAILABLE ON MULTIMEDIA.

1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

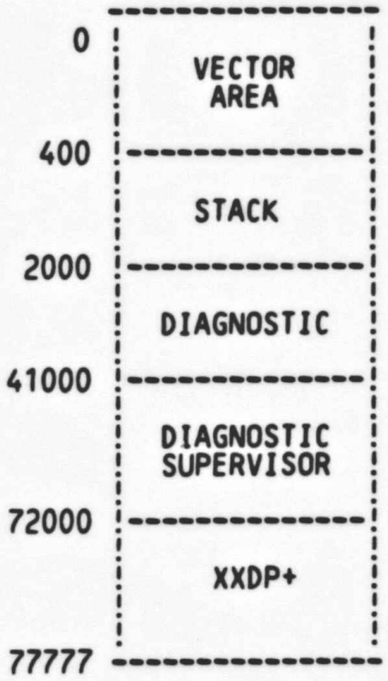
1.1.1 FUNCTIONAL DESCRIPTION

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



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

1.1.4.1 SCOPE

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

THERE ARE 6 TESTS IN THIS PROGRAM:

- TEST 1 - BASIC FUNCTIONS.
- TEST 2 - DATA RELIABILITY.
- TEST 3 - WRITE AND READ STREAMING TEST.
- TEST 4 - WRITE COMPATABILITY/WRITE UTILITY.
- TEST 5 - READ COMPATABILITY/READ UTILITY.
- TEST 6 - OPERATOR SELECTED SEQUENCE UTILITY.

1.1.4.2 ERROR RECOVERY

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

1.1.4.3 WRITE ERROR RECOVERY

THERE ARE 2 DISTINCT, SELECTABLE WRITE-ERROR-RECOVERY ALGORITHMS:

1. MEDIA/OPERATIONAL SELECTIVE ALGORITHM
2. OPERATIONAL ALGORITHM

BY DEFAULT THE DIAGNOSTIC SELECTS THE FIRST ALGORITHM TO DISCERN MEDIA RELATED WRITE ERRORS FROM OPERATIONAL ONES.

TO SELECT THE SECOND ALGORITHM:

- ANSWER 'Y' TO CHANGE SW (L) ?
- ANSWER 'N' TO BAD TAPE SPOT DETECTION (L) Y ?

WHEN ERROR RECOVERY IS INHIBITED, THE LATTER QUESTION IS NOT ASKED AND BOTH ALGORITHMS ARE BYPASSED.

1.1.4.3.1 MEDIA/OPERATIONAL SELECTIVE WRITE-ERROR-RECOVERY ALGORITHM

SCOPE

THE ALGORITHM DISCERNS MEDIA RELATED WRITE ERRORS FROM OPERATIONAL ONES.

ALGORITHM

A WRITE RETRY SUBROUTINE IS CALLED BY THE RECOVERABLE ERROR SUBROUTINE ENTERED UPON DETECTIION OF A WRITE RECOVERABLE ERROR.
THE WRITE RETRY SUBROUTINE REWRITES RECORD IN SAME SPOT ON TAPE:
REPEAT 4 TIMES.
IF ALL 4 REPEATS ARE GOOD, RECORD IS CONSIDERED AS RECOVERED AND A RECOVERABLE WRITE ERROR IS LOGGED AT THAT RECORD NUMBER.

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IF ANY OF THE 4 REPEAT FAILS, ERASE BAD RECORD, LOG SUSPECTED
BAD SPOT AT THAT RECORD NUMBER, RETRY AGAIN 3 INCHES FURTHER DOWN TAPE.
RETRY 4 TIMES, UP TO 4 REPEATS EACH.
IF RECORD CANNOT BE WRITTEN WITHOUT RECOVERABLE ERROR AFTER 4 RETRIES,
ERASE RECORD, REPORT RETRY FAILED ON BAD SPOT.
THE RECOVERABLE ERROR SUBROUTINE THEN CONTINUES TO CALL THE WRITE
RETRY SUBROUTINE, WHICH REISSUES THE GROUP OF 4 RETRIES,
UNTIL THE RECORD IS RECOVERED OR 20 BAD SPOTS HAVE BEEN LOGGED .

TWENTY (20) BAD SPOTS MAXIMUM ARE ALLOWED PER TAPE PASS.
WHEN 20 BAD SPOTS HAVE BEEN LOGGED, ON SAME RECORD NUMBER OR NOT,
TAPE IS CONSIDERED DEFECTIVE: A BAD TAPE OVERFLOW MESSAGE IS PRINTED
AND UNIT IS REWOUND, THEN DROPPED.

DURING THE RECOVERY PROCESS, IT IS NECESSARY TO PERFORM SEVERAL TAPE
POSITION OPERATIONS: SPACE REVERSE, ERASE. IF A POSITION ERROR STATUS
IS DETECTED DURING THOSE OPERATIONS, THEN THE RECOVERY ATTEMPT IS ABORTE
AN APPROPRIATE UNRECOVERABLE MESSAGE IS PRINTED AND UNIT IS DROPPED.

ALL BADLY WRITTEN RECORDS FLAGGED WITH RECOVERABLE ERRORS ARE ERASED
UNTIL RECOVERED, INCLUDING THE RECORD AT THE 20TH BAD SPOT,
SO THAT ALL RECORDS LEFT ON TAPE ARE GOOD WRITTEN RECORDS.
BAD SPOTS ARE ERASED, WITH ERASE GAPS FROM 3 TO 12 INCHES PER RETRY GRO
UP TO 20 FEET OF ERASE GAP COULD RESULT WHEN RETRYING TO RECOVER
A SINGLE RECORD,IF NO BAD SPOT WERE PREVIOUSLY DETECTED.
THAT LONG STRETCH OF BAD TAPE WOULD THEN BE FLAGGED WITH 20
BAD SPOTS AT SAME RECORD NUMBER AND THE TAPE CONSIDERED DEFECTIVE.

BAD SPOTS REPORTS

IF THE PRINT OF RECOVERABLE ERRORS IS ENABLED, THE BAD SPOTS ON TAPE ARE
IDENTIFIED AS THEY ARE DETECTED. SINCE THE BAD RECORDS ARE ERASED UNTIL
THE BAD SPOTS ACTUALLY PRECEDES THE RECORD NUMBER THAT IDENTIFIES THEM.
THE NUMBER OF REPEATS AND RETRIES ATTEMPTED IS PRINTED, FROM WHICH THE
LENGTH OF ERASE GAPS CAN BE DETERMINED: APPROXIMATELY 3 INCHES PER RETR

THE STATISTICAL REPORT PRINTED AT THE END OF TEST 2 OR UPON A "PRINT" RE
CONTAINS A SUMMARY OF THE BAD SPOTS LOGGED ON THE CURRENT TAPE PASS.
IN THAT REPORT, ALL COUNTS ARE CUMULATIVE FROM PASS TO PASS, EXCEPT FOR
THE NUMBER OF BAD SPOTS: IT RELATES TO A "TAPE PASS" ONLY.
FOR THIS PURPOSE, A "TAPE PASS" IS A WRITE PASS FROM BOT TO EOT, OR FROM
BOT TO WHERE THE DIAGNOSTIC IS HALTED BEFORE REACHING EOT.
A PASS IS DEFINED BY THE SUPERVISOR AS A RUN THROUGH ALL THE TESTS REQUE
ON ALL UNITS SELECTED. THOSE PASSES ARE IDENTIFIED AS "PASS" AND "EOP".

THE NUMBER OF WRITE RETRIES, CUMULATIVE FROM PASS TO PASS, IS A GLOBAL
COUNT OF HOW MANY TIMES THE GROUP OF 4 RETRIES HAS BEEN CALLED.

THE NUMBER OF WRITE RECOVERABLE ERRORS EXCLUDES BAD TAPE SPOTS
AND REFLECTS THE SPECIFICATIONS OF THE HARDWARE UNDER TEST.
PER TAPE PASS, THE NUMBER OF WRITE RETRIES EQUALS THE SUM OF THE
NUMBER OF RECOVERABLE WRITE ERRORS AND BAD SPOTS, MOST OF THE TIME.

TO CLEAR CUMULATIVE COUNTS, ANSWER 'Y' TO: CLEAR COUNTERS (L) Y ?.
BAD TAPE SPOTS COUNT IS CLEARED WHEN WRITING FROM BOT.

```
                        IF TEST 2 IS HALTED, THEN RESTARTED OR CONTINUED, THE RECORD COUNT
                        IS RESET TO ZERO AND THE BAD SPOT ID SHALL FOLLOW THAT  RESET COUNT.

                        SINCE ALL WRITTEN RECORDS ARE KNOWN GOOD, THE READ ERRORS CAN
                        BE ATTRIBUTED TO TRANSIENT NOISE, TRANSIENT ELECTRICAL MALFUNCTIONS,
                        OR CONTAMINANTS ON TAPE AS OPPOSED TO TAPE DEFECTS.

                        THE SAME RECORDS MUST BE WRITTEN FORM TAPE PASS TO TAPE PASS
                        FOR THE BAD SPOTS ID TO REMAIN CONSISTENT IN THOSE TAPE PASSES.

                        EXAMPLE OF A TAPE PASS PRINTS:
                        CZTUV SFT ERR  00009 ON UNIT 00 TST 002 SUB 000 PC: 012100
                        RECOVERABLE ERROR
                        WRT CMD FAILED - UNIT 0   PASS:    1   RECORD:    6
                        PREVIOUS CMD WAS  WRT
                        CMDPKT  TSBA    RFC     TSSR   TCC
                        100205  002406  000000  100210  4
                        026600
                        000000
                        003107
                        XST0    XST1    XST2    XST3
                        000350  000002  100400  000000
                        SUSPECT BAD SPOT AFTER 1 RETRY, 2 REPEAT
                        SUSPECT BAD SPOT AFTER 2 RETRY, 1 REPEAT
                        SUSPECT BAD SPOT AFTER 3 RETRY, 1 REPEAT
                        SUSPECT BAD SPOT AFTER 4 RETRY, 3 REPEAT
                        RETRY FAILED ON BAD SPOT...ERASED!
                        SUSPECT BAD SPOT AFTER 1 RETRY, 1 REPEAT

                        CZTUV SFT ERR  00009 ON UNIT 00 TST 002 SUB 000 PC: 012100
                        RECOVERABLE ERROR
                        WRT CMD FAILED - UNIT 0   PASS:    1   RECORD:10210
                        PREVIOUS CMD WAS  WRT
                        CMDPKT  TSBA    RFC     TSSR   TCC
                        100205  002406  000000  100210  4
                        026600
                        000000
                        004000
                        XST0    XST1    XST2    XST3
                        000350  000002  100010  000000
                        RECOVERED ON RETRY # 1
                        ^C
                        DR>PRI
                        UNIT 0   PASS:    1   RECORD:10210
                        BYTES WRITTEN    0,272,279,691
                        BYTES READ REV   0,301,123,654
                        BYTES READ REV   0,301,120,381
                                          WRT    RDR    RDF
                        RECOVERABLE ERRORS      1      0      0
                        UNRECOVERABLE ERRORS    0      0      0
                        WRITE RETRIES           3
                         2 BAD SPOTS THIS TAPE PASS PRECEDING RECORD #:
                                 6      6
                        SPEC COND   HARD   FATAL   COMPARE
                              2        0       0        0
                        DR>
```

```
                        THIS EXAMPLE SHOWS:
                                RECORD 6 RECOVERED ON 2ND RETRY GROUP
                                THE 2 BAD SPOTS RESIDE IN A 18 INCH ERASE GAP BETWEEN RECORDS 5
                                RECORD 10210 RECOVERED ON 1ST RETRY OF 4 GOOD REPEATS
                                3 WRITE GROUP RETRIES ATTEMPTED, RESULTING IN:
                                        1 RECOVERABLE  WRT ERR FROM RECORD 10210
                                        2 BAD SPOTS BETWEEN RECORDS 5 AND 6



                1.1.4.3.2       OPERATIONAL WRITE-ERROR-RECOVERY ALGORITHM

                        WHEN THIS ALGORITHM IS SELECTED, THE TU80 WRITE RETRY COMMAND
                        IS ISSUED UP TO 16 TIMES OR UNTIL RECORD IS RECOVERED, ON
                        A WRITE RECOVERABLE ERROR.  THE WRITE  RETRY COMMAND CONSISTS
                        OF A SPACE REVERSE OVER THE BAD RECORD, THEN AN ERASE OF 3 INCHES
                        OF TAPE AND REWRITE OF THE RECORD.  THAT COMPOSITE COMMAND
                        DOES NOT ALLOW TO DETECT BAD SPOTS ON TAPE.
                        THEREFORE NO BAD TAPE SPOTS STATUS IS PRINTED.

                        IF RECORD CANNOT BE RECOVERED AFTER 16 WRITE RETRY COMMANDS,
                        A RETRY LIMIT EXCEEDED IS FLAGGED AND UNIT IS DROPPED.


                1.1.4.4 DIAGNOSTIC TIMING ADJUSTMENT

                        A NUMBER OF SUPERVISOR TIMING DELAYS MACROS, KNOWN AS WATCH DOG
                        DELAYS, ARE CALLED BY THE DIAGNOSTIC TO WAIT FOR VARIOUS COMMANDS
                        COMPLETION.  THESE DELAYS ARE NOT CALIBRATED AND SIMPLY EXPANDS
                        INTO AN INLINE NESTED LOOP PAIR.  THE COUNT FOR THE OUTER LOOP
                        COMES FROM THE VARIABLE ARGUMENT SUPPLIED BY THE DELAY CALLS.
                        THE COUNT FOR THE INNER LOOP COMES FORM THE FIXED "HEADER"
                        ELEMENT "L$DLY".
                        AS THE DIAGNOSTIC IS RUN ON DIFFERENT CPU'S, THESE DELAYS WILL
                        VARY IN LENGTH WITH MEMORY SPEED.

                        IF TIME-OUT OCCURS WHEN NO APPARENT MALFUNCTIONS IN THE TAPE
                        UNIT IS EVIDENT, ALL TIMINGS OF THE DIAGNOSTIC MAY BE ADJUSTED
                        TO MATCH MEMORY SPEED AND NOT RESULT IN TIME-OUTS, BY PATCHING
                        THAT FIXED DELAY ELEMENT "L$DLY".

                        A PRESET COUNT OF 000000 RESIDES AT "L$DLY" IN LOCATION 2116 OF THE
                        "HEADER" SECTION.

        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
                        TU80 DRIVE AND UNIBUS ADAPTER MODULE
```

1.2.2 SOFTWARE REQUIREMENTS

DIAGNOSTIC SUPERVISOR

1.3 RELATED DOCUMENTS AND STANDARDS

XXDP+ USERS MANUAL MD-11-CHQUS
DIAGNOSTIC SUPERVISOR PROGRAM LISTING
PDP-11 DIAGNOSTIC SUPERVISOR INTERFACE SPECIFICATION.
PDP-11 DIAGNOSTIC SUPERVISOR PROGRAMMER'S GUIDE.
TU80 PROGRAMMING SPECIFICATION.
TU80 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

REVISION A - 23-MAR-83 - ORIGINAL RELEASE
REVISION B - 17-APR-83 - FIX TEST 3 FOR NEW SPEED ALGORITHM

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 = 172522 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 ADRRES 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

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 ?

PRINT RECOVERABLE ERRORS (L) N ?

HALT AFTER EACH CMD (L) N ?

INHIBIT RECOVERY (L) N ?

BAD TAPE SPOT DETECTION (L) Y ?

DISABLE INTERRUPTS (L) N ?

INHIBIT RFC ERROR REPORTS (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:

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)

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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 DIAL
```

2.2.1 COMMAND LIST FOR USE IN SOFTWARE DIALOGUE.

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 CHEC 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 TU80 PROGRAMMING SPECIFICATION FOR DESCRIPTION.
24 =	NOT USED	
25 =	JMP	JUMP TO THE NTH COMMAND IN THE COMMAND SEQUENCE TABLE, WHERE N IS DEFINED IN THE BRF FIELD. THE NUMBER OF JUMPS IS ENTERED IN THE # OF OPERATIONS FI
26 =	DLY	DELAY "N" MILISECONDS WHERE N IS DEFINED IN THE # OF OPERATIONS. THIS DELAY IS USED BETWEEN EACH EXECUTABLE COMMAND.
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 COMPL
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>
PRINT RECOVERABLE ERRORS  (L) N ?        Y<CR>
HALT AFTER EACH CMD (L) N ?              N<CR>
INHIBIT RECOVERY (L) N ?                 N<CR>
BAD TAPE SPOT DETECTION (L) Y ?          Y<CR>
DISABLE INTERRUPTS (L) N ?               N<CR>
INHIBIT RFC ERROR REPORT (L) N ?         N<CR>
CHANGE CMD SEQUENCE (L) N ?              N<CR>
```

```
712
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758
```

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

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>
PRINT RECOVERABLE ERRORS  (L) N ?                N<CR>
HALT AFTER EACH CMD (L) N ?                      N<CR>
INHIBIT RECOVERY (L) N ?                         N<CR>
BAD TAPE SPOT DETECTION (L) Y ?                  N<CR>
DISABLE INTERRUPTS (L) N ?                       N<CR>
INHIBIT RFC ERROR REPORT (L) N ?                 Y<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>
PRINT RECOVERABLE ERRORS  (L) N ?                N<CR>
HALT AFTER EACH CMD (L) N ?                      N<CR>
INHIBIT RECOVERY (L) N ?                         N<CR>
BAD TAPE SPOT DETECTION (L) Y ?                  N<CR>
DISABLE INTERRUPTS (L) N ?                       Y<CR>
INHIBIT RFC ERROR REPORT (L) N ?                 Y<CR>
CHANGE CMD SEQUENCE (L) N ?                      Y<CR>
CHARACTERISTICS CODE (O) 40 ?                   40<CR>
CMD/2 (D) 5 ?                                   13<CR>   (REWIND) (COULD
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 B
BRF (D) 2048 ?                                1000<CR>
# OF OPERATIONS (D) 10 ?                     10000<CR>
PATTERN (D) 7 ?                                  1<CR>
CMD/4 (D) 5 ?                                   27<CR>   (END)   (COULD B
BRF (D) 2048 ?                                  <^Z>
```

2.4 EXECUTION TIMES

2.4.1 SYSTEM CONFIGURATION

PDP11/34
MOS MEMORY
LA36
TU80

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/READ STREAMING TEST - 15 MINUTES PER UNIT.
TEST 4 - WRITE COMPATABILITY - 20 MINUTES PER PASS.
TEST 5 - READ COMPATABILITY - 20 MINUTES PER PASS.
TEST 6 - 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 EXCEPT WITH TEST 3, WHERE EACH
ADDITIONAL UNIT ADDS 8 MINUTES TO THE EXECUTION TIME.

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:

```
CZTUV 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 DIAGNOST
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
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 DI
TO GET A PRINT OF THE RECORD COUNT WHEN HALTED.

EXAMPLE OF AN ERROR REPORT:

```
CZTUV 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 - TU80 NOT READY:

BEFORE ANY COMMAND IS ISSUED TO THE TU80 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 TU80 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.

```
1008                                    4.0 PERFORMANCE REPORT
1009                                        ------------------
1010
1011                                        UNIT X   PASS:XXXXX  RECORD:XXXXX
1012                                        BYTES WRITTEN  XXX,XXX,XXX,XXX
1013                                        BYTES READ REV XXX,XXX,XXX,XXX
1014                                        BYTES READ FWD XXX,XXX,XXX,XXX
1015                                                          WRT       RDR     RDF
1016                                        RECOVERABLE ERRORS    XXXXX     XXXXX   XXXXX
1017                                        UNRECOVERABLE ERRORS  XXXXX     XXXXX   XXXXX
1018
1019                                        SPEC COND   HARD   FATAL   COMPARE
1020                                           XXXXX   XXXXX   XXXXX   XXXXX
1021
1022
1023
1024
1025
1026                                    5.0 TEST SUMMARIES
1027                                        --------------
1028
1029                                    5.1     TEST 1 -        BASIC FUNCTIONS.
1030
1031                                                            EXECUTES AND VERIFIES CORRECT COMPLETION OF ALL TU80 FUN
1032
1033                                                            SUBTEST 1  - SET CHAR, DRIVE INIT, GET STATUS.
1034                                                                       + SET CHARACTERISTIC 200.
1035                                                                       + DRIVE INITIATE.
1036                                                                       + SET CHARACTERISTIC  20.
1037                                                                       + GET STATUS
1038                                                                       + SET CHARACTERISTIC  40.
1039
1040                                                            SUBTEST 2  - REWIND.
1041                                                                       + REWIND.
1042                                                                       + REWIND AT BOT.
1043
1044                                                            SUBTEST 3  - WRITE/VERIFY.
1045                                                                       + WRITE/VERIFY PATTERN 1.
1046                                                                       + WRITE/VERIFY PATTERN 2.
1047                                                                       + WRITE/VERIFY PATTERN 3.
1048                                                                       + WRITE/VERIFY PATTERN 4.
1049                                                                       + WRITE/VERIFY PATTERN 5.
1050                                                                       + WRITE/VERIFY PATTERN 6.
1051                                                                       + WRITE/VERIFY PATTERN 0.
1052
1053                                                            SUBTEST 4  - WRITE TAPE MARK, ERASE.
1054                                                                       + WRITE TAPE MARK.
1055                                                                       + WRITE 10 RECORDS
1056                                                                       + ERASE 10 TIMES
1057                                                                       + WRITE TAPE MARK.
1058                                                                       + WRITE TAPE MARK RETRY.
1059
1060                                                            SUBTEST 5  - SPACE FILES.
1061                                                                       + SPACE 2 FILES REVERSE.
1062                                                                       + SPACE 2 FILES FORWARD.
1063                                                                       + SPACE 2 FILES REVERSE.
```

```
1064                                        + SPACE 2 FILES FORWARD.
1065
1066                                SUBTEST 6  - SPACE RECORDS.
1067                                             + REWIND.
1068                                             + SPACE 7 RECORDS FORWARD.
1069                                             + SPACE 7 RECORDS REVERSE.
1070                                             + SPACE 7 RECORDS FORWARD.
1071                                             + SPACE 7 RECORDS REVERSE.
1072
1073                                SUBTEST 7  - WRITE RETRY.
1074                                             + REWIND.
1075                                             + WRITE DATA.
1076                                             + WRITE RETRY.
1077
1078                                SUBTEST 8  - READ REV RETRY.
1079                                             + READ REVERSE.
1080                                             + READ NEXT REVERSE.
1081                                             + READ NEXT FORWARD.
1082
1083                                SUBTEST 9  - READ FWD RETRY.
1084                                             + READ FORWARD.
1085                                             + READ PREVIOUS FORWARD.
1086                                             + READ PREVIOUS REVERSE.
1087
1088                                SUBTEST 10 - CLEAN.
1089                                             + CLEAN.
1090                                             + REWIND.
1091
1092                                SUBTEST 11 - WRITE/VERIFY SWAPPED DATA BYTES.
1093                                             + WRITE/VERIFY EVEN LENGTH (RECORD 1).
1094                                             + WRITE/VERIFY ODD LENGTH (RECORD 2).
1095                                             + SET DATA BYTE SWAP.
1096                                             + WRITE/VERIFY EVEN LENGTH (RECORD 3).
1097                                             + WRITE/VERIFY ODD LENGTH (RECORD 4).
1098                                             + CLEAR DATA BYTE SWAP.
1099
1100                                SUBTEST 12 - READ SWAPPED DATA BYTES.
1101                                             + READ REV RECORD 4.
1102                                             + READ REV RECORD 3.
1103                                             + SET DATA BYTE SWAP.
1104                                             + READ REV RECORD 2.
1105                                             + READ REV RECORD 1.
1106                                             + READ FWD RECORD 1.
1107                                             + READ FWD RECORD 2.
1108                                             + CLEAR DATA BYTE SWAP.
1109                                             + READ FWD RECORD 3.
1110                                             + READ FWD RECORD 4.
```

```
1112                                    5.2     TEST 2 -        DATA RELIABILITY.
1113
1114                                              1. THE TAPE IS INITIATED WITH THE FOLLOWING COMMANDS:
1115                                                    SET CHARACTERISTIC 40
1116                                                    REWIND
1117                                                    WRITE/VERIFY 31 RECORDS OF RANDOM LENGTH AND DAT
1118                                              2. WRITE AND READ COMMANDS ARE SELECTED AT RANDOM AND
1119                                                 EXECUTED A RANDOM NUMBER OF TIMES WITH RANDOM
1120                                                 LENGTHS AND RANDOM PATTERN UNTIL END OF TAPE IS REA
1121                                              3. AT THE END OF EACH PASS, A REWIND COMMAND IS ISSUED
1122                                                 A PERFORMANCE REPORT IS PRINTED.
1123
1124                                                    NOTE:   IF A RESTART COMMAND IS USED TO INITIATE
1125                                                            TEST 1, THE INITIAL REWIND COMMAND IS NO
1126
1127                                    5.3     TEST 3 -        WRITE AND READ STREAMING TEST.
1128
1129                                              1. REWINDS ALL UNITS, THEN ON EACH UNIT:
1130
1131                                                                    >>>  REPEAT TWICE  <<<
1132
1133                                              ************************************************************
1134
1135                                              2. WRITE PATTERN 5 FOR 7000 - 1 KBYTE RECORDS.
1136                                                 THE SPEED ALGORITHM IN THE TU80 WILL ENABLE 100 IPS S
1137                                              3. READ REVERSE FOR 3500 RECORDS AT 100 IPS STREAMING.
1138                                              4. READ REVERSE FOR 3500 RECORDS AT 25 IPS STREAMING.
1139                                              5. READ FORWARD FOR 3500 RECORDS AT 100 IPS STREAMING.
1140                                              6. READ FORWARD FOR 3500 RECORDS AT 25 IPS STREAMING.
1141                                              7. WRITE A TAPE MARK
1142
1143                                              ************************************************************
1144
1145                                                                    >>>  END REPEAT  <<<
1146
1147                                              NOTE: 7000(10) RECORDS OF 1000(10) BYTES ARE WRITTEN AND
1148                                              ON EACH ITERATION.
1149
1150                                    5.4     TEST 4 -        WRITE COMPATABILITY/WRITE UTILITY.
1151
1152                                              REWINDS AND WRITES RECORDS OF RANDOM LENGTHS
1153                                              AND RANDOM DATA FROM BOT TO EOT.
1154
1155
1156                                    5.5     TEST 5 -        READ COMPATABILITY/READ UTILITY.
1157
1158                                              REWINDS AND READS ENTIRE TAPE, FORWARD AND REVERSE.
1159
1160
1161                                    5.6     TEST 6 -        EXECUTE OPERATOR SELECTED COMMAND SEQUENCE.
1162
1163                                              THE SEQUENCE OF COMMANDS ENTERED BY THE OPERATOR
1164                                              IS EXECUTED.  IF NO COMMANDS WERE ENTERED, A
1165                                              DEFAULT SEQUENCE OF REWIND/WRITE/READ REV/READ FWD/REWIN
1166                                              OF ENTIRE TAPE IS EXECUTED WITH RANDOM PATTERN
1167                                              AND RECORD LENGTH OF 2048 BYTES.
```

6.0 DEVICE INFORMATION TABLES

6.1 GENERAL

THE TU80 SUBSYSTEM IS A REEL-TO-REEL TAPE TRANSPORT WITH AN INTEGRATED FORMATTER. AN ADAPTER MODULE CONNECTS THE DRIVE TO ANY PROCESSOR WITH A UNIBUS. THE SUBSYSTEM READS AND WRITES AT EITHER 25 OR 100 IPS AND RECORDS AT 1600 BPI, PHASE ENCODED, ANSI STANDARD FORMAT. TAPE SPEEDS OF 25 OR 100 IPS ARE AUTOMATICALLY SELECTED BY THE CONTROLLER ACCORDING TO A SPEED ALGORITHM WITHIN THE CONTROLLERS' FIRMWARE. THE HOST SOFTWARE MAY SELECT THE 100 IPS SPEED; THE 25 IPS SPEED IS NOT USER-SELECTABLE. IN ADDITION, THE DRIVE IS MICROPROCESSOR CONTROLLED AND HAS SELF-CONTAINED LOGIC AND FUNCTIONAL DIAGNOSTICS. THE ADAPTER MODULE ENABLES THE TU80 TO BE 100% PROTOCOL COMPATIBLE WITH THE TS11.

OPERATIONALLY, THE TU80 IS UNIQUE 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 TU80 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

TU80	INT. VECTOR	UNIBUS ADDRESS	REGISTER
FIRST	224	772520	TSBA/TSDB
		772522	TSSR
SECOND	FLOAT	772524	TSBA/TSDB
		772526	TSSR
THIRD	FLOAT	772530	TSBA/TSDB
		772532	TSSR
FOURTH	FLOAT	772534	TSBA/TSDB
		772536	TSSR

6.3 BIT DEFINITIONS FOR TU80 REGISTERS

6.3.1 TU80 REGISTER SUMMARY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	
TSBA	A15	A14	A13	A12	A11	A10	A09	A08	A07	A06	A05	A04	A03	A02	A0	
TSDB	P15	P14	P13	P12	P11	P10	P09	P08	P07	P06	P05	P04	P03	P02	P1	
TSSR	SC			RMR	NXM	NBA	A17	A16	SSR	OFL	FC1	FC0	TC2	TC1	TC	
XST0	TMK	RLS	LET	RLL	WLE	NEF	ILC	ILA		ONL	IE	VCK	PED	WLK	BO	
XST1	DLT		COR	CRS		DBF									UN CR	
XST2	OPM	SIP	BPE	CAF		WCF		DTP	DT7	DT6	DT5	DT4	DT3	DT2	DT	
XST3	MICRO DIAGNOSTIC ERROR CODE									OPI	REV		DCK		LX	

TERMINATION CLASS CODES (TSSR TC0-TC2):

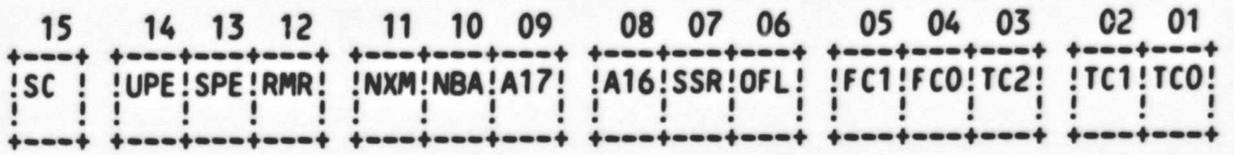
0 = NORMAL TERMINATION
1 = ATTENTION CONDITION
2 = TAPE STATUS ALERT
3 = FUNCTION REJECT
4 = RECOVERABLE ERROR - TAPE POSITION = ONE RECORD
    DOWN TAPE FROM START OF FUNCTION
5 = RECOVERABLE ERROR - TAPE NOT MOVED
6 = UNRECOVERABLE ERROR - TAPE POSITION LOST
7 = FATAL CONTROLLER ERROR

FATAL CLASS CODES (TSSR FC0-FC1):

0 = MICRO DIAGNOSTIC FAILURE (DISPLAYED IN TU80 OPERATOR PANEL AND
1 = I/O SEQUENCER CROM PARITY ERROR.
2 = MICROPROCESSOR CROM PARITY ERROR.
    SILO PARITY ERROR.
    SERIAL BUS PARITY ERROR DETECTED AT TU80 (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 TU80 STATUS REGISTER (TSSR)

UNIBUS ADDRESS + 2 - READ ONLY



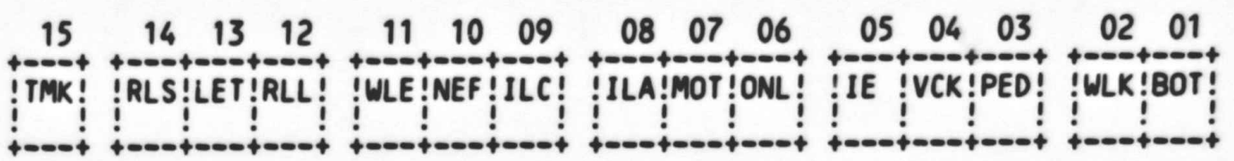
BIT	NAME	TCC	DEFINITION
15	SC	S	SPECIAL CONDITION. WHEN SET, INDICATES THAT THE LAST COMMAND DID NOT COMPLETE WITHOUT INCIDENT. SPECIFICALLY, EITHER AN ERROR WAS DETECTED OR AN EXCEPTION CONDITION OCCURRED. EXCEPTION CONDITIONS CAN BE TAPE MARKS ON READ COMMANDS, REVERSE MOTION AND AT BOT, EOT WHILE 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 SOMET OTHER THAN 0 (UNLESS RMR IS THE ONLY ERROR - SEE RM
14	NOT USED		
13	NOT USED		
12	RMR	S	REGISTER MODIFICATION REFUSED. SET BY THE TU80 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 TERMINATIO 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 TU80 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 TU80 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

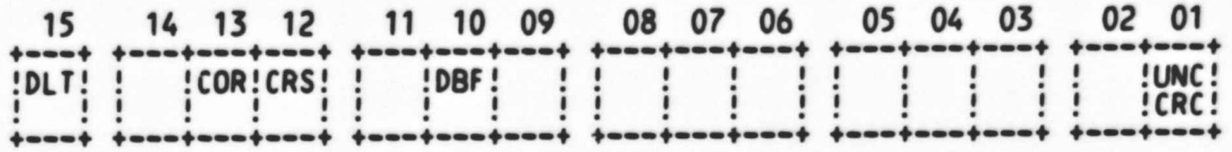
6.3.3 EXTENDED STATUS REGISTER 0 (XSTAT0)



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,

```
1466
1467
1468                                                    UNLOAD, OR A COMMAND WITH THE CLEAR VOLUME
1469                                                    CHECK (CVC) BIT SET, WHEN THE VOLUME CHECK
1470                                                    BIT IS SET.
1471                                                  - ANY COMMAND, EXCEPT GET STATUS OR DRIVE
1472                                                    INITIALIZE, WHEN THE TS04 IS OFF-LINE.
1473                                                  - ANY WRITE COMMAND WHEN THE TAPE DOES NOT
1474                                                    CONTAIN A WRITE ENABLE RING (WRITE LOCK
1475                                                    STATUS - WLS).
1476
1477                          09   ILC    3          ILLEGAL COMMAND. SET WHEN A COMMAND IS ISSUED
1478                                                 AND EITHER ITS COMMAND FIELD OR ITS COMMAND
1479                                                 MODE FIELD CONTAINS CODES WHICH ARE NOT
1480                                                 SUPPORTED BY THE TS04.
1481
1482                          08   ILA    3          ILLEGAL ADDRESS. (MORE THAN 18 BITS OR ODD WHEN
1483                                                 AN EVEN ADDRESS IS REQUIRED.)
1484
1485                          07   NOT USED
1486
1487                          06   ONL    S          ON LINE. WHEN SET, INDICATES THAT THE TS04 IS
1488                                                 ON-LINE AND OPERABLE.
1489
1490                          05   IE     S          INTERRUPT ENABLE. REFLECTS THE STATE OF THE
1491                                                 INTERRUPT ENABLE BIT SUPPLIED ON THE LAST
1492                                                 COMMAND.
1493
1494                          04   VCK    S          VOLUME CHECK. WHEN SET, INDICATES THAT THE
1495                                                 DRIVE HAS BEEN EITHER POWERED DOWN OR TURNED
1496                                                 OFF-LINE. CLEARED BY THE CLEAR VOLUME CHECK
1497                                                 (CVC) BIT IN THE COMMAND HEADER WORD. THIS BIT
1498                                                 CAN CAUSE A TERMINATION CLASS OF 3.
1499
1500                          03   PED    S          PHASE ENCODED DRIVE. WHEN SET, INDICATES THAT
1501                                                 THE TS04 IS CAPABLE OF READING AND WRITING ONLY
1502                                                 1600 BPI PHASE ENCODED DATA. WHEN RESET,
1503                                                 INDICATES THAT THE TS04 HAS ONLY 800 BPI NRZI
1504                                                 DATA CAPABILITIES.
1505
1506                          02   WLK    S,3        WRITE LOCKED. WHEN SET, INDICATES THAT THE
1507                                                 MOUNTED REEL OF TAPE DOES NOT HAVE A
1508                                                 WRITE-ENABLE RING INSTALLED. THE TAPE IS,
1509                                                 THEREFORE, WRITE PROTECTED.
1510
1511                          01   BOT    S,3        BEGINNING OF TAPE. WHEN SET, INDICATES THAT
1512                                                 THE TAPE IS POSITIONED AT THE LOAD POINT AS
1513                                                 DENOTED BY THE BOT REFLECTIVE STRIP ON THE
1514                                                 TAPE.
1515
1516                          00   EOT    S,2        END OF TAPE. THIS BIT IS SET WHENEVER THE TAPE
1517                                                 IS POSITIONED AT OR BEYOND THE END OF TAPE
1518                                                 REFLECTIVE STRIP. DOES NOT RESET UNTIL THE
1519                                                 TAPE PASSES OVER THE REFLECTIVE STRIP IN THE
1520                                                 REVERSE DIRECTION UNDER PROGRAM CONTROL.
```

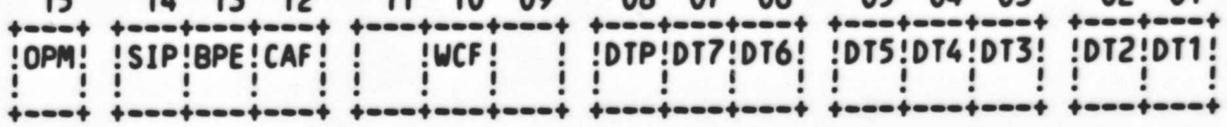
6.3.4 EXTENDED STATUS REGISTER 1 (XSTAT1)



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	NOT USED		
10	DBF	4	DESKEW BUFFER FAIL: THIS BIT IS SET WHEN ONE OF THE DESKEW BUFFERS FAILS TO SET OUTPUT READY WITHIN 20 MICROSECONDS AFTER BEING ENABLED. THE DEAD TRACK BITS INDICATE ON WHICH TRACKS THIS FAILURE OCCURRED.
09	NOT USED		
08	NOT USED		
07	NOT USED		
06	NOT USED		
05	NOT USED		
04	NOT USED		
03	NOT USED		
02	NOT USED		

```
1578                                    01   UNC    4       UNCORRECTABLE DATA.  SET ON PE  DRIVES  WHEN  A
1579                                                        PARITY  ERROR  OCCURRED WITHOUT A CORRESPONDING
1580                                                        DEAD TRACK INDICATION.
1581
1582                                         CRC    4       CRC ERROR.  SET ON NRZI DRIVES  WHEN  THE  CRC
1583                                                        CHARACTER WAS FOUND TO BE IN ERROR.
1584
1585                                    00   MTE    4       MULTI-TRACK ERROR.  SET ON PE DRIVES WHEN  MORE
1586                                                        THAN ONE DEAD TRACK OCCURRED IN THE PREAMBLE OR
1587                                                        IN THE DATA FIELD.
1588
1589                                         VPE    4       VERTICAL PARITY ERROR.  SET ON NRZI DRIVES WHEN
1590                                                        A  CHARACTER  DID  NOT CONTAIN AN ODD NUMBER OF
1591                                                        ONE BITS.
```

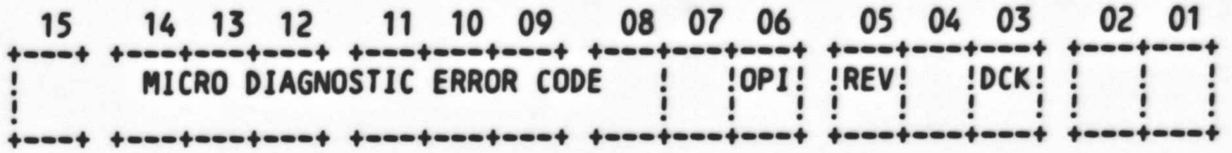
6.3.5 EXTENDED STATUS REGISTER 2 (XSTAT2)



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 TU80 WHEN A PARITY ERROR IS DETECTED ON DATA TRANSMITTED FROM THE ADAPTOR CARD TO THE TU80. CAUSES FA 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.

```
1649
1650                                    02   DT2    S       DEAD TRACK 2.  SEE DTP.
1651
1652                                    01   DT1    S       DEAD TRACK 1.  SEE DTP.
1653
1654                                    00   DT0    S       DEAD TRACK 0.  SEE DTP.
1655
1656                                NOTE:  ON A SET CHARACTERISTICS COMMAND, THE UCODE LEVEL  IS  RETURNED
1657                                       IN DT7 THRU DT0.  ON A GET STATUS COMMAND, THE RESIDUAL CAPSTAN
1658                                       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		7	MICRO DIAGNOSTIC ERROR CODE. THERE IS ONE OPERATIONAL ERROR. 337(8) OR LEFT JUSTIFIED TO 157400(8) IN A 16-BIT REGISTER (CAPSTAN RUNAWAY), WHICH IS DISPLAYED HERE. THIS MEANS THAT THE CAPSTAN WAS COMMANDED TO STOP BUT EXCEEDED THE ALLOWABLE STOPPING WINDOW. DRIVE MUST BE INITIALIZED TO BE USED FOR TAPE MOTION AGAIN.
07	NOT USED		
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	NOT USED		.
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	NOT USED		
01	NOT USED		
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.

