RH70/RP04

MECHANICAL R/W TEST

MD-11-DERPK-C

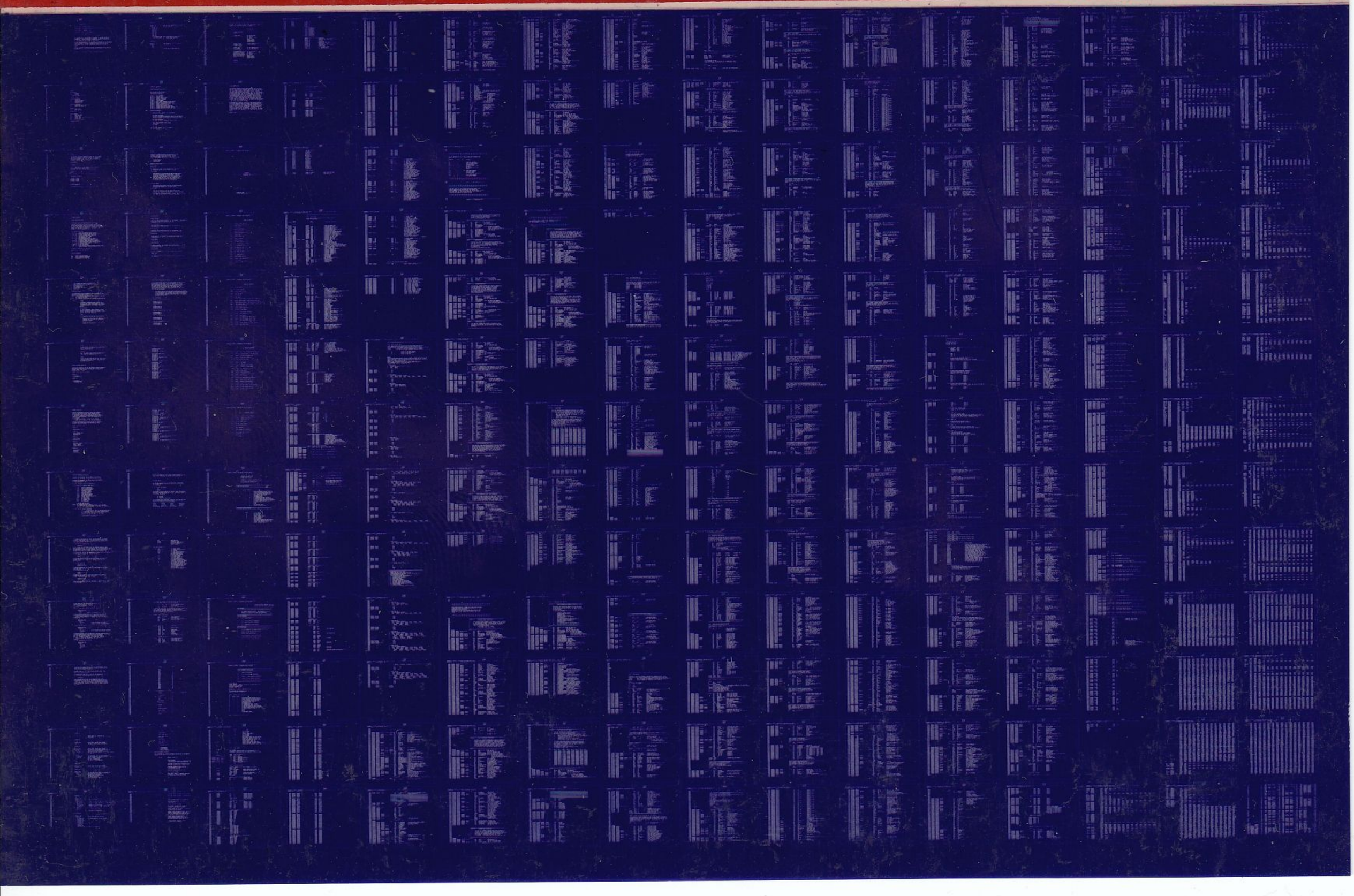
EP-DERPK-C-DL-A

FICHE 1 OF 2

NOV 1976

digital

MADE IN USA



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INDENTIFITION

PRODUCT CODE: MAINDEC-11-DERPK-C-D

PRODUCT NAME: RH70/RP04 MECHANICAL AND READ/WRITE TEST

DATE CREATED: OCTOBER 21, 1975

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: J. LACEY/C. HESS/SUB MALLICK

CONTENTS

1. ABSTRACT

THIS PROGRAM CONTAINS A SERIES OF TESTS THAT WILL INSURE
THE DISK IS CAPABLE OF PERFORMING SEEKS, THE ACCESS TIMES
ARE WITHIN TOLERANCE, THE TRACK AND SECTOR ADDRESSING
CIRCUITRY OPERATES PROPERLY, AND THE DATA STORAGE AND
RETRIEVEL CAPABILITIES ARE FUNCTIONAL.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 COMPUTER WITH 16K OF MEMORY, CONSOLE TELETYPE.
RH70/RP04 DISK WITH FORMATTED PACK,
AND A KW11-P CLOCK (IF TIMING TESTS ARE DESIRED).

2.2 STORAGE

THIS PROGRAM WILL LOAD IN 12K BUT REQUIRES. 16K TO RUN

2.3 PRELIMINARY PROGRAMS

MAINDEC-11-DERPS
MAINDEC-11-DERPT
MAINDEC-11-DERPU
MAINDEC-11-DERPV

3. LOADING PROCEDURE

USE STANDARD PROCEDURE FOR LOADING .ABS TAPES

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

THE CONTROL SWITCH SETTINGS ARE INPUT VIA THE TTY.

TO ENTER THE CONTROL SWITCH SETTING MODE PLACE SW<07>=1
BEFORE PRESSING START. THEN UPON STARTING THE PROGRAM IT
WILL TYPE THE PRESENT CONTENTS OF THE CONTROL SWITCH REGISTER
(C.SWR) AND WAIT FOR THE NEW SETTING TO BE INPUT. THE INPUT
STRING MUST CONSIST OF A SLASH (/), 1 TO 6 OCTAL DIGITS, TWO
PERIODS (..) AND A CARRIAGE RETURN.