&

```
                                .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


                                        HEADER  CZTUV,B,0,5000,1,INTPRI
002000                          L$NAME::                ;DIAGNOSTIC NAME
(4) 002000  103                                                         .ASCII /C/
(4) 002001  132                                                         .ASCII /Z/
(4) 002002  124                                                         .ASCII /T/
(4) 002003  125                                                         .ASCII /U/
(4) 002004  126                                                         .ASCII /V/
(6) 002005  000                                                         .BYTE   0
(6) 002006  000                                                         .BYTE   0
(5) 002007  000                                                         .BYTE   0
(5) 002010                      L$REV::                 ;REVISION LEVEL
(4) 002010  102                                                         .ASCII  /B/
(5) 002011                      L$DEPO::                ;0
(4) 002011  060                                                         .ASCII  /0/
(5) 002012                      L$UNIT::                ;NUMBER OF UNITS
(4) 002012  000001                                                      .WORD   T$PTHV
(5) 002014                      L$TIML::                ;LONGEST TEST TIME
(4) 002014  005000                                                      .WORD   5000
(5) 002016                      L$HPCP::                ;POINTER TO H.W. QUES.
(4) 002016  027202                                                      .WORD   L$HARD
(5) 002020                      L$SPCP::                ;POINTER TO S.W. QUES.
(4) 002020  027254                                                      .WORD   L$SOFT
(5) 002022                      L$HPTP::                ;PTR. TO DEF. H.W. PTABLE
(4) 002022  002176                                                      .WORD   L$HW
(5) 002024                      L$SPTP::                ;PTR. TO S.W. PTABLE
(4) 002024  002204                                                      .WORD   L$SW
(5) 002026                      L$LADP::                ;DIAG. END ADDRESS
(4) 002026  030670                                                      .WORD   L$LAST
(5) 002030                      L$STA::                 ;RESERVED FOR APT STATS
(4) 002030  000000                                                      .WORD   0
(5) 002032                      L$CO::
(4) 002032  000000                                                      .WORD   0
(5) 002034                      L$DTYP::                ;DIAGNOSTIC TYPE
(4) 002034  000001                                                      .WORD   1
(5) 002036                      L$APT::                 ;APT EXPANSION
(4) 002036  000000                                                      .WORD   0
(5) 002040                      L$DTP::                 ;PTR. TO DISPATCH TABLE
(4) 002040  002124                                                      .WORD   L$DISPAT
(5) 002042                      L$PRIO.:                ;DIAGNOSTIC RUN PRIORITY
(4) 002042  000340                                                      .WORD   INTPRI
(5) 002044                      L$ENVI::                ;FLAGS DESCRIBE HOW IT WAS SETUP
```

```
(4)  002044  000000                                        .WORD   0
(5)  002046
(4)  002046  000000   L$EXP1::          ;EXPANSION WORD   .WORD   0
(5)  002050
(4)  002050     003   L$MREV::          ;SVC REV AND EDIT #
                                                          .BYTE   C$REVISI
(3)  002051     003                                       .BYTE   C$EDIT
(5)  002052
(4)  002052  000000   L$EF::            ;DIAG. EVENT FLAGS
                                                          .WORD   0
(5)  002054  000000                                       .WORD   0
(5)  002056           L$SPC::
(4)  002056  000000                                       .WORD   0
(5)  002060           L$DEVP::          ; POINTER TO DEVICE TYPE LIST
(4)  002060  002166                                       .WORD   L$DVTYP
(5)  002062           L$REPP::          ;PTR. TO REPORT CODE
(4)  002062  017366                                       .WORD   L$RPT
(5)  002064           L$EXP4::
(4)  002064  000000                                       .WORD   0
(5)  002066           L$EXP5::
(4)  002066  000000                                       .WORD   0
(5)  002070           L$AUT::           ;PTR. TO ADD UNIT CODE
(4)  002070  023246                                       .WORD   L$AU
(5)  002072           L$DUT::           ;PTR. TO DROP UNIT CODE
(4)  002072  023202                                       .WORD   L$DU
(5)  002074           L$LUN::           ;LUN FOR EXERCISERS TO FILL
(4)  002074  000000                                       .WORD   0
(5)  002076           L$DESP::          ;POINTER TO DIAG. DESCRIPTION
(4)  002076  002140                                       .WORD   L$DESC
(5)  002100           L$LOAD::          ;GENERATE SPECIAL AUTOLOAD EMT
(4)  002100  104035                                       EMT     E$LOAD
(5)  002102           L$ETP::           ;POINTER TO ERRTBL
(4)  002102  000000                                       .WORD   0
(5)  002104           L$ICP::           ;PTR. TO INIT CODE
(4)  002104  021222                                       .WORD   L$INIT
(5)  002106           L$CCP::           ;PTR. TO CLEAN-UP CODE
(4)  002106  023140                                       .WORD   L$CLEAN
(5)  002110           L$ACP::           ;PTR. TO AUTO CODE
(4)  002110  022516                                       .WORD   L$AUTO
(5)  002112           L$PRT::           ;PTR. TO PROTECT TABLE
(4)  002112  021214                                       .WORD   L$PROT
(5)  002114           L$TEST::          ;TEST NUMBER
(4)  002114  000000                                       .WORD   0
(5)  002116           L$DLY::           ;DELAY COUNT
(4)  002116  000000                                       .WORD   0
(5)  002120           L$HIME::          ;PTR. TO HIGH MEM
(4)  002120  000000                                       .WORD   0
1776
```

```
                                        .SBTTL  DISPATCH TABLE

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

                                                DISPATCH 6              ; SIX TESTS
002122                                                                          .WORD   6
002122  000006                          L$DISPATCH::
002124                                                                          .WORD   T1
002124  023342                                                                 .WORD   T2
002126  024730                                                                 .WORD   T3
002130  025404                                                                 .WORD   T4
002132  026042                                                                 .WORD   T5
002134  026206                                                                 .WORD   T6
002136  026340

                                        .SBTTL  DESCRIPTIVE TEXT

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

                                                DESCRIPT        <DATA RELIABILITY TEST>
002140                                  L$DESC::
002140                                                                          .ASCIZ  /DATA RE
002140  040504  040524  051040
002146  046105  040511  044502
002154  044514  054524  052040
002162  051505  000124
                                                                                .EVEN

                                                        DEVTYP          <TU80>
002166                                  L$DVTYP::
002166  052524  030070      000                                               .ASCIZ  /TU80/
002174                                                                          .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.
                                ;--

                                        BGNHW   DFPTBL
 (3)  002174  000002                                                    .WORD   L10000-L
 (3)  002176                    L$HW::
 (3)  002176                    DFPTBL::

                                172522          ;TSSR ADDRESS.
                                224             ;VECTOR ADDRESS.

                                        ENDHW
 (3)  002202                    L10000:
```

```
                                .SBTTL  SOFTWARE P-TABLE

                                ;++
                                ; THE SOFTWARE P-TABLE CONTAINS THE VALUES OF THE PROGRAM
                                ; PARAMETERS THAT CAN BE CHANGED BY THE OPERATOR.
                                ;--
                                        BGNSW   SFPTBL
                                                                        .WORD   L10001-L
                                L$SW::
                                SFPTBL::
1845  002204      001           CLRFLG::.BYTE   1               ;CLEAR COUNTERS FLAG.
1846  002205      000           RRANV:: .BYTE   0               ;RESET RANDOM VARIABLES EACH PASS FLAG.
1847  002206      000           HAE::   .BYTE   0               ;HALT AFTER EACH COMMAND FLAG.
1848  002207      000           ERCVER::.BYTE   0               ;ENABLE RECOVERABLE ERROR PRINTS FLAG.
1849  002210      000           IREC::  .BYTE   0               ;INHIBIT ERROR RECOVERY FLAG.
1850  002211      001           BADTSW::.BYTE   1               ;BAD TAPE SWITCH TO REWRITE ON SAME SPOT & DETEC
1851  002212      000           DINT::  .BYTE   0               ;DISABLE INTERRUPTS FLAG.
1852  002213      000           PIRE::  .BYTE   0               ;INHIBIT RESIDUAL FRAMECOUNT ERROR REPORT FLAG.
1853  002214      000           RAMWRT::.BYTE   0               ;ENABLE OPTIONAL RAM DUMP
1854  002215      000           CHGFLG::.BYTE   0               ;CHANGE CMD SEQ TABLE FLAG.
1855  002216      000                   .BYTE   0               ;SPARE
1856  002217      000                   .BYTE   0               ;SPARE
1857                                    .EVEN
1858  002220  000040           CHAR::  CH.EAI                  ;CHARACTERISTICS CODE (DEFAULT = 40).
1859  002222  000015           CMDD::  .WORD   13.             ;COMMAND 2 (DEFAULT = REWIND).
1860  002224  000001                   .WORD   1               ;BYTE COUNT
1861  002226  000001                   .WORD   1               ;NUMBER OF OPERATIONS
1862  002230  000007                   .WORD   RANP            ;PATTERN
1863  002232  000004                   .WORD   4               ;COMMAND 3  (DEFAULT = WRITE)
1864  002234  004000                   .WORD   DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
1865  002236  076400                   .WORD   32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32000).
1866  002240  000007                   .WORD   RANP            ;PATTERN (DEFAULT = RANDOM).
1867  002242  000003                   .WORD   3               ;COMMAND 4 (DEFAULT = READ REV).
1868  002244  004000                   .WORD   DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
1869  002246  076400                   .WORD   32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32,000).
1870  002250  000007                   .WORD   RANP            ;PATTERN (DEFAULT = RANDOM).
1871  002252  000002                   .WORD   2               ;COMMAND 5 (DEFAULT = READ FWD).
1872  002254  004000                   .WORD   DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
1873  002256  076400                   .WORD   32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32,000).
1874  002260  000007                   .WORD   RANP            ;PATTERN (DEFAULT = RANDOM).
1875  002262  000015                   .WORD   13.             ;COMMAND 6 (DEFAULT = REWIND).
1876  002264  000001                   .WORD   1.              ;BYTE COUNT
1877  002266  000001                   .WORD   1               ;NUMBER OF OPERATIONS
1878  002270  000007                   .WORD   RANP            ;PATTERN
1879  002272  000033                   .WORD   27.             ;END OF CMD SEQ TABLE CODE (DEF) OR CMD 7
1880  002274  004000                   .WORD   DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
1881  002276  076400                   .WORD   32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32000).
1882  002300  000007                   .WORD   RANP            ;PATTERN (DEFAULT = RANDOM).
1883  002302  000033                   .WORD   27.             ;END OF CMD SEQ TABLE CODE (DEF) OR CMD 8
1884  002304  004000                   .WORD   DATCNT          ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
1885  002306  076400                   .WORD   32000.          ;NUMBER OF OPERATIONS (DEFAULT = 32000).
1886  002310  000007                   .WORD   RANP            ;PATTERN (DEFAULT = RANDOM).
1887  002312                           ENDSW
                                L10001:
1888  002312                           ENDMOD
```

```
                                .TITLE GLOBAL AREAS
                                .SBTTL  GLOBAL EQUATES SECTION
                                
002312                                  BGNMOD
                                
                                ;++
                                ; THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
                                ; ARE USED IN MORE THAN ONE TEST.
                                ;--
                                
002312                                  EQUALS
(1)                             ;
(1)                             ; BIT DIFINITIONS
(1)                             ;
(1)         100000              BIT15== 100000
(1)         040000              BIT14== 40000
(1)         020000              BIT13== 20000
(1)         010000              BIT12== 10000
(1)         004000              BIT11== 4000
(1)         002000              BIT10== 2000
(1)         001000              BIT09== 1000
(1)         000400              BIT08== 400
(1)         000200              BIT07== 200
(1)         000100              BIT06== 100
(1)         000040              BIT05== 40
(1)         000020              BIT04== 20
(1)         000010              BIT03== 10
(1)         000004              BIT02== 4
(1)         000002              BIT01== 2
(1)         000001              BIT00== 1
(1)                             ;
(1)         001000              BIT9==  BIT09
(1)         000400              BIT8==  BIT08
(1)         000200              BIT7==  BIT07
(1)         000100              BIT6==  BIT06
(1)         000040              BIT5==  BIT05
(1)         000020              BIT4==  BIT04
(1)         000010              BIT3==  BIT03
(1)         000004              BIT2==  BIT02
(1)         000002              BIT1==  BIT01
(1)         000001              BIT0==  BIT00
(1)                             ;
(1)                             ; EVENT FLAG DEFINITIONS
(1)                             ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
(1)                             ;
(1)         000040              EF.START==      32.                 ; START COMMAND WAS ISSUED
(1)         000037              EF.RESTART==    31.                 ; RESTART COMMAND WAS ISSUED
(1)         000036              EF.CONTINUE==   30.                 ; CONTINUE COMMAND WAS ISSUED
(1)         000035              EF.NEW==        29.                 ; A NEW PASS HAS BEEN STARTED
(1)         000034              EF.PWR==        28.                 ; A POWER-FAIL/POWER-UP OCCURRED
(1)                             ;
(1)                             ;
(1)                             ; PRIORITY LEVEL DEFINITIONS
(1)                             ;
(1)         000340              PRI07== 340
```

```
(1)   000300                    PRI06== 300
(1)   000240                    PRI05== 240
(1)   000200                    PRI04== 200
(1)   000140                    PRI03== 140
(1)   000100                    PRI02== 100
(1)   000040                    PRI01== 40
(1)   000000                    PRI00== 0
(1)                             ;
(1)                             ;OPERATOR FLAG BITS
(1)                             ;
(1)   000004                    EVL==       4
(1)   000010                    LOT==      10
(1)   000020                    ADR==      20
(1)   000040                    IDU==      40
(1)   000100                    ISR==     100
(1)   000200                    UAM==     200
(1)   000400                    BOE==     400
(1)   001000                    PNT==    1000
(1)   002000                    PRI==    2000
(1)   004000                    IXE==    4000
(1)   010000                    IBE==   10000
(1)   020000                    IER==   20000
(1)   040000                    LOE==   40000
(1)   100000                    HOE==  100000
1921
1929
1930                            ; REGISTER USAGE.
1931                            ;
1932                            ;       R0 - PASSES PARAMETERS TO/FROM DIAGNOSTIC SUPERVISOR.
1933                            ;       R1 - COMMAND SEQUENCE TABLE POINTER.
1934                            ;       R2 - GENERAL PURPOSE REGISTER.
1935                            ;       R3 - GENERAL PURPOSE REGISTER.
1936                            ;       R4 - GENERAL PURPOSE REGISTER.
1937                            ;       R5 - CURRENT LOGICAL DEVICE NUMBER X 2.
1938                            ;       R6 - STACK POINTER.
1939                            ;       R7 - PROGRAM COUNTER.
1940
1941                            ;THE FOLLOWING ARE BIT DEFINITIONS FOR THE TSSR REGISTERS.
1942
1943   100000                   TS.SC==100000           ;SPECIAL CONDITION BIT.
1944   040000                   TS.UPE==40000           ;UNIBUS PARITY ERROR
1945   020000                   TS.SPE==20000           ;SERIAL BUS PARITY ERROR.
1946   010000                   TS.RMR==10000           ;REGISTER MODIFICATION REFUSED.
1947   004000                   TS.NXM==4000            ;NON-EXISTENT MEMORY.
1948   002000                   TS.NBA==2000            ;NEED BUFFER ADDRESS.
1949   001000                   TS.A17==1000            ;BUS ADDRESS BIT 17.
1950   000400                   TS.A16==400             ;BUS ADDRESS BIT 16.
1951   000200                   TS.SSR==200             ;UNIT READY BIT.
1952   000100                   TS.OFL==100             ;OFF LINE.
1953   177717                   TSC.FCC==177717         ;FATAL CLASS CODE MASK.
1954   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 TU80 BUT USED INTERNALLY BY THIS PROGRAM ONL
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 TU80.
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 EO
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==TU80 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==PRI07                   ;PRIORITY TO BE USED IN INTERRUPT STATE.
000010                  SCHCNT==10                      ;ARBITRARY BYTE LENGTH FOR CHARACTERISTIC
                                                        ;BUFFER LENGTH. (EVEN #)
000016                  MSGCNT==16                      ;MESSAGE BUFFER LENGTH IN BYTES. (EVEN #)
000020                  DIACNT==20                      ;DIAGNOSTIC COMMAND BUFFER EXTENT.
004000                  DATCNT==2048.                   ;MAXIMUM RECORD LENGTH IN BYTES.
                                                        ;THIS COUNT SHOULD BE A MULTIPLE OF 256 TO INSUR
                                                        ;PROPER READ/WRITE BUFFER ALLOCATION BY THE SUPE
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 TU80 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

104410                  SRR==   ACK.C!BRF.C!MOD.C0!CMD.C3
                                                        ;SPACE RECORD REVERSE
```

```
2068
2069          105401                    RNR==   ACK.C!BRF.C!MOD.C1!MOD.C0!CMD.C0
2070                                              ;READ REV RETRY1 - REREAD NEXT REVERSE, IE. SPACE FWD, READ REVE
2071
2072          125401                    RNF==   ACK.C!BRF.C!OPP.C!MOD.C1!MOD.C0!CMD.C0
2073                                              ;READ REV RETRY2 - REREAD NEXT FORWARD, IE.READ FORWARD, SPACE R
2074
2075          105001                    RPF==   ACK.C!BRF.C!MOD.C1!CMD.C0
2076                                              ;READ FWD RETRY1 - REREAD PREVIOUS FORWARD, IE. SPACE REVERSE, R
2077
2078          125001                    RPR==   ACK.C!BRF.C!OPP.C!MOD.C1!CMD.C0
2079                                              ;READ FWD RETRY2 - REREAD PREVIOUS REVERSE, IE. READ REVERSE, SP
2080
2081          105005                    WRR==   ACK.C!MOD.C1!BRF.C!CMD.C2!CMD.C0
2082                                                                    ;WRITE RETRY
2083
2084          102010                    RWD==   ACK.C!MOD.C2!CMD.C3
2085                                                                    ;REWIND COMMAND
2086
2087          100012                    MBR==   ACK.C!CMD.C3!CMD.C1
2088                                                                    ;MESSAGE BUFFER RELEASE
2089
2090          100011                    WTM==   ACK.C!CMD.C3!CMD.C0
2091                                                                    ;WRITE TAPE MARK.
2092
2093          101011                    WTR==   ACK.C!MOD.C1!CMD.C3!CMD.C0
2094                                                                    ;WRITE TAPE MARK RETRY.
2095
2096          105010                    SFF==   ACK.C!BRF.C!MOD.C1!CMD.C3
2097                                                                    ;SPACE FILE FORWARD
2098
2099          105410                    SFR==   ACK.C!BRF.C!MOD.C0!MOD.C1!CMD.C3
2100                                                                    ;SPACE FILE REVERSE
2101
2102          100017                    GES==   ACK.C!CMD.C0!CMD.C1!CMD.C2!CMD.C3
2103                                                                    ;GET EXTENDED STATUS
2104
2105          100411                    ERS==   ACK.C!MOD.C0!CMD.C3!CMD.C0
2106                                                                    ;ERASE 3 INCHES OF TAPE
2107
2108          100412                    UNL==   ACK.C!MOD.C0!CMD.C3!CMD.C1
2109                                                                    ;UNLOAD COMMAND
2110
2111          101012                    CLN==   ACK.C!MOD.C1!CMD.C3!CMD.C1
2112                                                                    ;ERASE TAPE.
2113
2114          140004                    SCH==   ACK.C!CVC.C!CMD.C2      ;SET DEVICE CHARACTERISTICS.
2115
2116          100006                    DIA==   ACK.C!CMD.C2!CMD.C1     ;DIAGNOSTICS.
2117
2118          000040                    JMP==   JMP.C                   ;JUMP TO 'N'TH COMMAND
2119
2120          000020                    DLY==   DLY.C                   ;DELAY 'N'' MS.
2121
2122          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.

                002314                  .       =       .+3&177774      ;MUST BE ON MOD 4 BOUNDRY.
002314  000000                          CMDPKT:: 0                      ;1ST WORD IS TU80 COMMAND.
002316  000000                                   0                      ;2ND WORD IS THE BUFFER LOW ADDRESS.
002320  000000                                   0                      ;3RD WORD IS THE BUFFER HIGH ADDRESS.
002322  000000                                   0                      ;4TH WORD IS THE BYTE/RECORD/FILE COUNT.

                                        ;       GET STATUS COMMAND PACKET.

                002324                  .       =       .+3&177774      ;MUST BE ON MOD 4 BOUNDRY.
002324  100017                          GSCPK::  .WORD   GES

                                        ;       MESSAGE BUFFER RELEASE COMMAND PACKET.

                002330                  .       =       .+3&177774      ;MUST BE ON MOD 4 BOUNDRY.
002330  100012                          BRCPK::  .WORD   MBR

                                        ;       REWIND COMMAND PACKET (USED IN ERROR RECOVERY ONLY)

                002334                  .       =       .+3&177774      ;MUST BE ON A MODULE 4 BOUNDARY.
002334  102010                          RWCPK::  .WORD   RWD
002336  000001                                   .WORD   1

                                        ;       WORK AREA FOR ANALYSIS OF MESSAGE PACKET CONTENTS.

002340  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.

002356  000007                          MSGPK0:: .BLKW   7              ;MESSAGE PACKET FOR DEVICE #0
002374  000007                          MSGPK1:: .BLKW   7              ;MESSAGE PACKET FOR DEVICE #1
002412  000007                          MSGPK2:: .BLKW   7              ;MESSAGE PACKET FOR DEVICE #2
002430  000007                          MSGPK3:: .BLKW   7              ;MESSAGE PACKET FOR DEVICE #3
```

```
2173                                    ;       SET CHARACTERISTIC BLOCK.
2174
2175  002446  002356                    SCHBK:: MSGPK0                  ;1ST WORD:: MSGPKT ADDR LO(SET UP BY EXCUTE ROUT
2176  002450  000000                            0                       ;2ND WORD:: MSGPKT ADDR HI.
2177  002452  000016                            MSGCNT                  ;3RD WORD:: MSG BUFFER LENGTH (BYTES)
2178  002454  000040                            CH.EAI                  ;4TH WORD:: CHARACTERISTICS WORD(SET BY SETUP RO
2179
2180                                    ;       TU80 REGISTER ADDRESSES.
2181
2182  002456  000004                    TSDB:: .BLKW    4               ;TU80 DATA BUFFER ADDRESSES.
2183  002466  000004                    TSSR:: .BLKW    4               ;TU80 STATUS REGISTER ADDRESSES.
2184  002476  000004                    TSVCT:: .BLKW   4               ;TU80 VECTOR ADDRESSES.
2185          002456                    TSBA==TSDB                      ;DATA BUFFER ADDRESS REGISTER.
2186
2187                                    ;       ADDRESSES OF MESSAGE PACKETS.
2188
2189  002506  002356                    MSGPKA:: MSGPK0                 ;DEVICE 0.
2190  002510  002374                            MSGPK1                  ;DEVICE 1.
2191  002512  002412                            MSGPK2                  ;DEVICE 2.
2192  002514  002430                            MSGPK3                  ;DEVICE 3.
2193
2194                                    ;       ADDRESSES OF INTERRUPT HANDLING ROUTINES.
2195
2196  002516  006566                    TS4INT:: TS4IN0                 ;DEVICE 0.
2197  002520  006574                            TS4IN1                  ;DEVICE 1.
2198  002522  006602                            TS4IN2                  ;DEVICE 2.
2199  002524  006610                            TS4IN3                  ;DEVICE 3.
2200
2201                                    ;       TU80 CODE LEVELS, WILL BE STORED AFTER SCH CMD IN BASIC FUNCTION TEST
2202
2203  002526  000000                    TS4CL:: 0                       ;DEVICE 0
2204  002530  000000                            0                       ;DEVICE 1
2205  002532  000000                            0                       ;DEVICE 2
2206  002534  000000                            0                       ;DEVICE 3
2207
2208                                    ;       UNIT NUMBERS OF ALL DEVICES BEING TESTED(1-4).
2209                                    ;       WHEN DEVICE IS NOT IN USE, IT,S LOCATION WILL = -3.
2210                                    ;       R5 WILL ALWAYS CONTAIN THE PRESENT LOGICAL UNIT NUMBER X 2.
2211
2212  002536  177774                    DEVTBL:: .WORD  NINUSE
2213  002540  177774                            .WORD   NINUSE
2214  002542  177774                            .WORD   NINUSE
2215  002544  177774                            .WORD   NINUSE
2216  002546  177777                            .WORD   END
2217
2218                                    ;       BAD TAPE TABLE POINTER: USED BY WRITE RETRY ROUTINE
2219                                    ;       "WRTY" TO LOG BAD TAPE SPOTS ON UNITS UNDER TEST
2220
2221  002550  003000                    BTADDR:: BT0
2222  002552  003052                             BT1
2223  002554  003124                             BT2
2224  002556  003176                             BT3
```

```
                                ;       COUNTER AREA.

                        002560  CNTBGN=.
002560  000020                  WRBC:: .BLKW    20              ;BYTES WRITTEN.
002620  000020                  RRBC:: .BLKW    20              ;BYTES READ REV.
002660  000020                  RFBC:: .BLKW    20              ;BYTES READ FWD.
002720  000004                  WRREC:: .BLKW   4               ;RECOVERABLE WRITE ERRORS.
002730  000004                  WRUNR:: .BLKW   4               ;UNRECOVERABLE WRITE ERRORS.
002740  000004                  RRREC:: .BLKW   4               ;RECOVERABLE READ REV ERRORS.
002750  000004                  RRUNR:: .BLKW   4               ;UNRECOVERABLE READ REV ERRORS.
002760  000004                  RFREC:: .BLKW   4               ;RECOVERABLE READ FWDERRORS.
002770  000004                  RFUNR:: .BLKW   4               ;UNRECOVERABLE READ FWD ERRORS.
003000  000025                  BT0::   .BLKW   21.             ;UNIT 0 BAT TAPE SPOTS LOG
003052  000025                  BT1::   .BLKW   21.             ;UNIT 1 BAT TAPE SPOTS LOG
003124  000025                  BT2::   .BLKW   21.             ;UNIT 2 BAT TAPE SPOTS LOG
003176  000025                  BT3::   .BLKW   21.             ;UNIT 3 BAT TAPE SPOTS LOG
003250  000004                  WRTYCT:: .BLKW  4               ;WRITE RETRY COUNTER
003260  000004                  PASCNT:: .BLKW  4               ;PASS COUNT.
003270  000004                  SCCNT:: .BLKW   4               ;SPECIAL CONDITION COUNT.
003300  000004                  VFYCNT:: .BLKW  4               ;COUNT OF TU80 DATA COMPARE ERRORS.
003310  000004                  HRDCNT:: .BLKW  4               ;COUNT OF HARD ERRORS.
003320  000004                  FTLCNT:: .BLKW  4               ;COUNT OF FATAL ERRORS.
        003330                  CNTEND=.                        ;END OF STATICTICAL COUNTERS.
003330  000004                  RECCNT:: .BLKW  4               ;NUMBER OF RECORDS FROM BOT: CLEARED  ON REWIND
                                                                ;AND WHEN RESTARTING OR CONTINUING TEST 2.
        000550                  CNTLEN==CNTEND-CNTBGN           ;LENGTH OF STATISTICAL COUNTER AREA.

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

003340      000                 DOAGIN:: .BYTE  0               ;TEST 3 LOOP CONTROL
003341      000                 HERE::   .BYTE  0               ;THIS IS A 'BEEN HERE BEFORE'' MARKER
                                .EVEN
003342  000000                  RAMHLD:  .WORD  0               ;RAM ADDR HOLDER 1ST ADDRESS
003344  000000                  RAMR5H:  .WORD  0               ;HOLDS R5 FOR LATER
003346  000020                  RAMDATA::.BLKW  16.             ;DATA READ FROM RAM PACKET OR MESSAGE BUF AREA
003406  000000                  RAMSIZ:: .WORD  0               ;RAM DATA SIZE FOR PRAMPKT ROUTINE
003410  000000                  CMPDAT:: .WORD  0               ;COUNTS # OF READS (TEST 3) BEFORE ALLOWING A DA
003412  000000                  DATRAT:: .WORD  0               ;CONTROLS THE DATA COMPARE RATIO
003414  000000                  STTIM::  .WORD  0               ;BTL
003416  000000                  DATAWT:: .WORD  0               ;WRITE BUFFER ADDRESS.
003420  000000                  DATARD:: .WORD  0               ;READ BUFFER ADDRESS.
003422  000000                  NCNT::   .WORD  0               ;STORAGE FOR VALUE OF N.
003424  000000                  NCNT1::  .WORD  0               ;TEMP STORAGE FOR VALUE OF N.
003426  000000                  BRFCNT:: .WORD  0               ;STORAGE FOR BPCR VALUE.
003430  177777                  CMDWRD:: .WORD  END             ;CONTAINS COMMAND WORD BEING EXECUTED PRESENTLY.
003432  177777                  CMDSAV:: .WORD  END             ;SAVE LOCATION FOR CMD WORD DURING ERROR RECOVER
003434  177777                  PCMDWD:: .WORD  END             ;CONTAINS PREVOUS COMMAND WORD.
003436  000000                  CMDLG::  .WORD  0               ;CURRENT COMMAND LOGGING CODE.
003440  000000                  LENMSK:: .WORD  0               ;RANDOM WRITE LENGTH MASK, TO BE SET UP BY TESTS
003442  153624                  RANB::   .WORD  153624          ;RANDOM # GENERATOR BASE.
003444  032561                  RANS::   .WORD  32561           ;RANDOM # SAVE LOCATION.
003446  000000                  TIME1::  .WORD  0               ;TIME COUNT 1.
003450  000000                  TIME2::  .WORD  0               ;TIME COUNT 2.
003452  000000                  JLOOP::  .WORD  0               ;JMP COMMAND LOOP COUNT.
003454  000000                  JLOC::   .WORD  0               ;JMP COMMAND LOCATION COUNT.
```

```
  2282  003456  000000                    PATERN:: .WORD  0          ;PATTERN SELECT CODE.
```

```
2284  003460  000000                CTCL::   .WORD  0              ;CURRENT TERMINATION CLASS CODE.
2285  003462  000000                R5SAVE:: .WORD  0              ;LOCATION FOR SAVING CURRENT DEVICE POINTER.
2286  003464  000000                TSSREG:: .WORD  0              ;CURRENT STATUS REGISTER.
2287          003416                DIABLK==DATAWT                 ;WRITE BUFFER ALSO USED FOR DIAG CMD.
2288
2289                                ;       ERROR FLAG AREA, THESE FLAGS ARE CLEARED DURING INITIALIZATION AND
2290                                ;       AFTER EACH COMMAND IS COMPLETED.
2291
2292          003466                BGNFLG=.
2293  003466  000000                RETRYC:: .WORD  0              ;# OF RECOVERY ATTEMPTS EXECUTED.
2294  003470     000                RPTCNT:: .BYTE  0          ;WRITE REPEAT ON SAME SPOT CNTR: 4 PER WRITE RETRY
2295  003471     000                WRTYFG:: .BYTE  0              ;WRITE RETRY ON SAME SPOT IN PROGRESS FLAG
2296  003472     000                WRTYER:: .BYTE  0              ;WRITE RETRY ON SAME SPOT ERROR FLAG
2297  003473     000                RECLOG:: .BYTE  0              ;RECORD COUNT HAS BEEN UPDATED FOR THIS RECORD.
2298  003474     000                ERLOG::  .BYTE  0              ;DATA BYTES AND ERRORS HAVE BEEN LOGGED FOR THIS
2299  003475     000                RWERR::  .BYTE  0              ;READ/WRITE ERROR HAS OCCURED.
2300  003476     000                UNREC::  .BYTE  0              ;UNRECOVERABLE ERROR HAS OCCURED.
2301  003477     000                ERRREC:: .BYTE  0              ;ERROR RECOVERY MODE.
2302                                        .EVEN
2303          003500                ENDERF=.
2304
2305                                ;       ADDITIONAL FLAGS, THESE FLAGS ARE CLEARED DURING INITIALIZATION.
2306
2307  003500  000004                INTFLG:: .BLKW  4              ;INTERRUPT OCCURRED FLAGS FOR EACH DEVICE.
2308  003510  000004                EOTFLG:: .BLKW  4              ;EOT/BOT FLAGS FOR EACH DEVICE (XSTAT0).
2309  003520  000000                BTPT::   .WORD  0              ;BAD TAPE SPOT POINTER TO BT0-BT3 VIA BTADDR
2310  003522     000                EXPBOT:: .BYTE  0              ;BOT IS EXPECTED, DO NOT ABORT ON BOT/FUNC RTI.
2311  003523     000                RANDOM:: .BYTE  0              ;RANDOM EVERYTHING FLAG.
2312  003524     000                VFYFLG:: .BYTE  0              ;SET DURING WRITE/VERIFY COMMAND.
2313  003525     000                RPTFLG:: .BYTE  0              ;PERFORMANCE REPORT HAS BEEN REQUESTED.
2314  003526     000                SWBFLG:: .BYTE  0              ;ENABLES SWAP BYTE FUNCTION WHEN NOT EQUAL TO ZE
2315  003527     000                IRE::    .BYTE  0              ;INHIBIT RESIDUAL FRAME COUNT ERROR REPORT.
2316  003530     000                DROPED:: .BYTE  0              ;CURRENT UNIT HAS BEEN DROPPED
2317  003531     000                T1SWB::  .BYTE  0              ;TEST1 SWAP BYTES FLAG
2318  003532     000                ALLEOT:: .BYTE  0              ;ALL UNITS  @ EOT FLAG
2319  003533     000                STREAM:: .BYTE  0              ;INDICATES TEST ONE UNIT AT A TIME, COMPLETELY.
2320  003534     000                ERSFLG:: .BYTE  0              ;ERASE FLAG:  DO ERASE AFTER A SPACE REV TO DELE
2321                                                              ;BADLY WRITTEN RECORD.  1 TO 4 ERASES LEAVING
2322                                                              ;A 3 TO 12 INCH GAP MAY RESULT.
2323          003536                        .EVEN
2324          003536                ENDFLG=.
2325
2326                                ;       ADDITIONAL FLAGS, THESE FLAGS ARE CLEARED ONLY AFTER BEING CHECKED.
2327
2328  003536     000                STAFLG:: .BYTE  0              ;START FLAG - SET BY INIT CODE IF STARTING.
2329  003537     000                PWRFLG:: .BYTE  0              ;POWER FAILURE FLAG - SET ONLY DURING INIT.
2330  003540     000                TRAPD4:: .BYTE  0              ;TRAPED AT 4 FLAG
2331  003541     000                MISCFG:: .BYTE  0              ;MISCELLANEOUS FLAG
2332
```

```
2334                                    ;       OPERATOR FLAG SETTINGS PASSED BY DIAG. SUPERVISOR IN A 16 BIT WORD
2335                                    ;       SEE GLOBAL EQUATES SECTION FOR FLAG BIT LIST
2336
2337  003542  000000                    OPFLAG:: .WORD  0       ;READ ONLY OPERATOR FLAG WORD
2338                                            .EVEN
2339
2340                                            ;THE FOLLOWING IS THE COMMAND SEQUENCE TABLE.  THE TABLE
2341                                            ;HAS DEFAULT VALUES AT PROGRAM LOAD AS SHOWN.  THESE VALUES
2342                                            ;CAN BE UPDATED BY A TEST OR BY OPERATOR INPUT.
2343
2344  003544  140004                    CMDSEQ:: .WORD  SCH             ;SET CHARACTERISTICS.
2345  003546  000040                            .WORD   CH.EAI
2346  003550  000001                            .WORD   1
2347  003552  000000                            .WORD   0
2348  003554  102010                    CMDSE2:: .WORD  RWD             ;REWIND.
2349  003556  000001                            .WORD   1               ;BYTE COUNT.
2350  003560  000001                            .WORD   1               ;ONCE.
2351  003562  000007                            .WORD   RANP            ;PATTERN.
2352  003564  104005                            .WORD   WRT             ;WRITE.
2353  003566  004000                            .WORD   DATCNT          ;MAX BUFFER LENGTH.
2354  003570  076400                            .WORD   32000.          ;32,000 RECORDS.
2355  003572  000007                            .WORD   RANP            ;RANDOM PATTERN.
2356  003574  104401                            .WORD   RDR             ;READ REV.
2357  003576  004000                            .WORD   DATCNT          ;MAX BUFFER LENGTH.
2358  003600  076400                            .WORD   32000.          ;32,000 RECORDS
2359  003602  000007                            .WORD   RANP            ;RANDOM PATTERN.
2360  003604  104001                            .WORD   RDF             ;READ FWD.
2361  003606  004000                            .WORD   DATCNT          ;MAX BUFFER LENGTH.
2362  003610  076400                            .WORD   32000.          ;32,000 RECORDS.
2363  003612  000007                            .WORD   RANP            ;RANDOM PATTERN.
2364  003614  102010                            .WORD   RWD             ;REWIND.
2365  003616  000001                            .WORD   1               ;BYTE COUNT.
2366  003620  000001                            .WORD   1               ;ONCE.
2367  003622  000007                            .WORD   RANP            ;PATTERN.
2368  003624  000004                            .BLKW   4               ;EXTENSTION TO HOLD 1 MORE CMD.
2369  003634  177777                    SEQEND:: .WORD  END             ;SOFT END OF SEQUENCE TABLE.
2370  003636  177777                            .WORD   END
2371  003640  177777                            .WORD   END
2372  003642  177777                            .WORD   END
2373  003644  177777                            .WORD   END             ;HARD END OF SEQUENCE TABLE.
```

```
2375                                        ;THE FOLLOWING IS THE TU80 COMMAND TABLE
2376
2377  003646  100013          CMDTBL:: .WORD  DRI          ;DRIVE INIT.
2378  003650  104001                   .WORD  RDF          ;READ FORWARD.
2379  003652  104401                   .WORD  RDR          ;READ REVERSE.
2380  003654  104005                   .WORD  WRT          ;WRITE
2381  003656  104105                   .WORD  WTV          ;WRITE/VERIFY.  (WRITE ALL RECORDS, RDR AND
2382                                                       ;CHECK DATA ON ALL RECORDS, RDF AND
2383                                                       ;CHECK DATA ON ALL RECORDS.)
2384  003660  104010                   .WORD  SRF          ;SPACE 'N'' RECORDS FORWARD.
2385  003662  104410                   .WORD  SRR          ;SPACE 'N'' RECORDS REVERSE.
2386  003664  105401                   .WORD  RNR          ;READ NEXT REVERSE. I.E., SPACE FWD, READ REVERS
2387  003666  125401                   .WORD  RNF          ;READ NEXT FORWARD, I.E., READ FORWARD, SPACE RE
2388  003670  105001                   .WORD  RPF          ;READ PREVIOUS FORWARD. I.E., SPACE REVERSE, REA
2389  003672  125001                   .WORD  RPR          ;READ PREVIOUS REVERSE. I.E., READ REVERSE, SPAC
2390  003674  105005                   .WORD  WRR          ;WRITE RETRY.
2391  003676  102010                   .WORD  RWD          ;REWIND.
2392  003700  100012                   .WORD  MBR          ;MESSAGE BUFFER RELEASE
2393  003702  100011                   .WORD  WTM          ;WRITE TAPE MARK
2394  003704  101011                   .WORD  WTR          ;WRITE TAPE MARK RETRY.
2395  003706  105010                   .WORD  SFF          ;SPACE 'N'' FILES FORWARD.
2396  003710  105410                   .WORD  SFR          ;SPACE 'N'' FILES REVERSE.
2397  003712  100017                   .WORD  GES          ;GET EXTENDED STATUS.
2398  003714  100411                   .WORD  ERS          ;ERASE 3 INCHES OF TAPE.
2399  003716  100412                   .WORD  UNL          ;REWIND AND UNLOAD.
2400  003720  101012                   .WORD  CLN          ;CLEAR TAPE.
2401  003722  140004                   .WORD  SCH          ;SET CHARACTERISTICS.
2402  003724  100006                   .WORD  DIA          ;DIAGNOSTIC COMMAND.
2403  003726  000040                   .WORD  JMP          ;JUMP TO THE NTH COMMAND IN THE SEQUENCE.
2404  003730  000020                   .WORD  DLY          ;DELAY 'N'' MS.
2405  003732  177777                   .WORD  END          ;END OF COMMAND TABLE
2406
```

```
2408                                    ;       THE FOLLOWING TABLE CONTAINS THE ASCII FOR EACH COMMAND.
2409
2410  003734  051104     111      CMDASC:: .ASCII /DRI/          ;DRIVE INIT.
2411  003737     122  043104              .ASCII  /RDF/          ;READ FORWARD.
2412  003742  042122     122              .ASCII  /RDR/          ;READ REVERSE.
2413  003745     127  052122              .ASCII  /WRT/          ;WRITE
2414  003750  052127     126              .ASCII  /WTV/          ;WRITE/VERIFY.  (WRITE ALL RECORDS, RDR AND CHEC
2415                                                             ;ON ALL RECORDS, RDF AND CHECK DATA ON ALL RECOR
2416  003753     123  043122              .ASCII  /SRF/          ;SPACE 'N'' RECORDS FORWARD.
2417  003756  051123     122              .ASCII  /SRR/          ;SPACE 'N''  RECORDS REVERSE.
2418  003761     122  051116              .ASCII  /RNR/          ;READ NEXT REVERSE. I.E., SPACE FWD READ REVERSE
2419  003764  047122     106              .ASCII  /RNF/          ;READ NEXT FORWARD, I.E., READ FORWARD, SPACE RE
2420  003767     122  043120              .ASCII  /RPF/          ;READ PREVIOUS FORWARD. IE., SPACE REVERSE, READ
2421  003772  050122     122              .ASCII  /RPR/          ;READ PREVIOUS REVERSE. IE., READ REVERSE, SPACE
2422  003775     127  051122              .ASCII  /WRR/          ;WRITE RETRY.
2423  004000  053522     104              .ASCII  /RWD/          ;REWIND.
2424  004003     115  051102              .ASCII  /MBR/          ;MESSAGE BUFFER RELEASE
2425  004006  052127     115              .ASCII  /WTM/          ;WRITE TAPE MARK
2426  004011     127  051124              .ASCII  /WTR/          ;WRITE TAPE MARK RETRY.
2427  004014  043123     106              .ASCII  /SFF/          ;SPACE 'N'' FILES FORWARD.
2428  004017     123  051106              .ASCII  /SFR/          ;SPACE 'N'' FILES REVERSE.
2429  004022  042507     123              .ASCII  /GES/          ;GET EXTENDED STATUS.
2430  004025     105  051522              .ASCII  /ERS/          ;ERASE 3 INCHES OF TAPE.
2431  004030  047125     114              .ASCII  /UNL/          ;REWIND AND UNLOAD.
2432  004033     103  047114              .ASCII  /CLN/          ;CLEAN TAPE.
2433  004036  041523     110              .ASCII  /SCH/          ;SET CHARACTERISTICS.  WHERE BRF=200, 40, 20, 0.
2434                                                             ;SEE TU80 PROGRAMMING SPECIFICATION FOR DESCRIPT
2435  004041     104  040511              .ASCII  /DIA/          ;DIAGNOSTICS.  SEE TU80 PROGRAMMING SPECIFICATIO
2436                                                             ;FOR DESCRIPTION.  ODT MUST BE USED TO LOAD DIAG
2437                                                             ;INTO THE WRITE BUFFER BEFORE THIS CMD IS ISSUED
2438  004044  046512     120              .ASCII  /JMP/          ;JUMP TO THE NTH COMMAND IN THE COMMAND
2439                                                             ;SEQUENCE TABLE, WHERE N IS DEFINED IN
2440                                                             ;THE # OF OPERATIONS.
2441  004047     104  054514              .ASCII  /DLY/          ;DELAY 'N'' MS, WHERE N IS DEFINED IN
2442                                                             ;THE # OF OPERATIONS.
2443  004052  047105     104              .ASCII  /END/          ;END OF COMMAND SEQUENCE.
2444          004056                      .EVEN
2445
2446
2447
```

```
                                        .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

004056  047045  040445  047125          CODELM:: .ASCIZ /%N%AUNIT %D1%A TU80 CODE LEVEL P%03%N%N/
                                                 .EVEN
004126  054130  020130  046503          HALTM:: .ASCIZ  /XXX CMD - TYPE <CR> TO CONTINUE/
004166  046503  020104  040520          CMDPKM:: .ASCIZ /CMD PACKET ADR NOT ON MODULO 4 BOUNDARY: RELOAD!/
        004250                          .EVEN
004250  040504  040524  041440          WTVERM:: .ASCIZ /DATA COMPARE ERROR/
004273     116  020117  052524          TOERM:: .ASCIZ  /NO TU80 RESPONSE/
004314  047125  042504  044506          SCERM:: .ASCIZ  /UNDEFINED SPEC COND/
004340  043122  020103  047516          RFCERM:: .ASCIZ /RFC NON ZERO/
004355     124  034125  020060          NSSRM:: .ASCIZ  /TU80 NOT READY/
004374  042522  051124  020131          RLEXM:: .ASCIZ  /RETRY LIMIT EXCEEDED/
004421     125  044516  020124          ATTNM:: .ASCIZ  /UNIT OFF LINE/
004437     106  047125  052103          FUNRM:: .ASCIZ  /FUNCTION REJECT/
004457     106  052101  046101          FATSM:: .ASCIZ  /FATAL SUBSYSTEM ERROR/
004505     116  020117  047111          NOINTM:: .ASCIZ /NO INTERRUPT/
004522  040524  042520  051440          TSAM::  .ASCIZ  /TAPE STATUS ALERT/
004544  047524  020117  040515          TOOMM:: .ASCIZ  /TOO MANY INTERRUPTS/
004570  040503  051520  040524          RNYM::  .ASCIZ  /CAPSTAN RUNAWAY-GET STATUS RESULTS:/
004634  042522  047503  042526          RERM::  .ASCIZ  /RECOVERABLE ERROR/
004656  047125  042522  047503          URERM:: .ASCIZ  /UNRECOVERABLE ERROR/
004702  047045  040445  051104          DROPDM:: .ASCIZ /%N%ADROPPED UNIT %D1%N/
004731     045  022516  040501          AUDRPM:: .ASCIZ /%N%AALL UNITS DROPPED%N%N/
004763     045  022516  041101          DTAER2:: .ASCIZ '%N%ABYTE:%D4%S2%AWAS:%B8%S2%AS/B:%B8%N'
005032  042045  022464  020101          DTAER3:: .ASCIZ '%D4%A BYTES IN ERROR OUT OF %D4%N'
005074  040445  047516  042040          DTAER4:: .ASCIZ /%ANO DATA READ%N/
005115     045  051101  041505          DTAER5:: .ASCIZ /%ARECORD TOO LONG: >%04%A BYTES%N/
005157     045  051101  041505          NURTY1:: .ASCIZ /%ARECOVERED ON RETRY #%D2%N/
005213     045  052501  044516          OFLINM:: .ASCIZ /%AUNIT %D1%A OFF LINE%N/
005243     045  043501  052105          GETSTM:: .ASCIZ /%AGET STATUS CMD RESULTS:%N/
005277     045  000116                  CRLF::  .ASCIZ  /%N/
005302  047045  051445  000067          CRLFSP:: .ASCIZ /%N%S7/
005310  047045  040445  025040          RAMFHR: .ASCIZ  '%N%A ********** SPECIAL M7454 RAM MEMORY DUMP **********'
005401     045  022516  020101          RAMIOP: .ASCIZ  '%N%A RAM ADDRESS (OCTAL) = %03%A - %03%N'
005452  040445  022440  031517          RAMPD:  .ASCIZ  '%A %03%A '
005464  047045  047045  047045          RAMLIN: .ASCIZ  '%N%N%N'
                                                .LIST   BEX
        005474                          .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..
                                ;--


005474                          BGNMSG  DTAERM
005474                  DTAERM::
                                PRINTB  #STAER1,DEVTBL(R5),PASCNT(R5),RECCNT(R5)
005474  016546  003330                                                  MOV     RECCNT(R
005500  016546  003260                                                  MOV     PASCNT(R
005504  016546  002536                                                  MOV     DEVTBL(R
005510  012746  006154                                                  MOV     #STAER1,
005514  012746  000004                                                  MOV     #4,-(SP)
005520  010600                                                          MOV     SP,R0
005522  104414                                                          TRAP    C$PNTB
005524  062706  000012                                                  ADD     #12,SP
005530                          PRINTB  #STAER7
005530  012746  006246                                                  MOV     #STAER7,
005534  012746  000001                                                  MOV     #1,-(SP)
005540  010600                                                          MOV     SP,R0
005542  104414                                                          TRAP    C$PNTB
005544  062706  000004                                                  ADD     #4,SP
005550                          LET RECRED := R2                ;SAVE R2
005550  010237  006562                                                  MOV     R2,RECRE
005554                          LET TIME1 := R3                 ;SAVE R3
005554  010337  003446                                                  MOV     R3,TIME1
005560                          LET TIME2 := R4                 ;SAVE R4
005560  010437  003450                                                  MOV     R4,TIME2
005564  004737  006616          JSR PC,RECTAP                   ;RETRIEVE RECORD READ
005570                          LET R2 := RECRED                ;RESTORE R2
005570  013702  006562                                                  MOV     RECRED,R
005574                          LET RECRED := R3                ;SAVE RECORD READ
005574  010337  006562                                                  MOV     R3,RECRE
005600                          LET R3 := TIME1                 ;RESTORE R3
005600  013703  003446                                                  MOV     TIME1,R3
005604                          LET R4 := TIME2                 ;RESTORE R4
005604  013704  003450                                                  MOV     TIME2,R4
005610                          PRINTB  #STAER6,RECRED          ;PRINT RECORD READ
005610  013746  006562                                                  MOV     RECRED,-
005614  012746  006276                                                  MOV     #STAER6,
005620  012746  000002                                                  MOV     #2,-(SP)
005624  010600                                                          MOV     SP,R0
005626  104414                                                          TRAP    C$PNTB
005630  062706  000006                                                  ADD     #6,SP
005634                          EXIT    MSG
005634  000167                                                          .WORD   J$JMP
005636  000000                                                          .WORD   L10002-2
                                .EVEN

005640                          ENDMSG
005640                  L10002:
005640  104423                                                          TRAP    C$MSG
```

```
2539
2540  005642                                  BGNMSG  STAERM
 (3)  005642                          STAERM::
2541  005642                                  PRINTB  #STAER1,DEVTBL(R5),PASCNT(R5),RECCNT(R5)
 (10) 005642  016546  003330                                                    MOV     RECCNT(R
 (9)  005646  016546  003260                                                    MOV     PASCNT(R
 (8)  005652  016546  002536                                                    MOV     DEVTBL(R
 (7)  005656  012746  006154                                                    MOV     #STAER1,
 (6)  005662  012746  000004                                                    MOV     #4,-(SP)
 (3)  005666  010600                                                            MOV     SP,R0
 (4)  005670  104414                                                            TRAP    C$PNTB
 (4)  005672  062706  000012                                                    ADD     #12,SP
2542  005676                                  PRINTB  #STAER7
 (7)  005676  012746  006246                                                    MOV     #STAER7,
 (6)  005702  012746  000001                                                    MOV     #1,-(SP)
 (3)  005706  010600                                                            MOV     SP,R0
 (4)  005710  104414                                                            TRAP    C$PNTB
 (4)  005712  062706  000004                                                    ADD     #4,SP
2543  005716                                  LET R2 := CMDPKT CLR.BY #177740
 (4)  005716  013702  002314                                                    MOV     CMDPKT,R
 (6)  005722  042702  177740                                                    BIC     #177740,
2544  005726                                  LET R2 := R2 - #1
 (6)  005726  005302                                                            DEC     R2
2545  005730                                  IF R2 EQ #0 THEN                ;IF CMD IS A READ
 (6)  005730  005702                                                            TST     R2
 (9)  005732  001016                                                            BNE     50000$
2546  005734  004737  006616                    JSR PC,RECTAP                 ;THEN RETRIEVE
2547  005740                                    LET RECRED := R3              ;AND
 (4)  005740  010337  006562                                                    MOV     R3,RECRE
2548  005744                                    PRINTB #STAER6,RECRED         ;TYPE RECORD READ
 (8)  005744  013746  006562                                                    MOV     RECRED,-
 (7)  005750  012746  006276                                                    MOV     #STAER6,
 (6)  005754  012746  000002                                                    MOV     #2,-(SP)
 (3)  005760  010600                                                            MOV     SP,R0
 (4)  005762  104414                                                            TRAP    C$PNTB
 (4)  005764  062706  000006                                                    ADD     #6,SP
2549  005770                                  ENDIF
 (4)  005770                                                            50000$:
2550  005770                                  PRINTX  #STAER2
 (7)  005770  012746  006332                                                    MOV     #STAER2,
 (6)  005774  012746  000001                                                    MOV     #1,-(SP)
 (3)  006000  010600                                                            MOV     SP,R0
 (4)  006002  104415                                                            TRAP    C$PNTX
 (4)  006004  062706  000004                                                    ADD     #4,SP
2551  006010                                  PRINTX  #STAER3,CMDPKT,@TSDB(R5),MSGPKT+MS.RFC,TSSREG,CTCC
 (12) 006010  013746  003460                                                    MOV     CTCC,-(S
 (11) 006014  013746  003464                                                    MOV     TSSREG,-
 (10) 006020  013746  002344                                                    MOV     MSGPKT+M
 (9)  006024  017546  002456                                                    MOV     @TSDB(R5
 (8)  006030  013746  002314                                                    MOV     CMDPKT,-
 (7)  006034  012746  006411                                                    MOV     #STAER3,
 (6)  006040  012746  000006                                                    MOV     #6,-(SP)
 (3)  006044  010600                                                            MOV     SP,R0
 (4)  006046  104415                                                            TRAP    C$PNTX
 (4)  006050  062706  000016                                                    ADD     #16,SP
2552  006054                                  PRINTX  #STAER4,CMDPKT+2,CMDPKT+4,CMDPKT+6
```

```
 (10) 006054  013746  002322                                                    MOV     CMDPKT+6
 (9)  006060  013746  002320                                                    MOV     CMDPKT+4
 (8)  006064  013746  002316                                                    MOV     CMDPKT+2
 (7)  006070  012746  006447                                                    MOV     #STAER4,
 (6)  006074  012746  000004                                                    MOV     #4,-(SP)
 (3)  006100  010600                                                            MOV     SP,R0
 (4)  006102  104415                                                            TRAP    C$PNTX
 (4)  006104  062706  000012                                                    ADD     #12,SP
2553  006110                        PRINTX  #STAER5,MSGPKT+MS.XS0,MSGPKT+MS.XS1,MSGPKT+MS.XS2,MSGPKT+MS.XS3
 (11) 006110  013746  002354                                                    MOV     MSGPKT+M
 (10) 006114  013746  002352                                                    MOV     MSGPKT+M
 (9)  006120  013746  002350                                                    MOV     MSGPKT+M
 (8)  006124  013746  002346                                                    MOV     MSGPKT+M
 (7)  006130  012746  006467                                                    MOV     #STAER5,
 (6)  006134  012746  000005                                                    MOV     #5,-(SP)
 (3)  006140  010600                                                            MOV     SP,R0
 (4)  006142  104415                                                            TRAP    C$PNTX
 (4)  006144  062706  000014                                                    ADD     #14,SP
2554  006150                        EXIT    MSG
 (4)  006150  000167                                                            .WORD   J$JMP
 (3)  006152  000410                                                            .WORD   L10003-2
2555
2556                                    .NLIST  BEX
2557  006154  040445  054130  020130 STAER1: .ASCIZ  /%AXXX CMD FAILED - UNIT %D1%S3%APASS:%D5%S3%ARECORD:%D5%N/
2558                                    .EVEN
2559  006246  040445  051120  053105 STAER7: .ASCIZ  /%APREVIOUS CMD WAS  XXX/
2560  006276  051445  030461  040445 STAER6: .ASCIZ  /%S11%A* RECORD READ:%D5%A */
2561  006332  047045  040445  046503 STAER2: .ASCIZ  /%N%ACMDPKT%S2%ATSBA%S4%ARFC%S5%ATSSR%S3%ATCC%N/
2562  006411     045  033117  051445 STAER3: .ASCIZ  /%06%S2%06%S2%06%S2%06%S2%D1%N/
2563  006447     045  033117  047045 STAER4: .ASCII  /%06%N/
2564  006454  047445  022466     116         .ASCII  /%06%N/
2565  006461     045  033117  047045         .ASCIZ  /%06%N/
2566  006467     045  054101  052123 STAER5: .ASCII  /%AXST0%S4%AXST1%S4%AXST2%S4%AXST3%N/
2567  006532  047445  022466  031123         .ASCIZ  /%06%S2%06%S2%06%S2%06%N/
2568                                    .LIST   BEX
2569                                    .EVEN
2570  006562  000000                RECRED: .WORD   0                       ;RECORD READ FROM TAPE
2571
2572  006564                            ENDMSG
 (3)  006564                        L10003:
 (3)  006564  104423                                                            TRAP    C$MSG
```

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

                                        ;       MODULES TO HANDLE TU80 INTERRUPTS.

                                                BGNSRV  TS4IN0                  ;DEVICE 0.
                                        TS4IN0::
                                                LET INTFLG := INTFLG + #1        ;SET INTERRUPT OCCURRED FLAG.
                                                                                        INC     INTFLG
                                                ENDSRV
                                        L10004:
                                                                                        RTI

                                                BGNSRV  TS4IN1                  ;DEVICE 1.
                                        TS4IN1::
                                                LET INTFLG+2 := INTFLG+2 + #1    ;SET INTERRUPT OCCURRED FLAG.
                                                                                        INC     INTFLG+2
                                                ENDSRV
                                        L10005:
                                                                                        RTI

                                                BGNSRV  TS4IN2                  ;DEVICE 2.
                                        TS4IN2::
                                                LET INTFLG+4 := INTFLG+4 + #1    ;SET INTERRUPT OCCURRED FLAG.
                                                                                        INC     INTFLG+4
                                                ENDSRV
                                        L10006:
                                                                                        RTI

                                                BGNSRV  TS4IN3                  ;DEVICE 3.
                                        TS4IN3::
                                                LET INTFLG+6 := INTFLG+6 + #1    ;SET INTERRUPT OCCURRED FLAG.
                                                                                        INC     INTFLG+6
                                                ENDSRV
                                        L10007:
                                                                                        RTI
```

```
2598
2599                                    ;       SUBROUTINE TO RETRIEVE RECORD COUNT READ FROM TAPE FOR ERROR
2600                                    ;       PRINTS.
2601                                    ;       INPUTS:
2602                                    ;       OUTPUTS:  R3 = RECORD COUNT READ
2603                                    ;       REGISTERS:  R2, R3, R4
2604                                    ;       CALLS:
2605
2606  006616                            RECTAP::IF #MOD.CO SETIN CMDWRD THEN    ;READ REV FETCH
  (6) 006616  032737  000400  003430                                                    BIT     #MOD.CO,
  (9) 006624  001430                                                                    BEQ     50001$
2607  006626
  (4) 006626  013702  002344              LET R2 := MSGPKT+MS.RFC + DATARD ;FIND LAST READ AD.
  (6) 006632  063702  003420                                                            MOV     MSGPKT+M
                                                                                        ADD     DATARD,R
2608  006636                              IF #BIT00 SETIN R2 THEN       ;ODD AD., REASSEMBLE
  (6) 006636  032702  000001                                                            BIT     #BIT00,R
  (9) 006642  001417                                                                    BEQ     50002$
2609  006644                                LET R2 := R2 + #1           ;REC COUNT STARTING
  (6) 006644  005202                                                                    INC     R2
2610  006646                               LET R3 :B= (R2) CLR.BY #177400  ;WITH UPPER BYTE FETCH
  (4) 006646  111203                                                                    MOVB    (R2),R3
  (6) 006650  142703  177400                                                            BICB    #177400,
2611  006654                               LET R3 := SWAP R3           ;
  (6) 006654  000303                                                                    SWAB    R3
2612  006656                               LET R2 := R2 - #1           ;LOWER BYTE AD.
  (6) 006656  005302                                                                    DEC     R2
2613  006660                               IFB SWBFLG NE #0 THEN
  (6) 006660  105737  003526                                                            TSTB    SWBFLG
  (9) 006664  001401                                                                    BEQ     50003$
2614  006666                                 LET R2 := R2 - #1         ;LOWER BYTE AD. ON SWAP
  (6) 006666  005302                                                                    DEC     R2
2615  006670                               ENDIF
  (4) 006670                                                                    50003$:
2616  006670                               LET R4 :B= (R2) CLR.BY #177400 ;FETCH LOWER BYTE
  (4) 006670  111204                                                                    MOVB    (R2),R4
  (6) 006672  142704  177400                                                            BICB    #177400,
2617  006676                                 LET R3 := R3 OR R4          ;MERGE BYTES
  (6) 006676  050403                                                                    BIS     R4,R3
2618  006700                             ELSE
  (4) 006700  000401                                                                    BR      50004$
  (3) 006702                                                                    50002$:
2619  006702                                 LET R3 := (R2)              ;EVEN AD. FETCH
  (4) 006702  011203                                                                    MOV     (R2),R3
2620  006704                             ENDIF
  (4) 006704                                                                    50004$:
2621  006704                           ELSE
  (4) 006704  000402                                                                    BR      50005$
  (3) 006706                                                                    50001$:
2622  006706                               LET R3 := @DATARD           ;READ FWD FETCH
  (4) 006706  017703  174506                                                            MOV     @DATARD,
2623  006712                           ENDIF
  (4) 006712                                                                    50005$:
2624
2625  006712  000207                   RTS     PC
```

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

006714                  SETCH:: LET R1 := #CMDSEQ               ;INIT COMMAND SEQUENCE TABLE POINTER.
(4) 006714  012701  003544                                                      MOV     #CMDSEQ,
006720  012721  140004          MOV     #SCH,(R1)+              ;THIS CODE SETS UP A SET CHARACTERISTIC
006724  012721  000040          MOV     #DFTSCH,(R1)+           ;COMMAND AS THE FIRST COMMAND IN THE
006730  012721  000001          MOV     #1,(R1)+                ;SEQUENCE TABLE.
006734  005721                  TST     (R1)+                   ;SKIP PATTERN LOCATION.
006736  000207                  RTS PC


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

006740                  SETRW:: LET (R1)+ := #RWD               ;CMD = REWIND.
(4) 006740  012721  102010                                                      MOV     #RWD,(R1
006744                          LET (R1)+ := #1                 ;BRF.
(4) 006744  012721  000001                                                      MOV     #1,(R1)+
006750                          LET (R1)+ := #1                 ;# OF OPERATIONS.
(4) 006750  012721  000001                                                      MOV     #1,(R1)+
006754  005721                  TST (R1)+                       ;SKIP PATTERN.
006756  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.

006760                  EXALL:: LET R1 := #CMDSEQ               ;INIT SEQUENCE TABLE POINTER.
(4) 006760  012701  003544                                                      MOV     #CMDSEQ,
006764                          WHILE (R1) NE #END DO           ;WHILE THERE ARE CMDS IN THE SEQUENCE TA
(4) 006764                                                                      50006$:
(6) 006764  021127  177777                                                     CMP     (R1),#EN
(9) 006770  001527                                                              BEQ     50007$
006772  004737  007722                    JSR   PC,SETUP          ;GO SETUP THE COMMAND BLOCK.
006776                                    WHILE NCNT LT NCNT1 DO  ;WHILE THERE ARE RECORDS REMAINING:
(4) 006776                                                                      50010$:
(6) 006776  023737  003422  003424                                               CMP     NCNT,NCN
(9) 007004  002116                                                              BGE     50011$
007006  004737  007614                      JSR PC,CMDAC          ;STORE CMD ASCII IN ERROR MESSAGE.
007012                                      IFB RANDOM NE #0 THEN ;IF IN RANDOM MODE:
(6) 007012  105737  003523                                                      TSTB    RANDOM
(9) 007016  001435                                                              BEQ     50012$
007020                                        IF CMDWRD EQ #WRT THEN ;IF CMD IS A WRITE THEN:
(6) 007020  023727  003430  104005                                              CMP     CMDWRD,#
(9) 007026  001031                                                              BNE     50013$
007030                                          IFB VFYFLG EQ #0 THEN ;IF DATA IS NOT TO BE VERIFIED THEN:
(6) 007030  105737  003524                                                      TSTB    VFYFLG
(9) 007034  001026                                                              BNE     50014$
007036                                            LET RANB := RANB + RANS  ;GENERATE
(6) 007036  063737  003444  003442                                              ADD     RANS,RAN
007044                                            LET RANS := RANS + RANB  ;RANDOM
(6) 007044  063737  003442  003444                                              ADD     RANB,RAN
007052                                            LET BRFCNT := RANS       ;LENGTH
(4) 007052  013737  003444  003426                                              MOV     RANS,BRF
007060                                            LET BRFCNT := BRFCNT CLR.BY LENMSK  ;MASK RANDOM LENGTH.
(6) 007060  043737  003440  003426                                              BIC     LENMSK,B
007066                                            IF BRFCNT LT #18. THEN        ;DO NOT ALLOW BYTE COUNT OF LESS
(6) 007066  023727  003426  000022                                              CMP     BRFCNT,#
(9) 007074  002003                                                              BGE     50015$
007076                                              LET BRFCNT := #18.  ;CHANGE COUNT OF 0-17 TO 18.
(4) 007076  012737  000022  003426                                              MOV     #18.,BRF
007104                                            ENDIF
(4) 007104                                                                      50015$:
007104                                            LET CMDPKT+CP.CNT := BRFCNT  ;MOVE BRF TO CMD PACKET.
(4) 007104  013737  003426  002322                                              MOV     BRFCNT,C
007112                                          ENDIF
(4) 007112                                                                      50014$:
007112                                        ENDIF
(4) 007112                                                                      50013$:
007112                                      ENDIF
(4) 007112                                                                      50012$:
007112  004737  007254                    JSR PC,EXSUB            ;ISSUE CMD TO ALL,AWAIT INTS,CHECK STATU
007116  004737  017222                    JSR PC,CKHAE            ;CHECK HALT AFTER EACH CMD FLAG.
007122                                    LET R2 := #1            ;SET ALL UNITS AT BOT/EOT.
(4) 007122  012702  000001                                                      MOV     #1,R2
007126  004737  016614                    JSR PC,FIRSTU           ;FIND FIRST UNIT.
```

```
2687  007132                                  WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE UNITS:
 (4)  007132                                                                50016$:
 (6)  007132  026527  002536  177777                                        CMP     DEVTBL(R
 (9)  007140  001426                                                        BEQ     50017$
2688  007142                                    IF #MOD.CO SETIN CMDWRD THEN  ;IF CMD IS REVERSE THEN:
 (6)  007142  032737  000400  003430                                        BIT     #MOD.CO,
 (9)  007150  001406                                                        BEQ     50020$
2689  007152                                      IF #X0.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT THEN:
 (6)  007152  032765  000002  003510                                        BIT     #X0.BOT,
 (9)  007160  001001                                                        BNE     50021$
2690  007162                                        LET R2 := #0                        ;CLEAR EOT/BOT FLAG.
 (4)  007162  005002                                                        CLR     R2
2691  007164                                      ENDIF
 (4)  007164                                                                50021$:
2692  007164                                    ELSE                        ;ELSE IF CMD IS NOT REVERSE:
 (4)  007164  000411                                                        BR      50022$
 (3)  007166                                                                50020$:
2693  007166                                      IF #X0.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
 (6)  007166  032765  000001  003510                                        BIT     #X0.EOT,
 (8)  007174  001404                                                        BEQ     50023$
 (6)  007176  032737  000001  003430                                        BIT     #CMD.CO,
 (9)  007204  001001                                                        BNE     50024$
 (6)  007206                                                                50023$:
2694                                                                    ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
2695  007206                                        LET R2 := #0              ;CLEAR EOT/BOT FLAG.
 (4)  007206  005002                                                        CLR     R2
2696  007210                                      ENDIF
 (4)  007210                                                                50024$:
2697  007210                                    ENDIF
 (4)  007210                                                                50022$:
2698  007210  004737  016662                     JSR PC,NEXTU                ;FIND NEXT UNIT
2699  007214                                    ENDDO                       ;
 (4)  007214  000746                                                        BR      50016$
 (3)  007216                                                                50017$:
2700  007216                                    IF R2 EQ #1 THEN            ;IF ALL UNIT ARE AT EOT/BOT THEN:
 (6)  007216  020227  000001                                                CMP     R2,#1
 (9)  007222  001001                                                        BNE     50025$
2701  007224  000412                             BR        EXARTN          ;RETURN WITH R2 = #1.
2702  007226                                    ENDIF
 (4)  007226                                                                50025$:
2703  007226                                    LET NCNT := NCNT + #1       ;UPDATE RECORD COUNT.
 (6)  007226  005237  003422                                                INC     NCNT
2704  007232                                    LET PCMDWD := CMDWRD        ;SAVE PREVIOUS COMMAND WORD.
 (4)  007232  013737  003430  003434                                        MOV     CMDWRD,P
2705  007240                                  ENDDO
 (4)  007240  000656                                                        BR      50010$
 (3)  007242                                                                50011$:
2706  007242  004737  015370                   JSR   PC,VFYDAT             ;IF LAST CMD WAS A WRITE VERIFY, THEN GO
2707                                                                    ;VERIFY THE LAST N RECORDS OF DATA.
2708  007246                                  ENDDO
 (4)  007246  000646                                                        BR      50006$
 (3)  007250                                                                50007$:
2709  007250                                  LET R2 := #0                ;SET NORMAL RETURN INDICATOR.
 (4)  007250  005002                                                        CLR     R2
2710  007252  000207                  EXARTN: RTS PC                      ;RETURN.
2711
```

```
2712
2713
2714                                    ;       SUBROUTINE TO ISSUE COMMAND TO ALL DEVICES, WAIT FOR
2715                                    ;       ALL INTERRUPTS, AND CHECK ALL STATUS.
2716                                    ;       INPUTS:
2717                                    ;       OUTPUTS:
2718                                    ;       REGISTERS:
2719                                    ;       CALLS:          EXCUTE,GOWAIT,NEXTU,FIRSTU.
2720
2721  007254  004737  016614            EXSUB::     JSR PC,FIRSTU               ;SET UP FOR FIRST UNIT.
2722  007260                                        WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE DEVICES:
 (4)  007260                                                                                50026$:
 (6)  007260  026527  002536  177777                                                          CMP     DEVTBL(R
 (9)  007266  001465                                                                        BEQ     50027$
2723  007270                                          IF #MOD.CO SETIN CMDWRD THEN  ;IF CMD IS REVERSE THEN:
 (6)  007270  032737  000400  003430                                                        BIT     #MOD.CO,
 (9)  007276  001421                                                                        BEQ     50030$
2724  007300                                            IF #XO.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT
 (6)  007300  032765  000002  003510                                                        BIT     #XO.BOT,
 (9)  007306  001014                                                                        BNE     50031$
2725  007310                                              IF #XO.EOT SETIN EOTFLG(R5) THEN  ;BUT IF AT EOT
 (6)  007310  032765  000001  003510                                                        BIT     #XO.EOT,
 (9)  007316  001406                                                                        BEQ     50032$
2726  007320                                                IFB ALLEOT NE #0 THEN       ;AND ALL OTHERS AT EOT
 (6)  007320  105737  003532                                                                TSTB    ALLEOT
 (9)  007324  001402                                                                        BEQ     50033$
2727  007326  004737  010576                                    JSR PC,EXCUTE           ;THEN EXECUTE REV CMD
2728  007332                                                  ENDIF                     ;IF NOT ALL AT EOT, FREEZE UNIT(
 (4)  007332                                                                                50033$:
2729  007332                                                ELSE                        ;IF NOT AT BOT AND
 (4)  007332  000402                                                                        BR      50034$
 (3)  007334                                                                                50032$:
2730  007334  004737  010576                                    JSR PC,EXCUTE           ;NOT AT EOT, EXEC REV CM
2731  007340                                                  ENDIF
 (4)  007340                                                                                50034$:
2732  007340                                              ENDIF
 (4)  007340                                                                                50031$:
2733  007340                                          ELSE                        ;ELSE IF CMD IS NOT REVERSE:
 (4)  007340  000435                                                                        BR      50035$
 (3)  007342                                                                                50030$:
2734  007342                                            IF CMDLG EQ #2 AND #XO.BOT SETIN EOTFLG(R5) THEN
 (6)  007342  023727  003436  000002                                                        CMP     CMDLG,#2
 (9)  007350  001011                                                                        BNE     50036$
 (6)  007352  032765  000002  0035:0                                                        BIT     #XO.BOT,
 (9)  007360  001405                                                                        BEQ     50036$
2735                                                                        ;CLEAR BAD SPOT COUNTS WHEN WRITING FROM
2736  007362                                              LET BTPT := BTADDR(R5)
 (4)  007362  016537  002550  003520                                                        MOV     BTADDR(R
2737  007370                                              LET @BTPT := #0
 (4)  007370  005077  174124                                                                CLR     @BTPT
2738  007374                                          ENDIF
 (4)  007374                                                                                50036$:
2739  007374                                          IF #XO.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
 (6)  007374  032765  000001  003510                                                        BIT     #XO.EOT,
 (8)  007402  001404                                                                        BEQ     50037$
 (6)  007404  032737  000001  003430                                                        BIT     #CMD.CO,
```

```
 (9)  007412  001003                                                    BNE     50040$
 (6)  007414                                                        50037$:
2740                                                          ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
2741  007414  004737  010576                                    JSR PC,EXCUTE          ;ISSUE CMD TO TU80.
2742  007420                                                    ELSE
 (4)  007420  000405                                                    BR      50041$
 (3)  007422                                                        50040$:
2743  007422                                                      IFB ALLEOT NE #0 THEN
 (6)  007422  105737  003532                                                  TSTB    ALLEOT
 (9)  007426  001402                                                         BEQ     50042$
2744  007430  004737  010576                                        JSR PC,EXCUTE
2745  007434                                                      ENDIF
 (4)  007434                                                        50042$:
2746  007434                                                    ENDIF
 (4)  007434                                                        50041$:
2747  007434                                                  ENDIF
 (4)  007434                                                        50035$:
2748  007434  004737  016662                                  JSR       PC,NEXTU     ;FIND NEXT UNIT IN TEST CYCLE.
2749  007440                                                  ENDDO
 (4)  007440  000707                                                    BR      50026$
 (3)  007442                                                        50027$:
2750  007442                                                  IFB RPTFLG NE #0 THEN  ;IF REPORT HAS BEEN REQUESTED THEN:
 (6)  007442  105737  003525                                                  TSTB    RPTFLG
 (9)  007446  001403                                                         BEQ     50043$
2751  007450                                                    LET RPTFLG :B= #0    ;CLR THE FLAG,
 (4)  007450  105037  003525                                                  CLRB    RPTFLG
2752  007454                                                    DORPT                ;PRINT THE PERFORMANCE REPORT.
 (3)  007454  104424                                                          TRAP    C$DRPT
2753  007456                                                  ENDIF                  ;
 (4)  007456                                                        50043$:
2754  007456  004737  016614                                  JSR PC,FIRSTU          ;SET UP FOR FIRST UNIT.
2755  007462                                                  WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE DEVICES:
 (4)  007462                                                        50044$:
 (6)  007462  026527  002536  177777                                          CMP     DEVTBL(R
 (9)  007470  001450                                                         BEQ     50045$
2756  007472                                                    IF #MOD.CO SETIN CMDWRD THEN  ;IF CMD IS REVERSE THEN:
 (6)  007472  032737  000400  003430                                          BIT     #MOD.CO,
 (9)  007500  001421                                                         BEQ     50046$
2757  007502                                                      IF #X0.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT
 (6)  007502  032765  000002  003510                                          BIT     #X0.BOT,
 (9)  007510  001014                                                         BNE     50047$
2758  007512                                                        IF #X0.EOT SETIN EOTFLG(R5) THEN      ;BUT IF AT EOT
 (6)  007512  032765  000001  003510                                          BIT     #X0.EOT,
 (9)  007520  001406                                                         BEQ     50050$
2759  007522                                                          IFB ALLEOT NE #0 THEN               ;AND ALL OTHERS AT EOT
 (6)  007522  105737  003532                                                  TSTB    ALLEOT
 (9)  007526  001402                                                         BEQ     50051$
2760  007530  004737  011166                                            JSR PC,GOWAIT                     ;THEN WAIT FOR CMD END
2761  007534                                                          ENDIF                               ;IF NOT ALL AT EOT, DO N
 (4)  007534                                                        50051$:
2762  007534                                                      ELSE                                    ;NOT AT BOT, AND NOT AT
 (4)  007534  000402                                                    BR      50052$
 (3)  007536                                                        50050$:
2763  007536  004737  011166                                      JSR PC,GOWAIT                         ;WAIT FOR INT,CH
2764  007542                                                      ENDIF
 (4)  007542                                                        50052$:
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2765  007542                                                    ENDIF
 (4)  007542                                                                                    50047$:
2766  007542                                                  ELSE                    ;ELSE IF CMD IS FORWARD:
 (4)  007542  000420                                                                              BR      50053$
 (3)  007544                                                                                    50046$:
2767  007544                                                    IF #X0.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
 (6)  007544  032765  000001  003510                                                              BIT     #X0.EOT,
 (8)  007552  001404                                                                            BEQ     50054$
 (6)  007554  032737  000001  003430                                                            BIT     #CMD.CO,
 (9)  007562  001003                                                                            BNE     50055$
 (6)  007564                                                                                    50054$:
2768                                                                                          ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
2769  007564  004737  011166                                      JSR PC,GOWAIT               ;WAIT FOR INT,CHECK STATUS.
2770  007570                                                    ELSE
 (4)  007570  000405                                                                              BR      50056$
 (3)  007572                                                                                    50055$:
2771  007572                                                      IFB ALLEOT NE #0 THEN
 (6)  007572  105737  003532                                                                      TSTB    ALLEOT
 (9)  007576  001402                                                                            BEQ     50057$
2772  007600  004737  011166                                        JSR PC,GOWAIT
2773  007604                                                      ENDIF
 (4)  007604                                                                                    50057$:
2774  007604                                                    ENDIF
 (4)  007604                                                                                    50056$:
2775  007604                                                  ENDIF
 (4)  007604                                                                                    50053$:
2776  007604  004737  016662                                  JSR       PC,NEXTU          ;FIND NEXT UNIT IN TEST CYCLE.
2777  007610                                                ENDDO
 (4)  007610  000724                                                                              BR      50044$
 (3)  007612                                                                                    50045$:
2778  007612  000207                                        RTS PC                        ;RETURN.
```

```
                        ;       THIS SUBROUTINE STORES THE ASCII FOR THE CURRENT COMMAND AND PREVIOUS
                        ;       COMMAND IN THE STANDARD ERROR MESSAGE.  ON ENTRY LOCATION CMDWRD
                        ;       CONTAINS CURRENT CMD AND LOCATION PCMDWD CONTAINS PREVIOUS CMD.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R3, R4.
                        ;       CALLS:          GCMDA

007614                  CMDAC:: LET R4 := CMDWRD                ;R4 = CMD BINARY.
 (4)  007614  013704  003430                                            MOV     CMDWRD,R
007620  004737  007670          JSR     PC,GCMDA                ;GET CMD ASCII.
007624  112337  006156          MOVB    (R3)+,STAER1+2          ;MOVE CMD ASCII
007630  112337  006157          MOVB    (R3)+,STAER1+3          ;
007634  111337  006160          MOVB    (R3),STAER1+4           ;INTO MSG.
007640                          LET R4 := PCMDWD                ;R4 = PREVIOUS CMD BINARY.
 (4)  007640  013704  003434                                            MOV     PCMDWD,R
007644  004737  007670          JSR     PC,GCMDA                ;GET CMD ASCII.
007650  000240                  NOP
007652                          LET STAER7+24 :B= (R3)+         ;MOVE CMD ASCII
 (4)  007652  112337  006272                                            MOVB    (R3)+,ST
007656                          LET STAER7+25 :B= (R3)+         ;
 (4)  007656  112337  006273                                            MOVB    (R3)+,ST
007662                          LET STAER7+26 :B= (R3)          ;INTO MSG.
 (4)  007662  111337  006274                                            MOVB    (R3),STA
007666  000207                  RTS     PC                      ;RETURN. GO EXECUTE NEXT FUNCTION.


                        ;       SUBROUTINE TO FIND THE ASCII EQUIVILENT OF THE COMMAND IN R4.
                        ;       ADDRESS OF ASCII 1ST WORD IS RETURNED IN R3.
                        ;       INPUTS:         R4 = PRESENT COMMAND WORD.
                        ;       OUTPUTS:        R3 = ADDRESS OF PRESENT COMMAND ASCII.
                        ;       REGISTERS:
                        ;       CALLS:

007670                  GCMDA:: LET R3 := #0                    ;INIT CMD TBL POINTER.
 (4)  007670  005003                                                    CLR     R3
007672                          WHILE CMDTBL(R3) NE R4 DO       ;UNTIL CURRENT CMD IS FOUND:
 (4)  007672                                                                    50060$:
 (6)  007672  026304  003646                                            CMP     CMDTBL(R
 (9)  007676  001403                                                    BEQ     50061$
007700                            LET R3 := R3 + #2             ;SEARCH CMD TABLE.
 (6)  007700  062703  000002                                            ADD     #2,R3
007704                          ENDDO
 (4)  007704  000772                                                    BR      50060$
 (3)  007706                                                                    50061$:
007706                          LET R4 := R3
 (4)  007706  010304                                                    MOV     R3,R4
007710                          LET R3 := R3 SHIFT -1           ;POINT TO ASCII FOR THAT COMMAND
 (7)  007710  006203                                                    ASR     R3
007712  060403                  ADD     R4,R3
007714  062703  003734          ADD     #CMDASC,R3
007720  000207                  RTS     PC                      ;RETURN.
```

```
                        ;       THIS SUBROUTINE LOADS THE TU80 COMMAND PACKET FROM ONE
                        ;       ENTRY IN THE SEQUENCE TABLE.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R3.
                        ;       CALLS:          GENPAT.

007722                  SETUP:: LET CMDLG := #0                 ;CLR CMD LOGGING CODE(DISABLES LOGGING)
(4) 007722 005037 003436                                                        CLR     CMDLG
007726 012137 002314            MOV     (R1)+,CMDPKT            ;LOAD THE COMMAND WORD.
007732 011137 002322            MOV     (R1),CMDPKT+CP.CNT      ;LOAD THE BYTE/RECORD/FILE COUNT.
007736 011137 003426            MOV     (R1),BRFCNT             ;SAVE BRF FOR THIS COMMAND.
007742 013702 002314            MOV     CMDPKT,R2               ;GET CMD.
007746 042702 177740            BIC     #NCMD.C,R2              ;CLR ALL BUT CMD BITS.
007752 010203                   MOV     R2,R3                   ;SAVE IT TWICE.
007754 162703 000010            SUB     #CMD.C3,R3              ;POSITION COMMAND?
007760 001003                   BNE     2$                      ;BR IF NOT.
007762 011137 002316            MOV     (R1),CMDPKT+2           ;MOVE BPCR IN 2ND PKT WORD FOR POSITION
007766 000461                   BR      3$
007770                  2$:     IF CMDPKT EQ #WTM THEN          ;IF CMD IS A WRITE TAPE MARK THEN:
(6) 007770 023727 002314 100011                                                 CMP     CMDPKT,#
(9) 007776 001003                                                               BNE     50062$
010000                            LET CMDLG := #2                 ;WTM LOGGING CODE IS 2.
(4) 010000 012737 000002 003436                                                 MOV     #2,CMDLG
010006                          ENDIF
(4) 010006                                                                              50062$:
010006 010203                   MOV     R2,R3
010010 162703 000001            SUB     #CMD.C0,R3              ;IS IT A READ?
010014 001017                   BNE     1$                      ;BR IF NOT.
010016 013737 003420 002316     MOV     DATARD,CMDPKT+CP.ADL    ;IF SO, LOAD THE BUFFER ADDR.
010024                          IF #MOD.C0 SETIN CMDPKT THEN    ;IF CMD IS A READ REV THEN:
(6) 010024 032737 000400 002314                                                 BIT     #MOD.C0,
(9) 010032 001404                                                               BEQ     50063$
010034                            LET CMDLG := #4                 ;LOGGING CODE IS 4.
(4) 010034 012737 000004 003436                                                 MOV     #4,CMDLG
010042                          ELSE                            ;ELSE - IF CMD IS A READ FWD:
(4) 010042 000403                                                               BR      50064$
(3) 010044                                                                              50063$:
010044                            LET CMDLG := #6                 ;LOGGING CODE IS 6.
(4) 010044 012737 000006 003436                                                 MOV     #6,CMDLG
010052                          ENDIF
(4) 010052                                                                              50064$:
010052 000427                   BR      3$                      ;CONTINUE.
010054 010203           1$:     MOV     R2,R3                   ;IS IT
010056 162703 000004            SUB     #CMD.C2,R3              ;A SET CHARACTERISTICS CMD?
010062 001011                   BNE     4$                      ;BR IF NOT.
010064                          LET CMDPKT+CP.ADL := #SCHBK     ;SET UP ADR LO FOR SET CHAR.
(4) 010064 012737 002446 002316                                                 MOV     #SCHBK,C
010072 012737 000010 002322     MOV     #SCHCNT,CMDPKT+CP.CNT   ;SET BUFFER EXTENT
010100                          LET SCHBK+6 := (R1)             ;STORE CHARACTERISTIC CODE IN SCH BLOCK.
(4) 010100 011137 002454                                                        MOV     (R1),SCH
010104 000412                   BR      3$                      ;CONTINUE.
010106 010203           4$:     MOV     R2,R3                   ;IS IT
010110 162703 000006            SUB     #CMD.C1!CMD.C2,R3       ;A DIAGNOSTIC (DIA) CMD?
010114 001006                   BNE     3$                      ;BR IF NOT.
010116 012737 000020 002322     MOV     #DIACNT,CMDPKT+CP.CNT   ;LOAD BUFFER EXTENT.
```

```
2862  010124  012737  003416  002316          MOV     #DIABLK,CMDPKT+CP.ADL   ;LOAD BUFFER ADR LOW.
2863  010132  005721                  3$:     TST     (R1)+                   ;POINT TO N (NUMBER OF TIMES TO EXECUTE
2864  010134                                  LET NCNT1 := (R1)+              ;SAVE NUMBER OF OPERATIONS
 (4)  010134  012137  003424                                                          MOV     (R1)+,NC
2865  010140                                  LET NCNT := #0                  ;CLEAR OPERATION COUNTER.
 (4)  010140  005037  003422                                                          CLR     NCNT
2866  010144  012137  003456                  MOV     (R1)+,PATERN            ;SAVE PATTERN CODE FOR CURRENT CMD.
2867  010150  010203                          MOV     R2,R3                   ;IS IT
2868  010152  162703  000005                  SUB     #CMD.CO!CMD.C2,R3       ;A WRITE?
2869  010156  001010                          BNE     5$                      ;BR IF NOT.
2870  010160  013737  003416  002316          MOV     DATAWT,CMDPKT+CP.ADL    ;LOAD WRITE BUFFER LO ORDER.
2871  010166  004737  010300                  JSR     PC,GENPAT               ;GO GENERATE THE WRITE PATTERN.
2872  010172                                  LET CMDLG := #2                 ;WRITE LOGGING CODE IS 2.
 (4)  010172  012737  000002  003436                                                  MOV     #2,CMDLG
2873  010200                          5$:     IF #VFY.C SETIN CMDPKT THEN     ;IF DATA VERIFICATION IS REQUIRED:
 (6)  010200  032737  000100  002314                                                  BIT     #VFY.C,C
 (9)  010206  001407                                                                  BEQ     50065$
2874  010210                                    LET VFYFLG :B= #1             ;SET VERIFY FLAG.
 (4)  010210  112737  000001  003524                                                  MOVB    #1,VFYFL
2875  010216  042737  000100  002314           BIC   #VFY.C,CMDPKT           ;CLEAR VERIFY BIT(NOT USED BY HARDWARE).
2876  010224                                  ELSE                            ;IF DATA VERIFICATION IS NOT REQUIRED:
 (4)  010224  000402                                                                  BR      50066$
 (3)  010226                                                                  50065$:
2877  010226                                    LET VFYFLG :B= #0             ;CLR VERIFY FLAG.
 (4)  010226  105037  003524                                                          CLRB    VFYFLG
2878  010232                                  ENDIF
 (4)  010232                                                                  50066$:
2879  010232                                  LET PCMDWD := CMDWRD            ;SAVE PREVIOUS CMD WORD.
 (4)  010232  013737  003430  003434                                                  MOV     CMDWRD,P
2880  010240                                  LET CMDWRD := CMDPKT            ;SAVE PRESENT CMD WORD.
 (4)  010240  013737  002314  003430                                                  MOV     CMDPKT,C
2881  010246                                  IFB SWBFLG NE #0 THEN           ;IF SWAP BYTES IS ENABLED:
 (6)  010246  105737  003526                                                          TSTB    SWBFLG
 (9)  010252  001403                                                                  BEQ     50067$
2882  010254                                    LET CMDPKT := CMDPKT SET.BY #SWB.C  ;SET SWAP BIT IN COMMAND.
 (6)  010254  052737  010000  002314                                                  BIS     #SWB.C,C
2883  010262                                  ENDIF
 (4)  010262                                                                  50067$:
2884  010262  042737  004000  002314          BIC     #BRF.C,CMDPKT           ;CLR BRF BIT (INTERNAL ONLY).
2885  010270                                  LET CMDSAV := CMDPKT            ;SAVE 1ST WORD OF COMMAND PACKET.
 (4)  010270  013737  002314  003432                                                  MOV     CMDPKT,C
2886  010276  000207                          RTS     PC                      ;RETURN.
```

```
2888                            ;       THIS SUBROUTINE SETS UP AND CALLS THE APPROPRIATE SUBROUTINE TO GENERAT
2889                            ;       THE DESIRED PATTERN FOR THE WRITE AND WRITE/VERIFY COMMANDS.
2890                            ;       INPUTS:
2891                            ;       OUTPUTS:
2892                            ;       REGISTERS:      R2, R3, R4.
2893                            ;       CALLS:          PATR0 - PATR7
2894
2895  010300                    GENPAT:: LET R3 := PATERN SHIFT 1       ;SETUP PATTERN ROUTINE POINTER
 (4)  010300  013703  003456                                                    MOV     PATERN,R
 (7)  010304  006303                                                            ASL     R3
2896  010306                            LET R4 := BRFCNT + #1   ;SET LENGTH OF WRITE BFR
 (4)  010306  013704  003426                                                    MOV     BRFCNT,R
 (6)  010312  005204                                                            INC     R4
2897  010314                            LET R4 := R4 CLR.BY #1  ;ROUNDED UP TO NEXT WORD
 (6)  010314  042704  000001                                                    BIC     #1,R4
2898  010320                            LET R4 := R4 - #2       ;WITH FIRST WORD RESERVED
 (6)  010320  162704  000002                                                    SUB     #2,R4
2899  010324                            LET R2 := DATAWT + #2   ;FOR RECORD COUNT
 (4)  010324  013702  003416                                                    MOV     DATAWT,R
 (6)  010330  062702  000002                                                    ADD     #2,R2
2900  010334  004773  010342           JSR     PC,@PATTBL(R3)  ;GO GENERATE THE APPROPRIATE PATTERN.
2901  010340  000207                   RTS     PC              ;RETURN TO SETUP SUBROUTINE.
2902
2903                            ;TU80 WRITE PATTERN LOOKUP TABLE.  USED TO JSR TO THE
2904                            ;CORRECT DATA PATTERN GENERATING ROUTINE.
2905
2906  010342  010364            PATTBL: PATR0                   ; INCREMENTING PATTERN, 0 - 377
2907  010344  010422                    PATR1                   ; ALL ONES PATTERN
2908  010346  010442                    PATR2                   ; ALL ZEROES PATTERN
2909  010350  010452                    PATR3                   ; '1' BIT SHIFT, RIGHT TO LEFT
2910  010352  010476                    PATR4                   ; '0' BIT SHIFT, RIGHT TO LEFT
2911  010354  010510                    PATR5                   ; ALTERNATE '0' & '1' WITH ALT. BYTES COMPL.
2912  010356  010522                    PATR6                   ; ALTERNATE BYTES OF 000 AND 377
2913  010360  010542                    PATR7                   ; RANDOM PATTERN.
2914  010362  010574                    PATR8                   ; DUMMY.  NO PATTERN, JUST EXITS.
2915
2916
2917                            ;INCREMENTING PATTERN.  0 - 377.
2918
2919  010364                    PATR0:: LET R3 := #400
 (4)  010364  012703  000400                                                    MOV     #400,R3
2920  010370                    1$:     LET R4 := R4 - #2       ;DECREMENT WORD COUNT.
 (6)  010370  162704  000002                                                    SUB     #2,R4
2921  010374  100411                   BMI     2$              ;BR IF DONE.
2922  010376                            LET (R2)+ := R3         ;STORE DATA WORD.
 (4)  010376  010322                                                            MOV     R3,(R2)+
2923  010400                            LET R3 := R3 + #1002    ;UPDATE PATTERN.
 (6)  010400  062703  001002                                                    ADD     #1002,R3
2924  010404                            IF R3 EQ #1000 THEN     ;IF PATTERN HAS WRAPPED AROUND THEN:
 (6)  010404  020327  001000                                                    CMP     R3,#1000
 (9)  010410  001002                                                            BNE     50070$
2925  010412                              LET R3 := #400          ;INIT THE PATTERN AGAIN.
 (4)  010412  012703  000400                                                    MOV     #400,R3
2926  010416                            ENDIF
 (4)  010416                                                                50070$:
2927  010416  000764                   BR      1$              ;DO IT AGAIN.
```

```
 2928  010420  000207                    2$:     RTS     PC              ;RETURN.
 2929
 2930                                            ;ALL ONE'S PATTERN.
 2931
 2932  010422  012703  177777            PATR1:: MOV     #-1,R3          ;ALL ONES PATTERN;.
 2933  010426                            ZROPAT: LET R4 := R4 - #2       ;DECREMENT BYTE COUNT.
   (6) 010426  162704  000002                                                    SUB     #2,R4
 2934  010432  100402                            BMI     1$              ;DONE?,BR IF YES.
 2935  010434  010322                            MOV     R3,(R2)+        ;IF NOT LOAD NEXT BYTE WITH PATTERN.
 2936  010436  000773                            BR      ZROPAT          ;DO IT AGAIN.
 2937
 2938  010440  000207                    1$:     RTS     PC              ;RETURN.
```

```
                                        ;ALL ZEROES PATTERN.
                                PATR2:: CLR     R3              ;CLR PATTERN REGISTER.
010442  005003
010444  004737  010426                  JSR     PC,ZROPAT       ;GO GENERATE IT.
010450  000207                          RTS     PC              ;RETURN.

                                        ;ONE BIT WALKING FROM R TO L IN A FIELD OF ZEROES.

010452  012703  000401        PATR3:: MOV     #401,R3         ;INIT PATTERN REGISTER.
010456                          WLKZRO: LET R4 := R4 - #2       ;DECREMENT WORD COUNT.
(6)     010456  162704  000002                                                   SUB     #2,R4
010462  100404                          BMI     1$              ;BR IF DONE.
010464  010322                          MOV     R3,(R2)+        ;LOAD DATA.
010466  006303                          ASL     R3              ;SHIFT PATTERN.
010470  005503                          ADC     R3              ;ADD CARRY BACK INTO PATTERN.
010472  000771                          BR      WLKZRO          ;DO IT AGAIN.
010474  000207                  1$:     RTS     PC              ;RETURN.

                                        ;ZERO BIT WALKING FROM R TO L IN A FIELD OF 1'S.

010476  012703  177376        PATR4:: MOV     #177376,R3      ;INIT PATTERN REGISTER.
010502  004737  010456                  JSR     PC,WLKZRO       ;GO GENERATE ;IT.
010506  000207                          RTS     PC              ;RETURN.

                                        ;ALTERNATING ONE AND ZERO BITS WITH ALTERNATE BYTES
                                        ;COMPLEMENTED.

010510  012703  125125        PATR5:: MOV     #125125,R3      ;INIT PATTERN REGISTER.
010514  004737  010426                  JSR     PC,ZROPAT       ;GO GENERATE IT.
010520  000207                          RTS     PC              ;RETURN.

                                        ;ALTERNATING BYTES OF 000 AND 377.

010522  012703  177400        PATR6:: MOV     #177400,R3      ;INIT PATTERN REGISTER.
010526                          1$:     LET R4 := R4 - #2       ;DECREMENT WORD COUNT.
(6)     010526  162704  000002                                                   SUB     #2,R4
010532  100402                          BMI     2$              ;BR IF DONE.
010534  010322                          MOV     R3,(R2)+        ;LOAD DATA.
010536  000773                          BR      1$              ;DO IT AGAIN.
010540  000207                  2$:     RTS     PC              ;RETURN.

                                        ;RANDOM PATTERN GENERATOR

010542                          PATR7:: LET R4 := R4 - #2       ;DECREMENT WORD COUNT
(6)     010542  162704  000002                                                   SUB     #2,R4
010546  100411                          BMI     GIT             ;BR IF DONE.
010550  063737  003444  003442          ADD     RANS,RANB
010556  063737  003442  003444          ADD     RANB,RANS       ;GET NEW #.
010564  013722  003444                  MOV     RANS,(R2)+      ;SAVE #.
010570  000764                          BR      PATR7           ;CONTINUE.
010572  000207                  GIT:    RTS     PC              ;RETURN

                                ;       NO PATTERN GENERATION.

                                PATR8:: RTS     PC              ;RETURN.
```

```
                        ;       THIS SUBROUTINE INITIATES TU80 COMMAND EXECUTION
                        ;       AND CHECKS FOR TU80 RESPONSE.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R3.
                        ;       CALLS:          DROPU, MOVMSG, FIRSTU, NEXTU, WSSR.

010576                  EXCUTE::LET TIME1 := #-1                ;INIT TIMEOUT COUNTER.
(4) 010576  012737  177777  003446                                      MOV     #-1,TIME
                        REPEAT                                  ;WAIT -
(3) 010604                                                                      50071$:
                          LET TIME1 := TIME1 - #1               ;UPDATE TIMEOUT COUNTER.
(6) 010604  005337  003446                                              DEC     TIME1
                          IF TIME1 EQ #0 THEN                   ;IF TIMED OUT:
(6) 010610  005737  003446                                              TST     TIME1
(9) 010614  001011                                              BNE     50072$
                            JSR PC,MOVMSG                       ;MOVE CURRENT PACKET MSG.
                            ERRDF 2,NSSRM,STAERM                ;REPORT TU80 NOT READY
(4) 010622  104455                                              TRAP    C$ERDF
(5) 010624  000002                                              .WORD   2
(5) 010626  004355                                              .WORD   NSSRM
(5) 010630  005642                                              .WORD   STAERM
                            JSR PC,DROPU                        ;DROP THE UNIT.
                            BR  EXCRTN                          ;RETURN.
                          ENDIF
(4) 010640                                                                      50072$:
                        UNTIL #TS.SSR SETIN @TSSR(R5)           ;WAIT UNTIL DEVICE IS READY.
(3) 010640  032775  000200  002466                                      BIT     #TS.SSR,
(6) 010646  001756                                              BEQ     50071$
                        IF CMDWRD EQ #SCH THEN                  ;IF WE ARE DOING A SET CHAR CMD THEN:
(6) 010650  023727  003430  140004                                      CMP     CMDWRD,#
(9) 010656  001022                                              BNE     50073$
                          LET R5SAVE := R5                      ;SAVE CURRENT DEVICE POINTER.
(4) 010660  010537  003462                                              MOV     R5,R5SAV
                          JSR   PC,FIRSTU                       ;FIND FIRST UNIT.
                          WHILE DEVTBL(R5) NE #END DO
(4) 010670                                                                      50074$:
(6) 010670  026527  002536  177777                                      CMP     DEVTBL(R
(9) 010676  001405                                              BEQ     50075$
                            JSR PC,WSSR                         ;WAIT FOR UNIT READY OR TIME OUT.
                            JSR PC,NEXTU                        ;FIND NEXT UNIT.
                          ENDDO
(3) 010712                                                              BR      50074$
                                                                                50075$:
                          LET R5 := R5SAVE                      ;RESTORE CURRENT DEVICE POINTER.
(4) 010712  013705  003462                                              MOV     R5SAVE,R
                          LET SCHBK := MSGPKA(R5)               ;SET UP ADR OF MSG PKT IN SCH BLOCK.
(4) 010716  016537  002506  002446                                      MOV     MSGPKA(R
                        ENDIF
(4) 010724                                                                      50073$:
                        LET R3 := MSGPKA(R5)                    ;ADR OF THIS UNIT'S MSG PACKET.
(4) 010724  016503  002506                                              MOV     MSGPKA(R
                        LET R2 := #0                            ;CLR COUNTER.
(4) 010730  005002                                              CLR     R2
                        WHILE R2 NE #MSGCNT DO                  ;WHILE THERE ARE MORE LOCATIONS:
(4) 010732                                                                      50076$:
```

```
  (6)  010732  020227  000016                                                    CMP     R2,#MSGC
  (9)  010736  001405                                                            BEQ     50077$
3023   010740                        LET (R3)+ := #-1              ;INIT THE MSG PACKET WITH ALL 1'S
  (4)  010740  012723  177777                                                    MOV     #-1,(R3)
3024   010744                        LET R2 := R2 + #2             ;UPDATE COUNTER.
  (6)  010744  062702  000002                                                    ADD     #2,R2
3025   010750                      ENDDO
  (4)  010750  000770                                                            BR      50076$
  (3)  010752                                                                 50077$:
3026   010752  105737  002212      TSTB    DINT                  ;ARE INTERRUPTS DISABLED.
3027   010756  001023              BNE     1$                    ;BR IF YES.
3028   010760                      IFB INTFLG(R5) GT #1 THEN     ;IF MORE THAN ONE INTERRUPT HAS OCCURED:
  (6)  010760  126527  003500  000001                                          CMPB    INTFLG(R
  (9)  010766  003412                                                            BLE     50100$
3029   010770                        LET TSSREG := @TSSR(R5)               ;FREEZE THE CURRENT STATUS REG F
  (4)  010770  017537  002466  003464                                          MOV     @TSSR(R5
3030   010776                        ERRDF 15,TOOMM,STAERM   ;REPORT TOO MANY INTERRUPTS.
  (4)  010776  104455                                                            TRAP    C$ERDF
  (5)  011000  000017                                                            .WORD   15
  (5)  011002  004544                                                            .WORD   TOOMM
  (5)  011004  005642                                                            .WORD   STAERM
3031   011006  004737  016716        JSR PC,DROPU                  ;DROP THE UNIT
3032   011012  000464                BR  EXCRTN                    ;RETURN - UNIT HAS BEEN DROPPED.
3033   011014                      ENDIF
  (4)  011014                                                                 50100$:
3034   011014                      LET INTFLG(R5) := #0            ;CLR INTERRUPT FLAG FOR THIS DEV.
  (4)  011014  005065  003500                                                    CLR     INTFLG(R
3035   011020  052737  000200  002314  BIS     #IE.C,CMDPKT      ;SET INT ENABLE BIT.
3036   011026                1$:     IFB ERRREC EQ #0 THEN       ;IF NOT RETRYING
  (6)  011026  105737  003477                                                    TSTB    ERRREC
  (9)  011032  001005                                                            BNE     50101$
3037   011034                        LET RECCNT(R5) := RECCNT(R5) + #1
  (6)  011034  005265  003330                                                    INC     RECCNT(R
3038   011040                        LET @DATAWT := RECCNT(R5)     ;THEN UPDATE REC COUNT TO WRITE
  (4)  011040  016577  003330  172350                                          MOV     RECCNT(R
3039   011046                      ENDIF
  (4)  011046                                                                 50101$:
3040   011046                      IF L$TEST EQ #3 AND CMDWRD EQ #WRT THEN
  (6)  011046  023727  002114  000003                                          CMP     L$TEST,#
  (9)  011054  001024                                                            BNE     50102$
  (6)  011056  023727  003430  104005                                          CMP     CMDWRD,#
  (9)  011064  001020                                                            BNE     50102$
3041   011066                        IF NCNT GT #3500. THEN
  (6)  011066  023727  003422  006654                                          CMP     NCNT,#35
  (9)  011074  003414                                                            BLE     50103$
3042   011076                        DELAY 15.
  (2)  011076  012727  000017                                                    MOV     #15.,(PC
  (2)  011102  000000                                                            .WORD   0
  (2)  011104  013727  002116                                                    MOV     L$DLY,(P
  (2)  011110  000000                                                            .WORD   0
  (2)  011112  005367  177772                                                    DEC     -6(PC)
  (2)  011116  001375                                                            BNE     .-4
  (2)  011120  005367  177756                                                    DEC     -22(PC)
  (2)  011124  001367                                                            BNE     .-20
3043   011126                        ENDIF
  (4)  011126                                                                 50103$:
```

```
 3044  011126                                          ENDIF
  (4)  011126                                                                  50102$:
 3045  011126  012775  002314  002456                  MOV     #CMDPKT,@TSDB(R5)       ;LOAD TSDB WITH CMDPKT ADDRESS
 3046                                                                                  ;THIS INITIATES COMMAND EXECUTION.
 3047  011134                                          IF #TS.SSR SETIN @TSSR(R5) THEN ;IF READY DID NOT DROP THEN:
  (6)  011134  032775  000200  002466                                                    BIT     #TS.SSR,
  (9)  011142  001410                                                                    BEQ     50104$
 3048  011144  004737  011552                            JSR   PC,MOVMSG               ;MOVE CURRENT MESSAGE PACKET TO COMMON
 3049  011150                                            ERRDF 3,TOERM,STAERM          ;REPORT NO TU80 RESPONSE.
  (4)  011150  104455                                                                    TRAP    C$ERDF
  (5)  011152  000003                                                                    .WORD   3
  (5)  011154  004273                                                                    .WORD   TOERM
  (5)  011156  005642                                                                    .WORD   STAERM
 3050  011160  004737  016716                            JSR PC,DROPU                  ;DROP THE UNIT
 3051  011164                                          ENDIF
  (4)  011164                                                                  50104$:
 3052  011164  000207                          EXCRTN: RTS     PC                      ;RETURN.
```

```
                        ;       THIS SUBROUTINE WAITS FOR THE TU80 INERRUPT OR DONE BIT TO SET AND ALLOW
                        ;       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.

011166                  GOWAIT::IF DEVTBL(R5) EQ #NINUSE THEN
(6) 011166  026527  002536  177774                                       CMP     DEVTBL(R
(9) 011174  001002                                                      BNE     50105$
011176  000540                  BR      1$
011200                          ELSE
(4) 011200  000400                                                      BR      50106$
(3) 011202                                                      50105$:
011202                          ENDIF
(4) 011202                                                      50106$:
011202                          LET TIME1 := #-1                ;INIT TIME OUT COUNTER.
(4) 011202  012737  177777  003446                                      MOV     #-1,TIME
011210                          REPEAT                          ;REPEAT UNTIL INTERRUPT OCCURES:
(3) 011210                                                      50107$:
011210                            BREAK                         ;GO TO THE SUPER TO ALLOW TTY INPUT.
(3) 011210  104422                                                      TRAP    C$BRK
011212                            IF CMDWRD EQ #RWD THEN        ;IF COMMAND WAS REWIND THEN:
(6) 011212  023727  003430  102010                                      CMP     CMDWRD,#
(9) 011220  001014                                                      BNE     50110$
011222                              DELAY 10.                   ;WAIT  EXTRA 10 MSECS EACH LOOP.
(2) 011222  012727  000012                                              MOV     #10.,(PC
(2) 011226  000000                                                      .WORD   0
(2) 011230  013727  002116                                              MOV     L$DLY,(P
(2) 011234  000000                                                      .WORD   0
(2) 011236  005367  177772                                              DEC     -6(PC)
(2) 011242  001375                                                      BNE     .-4
(2) 011244  005367  177756                                              DEC     -22(PC)
(2) 011250  001367                                                      BNE     .-20
011252                          ENDIF
(4) 011252                                                      50110$:
011252                          IF CMDWRD EQ #SFF OR CMDWRD EQ #SFR THEN
(6) 011252  023727  003430  105010                                      CMP     CMDWRD,#
(8) 011260  001404                                                      BEQ     50111$
(6) 011262  023727  003430  105410                                      CMP     CMDWRD,#
(9) 011270  001014                                                      BNE     50112$
(6) 011272                                                      50111$:
011272                            DELAY 12.                   ;ADD DELAY FOR SPACE TAPE MARK COMMANDS
(2) 011272  012727  000014                                              MOV     #12.,(PC
(2) 011276  000000                                                      .WORD   0
(2) 011300  013727  002116                                              MOV     L$DLY,(P
(2) 011304  000000                                                      .WORD   0
(2) 011306  005367  177772                                              DEC     -6(PC)
(2) 011312  001375                                                      BNE     .-4
(2) 011314  005367  177756                                              DEC     -22(PC)
(2) 011320  001367                                                      BNE     .-20
011322                          ENDIF
(4) 011322                                                      50112$:
011322                          IFB DINT EQ #0 THEN             ;IF INTERRUPTS ARE ENABLED.
```

```
   (6)  011322  105737  002212                                                    TSTB    DINT
   (9)  011326  001003                                                            BNE     50113$
3077    011330                    LET R2 := INTFLG(R5)        ;FETCH INTERRUPT OCCURRED FLAG.
   (4)  011330  016502  003500                                                    MOV     INTFLG(R
3078    011334                  ELSE                          ;IF IN BRUTUS MODE:
   (4)  011334  000406                                                            BR      50114$
   (3)  011336                                                            50113$:
3079    011336                    LET R3 := COMP #TS.SSR      ;SET UP A MASK FOR THE DONE BIT.
   (6)  011336  012703  000200                                                    MOV     #TS.SSR,
   (6)  011342  005103                                                            COM     R3
3080    011344                    LET R2 := @TSSR(R5) CLR.BY R3  ;FETCH DONE BIT.
   (4)  011344  017502  002466                                                    MOV     @TSSR(R5
   (6)  011350  040302                                                            BIC     R3,R2
3081    011352                  ENDIF
   (4)  011352                                                            50114$:
3082    011352                  LET TIME1 := TIME1 - #1       ;UPDATE TIMEOUT COUNTER.
   (6)  011352  005337  003446                                                    DEC     TIME1
3083    011356                UNTIL R2 NE #0 OR TIME1 EQ #0   ;REPEAT UNTIL INTERRUPT OR READY OCCURES
   (4)  011356  005702                                                            TST     R2
   (6)  011360  001003                                                            BNE     50115$
   (4)  011362  005737  003446                                                    TST     TIME1
   (7)  011366  001310                                                            BNE     50107$
   (4)  011370                                                            50115$:
3084    011370                  IF TIME1 EQ #0 THEN           ;IF TIME OUT HAS OCCURRED:
   (6)  011370  005737  003446                                                    TST     TIME1
   (9)  011374  001022                                                            BNE     50116$
3085    011376                    LET @DATAWT := RECCNT(R5) - #1 ;RE-ADJUST REC COUNT DOWN
   (4)  011376  016577  003330  172012                                           MOV     RECCNT(R
   (6)  011404  005377  172006                                                    DEC     @DATAWT
3086    011410  004737  011552                JSR   PC,MOVMSG                   ;MOVE CURRENT MSG PACKET TO COMMON AREA.
3087    011414                  ERRDF 4,NOINTM,STAERM ;REPORT NO INTERRUPT.
   (4)  011414  104455                                                            TRAP    C$ERDF
   (5)  011416  000004                                                            .WORD   4
   (5)  011420  004505                                                            .WORD   NOINTM
   (5)  011422  005642                                                            .WORD   STAERM
3088    011424  004737  016716                  JSR PC,DROPU            ;DROP THE UNIT.
3089    011430                    LET R3 := #ENDERF
   (4)  011430  012703  003500                                                    MOV     #ENDERF,
3090    011434  004737  011502                  JSR PC,CLRERR                 ;CLEAR ALL ERROR FLAGS
3091    011440                  ELSE
   (4)  011440  000417                                                            BR      50117$
   (3)  011442                                                            50116$:
3092    011442  004737  011552                  JSR   PC,MOVMSG               ;MOVE CURRENT MSG. PACKET TO COMMON AREA
3093    011446  004737  011636                  JSR   PC,RECUD                ;UPDATE THE RECORD COUNT.
3094    011452  004737  012004                  JSR   PC,CHKERR               ;CHECK FOR STATUS ERRORS.
3095    011456                    IFB WRTYFG EQ #0 THEN       ;
   (6)  011456  105737  003471                                                    TSTB    WRTYFG
   (9)  011462  001006                                                            BNE     50120$
3096    011464  004737  014664                    JSR PC,LOG                  ;LOG BYTES AND ERRORS.
3097    011470                      LET R3 := #ENDERF
   (4)  011470  012703  003500                                                    MOV     #ENDERF,
3098    011474  004737  011502                    JSR PC,CLRERR                     ;CLEAR ALL ERROR FLAGS
3099    011500                    ENDIF
   (4)  011500                                                            50120$:
3100    011500                  ENDIF
   (4)  011500                                                            50117$:
```

```
 3101  011500  000207                    1$:     RTS     PC                      ;RETURN IF DONE.
```

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

011502                  CLRERR:: LET R2 := #BGNFLG
(4) 011502 012702 003466                                        MOV     #BGNFLG,
                                REPEAT
(3) 011506                                                    50121$:
                                  LET (R2)+ := #0
(4) 011506 005022                                               CLR     (R2)+
                                UNTIL R2 EQ R3
(3) 011510 020203                                               CMP     R2,R3
(6) 011512 001375                                               BNE     50121$
                                RTS PC

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

011516                  WSSR::  LET TIME1 := #-1                ;INIT TIMEOUT COUNTER.
(4) 011516 012737 177777 003446                                 MOV     #-1,TIME
                                REPEAT                          ;REPEAT UNTIL DEV READY OR TIMEOUT:
(3) 011524                                                    50122$:
                                  BREAK                         ;BREAK TO THE SUPERVISOR.
(3) 011524 104422                                               TRAP    C$BRK
                                  LET TIME1 := TIME1 - #1       ;UPDATE TIMEOUT COUNTER.
(6) 011526 005337 003446                                        DEC     TIME1
                                UNTIL #TS.SSR SETIN @TSSR(R5) OR TIME1 EQ #0
(4) 011532 032775 000200 002466                                 BIT     #TS.SSR,
(6) 011540 001003                                               BNE     50123$
(4) 011542 005737 003446                                        TST     TIME1
(7) 011546 001366                                               BNE     50122$
(4) 011550                                                    50123$:
                                                              ;REPEAT UNTIL DEV READY OR TIMEOUT.
011550 000207           RTS PC                                ;RETURN.
```

```
3133
3134                            ;       SUBROUTINE TO MOVE THE CURRENT MESSAGE PACKET TO THE COMMON AREA AND
3135                            ;       TO UPDATE THE CURRENT TERMINATION CLASS CODE.
3136                            ;       INPUTS:
3137                            ;       OUTPUTS:
3138                            ;       REGISTERS:      R2, R3.
3139                            ;       CALLS:
3140
3141  011552                    MOVMSG:: LET TSSREG := @TSSR(R5)        ;FREEZE THE STATUS REG CONTENTS
 (4)  011552  017537  002466  003464                                                MOV     @TSSR(R5
3142  011560                           LET R2 := TSSREG CLR.BY #TSC.TCC ;EXTRACT THE TERMINATION CLASS CODE,
 (4)  011560  013702  003464                                                        MOV     TSSREG,R
 (6)  011564  042702  177761                                                        BIC     #TSC.TCC
3143  011570                           LET CTCC := R2 SHIFT -1          ;AND SAVE IT
 (4)  011570  010237  003460                                                        MOV     R2,CTCC
 (7)  011574  006237  003460                                                        ASR     CTCC
3144  011600                           LET R3 := MSGPKA(R5)             ;ADR OF THIS DEVICE'S MSG.
 (4)  011600  016503  002506                                                        MOV     MSGPKA(R
3145  011604                           LET R2 := #0                     ;CLR COUNTER.
 (4)  011604  005002                                                                CLR     R2
3146  011606                          WHILE R2 NE #MSGCNT DO           ;WHILE THERE ARE MORE LOCATIONS:
 (4)  011606                                                                  50124$:
 (6)  011606  020227  000016                                                        CMP     R2,#MSGC
 (9)  011612  001405                                                                BEQ     50125$
3147  011614                             LET MSGPKT(R2) := (R3)+        ;MOVE MSG TO COMMON AREA.
 (4)  011614  012362  002340                                                        MOV     (R3)+,MS
3148  011620                             LET R2 := R2 + #2              ;UPDATE COUNTER.
 (6)  011620  062702  000002                                                        ADD     #2,R2
3149  011624                          ENDDO
 (4)  011624  000770                                                                BR      50124$
 (3)  011626                                                                  50125$:
3150  011626                          LET EOTFLG(R5) := MSGPKT+MS.XS0 ;MOVE XSTAT0 TO EOT FLAG.
 (4)  011626  013765  002346  003510                                                MOV     MSGPKT+M
3151  011634  000207                  RTS     PC
```

```
                        ;       SUBROUTINE TO ADJUST THE RECORD COUNT.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:
                        ;       CALLS:

011636                  RECUD:: IFB RECLOG EQ #0 THEN           ;IF RECORD HAS NOT BEEN LOGGED:
(6)  011636  105737  003473                                             TSTB    RECLOG
(9)  011642  001057                                                     BNE     50126$
011644                    LET RECCNT(R5) := RECCNT(R5) - #1
(6)  011644  005365  003330                                             DEC     RECCNT(R
011650                    IF #BIT0 NOTSETIN CTCC AND #X2.OPM SETIN MSGPKT+MS.XS2 THEN   ;IF TAPE
(6)  011650  032737  000001  003460                                     BIT     #BIT0,CT
(9)  011656  001046                                                     BNE     50127$
(6)  011660  032737  100000  002352                                     BIT     #X2.OPM,
(9)  011666  001442                                                     BEQ     50127$
011670                      LET RECLOG :B= RECLOG + #1  ;SET RECORD LOGGED,
(6)  011670  105237  003473                                             INCB    RECLOG
011674                      IF CMDWRD EQ #RWD THEN      ;IF THIS IS A REWIND CMD:
(6)  011674  023727  003430  102010                                     CMP     CMDWRD,#
(9)  011702  001003                                                     BNE     50130$
011704                        LET RECCNT(R5) := #0      ;CLEAR RECORD COUNT,
(4)  011704  005065  003330                                             CLR     RECCNT(R
011710                      ELSE
(4)  011710  000431                                                     BR      50131$
(3)  011712                                                     50130$:
011712                        IF #BRF.C SETIN CMDWRD THEN       ;IF BRF USED, UPDATE RECORD COUN
(6)  011712  032737  004000  003430                                     BIT     #BRF.C,C
(9)  011720  001425                                                     BEQ     50132$
011722                          IF #MOD.CO NOTSETIN CMDWRD THEN  ;IF A FORWARD CMD:
(6)  011722  032737  000400  003430                                     BIT     #MOD.CO,
(9)  011730  001007                                                     BNE     50133$
011732                        IF #MOD.CO NOTSETIN PCMDWD THEN  ;IF PREV CMD WAS A FWD ALSO:
(6)  011732  032737  000400  003434                                     BIT     #MOD.CO,
(9)  011740  001002                                                     BNE     50134$
011742                          LET RECCNT(R5) := RECCNT(R5) + #1  ;INCREMENT RECORD COUNT.
(6)  011742  005265  003330                                             INC     RECCNT(R
011746                        ENDIF
(4)  011746                                                     50134$:
011746                    ELSE                      ;IF REVERSE CMD:
(4)  011746  000412                                                     BR      50135$
(3)  011750                                                     50133$:
011750                        IF #MOD.CO SETIN PCMDWD THEN  ;IF PREVIOUS CMD WAS A REV ALSO:
(6)  011750  032737  000400  003434                                     BIT     #MOD.CO,
(9)  011756  001406                                                     BEQ     50136$
011760                          IF #X0.BOT NOTSETIN EOTFLG(R5) THEN ;WHEN NOT AT BOT THEN
(6)  011760  032765  000002  003510                                     BIT     #X0.BOT,
(9)  011766  001002                                                     BNE     50137$
011770                            LET RECCNT(R5) := RECCNT(R5) - #1  ;DECREMENT RECORD COUNT
(6)  011770  005365  003330                                             DEC     RECCNT(R
011774                          ENDIF
(4)  011774                                                     50137$:
011774                        ENDIF
(4)  011774                                                     50136$:
011774                    ENDIF
(4)  011774                                                     50135$:
```

```
GLOBAL AREAS    MACY11 30(1046)  12-JUL-83  09:44  PAGE 51-1                                                SEQ 0082
CZTUVB.P11    12-JUL-83 09:26          GLOBAL SUBROUTINES SECTION

  3178  011774                                          ENDIF
   (4)  011774                                                                  50132$:
  3179  011774                                        ENDIF
   (4)  011774                                                                  50131$:
  3180  011774                                      ENDIF
   (4)  011774                                                                  50127$:
  3181  011774                                      LET @DATAWT := RECCNT(R5)
   (4)  011774  016577  003330  171414                                                MOV     RECCNT(R
  3182  012002                                    ENDIF
   (4)  012002                                                                  50126$:
  3183  012002  000207                            RTS     PC                  ;RETURN.
```

```
                        ;       THIS IS THE ERROR CHECK SUBROUTINE.  AFTER INTERRUPT THIS
                        ;       SUBROUTINE IS CALLED TO CHECK THE TU80 STATUS.
                        ;       IF SPECIAL COND IS SET THEN THE TCC HANDLING SUBROUTINE IS ENTERED.
                        ;       IF THE RFC IS NON ZERO FOR A COMMAND REQUIRING A BPCR,
                        ;       THEN AN ERROR RFC IS REPORTED,
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R4.
                        ;       CALLS:          TCC0-TCC7.

012004                  CHKERR::IF DEVTBL(R5) EQ #NINUSE THEN
(6) 012004 026527 002536 177774                                         CMP     DEVTBL(R
(9) 012012 001003                                                       BNE     50140$
3196 012014 000137 012230               JMP     1$
3197 012020                             ELSE
(4) 012020 000400                                                       BR      50141$
(3) 012022                                                      50140$:
3198 012022                             ENDIF
(4) 012022                                                      50141$:
3199 012022                             IF #TS.SC SETIN TSSREG THEN     ;IF SPECIAL COND STATUS IS SET THEN:
(6) 012022 032737 100000 003464                                         BIT     #TS.SC,T
(9) 012030 001441                                                       BEQ     50142$
3200 012032                               IF CTCC NE #2 THEN            ;IF TCC IS NOT 2 THEN:
(6) 012032 023727 003460 000002                                         CMP     CTCC,#2
(9) 012040 001405                                                       BEQ     50143$
3201 012042                                 IFB ERRREC EQ #0 THEN       ;IF NOT IN ERROR RECOVERY:
(6) 012042 105737 003477                                                TSTB    ERRREC
(9) 012046 001002                                                       BNE     50144$
3202 012050 005265 003270                     INC     S.CNT(R5)         ;INC SC COUNTER.
3203 012054                                 ENDIF
(4) 012054                                                      50144$:
3204 012054                               ENDIF
(4) 012054                                                      50143$:
3205 012054                             IF #TS.NXM SETIN TSSREG OR #TS.UPE SETIN TSSREG THEN  ;WHEN NON-EXISTA
(6) 012054 032737 004000 003464                                         BIT     #TS.NXM,
(8) 012062 001004                                                       BNE     50145$
(6) 012064 032737 040000 003464                                         BIT     #TS.UPE,
(9) 012072 001412                                                       BEQ     50146$
(6) 012074                                                      50145$:
3206 012074                               IF #X2.OPM NOTSETIN MSGPKT+MS.XS2 THEN        ;AND TAPE NOT MO
(6) 012074 032737 100000 002352                                         BIT     #X2.OPM,
(9) 012102 001003                                                       BNE     50147$
3207 012104                                 LET R2 := #5                ;SET TCC5 INDEX
(4) 012104 012702 000005                                                MOV     #5,R2
3208 012110                               ELSE
(4) 012110 000402                                                       BR      50150$
(3) 012112                                                      50147$:
3209 012112                                 LET R2 := #4                ;TAPE MOVED, SET TCC4 INDEX
(4) 012112 012702 000004                                                MOV     #4,R2
3210 012116                               ENDIF
(4) 012116                                                      50150$:
3211 012116                             ELSE
(4) 012116 000402                                                       BR      50151$
(3) 012120                                                      50146$:
3212 012120                               LET R2 := CTCC                ;SET DETECTED TCC INDEX
(4) 012120 013702 003460                                                MOV     CTCC,R2
```

```
3213  012124                                                ENDIF
 (4)  012124                                                                    50151$:
3214  012124                                                LET R2 := R2 SHIFT 1  ;CURRENT TCC X 2.
 (7)  012124  006302                                                            ASL     R2
3215  012126  004772  012232                               JSR   PC,@TCCRA(R2)           ;GO TO THE TCC HANDLING SUBROUTINE.
3216  012132                                              ELSE
 (4)  012132  000430                                                            BR      50152$
 (3)  012134                                                                    50142$:
3217  012134                                              IF #BRF.C SETIN CMDWRD THEN   ;IF BRF IS USED IN THIS CMD THEN:
 (6)  012134  032737  004000  003430                                           BIT     #BRF.C,C
 (9)  012142  001424                                                            BEQ     50153$
3218  012144                                                IF MSGPKT+MS.RFC NE #0 THEN   ;IF THERE IS AN RFC THEN:
 (6)  012144  005737  002344                                                    TST     MSGPKT+M
 (9)  012150  001421                                                            BEQ     50154$
3219  012152                                                  IFB RANDOM EQ #0 ORB VFYFLG NE #0 THEN
 (6)  012152  105737  003523                                                    TSTB    RANDOM
 (8)  012156  001403                                                            BEQ     50155$
 (6)  012160  105737  003524                                                    TSTB    VFYFLG
 (9)  012164  001413                                                            BEQ     50156$
 (6)  012166                                                                    50155$:
3220                                                                          ;IF NOT IN RANDOM OR IF CMD IS W
3221  012166                                                    IFB IRE EQ #0 THEN          ;IF RFC ERROR REPORTS ARE ALLOWE
 (6)  012166  105737  003527                                                    TSTB    IRE
 (9)  012172  001010                                                            BNE     50157$
3222  012174                                                    LET HRDCNT(R5) := HRDCNT(R5) + #1  ;UPDATE HARD ERROR COUNT
 (6)  012174  005265  003310                                                    INC     HRDCNT(R
3223  012200                                                    ERRHRD 13,RFCERM,STAERM ;REPORT RFC ERROR
 (4)  012200  104456                                                            TRAP    C$ERHRD
 (5)  012202  000015                                                            .WORD   13
 (5)  012204  004340                                                            .WORD   RFCERM
 (5)  012206  005642                                                            .WORD   STAERM
3224  012210  004737  013360                                   JSR     PC,RAMDUM           ;GO DO RAM DUMP
3225  012214                                                    ENDIF
 (4)  012214                                                                    50157$:
3226  012214                                                  ENDIF
 (4)  012214                                                                    50156$:
3227  012214                                                ENDIF
 (4)  012214                                                                    50154$:
3228  012214                                              ENDIF
 (4)  012214                                                                    50153$:
3229  012214                                            ENDIF
 (4)  012214                                                                    50152$:
3230  012214                                            IFB RWERR NE #0 THEN          ;IF A READ/WRITE ERROR HAS OCCURRED THEN
 (6)  012214  105737  003475                                                    TSTB    RWERR
 (9)  012220  001403                                                            BEQ     50160$
3231  012222                                              LET CMDPKT := CMDSAV          ;RESTORE CMD PACKET AFTER ERROR RECOV.
 (4)  012222  013737  003432  002314                                           MOV     CMDSAV,C
3232  012230                                            ENDIF
 (4)  012230                                                                    50160$:
3233  012230  000207                              1$:    RTS     PC                    ;RETURN.
3234
```

```
3236                                    ;       ADDRESSES OF TCC HANDLING ROUTINES FOR TERMINATION CLASS CODES 0 - 7.
3237
3238  012232  012252                    TCCRA:  TCC0
3239  012234  012274                            TCC1
3240  012236  012312                            TCC2
3241  012240  012460                            TCC3
3242  012242  012502                            TCC4
3243  012244  013200                            TCC5
3244  012246  013302                            TCC6
3245  012250  013336                            TCC7
```

```
                                ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 0, UNDEFINED SPECIAL
                                ;       CONDITION ERROR.
                                ;       INPUTS:
                                ;       OUTPUTS:
                                ;       REGISTERS:
                                ;       CALLS:

012252                          TCC0::  LET HRDCNT(R5) := HRDCNT(R5) + #1  ;UPDATE HARD ERROR COUNT.
(6) 012252  005265  003310                                                      INC     HRDCNT(R
012256                                  ERRHRD 5,SCERM,STAERM           ;REPORT SPECIAL CONDITION ERROR.
(4) 012256  104456                                                              TRAP    C$ERHRD
(5) 012260  000005                                                              .WORD   5
(5) 012262  004314                                                              .WORD   SCERM
(5) 012264  005642                                                              .WORD   STAERM
012266  004737  013360                      JSR     PC,RAMDUM               ;GO DO RAM DUMP
012272  000207                            RTS PC                            ;RETURN.