THE C.SWR SETTINGS ARE:

```
C.SWR<15>=0...WRITE PACK BEFORE TESTING (TEST16)
         =1...INHIBIT WRITE PACK BEFORE TESTING (TEST16)
C.SWR<14>=0...NO STALL BETWEEN DRIVE FUNCTIONS
         =1...STALL AFTER EVERY DRIVE FUNCTION
C.SWR<13>=0...USE SPECIFIC STALL TIMES
         =1...USE RANDOM STALL TIMES
C.SWR<12>=0...NO INCREMENTING STALLS IN TEST4
         =1...PERFORM INCREMENTING STALLS IN TEST4
C.SWR<08>=0...DO IMPLIED SEEKS WITH DATA TRANSFERS
         =1...DO EXPLICIT SEEKS BEFORE DATA TRANSFERS
C.SWR<07>=0...DO READ HEADER AND  DATA COMMANDS IN TESTS 0-6
         =1...DO EXPLICIT SEEK COMMANDS IN TESTS 0-6
C SWR<06>=0...60 HZ POWER SOURCE
         =1...50 HZ POWER SOURCE
C.SWR<05>=0...ALLOW SOFTWARE TIMEOUTS(ENABLE WATCHDOG TIMER)
         =1...INHIBIT SOFTWARE TIMEOUTS(DISABLE WATCHDOG TIMER)
```

THE DEFAULT CONDITION OF C.SWR<15:00>=0.

REFER TO 4.4.1 FOR C.SWR SELECTION

4.2 STARTING ADDRESSES

```
200     NORMAL STARTING ADDRESS
204     SELECT OPERATING PARAMETERS
210     SELECT RH70/RP04 ADDRESSES
214     COMBINATION OF 204 AND 210
```

```
                                        --------------

                                        1.  LOAD PROGRAM INTO MEMORY (SEE SECTION 3.)
                                        2.  LOAD A FORMATTED PACK INTO DRIVE(S) TO BE TESTED
                                        3.  BRING DRIVE(S) TO ONLINE STATE, WRITE ENABLED,
                                            AND LOCKED ON PORT.
                                        4.  LOAD ADDRESS 200.
                                        5.  SET SWITCHES (SEE SECTION 4.1 & 5.1)
                                        6.  PRESS START.

                                4.4     PROGRAM ACTION
                                        --------------

                                          IN AN EFFORT TO ALLOW CONVERSATION WITH A PROGRAM FOR THE
                                        PURPOSE OF CONTROLLING ITS OPERATION AND PARAMETERS THE FOLLOWING
                                        CONSTRUCTIONS HAVE BEEN ADOPTED.
                                        NOTE1:  IN ALL EXAMPLES BRACKETS ARE USED FOR CLARITY AND ARE
                                                NOT TYPED BY THE USER.
                                        NOTE2:  THE CARRRIAGE RETURN TYPED BY THE USER IS INDICATED BY
                                                <CR> AND WILL BE ECHOED AS A "CARRIAGE RETURN-LINE FEED.

                                        <.><CR>         PERIOD

                                                        A STATEMENT TERMINATOR: WHEN TYPED AT THE
                                                        END OF A LINE (LEGAL ON ALL LINES) IT TELLS
                                                        THE PARAMETER STRING INTERPRETER (PSI) THIS IS
                                                        THE END OF CHANGES TO THE CURRENT PARAMETER
                                                        STRING.

                                        <..><CR>        PERIOD PERIOD

                                                        AN INPUT TERMINATOR: WHEN A PERIOD IS TYPED
                                                        AFTER A "STATEMENT TERMINATOR PERIOD" IT TELLS
                                                        THE PSI THIS IS THE END OF ALL CHANGES (LEGAL
                                                        ON ALL LINES) BEGIN EXECUTION.

                                        <,><CR>         COMMA

                                                        A CONTINUATION INDICATOR AND FIELD SEPARATOR:

                                                        1)  THIS IS THE CONSTRUCTION USED WHEN NOT USING
                                                            A PERIOD; THAT IS TO SAY THE COMMA SAYS
                                                            "TERMINATE THE LINE BUT NOT THE INPUT FOR
                                                            PARAMETER CHANGES".

                                                        2)  SEPARATE MULTIPLE ENTRIES ON THE SAME TEXT
                                                            STRING, I.E., A,B,C,D.
```

205 ‹/› SLASH
206
207 A MODIFICATION INDICATOR: AT ANY GIVEN PARAMETER
208 STOP IF A SLASH IS TYPED IT SAYS "OPEN THIS
209 PARAMETER FOR CHANGES".
210
211 ‹↑U› CONTROL-U
212
213 DUMP THE PRESENT INPUT STRING AND START A NEW
214 LINE. TYPED BY DEPRESSING THE "CONTROL KEY"
215 (CTRL) AND THEN STRIKING THE "U".
216
217 ‹\› RUBOUT
218
219 DELETE THE LAST CHARACTER FROM THE INPUT STRING.
220 TYPED BY STRIKING THE "RUBOUT" KEY. WHICH WILL
221 BE ECHOED BY A BACKSLASH (\) FOLLOWED BY THE
222 CHARACTER DELETED.
223
224
225
226 4.4.1 CONTROL SWITCHES SELECTION
227 ---------------------------
228
229 STARTING THE PROGRAM AT ANY OF THE POSSIBLE STARTING ADDRESSES
230 WITH SW‹07›=1 WILL RESULT IN ENTERING THE "CONTROL SWITCH
231 SETTING" MODE. THUS, ALLOWING THE OPERATOR TO SPECIFY THE
232 DESIRED STATE OF "C.SWR".
233
234 4.4.1.1 CONTROL SWITCH SELECTION EXAMPLES
235
236 EXAMPLE #1
237
238   SET SW‹07›=0
239   C.SWR=000000/400..
240
241 EXAMPLE #2
242
243   SET SW‹07›=0
244   C.SWR=000000/220.
245   C.SWR=000000/220..

```
                                4.4.2   ADDRESS SELECTION
                                        ----------------

                                        STARTING THE PROGRAM AT 200 WILL RESULT IN AUTOMATIC
                                        SELECT OF THE DEFAULT VALUES OF BUS ADDRESS (RHCS1),
                                        VECTOR ADDRESS, AND PRIORITY LEVEL OF THE RH70/RP04.
                                        IF THE DEFAULT VAULE OF THE BUS ADDRESS DOES NOT RESPOND
                                        (TIMES OUT) TO ADDRESSING IT IS REPORTED AS AN ERROR.
                                        AFTER THE ERROR IS REPORTED ONE OF TWO COURSES OF ACTION
                                        WILL BE TAKEN:
                                        1. IF THERE IS A MONITOR -- RETURN TO THE MONITOR
                                        2. IF THERE ISN'T A MONITOR -- ASK FOR NEW ADDRESSES

                                        STARTING THE PROGRAM AT 210 OR 214 ALLOWS THE OPERATOR
                                        TO CHANGE THE CONTROL AND STATUS REGISTER #1 (RHCS1)
                                        ADDRESS, THE VECTOR ADDRESS, AND THE PRIORITY LEVEL.

                                4.4.2.1 ADDRESS SELECTION EXAMPLES

                                        EXAMPLE #1

                                          RHCS1=177200/176300..

                                        EXAMPLE #2

                                          RHCS1=177200/176300,
                                          RHVEC=254/260,
                                          RHPRIO=5/6..

                                        EXAMPLE #3

                                          RHCS1=177200,
                                          RHVEC=254/260..

                                        EXAMPLE #4

                                          RH70/RP04 FAILED TO RESPOND TO ADDRESSING
                                          RHCS1   ERR PC
                                          177200  XXXXXX
                                          RHCS1=177200/176300..

                                        EXAMPLE #5

                                          RHCS1=177200/1776\67\6300,
                                          RHVEC=254,
                                          RHPRIO=5,
                                          RHCS1=176300..
```