                                ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 1, ATTENTION CONDITION.
                                ;       THIS TCC INDICATES THAT THE DRIVE HAS UNDERGONE A STATUS CHANGE
                                ;       SUCH AS GOING OFFLINE OR COMING ONLINE.
                                ;       INPUTS:
                                ;       OUTPUTS:
                                ;       REGISTERS:      R2,R4
                                ;       CALLS:          DROPU

012274                          TCC1::  ERRDF 6,ATTNM,STAERM            ;REPORT ATTENTION-UNIT OFF LINE.
(4) 012274  104455                                                              TRAP    C$ERDF
(5) 012276  000006                                                              .WORD   6
(5) 012300  004421                                                              .WORD   ATTNM
(5) 012302  005642                                                              .WORD   STAERM
012304  004737  013360                      JSR     PC,RAMDUM               ;GO DO RAM DUMP
012310  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:

012312                          TCC2::    IF #X0.BOT SETIN MSGPKT+MS.XS0 ANDB EXPBOT NE #0 THEN
(6) 012312  032737  000002  002346                                                  BIT     #X0.BOT,
(9) 012320  001404                                                                  BEQ     50161$
(6) 012322  105737  003522                                                          TSTB    EXPBOT
(9) 012326  001401                                                                  BEQ     50161$
                                                                        ;IF AT BOT AND BOT IS EXPECTED:
012330  000452                          BR TC2RTN                       ;RETURN-TCC2 CAUSED BY EXPECTED BOT.
012332                                  ENDIF
(4) 012332                                                                      50161$:
012332                                IF L$TEST EQ #3 THEN
(6) 012332  023727  002114  000003                                                  CMP     L$TEST,#
(9) 012340  001011                                                                  BNE     50162$
012342                                 IF PCMDWD EQ #WTM AND CMDWRD EQ #SRR THEN
(6) 012342  023727  003434  100011                                                  CMP     PCMDWD,#
(9) 012350  001005                                                                  BNE     50163$
(6) 012352  023727  003430  104410                                                  CMP     CMDWRD,#
(9) 012360  001001                                                                  BNE     50163$
012362  000435                         BR    TC2RTN
012364                                 ENDIF
(4) 012364                                                                      50163$:
012364                                ENDIF
(4) 012364                                                                      50162$:
012364                                IF #X0.RLS!X0.RLL!X0.TMK!X0.LET!X0.BOT SETIN MSGPKT+MS.XS0 THEN
(6) 012364  032737  170002  002346                                                  BIT     #X0.RLS!
(9) 012372  001431                                                                  BEQ     50164$
                                                                        ;IF TCC2 CAUSED BY ANYTHING BUT EOT:
012374                                  IFB RANDOM EQ #0 ORB VFYFLG NE #0 THEN
(6) 012374  105737  003523                                                          TSTB    RANDOM
(8) 012400  001403                                                                  BEQ     50165$
(6) 012402  105737  003524                                                          TSTB    VFYFLG
(9) 012406  001423                                                                  BEQ     50166$
(6) 012410                                                                      50165$:
                                                                        ;IF NOT IN RANDOM OR IF CMD IS WTV:
012410                                    IFB IRE EQ #0 THEN            ;IF RFC ERROR REPORTS ARE ALLOWED:
(6) 012410  105737  003527                                                          TSTB    IRE
(9) 012414  001020                                                                  BNE     50167$
012416                                    IFB ERRREC NE #0 THEN         ;IF WE ARE IN ERROR RECOVERY THE
(6) 012416  105737  003477                                                          TSTB    ERRREC
(9) 012422  001403                                                                  BEQ     50170$
012424                                      LET UNREC :B= UNREC + #1      ;SET UNRECOVERABLE FLAG FOR LO
(6) 012424  105237  003476                                                          INCB    UNREC
012430                                    ELSE                          ;ELSE - IF NOT IN ERROR RECOVERY
(4) 012430  000402                                                                  BR      50171$
(3) 012432                                                                      50170$:
012432                                      LET SCCNT(R5) := SCCNT(R5) + #1 ;INCREMENT THE SPEC COND COUNT
(6) 012432  005265  003270                                                          INC     SCCNT(R5
012436                                    ENDIF
(4) 012436                                                                      50171$:
```

```
3302  012436                                        LET HRDCNT(R5) := HRDCNT(R5) + #1   ;UPDATE HARD ERROR COUNT.
                                                                                        INC     HRDCNT(R
 (6)  012436  005265  003310
3303  012442                                        ERRHRD 7,TSAM,STAERM                ;REPORT TAPE STATUS ALERT.
 (4)  012442  104456                                                                    TRAP    C$ERHRD
 (5)  012444  000007                                                                    .WORD   7
 (5)  012446  004522                                                                    .WORD   TSAM
 (5)  012450  005642                                                                    .WORD   STAERM
3304  012452  004737  013360                          JSR     PC,RAMDUM               ;GO DO RAM DUMP
3305  012456                                        ENDIF
 (4)  012456                                                                            50167$:
3306  012456                                      ENDIF
 (4)  012456                                                                            50166$:
3307  012456                                    ENDIF
 (4)  012456                                                                            50164$:
3308  012456  000207                    TC2RTN:  RTS PC                              ;RETURN.
3309
3310
3311
3312
3313
3314
3315                                     ;       THE SPECIFIED FUNCTION WAS NOT INITIATED.  BITS OF INTEREST ARE
3316                                     ;       RMR, OFL, VCK, BOT, ILC, WLE, ILA, AND NBA.
3317                                     ;       INPUTS:
3318                                     ;       OUTPUTS:
3319                                     ;       REGISTERS:      R2,R4
3320                                     ;       CALLS:          DROPU
3321
3322  012460                             TCC3::   ERRDF 8,FUNRM,STAERM                ;REPORT FUNCTION REJECT.
 (4)  012460  104455                                                                    TRAP    C$ERDF
 (5)  012462  000010                                                                    .WORD   8
 (5)  012464  004437                                                                    .WORD   FUNRM
 (5)  012466  005642                                                                    .WORD   STAERM
3323  012470  004737  013360                          JSR     PC,RAMDUM               ;GO DO RAM DUMP
3324  012474  004737  016716                          JSR     PC,DROPU                ;DROP THE UNIT.
3325  012500  000207                                  RTS PC                          ;RETURN.
```

```
3327                                    ;       SUBROUTINE TO HANDLE TERMINATION CLASS CODE 4, RECOVERABLE ERROR.
3328                                    ;       TAPE POSITION IS ONE RECORD BEYOND WHAT ITS POSITION WAS WHEN
3329                                    ;       THE FUNCTION WAS INITIATED.  RECOVERY PROCEDURE IS TO LOG THE
3330                                    ;       ERROR AND ISSUE THE APPROPRIATE RETRY COMMAND.
3331                                    ;       2 WRITE-ERROR-RECOVERY ALGORITHMS CAN BE SELECTED:
3332                                    ;       THE FIRST ONE, VIA BADTSW SWITCH,  DOES DETECT BAD SPOTS ON TAPE.
3333                                    ;       IT CALLS A WRITE RETRY SUBR UNTIL THE RECORD IS RECOVERED
3334                                    ;       OR 20 BAD SPOTS HAVE BEEN LOGGED. ON REACHING 20 BAD
3335                                    ;       SPOTS LOGGED, A BAD TAPE OVERFLOW MSG IS PRINTED AND THE
3336                                    ;       UNIT DROPPED.
3337                                    ;       THE SECOND ALGORITHM ISSUES THE TU80 WRITE RETRY COMMAND
3338                                    ;       UP TO 16 TIMES BEFORE DROPPING THE UNIT OR PROCEEDING
3339                                    ;       WITH THE NEXT RECORD ON RECOVERY.
3340                                    ;       INPUTS:
3341                                    ;       OUTPUTS:
3342                                    ;       REGISTERS:      R2,R4.
3343                                    ;       CALLS:          RTLE, EXCUTE, GOWAIT, DROPU, WRTY
3344
3345  012502                            TCC4::  IF DEVTBL(R5) EQ #NINUSE THEN
 (6)  012502  026527  002536  177774                                                  CMP     DEVTBL(R
 (9)  012510  001003                                                                  BNE     50172$
3346  012512  000137  013176                    JMP     3$
3347  012516                            ELSE
 (4)  012516  000400                                                                  BR      50173$
 (3)  012520                                                                50172$:
3348  012520                            ENDIF
 (4)  012520                                                                50173$:
3349  012520                            IF CMDLG EQ #2 ANDB BADTSW NE #0 THEN
 (6)  012520  023727  003436  000002                                                  CMP     CMDLG,#2
 (9)  012526  001137                                                                  BNE     50174$
 (6)  012530  105737  002211                                                          TSTB    BADTSW
 (9)  012534  001534                                                                  BEQ     50174$
3350  012536                              IFB ERRREC EQ #0 ANDB ERCVER NE #0 THEN
 (6)  012536  105737  003477                                                          TSTB    ERRREC
 (9)  012542  001011                                                                  BNE     50175$
 (6)  012544  105737  002207                                                          TSTB    ERCVER
 (9)  012550  001406                                                                  BEQ     50175$
3351  012552                              ERRSOFT 9,RERM,STAERM ;
 (4)  012552  104457                                                                  TRAP    C$ERSOFT
 (5)  012554  000011                                                                  .WORD   9
 (5)  012556  004634                                                                  .WORD   RERM
 (5)  012560  005642                                                                  .WORD   STAERM
3352  012562  004737  013360              JSR   PC,RAMDUM           ;GO DO RAM DUMP
3353  012566                            ENDIF
 (4)  012566                                                                50175$:
3354  012566                              IFB IREC EQ #0 THEN           ;
 (6)  012566  105737  002210                                                          TSTB    IREC
 (9)  012572  001112                                                                  BNE     50176$
3355  012574                                LET ERRREC :B= ERRREC + #1  ;RETRY FLAG FOR EXCUTE SUBR: DON'T UPDAT
 (6)  012574  105237  003477                                                          INCB    ERRREC
3356  012600                                LET WRTYER :B= WRTYER + #1  ;REWRITE ERROR FLAG FOR WRTY SUBR
 (6)  012600  105237  003472                                                          INCB    WRTYER
3357  012604                                IFB WRTYFG EQ #0 THEN      ;FIRST RETRY ON THIS RECORD: SUBSEQUENT
 (6)  012604  105737  003471                                                          TSTB    WRTYFG
 (9)  012610  001102                                                                  BNE     50177$
3358                                                                    ;RETRIES WITH TCC4 ERRORS BY-PASS THIS S
```

```
3359  012612
 (4)  012612  013737  003430  014164
3360  012620
 (4)  012620  013737  002314  014162
3361  012626
 (4)  012626  013737  002322  014166
3362  012634
 (6)  012634  105237  003475
3363  012640
 (6)  012640  105237  003471
3364  012644
 (3)  012644
3365  012644
 (6)  012644  005265  003250
3366  012650
 (4)  012650  005037  003466
3367  012654
 (4)  012654  105037  003470
3368  012660  004737  013650
3369  012664
 (6)  012664  026527  002536  177774
 (9)  012672  001002
3370  012674  000540
3371  012676
 (4)  012676  000400
 (3)  012700
3372  012700
 (4)  012700
3373  012700
 (4)  012700  105737  003472
 (6)  012704  001404
 (4)  012706  027727  170606  000050
 (7)  012714  103753
 (4)  012716
3374
3375  012716
 (6)  012716  027727  170576  000050
 (9)  012724  103425
3376  012726
 (7)  012726  012746  014255
 (6)  012732  012746  000001
 (3)  012736  010600
 (4)  012740  104414
 (4)  012742  062706  000004
3377  012746  004737  014374
3378  012752
 (6)  012752  005365  003330
3379  012756  004737  013360
3380  012762  004737  016716
3381  012766
 (4)  012766  005065  003330
3382  012772
 (4)  012772  012775  002334  002456
3383  013000
 (4)  013000
3384  013000
```

```
LET WTYWRD := CMDWRD      ;SAVE WRITE COMMAND PACKET
                                        MOV     CMDWRD,W
LET WTYCMD := CMDPKT      ;
                                        MOV     CMDPKT,W
LET WTYBRF := CMDPKT+CP.CNT       ;
                                        MOV     CMDPKT+C
LET RWERR :B= RWERR + #1  ;LOG SUBR FLAG: COUNT WRT ERRORS
                                        INCB    RWERR
LET WRTYFG :B= WRTYFG + #1        ;RETRY IN PROGRESS FLAG
                                        INCB    WRTYFG
REPEAT
                                    50200$:
  LET WRTYCT(R5) := WRTYCT(R5) + #1       ;COUNT GLOBAL WRITE RETR
                                        INC     WRTYCT(R
  LET RETRYC := #0                ;CLEAR # OF RETRIES PER RECORD
                                        CLR     RETRYC
  LET RPTCNT :B= #0               ;CLEAR # OF REPEATS
                                        CLRB    RPTCNT
  JSR PC,WRTY             ;CALL WRITE RETRY
        IF DEVTBL(R5) EQ #NINUSE THEN
                                        CMP     DEVTBL(R
                                        BNE     50201$
  BR 3$
        ELSE
                                        BR      50202$
                                    50201$:
        ENDIF
                                    50202$:
UNTILB WRTYER EQ #0 OR @BTPT HIS #40.     ;REPEAT RETRIES ON SAME
                                        TSTB    WRTYER
                                        BEQ     50203$
                                        CMP     @BTPT,#4
                                        BLO     50200$
                                    50203$:
                                ;UNTIL RECOVERED OR 20 BAD SPOTS
IF @BTPT HIS #40. THEN          ;WHEN 20 BAD SPOTS LOGGED
                                        CMP     @BTPT,#4
                                        BLO     50204$
  PRINTB #BTMSG2                ;PRINT BAD TAPE OVERFLOW MSG
                                        MOV     #BTMSG2,
                                        MOV     #1,-(SP)
                                        MOV     SP,R0
                                        TRAP    C$PNTB
                                        ADD     #4,SP
  JSR PC,BORERS                 ;ERASE BAD RECORD
  LET RECCNT(R5) := RECCNT(R5) - #1       ;
                                        DEC     RECCNT(R
  JSR     PC,RAMDUM             ;GO DO RAM DUMP
  JSR     PC,DROPU              ;DROP THE UNIT.
  LET RECCNT(R5) :=  #0         ;
                                        CLR     RECCNT(R
  LET @TSDB(R5) := #RWCPK ;REWIND UNIT
                                        MOV     #RWCPK,@
ENDIF
                                    50204$:
LET WRTYFG :B= #0               ;RETRY COMPLETE FLAG
```

```
  (4)  013000  105037  003471                                                                    CLRB    WRTYFG
3385   013004                                  LET MISCFG :B= MISCFG + #1        ;DO NOT HALT ON THIS CMD FLG
  (6)  013004  105237  003541                                                                    INCB    MISCFG
3386   013010                                  LET PCMDWD := WTYWRD      ;RESTORE ORIGINAL WRT CMD AFTER RECOVERY
  (4)  013010  013737  014164  003434                                                            MOV     WTYWRD,P
3387   013016                                ENDIF
  (4)  013016                                                                          50177$:
3388   013016                              ELSE
  (4)  013016  000402                                                                            BR      50205$
  (3)  013020                                                                          50176$:
3389   013020                                LET UNREC :B= UNREC + #1    ;
  (6)  013020  105237  003476                                                                    INCB    UNREC
3390   013024                              ENDIF
  (4)  013024                                                                          50205$:
3391   013024                            ELSE
  (4)  013024  000464                                                                            BR      50206$
  (3)  013026                                                                          50174$:
3392   013026  004737  013512            JSR PC,RTLE                       ;CHECK FOR RETRY LIMIT EXCEEDED.
3393   013032                            IF CMDLG GT #2 THEN               ;IF READ CMD THEN:
  (6)  013032  023727  003436  000002                                                            CMP     CMDLG,#2
  (9)  013040  003411                                                                            BLE     50207$
3394   013042                                LET R2 := #RRECL SHIFT -1   ;R2=READ RETRY COUNT LIMIT / 2
  (4)  013042  012702  000020                                                                    MOV     #RRECL,R
  (7)  013046  006202                                                                            ASR     R2
3395   013050                                IF RETRYC GE R2 THEN                ;IF RETRY COUNT IS MORE THAN HAL
  (6)  013050  023702  003466                                                                    CMP     RETRYC,R
  (9)  013054  002403                                                                            BLT     50210$
3396   013056                                  LET CMDPKT := CMDPKT SET.BY #OPP.C        ;SET OPPOSITE BIT FOR RE
  (6)  013056  052737  020000  002314                                                            BIS     #OPP.C,C
3397   013064                                ENDIF
  (4)  013064                                                                          50210$:
3398   013064                              ENDIF
  (4)  013064                                                                          50207$:
3399   013064                            IF RETRYC EQ #0 ANDB ERCVER NE #0 THEN  ;IF THIS IS THE ORIGINAL ERROR
  (6)  013064  005737  003466                                                                    TST     RETRYC
  (9)  013070  001011                                                                            BNE     50211$
  (6)  013072  105737  002207                                                                    TSTB    ERCVER
  (9)  013076  001406                                                                            BEQ     50211$
3400   013100                            ERRSOFT 9,RERM,STAERM         ;REPORT RECOVERABLE ERROR
  (4)  013100  104457                                                                            TRAP    C$ERSOFT
  (5)  013102  000011                                                                            .WORD   9
  (5)  013104  004634                                                                            .WORD   RERM
  (5)  013106  005642                                                                            .WORD   STAERM
3401   013110  004737  013360            JSR   PC,RAMDUM                   ;GO DO RAM DUMP
3402   013114                            ENDIF                             ;PROVIDED OPERATOR HAS ENABLED THE REPOR
  (4)  013114                                                                          50211$:
3403   013114                            LET RETRYC := RETRYC + #1     ;UPDATE RETRY COUNT.
  (6)  013114  005237  003466                                                                    INC     RETRYC
3404   013120                            LET CMDPKT := CMDPKT SET.BY #MOD.C1   ;SET RETRY BIT IN CMD PACKET.
  (6)  013120  052737  001000  002314                                                            BIS     #MOD.C1,
3405   013126                            IFB IREC EQ #0 THEN               ;IF ERROR RECOVERY ENABLED:
  (6)  013126  105737  002210                                                                    TSTB    IREC
  (9)  013132  001017                                                                            BNE     50212$
3406   013134                                  IF DEVTBL(R5) EQ #NINUSE THEN
  (6)  013134  026527  002536  177774                                                            CMP     DEVTBL(R
  (9)  013142  001002                                                                            BNE     50213$
```

```
3407  013144  000414                                    BR 3$
3408  013146                                                  ELSE
 (4)  013146  000400                                                    BR      50214$
 (3)  013150                                                          50213$:
3409  013150                                                  ENDIF
 (4)  013150                                                          50214$:
3410  013150                                      LET ERRREC :B= ERRREC + #1  ;SET ERROR RECOVERY FLAG.
 (6)  013150  105237  003477                                                  INCB    ERRREC
3411  013154                                      POP R2,R2                  ;POP 2 RTN ADRS FROM STACK.
 (2)  013154  012602                                                          MOV     (SP)+,R2
 (3)  013156  012602                                                          MOV     (SP)+,R2
3412  013160  004737  010576                     JSR PC,EXCUTE                    ;GO EXECUTE THE RETRY COMMAND.
3413  013164  000137  011166                     JMP GOWAIT                 ;GO WAIT FOR INTERRUPT + CHECK STATUS.
3414  013170                                    ELSE                       ;ELSE IF ERROR RECOVERY IS NOT ENABLED:
 (4)  013170  000402                                                          BR      50215$
 (3)  013172                                                          50212$:
3415  013172                                      LET UNREC :B= UNREC + #1    ;SET UNRECOVERABLE ERROR FLAG.
 (6)  013172  105237  003476                                                  INCB    UNREC
3416  013176                                    ENDIF
 (4)  013176                                                          50215$:
3417  013176                                  ENDIF
 (4)  013176                                                          50206$:
3418  013176  000207                    3$:    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.

013200  004737  013512        TCC5::  JSR PC,RTLE                     ;CHECK FOR RETRY LIMIT EXCEEDED
013204                          IF RETRYC EQ #0 THEN                    ;IF THIS IS THE ORIGINAL ERROR THEN:
(6) 013204  005737  003466                                                      TST     RETRYC
(9) 013210  001006                                                              BNE     50216$
                          ERRSOFT 10,RERM,STAERM                        ;REPORT RECOVERABLE ERROR.
(4) 013212  104457                                                              TRAP    C$ERSOFT
(5) 013214  000012                                                              .WORD   10
(5) 013216  004634                                                              .WORD   RERM
(5) 013220  005642                                                              .WORD   STAERM
013222  004737  013360                JSR     PC,RAMDUM               ;GO DO RAM DUMP
013226                          ENDIF
(4) 013226                                                                                      50216$:
013226                          LET RETRYC := RETRYC + #1               ;UPDATE RETRY COUNTER.
(6) 013226  005237  003466                                                      INC     RETRYC
013232                          IFB IREC EQ #0 THEN                     ;IF ERROR RECOVERY IS ENABLED:
(6) 013232  105737  002210                                                      TSTB    IREC
(9) 013236  001016                                                              BNE     50217$
013240                            LET ERRREC :B= ERRREC + #1            ;SET ERROR RECOVERY FLAG.
(6) 013240  105237  003477                                                      INCB    ERRREC
013244                            LET RECCNT(R5) := RECCNT(R5) + #1      ;UPDATE REC COUNT
(6) 013244  005265  003330                                                      INC     RECCNT(R
013250                            LET @DATAWT := RECCNT(R5)             ;AND INSERT IT INTO WRT BFR
(4) 013250  016577  003330  170140                                              MOV     RECCNT(R
013256                            POP R2,R2                             ;POP 2 RTN ADRS FROM STACK.
(2) 013256  012602                                                              MOV     (SP)+,R2
(3) 013260  012602                                                              MOV     (SP)+,R2
013262  004737  010576              JSR PC,EXCUTE                       ;GO RE-ISSUE THE COMMAND.
013266  000137  011166              JMP GOWAIT                          ;GO WAIT FOR INTERRUPT + CHECK STATUS.
013272                          ELSE                                    ;ELSE IF ERROR RECOVERY IS NOT ENABLED:
(4) 013272  000402                                                              BR      50220$
(3) 013274                                                                                      50217$:
013274                            LET UNREC :B= UNREC + #1              ;SET UNRECOVERABLE ERROR FLAG.
(6) 013274  105237  003476                                                      INCB    UNREC
013300                          ENDIF
(4) 013300                                                                                      50220$:
013300  000207                  RTS PC                                  ;RETURN.
```

```
                        ;       SUBROUTINE TO HANDLE 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.  THIS DIAGNOSTIC WILL REWIND AND RETRY THE
                        ;       COMMAND ONLY IF DENSITY CHECK IS SET, OTHERWISE THE UNIT WILL BE
                        ;       DROPPED FROM THE TEST SEQUENCE.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R4
                        ;       CALLS:          RTLE, WSSR, EXCUTE, GOWAIT, DROPU

013302                  TCC6::  LET @TSDB(R5) := #RWCPK         ;ISSUE A REWIND COMMAND,
 (4) 013302 012775 002334 002456                                        MOV     #RWCPK,@
013310 004737 011516            JSR PC,WSSR                     ;WAIT FOR SUBSYSTEM READY,
013314                          ERRDF 11,URERM,STAERM           ;REPORT UNRECOVERABLE ERROR.
 (4) 013314 104455                                                      TRAP    C$ERDF
 (5) 013316 000013                                                      .WORD   11
 (5) 013320 004656                                                      .WORD   URERM
 (5) 013322 005642                                                      .WORD   STAERM
013324 004737 013360            JSR     PC,RAMDUM               ;GO DO RAM DUMP
013330 004737 016716            JSR     PC,DROPU                ;DROP THE UNIT.
013334 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:

013336                  TCC7::  ERRDF 12,FATSM,STAERM           ;REPORT FATAL SUBSYSTEM ERROR.
013336  104455                                                          TRAP    C$ERDF
013340  000014                                                          .WORD   12
013342  004457                                                          .WORD   FATSM
013344  005642                                                          .WORD   STAERM
013346  004737  013360                JSR     PC,RAMDUM               ;GO DO RAM DUMP
013352  004737  016716                JSR     PC,DROPU                ;DROP THE UNIT.
013356  000207                        RTS PC                          ;RETURN.


013360                  RAMDUM::IFB RAMWRT NE #0 THEN
013360  105737  002214                                                  TSTB    RAMWRT
013364  001452                                                          BEQ     50221$
013366                          PRINTX  #RAMFHR
013366  012746  005310                                                  MOV     #RAMFHR,
013372  012746  000001                                                  MOV     #1,-(SP)
013376  010600                                                          MOV     SP,R0
013400  104415                                                          TRAP    C$PNTX
013402  062706  000004                                                  ADD     #4,SP
013406  012737  000010  003406        MOV     #8.,RAMSIZ      ;RAM FIELD IS 8 BYTES LONG
013414  012737  000020  003342        MOV     #20,RAMHLD      ;FIELD STARTS AT 20 OCTAL (10 HEX)
013422  004737  015164                JSR     PC,RAMER        ;READ AND PRINT THEM
013426  012737  000040  003342        MOV     #40,RAMHLD      ;FIELD STARTS AT 40 OCTAL (20 HEX)
013434  004737  015164                JSR     PC,RAMER        ;READ AND PRINT THEM
013440  012737  000060  003342        MOV     #60,RAMHLD      ;FIELD STARTS AT 60 OCTAL (30 HEX)
013446  004737  015164                JSR     PC,RAMER        ;READ AND PRINT THEM
013452  012737  000020  003406        MOV     #16.,RAMSIZ     ;RAM FIELD IS SIXTEEN BYTES LONG
013460  012737  000100  003342        MOV     #100,RAMHLD     ;FIELD STARTS AT 100 OCTAL (40 HEX)
013466  004737  015164                JSR     PC,RAMER        ;READ AND PRINT THEM
013472                          PRINTX  #RAMLIN
013472  012746  005464                                                  MOV     #RAMLIN,
013476  012746  000001                                                  MOV     #1,-(SP)
013502  010600                                                          MOV     SP,R0
013504  104415                                                          TRAP    C$PNTX
013506  062706  000004                                                  ADD     #4,SP
013512                  ENDIF
013512                                                          50221$:


                        ;       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.
```

```
3505                                    ;       CALLS:          DROPU
3506
3507  013512
 (6)  013512  005737  003436           RTLE::  IF CMDLG EQ #0 THEN             ;IF CMD IS NOT A READ OR WRITE THEN:
                                                                                        TST     CMDLG
 (9)  013516  001012                                                                    BNE     50222$
3508  013520                                    ERRDF 11,URERM,STAERM             ;REPORT UNRECOVERABLE ERROR.
 (4)  013520  104455                                                                    TRAP    C$ERDF
 (5)  013522  000013                                                                    .WORD   11
 (5)  013524  004656                                                                    .WORD   URERM
 (5)  013526  005642                                                                    .WORD   STAERM
3509  013530  004737  013360                JSR     PC,RAMDUM               ;GO DO RAM DUMP
3510  013534  004737  016716                JSR     PC,DROPU                ;DROP THE UNIT.
3511  013540                                POP R2
 (2)  013540  012602                                                                    MOV     (SP)+,R2
3512  013542  000441                        BR RTLRTN                       ;AND RETURN.
3513  013544                                ENDIF
 (4)  013544                                                                    50222$:
3514  013544                                LET RWERR :B= RWERR + #1         ;SET READ/WRITE ERROR FLAG.
 (6)  013544  105237  003475                                                            INCB    RWERR
3515  013550                                IF CMDLG EQ #2 THEN              ;IF CMD IS A WRT OR WTM:
 (6)  013550  023727  003436  000002                                                    CMP     CMDLG,#2
 (9)  013556  001020                                                                    BNE     50223$
3516  013560                                  IF RETRYC EQ #WRECL THEN       ;IF RETRY COUNT HAS REACHED LIMIT:
 (6)  013560  023727  003466  000020                                                    CMP     RETRYC,#
 (9)  013566  001013                                                                    BNE     50224$
3517  013570                                    LET UNREC :B= UNREC + #1      ;SET UNRECOVERABLE FLAG
 (6)  013570  105237  003476                                                            INCB    UNREC
3518  013574                                    ERRDF 14,RLEXM,STAERM         ;REPORT RETRY LIMIT EXCEEDED.
 (4)  013574  104455                                                                    TRAP    C$ERDF
 (5)  013576  000016                                                                    .WORD   14
 (5)  013600  004374                                                                    .WORD   RLEXM
 (5)  013602  005642                                                                    .WORD   STAERM
3519  013604  004737  013360                  JSR   PC,RAMDUM               ;GO DO RAM DUMP
3520  013610  004737  016716                  JSR   PC,DROPU                ;DROP THE UNIT.
3521  013614                                  POP   R2
 (2)  013614  012602                                                                    MOV     (SP)+,R2
3522  013616                                ENDIF
 (4)  013616                                                                    50224$:
3523  013616                              ELSE                              ;ELSE - CMD IS A READ:
 (4)  013616  000413                                                                    BR      50225$
 (3)  013620                                                                    50223$:
3524  013620                                  IF RETRYC EQ #RRECL THEN      ;IF RETRY COUNT HAS REACHED LIMIT:
 (6)  013620  023727  003466  000020                                                    CMP     RETRYC,#
 (9)  013626  001007                                                                    BNE     50226$
3525  013630                                    LET UNREC :B= UNREC + #1      ;SET UNRECOVERABLE FLAG
 (6)  013630  105237  003476                                                            INCB    UNREC
3526  013634                                    ERRHRD 14,RLEXM,STAERM        ;REPORT RECOVERABLE ERROR.
 (4)  013634  104456                                                                    TRAP    C$ERHRD
 (5)  013636  000016                                                                    .WORD   14
 (5)  013640  004374                                                                    .WORD   RLEXM
 (5)  013642  005642                                                                    .WORD   STAERM
3527  013644                                    POP R2
 (2)  013644  012602                                                                    MOV     (SP)+,R2
3528  013646                                  ENDIF
 (4)  013646                                                                    50226$:
3529  013646                              ENDIF
```

```
                                                                50225$:
   (4)  013646
 3530   013646  000207          RTLRTN: RTS PC                 ;RETURN
```

```
                                        ;       SUBR TO REWRITE A BAD, BUT RECOVERABLE WRITTEN RECORD.
                                        ;       REWRITE RECORD ON SAME SPOT: REPEAT 4 TIMES.
                                        ;       IF ALL 4 REPEATS GOOD, RECORD IS RECOVERED
                                        ;       AND A RECOVERABLE WRITE ERROR IS LOGGED.
                                        ;       IF ANY OF 4 REPEATS BAD, ERASE BAD RECORD, LOG SUSPECTED
                                        ;       BAD SPOT, RETRY AGAIN. RETRY 4 TIMES, UP TO 4 REPEATS EACH.
                                        ;       IF RECORD NOT GOOD AFTER 4 RETRIES, ERASE IT, EXIT WITH
                                        ;       ERROR FLAG WRTYER SET, PRINTING RETRY FAILED.
                                        ;       THIS ALL SCHEME IS REENTERED 20 TIMES MAX, IE 20 BAD
                                        ;       SPOTS MAX ARE ALLOWED.
                                        ;
                                        ;       INPUTS:
                                        ;       OUTPUTS:
                                        ;       REGISTERS:      R3,R4
                                        ;       CALLS:          BORERS, REWRT

013650                                  WRTY:: IF DEVTBL(R5) NE #NINUSE THEN            ;IF DRIVE NOT DROPPED
(6)  013650  026527  002536  177774                                                             CMP     DEVTBL(R
(9)  013656  001540                                                                            BEQ     50227$
013660                                          BEGIN RETRY
013660                                            REPEAT
(3)  013660                                                                                             50231$:
013660                                              BEGIN REPEAT
013660                                                REPEAT
(3)  013660                                                                                             50233$:
013660  004737  014374                                JSR PC,BORERS                   ;BACKSPACE/ERASE ONE RECORD
013664                                                LET WRTYER :B= #0               ;CLEAR WRITE RETRY ERROR
(4)  013664  105037  003472                                                                    CLRB    WRTYER
013670  004737  014550                                JSR PC,REWRT                    ;REWRITE RECORD ON SAME SPOT
013674                                                IF DEVTBL(R5) EQ #NINUSE THEN
(6)  013674  026527  002536  177774                                                             CMP     DEVTBL(R
(9)  013702  001004                                                                            BNE     50234$
013704                                                LET RPTCNT :B= #3
(4)  013704  112737  000003  003470                                                            MOVB    #3,RPTCN
013712                                                ELSE
(4)  013712  000400                                                                            BR      50235$
(3)  013714                                                                                             50234$:
013714                                                ENDIF
(4)  013714                                                                                             50235$:
013714                                                LET RPTCNT :B= RPTCNT + #1      ;COUNT REPEATS
(6)  013714  105237  003470                                                                    INCB    RPTCNT
013720                                              UNTILB RPTCNT EQ #4 ORB WRTYER NE #0      ;LIMIT: 4 REPEATS OR REC
(4)  013720  123727  003470  000004                                                            CMPB    RPTCNT,#
(6)  013726  001403                                                                            BEQ     50236$
(4)  013730  105737  003472                                                                    TSTB    WRTYER
(7)  013734  001751                                                                            BEQ     50233$
(4)  013736                                                                                             50236$:
013736                                            END REPEAT                        ;
(3)  013736                                                                                             50232$:
013736                                            LET RETRYC := RETRYC + #1        ;COUNT RETRIES
(6)  013736  005237  003466                                                                    INC     RETRYC
013742                                              IF DEVTBL(R5) EQ #NINUSE THEN
(6)  013742  026527  002536  177774                                                             CMP     DEVTBL(R
(9)  013750  001002                                                                            BNE     50237$
013752  000502                                      BR      3$
013754                                              ELSE
```

```
  (4)  013754  000400                                                          BR      50240$
  (3)  013756                                                                50237$:
 3567  013756                    ENDIF
  (4)  013756                                                                50240$:
 3568  013756  IFB WRTYER EQ #0 THEN                ;
  (6)  013756  105737  003472                                                 TSTB    WRTYER
  (9)  013762  001001                                                         BNE     50241$
 3569  013764    LEAVE RETRY                       ;EXIT RETRY LOOP IF RECOVERED
  (4)  013764  000457                                                         BR      50230$
 3570  013766  ELSE                               ;
  (3)  013766                                                                50241$:
 3571  013766    IFB ERCVER NE #0 THEN             ;
  (6)  013766  105737  002207                                                 TSTB    ERCVER
  (9)  013772  001415                                                         BEQ     50243$
 3572  013774      PRINTB #BTMSG1,RETRYC,<B,RPTCNT>      ;PRINT SUSPECTED BAD SPO
  (9)  013774  005046                                                         CLR     -(SP)
  (9)  013776  153716  003470                                                 BISB    RPTCNT,(
  (8)  014002  013746  003466                                                 MOV     RETRYC,-
  (7)  014006  012746  014170                                                 MOV     #BTMSG1,
  (6)  014012  012746  000003                                                 MOV     #3,-(SP)
  (3)  014016  010600                                                         MOV     SP,R0
  (4)  014020  104414                                                         TRAP    C$PNTB
  (4)  014022  062706  000010                                                 ADD     #10,SP
 3573  014026    ENDIF                             ;
  (4)  014026                                                                50243$:
 3574  014026    IF RETRYC EQ #1 THEN      ;ON FIRST RETRY, LOGG BAD SPOT
  (6)  014026  023727  003466  000001                                         CMP     RETRYC,#
  (9)  014034  001021                                                         BNE     50244$
 3575  014036      LET BTPT := BTADDR(R5)          ;BTPT IS BOTH THE BAD SPOT COUNT
  (4)  014036  016537  002550  003520                                         MOV     BTADDR(R
 3576  014044      LET R4 := @BTPT + #2            ;AND THE LOGGING INDEX
  (4)  014044  017704  167450                                                 MOV     @BTPT,R4
  (6)  014050  062704  000002                                                 ADD     #2,R4
 3577  014054      LET @BTPT := R4                 ;
  (4)  014054  010477  167440                                                 MOV     R4,@BTPT
 3578  014060      IF R4 LOS #40. THEN             ;
  (6)  014060  020427  000050                                                 CMP     R4,#40.
  (9)  014064  101005                                                         BHI     50245$
 3579  014066        LET R3 := BTPT                ;STORE FIRST 20 BAD SPOTS
  (4)  014066  013703  003520                                                 MOV     BTPT,R3
 3580  014072        LET R4 := R4 + R3             ;
  (6)  014072  060304                                                         ADD     R3,R4
 3581  014074        LET (R4) := RECCNT(R5)        ;
  (4)  014074  016514  003330                                                 MOV     RECCNT(R
 3582  014100      ENDIF                                                      50245$:
  (4)  014100
 3583  014100    ENDIF                             ;
  (4)  014100                                                                50244$:
 3584  014100    LET ERSFLG :B= ERSFLG + #1        ;ERASE FLAG TO ERASE BAD RECORD
  (6)  014100  105237  003534                                                 INCB    ERSFLG
 3585  014104    LET RWERR :B= #0                  ;CANCELL "LOG" ERROR FLAG ON FAI
  (4)  014104  105037  003475                                                 CLRB    RWERR
 3586  014110    LET RPTCNT :B= #0                 ;CLEAR REPEAT COUNT FOR NEXT RET
  (4)  014110  105037  003470                                                 CLRB    RPTCNT
 3587  014114  ENDIF                              ;
  (4)  014114                                                                50242$:
```

```
3588  014114                                  UNTIL RETRYC EQ #4              ;LIMIT: 4 RETRIES
 (3)  014114  023727  003466  000004                                                CMP     RETRYC,#
 (6)  014122  001256                                                             BNE     50231$
3589  014124                                  END RETRY                       ;
 (3)  014124                                                                  50230$:
3590  014124                                  IFB WRTYER NE #0 THEN           ;
 (6)  014124  105737  003472                                                     TSTB    WRTYER
 (9)  014130  001413                                                             BEQ     50246$
3591  014132                                    IFB ERCVER NE #0 THEN         ;
 (6)  014132  105737  002207                                                     TSTB    ERCVER
 (9)  014136  001410                                                             BEQ     50247$
3592  014140                                      PRINTB #BTMSG3              ;PRINT RETRY FAILED
 (7)  014140  012746  014325                                                     MOV     #BTMSG3,
 (6)  014144  012746  000001                                                     MOV     #1,-(SP)
 (3)  014150  010600                                                             MOV     SP,R0
 (4)  014152  104414                                                             TRAP    C$PNTB
 (4)  014154  062706  000004                                                     ADD     #4,SP
3593  014160                                    ENDIF
 (4)  014160                                                                  50247$:
3594  014160                                  ENDIF
 (4)  014160                                                                  50246$:
3595  014160                                ENDIF
 (4)  014160                                                                  50227$:
3596  014160  000207                     3$:     RTS PC
3597
3598
3599
3600
3601
3602
3603  014162  000000                     WTYCMD: .WORD   0                ;STORAGE FOR WRITE CMD WHILE RETRYING
3604  014164  000000                     WTYWRD: .WORD   0                ;STORAGE FOR WRITE CMD WORD WHILE RETRYING
3605  014166  000000                     WTYBRF: .WORD   0                ;STORAGE FOR WRITE BPCR WHILE RETRYING
3606
3607
3608  014170  040445  052523  050123    BTMSG1: .ASCIZ  /%ASUSPECT BAD SPOT AFTER %D1%A RETRY, %D1%A REPEAT%N/
      014176  041505  020124  040502
      014204  020104  050123  052117
      014212  040440  052106  051105
      014220  022440  030504  040445
      014226  051040  052105  054522
      014234  020054  042045  022461
      014242  020101  042522  042520
      014250  052101  047045     000
3609  014255     045  022516  041101    BTMSG2: .ASCIZ  /%N%ABAD TAPE OVERFLOW: CHANGE TAPE!%N%N/
      014262  042101  052040  050101
      014270  020105  053117  051105
      014276  046106  053517  020072
      014304  044103  047101  042507
      014312  052040  050101  020505
      014320  047045  047045     000
3610  014325     045  051101  052105    BTMSG3: .ASCIZ  /%ARETRY FAILED ON BAD SPOT...ERASED!%N/
      014332  054522  043040  044501
      014340  042514  020104  047117
      014346  041040  042101  051440
      014354  047520  027124  027056
```

```
        014362  051105  051501  042105
        014370  022441  000116
  3611                                  .EVEN
```

```
3613                            ;       SUBR TO BACSPACE ONE RECORD
3614                            ;       IF THE ERASE FLAG IS SET, THEN ERASE THAT RECORD
3615                            ;       INPUTS:         ERSFLG  1 = DO ERASE
3616                            ;       OUTPUTS:
3617                            ;       REGISTERS:
3618                            ;       CALLS:          EXCUTE, GOWAIT, CKHAE
3619
3620  014374                    BORERS:: LET PCMDWD := CMDWRD   ;SET COMMAND  TO SPACE REV
 (4)  014374  013737  003430  003434                                          MOV     CMDWRD,P
3621  014402                           LET CMDWRD := #SRR      ;
 (4)  014402  012737  104410  003430                                          MOV     #SRR,CMD
3622  014410                           LET CMDPKT := CMDWRD CLR.BY #BRF.C      ;
 (4)  014410  013737  003430  002314                                          MOV     CMDWRD,C
 (6)  014416  042737  004000  002314                                          BIC     #BRF.C,C
3623  014424                           LET CMDSAV := CMDPKT    ;
 (4)  014424  013737  002314  003432                                          MOV     CMDPKT,C
3624  014432                           LET CMDPKT+CP.ADL := #1 ;
 (4)  014432  012737  000001  002316                                          MOV     #1,CMDPK
3625  014440                           LET CMDLG := #0         ;
 (4)  014440  005037  003436                                                  CLR     CMDLG
3626  014444  004737  007614          JSR PC,CMDAC            ;
3627  014450  004737  010576          JSR PC,EXCUTE           ;
3628  014454  004737  011166          JSR PC,GOWAIT           ;
3629  014460  004737  017222          JSR PC,CKHAE            ;
3630  014464                           IFB ERSFLG NE #0 THEN   ;WHEN ERASE FLAG IS SET, DO ERASE
 (6)  014464  105737  003534                                                  TSTB    ERSFLG
 (9)  014470  001426                                                          BEQ     50250$
3631  014472                             LET PCMDWD := CMDWRD  ;
 (4)  014472  013737  003430  003434                                          MOV     CMDWRD,P
3632  014500                             LET CMDWRD := #ERS    ;
 (4)  014500  012737  100411  003430                                          MOV     #ERS,CMD
3633  014506                             LET CMDPKT := CMDWRD  ;
 (4)  014506  013737  003430  002314                                          MOV     CMDWRD,C
3634  014514                             LET CMDSAV := CMDPKT  ;
 (4)  014514  013737  002314  003432                                          MOV     CMDPKT,C
3635  014522  004737  007614            JSR PC,CMDAC          ;
3636  014526  004737  010576            JSR PC,EXCUTE
3637  014532  004737  011166            JSR PC,GOWAIT
3638  014536  004737  017222            JSR PC,CKHAE
3639  014542                             LET ERSFLG :B= #0
 (4)  014542  105037  003534                                                  CLRB    ERSFLG
3640  014546                           ENDIF
 (4)  014546                                                          50250$:
3641  014546  000207                   RTS PC
3642                            ;       SUBR TO REWRITE A BADLY WRITTEN RECORD
3643
3644  014550                    REWRT:  IF DEVTBL(R5) NE #NINUSE THEN   ;IF DRIVE NOT DROPPED
 (6)  014550  026527  002536  177774                                          CMP     DEVTBL(R
 (9)  014556  001441                                                          BEQ     50251$
3645  014560                           LET PCMDWD := CMDWRD    ;RESTORE WRITE COMMAND PACKET
 (4)  014560  013737  003430  003434                                          MOV     CMDWRD,P
3646  014566                           LET CMDWRD := WTYWRD    ;
 (4)  014566  013737  014164  003430                                          MOV     WTYWRD,C
3647  014574                           LET CMDPKT := WTYCMD    ;
 (4)  014574  013737  014162  002314                                          MOV     WTYCMD,C
3648  014602                           LET CMDSAV := CMDPKT    ;
```

```
  (4)  014602  013737  002314  003432                                                    MOV     CMDPKT,C
3649   014610
  (4)  014610  013737  003416  002316                                                    MOV     DATAWT,C
3650   014616
  (4)  014616  013737  014166  002322                                                    MOV     WTYBRF,C
3651   014624
  (4)  014624  012737  000002  003436                                                    MOV     #2,CMDLG
3652   014632  004737  007614
3653   014636  004737  010576
3654   014642
  (6)  014642  026527  002536  177774                                                    CMP     DEVTBL(R
  (9)  014650  001404                                                                    BEQ     50252$
3655   014652  004737  011166
3656   014656  004737  017222
3657   014662
  (4)  014662
3658   014662
  (4)  014662
3659   014662  000207

                        LET CMDPKT+CP.ADL := DATAWT      ;
                        LET CMDPKT+CP.CNT := WTYBRF      ;
                        LET CMDLG := #2                  ;
                        JSR PC,CMDAC
                        JSR PC,EXCUTE                    ;RE-WRITE RECORD
                          IF DEVTBL(R5) NE #NINUSE THEN
                        JSR PC,GOWAIT                    ;
                        JSR PC,CKHAE                     ;
                          ENDIF
                                                                          50252$:
                        ENDIF
                                                                          50251$:
                        RTS PC
```

```
3661                                    ;       SUBROUTINE TO LOG BYTES READ/WRITTEN.
3662                                    ;       ALSO UPDATES READ/WRITE ERROR COUNTERS.
3663                                    ;       INPUTS:
3664                                    ;       OUTPUTS:
3665                                    ;       REGISTERS:      R2, R3, R4.
3666                                    ;       CALLS:
3667
3668  014664                            LOG::   IFB ERLOG EQ #0 THEN            ;IF DATA AND ERRORS HAVE NOT BEEN LOGGED
 (6)  014664  105737  003474                                                            TSTB    ERLOG
 (9)  014670  001126                                                                    BNE     50253$
3669  014672                                    LET ERLOG :B= ERLOG + #1         ;SET LOG DONE FLAG.
 (6)  014672  105237  003474                                                            INCB    ERLOG
3670  014676                                    LET R4 := CMDLG                  ;GET CURRENT CMD LOGGING CODE.
 (4)  014676  013704  003436                                                            MOV     CMDLG,R4
3671  014702                                    IF R4 NE #0 THEN                 ;IF THERE IS A CODE THEN:
 (6)  014702  005704                                                                    TST     R4
 (9)  014704  001520                                                                    BEQ     50254$
3672  014706                                      LET R4 := R4 - #2              ;ADJUST THE CODE FOR TABLE INDEX.
 (6)  014706  162704  000002                                                            SUB     #2,R4
3673  014712                                      LET R2 := R5 + BINC(R4) + #CNTBGN  ;R2 = ADR OF BYTE COUNT LSW.
 (4)  014712  010502                                                                    MOV     R5,R2
 (6)  014714  066402  015150                                                            ADD     BINC(R4)
 (7)  014720  062702  002560                                                            ADD     #CNTBGN,
3674  014724                                      LET (R2) := (R2) + BRFCNT      ;ADD BRF TO LSW.
 (6)  014724  063712  003426                                                            ADD     BRFCNT,(
3675  014730                                      IF MSGPKT+MS.RFC LOS BRFCNT THEN  ;IF THE RFC IS LOWER OR THE SAME AS
 (6)  014730  023737  002344  003426                                                    CMP     MSGPKT+M
 (9)  014736  101002                                                                    BHI     50255$
3676  014740                                        LET (R2) := (R2) - MSGPKT+MS.RFC  ;SUBTRACT RFC FROM EXPECTED BRF.
 (6)  014740  163712  002344                                                            SUB     MSGPKT+M
3677  014744                                      ENDIF
 (4)  014744                                                                  50255$:
3678  014744                                      LET R3 := R2 + #10             ;R3 = ADR OF 2ND WORD.
 (4)  014744  010203                                                                    MOV     R2,R3
 (6)  014746  062703  000010                                                            ADD     #10,R3
3679  014752                                      WHILE (R2) GT #999. DO
 (4)  014752                                                                  50256$:
 (6)  014752  021227  001747                                                            CMP     (R2),#99
 (9)  014756  003404                                                                    BLE     50257$
3680  014760                                        LET (R2) := (R2) - #1000.    ;UPDATE BYTE COUNT
 (6)  014760  162712  001750                                                            SUB     #1000.,(
3681  014764                                        LET (R3) := (R3) + #1        ;2ND WORD.
 (6)  014764  005213                                                                    INC     (R3)
3682  014766                                      ENDDO
 (4)  014766  000771                                                                    BR      50256$
 (3)  014770                                                                  50257$:
3683  014770                                      LET R2 := R3 + #10             ;R2 = ADR OF 3RD WORD.
 (4)  014770  010302                                                                    MOV     R3,R2
 (6)  014772  062702  000010                                                            ADD     #10,R2
3684  014776                                      WHILE (R3) GT #999. DO
 (4)  014776                                                                  50260$:
 (6)  014776  021327  001747                                                            CMP     (R3),#99
 (9)  015002  003404                                                                    BLE     50261$
3685  015004                                        LET (R3) := (R3) - #1000.    ;UPDATE BYTE COUNT
 (6)  015004  162713  001750                                                            SUB     #1000.,(
3686  015010                                        LET (R2) := (R2) + #1        ;3RD WORD.
```

```
  (6)  015010  005212                                                  INC     (R2)
3687   015012
                    ENDDO
  (4)  015012  000771                                                  BR      50260$
  (3)  015014                                                    50261$:
3688   015014
                    LET R3 := R2 + #10          ;R3 = ADR OF 4TH WORD.
  (4)  015014  010203                                                  MOV     R2,R3
  (6)  015016  062703  000010                                          ADD     #10,R3
3689   015022
                    WHILE (R2) GT #999. DO
  (4)  015022                                                    50262$:
  (6)  015022  021227  001747                                          CMP     (R2),#99
  (9)  015026  003404                                                  BLE     50263$
3690   015030
                      LET (R2) := (R2) - #1000.  ;UPDATE BYTE COUNT
  (6)  015030  162712  001750                                          SUB     #1000.,(
3691   015034
                      LET (R3) := (R3) + #1      ;4TH WORD.
  (6)  015034  005213                                                  INC     (R3)
3692   015036
                    ENDDO
  (4)  015036  000771                                                  BR      50262$
  (3)  015040                                                    50263$:
3693   015040
                    IFB RWERR NE #0 THEN        ;IF R/W ERROR, UPDATE ERROR COUNT.
  (6)  015040  105737  003475                                          TSTB    RWERR
  (9)  015044  001440                                                  BEQ     50264$
3694   015046
                      LET R2 := R5 + EINC(R4) + #WRREC  ;R2 = ADR OF COUNTER.
  (4)  015046  010502                                                  MOV     R5,R2
  (6)  015050  066402  015156                                          ADD     EINC(R4)
  (7)  015054  062702  002720                                          ADD     #WRREC,R
3695   015060
                      IFB UNREC NE #0 THEN      ;IS THE ERROR UNRECOVERABLE?
  (6)  015060  105737  003476                                          TSTB    UNREC
  (9)  015064  001404                                                  BEQ     50265$
3696   015066
                        LET R2 := R2 + #10      ;YES, POINT TO NEXT COUNTER.
  (6)  015066  062702  000010                                          ADD     #10,R2
3697   015072
                        LET (R2) := (R2) + #1   ;UPDATE THE ERROR COUNTER
  (6)  015072  005212                                                  INC     (R2)
3698   015074
                      ELSE                      ;ELSE - IF ERROR IS RECOVERABLE:
  (4)  015074  000424                                                  BR      50266$
  (3)  015076                                                    50265$:
3699   015076
                        LET (R2) := (R2) + #1   ;UPDATE THE ERROR COUNTER
  (6)  015076  005212                                                  INC     (R2)
3700   015100
                        IFB IREC EQ #0 THEN     ;IF ERROR RECOVERY IS ENABLED:
  (6)  015100  105737  002210                                          TSTB    IREC
  (9)  015104  001020                                                  BNE     50267$
3701   015106
                          IFB DROPED EQ #0 ANDB ERCVER NE #0 THEN ;IF UNIT HAS NOT BEEN DR
  (6)  015106  105737  003530                                          TSTB    DROPED
  (9)  015112  001015                                                  BNE     50270$
  (6)  015114  105737  002207                                          TSTB    ERCVER
  (9)  015120  001412                                                  BEQ     50270$
3702   015122
                            PRINTB #NURTY1,RETRYC   ;PRINT # OF RETRIES TO RECOVER
  (8)  015122  013746  003466                                          MOV     RETRYC,-
  (7)  015126  012746  005157                                          MOV     #NURTY1,
  (6)  015132  012746  000002                                          MOV     #2,-(SP)
  (3)  015136  010600                                                  MOV     SP,R0
  (4)  015140  104414                                                  TRAP    C$PNTB
  (4)  015142  062706  000006                                          ADD     #6,SP
3703   015146
                          ENDIF                 ;PROVIDED PRINT HAS BEEN ENABLED
  (4)  015146                                                    50270$:
3704   015146
                        ENDIF
  (4)  015146                                                    50267$:
```

```
3705  015146                                    ENDIF
 (4)  015146                                                                    50266$:
3706  015146                                   ENDIF
 (4)  015146                                                                    50264$:
3707  015146                                  ENDIF
 (4)  015146                                                                    50254$:
3708  015146                                  ENDIF
 (4)  015146                                                                    50253$:
3709  015146  000207                         RTS PC
3710                                  ;       INDEXES TO BYTE COUNTERS.
3711  015150  000000                 BINC:   0                                ;WRITE.
3712  015152  000040                         40                               ;READ REV.
3713  015154  000100                         100                              ;READ FWD.
3714                                  ;       INDEXES TO READ/WRITE ERROR COUNTERS.
3715  015156  000000                 EINC:   0                                ;WRITE.
3716  015160  000020                         20                               ;READ REV.
3717  015162  000040                         40                               ;READ FWD.
3718
3719
3720
```

```
                        .SBTTL RAMER - READ AND DISPLAY SELECTED RAM
                        ;+
                        ;ROUTINE TO READ THE SELECTED RAM LOCATIONS
                        ;-
015164 010546           RAMER:: MOV     R5,-(SP)
015166 010446                   MOV     R4,-(SP)
015170 010346                   MOV     R3,-(SP)
015172 010246                   MOV     R2,-(SP)
015174 010146                   MOV     R1,-(SP)
015176 012701 003346            MOV     #RAMDATA,R1     ;ADDRESS TO SAVE THE RAM DATA
015202 013702 003342            MOV     RAMHLD,R2       ;BYTE ADDRESS OF THE FIRST RAM DATA
015206 013703 003406            MOV     RAMSIZ,R3       ;SET THE SIZE OF THE READ UP
015212 016504 002456            MOV     TSDB(R5),R4     ;MOV THE TSDB ADDRESS INTO R4
015216 005204                   INC     R4              ;ADD 1 TO IT
015220 000240           10$:    NOP
015222 004737 011516            JSR     PC,WSSR         ;WAIT FOR THE SSR TO SET
015226 110214                   MOVB    R2,(R4)         ;SELECT NEXT RAM ADDRESS
015230 004737 011516            JSR     PC,WSSR         ;WAIT FOR SSR TO SET
015234 117521 002456            MOVB    @TSBA(R5),(R1)+ ;READ THE RAM DATA
015240 062702 000001    20$:    ADD     #1,R2           ;ADDRESS OF THE NEXT RAM LOCATION
015244 077313                   SOB     R3,10$          ;NUMBER OF LOCATIONS COUNTER
015246 013704 003406            MOV     RAMSIZ,R4       ;GET THE RAM SIZE
015252 013702 003342            MOV     RAMHLD,R2       ;GET THE STARTING RAM ADDRESS
015256 060204                   ADD     R2,R4           ;CALCULATE THE END ADDRESS
015260 162704 000001            SUB     #1,R4           ;CORRECT VALUE OF PRINTOUT
015264                          PRINTX  #RAMIOP,R2,R4   ;RAM ADDRESS = 10 - 17, ETC.
  (9) 015264 010446                                                     MOV     R4,-(SP)
  (8) 015266 010246                                                     MOV     R2,-(SP)
  (7) 015270 012746 005401                                              MOV     #RAMIOP,
  (6) 015274 012746 000003                                              MOV     #3,-(SP)
  (3) 015300 010600                                                     MOV     SP,R0
  (4) 015302 104415                                                     TRAP    C$PNTX
  (4) 015304 062706 000010                                              ADD     #10,SP
015310 012701 003346            MOV     #RAMDATA,R1     ;ADDRESS OF WHERE RAM DATA IS
015314 013703 003406            MOV     RAMSIZ,R3       ;THE SIZE OF THE RAM FIELD READ
015320 005004           30$:    CLR     R4              ;NO EXTRA DATA LEFT OVER
015322 112104                   MOVB    (R1)+,R4        ;PICK UP BYTE OF RAM DATA
015324 042704 177400            BIC     #177400,R4      ;GET RID OF SIGN EXTEND
015330                          PRINTX  #RAMPD,R4       ;"010 211 111 222 377 000 123 134 ETC."
  (8) 015330 010446                                                     MOV     R4,-(SP)
  (7) 015332 012746 005452                                              MOV     #RAMPD,-
  (6) 015336 012746 000002                                              MOV     #2,-(SP)
  (3) 015342 010600                                                     MOV     SP,R0
  (4) 015344 104415                                                     TRAP    C$PNTX
  (4) 015346 062706 000006                                              ADD     #6,SP
015352 077316                   SOB     R3,30$          ;LOOP UNTIL ALL PRINTED
015354 012601                   MOV     (SP)+,R1
015356 012602                   MOV     (SP)+,R2
015360 012603                   MOV     (SP)+,R3
015362 012604                   MOV     (SP)+,R4
015364 012605                   MOV     (SP)+,R5
015366 000207           50$:    RTS     PC              ;RETURN
                        ;       IF A WRITE/VERIFY COMMAND IS ISSUED, CONTROL IS THEN
                        ;       TRANSFERRED TO THIS SUBROUTINE TO READ REVERSE, CHECK DATA,
                        ;       READ FORWARD, CHECK DATA, THEN CONTINUE TO NEXT COMMAND.
                        ;       INPUTS:
```

```
3765                                    ;       OUTPUTS:
3766                                    ;       REGISTERS:
3767                                    ;       CALLS:          VFEXC.
3768
3769  015370                            VFYDAT::  LET CMPDAT := #0            ;BTL
 (4)  015370  005037  003410                                                      CLR     CMPDAT
3770  015374                                    LET STTIM  := #0              ;BTL
 (4)  015374  005037  003414                                                      CLR     STTIM
3771  015400                                    IFB VFYFLG NE #0 THEN         ;IF DATA IS TO BE VERIFIED:
 (6)  015400  105737  003524                                                      TSTB    VFYFLG
 (9)  015404  001436                                                              BEQ     50271$
3772  015406                                    LET PCMDWD := CMDWRD          ;SAVE THE PREVIOUS COMMAND WORD.
 (4)  015406  013737  003430  003434                                             MOV     CMDWRD,P
3773  015414                                    LET CMDWRD := #RDR            ;COMMAND IS READ REV.
 (4)  015414  012737  104401  003430                                             MOV     #RDR,CMD
3774  015422                                    LET CMDLG  := #4              ;SET UP CMD LOGGING INDEX.
 (4)  015422  012737  000004  003436                                             MOV     #4,CMDLG
3775  015430  004737  015504                    JSR   PC,VFEXC                ;GO READ ALL THE RECORDS REV.
3776  015434                                    IF DEVTBL(R5) NE #NINUSE THEN ;IF DRIVE HAS BEEN DROPPED EXIT
 (6)  015434  026527  002536  177774                                             CMP     DEVTBL(R
 (9)  015442  001417                                                              BEQ     50272$
3777  015444                                    LET CMPDAT := #0              ;BTL
 (4)  015444  005037  003410                                                      CLR     CMPDAT
3778  015450                                    LET STTIM  := #0              ;BTL
 (4)  015450  005037  003414                                                      CLR     STTIM
3779  015454                                    LET PCMDWD := CMDWRD          ;SAVE THE PREVIOUS COMMAND WORD.
 (4)  015454  013737  003430  003434                                             MOV     CMDWRD,P
3780  015462                                    LET CMDWRD := #RDF            ;COMMAND IS READ FWD.
 (4)  015462  012737  104001  003430                                             MOV     #RDF,CMD
3781  015470                                    LET CMDLG  := #6              ;SET UP CMD LOGGING INDEX.
 (4)  015470  012737  000006  003436                                             MOV     #6,CMDLG
3782  015476  004737  015504                    JSR   PC,VFEXC                ;GO READ ALL RECORDS FWD.
3783  015502                                    ENDIF
 (4)  015502                                                                      50272$:
3784  015502                                ENDIF
 (4)  015502                                                                      50271$:
3785  015502  000207                        RTS     PC                    ;RETURN.
```

```
3787                                    ;       SUBROUTINE TO EXECUTE THE READ AND VERIFY, FORWARD OR REVERSE.
3788                                    ;       INPUTS:
3789                                    ;       OUTPUTS:
3790                                    ;       REGISTERS:      R2
3791                                    ;       CALLS:          CMDAC, FIRSTU, VFISU, NEXTU, CKHAE.
3792
3793  015504                            VFEXC:: LET CMDPKT := CMDWRD CLR.BY #BRF.C  ;COMMAND PACKET = READ REV OR FWD.
 (4)  015504  013737  003430  002314                                                        MOV     CMDWRD,C
 (6)  015512  042737  004000  002314                                                        BIC     #BRF.C,C
3794  015520                                    IFB SWBFLG NE #0 THEN           ;IF BYTES ARE TO BE SWAPPED:
 (6)  015520  105737  003526                                                                TSTB    SWBFLG
 (9)  015524  001403                                                                        BEQ     50273$
3795  015526                                      LET CMDPKT := CMDPKT SET.BY #SWB.C  ;SET SWAB BIT IN CMD PACKET.
 (6)  015526  052737  010000  002314                                                        BIS     #SWB.C,C
3796  015534                                    ENDIF
 (4)  015534                                                                          50273$:
3797  015534                                    LET CMDSAV := CMDPKT            ;SAVE COMMAND PACKET 1ST WORD.
 (4)  015534  013737  002314  003432                                                        MOV     CMDPKT,C
3798  015542  013737  003420  002316            MOV     DATARD,CMDPKT+CP.ADL    ;SAVE BUFFER START ADDRESS.
3799  015550                                    LET NCNT := #0                  ;CLEAR NUMBER OF OPERATIONS.
 (4)  015550  005037  003422                                                                CLR     NCNT
3800  015554                                    WHILE NCNT LT NCNT1 DO          ;WHILE THERE ARE RECORDS REMAINING:
 (4)  015554                                                                          50274$:
 (6)  015554  023737  003422  003424                                                        CMP     NCNT,NCN
 (9)  015562  002101                                                                        BGE     50275$
3801  015564  004737  007614                      JSR PC,CMDAC                  ;STORE CMD ASCII IN ERROR MSG.
3802  015570  105737  003533                      TSTB  STREAM                  ;CHECK IF WE ARE STREAMING
3803  015574  001006                              BNE   1$                      ;BRANCH OVER DEVTBL CHECK. THIS ENABLES
3804                                                                  ;US TO TEST ONE DRIVE AT A TIME.
3805  015576  004737  016614                      JSR   PC,FIRSTU               ;SET UP FOR FIRST UNIT.
3806  015602                                    WHILE DEVTBL(R5) NE #END DO     ;WHILE THERE ARE DEVICES REMAINING:
 (4)  015602                                                                          50276$:
 (6)  015602  026527  002536  177777                                                        CMP     DEVTBL(R
 (9)  015610  001445                                                                        BEQ     50277$
3807  015612                          1$:           IF #MOD.CO SETIN CMDWRD THEN  ;IF CMD IS REVERSE THEN:
 (6)  015612  032737  000400  003430                                                        BIT     #MOD.CO,
 (9)  015620  001421                                                                        BEQ     50300$
3808  015622                                        IF #X0.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT
 (6)  015622  032765  000002  003510                                                        BIT     #X0.BOT,
 (9)  015630  001014                                                                        BNE     50301$
3809  015632                                          IF #X0.EOT SETIN EOTFLG(R5) THEN   ;BUT IF AT EOT
 (6)  015632  032765  000001  003510                                                        BIT     #X0.EOT,
 (9)  015640  001406                                                                        BEQ     50302$
3810  015642                                            IFB ALLEOT NE #0 THEN           ;AND ALL OTHERS AT EOT
 (6)  015642  105737  003532                                                                TSTB    ALLEOT
 (9)  015646  001402                                                                        BEQ     50303$
3811  015650  004737  015770                              JSR PC,VFISU                ;THEN READ VERIFY
3812  015654                                            ENDIF                         ;IF NOT ALL AT EOT, FREEZE
 (4)  015654                                                                          50303$:
3813  015654                                          ELSE                          ;IF NOT AT BOT AND
 (4)  015654  000402                                                                        BR      50304$
 (3)  015656                                                                          50302$:
3814  015656  004737  015770                              JSR PC,VFISU                ;NOT AT EOT, READ VFY
3815  015662                                            ENDIF
 (4)  015662                                                                          50304$:
3816  015662                                        ENDIF
```

```
  (4)  015662                                                                    50301$:
3817   015662                                ELSE                          ;ELSE IF CMD IS NOT REVERSE:
  (4)  015662  000412                                                              BR      50305$
  (3)  015664                                                                    50300$:
3818   015664                                  IF #X0.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
  (6)  015664  032765  000001  003510                                              BIT     #X0.EOT,
  (8)  015672  001404                                                              BEQ     50306$
  (6)  015674  032737  000001  003430                                              BIT     #CMD.CO,
  (9)  015702  001002                                                              BNE     50307$
  (6)  015704                                                                    50306$:
3819                                                                          ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
3820   015704  004737  015770                    JSR PC,VFISU                    ;ISSUE CMD, CHECK STATUS AND DATA.
3821   015710                                  ENDIF
  (4)  015710                                                                    50307$:
3822   015710                                  ENDIF
  (4)  015710                                                                    50305$:
3823   015710  105737  003533                  TSTB STREAM                   ;CHECK FOR TEST OF ON UNIT AT A TIME.
3824   015714  001003                          BNE 2$                        ;BRANCH, IF STREAMING TESTS.
3825   015716  004737  016662                  JSR PC,NEXTU                  ;GO FIND THE NEXT UNIT.
3826   015722                                ENDDO
  (4)  015722  000727                                                              BR      50276$
  (3)  015724                                                                    50277$:
3827   015724  004737  017222          2$:     JSR   PC,CKHAE                ;CHECK FOR HALT AFTER EACH CMD.
3828   015730                                IF DEVTBL(R5) EQ #NINUSE THEN ;IF DRIVES BEEN DROPPED EXIT
  (6)  015730  026527  002536  177774                                              CMP     DEVTBL(R
  (9)  015736  001005                                                              BNE     50310$
3829   015740                                  LET NCNT := NCNT1 - #1
  (4)  015740  013737  003424  003422                                              MOV     NCNT1,NC
  (6)  015746  005337  003422                                                      DEC     NCNT
3830   015752                                  ENDIF
  (4)  015752                                                                    50310$:
3831   015752                                  LET NCNT := NCNT + #1          ;UPDATE THE RECORD COUNT.
  (6)  015752  005237  003422                                                      INC     NCNT
3832   015756                                  LET PCMDWD := CMDWRD           ;SAVE PREVIOUS COMMAND WORD.
  (4)  015756  013737  003430  003434                                              MOV     CMDWRD,P
3833
3834   015764                                ENDDO
  (4)  015764  000673                                                              BR      50274$
  (3)  015766                                                                    50275$:
3835   015766  000207                        RTS     PC                    ;RETURN.
```

```
                        ;       SUBROUTINE TO ISSUE COMMAND, AWAIT INTERRUPT,
                        ;       CHECK STATUS, CHECK DATA.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2
                        ;       CALLS:          EXCUTE, GOWAIT, CKDATA.