4.4.3 DRIVE AND PARAMETER SELECTION

STARTING THE PROGRAM AT 200 WILL RESULT IN AUTOMATIC
SELECTION OF THE DRIVES TO TEST AND THE TESTS TO RUN.

STARTING THE PROGRAM AT 210 OR 214 ALLOWS THE OPERATOR
TO SELECT THE DRIVE(S) TO BE TESTED, THE TESTS TO BE EXECUTED,
AND THE PARAMETERS TO USE.

4.4.3.1 DRIVE AND PARAMETER SELECTION DESCRIPTION

THE FOLLOWING IS A TABLE OF TERMS USED BY THE PSI.

"R"	REPEATS (ITERATIONS)
"FC"	FIRST CYLINDER ADDRESS
"LC"	LAST CYLINDER ADDRESS
"IC"	INCREMENT CYLINDER
"FT"	FIRST TRACK ADDRESS
"LT"	LAST TRACK ADDRESS
"IT"	INCREMENT TRACK
"FS"	FIRST SECTOR ADDRESS
"LS"	LAST SECTOR ADDRESS
"PAT"	PATTERN (USED FOR DATA TEST)
"WDX"	WORD OF PATTERN 0 WHERE X IS 1 TO 16
*"S"	ALL SEEK TESTS
*"T"	ALL TIMING TESTS
*"A"	ALL ADDRESS TESTS
*"D"	THE DATA TESTS
*"E"	THE EXERCISER

* USED BY USER AS INPUT.
NOTE1: ALL OTHERS ARE OUTPUT ONLY.
NOTE2: ALL NUMBERS WILL BE IN DECIMAL EXCEPT FOR THE PATTERN
(PAT) AND WORDS (WDX) SELECTION. "PAT" WILL BE SELECTED
BY A BIT (I.E. 001000(8)=PATTERN 9) AND "WDX" WILL BE IN OCTAL.

SPECIAL CASES OF CONTROL CHARACTERS

IF <..> IS TYPED WHILE A TEST IS OPEN FOR MODIFICATION
(</>) AND OTHER TESTS IN THE "TEST COMMAND" STRING
ARE TO BE OPENED, THEY WILL RECIEVE THE PARAMETERS OF
THE TEST THAT IS OPEN WHEN <..> IS TYPED.