015770                  VFISU::
015770                      LET R2 := DATARD + #8.      ;INIT READ BUFFER POINTER.
(4)  015770  013702  003420                                         MOV     DATARD,R
(6)  015774  062702  000010                                         ADD     #8.,R2
016000                      WHILE R2 NE DATARD DO       ;UNTIL 8 BYTES HAVE BEEN SET,
(4)  016000                                                     50311$:
(6)  016000  020237  003420                                         CMP     R2,DATAR
(9)  016004  001403                                                 BEQ     50312$
016006                      LET -(R2) := #-1            ;INIT READ BUFFER.
(4)  016006  012742  177777                                         MOV     #-1,-(R2
016012                      ENDDO
(4)  016012  000772                                                 BR      50311$
(3)  016014                                                     50312$:
016014                      JSR PC,EXCUTE               ;GO EXECUTE THE COMMAND.
016020                      IFB DROPED EQ #0 THEN       ;IF UNIT HAS NOT BEEN DROPPED THEN:
(6)  016020  105737  003530                                         TSTB    DROPED
(9)  016024  001002                                                 BNE     50313$
016026  004737  011166            JSR PC,GOWAIT       ;GO WAIT FOR DONE BIT.
016032                      ENDIF
(4)  016032                                                     50313$:
016032                      IFB DROPED EQ #0 THEN       ;IF UNIT HAS NOT BEEN DROPPED THEN:
(6)  016032  105737  003530                                         TSTB    DROPED
(9)  016036  001057                                                 BNE     50314$
016040                        IF #X0.BOT NOTSETIN EOTFLG(R5) THEN     ;WHEN NOT REVERSED INTO BOT, THEN
(6)  016040  032765  000002  003510                                 BIT     #X0.BOT,
(9)  016046  001053                                                 BNE     50315$
016050                          IF L$TEST NE #3 THEN
(6)  016050  023727  002114  000003                                 CMP     L$TEST,#
(9)  016056  001403                                                 BEQ     50316$
016060  004737  016200                JSR   PC,CKDATA     ;GO VERIFY DATA.
016064                          ELSE
(4)  016064  000444                                                 BR      50317$
(3)  016066                                                     50316$:
016066                            IF NCNT LT #3500. THEN
(6)  016066  023727  003422  006654                                 CMP     NCNT,#35
(9)  016074  002004                                                 BGE     50320$
016076                              LET DATRAT := #56.  ;1.7% DATA COMPARISONS
(4)  016076  012737  000070  003412                                 MOV     #56.,DAT
016104                            ELSE
(4)  016104  000411                                                 BR      50321$
(3)  016106                                                     50320$:
016106                              IF DATRAT NE #15. THEN
(6)  016106  023727  003412  000017                                 CMP     DATRAT,#
(9)  016114  001405                                                 BEQ     50322$
016116                                LET DATRAT := #15.  ;6.67% DATA COMPARISONS
(4)  016116  012737  000017  003412                                 MOV     #15.,DAT
016124                                LET CMPDAT := #0
(4)  016124  005037  003410                                         CLR     CMPDAT
016130                              ENDIF
```

```
  (4)  016130                                                                                    50322$:
                                        ENDIF
3865  016130                                                                                    50321$:
  (4)  016130
3866  016130  005237  003410           INC   CMPDAT              ;ONE MORE XFER BEFORE A COMPARISON
3867  016134                          IF CMPDAT EQ DATRAT THEN
  (6)  016134  023737  003410  003412                                          CMP     CMPDAT,D
  (9)  016142  001015                                                         BNE     50323$
3868  016144                            IF STTIM NE #0 THEN ;BTL
  (6)  016144  005737  003414                                                 TST     STTIM
  (9)  016150  001405                                                         BEQ     50324$
3869  016152  004737  016200             JSR PC,CKDATA
3870  016156                            LET CMPDAT := #0
  (4)  016156  005037  003410                                                 CLR     CMPDAT
3871  016162                            ELSE
  (4)  016162  000405                                                         BR      50325$
  (3)  016164                                                                50324$:
3872  016164                            LET STTIM  := #1          ;BTL
  (4)  016164  012737  000001  003414                                        MOV     #1,STTIM
3873  016172                            LET CMPDAT := #0          ;BTL
  (4)  016172  005037  003410                                                 CLR     CMPDAT
3874  016176                            ENDIF                     ;BTL
  (4)  016176                                                                50325$:
3875  016176                          ENDIF
  (4)  016176                                                                50323$:
3876  016176                        ENDIF
  (4)  016176                                                                50317$:
3877  016176                      ENDIF
  (4)  016176                                                                50315$:
3878  016176                    ENDIF
  (4)  016176                                                                50314$:
3879  016176  000207            RTS PC
3880
```

```
                        ;       SUBROUTINE TO COMPARE DATA BETWEEN READ AND WRITE BUFFERS
                        ;       AND PRINT ERROR MESSAGE ON MISCOMPARE.
                        ;       INPUTS:
                        ;       OUTPUTS:
                        ;       REGISTERS:      R2, R3, R4.
                        ;       CALLS:          GCMDA

016200                  CKDATA:: LET R3 := BRFCNT - MSGPKT+MS.RFC ;COMPUTE REC LENGTH READ
(4) 016200 013703 003426                                                MOV     BRFCNT,R
(6) 016204 163703 002344                                                SUB     MSGPKT+M
016210                          IF R3 EQ #0 THEN                ;WHEN NO DATA RECEIVED
(6) 016210 005703                                                       TST     R3
(9) 016212 001015                                                       BNE     50326$
016214                            ERRHRD 17,WTVERM,DTAERM               ;PRINT ERROR AND EXIT
(4) 016214 104456                                                       TRAP    C$ERHRD
(5) 016216 000021                                                       .WORD   17
(5) 016220 004250                                                       .WORD   WTVERM
(5) 016222 005474                                                       .WORD   DTAERM
016224                            PRINTB #DTAER4                ;COMPARE ROUTINE
(7) 016224 012746 005074                                                MOV     #DTAER4,
(6) 016230 012746 000001                                                MOV     #1,-(SP)
(3) 016234 010600                                                       MOV     SP,R0
(4) 016236 104414                                                       TRAP    C$PNTB
(4) 016240 062706 000004                                                ADD     #4,SP
016244                          ELSE
(4) 016244 000560                                                       BR      50327$
(3) 016246                                                      50326$:
016246                            IF R3 HI BRFCNT THEN          ;WHEN REC READ IS LONGER
(6) 016246 020337 003426                                                CMP     R3,BRFCN
(9) 016252 101417                                                       BLOS    50330$
016254                              ERRHRD 17,WTVERM,DTAERM             ;THAN EXPECTED, PRINT
(4) 016254 104456                                                       TRAP    C$ERHRD
(5) 016256 000021                                                       .WORD   17
(5) 016260 004250                                                       .WORD   WTVERM
(5) 016262 005474                                                       .WORD   DTAERM
016264                            PRINTB #DTAER5,CMDPKT+CP.CNT  ;AN ERROR MESSAGE
(8) 016264 013746 002322                                                MOV     CMDPKT+C
(7) 016270 012746 005115                                                MOV     #DTAER5,
(6) 016274 012746 000002                                                MOV     #2,-(SP)
(3) 016300 010600                                                       MOV     SP,R0
(4) 016302 104414                                                       TRAP    C$PNTB
(4) 016304 062706 000006                                                ADD     #6,SP
016310                  ELSE                            ;AND EXIT ROUTINE
(4) 016310 000536                                                       BR      50331$
(3) 016312                                                      50330$:
016312                            LET CKDCNT := R3 - #1         ;SAVE VERIFICATION LENGTH - 1.
(4) 016312 010337 016610                                                MOV     R3,CKDCN
(6) 016316 005337 016610                                                DEC     CKDCNT
016322 005037 016612              CLR CKDFF                     ;CLEAR # OF BYTES IN ERROR COUNTER.
016326 005002                     CLR R2                        ;INIT BYTE COUNTER
016330                            LET R3 := DATAWT              ;GET WRITE BUFFER ADDRESS.
(4) 016330 013703 003416                                                MOV     DATAWT,R
016334                            LET R4 := DATARD              ;GET READ BUFFER ADDRESS.
(4) 016334 013704 003420                                                MOV     DATARD,R
016340                            IFB T1SWB NE #0 THEN          ;WHEN RUNNING TEST1-SUB 12,
(6) 016340 105737 003531                                                TSTB    T1SWB
```

```
  (9)  016344  001401                                                                    BEQ     50332$
3904   016346  000313                                    SWAB (R3)                     ;SWAP FIRST WORD OF WRT BFR
3905   016350                                            ENDIF                         ;WHICH CONTAINS THE RECORD COUNT
  (4)  016350                                                                           50332$:
3906   016350                                            REPEAT                        ;REPEAT UNTIL ALL DATA IS COMPARED:
  (3)  016350                                                                           50333$:
3907   016350                                              IF R2 EQ CKDCNT THEN        ;IF THIS IS THE LAST BYTE THEN:
  (6)  016350  020237  016610                                                           CMP     R2,CKDCN
  (9)  016354  001011                                                                   BNE     50334$
3908   016356                                                IFB SWBFLG NE #0 THEN     ;IF BYTE SWAPPING IS ENABLED THEN:
  (6)  016356  105737  003526                                                           TSTB    SWBFLG
  (9)  016362  001406                                                                   BEQ     50335$
3909   016364                                                  IF #BIT00 NOTSETIN CKDCNT THEN      ;IF RECORD LENGTH IS ODD
  (6)  016364  032737  000001  016610                                                   BIT     #BIT00,C
  (9)  016372  001002                                                                   BNE     50336$
3910   016374  105723                                           TSTB        (R3)+      ;LAST BYTE WILL BE IN
3911   016376  105724                                           TSTB        (R4)+      ;THE UPPER BYTE.
3912   016400                                                  ENDIF
  (4)  016400                                                                           50336$:
3913   016400                                                ENDIF
  (4)  016400                                                                           50335$:
3914   016400                                            ENDIF
  (4)  016400                                                                           50334$:
3915   016400  121314                                    CMPB (R3),(R4)                ;ARE THEY EQUAL.
3916   016402  001452                                    BEQ       3$                  ;BR IF SO.
3917   016404  005737  016612                           TST CKDFF                     ;1 ST TIME THRU?
3918   016410  001010                                    BNE       2$                  ;BR IF NOT.
3919   016412  005265  003300                           INC       VFYCNT(R5)          ;INC THE VERIFY ERROR COUNTER.
3920   016416  005265  003310                           INC HRDCNT(R5)                ;INC THE HARD ERROR COUNT.
3921   016422                                            ERRHRD 17,WTVERM,DTAERM       ;REPORT WRITE/VERIFY ERROR.
  (4)  016422  104456                                                                   TRAP    C$ERHRD
  (5)  016424  000021                                                                   .WORD   17
  (5)  016426  004250                                                                   .WORD   WTVERM
  (5)  016430  005474                                                                   .WORD   DTAERM
3922   016432                                  2$:       LET CKDFF := CKDFF + #1      ;INCREMENT # OF BYTES IN ERROR.
  (6)  016432  005237  016612                                                           INC     CKDFF
3923   016436  111437  003446                           MOVB (R4),TIME1               ;SAVE WAS DATA FOR TYPOUT.
3924   016442  042737  177400  003446                   BIC       #177400,TIME1       ;CLEAR GARBAGE.
3925   016450  111337  003450                           MOVB (R3),TIME2               ;SAVE SHOULD BE DATA FOR TYPOUT.
3926   016454  042737  177400  003450                   BIC       #177400,TIME2       ;CLEAR GARBAGE.
3927   016462                                            IF CKDFF LT #11. THEN         ;IF ERROR BYTE COUNT IS LESS THAN 11:
  (6)  016462  023727  016612  000013                                                 CMP     CKDFF,#1
  (9)  016470  002017                                                                   BGE     50337$
3928   016472                                              PRINTX #DTAER2,R2,<B,TIME1>,<B,TIME2>  ;PRINT EXP + ACT DATA.
  (10) 016472  005046                                                                   CLR     -(SP)
  (10) 016474  153716  003450                                                           BISB    TIME2,(S
  (9)  016500  005046                                                                   CLR     -(SP)
  (9)  016502  153716  003446                                                           BISB    TIME1,(S
  (8)  016506  010246                                                                   MOV     R2,-(SP)
  (7)  016510  012746  004763                                                           MOV     #DTAER2,
  (6)  016514  012746  000004                                                           MOV     #4,-(SP)
  (3)  016520  010600                                                                   MOV     SP,R0
  (4)  016522  104415                                                                   TRAP    C$PNTX
  (4)  016524  062706  000012                                                           ADD     #12,SP
3929   016530                                            ENDIF
  (4)  016530                                                                           50337$:
```

```
3930  016530  105723                  3$:     TSTB (R3)+                      ;UPDATE WRITE BUFFER ADDRESS.
3931  016532  105724                          TSTB (R4)+                      ;UPDATE READ BUFFER ADDRESS.
3932  016534  105722                          TSTB (R2)+                      ;UPDATE BYTE COUNTER.
3933  016536                              UNTIL R2 GT CKDCNT          ;END OF DATA COMPARE REPEAT LOOP.
  (3) 016536  020237  016610                                                      CMP     R2,CKDCN
  (6) 016542  003702                                                              BLE     50333$
3934  016544                              LET CKDCNT := CKDCNT + #1   ;CKDCNT EQUALS RECORD LENGTH.
  (6) 016544  005237  016610                                                      INC     CKDCNT
3935  016550                              IF CKDFF NE #0 THEN         ;IF COMPARE ERROR HAS OCCURED THEN:
  (6) 016550  005737  016612                                                      TST     CKDFF
  (9) 016554  001414                                                              BEQ     50340$
3936  016556                                PRINTB #DTAER3,CKDFF,CKDCNT       ;PRINT # OF BYTES IN ERROR.
  (9) 016556  013746  016610                                                      MOV     CKDCNT,-
  (8) 016562  013746  016612                                                      MOV     CKDFF,-(
  (7) 016566  012746  005032                                                      MOV     #DTAER3,
  (6) 016572  012746  000003                                                      MOV     #3,-(SP)
  (3) 016576  010600                                                              MOV     SP,R0
  (4) 016600  104414                                                              TRAP    C$PNTB
  (4) 016602  062706  000010                                                      ADD     #10,SP
3937  016606                                ENDIF
  (4) 016606                                                                50340$:
3938  016606                              ENDIF
  (4) 016606                                                                50331$:
3939  016606                            ENDIF
  (4) 016606                                                                50327$:
3940  016606  000207                    RTS     PC                       ;OTHERWISE, RETURN.
3941
3942  016610  000000              CKDCNT: .WORD   0                        ;# OF BYTES TO BE VERIFIED -1.
3943  016612  000000              CKDFF:  .WORD   0                        ;# OF BYTES IN ERROR COUNTER.
```

```
3945                                    ;       SUBROUTINE TO FIND THE FIRST DEVICE IN THE TEST SEQUENCE.
3946                                    ;       INPUTS:
3947                                    ;       OUTPUTS:
3948                                    ;       REGISTERS:
3949                                    ;       CALLS:
3950
3951  016614                            FIRSTU::LET DROPED :B= #0               ;CLR UNIT DROPPED FLAG
 (4)  016614  105037  003530                                                            CLRB    DROPED
3952  016620                                    LET R5 := #0                    ;CLR DEVICE POINTER.
 (4)  016620  005005                                                                    CLR     R5
3953  016622                                    WHILE DEVTBL(R5) EQ #NINUSE DO  ;WHILE DEVICES ARE NOT IN USE:
 (4)  016622                                                                                    50341$:
 (6)  016622  026527  002536  177774                                                        CMP     DEVTBL(R
 (9)  016630  001003                                                                    BNE     50342$
3954  016632                                      LET R5 := R5 + #2             ;POINT TO NEXT DEVICE.
 (6)  016632  062705  000002                                                            ADD     #2,R5
3955  016636                                    ENDDO
 (4)  016636  000771                                                                    BR      50341$
 (3)  016640                                                                                    50342$:
3956  016640                                    IF DEVTBL(R5) EQ #END THEN      ;IF ALL UNITS HAVE BEEN DROPPED THEN:
 (6)  016640  026527  002536  177777                                                        CMP     DEVTBL(R
 (9)  016646  001001                                                                    BNE     50343$
3957  016650                                      DOCLN                           ;DO CLEAN CODE AND TERMINATE PASS.
 (3)  016650  104444                                                                    TRAP    C$DCLN
3958  016652                                    ENDIF
 (4)  016652                                                                                    50343$:
3959  016652                                    LET L$LUN := DEVTBL(R5)         ;SET UNIT # IN "HEADER" FOR ERROR REPORT
 (4)  016652  016537  002536  002074                                                        MOV     DEVTBL(R
3960  016660  000207                           RTS     PC                      ;RETURN WITH 1ST DEVICE IN R5.
3961
3962
3963
3964
3965
3966                                    ;       SUBROUTINE TO FIND THE NEXT UNIT IN THE TEST CYCLE.
3967                                    ;       INPUTS:
3968                                    ;       OUTPUTS:
3969                                    ;       REGISTERS:
3970                                    ;       CALLS:
3971
3972  016662                            NEXTU:: LET DROPED :B= #0               ;CLR UNIT DROPPED FLAG
 (4)  016662  105037  003530                                                            CLRB    DROPED
3973  016666  042705  177770                   BIC     #177770,R5
3974  016672                                    REPEAT                          ;REPEAT UNTIL THE NEXT DEVICE IS FOUND.
 (3)  016672                                                                                    50344$:
3975  016672                                      LET R5 := R5 + #2             ;UPDATE DEVICE TABLE POINTER.
 (6)  016672  062705  000002                                                            ADD     #2,R5
3976  016676                                    UNTIL DEVTBL(R5) NE #NINUSE
 (3)  016676  026527  002536  177774                                                        CMP     DEVTBL(R
 (6)  016704  001772                                                                    BEQ     50344$
3977  016706                                    LET L$LUN := DEVTBL(R5)         ;SET UNIT # IN "HEADER" FOR ERROR REPORT
 (4)  016706  016537  002536  002074                                                        MOV     DEVTBL(R
3978  016714  000207                           RTS     PC                      ;RETURN.
3979
3980
3981
```

```
                                        ;       SUBROUTINE TO DROP A DEVICE FROM THE TEST SEQUENCE.
                                        ;       INPUTS:
                                        ;       OUTPUTS:
                                        ;       REGISTERS:
                                        ;       CALLS:          MOVMSG, PRXST, LOG

                                        DROPU:: LET R5SAVE := R5                                        MOV     R5,R5SAV
                                                LET FTLCNT(R5) := FTLCNT(R5) + #1  ;INCREMENT THE FATAL ERROR COUNT.
                                                                                                        INC     FTLCNT(R
                                                LET R4 := MSGPKT+MS.XS3 CLR.BY #377 ;GET UDIAG ERROR CODE FROM XSTAT3.
                                                                                                        MOV     MSGPKT+M
                                                                                                        BIC     #377,R4
                                                LET R3 := MSGPKA(R5)            ;ADR OF THIS UNIT'S MSG PACKET.
                                                                                                        MOV     MSGPKA(R
                                                LET R2 := #0                    ;CLR COUNTER.
                                                                                                        CLR     R2
                                                WHILE R2 NE #MSGCNT DO          ;WHILE THERE ARE MORE LOCATIONS:
                                                                                                50345$:
                                                                                                        CMP     R2,#MSGC
                                                                                                        BEQ     50346$
                                                  LET (R3)+ := #-1              ;INIT THE MSG PACKET WITH ALL 1'S
                                                                                                        MOV     #-1,(R3)
                                                  LET R2 := R2 + #2             ;UPDATE COUNTER.
                                                                                                        ADD     #2,R2
                                                ENDDO
                                                                                                        BR      50345$
                                                                                                50346$:
                                                LET @TSDB(R5) := #GSCPK         ;INITIATE A GET STATUS COMMAND.
                                                                                                        MOV     #GSCPK,@
                                                JSR PC,WSSR                     ;WAIT A WHILE FOR SSR=1
                                                JSR PC,MOVMSG                   ;MOVE MSG PACKET TO COMMON AREA.
                                                IF R4 EQ #X3.RNY THEN           ;IF WE HAVE A CAPSTAN RUNAWAY THEN:
                                                                                                        CMP     R4,#X3.R
                                                                                                        BNE     50347$
                                                  ERRDF 16,RNYM,STAERM            ;REPORT CAPSTAN RUNAWAY WITH TACH CNT.
                                                                                                        TRAP    C$ERDF
                                                                                                        .WORD   16
                                                                                                        .WORD   RNYM
                                                                                                        .WORD   STAERM
                                                ELSE                            ;ELSE-IF NOT A RUNNAWAY:
                                                                                                        BR      50350$
                                                                                                50347$:
                                                  JSR PC,PRXST                  ;PRINT EXTENDED STATUS REGISTERS.
                                                ENDIF
                                                                                                50350$:
                                                IFB RECLOG NE #0 THEN           ;IF THE RECORD HAS BEEN LOGGED THEN:
                                                                                                        TSTB    RECLOG
                                                                                                        BEQ     50351$
                                                  LET DROPED :B= DROPED + #1    ;SET UNIT DROPPED FLAG.
                                                                                                        INCB    DROPED
                                                  JSR PC,LOG                    ;LOG DATA BYTES + RD/WR ERRORS.
                                                ENDIF
                                                                                                50351$:
                                                DORPT                           ;PRINT PERFORMANCE REPORT
                                                                                                        TRAP    C$DRPT
```

```
4011  017046                    DROPUA: IF PASCNT(R5) NE #0 THEN                                TST     PASCNT(R
 (6)  017046  005765  003260                                                                    BEQ     50352$
 (9)  017052  001402
4012  017054                              LET PASCNT(R5) := PASCNT(R5) - #1                     DEC     PASCNT(R
 (6)  017054  005365  003260
4013  017060                            ENDIF
 (4)  017060                                                                                  50352$:
4014  017060                            LET DROPN := DEVTBL(R5)          ;SAVE # OF UNIT TO BE DROPPED.
 (4)  017060  016537  002536  017136                                                          MOV     DEVTBL(R
4015  017066                            LET R0 := R5 SHIFT -1            ;R0=LOGICAL DEVICE NUMBER
 (4)  017066  010500                                                                          MOV     R5,R0
 (7)  017070  006200                                                                          ASR     R0
4016  017072                            DODU R0                  ;DROP THE UNIT: EXEC BGNDU-ENDDU CODE IF IDU = 0
 (3)  017072  104451                                                                          TRAP    C$DODU
4017  017074                            IF DEVTBL(R5) NE #NINUSE THEN   ;IF UNIT NOT DROPPED
 (6)  017074  026527  002536  177774                                                          CMP     DEVTBL(R
 (9)  017102  001410                                                                          BEQ     50353$
4018  017104                              IFB IREC EQ #0 THEN             ;IF RECOVERY IS ENABLED THEN:
 (6)  017104  105737  002210                                                                  TSTB    IREC
 (9)  017110  001005                                                                          BNE     50354$
4019  017112  000240                          NOP
4020  017114  000240                          NOP
4021  017116  000240                          NOP
4022  017120                                  LET STAFLG :B= STAFLG + #1      ;SET START FLAG TO ENABLE REWIND,
 (6)  017120  105237  003536                                                                  INCB    STAFLG
4023  017124                              ENDIF
 (4)  017124                                                                                50354$:
4024  017124                            ENDIF
 (4)  017124                                                                                50353$:
4025  017124
 (6)  017124  105237  003530  DRORTN: LET DROPED :B= DROPED + #1      ;SET UNIT DROPPED FLAG.
                                                                                             INCB    DROPED
4026  017130                            LET R5 := R5SAVE
 (4)  017130  013705  003462                                                                 MOV     R5SAVE,R
4027  017134  000207                    RTS     PC                    ;RETURN.
4028
4029  017136  000000           DROPN:   .WORD   0                     ;# OF UNIT TO BE DROPPED
```

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

 017140                                 PRXST:: PRINTX #GETSTM
 017140  012746  005243                                                  MOV     #GE1STM,
 017144  012746  000001                                                  MOV     #1,-(SP)
 017150  010600                                                          MOV     SP,R0
 017152  104415                                                          TRAP    C$PNTX
 017154  062706  000004                                                  ADD     #4,SP
 017160                                         PRINTX  #STAER5,MSGPKT+MS.XS0,MSGPKT+MS.XS1,MSGPKT+MS.XS2,MSGPKT+MS.XS3
 017160  013746  002354                                                  MOV     MSGPKT+M
 017164  013746  002352                                                  MOV     MSGPKT+M
 017170  013746  002350                                                  MOV     MSGPKT+M
 017174  013746  002346                                                  MOV     MSGPKT+M
 017200  012746  006467                                                  MOV     #STAER5,
 017204  012746  000005                                                  MOV     #5,-(SP)
 017210  010600                                                          MOV     SP,R0
 017212  104415                                                          TRAP    C$PNTX
 017214  062706  000014                                                  ADD     #14,SP
 017220  000207                                 RTS PC


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

 017222                                 CKHAE:: IFB HAE NE #0 THEN              ;IF HALT FLAG IS SET:
 017222  105737  002206                                                          TSTB    HAE
 017226  001430                                                                  BEQ     50355$
 017230                                         IFB MISCFG EQ #0 THEN            ;
 017230  105737  003541                                                          TSTB    MISCFG
 017234  001023                                                                  BNE     50356$
 017236                                           MANUAL                        ;IS MANUAL INTERVENTION ALLOWED?
 017236  104450                                                                  TRAP    C$MANI
 017240                                           BNCOMPLETE CKHRTN             ;BR IF NOT.
 017240  103023                                                                  BCC     CKHRTN
 017242                                           LET R4 := CMDWRD              ;COMMAND WORD.
 017242  013704  003430                                                          MOV     CMDWRD,R
 017246  004737  007670                          JSR PC,GCMDA                   ;FETCH ADR OF CMD ASCII.
 017252                                          LET HALTM :B= (R3)+            ;MOVE CMD ASCII
 017252  112337  004126                                                          MOVB    (R3)+,HA
 017256                                          LET HALTM+1 :B= (R3)+
 017256  112337  004127                                                          MOVB    (R3)+,HA
 017262                                          LET HALTM+2 :B= (R3)                    ;INTO MESSAGE.
 017262  111337  004130                                                          MOVB    (R3),HAL
 017266                                          GMANIL HALTM,TIME1,1,YES       :HALT - WAIT FOR AN OEPRATOR INPUT.
 017266  104443                                                                  TRAP    C$GMAN
 017270  000404                                                                  BR      10000$
 017272  003446                                                                  .WORD   TIME1
```

```
  (5)  017274  000130                                                                    .WORD   T$CODE
  (5)  017276  004126                                                                    .WORD   HALTM
  (5)  017300  000001                                                                    .WORD   1
  (3)  017302                                  10000$:
 4060  017302                                            ELSE
  (4)  017302  000402                                                                    BR      50357$
                                                                                50356$:
  (3)  017304
 4061  017304                                              LET MISCFG :B= #0          ;
  (4)  017304  105037  003541                                                            CLRB    MISCFG
 4062  017310                                            ENDIF
  (4)  017310                                                                   50357$:
 4063  017310                                          ENDIF
  (4)  017310                                                                   50355$:
 4064  017310  000207                        CKHRTN: RTS     PC                      ;RETURN
```

```
 4066                                   ;       SUBROUTINE TO CREATE THE SEQUENCE FOR A WRITE TAPE MARK
 4067                                   ;       COMMAND.  WILL EXECUTE COMMAND TO UUT.
 4068                                   ;       INPUTS:
 4069                                   ;       OUTPUTS: CMDSEQ
 4070                                   ;       CALLS:  SETUP, CMDAC, EXCUTE, GOWAIT
 4071
 4072  017312                           WRITEM::
 4073  017312                                   LET R1 := #CMDSEQ
  (4)  017312  012701  003544                                                      MOV     #CMDSEQ,
 4074  017316                                   LET (R1)+ := #WTM       ;COMMAND
  (4)  017316  012721  100011                                                      MOV     #WTM,(R1
 4075  017322                                   LET (R1)+ := #1         ;BRF
  (4)  017322  012721  000001                                                      MOV     #1,(R1)+
 4076  017326                                   LET (R1)+ := #1         ;ITERATIONS
  (4)  017326  012721  000001                                                      MOV     #1,(R1)+
 4077  017332  005721                           TST (R1)+               ;PATTERN
 4078  017334                                   LET (R1)+ := #END       ;TERMINATOR
  (4)  017334  012721  177777                                                      MOV     #END,(R1
 4079  017340                                   LET R1 := #CMDSEQ       ;TOP OF BUFFER
  (4)  017340  012701  003544                                                      MOV     #CMDSEQ,
 4080  017344  004737  007722                   JSR PC, SETUP           ;SET UP THE TABLE
 4081  017350  004737  007614                   JSR PC, CMDAC           ;LOAD THE ASCII
 4082  017354  004737  010576                   JSR PC, EXCUTE          ;ISSUE THE WTM COMMAND
 4083  017360  004737  011166                   JSR PC, GOWAIT          ;WAIT FOR THE COMMAND TO FINISH
 4084  017364  000207                           RTS PC                  ;RETURN TO CALLER
 4085                                           .EVEN
 4086
 4087  017366                                   ENDMOD
```

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

017366                                          BGNMOD

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

017366                                          BGNRPT
017366                                  L$RPT::

017366                                          LET     R5SAVE := R5            ;SAVE CURRENT DEVICE POINTER.
017366  010537  003462                                                                  MOV     R5,R5SAV
017372  004737  016614                          JSR     PC,FIRSTU               ;FIND THE FIRST UNIT.
017376                                          WHILE DEVTBL(R5) NE #END DO     ;WHILE THERE ARE MORE DEVICES:
017376                                                                                  50360$:
017376  026527  002536  177777                                                          CMP     DEVTBL(R
017404  001562                                                                        BEQ     50361$
017406                                            PRINTS        #RPT1A,DEVTBL(R5),PASCNT(R5),RECCNT(R5)
017406  016546  003330                                                                MOV     RECCNT(R
017412  016546  003260                                                                MOV     PASCNT(R
017416  016546  002536                                                                MOV     DEVTBL(R
017422  012746  020230                                                                MOV     #RPT1A,-
017426  012746  000004                                                                MOV     #4,-(SP)
017432  010600                                                                        MOV     SP,R0
017434  104416                                                                        TRAP    C$PNTS
017436  062706  000012                                                                ADD     #12,SP
017442                                  PRINTS        #RPT1B,WRBC+30(R5),WRBC+20(R5),WRBC+10(R5),WRBC(R5)
017442  016546  002560                                                                MOV     WRBC(R5)
017446  016546  002570                                                                MOV     WRBC+10(
017452  016546  002600                                                                MOV     WRBC+20(
017456  016546  002610                                                                MOV     WRBC+30(
017462  012746  020305                                                                MOV     #RPT1B,-
017466  012746  000005                                                                MOV     #5,-(SP)
017472  010600                                                                        MOV     SP,R0
017474  104416                                                                        TRAP    C$PNTS
017476  062706  000014                                                                ADD     #14,SP
017502                                  PRINTS        #RPT1C,RRBC+30(R5),RRBC+20(R5),RRBC+10(R5),RRBC(R5)
017502  016546  002620                                                                MOV     RRBC(R5)
017506  016546  002630                                                                MOV     RRBC+10(
017512  016546  002640                                                                MOV     RRBC+20(
017516  016546  002650                                                                MOV     RRBC+30(
017522  012746  020356                                                                MOV     #RPT1C,-
017526  012746  000005                                                                MOV     #5,-(SP)
017532  010600                                                                        MOV     SP,R0
017534  104416                                                                        TRAP    C$PNTS
017536  062706  000014                                                                ADD     #14,SP
017542                                  PRINTS        #RPT1D,RFBC+30(R5),RFBC+20(R5),RFBC+10(R5),RFBC(R5)
017542  016546  002660                                                                MOV     RFBC(R5)
017546  016546  002670                                                                MOV     RFBC+10(
017552  016546  002700                                                                MOV     RFBC+20(
017556  016546  002710                                                                MOV     RFBC+30(
017562  012746  020427                                                                MOV     #RPT1D,-
```

```
   (6)  017566  012746  000005                                                          MOV     #5,-(SP)
   (3)  017572  010600                                                                  MOV     SP,R0
   (4)  017574  104416                                                                  TRAP    C$PNTS
   (4)  017576  062706  000014                                                          ADD     #14,SP
 4132   017602                    PRINTS      #RPT1F,WRREC(R5),RRREC(R5),RFREC(R5)
  (10)  017602  016546  002760                                                          MOV     RFREC(R5
  (9)   017606  016546  002740                                                          MOV     RRREC(R5
  (8)   017612  016546  002720                                                          MOV     WRREC(R5
  (7)   017616  012746  020533                                                          MOV     #RPT1F,-
  (6)   017622  012746  000004                                                          MOV     #4,-(SP)
  (3)   017626  010600                                                                  MOV     SP,R0
  (4)   017630  104416                                                                  TRAP    C$PNTS
  (4)   017632  062706  000012                                                          ADD     #12,SP
 4133   017636                    PRINTS      #RPT1G,WRUNR(R5),RRUNR(R5),RFUNR(R5)
  (10)  017636  016546  002770                                                          MOV     RFUNR(R5
  (9)   017642  016546  002750                                                          MOV     RRUNR(R5
  (8)   017646  016546  002730                                                          MOV     WRUNR(R5
  (7)   017652  012746  020604                                                          MOV     #RPT1G,-
  (6)   017656  012746  000004                                                          MOV     #4,-(SP)
  (3)   017662  010600                                                                  MOV     SP,R0
  (4)   017664  104416                                                                  TRAP    C$PNTS
  (4)   017666  062706  000012                                                          ADD     #12,SP
 4134   017672                    IFB BADTSW NE #0 THEN         ;
  (6)   017672  105737  002211                                                          TSTB    BADTSW
  (9)   017676  001402                                                                  BEQ     50362$
 4135   017700  004737  017762      JSR PC,BTRPT        ;GO PRINT BAD TAPE SPOTS WHEN  ENABLED
 4136   017704                    ENDIF
  (4)   017704                                                                  50362$:
 4137   017704                    PRINTS      #RPT1I,SCCNT(R5),HRDCNT(R5),FTLCNT(R5),VFYCNT(R5)
  (11)  017704  016546  003300                                                          MOV     VFYCNT(R
  (10)  017710  016546  003320                                                          MOV     FTLCNT(R
  (9)   017714  016546  003310                                                          MOV     HRDCNT(R
  (8)   017720  016546  003270                                                          MOV     SCCNT(R5
  (7)   017724  012746  021001                                                          MOV     #RPT1I,-
  (6)   017730  012746  000005                                                          MOV     #5,-(SP)
  (3)   017734  010600                                                                  MOV     SP,R0
  (4)   017736  104416                                                                  TRAP    C$PNTS
  (4)   017740  062706  000014                                                          ADD     #14,SP
 4138   017744  004737  016662        JSR   PC,NEXTU                ;FIND THE NEXT UNIT.
 4139   017750                    ENDDO
  (4)   017750  000612                                                                  BR      50360$
  (3)   017752                                                                  50361$:
 4140   017752                    LET R5 := R5SAVE              ;RESTORE CURRENT DEVICE POINTER.
  (4)   017752  013705  003462                                                          MOV     R5SAVE,R
 4141   017756                    EXIT    RPT
  (4)   017756  000167                                                                  .WORD   J$JMP
  (3)   017760  001230                                                                  .WORD   L10010-2
 4142
 4143                       ;       SUBR TO PRINT BAD TAPES SPOTS DURING THE REPORT PRINTS
 4144                       ;       WRITE RETRIES: CUMULATIVE COUNT
 4145                       ;       BAD TAPE SPOTS: COUNT PER TAPE PASS ONLY, NOT CUMULATIVE.
 4146                       ;       COUNT OF RECOVERABLE WRITE ERRORS EXCLUDES BAD TAPE SPOTS.
 4147
 4148   017762             BTRPT:  PRINTS  #RPT1E,WRTYCT(R5)     ;PRINT GLOBAL WRITE RETRY COUNT
  (8)   017762  016546  003250                                                          MOV     WRTYCT(R
  (7)   017766  012746  020655                                                          MOV     #RPT1E,-
```

```
   (6)  017772  012746  000002                                                                    MOV     #2,-(SP)
   (3)  017776  010600                                                                            MOV     SP,R0
   (4)  020000  104416                                                                            TRAP    C$PNTS
   (4)  020002  062706  000006                                                                    ADD     #6,SP
 4149   020006                    LET BTPT := BTADDR(R5)  ;BTPT IS BOTH THE BAD TAPE SPOT COUNTER
   (4)  020006  016537  002550  003520                                                          MOV     BTADDR(R
 4150   020014                    LET R3 := @BTPT SHIFT -1        ;AND THE LOGGING INDEX
   (4)  020014  017703  163500                                                                    MOV     @BTPT,R3
   (7)  020020  006203                                                                            ASR     R3
 4151   020022                    PRINTS  #RPT1J,R3       ;PRINT # OF BAD TAPE SPOTS
   (8)  020022  010346                                                                            MOV     R3,-(SP)
   (7)  020024  012746  020705                                                                    MOV     #RPT1J,-
   (6)  020030  012746  000002                                                                    MOV     #2,-(SP)
   (3)  020034  010600                                                                            MOV     SP,R0
   (4)  020036  104416                                                                            TRAP    C$PNTS
   (4)  020040  062706  000006                                                                    ADD     #6,SP
 4152   020044                    IF R3 NE #0 THEN                ;PRINT RECORD # IF BAD SPOTS DETECTED
   (6)  020044  005703                                                                            TST     R3
   (9)  020046  001457                                                                            BEQ     50363$
 4153   020050                      IF R3 HI #20. THEN            ;
   (6)  020050  020327  000024                                                                    CMP     R3,#20.
   (9)  020054  101402                                                                            BLOS    50364$
 4154   020056                        LET R3 := #20.              ;20 BAD SPOTS IS THE LIMIT
   (4)  020056  012703  000024                                                                    MOV     #20.,R3
 4155   020062                      ENDIF
   (4)  020062                                                                                  50364$:
 4156   020062                      PRINTS        #CRLFSP         ;
   (7)  020062  012746  005302                                                                    MOV     #CRLFSP,
   (6)  020066  012746  000001                                                                    MOV     #1,-(SP)
   (3)  020072  010600                                                                            MOV     SP,R0
   (4)  020074  104416                                                                            TRAP    C$PNTS
   (4)  020076  062706  000004                                                                    ADD     #4,SP
 4157   020102                    LET R4 := BTPT + #2   ;FETCH A BAD SPOT ID
   (4)  020102  013704  003520                                                                    MOV     BTPT,R4
   (6)  020106  062704  000002                                                                    ADD     #2,R4
 4158   020112                    LET R2 := #0          ;R2 = PRINT COUNT PER LINE: 10 MAX
   (4)  020112  005002                                                                            CLR     R2
 4159   020114                    REPEAT                          ;
   (3)  020114                                                                                  50365$:
 4160   020114                      PRINTS      #RPT1K,(R4)       ;PRINT A BAD SPOT ID
   (8)  020114  011446                                                                            MOV     (R4),-(S
   (7)  020116  012746  020772                                                                    MOV     #RPT1K,-
   (6)  020122  012746  000002                                                                    MOV     #2,-(SP)
   (3)  020126  010600                                                                            MOV     SP,R0
   (4)  020130  104416                                                                            TRAP    C$PNTS
   (4)  020132  062706  000006                                                                    ADD     #6,SP
 4161   020136                      LET R2 := R2 + #1   ;COUNT PRINTS
   (6)  020136  005202                                                                            INC     R2
 4162   020140                      LET R4 := R4 + #2   ;NEXT
   (6)  020140  062704  000002                                                                    ADD     #2,R4
 4163   020144                      IF R2 EQ #10. THEN  ;
   (6)  020144  020227  000012                                                                    CMP     R2,#10.
   (9)  020150  001014                                                                            BNE     50366$
 4164   020152                        PRINTS #CRLFSP            ;GO TO NEXT PRINT LINE PAST 10 PRINTS
   (7)  020152  012746  005302                                                                    MOV     #CRLFSP,
   (6)  020156  012746  000001                                                                    MOV     #1,-(SP)
```

```
  (3)  020162  010600                                                    MOV     SP,R0
  (4)  020164  104416                                                    TRAP    C$PNTS
  (4)  020166  062706  000004                                            ADD     #4,SP
4165   020172                        LET R3 := R3 - #10.      ;ADJUST BAD SPOT COUNT
  (6)  020172  162703  000012                                            SUB     #10.,R3
4166   020176                        LET R2 := R2 - #10.      ;ADJUST PRINT COUNT
  (6)  020176  162702  000012                                            SUB     #10.,R2
4167   020202                      ENDIF                      ;
  (4)  020202                                                        50366$:
4168   020202                      UNTIL R2 EQ R3             ;LIMIT: # OF BAD SPOTS
  (3)  020202  020203                                                    CMP     R2,R3
  (6)  020204  001343                                                    BNE     50365$
4169   020206                    ENDIF                        ;
  (4)  020206                                                        50363$:
4170   020206                    PRINTS  #CRLF                ;
  (7)  020206  012746  005277                                            MOV     #CRLF,-(
  (6)  020212  012746  000001                                            MOV     #1,-(SP)
  (3)  020216  010600                                                    MOV     SP,R0
  (4)  020220  104416                                                    TRAP    C$PNTS
  (4)  020222  062706  000004                                            ADD     #4,SP
4171   020226  000207                    RTS PC
4172
4184                                      .NLIST  BEX
4185   020230  047045  047045  040445  RPT1A:  .ASCIZ  /%N%N%AUNIT %D1%S3%APASS:%D5%S3%ARECORD:%D5%N/
4186   020305     045  041101  052131  RPT1B:  .ASCIZ  /%ABYTES WRITTEN  %D3%A,%Z3%A,%Z3%A,%Z3%N/
4187   020356  040445  054502  042524  RPT1C:  .ASCIZ  /%ABYTES READ REV %D3%A,%Z3%A,%Z3%A,%Z3%N/
4188   020427     045  041101  052131  RPT1D:  .ASCII  /%ABYTES READ FWD %D3%A,%Z3%A,%Z3%A,%Z3%N/
4189   020477     045  031123  022463          .ASCIZ  /%S23%AWRT%S4%ARDR%S4%ARDF%N/
4190   020533     045  051101  041505  RPT1F:  .ASCIZ  /%ARECOVERABLE ERRORS   %D5%S2%D5%S2%D5%N/
4191   020604  040445  047125  042522  RPT1G:  .ASCIZ  /%AUNRECOVERABLE ERRORS %D5%S2%D5%S2%D5%N/
4192   020655     045  053501  044522  RPT1E:  .ASCIZ  /%AWRITE RETRIES%S8%D5%N/
4193   020705     045  022516  031104  RPT1J:  .ASCIZ  /%N%D2%A BAD SPOTS THIS TAPE PASS PRECEDING RECORD #:/
4194   020772  042045  022465  030523  RPT1K:  .ASCIZ  /%D5%S1/
4195   021001     045  051501  042520  RPT1I:  .ASCII  '%ASPEC COND%S3%AHARD%S3%AFATAL%S3%ACOMPARE%N''
4196   021055     045  031523  042045          .ASCIZ  /%S3%D5%S3%D5%S3%D5%S3%D5%N%N/
4197   021112  047045  040445  040524  TAPCAP: .ASCII  /%N%ATAPE LENGTH MUST BE 2400 FT. TO /
4198   021156  047503  051122  041505          .ASCIZ  /CORRECTLY RUN THIS TEST!!%N/
4199                                            .LIST   BEX
4200                                            .EVEN
4201   021212                                   ENDRPT
  (3)  021212                           L10010:
  (3)  021212  104425                                                    TRAP    C$RPT
4202
4203                                    ;LOAD DEVICE PROTECTION TABLE
4204                                    ;TABLE FOR SUPERVISOR TO IDENTIFY THE P-TBL FOR THE LOAD DEV
4205                                    ;THE SUPERVISOR USES THE TBL TO WARN THE OPERATOR WHEN HE TRIES TO TEST THE LOAD
4206
4207   021214                                   BGNPROT
  (3)  021214                           L$PROT::
4208   021214  000000                           .WORD 0          ;P-TBL OFFSET OF TSSR, THE TU80 CSR
4209   021216  177777                           .WORD -1         ;P-TBL OFFSET OF MASS BUS UNIT #: -1 = NOT A MAS
4210   021220  177777                           .WORD -1         ;P-TBL OFFSET OF DRIVE #: -1 = NONE, ONE DRIVE P
4211   021222                                   ENDPROT
```

```
                        .SBTTL  INITIALIZE SECTION

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

                              BGNINIT
                        L$INIT::

                        INIT10: IF #BIT0!BIT1 SETIN #CMDPKT THEN  ;IF CMD PACKET IS NOT ON MODULO 4 BOUN
021222  032727  000003  002314                                          BIT     #BIT0!BI
021230  001421                                                         BEQ     50367$
                                ERRSF 1,CMDPKM                ;PRINT ERROR MSG,
021232  104454                                                         TRAP    C$ERSF
021234  000001                                                         .WORD   1
021236  004166                                                         .WORD   CMDPKM
021240  000000                                                         .WORD   0
                                DELAY 20.                     ;GO TO SUPERVISOR, WAIT 2 SECONDS.
021242  012727  000024                                                 MOV     #20.,(PC
021246  000000                                                         .WORD   0
021250  013727  002116                                                 MOV     L$DLY,(P
021254  000000                                                         .WORD   0
021256  005367  177772                                                 DEC     -6(PC)
021262  001375                                                         BNE     .-4
021264  005367  177756                                                 DEC     -22(PC)
021270  001367                                                         BNE     .-20
021272  000753                  BR    INIT10                  ;
                                ENDIF
021274                                                                 50367$:

                        IFB CLRFLG NE #0 THEN                 ;IF CLR COUNTERS FLAG SET:
021274  105737  002204                                                 TSTB    CLRFLG
021300  001413                                                         BEQ     50370$
                          CLRB  CLRFLG                        ;INIT CLR FLAG.
021302  105037  002204
                          LET R2 := #0
021306  005002                                                         CLR     R2
                          WHILE R2 NE #CNTLEN DO
021310                                                                 50371$:
021310  020227  000550                                                 CMP     R2,#CNTL
021314  001405                                                         BEQ     50372$
                            LET WRBC(R2) := #0                ;CLR ALL STATISTICAL COUNTERS.
021316  005062  002560                                                 CLR     WRBC(R2)
                            LET R2 := R2 + #2
021322  062702  000002                                                 ADD     #2,R2
                          ENDDO
021326  000770                                                         BR      50371$
                        ENDIF
021330                                                                 50372$:

021330                                                                 50370$:

                        IFB RRANV NE #0 THEN                  ;IF RESET RANDOM VARIABLE FLAG IS SET TH
021330  105737  002205                                                 TSTB    RRANV
021334  001406                                                         BEQ     50373$
                          LET RANB := #RANBC                    ;RESET RANDOM BASE #.
021336  012737  153624  003442                                         MOV     #RANBC,R
```

```
4248  021344
 (4)  021344  012737  032561  003444
4249  021352
 (4)  021352
4250  021352
 (3)  021352  012700  000040
 (3)  021356  104447
4251  021360
 (2)  021360  103030
4252  021362
 (6)  021362  105237  003536
4253  021366
 (4)  021366  012705  000006
4254  021372
 (4)  021372  105037  003341
4255  021376
 (3)  021376
4256  021376
 (4)  021376  012765  177774  002536
4257  021404
 (6)  021404  162705  000002
4258  021410
 (3)  021410  005705
 (6)  021412  001371
4259  021414
 (4)  021414  013705  002012
 (7)  021420  006305
4260  021422
 (3)  021422
4261  021422
 (6)  021422  162705  000002
4262  021426
 (4)  021426  010565  002536
 (7)  021432  006265  002536
4263  021436
 (3)  021436  005705
 (6)  021440  001370
4264
4265  021442
 (3)  021442  012700  000034
 (3)  021446  104447
4266  021450
 (2)  021450  103004
4267  021452
 (6)  021452  105237  003536
4268  021456
 (6)  021456  105237  003537
4269
4270  021462
 (3)  021462  104421
 (3)  021464  010037  003542
4271  021470
 (4)  021470  005003
4272  021472
 (6)  021472  105737  003537
 (9)  021476  001020
```

```
        LET RANS := #RANSC
    ENDIF
    READEF  #EF.START

    BNCOMPLETE      INIT15
    LET STAFLG :B= STAFLG + #1
    LET R5 := #6
    LET HERE :B= #0
    REPEAT
      LET DEVTBL(R5) := #NINUSE
      LET R5 := R5 - #2
    UNTIL R5 EQ #0

    LET R5 := L$UNIT SHIFT 1

    REPEAT
      LET R5 := R5 - #2
      LET DEVTBL(R5) := R5 SHIFT -1

    UNTIL R5 EQ #0

INIT15: READEF #EF.PWR

    BNCOMPLETE INIT16
      LET STAFLG :B= STAFLG + #1
      LET PWRFLG :B= PWRFLG + #1

INIT16: RFLAGS  OPFLAG

    LET R3 := #0
        IFB PWRFLG EQ #0 THEN
```

```
                ;RESET RANDOM SAVE LOCATION.
                        MOV     #RANSC,R
                50373$:
;READ START COMMAND EVENT FLAG.
                        MOV     #EF.STAR
                        TRAP    C$REFG
;BRANCH IF NOT STARTING.
                        BCC     INIT15
;SET START COMMAND FLAG.
                        INCB    STAFLG
                        MOV     #6,R5
;CLEAR THE 'BEEN HERE BEFORE'' FLAG
                        CLRB    HERE
;INITIATE UNIT NUMBER TABLE
                50374$:
;BY STORING NOT IN USE IN EACH LOCATION.
                        MOV     #NINUSE,
                        SUB     #2,R5
                        TST     R5
                        BNE     50374$
                        MOV     L$UNIT,R
                        ASL     R5
;STORE ALL UNIT
                50375$:
;NUMBERS IN DEVTBL.
                        SUB     #2,R5
                        MOV     R5,DEVTB
                        ASR     DEVTBL(R
                        TST     R5
                        BN      50375$
;HAS THERE BE A POWER FAILURE?
                        MOV     #EF.PWR,
                        TRAP    C$REFG
;BRANCH IF NOT.
                        BCC     INIT16
  ;IF SO - SET THE START FLAG.
                        INCB    STAFLG
;IF SO - SET THE POWER FAIL FLAG.
                        INCB    PWRFLG
;READ AND STORE FLAGS SET BY OPERATOR
                        TRAP    C$RFLA
                        MOV     R0,OPFLA
;CLEAR EVENT FLAG
                        CLR     R3
;IF POWER FAIL HAS NOT OCCURRED THEN:
                        TSTB    PWRFLG
                        BNE     50376$
```

```
4273  021500
 (3)  021500  012700  000035          READEF #EF.NEW          ;UPDATE PASS COUNT WHEN
 (3)  021504  104447                                                  MOV     #EF.NEW,
                                                                      TRAP    C$REFG
4274  021506
 (6)  021506  103014                  IFCOND CS THEN          ;SUPERVISOR IS IN NEW PASS
                                                                      BCC     50377$
4275  021510
 (6)  021510  105737  003536            IFB STAFLG EQ #0 THEN ;AND DIAG WAS NEITHER STARTED
 (9)  021514  001010                                                  TSTB    STAFLG
                                                                      BNE     50400$
4276  021516
 (3)  021516  012700  000037              READEF #EF.RES        ;NOR
 (3)  021522  104447                                                  MOV     #EF.RES,
                                                                      TRAP    C$REFG
4277  021524
 (6)  021524  103402                      IFCOND CC THEN        ;RESTARTED
                                                                      BCS     50401$
4278  021526
 (6)  021526  005103                        LET R3 := COMP R3   ;DO IT
                                                                      COM     R3
4279  021530
 (4)  021530  000401                      ELSE
 (3)  021532                                                          BR      50402$
                                                                50401$:
4280  021532
 (6)  021532  005203                        LET R3 := R3 + #1   ;SET 1ST PASS IF NEW PASS AND
                                                                      INC     R3
4281  021534
 (4)  021534                              ENDIF                 ;RESTARTING
                                                                50402$:
4282  021534
 (4)  021534  000401                    ELSE
 (3)  021536                                                          BR      50403$
                                                                50400$:
4283  021536
 (6)  021536  005203                        LET R3 := R3 + #1   ;SET 1ST PASS IF NEW PASS AND
                                                                      INC     R3
4284  021540
 (4)  021540                              ENDIF                 ;STARTING
                                                                50403$:
4285  021540                          ENDIF                     ;DO NOT UPDATE IT ON CONTINUE
 (4)  021540                                                    50377$:
4286  021540
 (4)  021540                        ENDIF                     ;OR ON POWER FAIL
                                                                50376$:
4287  021540  004737  016614  JSR     PC,FIRSTU               ;INIT DEVICE POINTER.
4288  021544                  LET R2 := #0                    ;INIT DEVICE COUNTER.
 (4)  021544  005002                                                  CLR     R2
4289  021546                  WHILE DEVTBL(R5) NE #END DO
 (4)  021546                                                    50404$:
 (6)  021546  026527  002536  177777                                 CMP     DEVTBL(R
 (9)  021554  001450                                                  BEQ     50405$
4290  021556                    LET R2 := R2 + #1
 (6)  021556  005202                                                  INC     R2
4291  021560                    LET R0 := R5 SHIFT -1
 (4)  021560  010500                                                  MOV     R5,R0
 (7)  021562  006200                                                  ASR     R0
4292  021564                    GPHARD  R0,R0           ;GET HARDWARE P TABLE FROM SUPER.
 (3)  021564  104442                                                  TRAP    C$GPHRD
4293  021566                    IFCOND CS THEN
 (6)  021566  103036                                                  BCC     50406$
4294  021570                      LET TSSR(R5) := (R0)  ;SAVE TSSR ADDRESS.
 (4)  021570  011065  002466                                          MOV     (R0),TSS
4295  021574                      LET TSDB(R5) := (R0)+ - #2  ;SAVE TSDB ADDRESS.
 (4)  021574  012065  002456                                          MOV     (R0)+,TS
 (6)  021600  162765  000002  002456                                 SUB     #2,TSDB(
4296  021606                      LET TSVCT(R5) := (R0)  ;SAVE INTERRUPT VECTOR ADDRESS.
 (4)  021606  011065  002476                                          MOV     (R0),TSV
```

```
4297  021612
 (7)  021612  012746  000340                SETVEC TSVCT(R5),TS4INT(R5),#INTPRI ;SET UP INTERUPT PROCESSING COND
 (6)  021616  016546  002516                                                    MOV     #INTPRI,
 (5)  021622  016546  002476                                                    MOV     TS4INT(R
 (4)  021626  012746  000003                                                    MOV     TSVCT(R5
 (3)  021632  104437                                                            MOV     #3,-(SP)
 (2)  021634  062706  000010                                                    TRAP    C$SVEC
4298  021640                                                                    ADD     #10,SP
 (6)  021640  005703                     IF R3 NE #0 THEN           ;ACTUAL PASSCOUNT UPDATE PER R3
 (9)  021642  001410                                                            TST     R3
4299  021644                                                                    BEQ     50407$
 (6)  021644  005703                       IF R3 LT #0 THEN
 (9)  021646  002003                                                            TST     R3
4300  021650                                                                    BGE     50410$
 (6)  021650  005265  003260                 LET PASCNT(R5) := PASCNT(R5) + #1
4301  021654                                                                    INC     PASCNT(R
 (4)  021654  000403                       ELSE
 (3)  021656                                                                    BR      50411$
4302  021656                                                          50410$:
 (4)  021656  012765  000001  003260         LET PASCNT(R5) := #1
4303  021664                                                                    MOV     #1,PASCN
 (4)  021664                               ENDIF
4304  021664                                                          50411$:
 (4)  021664                             ENDIF
4305  021664                                                          50407$:
 (4)  021664                           ENDIF
4306  021664                                                          50406$:
 (4)  021664  005065  003330             LET RECCNT(R5) := #0          ;CLEAR RECORD COUNT
4307  021670  004737  016662                                                    CLR     RECCNT(R
4308  021674                             JSR   PC,NEXTU               ;DO IT FOR ALL DEVICES.
 (4)  021674  000724                     ENDDO
 (3)  021676                                                                    BR      50404$
4309                                                                    50405$:
4310  021676
 (6)  021676  005702                     IF R2 EQ #0 THEN           ;IF THERE ARE NO UNITS:
 (9)  021700  001026                                                            TST     R2
4311  021702                                                                    BNE     50412$
 (7)  021702  012746  004731               PRINTF #AUDRPM           ;PRINT ALL UNITS DROPPED,
 (6)  021706  012746  000001                                                    MOV     #AUDRPM,
 (3)  021712  010600                                                            MOV     #1,-(SP)
 (4)  021714  104417                                                            MOV     SP,R0
 (4)  021716  062706  000004                                                    TRAP    C$PNTF
4312  021722                                                                    ADD     #4,SP
 (2)  021722  012727  000024               DELAY 20.                ;GO TO SUPERVISOR, WAIT 2 SECONDS.
 (2)  021726  000000                                                            MOV     #20.,(PC
 (2)  021730  013727  002116                                                    .WORD   0
 (2)  021734  000000                                                            MOV     L$DLY,(P
 (2)  021736  005367  177772                                                    .WORD   0
 (2)  021742  001375                                                            DEC     -6(PC)
 (2)  021744  005367  177756                                                    BNE     .-4
 (2)  021750  001367                                                            DEC     -22(PC)
4313  021752                                                                    BNE     .-20
 (3)  021752  104422               BREAK                            ;GO TO SUPERVISOR, CHECK TTY.
4314  021754                                                                    TRAP    C$BRK
 (3)  021754  104444               DOCLN                            ;DO CLEAN CODE + ABORT PASS.
4315  021756                                                                    TRAP    C$DCLN
                                   ENDIF
```

```
  (4)  021756                                                                                50412$:
4316
4317  021756
                                    SETPRI #PRI00                   ;LOWER CPU PRIORITY TO 0
  (3)  021756  012700  000000                                                                MOV     #PRI00,R
  (3)  021762  104441                                                                        TRAP    C$SPRI
                                    IFB IREC EQ #0 AND #ADR NOTSETIN OPFLAG THEN    ;IF ERROR RECOVERY IS EN
4318  021764
  (6)  021764  105737  002210                                                                TSTB    IREC
  (9)  021770  001145                                                                        BNE     50413$
  (6)  021772  032737  000020  003542                                                        BIT     #ADR,OPF
  (9)  022000  001141                                                                        BNE     50413$
                                      JSR PC,FIRSTU                 ;AND AUTO-DROP NOT CALLED, THEN SET UP F
                                      WHILE DEVTBL(R5) NE #END DO   ;WHILE THERE ARE MORE DEVICES:
4319  022002  004737  016614                                                                50414$:
4320  022006
  (4)  022006                                                                                CMP     DEVTBL(R
  (6)  022006  026527  002536  177777                                                        BEQ     50415$
  (9)  022014  001533
                                        BEGIN COUNTER               ;START 3.5 MINUTE COUNTER
                                          INCR TIME1 FROM #1 TO #25 BY #1
4321  022016
4322  022016
  (4)  022016  012737  000001  003446                                                        MOV     #1,TIME1
  (5)  022024  000402                                                                        BR      50417$
  (4)  022026                                                                               50420$:
  (7)  022026  005237  003446                                                                INC     TIME1
  (5)  022032                                                                               50417$:
  (5)  022032  023727  003446  000025                                                        CMP     TIME1,#2
  (7)  022040  003106                                                                        BGT     50421$
                                          LET @TSDB(R5) := #GSCPK ;AND GET UNITS STATUS
4323  022042
  (4)  022042  012775  002324  002456                                                        MOV     #GSCPK,@
                                          DELAY 32.               ;WAIT 3.2 MSEC.
4324  022050
  (2)  022050  012727  000040                                                                MOV     #32.,(PC
  (2)  022054  000000                                                                        .WORD   0
  (2)  022056  013727  002116                                                                MOV     L$DLY,(P
  (2)  022062  000000                                                                        .WORD   0
  (2)  022064  005367  177772                                                                DEC     -6(PC)
  (2)  022070  001375                                                                        BNE     .-4
  (2)  022072  005367  177756                                                                DEC     -22(PC)
  (2)  022076  001367                                                                        BNE     .-20
                                      IF #TS.SSR SETIN @TSSR(R5) THEN
4325  022100
  (6)  022100  032775  000200  002466                                                        BIT     #TS.SSR,
  (9)  022106  001420                                                                        BEQ     50422$
                                        IF #TS.OFL NOTSETIN @TSSR(R5) THEN
4326  022110
  (6)  022110  032775  000100  002466                                                        BIT     #TS.OFL,
  (9)  022116  001001                                                                        BNE     50423$
                                          LEAVE COUNTER             ;EXIT COUNTER WHEN UNIT ON LINE
4327  022120
  (4)  022120  000456                                                                        BR      50416$
                                        ELSE
4328  022122                                                                              50423$:
  (3)  022122
                                          PRINTF #OFLINM,DEVTBL(R5) ;PRINT UNIT OFF LINE EVERY 10 SEC
4329  022122
  (8)  022122  016546  002536                                                                MOV     DEVTBL(R
  (7)  022126  012746  005213                                                                MOV     #OFLINM,
  (6)  022132  012746  000002                                                                MOV     #2,-(SP)
  (3)  022136  010600                                                                        MOV     SP,R0
  (4)  022140  104417                                                                        TRAP    C$PNTF
  (4)  022142  062706  000006                                                                ADD     #6,SP
                                        ENDIF
4330  022146                                                                              50424$:
  (4)  022146
                                    ELSE
4331  022146
  (4)  022146  000412                                                                        BR      50425$
```

```
  (3)  022150
4332   022150
  (8)  022150  016546  002536                    50422$:
  (7)  022154  012746  023102          PRINTF #NRDYM,DEVTBL(R5)
  (6)  022160  012746  000002                            MOV     DEVTBL(R
  (3)  022164  010600                                    MOV     #NRDYM,-
  (4)  022166  104417                                    MOV     #2,-(SP)
  (4)  022170  062706  000006                            MOV     SP,R0
4333   022174                                           TRAP    C$PNTF
  (4)  022174                                           ADD     #6,SP
4334   022174                        ENDIF
  (4)  022174  012737  000001  003450                    50425$:
  (5)  022202  000402          INCR TIME2 FROM #1 TO #13 BY #1
  (4)  022204                                            MOV     #1,TIME2
  (7)  022204  005237  003450                            BR      50426$
  (5)  022210                                           50427$:
  (5)  022210  023727  003450  000013                    INC     TIME2
  (7)  022216  003016                                   50426$:
4335   022220                                           CMP     TIME2,#1
  (2)  022220  012727  000310                            BGT     50430$
  (2)  022224  000000          DELAY 200.          ;WAIT FOR UNIT TO BE SET ON-LINE
  (2)  022226  013727  002116                            MOV     #200.,(P
  (2)  022232  000000                                    .WORD   0
  (2)  022234  005367  177772                            MOV     L$DLY,(P
  (2)  022240  001375                                    .WORD   0
  (2)  022242  005367  177756                            DEC     -6(PC)
  (2)  022246  001367                                    BNE     .-4
4336   022250                                           DEC     -22(PC)
  (3)  022250  104422                                    BNE     .-20
4337   022252            BREAK          ;ALLOW TERMINAL INTERRUPT
  (4)  022252  000754                                    TRAP    C$BRK
  (3)  022254                   ENDINC
4338   022254                                           BR      50427$
  (4)  022254  000664                                   50430$:
  (3)  022256
4339   022256              ENDINC                        BR      50420$
  (3)  022256                                           50421$:
4340   022256
  (6)  022256  023727  003446  000025          END COUNTER
  (9)  022264  003404                                   50416$:
4341   022266  004737  011552          IF TIME1 GT #25 THEN      ;IF OFF LINE FOR 3.5 MINUTES
4342   022272  004737  012274                                    CMP     TIME1,#2
4343   022276                                                   BLE     50431$
  (4)  022276            JSR PC,MOVMSG          ;GET MESSAGE PACKET
4344             JSR PC,TCC1            ;PRINT ERROR AND DROP OFF LINE UNIT
4345   022276  004737  016662          ENDIF
4346   022302                                                 50431$:
  (4)  022302  000641          ;REPEAT UNTIL ON LINE OR TIMED OUT.
  (3)  022304            JSR PC,NEXTU           ;SET UP FOR NEXT UNIT.
4347   022304          ENDDO                                   BR      50414$
  (4)  022304                                           50415$:
4348   022304        ENDIF
  (6)  022304  105737  003537                           50413$:
  (9)  022310  001026          IFB PWRFLG EQ #0 THEN
4349   022312                                                   TSTB    PWRFLG
  (3)  022312  104431                                        BNE     50432$
            MEMORY DATAWT          ;REQUEST MEMORY FROM SUPER FOR RD/WR BUF
                                                             TRAP    C$MEM
```

```
                                                                                MOV     R0,DATAW
                        LET DATARD := DATAWT + #DATCNT          ;SET RD BFR AD
                                                                                MOV     DATAWT,D
                                                                                ADD     #DATCNT,
                        IF @DATAWT LT #DATCNT THEN      ;WHEN NOT ENOUGH FREE MEMO AVAILABLE
                                                                                CMP     @DATAWT,
                                                                                BGE     50433$
                          PRINTF #MEMOM                 ;WARN OPERATOR
                                                                                MOV     #MEMOM,-
                                                                                MOV     #1,-(SP)
                                                                                MOV     SP,R0
                                                                                TRAP    C$PNTF
                                                                                ADD     #4,SP
                          DOCLN                         ;AND ABORT PASS
                                                                                TRAP    C$DCLN
                        ENDIF           ;DIAG MUST BE RE-LOADED IN A CPU WITH LARGER MEMO
                                                                        50433$:
                      ENDIF
                                                                        50432$:
                        LET CHGFLG :B= #0               ;CLR CHANGE CMD SEQ TBL FLAG.
                                                                                CLRB    CHGFLG
                        LET R3 := #ENDFLG
                                                                                MOV     #ENDFLG,
                        JSR     PC,CLRERR               ;CLEAR ALL FLAGS.
                        LET PWRFLG :B= #0               ;CLEAR THE POWER FAIL FLAG.
                                                                                CLRB    PWRFLG

                        EXIT    INIT
                                                                                TRAP    C$EXIT
                                                                                .WORD   L10012-.
MEMOM:                  .ASCII  /%AFREE MEMO TOO SMALL FOR RD-WR BFRS%N/

                        .ASCIZ  /%ARE-LOAD IN LARGER MEMO%N/

                        .EVEN

                        ENDINIT
L10012:
                                                                                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
                                        ;--

022516                                          BGNAUTO
022516                                  L$AUTO::

022516 004737 016614                            JSR PC,FIRSTU                   ;FIND FIRST UNIT
022522                                          WHILE DEVTBL(R5) NE #END DO     ;
                                                                                        50434$:
022522 026527 002536 177777                                                             CMP     DEVTBL(R
022530 001525                                                                           BEQ     50435$
022532                                            LET TRAPD4 :B= #0             ;
022532 105037 003540                                                                    CLRB    TRAPD4
022536                                          SETVEC #4,#TRAP4,#PRIO7         ;SET VECTOR 4
022536 012746 000340                                                                    MOV     #PRIO7,-
022542 012746 023132                                                                    MOV     #TRAP4,-
022546 012746 000004                                                                    MOV     #4,-(SP)
022552 012746 000003                                                                    MOV     #3,-(SP)
022556 104437                                                                           TRAP    C$SVEC
022560 062706 000010                                                                    ADD     #10,SP
022564                                            LET R2 := @TSSR(R5)           ;ADDRESS TU80 INTERFACE
022564 017502 002466                                                                    MOV     @TSSR(R5
022570                                          CLRVEC #4                       ;CLEAR VECTOR AT 4
022570 012700 000004                                                                    MOV     #4,R0
022574 104436                                                                           TRAP    C$CVEC
022576                                  IFB TRAPD4 NE #0 THEN
022576 105737 003540                                                                    TSTB    TRAPD4
022602 001423                                                                           BEQ     50436$
022604                                    LET FTLCNT(R5) := FTLCNT(R5) + #1
022604 005265 003320                                                                    INC     FTLCNT(R
022610                                    PRINTF #AUTODM,TSSR(R5)       ;PRINT ERROR
022610 016546 002466                                                                    MOV     TSSR(R5)
022614 012746 023006                                                                    MOV     #AUTODM,
022620 012746 000002                                                                    MOV     #2,-(SP)
022624 010600                                                                           MOV     SP,R0
022626 104417                                                                           TRAP    C$PNTF
022630 062706 000006                                                                    ADD     #6,SP
022634                                    LET DROPN := DEVTBL(R5)               ;SAVE # OF UNIT TO BE DROPPED.
022634 016537 002536 017136                                                             MOV     DEVTBL(R
022642                                    LET R0 := R5 SHIFT -1                 ;R0=LOGICAL DEVICE NUMBER
022642 010500                                                                           MOV     R5,R0
022644 006200                                                                           ASR     R0
022646                                    DODU R0                       ;DROP THE UNIT: EXEC BGNDU-ENDDU CODE IF
022646 104451                                                                           TRAP    C$DODU
022650                                  ELSE
022650 000452                                                                           BR      50437$
022652                                                                          50436$:
022652                                    LET @TSDB(R5) := #GSCPK       ;SEND GET STATUS COMMAND
022652 012775 002324 002456                                                             MOV     #GSCPK,@
022660 004737 011516                    JSR PC,WSSR                     ;WAIT
022664                                  IF #TS.SSR SETIN @TSSR(R5) THEN
```

```
  (6)  022664  032775  000200  002466                                                    BIT     #TS.SSR,
  (9)  022672  001423                                                                    BEQ     50440$
4406   022674                        IF #TS.OFL SETIN @TSSR(R5) THEN
  (6)  022674  032775  000100  002466                                                    BIT     #TS.OFL,
  (9)  022702  001416                                                                    BEQ     50441$
4407   022704                          LET FTLCNT(R5) := FTLCNT(R5) + #1
  (6)  022704  005265  003320                                                          INC     FTLCNT(R
4408   022710                          PRINTF #OFLINM,DEVTBL(R5)
  (8)  022710  016546  002536                                                          MOV     DEVTBL(R
  (7)  022714  012746  005213                                                          MOV     #OFLINM,
  (6)  022720  012746  000002                                                          MOV     #2,-(SP)
  (3)  022724  010600                                                                  MOV     SP,R0
  (4)  022726  104417                                                                  TRAP    C$PNTF
  (4)  022730  062706  000006                                                          ADD     #6,SP
4409   022734  004737  017046                          JSR PC,DROPUA
4410   022740                                        ENDIF
  (4)  022740                                                                50441$:
4411   022740                                      ELSE
  (4)  022740  000416                                                                  BR      50442$
  (3)  022742                                                                50440$:
4412   022742                          LET FTLCNT(R5) := FTLCNT(R5) + #1
  (6)  022742  005265  003320                                                          INC     FTLCNT(R
4413   022746                          PRINTF #NRDYM,DEVTBL(R5)
  (8)  022746  016546  002536                                                          MOV     DEVTBL(R
  (7)  022752  012746  023102                                                          MOV     #NRDYM,-
  (6)  022756  012746  000002                                                          MOV     #2,-(SP)
  (3)  022762  010600                                                                  MOV     SP,R0
  (4)  022764  104417                                                                  TRAP    C$PNTF
  (4)  022766  062706  000006                                                          ADD     #6,SP
4414   022772  004737  017046                          JSR PC,DROPUA
4415   022776                                        ENDIF
  (4)  022776                                                                50442$:
4416   022776                                      ENDIF
  (4)  022776                                                                50437$:
4417   022776  004737  016662                      JSR PC,NEXTU
4418   023002                                    ENDDO
  (4)  023002  000647                                                                  BR      50434$
  (3)  023004                                                                50435$:
4419
4420   023004                                  ENDAUTO
  (3)  023004                              L10013:
  (3)  023004  104461                                                                  TRAP    C$AUTO
4421
4422   023006  040445  052502  020123      AUTODM: .ASCII  /%ABUS TRAP AT %O6%N/
       023014  051124  050101  040440
       023022  020124  047445  022466
       023030     116
4423   023031     045  044501  052116              .ASCIZ  /%AINTERFACE BAD OR NOT SET TO ABOVE AD%N/
       023036  051105  040506  042503
       023044  041040  042101  047440
       023052  020122  047516  020124
       023060  042523  020124  047524
       023066  040440  047502  042526
       023074  040440  022504  000116
4424   023102  040445  047125  052111      NRDYM:  .ASCIZ  /%AUNIT %D1%A NOT RDY%N/
       023110  022440  030504  040445
```

```
        023116  047040  052117  051040
        023124  054504  047045     000
 4425           023132                          .EVEN
 4426
 4427                                   ;       DEVICE BUS TRAP HANDLER
 4428                                   ;       OUTPUT: TRAPD4 BYTE  1: TRAPED AT 4
 4429                                   ;                            0: NO TRAP
 4430
 4431   023132                          TRAP4:: LET TRAPD4 :B= TRAPD4 + #1
  (6)   023132  105237  003540                                                        INCB    TRAPD4
 4432   023136  000002                          RTI
 4433
 4434
 4435
```

```
                                        .SBTTL  CLEANUP CODING SECTION

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

                                                BGNCLN
                                        L$CLEAN::

                                                JSR     PC,FIRSTU               ;FIND FIRST UNIT.
                                                WHILE DEVTBL(R5) NE #END DO
                                                                                        50443$:
                                                                                                CMP     DEVTBL(R
                                                                                                BEQ     50444$
                                                  JSR PC,WSSR                   ;WAIT FOR UNIT READY OR TIMEOUT,
                                                  CLRVEC        TSVCT(R5)       ;RELEASE INTERRUPT VECTORS FOR ALL DEV.
                                                                                                MOV     TSVCT(R5
                                                                                                TRAP    C$CVEC
                                                  JSR   PC,NEXTU                ;FIND NEXT UNIT.
                                                ENDDO
                                                                                                BR      50443$
                                                                                        50444$:

                                                EXIT    CLN
                                                                                                TRAP    C$EXIT
                                                                                                .WORD   L10014-.

                                                .EVEN

                                                ENDCLN
                                        L10014:
                                                                                                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
                                        ;--

4484  023202                                    BGNDU
 (3)  023202                            L$DU::
4485
4491  023202                                    LET R5 := R0 SHIFT 1          ;R5 = LOGICAL DEVICE NUMBER X 2.
 (4)  023202  010005                                                                MOV     R0,R5
 (7)  023204  006305                                                                ASL     R5
4492  023206                                    LET DEVTBL(R5) := #NINUSE     ;SET NOT IN USE FLAG FOR THE DEVICE.
 (4)  023206  012765  177774  002536                                               MOV     #NINUSE,
4493  023214                                    PRINTF  #DROPDM,DROPN         ;PRINT DROP DEVICE MESSAGE
 (8)  023214  013746  017136                                                        MOV     DROPN,-(
 (7)  023220  012746  004702                                                        MOV     #DROPDM,
 (6)  023224  012746  000002                                                        MOV     #2,-(SP)
 (3)  023230  010600                                                                MOV     SP,R0
 (4)  023232  104417                                                                TRAP    C$PNTF
 (4)  023234  062706  000006                                                        ADD     #6,SP
4494  023240                                    EXIT    DU
 (4)  023240  000167                                                                .WORD   J$JMP
 (3)  023242  000000                                                                .WORD   L10015-2
4506
4507                                    .EVEN
4508  023244                                    ENDDU
 (3)  023244                            L10015:
 (3)  023244  104453                                                                TRAP    C$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.
                                        ;--

4519 023246                                     BGNAU
  (3) 023246                            L$AU::

4526
4527 023246                                     LET R5 := R0 SHIFT 1            ;R5 = LOGICAL DEVICE NUMBER X 2.
  (4) 023246  010005                                                                    MOV     R0,R5
  (7) 023250  006305                                                                    ASL     R5
4528 023252
  (4) 023252  010065  002536                    LET DEVTBL(R5) := R0     ;STORE UNIT # IN DEVICE TABLE.
                                                                                        MOV     R0,DEVTB
4529 023256                                     GPHARD  R0,R0                   ;GET HARDWARE P TABLE FROM SUPER.
  (3) 023256  104442                                                                    TRAP    C$GPHRD
4530 023260                                     LET TSSR(R5) := (R0)            ;SAVE TSSR ADDRESS.
  (4) 023260  011065  002466                                                            MOV     (R0),TSS
4531 023264                                     LET TSDB(R5) := (R0)+ - #2      ;SAVE TSDB ADDRESS.
  (4) 023264  012065  002456                                                            MOV     (R0)+,TS
  (6) 023270  162765  000002  002456                                                    SUB     #2,TSDB(
4532 023276                                     LET TSVCT(R5) := (R0)           ;SAVE INTERRUPT VECTOR ADDRESS.
  (4) 023276  011065  002476                                                            MOV     (R0),TSV
4533 023302                                     SETVEC TSVCT(R5),TS4INT(R5),#INTPRI     ;SET UP INTERUPT PROCESSING COND
  (7) 023302  012746  000340                                                            MOV     #INTPRI,
  (6) 023306  016546  002516                                                            MOV     TS4INT(R
  (5) 023312  016546  002476                                                            MOV     TSVCT(R5
  (4) 023316  012746  000003                                                            MOV     #3,-(SP)
  (3) 023322  104437                                                                    TRAP    C$SVEC
  (2) 023324  062706  000010                                                            ADD     #10,SP
4534 023330                                     LET INTFLG(R5) := #0            ;CLEAR INTERRUPT FLAGS.
  (4) 023330  005065  003500                                                            CLR     INTFLG(R
4535
4536 023334                                     EXIT    AU
  (4) 023334  000167                                                                    .WORD   J$JMP
  (3) 023336  000000                                                                    .WORD   L10016-2
4548
4549                                            .EVEN
4550
4551 023340                                     ENDAU
  (3) 023340                            L10016:
  (3) 023340  104452                                                                    TRAP    C$AU
4552
4553 023342                                     ENDMOD
4554
```

```
4557
4568                                        .TITLE HARDWARE TESTS
4569
4570                                        .SBTTL  TEST 1:  BASIC FUNCTIONS.
4571
4572                                        ;++
4573                                        ; TEST TO EXECUTE ALL TU80 FUNCTIONS.
4574                                        ;--
4575
4576  023342                                        BGNMOD
4577
4578  023342                                        BGNTST
 (3)  023342                                T1::
4579
4580  023342                                        LET RANDOM :B= #0               ;CLR THE RANDOM OPERATIONS FLAG.
 (4)  023342  105037  003523                                                              CLRB    RANDOM
4581  023346                                        LET EXPBOT :B= #0               ;CLR EXPECT BOT FLAG.
 (4)  023346  105037  003522                                                              CLRB    EXPBOT
4582
4583  023352                                        BGNSUB                          ;SUBTEST 1 - SET CHAR, DRIVE INIT, GET S
 (3)  023352                                T1.1:
 (3)  023352  104402                                                                      TRAP    C$BSUB
4584
4585  023354                                        LET R2 := #BFSEQ0               ;ADR OF CMD SEQ.
 (4)  023354  012702  024200                                                              MOV     #BFSEQ0,
4586  023360  004737  024154                        JSR     PC,BFSEQ                ;SET UP CMD SEQ.
4587  023364  004737  006760                        JSR     PC,EXALL                ;EXECUTE CMD SEQ ON ALL DEVICES.
4588  023370  004737  016614                        JSR     PC,FIRSTU               ;FIND THE FIRST UNIT.
4589  023374                                        WHILE DEVTBL(R5) NE #END DO     ;WHILE THERE ARE MORE DEVICES:
 (4)  023374                                                                          50445$:
 (6)  023374  026527  002536  177777                                                    CMP     DEVTBL(R
 (9)  023402  001434                                                                      BEQ     50446$
4590  023404                                          LET R2 := MSGPKA(R5)          ;GET MSG PACKET ADR,
 (4)  023404  016502  002506                                                              MOV     MSGPKA(R
4591  023410                                          LET R2 := R2 + #12            ;GET XSTAT2 ADR,
 (6)  023410  062702  000012                                                              ADD     #12,R2
4592  023414                                          LET TS4CL(R5) := (R2) CLR.BY #177400  ;STORE CODE LEVEL FROM DTR BYTE,
 (4)  023414  011265  002526                                                              MOV     (R2),TS4
 (6)  023420  042765  177400  002526                                                    BIC     #177400,
4593  023426                                          IF PASCNT(R5) EQ #1 THEN      ;IF THIS IS PASS 1 THEN:
 (6)  023426  026527  003260  000001                                                      CMP     PASCNT(R
 (9)  023434  001014                                                                      BNE     50447$
4594  023436                                            PRINTF #CODELM,DEVTBL(R5),TS4CL(R5) ;PRINT THE TU80 MICROCODE LEVEL.
 (9)  023436  016546  002526                                                              MOV     TS4CL(R5
 (8)  023442  016546  002536                                                              MOV     DEVTBL(R
 (7)  023446  012746  004056                                                              MOV     #CODELM,
 (6)  023452  012746  000003                                                              MOV     #3,-(SP)
 (3)  023456  010600                                                                      MOV     SP,R0
 (4)  023460  104417                                                                      TRAP    C$PNTF
 (4)  023462  062706  000010                                                              ADD     #10,SP
4595  023466                                          ENDIF
 (4)  023466                                                                          50447$:
4596  023466  004737  016662                          JSR   PC,NEXTU                ;FIND NEXT UNIT.
4597  023472                                        ENDDO
 (4)  023472  000740                                                                      BR      50445$
 (3)  023474                                                                          50446$:
```

```
4598  023474                                    ENDSUB
  (3) 023474                              L10020:
  (3) 023474  104403                                                  TRAP    C$ESUB
4599
4600  023476                                    BGNSUB                ;SUBTEST 2 - REWIND.
  (3) 023476                              T1.2:
  (3) 023476  104402                                                  TRAP    C$BSUB
4601
4602  023500                                    LET R2 := #BFSEQ1     ;ADR OF CMD SEQ.
  (4) 023500  012702  024252                                          MOV     #BFSEQ1,
4603  023504  004737  024154                    JSR     PC,BFSEQ      ;SET UP CMD SEQ.
4604  023510  004737  006760                    JSR     PC,EXALL      ;EXECUTE CMD SEQ ON ALL DEVICES.
4605  023514                                    LET STAFLG :B= #0     ;CLEAR START FLAG
  (4) 023514  105037  003536                                          CLRB    STAFLG
4606  023520                                    ENDSUB
  (3) 023520                              L10021:
  (3) 023520  104403                                                  TRAP    C$ESUB
4607
4608  023522                                    BGNSUB                ;SUBTEST 3 - WRITE/VERIFY.
  (3) 023522                              T1.3:
  (3) 023522  104402                                                  TRAP    C$BSUB
4609
4610  023524                                    LET R2 := #BFSEQ2     ;ADR OF CMD SEQ.
  (4) 023524  012702  024264                                          MOV     #BFSEQ2,
4611  023530  004737  024154                    JSR     PC,BFSEQ      ;SET UP CMD SEQ.
4612  023534  004737  006760                    JSR     PC,EXALL      ;EXECUTE CMD SEQ ON ALL DEVICES.
4613  023540                                    ENDSUB
  (3) 023540                              L10022:
  (3) 023540  104403                                                  TRAP    C$ESUB
4614
4615  023542                                    BGNSUB                ;SUBTEST 4 - WRITE TAPE MARK, ERASE.
  (3) 023542                              T1.4:
  (3) 023542  104402                                                  TRAP    C$BSUB
4616
4617  023544                                    LET R2 := #BFSEQ3     ;ADR OF CMD SEQ.
  (4) 023544  012702  024356                                          MOV     #BFSEQ3,
4618  023550  004737  024154                    JSR     PC,BFSEQ      ;SET UP CMD SEQ.
4619  023554  004737  006760                    JSR     PC,EXALL      ;EXECUTE CMD SEQ ON ALL DEVICES.
4620  023560                                    ENDSUB
  (3) 023560                              L10023:
  (3) 023560  104403                                                  TRAP    C$ESUB
4621
4622  023562                                    BGNSUB                ;SUBTEST 5 - SPACE FILES.
  (3) 023562                              T1.5:
  (3) 023562  104402                                                  TRAP    C$BSUB
4623
4624  023564                                    LET R2 := #BFSEQ4     ;ADR OF CMD SEQ.
  (4) 023564  012702  024430                                          MOV     #BFSEQ4,
4625  023570  004737  024154                    JSR     PC,BFSEQ      ;SET UP CMD SEQ.
4626  023574  004737  006760                    JSR     PC,EXALL      ;EXECUTE CMD SEQ ON ALL DEVICES.
4627  023600                                    ENDSUB
  (3) 023600                              L10024:
  (3) 023600  104403                                                  TRAP    C$ESUB
4628
4629  023602                                    BGNSUB                ;SUBTEST 6 - SPACE RECORDS.
  (3) 023602                              T1.6:
```

```
  (3)  023602  104402                                                    TRAP    C$BSUB
4630
4631  023604                        LET R2 := #BFSEQ5                  ;ADR OF CMD SEQ.
  (4)  023604  012702  024472                                           MOV     #BFSEQ5,
4632  023610  004737  024154        JSR     PC,BFSEQ                   ;SET UP CMD SEQ.
4633  023614  004737  006760        JSR     PC,EXALL                   ;EXECUTE CMD SEQ ON ALL DEVICES.
4634  023620                        ENDSUB
  (3)  023620                  L10025:
  (3)  023620  104403                                                    TRAP    C$ESUB
4635
4636  023622                        BGNSUB                             ;SUBTEST 7 - WRITE RETRY.
  (3)  023622                  T1.7:
  (3)  023622  104402                                                    TRAP    C$BSUB
4637
4638  023624                        LET R2 := #BFSEQ6                  ;ADR OF CMD SEQ.
  (4)  023624  012702  024544                                           MOV     #BFSEQ6,
4639  023630  004737  024154        JSR     PC,BFSEQ                   ;SET UP CMD SEQ.
4640  023634  004737  006760        JSR     PC,EXALL                   ;EXECUTE CMD SEQ ON ALL DEVICES.
4641  023640                        ENDSUB
  (3)  023640                  L10026:
  (3)  023640  104403                                                    TRAP    C$ESUB
4642
4643  023642                        BGNSUB                             ;SUBTEST 8 - READ REV RETRY.
  (3)  023642                  T1.8:
  (3)  023642  104402                                                    TRAP    C$BSUB
4644
4645  023644                        LET R2 := #BFSEQ7                  ;ADR OF CMD SEQ.
  (4)  023644  012702  024576                                           MOV     #BFSEQ7,
4646  023650  004737  024154        JSR     PC,BFSEQ                   ;SET UP CMD SEQ.
4647  023654  004737  006760        JSR     PC,EXALL                   ;EXECUTE CMD SEQ ON ALL DEVICES.
4648  023660                        ENDSUB
  (3)  023660                  L10027:
  (3)  023660  104403                                                    TRAP    C$ESUB
4649
4650  023662                        BGNSUB                             ;SUBTEST 9 - READ FWD RETRY.
  (3)  023662                  T1.9:
  (3)  023662  104402                                                    TRAP    C$BSUB
4651
4652  023664                        LET R2 := #BFSEQ8                  ;ADR OF CMD SEQ.
  (4)  023664  012702  024630                                           MOV     #BFSEQ8,
4653  023670  004737  024154        JSR     PC,BFSEQ                   ;SET UP CMD SEQ.
4654  023674  004737  006760        JSR     PC,EXALL                   ;EXECUTE CMD SEQ ON ALL DEVICES.
4655  023700                        ENDSUB
  (3)  023700                  L10030:
  (3)  023700  104403                                                    TRAP    C$ESUB
4656
4657  023702                        BGNSUB                             ;SUBTEST 10- CLEAN.
  (3)  023702                  T1.10:
  (3)  023702  104402                                                    TRAP    C$BSUB
4658
4659  023704                        LET R2 := #BFSEQ9                  ;ADR OF CMD SEQ.
  (4)  023704  012702  024662                                           MOV     #BFSEQ9,
4660  023710  004737  024154        JSR     PC,BFSEQ                   ;SET UP CMD SEQ.
4661  023714  004737  006760        JSR     PC,EXALL                   ;EXECUTE CMD SEQ ON ALL DEVICES.
4662  023720                        ENDSUB
  (3)  023720                  L10031:
```

```
  (3)  023720  104403                                                          TRAP    C$ESUB
4663
4664  023722                                  BGNSUB                          ;SUBTEST 11 - WTV SWAPPED DATA BYTES.
  (3)  023722                           T1.11:
  (3)  023722  104402                                                          TRAP    C$BSUB
4665
4666  023724                                  LET R2 := #BFSE10               ;ADR OF CMD SEQ.
  (4)  023724  012702  024704                                                  MOV     #BFSE10,
4667  023730  004737  024154                  JSR     PC,BFSEQ                ;SET UP CMD SEQ.
4668  023734  004737  006760                  JSR     PC,EXALL                ;WRITE/VERIFY RECORDS 1 AND 2.
4669  023740                                  LET SWBFLG :B= #1               ;ENABLE BYTE SWAPPING.
  (4)  023740  112737  000001  003526                                         MOVB    #1,SWBFL
4670  023746  004737  006760                  JSR     PC,EXALL                ;WRITE/VERIFY RECORDS 3 AND 4.
4671  023752                                  LET SWBFLG :B= #0               ;DISABLE BYTE SWAPPING.
  (4)  023752  105037  003526                                                  CLRB    SWBFLG
4672  023756                                  ENDSUB
  (3)  023756                           L10032:
  (3)  023756  104403                                                          TRAP    C$ESUB
4673
4674  023760                                  LET R2 := DATAWT + #10.         ;INIT WRITE BUFFER POINTER.
  (4)  023760  013702  003416                                                  MOV     DATAWT,R
  (6)  023764  062702  000012                                                  ADD     #10.,R2
4675  023770                                  WHILE R2 NE DATAWT DO   ;UNTIL 10 BYTES HAVE BEEN SWAPPED.
  (4)  023770                                                            50450$:
  (6)  023770  020237  003416                                                  CMP     R2,DATAW
  (9)  023774  001402                                                          BEQ     50451$
4676  023776  000342                            SWAB -(R2)                    ;SWAP DATA BYTES IN WRITE BUFFER.
4677  024000                                  ENDDO
  (4)  024000  000773                                                          BR      50450$
  (3)  024002                                                            50451$:
4678  024002                                  LET T1SWB :B= T1SWB + #1        ;SET T1 SWAP BYTES FLAG FOR "CKDATA" SUB
  (6)  024002  105237  003531                                                  INCB    T1SWB
4679
4680  024006                                  BGNSUB                          ;SUBTEST 12 - READ SWAPPED DATA BYTES.
  (3)  024006                           T1.12:
  (3)  024006  104402                                                          TRAP    C$BSUB
4681
4682  024010                                  LET CMDWRD := #RDR              ;CMD IS READ REV.
  (4)  024010  012737  104401  003430                                         MOV     #RDR,CMD
4683  024016  004737  015504                  JSR     PC,VFEXC                ;VERIFY ODD LENGTH SWAP (RECORD 4).
4684  024022                                  LET CMDPKT+CP.CNT := #12        ;CHANGE BYTE COUNT TO 10.
  (4)  024022  012737  000012  002322                                         MOV     #12,CMDP
4685  024030  004737  015504                  JSR     PC,VFEXC                ;VERIFY EVEN LENGTH SWAP (RECORD 3).
4686  024034                                  LET SWBFLG :B= #1               ;ENABLE BYTE SWAPPING.
  (4)  024034  112737  000001  003526                                         MOVB    #1,SWBFL
4687  024042                                  LET CMDPKT+CP.CNT := #11                ;CHANGE BYTE COUNT TO 9.
  (4)  024042  012737  000011  002322                                         MOV     #11,CMDP
4688  024050  004737  015504                  JSR     PC,VFEXC                ;VERIFY ODD LENGTH SWAP (RECORD 2).
4689  024054                                  LET CMDPKT+CP.CNT := #12        ;CHANGE BYTE COUNT TO 10.
  (4)  024054  012737  000012  002322                                         MOV     #12,CMDP
4690  024062  004737  015504                  JSR     PC,VFEXC                ;VERIFY EVEN LENGTH SWAP (RECORD 1).
4691  024066                                  LET CMDWRD := #RDF              ;CMD IS READ FWD.
  (4)  024066  012737  104001  003430                                         MOV     #RDF,CMD
4692  024074  004737  015504                  JSR     PC,VFEXC                ;VERIFY EVEN LENGTH SWAP (RECORD 1).
4693  024100                                  LET CMDPKT+CP.CNT := #11                ;CHANGE BYTE COUNT TO 9.
  (4)  024100  012737  000011  002322                                         MOV     #11,CMDP
```