<,> IS ILLEGAL AS A "TEST" LINE TERMINATOR
UNLESS A TEST IS TO BE OPENED.

```
                        ON STARTING THE PROGRAM ALL TESTS WILL RUN AGAINST ALL DRIVES
                        IN A WORST CASE MANNER.  BUT IF THE USER DESIRES TO SELECT THE
                        DRIVES TO BE TESTED, THE TESTS TO BE EXECUTED, AND THE PARAMETERS
                        TO BE USED HE ENTERS CONVERSATION MODE BY TYPING CONTROL C (↑C).

                        THE PROGRAM WILL RESPOND WITH:

                                DRIVE(S)=

                        WE WILL ASSUME FOR OUR EXAMPLE THAT THE OPERATOR WISHES TO TEST
                        DRIVE #3 USING TESTS 2 THRU 7 AND TEST 11 AND DOES NOT DESIRE TO CHANGE
                        THE PARAMETERS (INITIAL CYLINDER ADDRESS, FINAL CYLINDER ADDRESS, ETC.).
                        THE USER WOULD TYPE "3<,>" WHICH SAYS "THIS IS THE END OF ANY
                        CHANGES TO THIS LINE BUT TAKE ME DEEPER FOR MORE CHANGES", AND <CR> "TAKE IT."

                        FOR CLARITY THE LINE WILL BE REPEATED AS IT LOOKS AFTER USER RESPONSE WITH
                        THE LINE BELOW IT ADDED, THE PROGRAMS RESPONSE:

                                DRIVE(S)=3,<CR>
                                TEST=

                        NOW THE USER INSERTS THE TEST NUMBERS HE DESIRES. IN THIS CASE
                        HE WANTS TESTS 2 THRU 7 AND TEST 11 SO HE TYPES 2-7<,> (TO
                        SEPERATE FIELD), 11<..> (END OF ANY CHANGES START EXECUTION),
                        <CR> (TAKE IT).

                        IT NOW LOOKS LIKE THIS

                                DRIVE(S)=3,<CR>
                                TEST=2-7,11..<CR>

                        IN OUR NEXT EXAMPLE WE WILL ASSUME THE USER WISHES TO TEST DRIVE
                        4 AND RUN TESTS 1 AND 3 THRU 11 WITH THE PARAMETER FOR TESTS 3
                        AND 10 MODIFIED.
                        THIS IS HOW HE WOULD RESPOND:

                                DRIVE(S)=4,<CR>
                                TEST=

                        THE USER NOW WILL INSERT A LINE TO GET TESTS 1 AND 3 THRU 11
                        BUT REMEMBER HE WISHES TO "OPEN" TESTS 3 AND 10 FOR PARAMETER
                        CHANGES.  THE ENTIRE ENTRY IS SHOWN BELOW:

                                DRIVE(S)=4,<CR>
                                TEST=1,3/4-7,10/11.<CR>

                        NOTICE THIS SAYS SELECT TEST ONE, CONTINUE<,>; SELECT TEST 3, OPEN</>;
                        SELECT TESTS 4-7, CONTINUE<,>; SELECT TEST 10, OPEN</>; SELECT TEST
                        11, END OF INPUT <.>.
```

```
                                THE PSI SCANS THE TEST STRING AND DETERMINES THAT TEST #1'S
                                PARAMETERS WILL REMAIN THE SAME BUT
                                TEST 3'S MUST BE CHANGED.  THEREFORE, TEST
                                3 IS OPENED FOR CHANGE.

                                RESPONDS: <FOR CLARITY ENTIRE TRANSACTION REPEATED>

                                        DRIVE(S)=4,<CR>
                                        TEST=1,3/4-7,10/11.<CR>
                                          TEST 3
                                            R=X         ;WHERE X IS ITERATION

                                AS IN THE NORMAL MANNER TYPING A </> WILL OPEN THIS LINE FOR
                                MODIFICATION OF THE ITERATION COUNT, ENDING THE LINE WITH A
                                <.> (PERIOD) WOULD TERMINATE THE CHANGES FOR THIS TEST, AND AS
                                IN THE EXAMPLE SHOWN USING A <,> (COMMA) WILL GET US THE NEXT
                                PARAMETER.

                                        DRIVE(S)=4,<CR>
                                        TEST=1,3/4-7,10/11,<CR>
                                          TEST 3
                                            R=1,<CR>            ;DO NOT ALTER-BUT CONTINUE
                                            FC=N                ;WHERE N IS FIRST CYLINDER ADDRESS

                                THE USER DOES NOT WISH TO CHANGE "FC" SO THE FOLLOWING ACTION IS TAKEN:

                                        DRIVE(S)=4,<CR>
                                        TEST=1,3/4-7,10/11.<CR>
                                          TEST 3
                                            R=1,<CR>            ;DO NOT ALTER THIS LINE BUT CONTINUE
                                            FC=0,<CR>           ;DO NOT ALTER THIS LINE BUT CONTINUE
                                            LC=410

                                THE PROGRAM RESPONDS WITH THE PREVIOUSLY ASSIGNED PARAMETER FOR LAST
                                CYLINDER ADDRESS IN THIS CASE USING 410 AS THE EXAMPLE.  THIS IS
                                WHAT THE USER INTENDED TO MODIFY AND IS WHY HE OPENED
                                TEST #3.  HE WANTS TO CHANGE IT TO CYLINDER 20. THEREFORE
                                HE TYPES </> (OPEN LINE FOR CHANGE), "20" (THE NEW VALUE),
                                <.> (THIS IS THE END OF CHANGES FOR THIS DRIVE), <CR>
                                (TAKE IT).
                                THE TOTAL TRANSACTION AND RESPONSE:

                                        DRIVE(S)=4,<CR>
                                        TEST=1,3/4-7,10/11.<CR>
                                          TEST 3
                                            R= 1,<CR>
                                            FC=0,<CR>
                                            LC= 410/20.<CR>
                                          TEST 10
                                            R=1
```

THE PROGRAM HAS LOADED TEST #3 WITH ITS NEW PARAMETERS, TESTS
NUMBER 4 THRU 7 WITH THEIR PREVIOUSLY ASSIGNED PARAMETERS AND IS
NOW WAITING FOR CHANGES TO TEST 10.

THE USER TYPES </> (OPEN THIS LINE FOR CHANGE), "10" (MAKE
ITERATION COUNT 10), <.> (THIS IS THE END OF CHANGES TO THIS
TEST) <CR> (TAKE IT).

THE PROGRAM NOW LOADS TEST 10 WITH THE NEW PARAMETERS, TEST 11
WITH PREVIOUSLY ASSIGNED PARAMETERS AND RESPONDS WITH:

        DRIVE(S)=

SINCE THE USER DID NOT END THE CONVERSATION MODE WITH A <..>
THE PROGRAM HAS LOOPED BACK TO THE BEGINNING LOOKING FOR MORE
CHANGES. THAT IS TO SAY, AFTER THE ENTRY FOR DRIVE SELECTION A
<,><CR> WILL CAUSE THE TEST MESSAGE TO BE REPEATED AND FURTHER
CHANGES CAN BE MADE. HOWEVER, AT SOME POINT IN ORDER TO EXECUTE
THE CHANGES MADE WE MUST NOTIFY THE PROGRAM WE ARE FINISHED BY
TYPING <..>.

```
                                        EXAMPLE #1
                                        ----------

                                        DRIVE=4..<CR>           ;SELECT DRIVE #4, TERMINATE AND
                                                                ;BEGIN EXECUTION USING PREVIOUSLY ASSIGNED
                                                                ;PARAMETERS

                                        EXAMPLE #2
                                        ----------

                                        DRIVE=0,<CR>            ;SELECT DRIVE #0 AND MAKE CHANGES "."
                                        TEST=1-5..<CR>          ;RUN TEST 1 THRU 5 ONLY, USE DEFAULT
                                                                ;PARAMETERS AND TERMINATE AND EXECUTE ".."

                                        EXAMPLE #3
                                        ----------

                                        DRIVE=2,<CR>            ;SELECT DRIVE #2 AND MAKE CHANGES "."
                                        TEST=1-5,6/7/10/.<CR>   ;RUN TEST 1-5 WITH DEFAULT PARAMETERS, OPEN
                                          TEST 6                ;TEST 6,7 AND 10 FOR CHANGES
                                            R=1,<CR>            ;LEAVE R AS IS MOVE TO NEXT PARAMETER
                                            FC=0/10.<CR>        ;SET "FC" CYLINDER ADDRESS TO 10 "." END CHANGES
                                                                ;TO TEST #6

                                          TEST 7
                                            R=1/50,<CR>         ;50 ITERATIONS, MOVE TO NEXT PARAMETER
                                            FC=0,<CR>           ;DO NOT CHANGE "FC" CYLINDER ADDRESS BUT CONTINUE ","
                                            LC=410/50..<CR>     ;TEST 10 IS STILL PENDING
                                                                ;AND WILL THEREFORE BE
                                                                ;SET TO THE SAME PARAMETERS
                                                                ;AS TEST 7 -- START EXECUTION


                                        EXAMPLE #4
                                        ----------

                                        DRIVE=0,<CR>            ;SELECT DRIVE #0 AND MAKE CHANGES
                                        TEST=S,E..<CR>          ;RUN ALL SEEK TESTS AND THE EXERCISER

                                        EXAMPLE #5
                                        ----------


                                        DRIVE=1,<CR>
                                        TEST=S/0.<CR>           ;RUN ALL SEEK TESTS (OPEN FOR CHANGES) AND
                                          TEST 0                ;THE DATA TEST (WITH DEFAULT PARAMETERS).
                                            R=10,<CR>           ;RUN WITH 10 ITERATIONS
                                            FC=0/10..<CR>       ;CHANGE FIRST CYLINDER ADDRESS
                                                                ;AND START EXECUTION
                                                                ;TESTS 1-6 WILL BE ASSIGNED THE
                                                                ;SAME PARAMETERS AS TEST 0
```

```
                                EXAMPLE #6
                                ----------

                                DRIVE=1,<CR>
                                TEST=S/.<CR>            ;OPEN THE SEEK TESTS (TST 0-6)
                                  TEST 0
                                    R=10/100.<CR>       ;CHANGE TO 100 ITERATIONS; <.> MOVE TO NEXT TEST
                                  TEST 1
                                    R=100/1000.<CR>     ;CHANGE R TO 1000 ITERATIONS; <.> MOVE TO NEXT TEST
                                  TEST 2
                                    R=1/10,<CR>         ;CHANGE R TO 10 ITERATIONS      ; <,> MOVE TO NEXT LINE
                                    FC=0/50,<CR>        ;CHANGE FC TO 50; <,> MOVE TO NEXT LINE
                                    LC=410/51.<CR>      ;CHANGE LC TO 51; <.> MOVE TO NEXT TEST
                                  TEST 3
                                    R=1.<CR>            ;<.> MOVE TO NEXT TEST
                                  TEST 4
                                    R=1..<CR>           ;USE TESTS 4'S PARAMETERS
                                                        ;FOR TEST 5 & 6 START EXECUTION

                                EXAMPLE #7
                                ----------

                                DRIVE=1,<CR>
                                TEST=D/.<CR>            ;SELECT AND OPEN THE DATA TEST
                                  TEST 15
                                    R=1/1000,<CR>       ;DO 1000 ITERATION OF TEST PATTERN
                                    FC=0/10,<CR>        ;#8 ON CYLINDER 10, TRACK 2, SECTOR 4
                                    LC=410/10,<CR>
                                    IC=64/0,<CR>
                                    FT=0/2,<CR>
                                    LT=18/2,<CR>
                                    IT=1,<CR>
                                    FS=0/4,<CR>
                                    LS=22/4,<CR>
                                    PAT=177777/400..<CR> ;RUN WITH PATTERN #8
```

```
                                        EXAMPLE #8
                                        ----------

                                        DRIVE=1,<CR>            ;USE THE SAME PARAMETERS AS IN EXAMPLE
                                        TEST=0/,<CR>            ;#7, BUT ALSO SPECIFY YOUR OWN DATA
                                          TEST 15               ;PATTERN (PAT #0).
                                            R=1000,<CR>
                                            FC=10,<CR>
                                            LC=10,<CR>
                                            IC=0,<CR>
                                            FT=2,<CR>
                                            LT=2,<CR>
                                            IT=1,<CR>
                                            FS=4,<CR>
                                            LS=4,<CR>
                                            PAT=000400/401,<CR> ;RUN WITH PATTERN #8 & #0 (0=OPERATOR INPUT)
                                              WD1=165555/125252,<CR> ;FIRST WORD OF PATTERN 0
                                              WD2=133333/52525..<CR> ;SECOND WORD OF PATTERN 0
                                                                ;<..> START EXECUTION

                                        EXAMPLE #9
                                        ----------

                                        DRIVE=0,1,4,            ;TEST DRIVES 0,1, AND 4 IN SEQUENCE
                                        TEST=0-5/               ;CHANGE TEST 0-5
                                          TEST 0
                                            R=10,
                                            FC=0,
                                            LC=410/1..          ;CHANGE LAST CYLINDER FROM 410
                                                                ;TO 1 FOR TEST #0-5; START TESTING
```

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

WITH SW<15:0>=0 THE PROGRAM WILL PRINT OUT ON
ERRORS AND CONTINUE IN TEST.
THE SWITCH SETTINGS ARE:

SW<15>=1...HALT ON ERROR
SW<14>=1...LOOP ON TEST
SW<13>=1...INHIBIT ERROR TYPEOUTS
SW<11>=1...INHIBIT ITERATIONS
SW<10>=1...RING BELL ON ERROR
SW<09>=1...LOOP ON ERROR
SW<08>=1...PRINT ERROR MESSAGE ON LINE PRINTER
SW<07>=1...READ CONTROL SWITCH SETTINGS FROM TTY
SW<06>=1...INHIBIT TIME REPORTS (TESTS 7-12)
SW<05>=1...REPORT ONE ERROR PER SECTOR (TESTS 13&14)
SW<04>=1...INHIBIT WRITES (TEST 15)
SW<03>=1...INHIBIT WRITE CHECKS (TEST 15)
SW<02>=1...INHIBIT READ AND SOFTWARE COMPARES (TEST 15)
SW<01>=1...INHIBIT SOFTWARE COMPARES (TEST 15)
SW<00>=1...PERFORM READ AFTER WRITE CHECK ERROR (TEST 15)

5.2 SUBROUTINE ABSTRACTS

THE SUBROUTINE CALLS USED BY THIS PROGRAM ARE:

1. IOT (USED FOR SCOPE)
   THIS CALL IS PLACED BETWEEN EACH TEST IN THE INSTRUCTION
   SECTION. IT RECORDS THE STARTING ADDRESS OF EACH TEST IN
   LOCATIONS "$LPADR" AND "$LPERR" AS IT IS BEING ENTERED.

2. EMT (USED FOR ERROR)
   THIS CALL IS USED TO REPORT ALL ERRORS (REFER TO 6).

3. TRAP (USED FOR TYPE, TYPOC, TYPOS,
   TYPON, TYPDS, RDCHR, RDLIN, SAVREG,
   AND RESREG)

4. JSR R,ADR

THE FOLLOWING SECTION CONTAINS AN ABSTRACT
FOR EACH SUBROUTINE

5. ERRORS

THERE ARE A NUMBER OF ERRORS THAT CAN OCCUR IN THIS
PROGRAM. WHEN AN ERROR IS ENCOUNTERED THE CALL TO
THE ERROR ROUTINE IS MADE AND IF SW<13> IS NOT
SET AN ERROR MESSAGE PERTAINING TO THE ERROR WILL BE
TYPED. EACH ERROR TYPE OUT WILL CONTAIN THE FOLLOWING:

1. AN ERROR MESSAGE
2. A DATA HEADER
3. A DATA STRING

REFER TO THE FOLLOWING SECTION FOR THE DIFFERENT
ERRORS THAT CAN OCCUR.

5.1 ERROR TYPES

THE ERRORS THAT OCCUR IN THIS PROGRAM FALL INTO THREE
(3) CATEGORIES DEFINED AND EXPLAINED AS FOLLOWS:

5.1.1 DRIVER ERROR

THESE ERRORS WILL BE DETECTED BY THE RH70/RP04 DRIVER.
THERE ARE TWO CLASSES OF DRIVER ERRORS; THOSE THAT
CAN NOT BE IDENTIFIED IN A MANNER THAT WLLOWS THE
INFORMATION TO BE RETURNED TO A "DATA PARAMETER BLOCK"
(DPB) AND THOSE THAT CAN. THE FIRST CLASS WILL BE
REPORTED BY ERROR CALLS (EMT'S) 1-5 WITHIN THE DRIVER.
THE SECOND CLASS WILL PASS THE ERROR CODES TO THE
STATUS/ERROR WORD (DPB+16) OF THE PROPER DPB.

5.1.2 NON-FATAL ERROR

THESE ERRORS WILL BE DUE TO "DISK" OR "DATA" FAILURES
WHICH WILL BE REPORTED AS THEY OCCUR. AFTER REPORTING
THE ERROR THE PROGRAM WILL CONTINUE TESTING.

5.1.3 FATAL ERROR

THIS TYPE OF ERROR WILL BE THE RESULT OF ANY KIND
OF ERROR THAT INHIBITS THE PROGRAM FROM TESTING THE DISK.

THIS ERROR WILL BE REPORTED WHEN IT OCCURS, THEN THE PROGRAM
WILL ABORT THE TEST AND GO TO THE END OF PROGRAM.

```
                                5.2     ERROR RECOVERY
                                        --------------

                                5.2.1   PRETEST ERROR

                                        WHEN THIS TYPE OF ERROR OCCURS IT WILL BE REPORTED.  THEN DEPENDING
                                        ON HOW THE PROGRAM WAS STARTED IT WILL ASK FOR THE DRIVES AND
                                        ADDRESSES FOR TESTING OR RETURN TO MONITOR.

                                5.2.2   NON-FATAL ERROR

                                        WHEN THIS TYPE OF ERROR OCCURS IT WILL BE REPORTED AND
                                        THE PROGRAM WILL CONTINUE IN TEST.

                                5.2.3   FATAL ERROR

                                        WHEN THIS TYPE OF ERROR OCCURS IT WILL BE REPORTED.  THE
                                        PROGRAM WILL ABORT THE TEST AND GO TO THE END OF PROGRAM.

                                7.      RESTRICTIONS
                                        ------------

                                        BEFORE STARTING THE PROGRAM THE OPERATOR MUST INSURE THAT A
                                        FORMATTED PACK IS LOADED AND WRITE ENABLED IN THE DRIVE(S)
                                        TO BE TESTED.

                                8.      MISCELLANEOUS
                                        -------------

                                8.1     EXECUTION TIME
                                        --------------

                                        TO MAKE ONE PASS OF THE PROGRAM TAKES APPROXIMATELY
                                        4 MINUTES FOR EVERY 4K OF CORE.  THE RUN TIME INCREASES LINEARALLY
                                        FOR EACH DRIVE TESTED.

                                8.2     STACK POINTER
                                        -------------

                                        STACK IS INITIALLY SET TO 1100 AND EXTENDS DOWN IN MEMORY.

                                8.3     COMMON TAGS
                                        -----------

                                        THE COMMON TAGS USED IN THIS PROGRAM START AT 1100 AND EXTEND
                                        UP IN MEMORY.
```

9.4 TIMING TESTS (TST7-TST12) PRINTOUTS

AT THE COMPLETION OF EACH OF THE TIMING TESTS THE TIME OF THE MINIMUM SEEK, MAXIMUM SEEK, AND THE AVERAGE OF ALL OF THE SEEKS PERFORMED ARE TYPED ON THE TTY. THE NUMBER OF SEEKS THAT HAD TIMES BELOW THE MINIMUM TIME ALLOWED WILL BE TYPED ON THE SAME LINE AS THE MINIMUM TIME. THE NUMBER ABOVE THE MAXIMUM WILL BE TYPED ON THE SAME LINE AS THE MAXIMUM TIME, AND THE TOTAL NUMBER OF SEEKS PERFORMED WILL BE ON THE SAME LINE AS THE AVERAGE.