```
 4694  024106  004737  015504                    JSR     PC,VFEXC            ;VERIFY ODD LENGTH SWAP (RECORD 2).
 4695  024112                                    LET SWBFLG :B= #0           ;DISABLE BYTE SWAPPING.
  (4)  024112  105037  003526                                                CLRB    SWBFLG
 4696  024116                                    LET CMDPKT+CP.CNT := #12    ;CHANGE BYTE COUNT TO 10.
  (4)  024116  012737  000012  002322                                        MOV     #12,CMDP
 4697  024124  004737  015504                    JSR     PC,VFEXC            ;VERIFY EVEN LENGTH SWAP (RECORD 3).
 4698  024130                                    LET CMDPKT+CP.CNT := #11    ;CHANGE BYTE COUNT TO 9.
  (4)  024130  012737  000011  002322                                        MOV     #11,CMDP
 4699  024136  004737  015504                    JSR     PC,VFEXC            ;VERIFY ODD LENGTH SWAP (RECORD 4).
 4700
 4701  024142                                    ENDSUB
  (3)  024142                            L10033:
  (3)  024142  104403                                                        TRAP    C$ESUB
 4702
 4703  024144                                    LET T1SWB :B= #0            ;CLEAR T1 SWAP BYTES FLAG
  (4)  024144  105037  003531                                                CLRB    T1SWB
 4704
 4705
 4706  024150                                    EXIT    TST
  (3)  024150  104432                                                        TRAP    C$EXIT
  (3)  024152  000554                                                        .WORD   L10017-.
```

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

024154                                  BFSEQ:  LET R1 := #CMDSEQ               ;INIT SEQ TABLE ADDRESS.
(4) 024154  012701  003544                                                              MOV     #CMDSEQ,
                                                WHILE (R2) NE #END DO           ;WHILE THERE ARE MORE COMMANDS:
024160                                                                                  50452$:
(4) 024160
(6) 024160  021227  177777                                                              CMP     (R2),#EN
(9) 024164  001402                                                                      BEQ     50453$
                                                  LET (R1)+ := (R2)+            ;MOVE COMMANDS TO SEQ TABLE.
024166                                                                                  MOV     (R2)+,(R
(4) 024166  012221
                                                ENDDO
024170                                                                                  BR      50452$
(4) 024170  000773
(3) 024172                                                                      50453$:
                                                LET (R1) := #END                ;STORE END OF SEQUENCE CODE.
024172                                                                                  MOV     #END,(R1
(4) 024172  012711  177777
                                                RTS     PC                      ;RETURN.
024176  000207


                                        ;       BASIC FUNCTION COMMAND SEQUENCE

024200  140004                          BFSEQ0: .WORD   SCH                     ;SET CHAR. 200.         (1)
024202  000200                                  200
024204  000001                                  1
024206  000000                                  0
024210  100013                                  DRI                             ;DRIVE INIT.            (2)
024212  000001                                  1
024214  000001                                  1
024216  000000                                  0
024220  140004                                  SCH                             ;SET CHAR. 20           (3)
024222  000020                                  20
024224  000001                                  1
024226  000000                                  0
024230  100017                                  GES                             ;GET STATUS.            (4)
024232  000001                                  1
024234  000001                                  1
024236  000000                                  0
024240  140004                                  SCH                             ;SET CHAR. 40.          (5)
024242  000040                                  40
024244  000001                                  1
024246  000000                                  0
024250  177777                          .WORD   END


024252  102010                          BFSEQ1:         RWD                     ;REWIND TWICE.          (6)
024254  000001                                          1
024256  000002                                          2
024260  000000                                          0
024262  177777                          .WORD   END

024264  104105                          BFSEQ2:         WTV                     ;WRITE/VERIFY PAT 1.    (7)
024266  004000                                          DATCNT
024270  000001                                          1
```

```
4756  024272  000001                                    1
4757  024274  104105                                    WTV             ;WTV PAT 2.         (8)
4758  024276  004000                                    DATCNT
4759  024300  000001                                    1
4760  024302  000002                                    2
4761  024304  104105                                    WTV             ;WTV PAT 3.         (9)
4762  024306  004000                                    DATCNT
4763  024310  000001                                    1
4764  024312  000003                                    3
4765  024314  104105                                    WTV             ;WTV PAT 4.         (10)
4766  024316  004000                                    DATCNT
4767  024320  000001                                    1
4768  024322  000004                                    4
4769  024324  104105                                    WTV             ;WTV PAT 5.         (11)
4770  024326  004000                                    DATCNT
4771  024330  000001                                    1
4772  024332  000005                                    5
4773  024334  104105                                    WTV             ;WTV PAT 6.         (12)
4774  024336  004000                                    DATCNT
4775  024340  000001                                    1
4776  024342  000006                                    6
4777  024344  104105                                    WTV             ;WTV PAT 0.         (13)
4778  024346  004000                                    DATCNT
4779  024350  000001                                    1
4780  024352  000000                                    0
4781  024354  177777                        .WORD       END
4782
4783  024356  100011              BFSEQ3:               WTM             ;WRITE TAPE MARK.   (14)
4784  024360  000001                                    1
4785  024362  000001                                    1
4786  024364  000000                                    0
4787  024366  104005                                    WRT             ;WRITE 10 RECORDS.  (15)
4788  024370  004000                                    DATCNT
4789  024372  000010                                    10
4790  024374  000001                                    1
4791  024376  100411                                    ERS             ;ERASE 10 TIMES.    (16)
4792  024400  000001                                    1
4793  024402  000010                                    10
4794  024404  000000                                    0
4795  024406  100011                                    WTM             ;WRITE TAPE MARK.   (17)
4796  024410  000001                                    1
4797  024412  000001                                    1
4798  024414  000000                                    0
4799  024416  101011                                    WTR             ;WTM RETRY          (18)
4800  024420  000001                                    1
4801  024422  000001                                    1
4802  024424  000000                                    0
4803  024426  177777                        .WORD       END
4804
4805  024430  105410              BFSEQ4:               SFR             ;SPACE 2 FILES REV. (19)
4806  024432  000002                                    2
4807  024434  000001                                    1
4808  024436  000000                                    0
4809  024440  105010                                    SFF             ;SPACE 2 FILES FWD. (20)
4810  024442  000002                                    2
4811  024444  000001                                    1
```

```
4812  024446  000000                                    0
4813  024450  105410                                    SFR             ;SPACE 2 FILES REV.     (21)
4814  024452  000001                                    1
4815  024454  000002                                    2
4816  024456  000000                                    0
4817  024460  105010                                    SFF             ;SPACE 2 FILES FWD.     (22)
4818  024462  000001                                    1
4819  024464  000002                                    2
4820  024466  000000                                    0
4821  024470  177777                          .WORD     END
4822
4823  024472  102010                BFSEQ5:             RWD             ;REWIND.                (23)
4824  024474  000001                                    1
4825  024476  000001                                    1
4826  024500  000000                                    0
4827  024502  104010                                    SRF             ;SPACE 7 RECORDS FWD.   (24)
4828  024504  000007                                    7
4829  024506  000001                                    1
4830  024510  000000                                    0
4831  024512  104410                                    SRR             ;SPACE 7 RECORDS REV.   (25)
4832  024514  000007                                    7
4833  024516  000001                                    1
4834  024520  000000                                    0
4835  024522  104010                                    SRF             ;SPACE 7 RECORDS FWD.   (26)
4836  024524  000001                                    1
4837  024526  000007                                    7
4838  024530  000000                                    0
4839  024532  104410                                    SRR             ;SPACE 7 RECORDS REV.   (27)
4840  024534  000001                                    1
4841  024536  000007                                    7
4842  024540  000000                                    0
4843  024542  177777                          .WORD     END
4844
4845  024544  102010                BFSEQ6:             RWD             ;REWIND.                (28)
4846  024546  000001                                    1
4847  024550  000001                                    1
4848  024552  000000                                    0
4849  024554  104005                                    WRT             ;WRITE.                 (29)
4850  024556  004000                                    DATCNT
4851  024560  000001                                    1
4852  024562  000001                                    1
4853  024564  105005                                    WRR             ;WRITE RETRY.           (30)
4854  024566  004000                                    DATCNT
4855  024570  000001                                    1
4856  024572  000001                                    1
4857  024574  177777                          .WORD     END
4858
4859  024576  104401                BFSEQ7:             RDR             ;READ REV.              (31)
4860  024600  004000                                    DATCNT
4861  024602  000001                                    1
4862  024604  000001                                    1
4863  024606  105401                                    RNR             ;READ NEXT REV.         (32)
4864  024610  004000                                    DATCNT
4865  024612  000001                                    1
4866  024614  000001                                    1
4867  024616  125401                                    RNF             ;READ NEXT FWD.         (33)
```

```
 4868  024620  004000                              DATCNT
 4869  024622  000001                              1
 4870  024624  000001                              1
 4871  024626  177777                    .WORD     END
 4872
 4873  024630  104001              BFSEQ8:         RDF                 ;READ FWD.              (34)
 4874  024632  004000                              DATCNT
 4875  024634  000001                              1
 4876  024636  000001                              1
 4877  024640  105001                              RPF                 ;READ PREVIOUS FWD.     (35)
 4878  024642  004000                              DATCNT
 4879  024644  000001                              1
 4880  024646  000001                              1
 4881  024650  125001                              RPR                 ;READ PREVIOUS REV.     (36)
 4882  024652  004000                              DATCNT
 4883  024654  000001                              1
 4884  024656  000001                              1
 4885  024660  177777                    .WORD     END
 4886
 4887  024662  101012              BFSEQ9: .WORD     CLN                 ;CLEAN.                 (37)
 4888  024664  000001                              1
 4889  024666  000001                              1
 4890  024670  000000                              0
 4891  024672  102010                              RWD                 ;REWIND                 (38)
 4892  024674  000001                              1
 4893  024676  000001                              1
 4894  024700  000000                              0
 4895  024702  177777                    .WORD     END                 ;END OF SEQUENCE.
 4896
 4897  024704  104105              BFSE10:         WTV                 ;WRITE/VERIFY EVEN LENGTH.  (39)
 4898  024706  000012                              12
 4899  024710  000001                              1
 4900  024712  000000                              0
 4901  024714  104105                              WTV                 ;WRITE/VERIFY ODD LENGTH.   (40)
 4902  024716  000011                              11
 4903  024720  000001                              1
 4904  024722  000000                              0
 4905  024724  177777                    .WORD     END
 4906                                    .EVEN
 4907
 4908  024726                                      ENDTST
   (3) 024726                          L10017:
   (3) 024726  104401                                                  TRAP    C$ETST
```

```
                                        .SBTTL  TEST 2: DATA RELIABILITY.

                                        ;++
                                        ; TEST TO CHECK THE DATA RELIABILITY OF THE TU80.
                                        ;--
                                                BGNTST
                                        T2::

                                                LET RANDOM :B= #1               ;SET THE RANDOM OPERATIONS FLAG.
                                                                                        MOVB    #1,RANDO
                                                LET EXPBOT :B= #0               ;CLEAR EXPECT BOT FLAG.
                                                                                        CLRB    EXPBOT
                                                LET R2 := #DATCNT - #1          ;SET UP THE RECORD LENGTH MASK.
                                                                                        MOV     #DATCNT,
                                                                                        DEC     R2
                                                LET LENMSK := COMP R2           ;ALLOW MAXIMUM BUFFER.
                                                                                        MOV     R2,LENMS
                                                                                        COM     LENMSK
                                                JSR PC,SETCH                    ;CMD 1 = SET CHARACTERISTIC.
                                                IFB STAFLG NE #0 THEN           ;IF STARTING THEN:
                                                                                        TSTB    STAFLG
                                                                                        BEQ     50454$

                                                  JSR   PC,SETRW                ;CMD2=REWIND
                                                  LET STAFLG :B= #0             ;CLR START FLAG.
                                                                                        CLRB    STAFLG
                                                ENDIF
                                                                                50454$:
                                                LET (R1)+ := #WTV               ;CMD3 = WRITE/ VERIFY.
                                                                                        MOV     #WTV,(R1
                                                LET (R1)+ := #DATCNT            ;SET BRF TO MAX FOR PATTERN GENERATION.
                                                                                        MOV     #DATCNT,
                                                LET R2 := COMP #RNOPSC
                                                                                        MOV     #RNOPSC,
                                                                                        COM     R2
                                                LET (R1)+ := R2                 ;31 OPERATIONS.
                                                                                        MOV     R2,(R1)+
                                                LET (R1)+ := #RANP              ;RANDOM PATTERN.
                                                                                        MOV     #RANP,(R
                                                REPEAT                          ;REPEAT TO EOT:
                                                                                50455$:
                                                  WHILE R1 LT #SEQEND DO        ;FILL SEQ TBL WITH RANDOM CMDS.
                                                                                50456$:
                                                                                        CMP     R1,#SEQE
                                                                                        BGE     50457$
                                                    LET RANS := RANS + RANB
                                                                                        ADD     RANB,RAN
                                                    LET R2 := RANS CLR.BY #177741  ;R2 = RANDOM # (0 - 36).
                                                                                        MOV     RANS,R2
                                                                                        BIC     #177741,
                                                    JSR PC,@RANCMD(R2)          ;SET UP A RANDOM CMD + BRF.
                                                  ENDDO
                                                                                        BR      50456$
                                                                                50457$:
                                                LET (R1) := #END                ;STORE END OF SEQUENCE CODE IN TABLE.
                                                                                        MOV     #END,(R1
                                                JSR   PC,EXALL                  ;GO EXECUTE ALL CMDS IN SEQUENCE TABLE.
```

```
4910
4911
4912
4913
4914
4915  024730
 (3)  024730
4916
4917  024730
 (4)  024730  112737  000001  003523
4918  024736
 (4)  024736  105037  003522
4919  024742
 (4)  024742  012702  004000
 (6)  024746  005302
4920  024750
 (6)  024750  010237  003440
 (6)  024754  005137  003440
4921  024760  004737  006714
4922  024764
 (6)  024764  105737  003536
 (9)  024770  001404
4923  024772  004737  006740
4924  024776
 (4)  024776  105037  003536
4925  025002
 (4)  025002
4926  025002
 (4)  025002  012721  104105
4927  025006
 (4)  025006  012721  004000
4928  025012
 (6)  025012  012702  177740
 (6)  025016  005102
4929  025020
 (4)  025020  010221
4930  025022
 (4)  025022  012721  000007
4931  025026
 (3)  025026
4932  025026
 (4)  025026
 (6)  025026  020127  003634
 (9)  025032  002012
4933  025034
 (6)  025034  063737  003442  003444
4934  025042
 (4)  025042  013702  003444
 (6)  025046  042702  177741
4935  025052  004772  025210
4936  025056
 (4)  025056  000763
 (3)  025060
4937  025060
 (4)  025060  012711  177777
4938  025064  004737  006760
```

```
4939  025070
 (4)  025070  012701  003544                    LET R1 := #CMDSEQ              ;INIT CMD SEQ TBL POINTER,
                                                                                        MOV     #CMDSEQ,
4940  025074
 (3)  025074  005702                            UNTIL R2 NE #0                 ;REPEAT UNTIL EOT IS REACHED
 (6)  025076  001753                                                                    TST     R2
                                                                                        BEQ     50455$
4941  025100
 (6)  025100  105237  003532                    LET ALLEOT :B= ALLEOT + #1      ;FLAG ALL UNITS @ EOT
                                                                                        INCB    ALLEOT
4942  025104  000240                            NOP
4943  025106  000240                            NOP
4944  025110  000240                            NOP
4945  025112  004737  027072                    JSR     PC,T5WEOT              ;WRITE ONE RECORD BEYOND EOT ON ALL UNIT
4946                                                                            ;SO THAT SHORTER READ STOP DISTANCE
4947                                                                            ;SHALL POSITION HEAD IN CLEAN IRG GAP
4948                                                                            ;READ REV THAT EXTRA REC TO RE-POSITION
4949  025116  004737  025250                    JSR     PC,RANRD               ;SET UP READ REV/FWD CMDS,
4950  025122                                    LET CMDSEQ+4 := COMP #RNOPSC   ;# OF RECORDS FOR READ REV.
 (6)  025122  012737  177740  003550                                                 MOV     #RNOPSC,
 (6)  025130  005137  003550                                                        COM     CMDSEQ+4
4951  025134                                    LET CMDSEQ+14 := CMDSEQ+4      ;# OF RECORDS FOR READ FORWARD.
 (4)  025134  013737  003550  003560                                                MOV     CMDSEQ+4
4952  025142                                    LET (R1) := #END               ;STORE END OF SEQUENSE CODE IN SEQ TABLE
 (4)  025142  012711  177777                                                        MOV     #END,(R1
4953  025146  004737  006760                    JSR     PC,EXALL               ;GO EXECUTE READ REV/FWD OF LAST N RECOR
4954  025152                                    LET ALLEOT :B= #0              ;CLEAR ALL UNITS @ EOT FLAG
 (4)  025152  105037  003532                                                        CLRB    ALLEOT
4955  025156                                    LET RPTFLG :B= #1              ;REQUEST PERFORMANCE REPORT DURING REWIN
 (4)  025156  112737  000001  003525                                                MOVB    #1,RPTFL
4956  025164                                    LET R1 := #CMDSEQ              ;INIT SEQ TBL POINTER,
 (4)  025164  012701  003544                                                        MOV     #CMDSEQ,
4957  025170  004737  006740                    JSR PC,SETRW                   ;STORE REWIND IN SEQ TBL,
4958  025174                                    LET (R1) := #END               ;STORE END IN SEQ TBL,
 (4)  025174  012711  177777                                                        MOV     #END,(R1
4959  025200  004737  006760                    JSR PC,EXALL                   ;EXECUTE REWIND CMD ON ALL UNITS
4960
4961  025204                                    EXIT    TST
 (3)  025204  104432                                                        TRAP    C$EXIT
 (3)  025206  000174                                                        .WORD   L10034-.
4962
```

```
                                        ;       ADDRESSES OF SUBROUTINES USED TO SET UP RANDOM OPERATIONS IN
                                        ;       THE DATA RELIABILITY TEST.
                                        ;
4964
4965
4966
4967  025210  025336                    RANCMD: RANWV                   ;WRITE/VERIFY.
4968  025212  025324                            RANWR                   ;WRITE.
4969  025214  025324                            RANWR                   ;WRITE.
4970  025216  025324                            RANWR                   ;WRITE.
4971  025220  025324                            RANWR                   ;WRITE.
4972  025222  025324                            RANWR                   ;WRITE.
4973  025224  025324                            RANWR                   ;WRITE.
4974  025226  025324                            RANWR                   ;WRITE.
4975  025230  025250                            RANRD                   ;READ.
4976  025232  025250                            RANRD                   ;READ.
4977  025234  025250                            RANRD                   ;READ.
4978  025236  025250                            RANRD                   ;READ.
4979  025240  025250                            RANRD                   ;READ.
4980  025242  025250                            RANRD                   ;READ.
4981  025244  025250                            RANRD                   ;READ.
4982  025246  025250                            RANRD                   ;READ.
4983
4984
4985
4986
4987
                                        ;       SUBROUTINE TO SET UP READ COMMANDS IN SEQUENCE TABLE.
                                        ;       INPUTS:
                                        ;       OUTPUTS:
                                        ;       REGISTERS:      R2
                                        ;       CALLS:
4992
4993
4994  025250                            RANRD:  LET (R1)+ := #RDR               ;STORE READ REV CMD.
 (4)  025250  012721  104401                                                            MOV     #RDR,(R1
4995  025254                                    LET (R1)+ := #DATCNT            ;SET BRF TO MAX FOR READ RANDOM LENGTHS.
 (4)  025254  012721  004000                                                            MOV     #DATCNT,
4996  025260                                    LET RANB := RANB + RANS
 (6)  025260  063737  003444  003442                                                    ADD     RANS,RAN
4997  025266                                    LET R2 := RANB CLR.BY #RNOPSC
 (4)  025266  013702  003442                                                            MOV     RANB,R2
 (6)  025272  042702  177740                                                            BIC     #RNOPSC,
4998  025276                                    LET (R1)+ := R2                 ;SET RANDOM # OF OPERATIONS.
 (4)  025276  010221                                                                    MOV     R2,(R1)+
4999  025300                                    LET (R1)+ := #RANP              ;RANDOM PATTERN.
 (4)  025300  012721  000007                                                            MOV     #RANP,(R
5000  025304                                    LET (R1)+ := #RDF               ;STORE READ FWD CMD.
 (4)  025304  012721  104001                                                            MOV     #RDF,(R1
5001  025310                                    LET (R1)+ := #DATCNT            ;SET BRF TO MAX TO READ RANDOM LENGTHS.
 (4)  025310  012721  004000                                                            MOV     #DATCNT,
5002  025314                                    LET (R1)+ := R2                 ;SET RANDOM # OF OPERATIONS.
 (4)  025314  010221                                                                    MOV     R2,(R1)+
5003  025316                                    LET (R1)+ := #RANP              ;RANDOM PATTERN.
 (4)  025316  012721  000007                                                            MOV     #RANP,(R
5004  025322  000207                           RTS PC
```

```
5006                                    ;       SUBROUTINE TO SET UP A WRITE COMMAND IN THE SEQUENCE TABLE.
5007                                    ;       INPUTS:
5008                                    ;       OUTPUTS:
5009                                    ;       REGISTERS:
5010                                    ;       CALLS:
5011
5012  025324                            RANWR:  LET (R1)+ := #WRT               ;STORE WRITE CMD.
 (4)  025324  012721  104005                                                            MOV     #WRT,(R1
5013  025330  004737  025350                    JSR PC,RANW                     ;STORE BRF, # OF OPERATIONS, PATTERN.
5014  025334  000207                            RTS PC
5015
5016
5017
5018
5019
5020                                    ;       SUBROUTINE TO SET UP A WRITE/VERIFY COMMAND IN THE SEQUENCE TABLE.
5021                                    ;       INPUTS:
5022                                    ;       OUTPUTS:
5023                                    ;       REGISTERS:
5024                                    ;       CALLS:
5025
5026  025336                            RANWV:  LET (R1)+ := #WTV               ;STORE WRITE/VERIFY CMD.
 (4)  025336  012721  104105                                                            MOV     #WTV,(R1
5027  025342  004737  025350                    JSR PC,RANW                     ;STORE BRF, # OF OPERATIONS, PATTERN.
5028  025346  000207                            RTS     PC
5029
5030
5031
5032
5033
5034                                    ;       SUBROUTINE TO STORE BRF, # OF OPERATIONS, PATTERN IN COMMAND
5035                                    ;       SEQUENCE TABLE FOR WRITE AND WRITE/VERIFY COMMANDS.
5036                                    ;       INPUTS:
5037                                    ;       OUTPUTS:
5038                                    ;       REGISTERS:      R2
5039                                    ;       CALLS:
5040
5041  025350                            RANW:   LET (R1)+ := #DATCNT            ;SET BRF TO MAX FOR PATTERN GENERATION.
 (4)  025350  012721  004000                                                            MOV     #DATCNT,
5042                                                                            ;RANDOM BRF WILL BE GENERATED FOR EACH R
5043  025354                                    LET RANB := RANB + RANS
 (6)  025354  063737  003444  003442                                                    ADD     RANS,RAN
5044  025362                                    LET R2 := RANB CLR.BY #RNOPSC
 (4)  025362  013702  003442                                                            MOV     RANB,R2
 (6)  025366  042702  177740                                                            BIC     #RNOPSC,
5045  025372                                    LET (R1)+ := R2                 ;SET RANDOM # OF OPERATIONS.
 (4)  025372  010221                                                                    MOV     R2,(R1)+
5046  025374                                    LET (R1)+ := #RANP              ;RANDOM PATTERN.
 (4)  025374  012721  000007                                                            MOV     #RANP,(R
5047  025400  000207                            RTS PC                          ;RETURN.
5048
5049                                            .EVEN
5050
5051  025402                                    ENDTST
```

```
   (3)  025402                          L10034:
   (3)  025402  104401                                  TRAP    C$ETST
  5052
```

```
                                        .SBTTL  TEST 3: WRITE AND READ STREAMING TEST.

                                        ;++
                                        ;
                                        ;       THIS TEST STREAM WRITES 7000 RECORDS OF 1000 BYTES EACH.
                                        ;       DATA IS THEN VERIFIED BY READ REVERSE 7000 RECORDS, FOLLOWED
                                        ;       BY READ FORWARD THE 7000 RECORDS.  THIS PARTICULAR SEQUENCE IS
                                        ;       PERFORMED TWICE ON EACH UNIT UNDER TEST.  ALL STREAMING SPEEDS
                                        ;       ARE TESTED FOR BOTH READ AND WRITE OPERATIONS.
                                        ;
                                        ;--

025404                                  BGNTST
025404                                  T3::
025404                                  IFB HERE EQ #0 THEN
025404  105737  003341                                                  TSTB    HERE
025410  001013                                                          BNE     50460$
025412                                   PRINTF #TAPCAP
025412  012746  021112                                                  MOV     #TAPCAP,
025416  012746  000001                                                  MOV     #1,-(SP)
025422  010600                                                          MOV     SP,R0
025424  104417                                                          TRAP    C$PNTF
025426  062706  000004                                                  ADD     #4,SP
025432                                   LET HERE :B= #255.
025432  112737  000377  003341                                          MOVB    #255.,HE
025440                                  ENDIF
025440                                                          50460$:
                                        LET DOAGIN :B= #0               ;FIRST OF TWO ITERATONS
025440  105037  003340                                                  CLRB    DOAGIN
                                        LET RANDOM :B= #0               ;CLEAR THE RANDOM OPERATIONS FLAG.
025444  105037  003523                                                  CLRB    RANDOM
                                        LET EXPBOT :B= #0               ;CLEAR THE EXPECT BOT FLAG.
025450  105037  003522                                                  CLRB    EXPBOT
025454  004737  006714                JSR PC, SETCH                   ;SET CHARACTERISTICS.
025460  004737  006740                JSR PC, SETRW                   ;SET REWIND COMMAND IN BUFFER.
                                        LET STAFLG :B= #0               ;CLEAR THE START FLAG.
025464  105037  003536                                                  CLRB    STAFLG
                                        LET (R1) := #END                ;PLACE END FLAG IN SEQUENCE TABLE.
025470  012711  177777                                                  MOV     #END,(R1
025474  004737  006760                JSR PC, EXALL                   ;REWIND ALL UNITS.

025500  004737  016614                JSR PC, FIRSTU                  ;FIND THE FIRST UNIT TO TEST (UUT)

                                        ; ***************************************************************

                                        ;WRITE AND READ EACH UNIT IN TURN BEFORE GOING ON TO THE NEXT.

                                        ; ***************************************************************

025504                                  WHILE DEVTBL(R5) NE #END DO     ;WHILE THERE ARE MORE DEVICES:
025504                                                          50461$:
025504  026527  002536  177777                                          CMP     DEVTBL(R
025512  001546                                                          BEQ     50462$

                                        LET BTPT := BTADDR(R5)          ;CLEAR BAD SPOT COUNTER
```

```
  (4)  025514  016537  002550  003520                                                    MOV     BTADDR(R
5092   025522
  (4)  025522  005077  155772                                                            CLR     @BTPT
5093   025526                        LET @BTPT := #0                ;START FROM BOT
  (4)  025526  112737  000377  003533                                                    MOVB    #255.,ST
5094   025534                        LET STREAM :B= #255.           ;SET FLAG - WE'RE GOING TO STREAM
  (4)  025534  012701  003544                                                            MOV     #CMDSEQ,
5095   025540                  1$:     LET R1 := #CMDSEQ            ;SETUP SEQUENCE TABLE ADDRESS
  (4)  025540  012721  104005                                                            MOV     #WRT,(R1
5096   025544                        LET (R1)+ := #WRT              ;WRITE COMMAND
  (4)  025544  012721  001750                                                            MOV     #1000.,(
5097   025550                        LET (R1)+ := #1000.            ;1000-BYTE RECORD LENGTH.
  (4)  025550  012721  015530                                                            MOV     #7000.,(
5098   025554                        LET (R1)+ := #7000.            ;WRITE 7000 RECORDS.
  (4)  025554  012721  000005                                                            MOV     #5,(R1)+
5099   025560                        LET (R1)  := #END              ;GENERATE AND WRITE PATTERN 5.
  (4)  025560  012711  177777                                                            MOV     #END,(R1
5100                                                               ;SET END OF SEQUENCE TABLE.
5101   025564                        LET R1 := #CMDSEQ              ;SEQ. TABLE ADDRESS FOR SUBR. 'SETUP'.
  (4)  025564  012701  003544                                                            MOV     #CMDSEQ,
5102   025570  004737  007722       JSR PC, SETUP                  ;SETUP THE COMMAND TABLE
5103
5104   025574                        WHILE NCNT LT NCNT1 DO         ;WHILE MORE RECORDS SHOULD BE WRITTEN:
  (4)  025574                                                                      50463$:
  (6)  025574  023737  003422  003424                                                CMP     NCNT,NCN
  (9)  025602  002022                                                                BGE     50464$
5105
5106   025604  004737  007614            JSR PC, CMDAC             ;SAVE ASCII COMMAND FOR ERROR MESSAGE
5107   025610  004737  010576            JSR PC, EXCUTE            ;ISSUE COMMAND TO UNIT.
5108   025614  004737  011166            JSR PC, GOWAIT            ;GO WAIT FOR DONE TO SET
5109   025620                        IF DEVTBL(R5) EQ #NINUSE THEN
  (6)  025620  026527  002536  177774                                                CMP     DEVTBL(R
  (9)  025626  001005                                                                BNE     50465$
5110   025630                        LET NCNT := NCNT1 - #1
  (4)  025630  013737  003424  003422                                                MOV     NCNT1,NC
  (6)  025636  005337  003422                                                        DEC     NCNT
5111   025642                        ENDIF
  (4)  025642                                                                      50465$:
5112   025642                            LET NCNT := NCNT + #1      ;UPDATE THE RECORD COUNT
  (6)  025642  005237  003422                                                        INC     NCNT
5113   025646                        ENDDO                          ;END OF RECORD 'DO' LOOP
  (4)  025646  000752                                                                BR      50463$
  (3)  025650                                                                      50464$:
5114   025650                        IF DEVTBL(R5) NE #NINUSE THEN  ;IF DRIVE DROPPED EXIT
  (6)  025650  026527  002536  177774                                                CMP     DEVTBL(R
  (9)  025656  001453                                                                BEQ     50466$
5115   025660  004737  017312       JSR PC, WRITEM                 ;WRITE A TAPE MARK NOW
5116   025664                        LET ERSFLG :B= #0              ;DON'T ERASE AFTER BACKSPACE
  (4)  025664  105037  003534                                                        CLRB    ERSFLG
5117   025670  004737  014374       JSR PC, BORERS                 ;BACKSPACE OVER THE TAPE MARK
5118   025674                        LET R1 := #CMDSEQ              ;RELOAD THE COMMAND TABLE
  (4)  025674  012701  003544                                                        MOV     #CMDSEQ,
5119   025700                        LET (R1)+ := #WRT              ;NOT REALLY NECESSARY FOR WHAT FOLLOWS
  (4)  025700  012721  104005                                                        MOV     #WRT,(R1
5120   025704                        LET (R1)+ := #1000.            ;1000-BYTE RECORD LENGTH
  (4)  025704  012721  001750                                                        MOV     #1000.,(
```

```
5121  025710
 (4)  025710  012721  015530                LET (R1)+ := #7000.             ;FOR 7000 ITERATIONS
5122  025714                                                                          MOV     #7000.,(
 (4)  025714  012721  000005                LET (R1)+ := #5                 ;DATA PATTERN NUMBER 5
                                                                                      MOV     #5,(R1)+
5123  025720                                LET (R1) := #END                ;TABLE TERMINATOR
 (4)  025720  012711  177777                                                          MOV     #END,(R1
5124  025724                                LET R1 := #CMDSEQ               ;TOP OF THE TABLE AGAIN
 (4)  025724  012701  003544                                                          MOV     #CMDSEQ,
5125  025730  004737  007722                JSR PC, SETUP                   ;SET UP THE COMMAND TABLE
5126  025734                                LET VFYFLG :B= #1               ;ALLOW THE DATA VERIFY
 (4)  025734  112737  000001  003524                                                 MOVB    #1,VFYFL
5127  025742                                LET R5SAVE := R5                ;SAVE R5
 (4)  025742  010537  003462                                                          MOV     R5,R5SAV
5128  025746  004737  015370                JSR PC, VFYDAT                  ;GO OFF AND CHECK REV AND FWD.
5129  025752                                LET R5 := R5SAVE                ;RESTORE R5
 (4)  025752  013705  003462                                                          MOV     R5SAVE,R
5130  025756                                  IF DEVTBL(R5) NE #NINUSE THEN ;IF DRIVE DROPPED EXIT
 (6)  025756  026527  002536  177774                                                 CMP     DEVTBL(R
 (9)  025764  001410                                                                 BEQ     50467$
5131  025766  105137  003340                COMB    DOAGIN                  ;LOOP CONTROL
5132  025772  001405                        BEQ     2$                      ;IF ZERO, DONE
5133  025774                                LET NCNT := #0                  ;KEEP CONTROL HERE
 (4)  025774  005037  003422                                                          CLR     NCNT
5134  026000  004737  017312                JSR PC, WRITEM                  ;WRITE ANOTHER TAPE MARK
5135  026004  000653                        BR      1$                      ;AND LOOP
5136  026006                                  ENDIF
 (4)  026006                                                                                  50467$:
5137  026006                                ENDIF
 (4)  026006                                                                                  50466$:
5138  026006                          2$:   LET NCNT := #0                  ;CLEAR RECORD COUNT
 (4)  026006  005037  003422                                                          CLR     NCNT
5139  026012                                LET VFYFLG :B= #0               ;CLEAR VERIFY FLAG
 (4)  026012  105037  003524                                                          CLRB    VFYFLG
5140  026016                                LET EXPBOT :B= #0               ;CLEAR EXPECT BOT FLAG.
 (4)  026016  105037  003522                                                          CLRB    EXPBOT
5141  026022  004737  016662                JSR PC, NEXTU                   ;GET NEXT UNIT TO TEST (UUT).
5142
5143  026026                                ENDDO                           ;END OF UUT LOOP
 (4)  026026  000626                                                                  BR      50461$
 (3)  026030                                                                                  50462$:
5144
5145  026030                                LET STREAM :B= #0               ;CLEAR STREAMING FLAG FOR OTHER TESTS.
 (4)  026030  105037  003533                                                          CLRB    STREAM
5146
5147  026034                                EXIT    TST                     ;EXIT TEST
 (3)  026034  104432                                                                  TRAP    C$EXIT
 (3)  026036  000002                                                                  .WORD   L10035-.
5148                                    .EVEN                           ;JUST IN CASE.
5149
5150  026040                                ENDTST
 (3)  026040                      L10035:
 (3)  026040  104401                                                                  TRAP    C$ETST
```

```
                                .SBTTL  TEST 4: WRITE COMPATABILITY/WRITE UTILITY.

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

                                        BGNTST
                                T4::

                                        LET RANDOM :B= #1               ;SET THE RANDOM OPERATIONS FLAG.
                                                                                MOVB    #1,RANDO
                                        LET EXPBOT :B= #0               ;CLEAR EXPECT BOT FLAG.
                                                                                CLRB    EXPBOT
                                        LET R2 := #DATCNT - #1          ;SET UP THE RECORD LENGTH MASK.
                                                                                MOV     #DATCNT,
                                                                                DEC     R2
                                        LET LENMSK := COMP R2           ;ALLOW MAXIMUM BUFFER.
                                                                                MOV     R2,LENMS
                                                                                COM     LENMSK
                                        JSR PC,SETCH                    ;CMD 1 = SET CHARACTERISTIC.
                                        JSR PC,SETRW                    ;CMD2=REWIND
                                        LET STAFLG :B= #0               ;CLEAR START FLAG
                                                                                CLRB    STAFLG
                                        REPEAT                          ;REPEAT TO EOT.
                                                                              50470$:
                                          WHILE R1 LT #SEQEND DO        ;WHILE THERE IS MORE ROOM IN SEQ TABLE:
                                                                              50471$:
                                                                                CMP     R1,#SEQE
                                                                                BGE     50472$
                                            JSR PC,RANWR                  ;STORE A WRITE CMD IN SEQUENCE TABLE.
                                          ENDDO
                                                                                BR      50471$
                                                                              50472$:
                                          LET (R1) := #END              ;STORE END OF SEQUENCE CODE IN TABLE.
                                                                                MOV     #END,(R1
                                          JSR   PC,EXALL                ;EXECUTE ALL CMDS IN SEQ TBL ON UNITS.
                                          LET R1 := #CMDSEQ             ;INIT SEQ TBL POINTER,
                                                                                MOV     #CMDSEQ,
                                        UNTIL R2 NE #0                  ;REPEAT UNTIL EOT IS REACHED
                                                                                TST     R2
                                                                                BEQ     50470$
                                        LET ALLEOT :B= ALLEOT + #1      ;SET ALL UNITS @ EOT FLAG
                                                                                INCB    ALLEOT
                                        NOP
                                        NOP
                                        NOP
                                        JSR     PC,T5WEOT               ;WRITE ONE RECORD BEYOND EOT ON ALL UNIT
                                                                        ;SO THAT SHORTER READ STOP DISTANCE
                                                                        ;SHALL POSITION HEAD IN CLEAN IRG GAP
                                                                        ;READ REV THAT EXTRA REC TO RE-POSITION
                                        LET ALLEOT :B= #0               ;CLEAR ALL UNITS @ EOT FLAG
                                                                                CLRB    ALLEOT
                                        JSR PC,SETRW                    ;STORE REWIND IN SEQ TBL,
                                        LET (R1) := #END                ;STORE END IN SEQ TBL,
                                                                                MOV     #END,(R1
```

```
 5187  026174  004737  006760                    JSR PC,EXALL                ;EXECUTE REWIND CMD ON ALL UNITS
 5188
 5189  026200                                    EXIT    TST
   (3) 026200  104432                                                        TRAP    C$EXIT
   (3) 026202  000002                                                        .WORD   L10036-.
 5190
 5191                                            .EVEN
 5192
 5193  026204                                    ENDTST
   (3) 026204                              L10036:
   (3) 026204  104401                                                        TRAP    C$ETST
 5194
```

```
5196
5197                                    .SBTTL  TEST 5:  READ COMPATABILITY/READ UTILITY.
5198
5199                                    ;++
5200                                    ; TEST TO READ ENTIRE TAPE FORWARD AND REVERSE.
5201                                    ;--
5202
5203  026206                                    BGNTST
 (3)  026206                            T5::
5204
5205  026206                                    LET RANDOM :B= #1             ;SET THE RANDOM OPERATIONS FLAG.
 (4)  026206  112737  000001  003523                                                MOVB    #1,RANDO
5206  026214                                    LET EXPBOT :B= #1             ;SET EXPECT BOT FLAG.
 (4)  026214  112737  000001  003522                                                MOVB    #1,EXPBO
5207  026222  004737  006714                    JSR PC,SETCH                  ;CMD 1 = SET CHARACTERISTIC.
5208  026226  004737  006740                    JSR PC,SETRW                  ;CMD2=REWIND.
5209  026232                                    LET STAFLG :B= #0             ;CLEAR START FLAG
 (4)  026232  105037  003536                                                CLRB    STAFLG
5210  026236                                    LET (R1)+ := #RDF             ;CMD3 = READ FORWARD.
 (4)  026236  012721  104001                                                MOV     #RDF,(R1
5211  026242                                    LET (R1)+ := #DATCNT          ;SET LENGTH TO MAX FOR UNKNOWN LENGTHS.
 (4)  026242  012721  004000                                                MOV     #DATCNT,
5212  026246                                    LET (R1)+ := #77777           ;SET RECORD COUNT TO MAX FOR WHOLE TAPE.
 (4)  026246  012721  077777                                                MOV     #77777,(
5213  026252                                    LET (R1)+ := #RANP            ;PATTERN = RANDOM.
 (4)  026252  012721  000007                                                MOV     #RANP,(R
5214  026256                                    LET (R1) := #END              ;STORE END OF SEQUENCE CODE IN TABLE.
 (4)  026256  012711  177777                                                MOV     #END,(R1
5215  026262  004737  006760                    JSR     PC,EXALL              ;EXECUTE ALL CMDS IN SEQ TBL ON ALL UNIT
5216  026266                                    LET ALLEOT :B= ALLEOT + #1    ;FLAG TO ALLOW ALL UNITS AT EOT TO READ
 (6)  026266  105237  003532                                                INCB    ALLEOT
5217  026272                                    LET R1 := #CMDSEQ             ;INIT CMD SEQ TBL POINTER.
 (4)  026272  012701  003544                                                MOV     #CMDSEQ,
5218  026276                                    LET (R1)+ := #RDR             ;CMD1 = READ REVERSE.
 (4)  026276  012721  104401                                                MOV     #RDR,(R1
5219  026302                                    LET (R1)+ := #DATCNT          ;SET LENGTH TO MAX FOR UNKNOWN LENGTHS.
 (4)  026302  012721  004000                                                MOV     #DATCNT,
5220  026306                                    LET (R1)+ := #77777           ;RECORD COUNT = MAX FOR WHOLE TAPE.
 (4)  026306  012721  077777                                                MOV     #77777,(
5221  026312                                    LET (R1)+ := #RANP            ;PATTERN = RANDOM.
 (4)  026312  012721  000007                                                MOV     #RANP,(R
5222  026316                                    LET (R1) := #END              ;STORE END OF SEQUENCE CODE IN TABLE.
 (4)  026316  012711  177777                                                MOV     #END,(R1
5223  026322  004737  006760                    JSR     PC,EXALL              ;GO EXECUTE READ REV. OF ENTIRE TAPE.
5224  026326                                    LET ALLEOT :B= #0             ;CLEAR ALL UNITS @ EOT FLAG
 (4)  026326  105037  003532                                                CLRB    ALLEOT
5225
5226  026332                                    EXIT    TST
 (3)  026332  104432                                                        TRAP    C$EXIT
 (3)  026334  000002                                                        .WORD   L10037-.
5227
5228                                    .EVEN
5229
5230  026336                                    ENDTST
 (3)  026336                            L10037:
 (3)  026336  104401                                                        TRAP    C$ETST
```

```
                                .SBTTL  TEST 6: EXECUTE OPERATOR SELECTED COMMAND SEQUENCE.

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

                                        BGNTST
                                T6::

                                        LET RANDOM :B= #0               ;CLEAR RAMDOM MODE FLAG.
                                                                                CLRB    RANDOM
                                        LET EXPBOT :B= #1               ;SET EXPECT BOT FLAG.
                                                                                MOVB    #1,EXPBO
                                        LET IRE :B= PIRE                ;MOVE INHIBIT RFC ERROR REPORT FLAG.
                                                                                MOVB    PIRE,IRE
                                        JSR PC,SETCH                    ;CMD 1 = SET CHARACTERISTIC.
                                        LET CMDSEQ+2 := CHAR            ;MOVE CHAR CODE FROM P TBL TO SEQ TBL.
                                                                                MOV     CHAR,CMD
                                        LET R2 := #CMDD                 ;R2 POINTS TO CMD2 IN SOFT P TABLE.
                                                                                MOV     #CMDD,R2
                                        JSR     PC,PTCMDS               ;MOVE CMD 2 FROM P TBL TO SEQ TBL.
                                        JSR     PC,PTCMDS               ;MOVE CMD 3 FROM P TBL TO SEQ TBL.
                                        JSR     PC,PTCMDS               ;MOVE CMD 4 FROM P TBL TO SEQ TBL.
                                        JSR     PC,PTCMDS               ;MOVE CMD 5 FROM P TBL TO SEQ TBL.
                                        JSR     PC,PTCMDS               ;MOVE CMD 6 FROM P TBL TO SEQ TBL.
                                        JSR     PC,PTCMDS               ;MOVE CMD 7 FROM P TBL TO SEQ TBL.
                                        JSR     PC,PTCMDS               ;MOVE END CMD FROM P TBL TO SEQ TBL.
                                        LET JLOOP := #0                 ;CLEAR JMP CMD LOOP COUNT.
                                                                                CLR     JLOOP
                                        LET STAFLG :B= #0               ;CLEAR START FLAG
                                                                                CLRB    STAFLG
                                        LET R1 := #CMDSEQ               ;INIT SEQUENCE TABLE POINTER.
                                                                                MOV     #CMDSEQ,
000000                          $BRJMP=0        ;ENABLE JMP SUBSTITUTION FOR BR, IF NECESSARY.

                                3$:     WHILE (R1) NE #END DO           ;WHILE THERE ARE CMDS LEFT IN SEQUENCE T
                                                                                50473$:
                                                                                CMP     (R1),#EN
                                                                                BEQ     50474$
                                          CMP   #JMP.C,(R1)             ;IS THIS A JUMP CMD?
                                          BNE   6$                      ;BR IF NOT.
                                          LET R1 := R1 + #2             ;POINT TO BRF.
                                                                                ADD     #2,R1
                                          MOV   (R1)+,JLOC              ;SAVE BRF (LOCATION).
                                          CMP (R1)+,JLOOP               ;HAS LOOP COUNT BE SATISFIED?
                                          BNE   1$                      ;IF NOT, JMP AGAIN.
                                          LET R1 := R1 + #2             ;IF SO, ADJUST SEQ POUNTER
                                                                                ADD     #2,R1
                                          BR    3$                      ;AND GO TO NEXT COMMAND.
                                1$:       LET JLOOP := JLOOP + #1       ;UPDATE THE LOOP COUNT.
                                                                                INC     JLOOP
                                          LET R1 := #CMDSEQ             ;INIT CMD SEQ TABLE POINTER.
                                                                                MOV     #CMDSEQ,
                                2$:       DEC   JLOC                    ;DECR LOCATION COUNTER.
```

```
5272  026522  001751                          BEQ   3$                        ;IF THIS IS THE RIGHT LOCATION TO JMP TO
5273  026524                                  LET R1 := R1 + #10                ;IF NOT, UPDATE SEQ POINTER TO NEXT CMD.
 (6)  026524  062701  000010                                                              ADD     #10,R1
5274  026530  000772                         BR    2$                          ;DO IT AGAIN.
5275  026532  022711  000020          6$:    CMP   #DLY.C,(R1)                 ;DELAY?
5276  026536  001026                         BNE   4$                          ;BR IF NOT.
5277  026540                                  LET R1 := R1 + #4                 ;R1 = LOCATION OF N COUNT.
 (6)  026540  062701  000004                                                              ADD     #4,R1
5278  026544                                  LET TIME2 := (R1)                 ;SAVE N COUNT.
 (4)  026544  011137  003450                                                              MOV     (R1),TIM
5279  026550                          7$:     DELAY 10.                         ;GO TO SUPER-WAIT 1 MSEC.
 (2)  026550  012727  000012                                                              MOV     #10.,(PC
 (2)  026554  000000                                                              .WORD   0
 (2)  026556  013727  002116                                                      MOV     L$DLY,(P
 (2)  026562  000000                                                              .WORD   0
 (2)  026564  005367  177772                                                      DEC     -6(PC)
 (2)  026570  001375                                                              BNE     .-4
 (2)  026572  005367  177756                                                      DEC     -22(PC)
 (2)  026576  001367                                                              BNE     .-20
5280  026600  005337  003450                  DEC   TIME2
5281  026604  001361                         BNE   7$
5282  026606                                  LET R1 := R1 + #4                 ;POINT TO NEXT CMD.
 (6)  026606  062701  000004                                                              ADD     #4,R1
5283  026612  000715                         BR    3$                          ;GO CHECK NEXT CMD.
5284  026614  004737  007722          4$:    JSR   PC,SETUP                    ;GO SETUP THE COMMAND BLOCK.
5285  026620                                  WHILE NCNT LT NCNT1 DO            ;WHILE THERE ARE RECORDS REMAINING:
 (4)  026620                                                                  50475$:
 (6)  026620  023737  003422  003424                                                      CMP     NCNT,NCN
 (9)  026626  002103                                                              BGE     50476$
5286  026630  004737  007614                  JSR PC,CMDAC                      ;STORE CMD ASCII IN ERROR MSG.
5287  026634  004737  007254                  JSR PC,EXSUB                      ;ISSUE CMD TO ALL,AWAIT INTS,CHECK STATU
5288  026640                                  IF CMDWRD EQ #GES THEN            ;IF CMD IS GET STATUS THEN:
 (6)  026640  023727  003430  100017                                                      CMP     CMDWRD,#
 (9)  026646  001002                                                              BNE     50477$
5289  026650  004737  017140                    JSR PC,PRXST                    ;PRINT EXTENDED STATUS REGISTERS.
5290  026654                                  ENDIF
 (4)  026654                                                                  50477$:
5291  026654  004737  017222                  JSR PC,CKHAE                      ;CHECK HALT AFTER EACH CMD FLAG.
5292  026660                                  LET R2 := #1                      ;SET ALL UNITS AT BOT/EOT.
 (4)  026660  012702  000001                                                              MOV     #1,R2
5293  026664  004737  016614                  JSR PC,FIRSTU                     ;FIND FIRST UNIT.
5294  026670                                  WHILE DEVTBL(R5) NE #END DO       ;WHILE THERE ARE MORE UNITS:
 (4)  026670                                                                  50500$:
 (6)  026670  026527  002536  177777                                                      CMP     DEVTBL(R
 (9)  026676  001426                                                              BEQ     50501$
5295  026700                                    IF #MOD.CO SETIN CMDWRD THEN    ;IF CMD IS REVERSE THEN:
 (6)  026700  032737  000400  003430                                                      BIT     #MOD.CO,
 (9)  026706  001406                                                              BEQ     50502$
5296  026710                                      IF #X0.BOT NOTSETIN EOTFLG(R5) THEN  ;IF NOT AT BOT THEN:
 (6)  026710  032765  000002  003510                                                      BIT     #X0.BOT,
 (9)  026716  001001                                                              BNE     50503$
5297  026720                                        LET R2 := #0                ;CLEAR EOT/BOT FLAG.
 (4)  026720  005002                                                              CLR     R2
5298  026722                                      ENDIF
 (4)  026722                                                                  50503$:
5299  026722                                    ELSE                            ;ELSE IF CMD IS NOT REVERSE:
```

```
 (4)  026722  000411                                                                  BR      50504$
 (3)  026724                                                                    50502$:
5300  026724                    IF #X0.EOT NOTSETIN EOTFLG(R5) OR #CMD.CO NOTSETIN CMDWRD THEN
 (6)  026724  032765  000001  003510                                                BIT     #X0.EOT,
 (8)  026732  001404                                                                BEQ     50505$
 (6)  026734  032737  000001  003430                                                BIT     #CMD.CO,
 (9)  026742  001001                                                                BNE     50506$
 (6)  026744                                                                    50505$:
5301                                                                 ;IF NOT AT EOT OR NOT A MOTION CMD THEN:
5302  026744                      LET R2 := #0                        ;CLEAR EOT/BOT FLAG.
 (4)  026744  005002                                                                CLR     R2
5303  026746                    ENDIF
 (4)  026746                                                                    50506$:
5304  026746                  ENDIF
 (4)  026746                                                                    50504$:
5305  026746  004737  016662    JSR PC,NEXTU                        ;FIND NEXT UNIT
5306  026752                  ENDDO                                 ;
 (4)  026752  000746                                                                BR      50500$
 (3)  026754                                                                    50501$:
5307  026754                  IF R2 EQ #1 THEN                      ;IF ALL UNIT ARE AT EOT/BOT THEN:
 (6)  026754  020227  000001                                                        CMP     R2,#1
 (9)  026760  001016                                                                BNE     50507$
5308  026762                    LET NCNT1 := NCNT + #1              ;FORCE TERMINATION OF COMMAND.
 (4)  026762  013737  003422  003424                                                MOV     NCNT,NCN
 (6)  026770  005237  003424                                                        INC     NCNT1
5309  026774                    LET ALLEOT :B= ALLEOT + #1 ;FLAG ALL UNITS AT EOT/BOT TO ALLOW VER
 (6)  026774  105237  003532                                                        INCB    ALLEOT
5310  027000                    IF CMDLG EQ #2 THEN                 ;WHEN WRITING IS CURRENT COMMAND
 (6)  027000  023727  003436  000002                                                CMP     CMDLG,#2
 (9)  027006  001002                                                                BNE     50510$
5311  027010  004737  027072      JSR PC,T5WEOT                     ;GO WRITE/READ REV ONE RECORD BEYOND EOT
5312  027014                    ENDIF
 (4)  027014                                                                    50510$:
5313  027014                  ELSE
 (4)  027014  000402                                                                BR      50511$
 (3)  027016                                                                    50507$:
5314  027016                    LET ALLEOT :B= #0 ;WHEN NOT ALL @EOT, CLEAR FLAG
 (4)  027016  105037  003532                                                        CLRB    ALLEOT
5315  027022                  ENDIF
 (4)  027022                                                                    50511$:
5316  027022                  LET NCNT := NCNT + #1                 ;UPDATE RECORD COUNT.
 (6)  027022  005237  003422                                                        INC     NCNT
5317  027026                  LET PCMDWD := CMDWRD                  ;SAVE PREVIOUS COMMAND WORD.
 (4)  027026  013737  003430  003434                                                MOV     CMDWRD,P
5318  027034                ENDDO
 (4)  027034  000671                                                                BR      50475$
 (3)  027036                                                                    50476$:
5319  027036  004737  015370    JSR   PC,VFYDAT                     ;IF LAST CMD WAS A WRITE VERIFY, THEN GO
5320                                                                 ;VERIFY THE LAST N RECORDS OF DATA.
5321
5322  027042                  ENDDO
 (4)  027042  000601                                                                BR      50473$
 (3)  027044                                                                    50474$:
5323
5324        177777          $BRJMP=-1       ;TURN OFF JMP SUBSTITUTION (SPMACJ CONTROL, ONLY).
5325
```

```
5326  027044                                  EXIT    TST
                                                                TRAP    C$EXIT
 (3)  027044  104432                                            .WORD   L10040-.
 (3)  027046  000130
5327
```

```
5329
5330                                    ;       SUBROUTINE TO MOVE A COMMAND FROM THE SOFTWARE P TABLE TO
5331                                    ;       THE COMMAND SEQUENCE TABLE.
5332                                    ;       INPUTS:         R2 = POINTER TO SOFT "P" TABLE
5333                                    ;       OUTPUTS:
5334                                    ;       REGISTERS:      R3.
5335                                    ;       CALLS:
5336
5337  027050                            PTCMDS: LET R3 := (R2)+ - #1 SHIFT +1   ;R3 = COMMAND TABLE INDEX.
 (4)  027050  012203                                                                    MOV     (R2)+,R3
 (6)  027052  005303                                                                    DEC     R3
 (8)  027054  006303                                                                    ASL     R3
5338  027056                                    LET (R1)+ := CMDTBL(R3)         ;MOVE COMMAND WORD.
 (4)  027056  016321  003646                                                            MOV     CMDTBL(R
5339  027062                                    LET (R1)+ := (R2)+              ;MOVE # OF BYTES.
 (4)  027062  012221                                                                    MOV     (R2)+,(R
5340  027064                                    LET (R1)+ := (R2)+              ;MOVE # OF OPERATIONS.
 (4)  027064  012221                                                                    MOV     (R2)+,(R
5341  027066                                    LET (R1)+ := (R2)+              ;MOVE PATTERN CODE.
 (4)  027066  012221                                                                    MOV     (R2)+,(R
5342  027070  000207                           RTS PC
5343
5344                                    ;       SUBROUTINE TO WRITE THEN READ REVERSE ONE RECORD BEYOND EOT
5345                                    ;       INPUTS:
5346                                    ;       OUTPUTS:
5347                                    ;       REGISTERS:
5348                                    ;       CALLS:          CMDAC,EXSUB,CKHAE
5349
5350  027072  000240                    T5WEOT: NOP
5351  027074  000240                            NOP
5352  027076  004737  007254                    JSR PC,EXSUB            ;WRITE ONE RECORD BEYOND EOT
5353  027102  004737  017222                    JSR PC,CKHAE            ;SO THAT READ SHORTER STOP DISTANCE
5354                                                                    ;SHALL POSITION HEAD IN CLEAN IRG GAP
5355  027106                                    LET PCMDWD := CMDWRD    ;REPOSITION TAPE
 (4)  027106  013737  003430  003434                                                    MOV     CMDWRD,P
5356  027114                                    LET CMDWRD := #RDR      ;BEFORE EXTRA RECORD
 (4)  027114  012737  104401  003430                                                    MOV     #RDR,CMD
5357  027122                                    LET CMDLG := #4         ;BY READING REVERSE
 (4)  027122  012737  000004  003436                                                    MOV     #4,CMDLG
5358  027130                                    LET CMDPKT := CMDWRD CLR.BY #BRF.C
 (4)  027130  013737  003430  002314                                                    MOV     CMDWRD,C
 (6)  027136  042737  004000  002314                                                    BIC     #BRF.C,C
5359  027144                                    LET CMDSAV := CMDPKT    ;THAT RECORD TO ALLOW
 (4)  027144  013737  002314  003432                                                    MOV     CMDPKT,C
5360  027152                                    LET CMDPKT+CP.ADL := DATARD     ;NEXT COMMAND IN THE
 (4)  027152  013737  003420  002316                                                    MOV     DATARD,C
5361  027160  004737  007614                    JSR PC,CMDAC            ;TABLE TO BE EXECUTED
5362  027164  004737  007254                    JSR PC,EXSUB
5363  027170  004737  017222                    JSR PC,CKHAE
5364  027174  000207                           RTS PC
5365                                            .EVEN
5366  027176                                    ENDTST
 (3)  027176                            L10040:
 (3)  027176  104401                                                                    TRAP    C$ETST
5367  027200                                    ENDMOD
```

```
                                        .TITLE PARAMETER CODING

                                        .SBTTL  HARDWARE PARAMETER CODING SECTION

027200                                          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.
                                        ;--

027200                                          BGNHRD
(3)  027200  000024                                                     .WORD L10041-L$H
(3)  027202                             L$HARD::

027202                                          GPRMA   TS4ADR,0,0,160002,177564,YES
(4)  027202  000031                                                     .WORD   T$CODE
(4)  027204  027226                                                     .WORD   TS4ADR
(4)  027206  160002                                                     .WORD   T$LOLIM
(4)  027210  177564                                                     .WORD   T$HILIM
027212                                          GPRMD   TS4VCT,2,0,777,60,776,YES
(4)  027212  001032                                                     .WORD   T$CODE
(4)  027214  027243                                                     .WORD   TS4VCT
(4)  027216  000777                                                     .WORD   777
(4)  027220  000060                                                     .WORD   T$LOLIM
(4)  027222  000776                                                     .WORD   T$HILIM

027224                                          EXIT HRD
(7)  027224  013004                                                     .WORD   T$CODE

                                                .NLIST  BEX
027226  051524  051123  040440      TS4ADR:   .ASCIZ  /TSSR ADDRESS/
027243     126  041505  047524      TS4VCT:   .ASCIZ  /VECTOR/
                                                .LIST   BEX
                                                .EVEN

027252                                          ENDHRD
(2)                                                                     .EVEN
(3)  027252                             L10041:
```

```
                                .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.
                                ;--

                                        BGNSFT
                                                                        .WORD L10042-L$S
                                L$SOFT::

                                        GPRML   CLRM,0,1,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   CLRM
                                                                        .WORD   1
                                        GPRML   RRVM,0,400,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   RRVM
                                                                        .WORD   400
                                        GPRML   HAEM,2,1,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   HAEM
                                                                        .WORD   1
                                        GPRML   RCVERM,2,400,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   RCVERM
                                                                        .WORD   400
                                        GPRML   IRECM,4,1,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   IRECM
                                                                        .WORD   1
                                        XFERT   NEXTSP
                                                                        .WORD   T$CODE
                                        GPRML   BADTM,4,400,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   BADTM
                                                                        .WORD   400
                                NEXTSP: GPRML   DINTM,6,1,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   DINTM
                                                                        .WORD   1
                                        GPRML   IREM,6,400,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   IREM
                                                                        .WORD   400
                                        GPRML   RAMM,10,1,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   RAMM
                                                                        .WORD   1
                                        GPRML   CHGM,10,400,YES
                                                                        .WORD   T$CODE
```

```
                                                                .WORD   CHGM
                                                                .WORD   400
                        XFERF   ENDSP1
                                                                .WORD   T$CODE
                        GPRMD   CHARM,14,0,377,0,777,YES
                                                                .WORD   T$CODE
                                                                .WORD   CHARM
                                                                .WORD   377
                                                                .WORD   T$LOLIM
                                                                .WORD   T$HILIM
                        GPRMD   CMD2M,16,D,37,1,33,YES
                                                                .WORD   T$CODE
                                                                .WORD   CMD2M
                                                                .WORD   37
                                                                .WORD   T$LOLIM
                                                                .WORD   T$HILIM
                        GPRMD   BPCRM,20,D,-1,1,DATCNT,YES
                                                                .WORD   T$CODE
                                                                .WORD   BPCRM
                                                                .WORD   -1
                                                                .WORD   T$LOLIM
                                                                .WORD   T$HILIM
                        GPRMD   NUMBM,22,D,-1,1,77777,YES
                                                                .WORD   T$CODE
                                                                .WORD   NUMBM
                                                                .WORD   -1
                                                                .WORD   T$LOLIM
                                                                .WORD   T$HILIM
                        GPRMD   PATTM,24,D,17,0,10,YES
                                                                .WORD   T$CODE
                                                                .WORD   PATTM
                                                                .WORD   17
                                                                .WORD   T$LOLIM
                                                                .WORD   T$HILIM
                        GPRMD   CMD3M,26,D,37,1,33,YES
                                                                .WORD   T$CODE
                                                                .WORD   CMD3M
                                                                .WORD   37
                                                                .WORD   T$LOLIM
                                                                .WORD   T$HILIM
                        GPRMD   BPCRM,30,D,-1,1,DATCNT,YES
                                                                .WORD   T$CODE
                                                                .WORD   BPCRM
                                                                .WORD   -1
                                                                .WORD   T$LOLIM
                                                                .WORD   T$HILIM
                        GPRMD   NUMBM,32,D,-1,1,77777,YES
                                                                .WORD   T$CODE
                                                                .WORD   NUMBM
                                                                .WORD   -1
                                                                .WORD   T$LOLIM
                                                                .WORD   T$HILIM
                        GPRMD   PATTM,34,D,17,0,10,YES
                                                                .WORD   T$CODE
                                                                .WORD   PATTM
                                                                .WORD   17
```

(4) 027346 030301
(4) 027350 000400
5461 027352
(5) 027352 127044
5462 027354
(4) 027354 006032
(4) 027356 030320
(4) 027360 000377
(4) 027362 000000
(4) 027364 000777
5463 027366
(4) 027366 007052
(4) 027370 030345
(4) 027372 000037
(4) 027374 000001
(4) 027376 000033
5464 027400
(4) 027400 010052
(4) 027402 030353
(4) 027404 177777
(4) 027406 000001
(4) 027410 004000
5465 027412
(4) 027412 011052
(4) 027414 030365
(4) 027416 177777
(4) 027420 000001
(4) 027422 077777
5466 027424
(4) 027424 012052
(4) 027426 030405
(4) 027430 000017
(4) 027432 000000
(4) 027434 000010
5467 027436
(4) 027436 013052
(4) 027440 030420
(4) 027442 000037
(4) 027444 000001
(4) 027446 000033
5468 027450
(4) 027450 014052
(4) 027452 030353
(4) 027454 177777
(4) 027456 000001
(4) 027460 004000
5469 027462
(4) 027462 015052
(4) 027464 030365
(4) 027466 177777
(4) 027470 000001
(4) 027472 077777
5470 027474
(4) 027474 016052
(4) 027476 030405
(4) 027500 000017

```
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   CMD4M,36,D,37,1,33,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   CMD4M
                                                                        .WORD   37
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   BPCRM,40,D,-1,1,DATCNT,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   BPCRM
                                                                        .WORD   -1
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   NUMBM,42,D,-1,1,77777,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   NUMBM
                                                                        .WORD   -1
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   PATTM,44,D,17,0,10,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   PATTM
                                                                        .WORD   17
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   CMD5M,46,D,37,1,33,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   CMD5M
                                                                        .WORD   37
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   BPCRM,50,D,-1,1,DATCNT,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   BPCRM
                                                                        .WORD   -1
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   NUMBM,52,D,-1,1,77777,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   NUMBM
                                                                        .WORD   -1
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   PATTM,54,D,17,0,10,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   PATTM
                                                                        .WORD   17
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        XFER    ENDSP2
                                                                        .WORD   T$CODE
ENDSP1:                 XFER    ENDSP
                                                                        .WORD   T$CODE
ENDSP2:                 GPRMD   CMD6M,56,D,37,1,33,YES
                                                                        .WORD   T$CODE
```

```
   (4)  027634  030442                                                    .WORD   CMD6M
   (4)  027636  000037                                                    .WORD   37
   (4)  027640  000001                                                    .WORD   T$LOLIM
   (4)  027642  000033                                                    .WORD   T$HILIM
5482    027644
                                    GPRMD   BPCRM,60,D,-1,1,DATCNT,YES
   (4)  027644  030052                                                    .WORD   T$CODE
   (4)  027646  030353                                                    .WORD   BPCRM
   (4)  027650  177777                                                    .WORD   -1
   (4)  027652  000001                                                    .WORD   T$LOLIM
   (4)  027654  004000                                                    .WORD   T$HILIM
5483    027656
                                    GPRMD   NUMBM,62,D,-1,1,77777,YES
   (4)  027656  031052                                                    .WORD   T$CODE
   (4)  027660  030365                                                    .WORD   NUMBM
   (4)  027662  177777                                                    .WORD   -1
   (4)  027664  000001                                                    .WORD   T$LOLIM
   (4)  027666  077777                                                    .WORD   T$HILIM
5484    027670
                                    GPRMD   PATTM,64,D,17,0,10,YES
   (4)  027670  032052                                                    .WORD   T$CODE
   (4)  027672  030405                                                    .WORD   PATTM
   (4)  027674  000017                                                    .WORD   17
   (4)  027676  000000                                                    .WORD   T$LOLIM
   (4)  027700  000010                                                    .WORD   T$HILIM
5485    027702
                                    GPRMD   CMD7M,66,D,37,1,33,YES
   (4)  027702  033052                                                    .WORD   T$CODE
   (4)  027704  030450                                                    .WORD   CMD7M
   (4)  027706  000037                                                    .WORD   37
   (4)  027710  000001                                                    .WORD   T$LOLIM
   (4)  027712  000033                                                    .WORD   T$HILIM
5486    027714
                                    GPRMD   BPCRM,70,D,-1,1,DATCNT,YES
   (4)  027714  034052                                                    .WORD   T$CODE
   (4)  027716  030353                                                    .WORD   BPCRM
   (4)  027720  177777                                                    .WORD   -1
   (4)  027722  000001                                                    .WORD   T$LOLIM
   (4)  027724  004000                                                    .WORD   T$HILIM
5487    027726
                                    GPRMD   NUMBM,72,D,-1,1,77777,YES
   (4)  027726  035052                                                    .WORD   T$CODE
   (4)  027730  030365                                                    .WORD   NUMBM
   (4)  027732  177777                                                    .WORD   -1
   (4)  027734  000001                                                    .WORD   T$LOLIM
   (4)  027736  077777                                                    .WORD   T$HILIM
5488    027740
                                    GPRMD   PATTM,74,D,17,0,10,YES
   (4)  027740  036052                                                    .WORD   T$CODE
   (4)  027742  030405                                                    .WORD   PATTM
   (4)  027744  000017                                                    .WORD   17
   (4)  027746  000000                                                    .WORD   T$LOLIM
   (4)  027750  000010                                                    .WORD   T$HILIM
5489    027752
                                    GPRMD   CMD8M,76,D,37,1,33,YES
   (4)  027752  037052                                                    .WORD   T$CODE
   (4)  027754  030456                                                    .WORD   CMD8M
   (4)  027756  000037                                                    .WORD   37
   (4)  027760  000001                                                    .WORD   T$LOLIM
   (4)  027762  000033                                                    .WORD   T$HILIM
5490    027764
                                    GPRMD   BPCRM,100,D,-1,1,DATCNT,YES
   (4)  027764  040052                                                    .WORD   T$CODE
   (4)  027766  030353                                                    .WORD   BPCRM
   (4)  027770  177777                                                    .WORD   -1
```

```
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   NUMBM,102,D,-1,1,77777,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   NUMBM
                                                                        .WORD   -1
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
                        GPRMD   PATTM,104,D,17,0,10,YES
                                                                        .WORD   T$CODE
                                                                        .WORD   PATTM
                                                                        .WORD   17
                                                                        .WORD   T$LOLIM
                                                                        .WORD   T$HILIM
ENDSP:
                        XFER    JMPMSG
                                                                        .WORD   T$CODE
```

```
5496
5503                                                    .NLIST  BEX
5504  030024  046103  040505  020122          CLRM:   .ASCIZ  /CLEAR COUNTERS/
5505  030043     122  051505  052105          RRVM:   .ASCIZ  /RESET RANDOM VARIABLES/
5506  030072  040510  052114  040440          HAEM:   .ASCIZ  /HALT AFTER EACH CMD/
5507  030116  051120  047111  020124          RCVERM: .ASCIZ  /PRINT SOFT ERRORS/
5508  030140  047111  044510  044502          IRECM:  .ASCIZ  /INHIBIT RECOVERY/
5509  030161     102  042101  052040          BADTM:  .ASCIZ  /BAD TAPE SPOT DETECT/
5510  030206  044504  040523  046102          DINTM:  .ASCIZ  /DISABLE INTERRUPTS/
5511  030231     111  044516  041111          IREM:   .ASCIZ  /INHIBIT RFC ERROR REPORT/
5512  030262  033515  032464  020064          RAMM:   .ASCIZ  /M7454 RAM DUMP/
5513  030301     103  040510  043516          CHGM:   .ASCIZ  /CHANGE CMD SEQ/
5514  030320  044103  051101  041501          CHARM:  .ASCIZ  /CHARACTERISTICS CODE/
5515  030345     103  042115  031057          CMD2M:  .ASCIZ  "CMD/2"
5516  030353     102  043122  041440          BPCRM:  .ASCIZ  /BRF COUNT/
5517  030365     043  047440  020106          NUMBM:  .ASCIZ  /# OF OPERATIONS/
5518  030405     120  052101  042524          PATTM:  .ASCIZ  /PATTERN/
5519                                                    .LIST   BEX
5520          030416                                    .EVEN
5521  030416                                  JMPMSG:
5522  030416                                          EXIT SFT
 (7)  030416  023004                                                .WORD   T$CODE
5523
5524                                                    .NLIST  BEX
5525  030420  046503  027504  000063          CMD3M:  .ASCIZ  "CMD/3"
5526  030426  046503  027504  000064          CMD4M:  .ASCIZ  "CMD/4"
5527  030434  046503  027504  000065          CMD5M:  .ASCIZ  "CMD/5"
5528  030442  046503  027504  000066          CMD6M:  .ASCIZ  "CMD/6"
5529  030450  046503  027504  000067          CMD7M:  .ASCIZ  "CMD/7"
5530  030456  046503  027504  000070          CMD8M:  .ASCIZ  "CMD/8"
5531                                                  .LIST   BEX
5532  030464                                          ENDSFT
 (2)                                                                .EVEN
 (3)  030464                                L10042:
5533
5534                                            ;*******************************************************************************
5535                                            ;*******************************************************************************
5536                                            ;       PATCH AREA
5537
5538  030464  000100                        PATCH:: .BLKW   64.
5539                                            ;*******************************************************************************
5540                                            ;*******************************************************************************
5541
5542  030664                                          LASTAD
 (2)                                                                .EVEN
 (2)  030664  030700                                                .WORD T$FREE
 (2)  030666  000004                                                .WORD T$SIZE
 (3)  030670                                L$LAST::
5543  030670                                          ENDMOD
```

```
 5545                                   .SBTTL  HARD CODED P-TBL
 5546
 5547                                   ;++
 5548                                   ;DIAG IS PRE-PARAMETERIZED PER TBL
 5549                                   ;--
 5550
 5551  030670                                    BGNSETUP 1
 5552  030670                                      BGNPTAB
  (4)  030670  000000                                                .WORD   0
  (3)  030672  000002                                                .WORD   L10045-.
  (3)  030674                           L10043:
 5553  030674  172522                                 172522
 5554  030676  000224                                 224
 5555  030700                                       ENDPTAB
  (3)  030700                           L10045:
 5556  030700                                    ENDSETUP
 5557
 5558          000001                   .END
```

```
ACK.C = 100000 G    1958# 2043 2048 2051 2054 2057 2060 2063 2066 2069 2072 2075 2078
                    2081 2084 2087 2090 2093 2096 2099 2102 2105 2108 2111 2114 2116
ADR   = 000020 G    1920# 4318
ALLEOT  003532 G    2318# 2726 2743 2759 2771 3810 4941* 4954* 5176* 5184* 5216* 5224* 5309*
                    5314*
ASSEMB= 000010      1728
ATTNM   004421 G    2481# 3271
AUDRPM  004731 G    2491# 4311
AUTODM  023006      4398 4422#
BADTM   030161      5456 5509#
BADTSW  002211 G    1850# 3349 4134
BFSEQ   024154      4586 4603 4611 4618 4625 4632 4639 4646 4653 4660 4667 4714#
BFSEQ0  024200      4585 4725#
BFSEQ1  024252      4602 4747#
BFSEQ2  024264      4610 4753#
BFSEQ3  024356      4617 4783#
BFSEQ4  024430      4624 4805#
BFSEQ5  024472      4631 4823#
BFSEQ6  024544      4638 4845#
BFSEQ7  024576      4645 4859#
BFSEQ8  024630      4652 4873#
BFSEQ9  024662      4659 4887#
BFSE10  024704      4666 4897#
BGNFLG= 003466      2292# 3109
BINC    015150      3673 3711#
BIT0  = 000001 G    1920# 3161 4231
BIT00 = 000001 G    1920# 2608 3909
BIT01 = 000002 G    1920#
BIT02 = 000004 G    1920#
BIT03 = 000010 G    1920#
BIT04 = 000020 G    1920#
BIT05 = 000040 G    1920#
BIT06 = 000100 G    1920#
BIT07 = 000200 G    1920#
BIT08 = 000400 G    1920#
BIT09 = 001000 G    1920#
BIT1  = 000002 G    1920# 4231
BIT10 = 002000 G    1920#
BIT11 = 004000 G    1920#
BIT12 = 010000 G    1920#
BIT13 = 020000 G    1920#
BIT14 = 040000 G    1920#
BIT15 = 100000 G    1920#
BIT2  = 000004 G    1920#
BIT3  = 000010 G    1920#
BIT4  = 000020 G    1920#
BIT5  = 000040 G    1920#
BIT6  = 000100 G    1920#
BIT7  = 000200 G    1920#
BIT8  = 000400 G    1920#
BIT9  = 001000 G    1920#
BOE   = 000400 G    1920#
BORERS  014374 G    3377 3553 3620# 5117
BPCRM   030353      5464 5468 5472 5476 5482 5486 5490 5516#
BRCPK   002330 G    2148#
BRFCNT  003426 G    2270# 2674* 2675* 2676 2677* 2679 2830* 2896 3674 3675 3889 3894
```

```
BRF.C = 004000 G  1963# 2051  2054  2057  2060  2063  2066  2069  2072  2075  2078  2081  2096
                  2099  2884  3166  3217  3622  3793  5358
BTADDR  002550 G  2221# 2736  3575  4149  5091
BTMSG1  014170    3572  3608#
BTMSG2  014255    3376  3609#
BTMSG3  014325    3592  3610#
BTPT    003520 G  2309# 2736* 2737* 3373  3375  3575* 3576  3577* 3579  4149* 4150  4157  5091*
                  5092*
BTRPT   017762    4135  4148#
BTO     003000 G  2221  2238#
BT1     003052 G  2222  2239#
BT2     003124 G  2223  2240#
BT3     003176 G  2224  2241#
CHAR    002220 G  1858# 5245
CHARM   030320    5462  5514#
CHGFLG  002215 G  1854# 4357*
CHGM    030301    5460  5513#
CHKERR  012004 G  3094  3195#
CH.EAI= 000040 G  1858  1986# 1988  2178  2345
CH.ERI= 000020 G  1987#
CH.ESS= 000200 G  1985#
CKDATA  016200 G  3856  3869  3889#
CKDCNT  016610    3898* 3907  3909  3933  3934* 3936  3942#
CKDFF   016612    3899* 3917  3922* 3927  3935  3936  3943#
CKHAE   017222 G  2684  3629  3638  3656  3827  4050# 5291  5353  5363
CKHRTN  017310    4053  4064#
CLN   = 101012 G  2111# 2400  4887
CLRERR  011502 G  3090  3098  3109# 4359
CLRFLG  002204 G  1845# 4237  4238*
CLRM    030024    5450  5504#
CMDAC   007614 G  2668  2788# 3626  3635  3652  3801  4081  5106  5286  5361
CMDASC  003734 G  2410# 2817
CMDD    002222 G  1859# 5246
CMDLG   003436 G  2274# 2734  2827* 2839* 2846* 2848* 2872* 3349  3393  3507  3515  3625* 3651*
                  3670  3774* 3781* 5310  5357*
CMDPKM  004166 G  2473# 4232
CMDPKT  002314 G  2134# 2543  2551  2552  2679* 2828* 2829* 2831  2836* 2838  2844* 2845  2854*
                  2855* 2861* 2862* 2870* 2873  2875* 2880  2882* 2884* 2885  3035* 3045  3231*
                  3360  3361  3396* 3404* 3622* 3623  3624* 3633* 3634  3647* 3648  3649* 3650*
                  3793* 3795* 3797  3798* 3896  4231  4684* 4687* 4689* 4693* 4696* 4698* 5358*
                  5359  5360*
CMDSAV  003432 G  2272# 2885* 3231  3623* 3634* 3648* 3797* 5359*
CMDSEQ  003544 G  2344# 2635  2664  4073  4079  4714  4939  4950* 4951* 4956  5094  5101  5118
                  5124  5174  5217  5245* 5256  5270
CMDSE2  003554 G  2348#
CMDTBL  003646 G  2377# 2811  5338
CMDWRD  003430 G  2271# 2606  2670  2688  2693  2704  2723  2739  2756  2767  2788  2879  2880*
                  3010  3040  3070  3073  3163  3166  3167  3217  3288  3359  3620  3621* 3622
                  3631  3632* 3633  3645  3646* 3772  3773* 3779  3780* 3793  3807  3818  3832
                  4054  4682* 4691* 5288  5295  5300  5317  5355  5356* 5358
CMD.C0= 000001 G  1981# 2048  2051  2054  2057  2060  2069  2072  2075  2078  2081  2090  2093
                  2102  2105  2693  2739  2767  2842  2868  3818  5300
CMD.C1= 000002 G  1980# 2048  2087  2102  2108  2111  2116  2859
CMD.C2= 000004 G  1979# 2057  2060  2081  2102  2114  2116  2852  2859  2868
CMD.C3= 000010 G  1978# 2048  2063  2066  2084  2087  2090  2093  2096  2099  2102  2105  2108
                  2111  2834
```

```
CMD.C4= 000020 G  1976#
CMD2M   030345    5463    5515#
CMD3M   030420    5467    5525#
CMD4M   030426    5471    5526#
CMD5M   030434    5475    5527#
CMD6M   030442    5481    5528#
CMD7M   030450    5485    5529#
CMD8M   030456    5489    5530#
CMPDAT  003410 G  2263#   3769*   3777*   3863*   3866*   3867    3870*   3873*
CNTBGN= 002560    2228#   2251    3673
CNTEND= 003330    2248#   2251
CNTLEN= 000550 G  2251#   4240
CODELM  004056 G  2470#   4594
COUNTE= 050416    4321#   4327    4339
CP.ADH= 000004 G  2023#
CP.ADL= 000002 G  2022#   2844*   2854*   2862*   2870*   3624*   3649*   3798*   5360*
CP.CMD= 000000 G  2021#
CP.CNT= 000006 G  2024#   2679*   2829*   2855*   2861*   3361    3650*   3896    4684*   4687*   4689*   4693*   4696*
                  4698*
CRLF    005277 G  2499#   4170
CRLFSP  005302 G  2500#   4156    4164
CTCC    003460 G  2284#   2551    3143*   3161    3200    3212
CVC.C = 040000 G  1959#   2043    2114
C$AU  = 000052    1728#   4551
C$AUTO= 000061    1728#   4420
C$BRK = 000022    1728#   3069    3125    4313    4336
C$BSEG= 000004    1728#
C$BSUB= 000002    1728#   4583    4600    4608    4615    4622    4629    4636    4643    4650    4657    4664    4680
C$CEFG= 000045    1728#
C$CLCK= 000062    1728#
C$CLEA= 000012    1728#   4474
C$CLOS= 000035    1728#
C$CLP1= 000006    1728#
C$CVEC= 000036    1728#   4395    4456
C$DCLN= 000044    1728#   3957    4314    4353
C$DODU= 000051    1728#   4016    4401
C$DRPT= 000024    1728#   2752    4010
C$DU  = 000053    1728#   4508
C$EDIT= 000003    1728#   1775
C$ERDF= 000055    1728#   3005    3030    3049    3087    3271    3322    3461    3476    3508    3518    4002
C$ERHR= 000056    1728#   3223    3255    3303    3526    3891    3895    3921
C$ERRO= 000060    1728#
C$ERSF= 000054    1728#   4232
C$ERSO= 000057    1728#   3351    3400    3430
C$ESCA= 000010    1728#
C$ESEG= 000005    1728#
C$ESUB= 000003    1728#   4598    4606    4613    4620    4627    4634    4641    4648    4655    4662    4672    4701
C$ETST= 000001    1728#   4908    5051    5150    5193    5230    5366
C$EXIT= 000032    1728#   4362    4460    4706    4961    5147    5189    5226    5326
C$GETB= 000026    1728#
C$GETW= 000027    1728#
C$GMAN= 000043    1728#   4059
C$GPHR= 000042    1728#   4292    4529
C$GPLO= 000030    1728#
C$GPRI= 000040    1728#
C$INIT= 000011    1728#   4378
```

```
C$INLP= 000020          1728#
C$MANI= 000050          1728#   4052
C$MEM = 000031          1728#   4349
C$MSG = 000023          1728#   2538    2572
C$OPEN= 000034          1728#
C$PNTB= 000014          1728#   2524    2525    2534    2541    2542    2548    3376    3572    3592    3702    3892    3896
                        3936
C$PNTF= 000017          1728#   4311    4329    4332    4352    4398    4408    4413    4493    4594    5068
C$PNTS= 000016          1728#   4128    4129    4130    4131    4132    4133    4137    4148    4151    4156    4160    4164
                        4170
C$PNTX= 000015          1728#   2550    2551    2552    2553    3485    3496    3747    3753    3928    4037    4038
C$QIO = 000377          1728#
C$RDBU= 000007          1728#
C$REFG= 000047          1728#   4250    4265    4273    4276
C$RESE= 000033          1728#
C$REVI= 000003          1728#   1775
C$RFLA= 000021          1728#   4270
C$RPT = 000025          1728#   4201
C$SEFG= 000046          1728#
C$SPRI= 000041          1728#   4317
C$SVEC= 000037          1728#   4297    4393    4533
C$TPRI= 000013          1728#
DATARD  003420 G        2267#   2607    2622    2844    3798    3845    3846    3902    4350*   5360
DATAWT  003416 G        2266#   2287    2870    2899    3038*   3085*   3181*   3437*   3649    3901    4349*   4350    4351
                        4674    4675
DATCNT= 004000 G        1864    1868    1872    1880    1884    2033#   2353    2357    2361    4350    4351    4754    4758
                        4762    4766    4770    4774    4778    4788    4850    4854    4860    4864    4868    4874    4878
                        4882    4919    4927    4995    5001    5041    5163    5211    5219    5464    5468    5472    5476
                        5482    5486    5490
DATRAT  003412 G        2264#   3859*   3861    3862*   3867
DEVTBL  002536 G        2212#   2524    2541    2687    2722    2755    3013    3063    3195    3345    3369    3406    3548
                        3556    3564    3644    3654    3776    3806    3828    3953    3956    3959    3976    3977    4014
                        4017    4127    4128    4256*   4262*   4289    4320    4329    4332    4391    4399    4408    4413
                        4454    4492*   4528*   4589    4594    5089    5109    5114    5130    5294
DFPTBL  002176 G        1818#
DFTSCH= 000040 G        1988#   2637
DIA   = 100006 G        2116#   2402
DIABLK= 003416 G        2287#   2862
DIACNT= 000020 G        2032#   2861
DIAGMC= 000000          1728
DINT    002212 G        1851#   3026    3076
DINTM   030206          5457    5510#
DLY   = 000020 G        2120#   2404
DLY.C = 000020 G        1977#   2120    5275
DOAGIN  003340 G        2256#   5072*   5131*
DRI   = 100013 G        2048#   2377    4729
DROPDM  004702 G        2490#   4493
DROPED  003530 G        2316#   3701    3850    3853    3951*   3972*   4007*   4025*
DROPN   017136          4014*   4029#   4399*   4493
DROPU   016716 G        3006    3031    3050    3088    3324    3380    3463    3478    3510    3520    3989#
DROPUA  017046          4011#   4409    4414
DRORTN  017124          4025#
DTAERM  005474 G        2518#   3891    3895    3921
DTAER2  004763 G        2492#   3928
DTAER3  005032 G        2493#   3936
DTAER4  005074 G        2494#   3892
```

```
DTAER5  005115 G        2495#   3896
EF.CON= 000036 G        1920#
EF.NEW= 000035 G        1920#   4273
EF.PWR= 000034 G        1920#   4265
EF.RES= 000037 G        1920#   4276
EF.STA= 000040 G        1920#   4250
EINC    015156          3694    3715#
END   = 177777 G        2122#   2216    2271    2272    2273    2369    2370    2371    2372    2373    2405    2665    2687
                        2722    2755    3013    3806    3956    4078    4127    4289    4320    4391    4454    4589    4715
                        4718    4745    4751    4781    4803    4821    4843    4857    4871    4885    4895    4905    4937
                        4952    4958    5078    5089    5099    5123    5172    5186    5214    5222    5260    5294
ENDERF= 003500          2303#   3089    3097
ENDFLG= 003536          2324#   4358
ENDSP   030022          5480    5493#
ENDSP1  027630          5461    5480#
ENDSP2  027632          5479    5481#
EOTFLG  003510 G        2308#   2689    2693    2724    2725    2734    2739    2757    2758    2767    3150*   3173    3808
                        3809    3818    3854    5296    5300
ERCVER  002207 G        1848#   3350    3399    3571    3591    3701
ERLOG   003474 G        2298#   3668    3669*
ERRREC  003477 G        2301#   3036    3201    3297    3350    3355*   3410*   3435*
ERS   = 100411 G        2105#   2398    3632    4791
ERSFLG  003534 G        2320#   3584*   3630    3639*   5116*
EVL   = 000004 G        1920#
EXALL   006760 G        2664#   4587    4604    4612    4619    4626    4633    4640    4647    4654    4661    4668    4670
                        4938    4953    4959    5079    5173    5187    5215    5223
EXARTN  007252          2701    2710#
EXCRTN  011164          3007    3032    3052#
EXCUTE  010576 G        2727    2730    2741    2744    3000#   3412    3439    3627    3636    3653    3849    4082    5107
EXPBOT  003522 G        2310#   3283    4581*   4918*   5074*   5140*   5162*   5206*   5242*
EXSUB   007254 G        2683    2721#   5287    5352    5362
E$END = 002100          1728#
E$LOAD= 000035          1728#   1775
FATSM   004457 G        2483#   3476
FIRSTU  016614 G        2686    2721    2754    3012    3805    3951#   4126    4287    4319    4390    4453    4588    5081
                        5293
FMT.C0= 000040 G        1972#   2043
FMT.C1= 000100 G        1969#   2043
FTLCNT  003320 G        2247#   3990*   4137    4397*   4407*   4412*
FUNRM   004437 G        2482#   3322
F$AU  = 000015          1728#   4519    4551
F$AUTO= 000020          1728#   4388    4420
F$BGN = 000040          1728#   1758    1888    1913    2518    2535    2540    2554    2582    2586    2590    2594    4087
                        4111    4118    4141    4207    4220    4362    4388    4444    4460    4484    4494    4519    4536
                        4553    4576    4578    4583    4598    4600    4606    4608    4613    4615    4620    4622    4627
                        4629    4634    4636    4641    4643    4648    4650    4655    4657    4662    4664    4672    4680
                        4701    4706    4908    4915    4961    5051    5066    5147    5150    5159    5189    5193    5203
                        5226    5230    5239    5326    5366    5367    5392    5403    5413    5441    5522    5543    5551
                        5552    5555    5556
F$CLEA= 000007          1728#   4444    4474
F$DU  = 000016          1728#   4484    4508
F$END = 000041          1728#   1758    1888    1913    2535    2538    2554    2572    2584    2588    2592    2596    4087
                        4111    4141    4201    4362    4378    4420    4460    4474    4494    4508    4536    4551    4553
                        4576    4578    4583    4598    4600    4606    4608    4613    4615    4620    4622    4627    4629
                        4634    4636    4641    4643    4648    4650    4655    4657    4662    4664    4672    4680    4701
                        4706    4908    4915    4961    5051    5066    5147    5150    5159    5189    5193    5203    5226
```