NOTE: THE PROGRAM STALLS FOR 2 MILLISECONDS BETWEEN SEEK ORDERS, THIS STALL TIME IS NOT INCLUDED IN THE CALCULATED SEEK TIMES. THE 2 MILLISECOND STALL BETWEEN SEEK ORDERS IS SPECIFIED BY THE RP04 VENDOR. THE SEEK TIMES SPECIFIED BY THE VENDOR ARE POSITIONER MOVEMENT TIMES ONLY AND ARE NOT A MEASUREMENT OF EFFECTIVE SEEK TIME.

8.4.1 TIMING TOLERANCES

1. TEST 7 -- ROTATIONAL SPEED TIMES

   60 HZ
   MINIMUM=16340 US
   MAXIMUM=17000 US
   NOMINAL=16670 US

   50 HZ
   MINIMUM=16250 US
   MAXIMUM=17090 US
   NOMINAL=16670 US

2. TEST 10 -- ONE CYLINDER SEEK TIMES

   MINIMUM=3000 US
   MAXIMUM=10000 US
   NOMINAL=7000 US

3. TEST 11 -- AVERAGE SEEK TIMES

   MINIMUM=26000 US
   MAXIMUM=30000 US
   NOMINAL=28000 US

4. TEST 12 -- MAXIMUM SEEK TIMES

   MINIMUM=46000 US
   MAXIMUM=52000 US
   NOMINAL=50000 US

```
                                        EXAMPLE #1
                                        ----------

                                        ROTATIONAL SPEED TIMES
                                        MIN=16670 US
                                        MAX=16690 US
                                        AVG=16680 US  10 SEEKS TIMED

                                        ONE CYLINDER SEEK TIMES
                                        ** 0, 1, 2,...410 **
                                        MIN=5350 US
                                        MAX=6920 US
                                        AVG=5550 US  409 SEEKS TIMED
                                        **  410, 409, 408,...0 **
                                        MIN=5140 US
                                        MAX=5960 US
                                        AVG=5430 US  410 SEEKS TIMED

                                        AVERAGE SEEK TIMES
                                        ** 0 TO 136 **
                                        MIN=27770 US
                                        MAX=28640 US
                                        AVG=28230 US  128 SEEKS TIMED
                                        ** 136 TO 0 **
                                        MIN=27990 US
                                        MAX=28550 US
                                        AVG=28220 US  128 SEEKS TIMED

                                        MAXIMUM SEEK TIMES
                                        ** 0 TO 410 **
                                        MIN=49990 US
                                        MAX=51980 US
                                        AVG=51010 US  128 SEEKS TIMED
                                        ** 410 TO 0 **
                                        MIN=48120 US
                                        MAX=50650 US
                                        AVG=49340 US  128 SEEKS TIMED
```

```
                                        ----------

                                        ROTATIONAL SPEED TIMES
                                        MIN=16670 US
                                        MAX=16690 US
                                        AVG=16680 US  10 SEEKS TIMED

                                        ONE CYLINDER SEEK TIMES
                                        ** 0, 1, 2,...410 **
                                        MIN=5470 US
                                        MAX=10940 US  3 ABOVE THE MAXIMUM OF 10000 US
                                        AVG=5830 US  409 SEEKS TIMED
                                        ** 410, 409, 408,...0 **
                                        MIN=5040 US
                                        MAX=5970 US
                                        AVG=5330 US 410 SEEKS TIMED

                                        AVERAGE SEEK TIMES
                                        ** 0 TO 136 **
                                        MIN=29730 US
                                        MAX=31620 US  73 ABOVE THE MAXIMUM OF 30000 US
                                        AVG=30320 US  128 SEEKS TIMED
                                        ** 136 TO 0 **
                                        MIN=28620
                                        MAX=31230 US  128 ABOVE THE MAXIMUM OF 30000 US
                                        AVG=30800 US  128 SEEKS TIMED

                                        MAXIMUM SEEK TIMES
                                        ** 0 TO 410 **
                                        MIN=53510 US
                                        MAX=54240 US  128 ABOVE THE MAXIMUM OF 52000 US
                                        AVG=54020 US  128 SEEKS TIMED
                                        ** 410 TO 0 **
                                        MIN=52050 US
                                        MAX=54550 US  128 ABOVE THE MAXIMUM OF 52000 US
                                        AVG=52210 US  128 SEEKS TIMED
```

```
                                        ----------

                                        WITH ALL SWITCHES ON A "0" AN "END OF PASS" MESSAGE WILL BE
                                        TYPED AT THE COMPLETION OF TESTING A DRIVE AND THE "END OF TEST"
                                        TYPEOUT WILL OCCUR WHEN ALL DRIVES HAVE BEEN TESTED.



                                8.6     RH70/RP04 DRIVER
                                        ----------------

                                        ALL OF THE COMMUNICATION WITH THE RH70/RP04 IS PERFORMED
                                        VIA A COMMON DRIVER. THIS SECTION CONTAINS THE USERS QUIDE
                                        FOR THE DRIVER.

                                8.6.1.  TO INITIALIZE THE DRIVER:

                                                JSR     PC,RPINIT
                                                RETURN

                                        UPON RETURN YOU MUST EXAMINE THE "DRVSTA" TABLE TO DETERMINE
                                        THE DRIVES THAT ARE ONLINE FOR TESTING.  THE DRVSTA TABLE IS
                                        EIGHT BYTES; ONE BYTE PER DRIVE.  THE STATE OF EACH DRIVE WILL
                                        BE INDICATED AS FOLLOWS:

                                                >0  ON LINE
                                                =0  OFFLINE
                                                <0  UNSAFE OR NONEXISTENT

                                        WITH NON-RP04 DRIVES INDICATED AS OFFLINE. AND THE DRIVE TYPE
                                        WILL BE INDICATED IN THE "DRVTYP" TABLE. USING "DRVSTA" AND
                                        "DRVTYP" THE FO'.LOWING CAN BE DETERMINED:

                                        ONLINE          OFFLINE         UNSAFE          NONEXISTENT
                                        ------          -------         ------          -----------
                                        DRVSTA>0        DRVSTA=0        DRVSTA<0        DRVSTA<0
                                        DRVTYP=(RHDT)   DRVTYP=(RHDT)   DRVTYP=(RHDT)   DRVTYP=0

                                        THE RPINIT ROUTINE WILL DO A READIN PRESET AND WILL SET FMT22.
```

```
                                FOR YOU.

                                CALL:
                                        JSR     R0,RP04         ;MAKE THE CALL
                                        PNTDPB                  ;ADDRESS OF DPB*
                                        RETURN1                 ;RETURN IF QUEUE IS FULL
                                        RETURN2                 ;RETURN IF REQUEST IS IN
                                                                ;QUEUE OR THERE IS AN
                                                                ;ERROR CONDITION

                                *DPB (DATA PARAMETER BLOCK)

                                PNTDPB: .BYTE   0               ;(0) DRIVE NUMBER
                                        .BYTE   0               ;(1) OFFSET VALUE OR FMT22, ECT, AND HCI
                                        .BYTE   0               ;(2) COMMAND
                                        .BYTE   0               ;(3) PSEL AND A17 AND A16
                                        .WORD   0               ;(4) WORD COUNT (MUST BE NEG.)
                                        .WORD   0               ;(6) BUFFER ADDRESS OR
                                                                ;REGISTER TABLE POINTER
                                        .BYTE   0               ;(10) SECTOR ADDRESS OR
                                                                ;FIRST REG. INDEX
                                        .BYTE   0               ;(11) TRACK ADDRESS OR
                                                                ;LAST REG. INDEX
                                        .WORD   0               ;(12) CYLINDER ADDRESS
                                        .WORD   0               ;(14) ERROR TABLE POINTER
                                                                ;POINTS TO THE FIRST OF TWENTY
                                                                ;LOCATIONS OF WHERE THE DRIVER
                                                                ;IS TO STORE THE RH70/RP04
                                                                ;REGISTERS ON AN ERROR. IF LEFT
                                                                ;ZERO REGISTERS ARE NOT SAVED.
                                        .WORD   0               ;(16) STATUS/ERROR INDICATOR
                                                                ;BIT15=1=>ERROR OCCURRED
                                                                ;BIT07=1=>DONE
                                                                ;BIT14-BIT09 AND BIT06-BIT03
                                                                ;INDICATE TYPE OF ERROR
```

```
                        TO UTILIZE THIS CAPABILITY YOU MUST SUPPLY THE "RP TIMER" ROUTINE
                        WITH THE ELAPSED TIME IN THE FOLLOWING MANNER:

                                MOV     #16.,-(SP)      ;16 MILLISECONDS BETWEEN
                                                        ;CLOCK TICKS
                                JSR     R0,RPTMR        ;CALL THE TIMER ROUTINE

                        IT SHOULD BE NOTED THAT YOU MUST PROVIDE THE CODE TO DRIVE THE
                        CLOCK.  AND THE ELAPSED TIME MUST BE IN MILLISECONDS.
                        THE DRIVER WILL SET THE TIMEOUT TO 1 SECOND FOR ALL POSITIONING
                        AND DATA TRANSFER OPERATIONS AND WILL SET THE TIMOUT TO 30
                        SECONDS FOR ERROR RECOVERY OPERATIONS.


                8.6.4.  EXAMPLE - WRITE 1000. WORDS

                        1$:     JSR     R0,RP03         ;CALL THE DRIVER
                                WRTDPB                  ;DPB ADDRESS
                                BR      1$              ;WAIT FOR QUEUE IF FULL
                        2$:     TST     WRTDPB+16       ;WAIT FOR COMMAND TO COMPLETE
                                BEQ     2$
                                BMI     ERROR1          ;ERROR OCCURRED
                                .
                                .
                                .

                        WRTDPB: .BYTE   5               ;DRIVE #5
                                .BYTE   0               ;
                                .BYTE   161             ;WRITE COMMAND
                                .BYTE   0               ;
                                .WORD   -1000.          ;WORD COUNT
                                .WORD   WRTBUF          ;BUFFER ADDRESS
                                .BYTE   3               ;SECTOR
                                .BYTE   5               ;TRACK
                                .WORD   400             ;CYLINDER
                                .WORD   ERRTB5          ;ERROR TABLE
                                .WORD   0               ;STATUS/ERROR INDICATOR

                                ATERNATE DPB SETUP

                        WRTDPB: .WORD   5               ;THIS SETUP ACHIEVED
                                .WORD   WRITE           ;EVERYTHING THE
                                .WORD   -1000.          ;ABOVE TABLE DID, BUT
                                .WORD   WRTBUF          ;IN A CLEANER FORMAT
                                .BYTE   3,5
                                .WORD   400,ERRTB5,0
```