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                    5230  5239  5326  5366  5367  5392  5413  5427  5522  5532  5543  5551  5552
                    5555  5556
F$HARD= 000004      1728# 5403  5413  5427  5455  5461  5479  5480  5494  5522
F$HW  = 000013      1728# 1818  1829
F$INIT= 000006      1728# 4220  4378
F$JMP = 000050      1728# 2535  2554  4141  4362  4460  4494  4536  4706  4961  5147  5189  5226
                    5326  5413  5522
F$MOD = 000000      1728# 1758  1888  1913  4087  4111  4553  4576  5367  5392  5543
F$MSG = 000011      1728# 2518  2538  2540  2572
F$PROT= 000021      1728# 4207  4211
F$PWR = 000017      1728#
F$RPT = 000012      1728# 4118  4201
F$SEG = 000003      1728#
F$SOFT= 000005      1728# 5441  5455  5461  5479  5480  5494  5522  5532
F$SRV = 000010      1728# 2582  2584  2586  2588  2590  2592  2594  2596
F$SUB = 000002      1728# 4583  4598  4600  4606  4608  4613  4615  4620  4622  4627  4629  4634
                    4636  4641  4643  4648  4650  4655  4657  4662  4664  4672  4680  4701
F$SW  = 000014      1728# 1838  1887
F$TEST= 000001      1728# 4578  4908  4915  5051  5066  5150  5159  5193  5203  5230  5239  5366
GCMDA   007670 G    2789  2794  2810# 4055
GENPAT  010300 G    2871  2895#
GES   = 100017 G    2102# 2142  2397  4737  5288
GETSTM  005243 G    2498# 4037
GIT     010572      2982  2987#
GOWAIT  011166 G    2760  2763  2769  2772  3063# 3413  3440  3628  3637  3655  3851  4083  5108
GSCPK   002324 G    2142# 3998  4323  4403
G$CNTO= 000200      1728#
G$DELM= 000372      1728# 3042  3071  3074  4233  4312  4324  4335  5279
G$DISP= 000003      1728#
G$EXCP= 000400      1728#
G$HILI= 000002      1728#
G$LOLI= 000001      1728#
G$NO  = 000000      1728#
G$OFFS= 000400      1728# 4059  5410  5411  5450  5451  5452  5453  5454  5456  5457  5458  5459
                    5460  5462  5463  5464  5465  5466  5467  5468  5469  5470  5471  5472  5473
                    5474  5475  5476  5477  5478  5481  5482  5483  5484  5485  5486  5487  5488
                    5489  5490  5491  5492
G$OFSI= 000376      1728# 4059  5410  5411  5450  5451  5452  5453  5454  5456  5457  5458  5459
                    5460  5462  5463  5464  5465  5466  5467  5468  5469  5470  5471  5472  5473
                    5474  5475  5476  5477  5478  5481  5482  5483  5484  5485  5486  5487  5488
                    5489  5490  5491  5492
G$PRMA= 000001      1728# 5410
G$PRMD= 000002      1728# 5411  5462  5463  5464  5465  5466  5467  5468  5469  5470  5471  5472
                    5473  5474  5475  5476  5477  5478  5481  5482  5483  5484  5485  5486  5487
                    5488  5489  5490  5491  5492
G$PRML= 000000      1728# 4059  5450  5451  5452  5453  5454  5456  5457  5458  5459  5460
G$RADA= 000140      1728#
G$RADB= 000000      1728#
G$RADD= 000040      1728# 5463  5464  5465  5466  5467  5468  5469  5470  5471  5472  5473  5474
                    5475  5476  5477  5478  5481  5482  5483  5484  5485  5486  5487  5488  5489
                    5490  5491  5492
G$RADL= 000120      1728# 4059  5450  5451  5452  5453  5454  5456  5457  5458  5459  5460
G$RADO= 000020      1728# 5410  5411  5462
G$XFER= 000004      1728# 5413  5455  5461  5479  5480  5494  5522
G$YES = 000010      1728# 4059  5410  5411  5450  5451  5452  5453  5454  5456  5457  5458  5459
                    5460  5462  5463  5464  5465  5466  5467  5468  5469  5470  5471  5472  5473
```

```
                    5474  5475  5476  5477  5478  5481  5482  5483  5484  5485  5486  5487  5488
                    5489  5490  5491  5492
HAE      002206 G   1847#  4050
HAEM     030072     5452  5506#
HALTM    004126 G   2472#  4056*  4057*  4058*  4059
HELP   = 000000     1716#  1723  1750  1767  1777  1793  1820  1839  1922  2458  2519  4120  4173
                    4222  4363  4446  4461  4486  4495  4521  4537  5405  5415  5443  5497
HERE     003341 G   2257#  4254*  5067  5069*
HOE    = 100000 G   1920#
HRDCNT   003310 G   2246#  3222*  3254*  3302*  3920*  4137
IBE    = 010000 G   1920#
IDU    = 000040 G   1920#
IER    = 020000 G   1920#
IE.C   = 000200 G   1968#  2043  3035
INIT10   021222     4231#  4234
INIT15   021442     4251  4265#
INIT16   021462     4266  4270#
INTFLG   003500 G   2307#  2583*  2587*  2591*  2595*  3028  3034*  3077  4534*
INTPRI=  000340 G   1775  2028#  4297  4533
IRE      003527 G   2315#  3221  3296  5243*
IREC     002210 G   1849#  3354  3405  3434  3700  4018  4318
IRECM    030140     5454  5508#
IREM     030231     5458  5511#
ISR    = 000100 G   1920#
IXE    = 004000 G   1920#
I$AU   = 000041     1728#  4519#  4551#
I$AUTO=  000041     1728#  4388#  4420#
I$CLN  = 000041     1728#  4444#  4460  4474#
I$DU   = 000041     1728#  4484#  4508#
I$HRD  = 000041     5403#  5427#
I$INIT=  000041     1728#  4220#  4362  4378#
I$MOD  = 000041     1728#  1758#  1888#  1913#  4087#  4111#  4553#  4576#  5367#  5392#  5543#
I$MSG  = 000041     1728#  2518#  2538#  2540#  2572#
I$PROT=  000040     1728#  4207#
I$PTAB=  000041     1728#  5552#  5555#
I$PWR  = 000041     1728#
I$RPT  = 000041     1728#  4118#  4201#
I$SEG  = 000041     1728#  4578  4583  4600  4608  4615  4622  4629  4636  4643  4650  4657  4664
                    4680  4915  5066  5159  5203  5239
I$SETU=  000041     1728#  5551#  5552  5556#
I$SFT  = 000041     5441#  5532#
I$SRV  = 000041     1728#  2582#  2584#  2586#  2588#  2590#  2592#  2594#  2596#
I$SUB  = 000041     1728#  4578  4583#  4598#  4600#  4606#  4608#  4613#  4615#  4620#  4622#  4627#  4629#
                    4634#  4636#  4641#  4643#  4648#  4650#  4655#  4657#  4662#  4664#  4672#  4680#  4701#
                    4915  5066  5159  5203  5239
I$TST  = 000041     1728#  4578#  4583  4600  4608  4615  4622  4629  4636  4643  4650  4657  4664
                    4680  4706  4908#  4915#  4961  5051#  5066#  5147  5150#  5159#  5189  5193#  5203#
                    5226  5230#  5239#  5326  5366#
JLOC     003454 G   2281#  5264*  5271*
JLOOP    003452 G   2280#  5254*  5265  5269*
JMP    = 000040 G   2118#  2403
JMPMSG   030416     5494  5521#
JMP.C  = 000040 G   1973#  2118  5261
J$JMP  = 000167     1728#  2535  2554  4141  4494  4536
LENMSK   003440 G   2275#  2675  4920*  5164*
LOE    = 040000 G   1920#
```

```
LOG     014664 G        3096    3668#   4008
LOT   = 000010 G        1920#
L$ACP   002110 G        1775#
L$APT   002036 G        1775#
L$AU    023246 G        1775    4519#
L$AUT   002070 G        1775#
L$AUTO  022516 G        1775    4388#
L$CCP   002106 G        1775#
L$CLEA  023140 G        1775    4444#
L$CO    002032 G        1775#
L$DEPO  002011 G        1775#
L$DESC  002140 G        1775    1806#
L$DESP  002076 G        1775#
L$DEVP  002060 G        1775#
L$DISP  002124 G        1775    1791#
L$DLY   002116 G        1775#   3042    3071    3074    4233    4312    4324    4335    5279
L$DTP   002040 G        1775#
L$DTYP  002034 G        1775#
L$DU    023202 G        1775    4484#
L$DUT   002072 G        1775#
L$DVTY  002166 G        1775    1807#
L$EF    002052 G        1775#
L$ENVI  002044 G        1775#
L$ETP   002102 G        1775#
L$EXP1  002046 G        1775#
L$EXP4  002064 G        1775#
L$EXP5  002066 G        1775#
L$HARD  027202 G        1775    5403#
L$HIME  002120 G        1775#
L$HPCP  002016 G        1775#
L$HPTP  002022 G        1775#
L$HW    002176 G        1775    1818#
L$ICP   002104 G        1775#
L$INIT  021222 G        1775    4220#
L$LADP  002026 G        1775#
L$LAST  030670 G        1775    5542#   5556
L$LOAD  002100 G        1775#
L$LUN   002074 G        1775#   3959*   3977*
L$MREV  002050 G        1775#
L$NAME  002000 G        1775#
L$PRIO  002042 G        1775#
L$PROT  021214 G        1775    4207#
L$PRT   002112 G        1775#
L$REPP  002062 G        1775#
L$REV   002010 G        1775#
L$RPT   017366 G        1775    4118#
L$SOFT  027254 G        1775    5441#
L$SPC   002056 G        1775#
L$SPCP  002020 G        1775#
L$SPTP  002024 G        1775#
L$STA   002030 G        1775#
L$SW    002204 G        1775    1838#
L$TEST  002114 G        1775#   3040    3287    3855
L$TIML  002014 G        1775#
L$UNIT  002012 G        1775#   4259
L10000  002202          1818    1829#
```

```
L10001  002312            1838    1887#
L10002  005640            2535    2538#
L10003  006564            2554    2572#
L10004  006572            2584#
L10005  006600            2588#
L10006  006606            2592#
L10007  006614            2596#
L10010  021212            4141    4201#
L10012  022514            4362    4378#
L10013  023004            4420#
L10014  023200            4460    4474#
L10015  023244            4494    4508#
L10016  023340            4536    4551#
L10017  024726            4706    4908#
L10020  023474            4598#
L10021  023520            4606#
L10022  023540            4613#
L10023  023560            4620#
L10024  023600            4627#
L10025  023620            4634#
L10026  023640            4641#
L10027  023660            4648#
L10030  023700            4655#
L10031  023720            4662#
L10032  023756            4672#
L10033  024142            4701#
L10034  025402            4961    5051#
L10035  026040            5147    5150#
L10036  026204            5189    5193#
L10037  026336            5226    5230#
L10040  027176            5326    5366#
L10041  027252            5403    5413    5427#
L10042  030464            5441    5522    5532#
L10043  030674            5552#
L10045  030700            5552    5555#
MBR   = 100012  G         2087#   2148    2392
MEMOM   022412            4352    4374#
MISCFG  003541  G         2331#   3385*   4051    4061*
MOD.C0= 000400  G         1967#   2043    2054    2066    2069    2072    2099    2105    2108    2606    2688    2723    2756
                          2845    3167    3168    3172    3807    5295
MOD.C1= 001000  G         1966#   2043    2069    2072    2075    2078    2081    2093    2096    2099    2111    3404
MOD.C2= 002000  G         1965#   2043    2084
MOD.C3= 004000  G         1962#   2043
MOVMSG  011552  G         3004    3048    3086    3092    3141#   4000    4341
MSGCNT= 000016  G         2031#   2177    3022    3146    3994
MSGPKA  002506  G         2189#   3018    3020    3144    3992    4590
MSGPKT  002340  G         2158#   2551    2553    2607    3147*   3150    3161    3206    3218    3283    3292    3675    3676
                          3889    3991    4038
MSGPK0  002356  G         2168#   2175    2189
MSGPK1  002374  G         2169#   2190
MSGPK2  002412  G         2170#   2191
MSGPK3  002430  G         2171#   2192
MS.RFC= 000004  G         1993#   2551    2607    3218    3675    3676    3889
MS.XS0= 000006  G         1994#   2553    3150    3283    3292    4038
MS.XS1= 000010  G         1995#   2553    4038
MS.XS2= 000012  G         1996#   2553    3161    3206    4038
```

```
MS.XS3= 000014 G   1997#  2553   3991   4038
NCMD.C= 177740 G   2043#  2832
NCNT    003422 G   2268#  2667   2703*  2865*  3041   3799*  3800   3829*  3831*  3858   5104   5110*  5112*
                   5133*  5138*  5285   5308   5316*
NCNT1   003424 G   2269#  2667   2864*  3800   3829   5104   5110   5285   5308*
NEXTSP  027322     5455   5457#
NEXTU   016662 G   2698   2748   2776   3015   3825   3972#  4138   4307   4345   4417   4457   4596   5141
                   5305
NINUSE= 177774 G   2042#  2212   2213   2214   2215   3063   3195   3345   3369   3406   3548   3556   3564
                   3644   3654   3776   3828   3953   3976   4017   4256   4492   5109   5114   5130
NOINTM  004505 G   2484#  3087
NRDYM   023102     4332   4413   4424#
NSSRM   004355 G   2479#  3005
NUMBM   030365     5465   5469   5473   5477   5483   5487   5491   5517#
NURTY1  005157 G   2496#  3702
OFLINM  005213 G   2497#  4329   4408
ONEFIL= 000001     1712#  1754   1889   1890   1897#  1904   4095#  4102   4555   4564#  5368   5369   5377#
                   5383
OPFLAG  003542 G   2337#  4270*  4318
OPP.C = 020000 G   1960#  2043   2072   2078   3396
O$APTS= 000000     1728#  1775
O$AU  = 000001     1728#  1765#  1775
O$BGNR= 000001     1728#  1765#  1775
O$BGNS= 000001     1728#  1765#  1775
O$DU  = 000001     1728#  1765#  1775
O$ERRT= 000000     1728#  1775
O$GNSW= 000001     1728#  1765#  1775
O$POIN= 000001     1728#  1765#  1775
O$SETU= 000001     1728#  1765#  1775   5542
PASCNT  003260 G   2243#  2524   2541   4011   4012*  4128   4300*  4302*  4593
PATCH   030464 G   5538#
PATERN  003456 G   2282#  2866*  2895
PATR0   010364 G   2906   2919#
PATR1   010422 G   2907   2932#
PATR2   010442 G   2908   2942#
PATR3   010452 G   2909   2948#
PATR4   010476 G   2910   2959#
PATR5   010510 G   2911   2966#
PATR6   010522 G   2912   2972#
PATR7   010542 G   2913   2981#  2986
PATR8   010574 G   2914   2991#
PATTBL  010342     2900   2906#
PATTM   030405     5466   5470   5474   5478   5484   5488   5492   5518#
PCMDWD  003434 G   2273#  2704*  2793   2879*  3168   3172   3288   3386*  3620*  3631*  3645*  3772*  3779*
                   3832*  5317*  5355*
PIRE    002213 G   1852#  5243
PNT   = 001000 G   1920#
PRI   = 002000 G   1920#
PRI00 = 000000 G   1920#  4317
PRI01 = 000040 G   1920#
PRI02 = 000100 G   1920#
PRI03 = 000140 G   1920#
PRI04 = 000200 G   1920#
PRI05 = 000240 G   1920#
PRI06 = 000300 G   1920#
PRI07 = 000340 G   1920#  2028   4393
```

```
PRXST   017140 G   4004  4037# 5289
PTCMDS  027050     5247  5248  5249  5250  5251  5252  5253  5337#
PWRFLG  003537 G   2329# 4268* 4272  4348  4360*
RAMDAT  003346 G   2261# 3731  3748
RAMDUM  013360 G   3224  3256  3272  3304  3323  3352  3379  3401  3431  3462  3477  3484# 3509
                   3519
RAMER   015164 G   3488  3490  3492  3495  3726#
RAMFHR  005310     2501# 3485
RAMHLD  003342     2259# 3487* 3489* 3491* 3494* 3732  3744
RAMIOP  005401     2502# 3747
RAMLIN  005464     2504# 3496
RAMM    030262     5459  5512#
RAMPD   005452     2503# 3753
RAMR5H  003344     2260#
RAMSIZ  003406 G   2262# 3486* 3493* 3733  3743  3749
RAMWRT  002214 G   1853# 3484
RANB    003442 G   2276# 2672* 2673  2983* 2984  4247* 4933  4996* 4997  5043* 5044
RANBC = 153624 G   2040# 4247
RANCMD  025210     4935  4967#
RANDOM  003523 G   2311# 2669  3219  3294  4580* 4917* 5073* 5161* 5205* 5241*
RANP  = 000007 G   1862  1866  1870  1874  1878  1882  1886  2037# 2351  2355  2359  2363  2367
                   4930  4999  5003  5046  5213  5221
RANRD   025250     4949  4975  4976  4977  4978  4979  4980  4981  4982  4994#
RANS    003444 G   2277# 2672  2673* 2674  2983  2984* 2985  4248* 4933* 4934  4996  5043
RANSC = 032561 G   2041# 4248
RANW    025350     5013  5027  5041#
RANWR   025324     4968  4969  4970  4971  4972  4973  4974  5012# 5170
RANWV   025336     4967  5026#
RCVERM  030116     5453  5507#
RDF   = 104001 G   2051# 2360  2378  3780  4691  4873  5000  5210
RDR   = 104401 G   2054# 2356  2379  3773  4682  4859  4994  5218  5356
RECCNT  003330 G   2249# 2524  2541  3037* 3038  3085  3160* 3164* 3169* 3174* 3181  3378* 3381*
                   3436* 3437  3581  4128  4306*
RECLOG  003473 G   2297# 3159  3162* 4006
RECRED  006562     2526* 2530  2531* 2534  2547* 2548  2570#
RECTAP  006616 G   2529  2546  2606#
RECUD   011636 G   3093  3159#
REPEAT= 050232     3551# 3562
RERM    004634 G   2488# 3351  3400  3430
RETRY = 050230     3549# 3569  3589
RETRYC  003466 G   2293# 3366* 3395  3399  3403* 3429  3433* 3516  3524  3563* 3572  3574  3588
                   3702
REWRT   014550     3555  3644#
RFBC    002660 G   2231# 4131
RFCERM  004340 G   2478# 3223
RFREC   002760 G   2236# 4132
RFUNR   002770 G   2237# 4133
RLEXM   004374 G   2480# 3518  3526
RNF   = 125401 G   2072# 2387  4867
RNOPSC= 177740 G   2036# 4928  4950  4997  5044
RNR   = 105401 G   2069# 2386  4863
RNYM    004570 G   2487# 4002
RPF   = 105001 G   2075# 2388  4877
RPR   = 125001 G   2078# 2389  4881
RPTCNT  003470 G   2294# 3367* 3557* 3560* 3561  3572  3586*
RPTFLG  003525 G   2313# 2750  2751* 4955*
```

```
RPT1A   020230          4128    4185#
RPT1B   020305          4129    4186#
RPT1C   020356          4130    4187#
RPT1D   020427          4131    4188#
RPT1E   020655          4148    4192#
RPT1F   020533          4132    4190#
RPT1G   020604          4133    4191#
RPT1I   021001          4137    4195#
RPT1J   020705          4151    4193#
RPT1K   020772          4160    4194#
RRANV   002205 G        1846#   4246
RRBC    002620 G        2230#   4130
RRECL = 000020 G        2038#   3394    3524
RRREC   002740 G        2234#   4132
RRUNR   002750 G        2235#   4133
RRVM    030043          5451    5505#
RTLE    013512 G        3392    3428    3507#
RTLRTN  013646          3512    3530#
RWCPK   002334 G        2153#   3382    3459
RWD   = 102010 G        2084#   2153    2348    2364    2391    2651    3070    3163    4747    4823    4845    4891
RWERR   003475 G        2299#   3230    3362*   3514*   3585*   3693
R5SAVE  003462 G        2285#   3011*   3017    3989*   4026    4125*   4140    5127*   5129
SCCNT   003270 G        2244#   3202*   3300*   4137
SCERM   004314 G        2477#   3255
SCH   = 140004 G        2114#   2344    2401    2636    3010    4725    4733    4741
SCHBK   002446 G        2175#   2854    2856*   3018*
SCHCNT= 000010 G        2029#   2855
SEQEND  003634 G        2369#   4932    5169
SETCH   006714 G        2635#   4921    5075    5165    5207    5244
SETRW   006740 G        2651#   4923    4957    5076    5166    5185    5208
SETUP   007722 G        2666    2827#   4080    5102    5125    5284
SFF   = 105010 G        2096#   2395    3073    4809    4817
SFPTBL  002204 G        1838#
SFR   = 105410 G        2099#   2396    3073    4805    4813
SRF   = 104010 G        2063#   2384    4827    4835
SRR   = 104410 G        2066#   2385    3288    3621    4831    4839
STAERM  005642 G        2540#   3005    3030    3049    3087    3223    3255    3271    3303    3322    3351    3400    3430
                        3461    3476    3508    3518    3526    4002
STAER1  006154          2524    2541    2557#   2790*   2791*   2792*
STAER2  006332          2550    2561#
STAER3  006411          2551    2562#
STAER4  006447          2552    2563#
STAER5  006467          2553    2566#   4038
STAER6  006276          2534    2548    2560#
STAER7  006246          2525    2542    2559#   2796*   2797*   2798*
STAFLG  003536 G        2328#   4022*   4252*   4267*   4275    4605*   4922    4924*   5077*   5167*   5209*   5255*
STREAM  003533 G        2319#   3802    3823    5093*   5145*
STTIM   003414 G        2265#   3770*   3778*   3868    3872*
SVCGBL= 000000          1728#   1742#   1775    1791    1806    1807    1818    1838    2518    2540    2582    2586    2590
                        2594    4118    4207    4220    4388    4444    4484    4519    5403    5441    5542#
SVCINS= 000001          1728#   1739#   1775    1791    1806    1807    1818    1838    2524    2525    2534    2535    2538
                        2541    2542    2548    2550    2551    2552    2553    2554    2572    2584    2588    2592    2596
                        2752    3005    3030    3042    3049    3069    3071    3074    3087    3125    3223    3255    3271
                        3303    3322    3351    3376    3400    3430    3461    3476    3485    3496    3508    3518    3526
                        3572    3592    3702    3747    3753    3891    3892    3895    3896    3921    3928    3936    3957
                        4002    4010    4016    4037    4038    4052    4053    4059    4128    4129    4130    4131    4132
```

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                    4133    4137    4141    4148    4151    4156    4160    4164    4170    4201    4232    4233    4250
                    4251    4265    4266    4270    4273    4276    4292    4297    4311    4312    4313    4314    4317
                    4324    4329    4332    4335    4336    4349    4352    4353    4362    4378    4393    4395    4398
                    4401    4408    4413    4420    4456    4460    4474    4493    4494    4508    4529    4533    4536
                    4551    4583    4594    4598    4600    4606    4608    4613    4615    4620    4622    4627    4629
                    4634    4636    4641    4643    4648    4650    4655    4657    4662    4664    4672    4680    4701
                    4706    4908    4961    5051    5068    5147    5150    5189    5193    5226    5230    5279    5326
                    5366    5403    5410    5411    5413    5427    5441    5450    5451    5452    5453    5454    5455
                    5456    5457    5458    5459    5460    5461    5462    5463    5464    5465    5466    5467    5468
                    5469    5470    5471    5472    5473    5474    5475    5476    5477    5478    5479    5480    5481
                    5482    5483    5484    5485    5486    5487    5488    5489    5490    5491    5492    5494    5522
                    5532    5542    5552
SVCSUB= 000000       1728#   1741#   4583    4600    4608    4615    4622    4629    4636    4643    4650    4657    4664
                    4680
SVCTAG= 000000       1728#   1743#   1829    1887    2538    2572    2584    2588    2592    2596    4059    4201    4378
                    4420    4474    4508    4551    4598    4606    4613    4620    4627    4634    4641    4648    4655
                    4662    4672    4701    4908    5051    5150    5193    5230    5366    5427    5532    5552    5555
SVCTST= 000000       1728#   1740#   4578    4915    5066    5159    5203    5239
SWBFLG  003526 G     2314#   2613    2881    3794    3908    4669*   4671*   4686*   4695*
SWB.C = 010000 G     1961#   2043    2882    3795
S$LSYM= 010000       1728#   1829#   1887#   2538#   2572#   2584#   2588#   2592#   2596#   4059#   4201#   4378#   4420#
                    4474#   4508#   4551#   4598#   4606#   4613#   4620#   4627#   4634#   4641#   4648#   4655#   4662#
                    4672#   4701#   4908#   5051#   5150#   5193#   5230#   5366#   5427#   5532#
TAPCAP  021112       4197#   5068
TCCRA   012232       3215    3238#
TCC0    012252 G     3238    3254#
TCC1    012274 G     3239    3271#   4342
TCC2    012312 G     3240    3283#
TCC3    012460 G     3241    3322#
TCC4    012502 G     3242    3345#
TCC5    013200 G     3243    3428#
TCC6    013302 G     3244    3459#
TCC7    013336 G     3245    3476#
TC2RTN  012456       3285    3289    3308#
TIME1   003446 G     2278#   2527*   2532    3000*   3002*   3003    3067*   3082*   3083    3084    3123*   3126*   3127
                    3923*   3924*   3928    4059    4322*   4340
TIME2   003450 G     2279#   2528*   2533    3925*   3926*   3928    4334*   5278*   5280*
TOERM   004273 G     2476#   3049
TOOMM   004544 G     2486#   3030
TRAPD4  003540 G     2330#   4392*   4396    4431*
TRAP4   023132 G     4393    4431#
TSAM    004522 G     2485#   3303
TSBA  = 002456 G     2185#   3740
TSC.FC= 177717 G     1953#
TSC.TC= 177761 G     1954#   3142
TSDB    002456 G     2182#   2185    2551    3045*   3382*   3459*   3734    3998*   4295*   4323*   4403*   4531*
TSSR    002466 G     2183#   3009    3029    3047    3080    3127    3141    4294*   4325    4326    4394    4398    4405
                    4406    4530*
TSSREG  003464 G     2286#   2551    3029*   3141*   3142    3199    3205
TSVCT   002476 G     2184#   4296*   4297    4456    4532*   4533
TS.A16= 000400 G     1950#
TS.A17= 001000 G     1949#
TS.NBA= 002000 G     1948#
TS.NXM= 004000 G     1947#   3205
TS.OFL= 000100 G     1952#   4326    4406
TS.RMR= 010000 G     1946#
```

```
TS.SC = 100000 G        1943#   3199
TS.SPE= 020000 G        1945#
TS.SSR= 000200 G        1951#   3009    3047    3079    3127    4325    4405
TS.UPE= 040000 G        1944#   3205
TS4ADR  027226          5410    5422#
TS4CL   002526 G        2203#   4592*   4594
TS4INT  002516 G        2196#   4297    4533
TS4IN0  006566 G        2196    2582#
TS4IN1  006574 G        2197    2586#
TS4IN2  006602 G        2198    2590#
TS4IN3  006610 G        2199    2594#
TS4VCT  027243          5411    5423#
T$ARGC= 000001          1775#   2524#   2525#   2534#   2541#   2542#   2548#   2550#   2551#   2552#   2553#   3376#   3485#
                        3496#   3572#   3592#   3702#   3747#   3753#   3892#   3896#   3928#   3936#   4037#   4038#   4128#
                        4129#   4130#   4131#   4132#   4133#   4137#   4148#   4151#   4156#   4160#   4164#   4170#   4311#
                        4329#   4332#   4352#   4398#   4408#   4413#   4493#   4594#   5068#
T$CODE= 023004          4059#   5410#   5411#   5413#   5450#   5451#   5452#   5453#   5454#   5455#   5456#   5457#   5458#
                        5459#   5460#   5461#   5462#   5463#   5464#   5465#   5466#   5467#   5468#   5469#   5470#   5471#
                        5472#   5473#   5474#   5475#   5476#   5477#   5478#   5479#   5480#   5481#   5482#   5483#   5484#
                        5485#   5486#   5487#   5488#   5489#   5490#   5491#   5492#   5494#   5522#
T$ERRN= 000001          1728#   3005#   3030#   3049#   3087#   3223#   3255#   3271#   3303#   3322#   3351#   3400#   3430#
                        3461#   3476#   3508#   3518#   3526#   3891#   3895#   3921#   4002#   4232#
T$EXCP= 000000          5410#   5411#   5462#   5463#   5464#   5465#   5466#   5467#   5468#   5469#   5470#   5471#   5472#
                        5473#   5474#   5475#   5476#   5477#   5478#   5481#   5482#   5483#   5484#   5485#   5486#   5487#
                        5488#   5489#   5490#   5491#   5492#
T$FLAG= 000041          2535#   2554#   4141#   4362#   4460#   4494#   4536#   4706#   4961#   5147#   5189#   5226#   5326#
                        5413#   5522#
T$FREE= 030700          5542    5556#
T$GMAN= 000000          1728#
T$HILI= 000010          5410#   5411#   5462#   5463#   5464#   5465#   5466#   5467#   5468#   5469#   5470#   5471#   5472#
                        5473#   5474#   5475#   5476#   5477#   5478#   5481#   5482#   5483#   5484#   5485#   5486#   5487#
                        5488#   5489#   5490#   5491#   5492#
T$LAST= 000001          1728#   5542#   5551
T$LOLI= 000000          5410#   5411#   5462#   5463#   5464#   5465#   5466#   5467#   5468#   5469#   5470#   5471#   5472#
                        5473#   5474#   5475#   5476#   5477#   5478#   5481#   5482#   5483#   5484#   5485#   5486#   5487#
                        5488#   5489#   5490#   5491#   5492#
T$LSYM= 010000          1728#   1829    1887    2538    2572    2584    2588    2592    2596    4201    4378    4420    4474
                        4508    4551    4598    4606    4613    4620    4627    4634    4641    4648    4655    4662    4672
                        4701    4908    5051    5150    5193    5230    5366    5427    5532
T$LTNO= 000006          5542#
T$NEST= 177777          1728#   1758#   1818#   1829#   1838#   1887#   1888#   1913#   2518#   2538#   2540#   2572#   2582#
                        2584#   2586#   2588#   2590#   2592#   2594#   2596#   4087#   4111#   4118#   4201#   4207#   4211#
                        4220#   4378#   4388#   4420#   4444#   4474#   4484#   4508#   4519#   4551#   4553#   4576#   4578#
                        4583#   4598#   4600#   4606#   4608#   4613#   4615#   4620#   4622#   4627#   4629#   4634#   4636#
                        4641#   4643#   4648#   4650#   4655#   4657#   4662#   4664#   4672#   4680#   4701#   4908#   4915#
                        5051#   5066#   5150#   5159#   5193#   5203#   5230#   5239#   5366#   5367#   5392#   5403#   5413
                        5427#   5441#   5455    5461    5479    5480    5494    5522    5532#   5543#
T$NS0 = 000000          1758#   1888    1913#   4087    4111#   4553    4576#   5367    5392#   5543
T$NS1 = 000005          1818#   1829    1838#   1887    2518#   2538    2540#   2572    2582#   2584    2586#   2588    2590#
                        2592    2594#   2596    4118#   4201    4207#   4211    4220#   4378    4388#   4420    4444#   4474
                        4484#   4508    4519#   4551    4578#   4908    4915#   5051    5066#   5150    5159#   5193    5203#
                        5230    5239#   5366    5403#   5413    5427    5441#   5455    5461    5479    5480    5494    5522
                        5532
T$NS2 = 000002          4583#   4598    4600#   4606    4608#   4613    4615#   4620    4622#   4627    4629#   4634    4636#
                        4641    4643#   4648    4650#   4655    4657#   4662    4664#   4672    4680#   4701
T$PCNT= 000000          5551#   5552#
```

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T$PTAB= 010044          5552#
T$PTHV= 000001          1775    5556#
T$PTNU= 000001          1728#   5552#   5556
T$SAVL= 177777          1728#
T$SEGL= 177777          1728#
T$SIZE= 000004          5542    5556#
T$SUBN= 000000          1728#   4578#   4583#   4600#   4608#   4615#   4622#   4629#   4636#   4643#   4650#   4657#   4664#
                        4680#   4915#   5066#   5159#   5203#   5239#
T$TAGL= 177777          1728#
T$TAGN= 010046          1728#   1818#   1838#   2518#   2540#   2582#   2586#   2590#   2594#   4118#   4207#   4220#   4388#
                        4444#   4484#   4519#   4578#   4583#   4600#   4608#   4615#   4622#   4629#   4636#   4643#   4650#
                        4657#   4664#   4680#   4915#   5066#   5159#   5203#   5239#   5403#   5441#   5551#   5552#
T$TEMP= 000000          1791#   1829#   1887#   1888#   2535#   2538#   2554#   2572#   2584#   2588#   2592#   2596#   4059#
                        4087#   4141#   4201#   4211#   4362#   4378#   4420#   4460#   4474#   4494#   4508#   4536#   4551#
                        4553#   4598#   4606#   4613#   4620#   4627#   4634#   4641#   4648#   4655#   4662#   4672#   4701#
                        4706#   4908#   4961#   5051#   5147#   5150#   5189#   5193#   5226#   5230#   5326#   5366#   5367#
                        5410#   5411#   5413#   5427#   5450#   5451#   5452#   5453#   5454#   5456#   5457#   5458#   5459#
                        5460#   5462#   5463#   5464#   5465#   5466#   5467#   5468#   5469#   5470#   5471#   5472#   5473#
                        5474#   5475#   5476#   5477#   5478#   5481#   5482#   5483#   5484#   5485#   5486#   5487#   5488#
                        5489#   5490#   5491#   5492#   5522#   5532#   5543#
T$TEST= 000006          1728#   4578#   4583    4600    4608    4615    4622    4629    4636    4643    4650    4657    4664
                        4680    4915#   5066#   5159#   5203#   5239#   5542
T$TSTM= 177777          1728#   2524    2525    2534    2538    2541    2542    2548    2550    2551    2552    2553    2572
                        2752    3005    3030    3049    3069    3087    3125    3223    3255    3271    3303    3322    3351
                        3376    3400    3430    3461    3476    3485    3496    3508    3518    3526    3572    3592    3702
                        3747    3753    3891    3892    3895    3896    3921    3928    3936    3957    4002    4010    4016
                        4037    4038    4052    4059    4128    4129    4130    4131    4132    4133    4137    4148    4151
                        4156    4160    4164    4170    4201    4232    4250    4265    4270    4273    4276    4292    4297
                        4311    4313    4314    4317    4329    4332    4336    4349    4352    4353    4362    4378    4393
                        4395    4398    4401    4408    4413    4420    4456    4460    4474    4493    4508    4529    4533
                        4551    4583    4594    4598    4600    4606    4608    4613    4615    4620    4622    4627    4629
                        4634    4636    4641    4643    4648    4650    4655    4657    4662    4664    4672    4680    4701
                        4706    4908    4961    5051    5068    5147    5150    5189    5193    5226    5230    5326    5366
T$TSTS= 000001          1728#   4578#   4915#   5066#   5159#   5203#   5239#
T$$AU = 010016          4519#   4536    4551
T$$AUT= 010013          4388#   4420
T$$CLE= 010014          4444#   4460    4474
T$$DAT= 010045          5552#   5555
T$$DU = 010015          4484#   4494    4508
T$$HAR= 010041          5403#   5413    5427
T$$HW = 010000          1818#   1829
T$$INI= 010012          4220#   4362    4378
T$$MSG= 010003          2518#   2535    2538    2540#   2554    2572
T$$PC = 000001          5551#   5556
T$$PRO= 010011          4207#
T$$PTA= 010044          5551#   5552#
T$$RPT= 010010          4118#   4141    4201
T$$SOF= 010042          5441#   5522    5532
T$$SRV= 010007          2582#   2584    2586#   2588    2590#   2592    2594#   2596
T$$SUB= 010033          4583#   4598    4600#   4606    4608#   4613    4615#   4620    4622#   4627    4629#   4634    4636#
                        4641    4643#   4648    4650#   4655    4657#   4662    4664#   4672    4680#   4701
T$$SW = 010001          1838#   1887
T$$TES= 010040          4578#   4706    4908    4915#   4961    5051    5066#   5147    5150    5159#   5189    5193    5203#
                        5226    5230    5239#   5326    5366
T1      023342 G        1791    4578#
T1SWB   003531 G        2317#   3903    4678*   4703*
```

```
T1.1     023352          4583#
T1.10    023702          4657#
T1.11    023722          4664#
T1.12    024006          4680#
T1.2     023476          4600#
T1.3     023522          4608#
T1.4     023542          4615#
T1.5     023562          4622#
T1.6     023602          4629#
T1.7     023622          4636#
T1.8     023642          4643#
T1.9     023662          4650#
T2       024730 G        1791    4915#
T3       025404 G        1791    5066#
T4       026042 G        1791    5159#
T5       026206 G        1791    5203#
T5WEOT   027072          4945    5180    5311    5350#
T6       026340 G        1791    5239#
UAM   =  000200 G        1920#
UNL   =  100412 G        2108#   2399
UNREC    003476 G        2300#   3298*   3389*   3415*   3442*   3517*   3525*   3695
URERM    004656 G        2489#   3461    3508
VFEXC    015504 G        3775    3782    3793#   4683    4685    4688    4690    4692    4694    4697    4699
VFISU    015770 G        3811    3814    3820    3844#
VFYCNT   003300 G        2245#   3919*   4137
VFYDAT   015370 G        2706    3769#   5128    5319
VFYFLG   003524 G        2312#   2671    2874*   2877*   3219    3294    3771    5126*   5139*
VFY.C =  000100 G        1970#   2060    2873    2875
WLKZRO   010456          2949#   2954    2960
WRBC     002560 G        2229#   4129    4241*
WRECL =  000020 G        2039#   3516
WRITEM   017312 G        4072#   5115    5134
WRR   =  105005 G        2081#   2390    4853
WRREC    002720 G        2232#   3694    4132
WRT   =  104005 G        2057#   2352    2380    2670    3040    4787    4849    5012    5095    5119
WRTY     013650 G        3368    3548#
WRTYCT   003250 G        2242#   3365*   4148
WRTYER   003472 G        2296#   3356*   3373    3554*   3561    3568    3590
WRTYFG   003471 G        2295#   3095    3357    3363*   3384*
WRUNR    002730 G        2233#   4133
WSSR     011516 G        3014    3123#   3460    3737    3739    3999    4404    4455
WTM   =  100011 G        2090#   2393    2838    3288    4074    4783    4795
WTR   =  101011 G        2093#   2394    4799
WTV   =  104105 G        2060#   2381    4753    4757    4761    4765    4769    4773    4777    4897    4901    4926    5026
WTVERM   004250 G        2475#   3891    3895    3921
WTYBRF   014166          3361*   3605#   3650
WTYCMD   014162          3360*   3603#   3647
WTYWRD   014164          3359*   3386    3604#   3646
X$ALWA=  000000          1728#   5413    5479    5480    5494    5522
X$FALS=  000040          1728#   5461
X$OFFS=  000400          1728#   5413    5455    5461    5479    5480    5494    5522
X$TRUE=  000020          1728#   5455
XO.BOT=  000002 G        2006#   2689    2724    2734    2757    3173    3283    3292    3808    3854    5296
XO.EOT=  000001 G        2007#   2693    2725    2739    2758    2767    3809    3818    5300
XO.LET=  020000 G        2003#   3292
XO.ONL=  000100 G        2005#
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X0.RLL= 010000 G        2004#   3292
X0.RLS= 040000 G        2002#   3292
X0.TMK= 100000 G        2001#   3292
X2.OPM= 100000 G        2011#   3161    3206
X3.DCK= 000010 G        2015#
X3.RNY= 157400 G        2016#   4001
ZROPAT  010426          2933#   2936    2943    2967
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$BRJMP= 177777          5258#   5324#
$ERFLG= 000400          1730#   2526#   2527#   2528#   2530#   2531#   2532#   2533#   2543#   2544#   2547#   2583#   2587#
                        2591#   2595#   2607#   2609#   2610#   2611#   2612#   2614#   2616#   2617#   2619#   2622#   2635#
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                        5217#   5218#   5219#   5220#   5221#   5222#   5224#   5241#   5242#   5243#   5245#   5246#   5254#
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                        3010    3013    3022    3028    3036    3040    3041    3047    3063    3070    3073    3076    3084
                        3095    3146    3159    3161    3163    3166    3167    3168    3172    3173    3195    3199    3200
                        3201    3205    3206    3217    3218    3219    3221    3230    3283    3287    3288    3292    3294
                        3296    3297    3345    3349    3350    3354    3357    3369    3375    3393    3395    3399    3405
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FBAD= 000401

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3818 3828 3846 3850 3853 3854 3855 3858 3861 3867 3868 3890 3894
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                4277#  4279#  4281   4298#  4304   4322#  4338   4340#  4343   4405#  4411#  4415   5104#
                5113   5130#  5136   5285#  5318
$TSK4 = 050511  2669#  2682   2687#  2699   2700#  2702   2725#  2729#  2731   2743#  2745   2758#  2762#
                2764   2771#  2773   3167#  3171#  3177   3221#  3225   3369#  3371#  3372   3578#  3582
                3700#  3704   3807#  3817#  3822   3861#  3864   3868#  3871#  3874   3908#  3913   4299#
                4301#  4303   4322#  4338   4406#  4410   5109#  5111   5288#  5290   5294#  5306   5307#
                5313#  5315
$TSK5 = 050510  2670#  2681   2687#  2699   2726#  2728   2759#  2761   3168#  3170   3172#  3176   3701#
                3703   3808#  3816   3818#  3821   3909#  3912   4325#  4331#  4333   4334#  4337   5294#
                5306   5310#  5312
$TSK6 = 050504  2671#  2680   2688#  2692#  2697   3173#  3175   3809#  3813#  3815   4326#  4328#  4330
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$TSK7 = 050506  2676#  2678   2689#  2691   2693#  2696   3810#  3812   5296#  5298   5300#  5303
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```

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ENDSW   1887
ENDTST  4908    5051    5150    5193    5230    5366
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ERRDF   3005    3030    3049    3087    3271    3322    3461    3476    3508    3518    4002
ERRHRD  3223    3255    3303    3526    3891    3895    3921
ERRSF   4232
ERRSOF  3351    3400    3430
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EXIFB   1730#
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GPHARD  4292    4529
GPRMA   5410
GPRMD   5411    5462    5463    5464    5465    5466    5467    5468    5469    5470    5471    5472    5473    5474    5475
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LOOP    1730#
MANUAL  4052
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M$MCLO          1728#
M$POP           1829#  1887#  1888#  2538#  2572#  2584#  2588#  2592#  2596#  4087#  4201#  4211#  4378#  4420#  4474#
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                3896#  3921   3928#  3936#  3957#  4002   4010#  4016#  4037#  4038#  4052#  4059#  4128#  4129#  4130#
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M$TSTL          2524#  2525#  2534#  2538#  2541#  2542#  2548#  2550#  2551#  2552#  2553#  2572#  2752#  3005#  3030#
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MSWORD          1775#   1791#   2535#   2554#   3005#   3030#   3049#   3087#   3223#   3255#   3271#   3303#   3322#   3351#   3400#
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MSXFER          5413#   5455#   5461#   5479#   5480#   5494#   5522#
POINTE          1765
POP             1730#   3411    3438    3511    3521    3527
PRINTB          2524    2525    2534    2541    2542    2548    3376    3572    3592    3702    3892    3896    3936
PRINTF          4311    4329    4332    4352    4398    4408    4413    4493    4594    5068
PRINTS          4128    4129    4130    4131    4132    4133    4137    4148    4151    4156    4160    4164    4170
PRINTX          2550    2551    2552    2553    3485    3496    3747    3753    3928    4037    4038
PUSH            1730#
READEF          4250    4265    4273    4276
REPEAT          1730#   3001    3068    3110    3124    3364    3550    3552    3906    3974    4159    4255    4260    4931    5168
RETURN          1730#
RFLAGS          4270
ROUTIN          1730#
SAVR14          1730#
SELECT          1730#
SETPRI          4317
SETVEC          4297    4393    4533
STRUCT          1729#   1730
SVC             1727#   1728
UNTIL           1730#   3009    3083    3112    3127    3588    3933    3976    4168    4258    4263    4940    5175
UNTILB          1730#   3373    3561
WHILE           1730#   2665    2667    2687    2722    2755    2811    3013    3022    3146    3679    3684    3689    3800    3806
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                5169    5260    5285    5294
WHILEB          1730#
XFER            2535#   2554#   4141#   4362#   4460#   4494#   4536#   4706#   4961#   5147#   5189#   5226#   5326#   5413#   5479
                5480    5494    5522#
XFERF           5461
XFERT           5455
$ADDON          1730#   2545    2606    2608    2613    2618    2621    2665    2667    2669    2670    2671    2676    2687    2688
                2689    2692    2693    2699    2700    2705    2708    2722    2723    2724    2725    2726    2729    2733    2734
                2739    2742    2743    2749    2750    2755    2756    2757    2758    2759    2762    2766    2767    2770    2771
                2777    2811    2813    2838    2845    2847    2873    2876    2881    2924    3001    3003    3010    3013    3016
                3022    3025    3028    3036    3040    3041    3047    3063    3065    3068    3070    3073    3076    3078    3083
                3084    3091    3095    3110    3124    3127    3146    3149    3159    3161    3163    3165    3166    3167    3168
                3171    3172    3173    3195    3197    3199    3200    3201    3205    3206    3208    3211    3216    3217    3218
                3219    3221    3230    3283    3287    3288    3292    3294    3296    3297    3299    3345    3347    3349    3350
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                3414    3429    3434    3441    3484    3507    3515    3516    3523    3524    3548    3549    3550    3551    3552
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```

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 ERRORS DETECTED:  0

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 RUN-TIME RATIO: 347/312=1.1
 CORE USED:  31K  (62 PAGES)
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