MNEMONIC	INDEX
RHCS1	0
RHWC	2
RHBA	4
RHDA	6
RHCS2	10
RHDS1	12
RHER1	14
RHAS	16
RHLA	20
RHDB	22
RHMR	24
RHDT	26
RHSN	30
RHOF	32
RHCA	34
RHCC	36
RHER2	40
RHER3	42
RHEC1	44
RHEC2	46
RHBAE	50
RHCS3	52

8.6.6. COMMANDS PERFORMED BY THE DRIVER

COMMAND	CODE	COMMAND TYPE
NO OPERATION	101	N
UNLOAD	103	N
SEEK	105	P
RECALIRATE	107	P
DRIVE CLEAR	111	N
RELEASE	113	N
OFFSET	115	P
RETURN TO CENTER	117	P
READIN PRESET	121	N
PACK ACKNOWLEDGE	123	N
SEARCH	131	P

SET FORMAT	143	S
SELECT DRIVE	145	S
WRITE CHECK DATA	151	D
WRITE CHECK HEADER AND DATA	153	D
WRITE DATA	161	D
WRITE HEADER & DATA	163	D
READ DATA	171	D
READ HEADER & DATA	173	D

N = HOUSEKEEPING
P = POSITIONING
D = DATA TRANSFER
S = SPECIAL PROVIDED BY THE DRIVER

8.6.7. DPB STATUS/ERROR INDICATOR

THIS INDICATOR WILL INFORM THE USER OF THE RESULTS OF THE REQUEST. THIS IS ACCOMPLISHED BY SETTING VARIES BITS OF THE INDICATOR TO A ONE.

BIT NO.	MEANING IF ON A "1"
15	ERROR OCCURRED DONE (BIT07=0); BITS 14-10 SPECIFIES TYPE DONE (BIT07=1); BITS 06-03 SPECIFIES TYPE
14(1)	USER MADE A REQUEST FOR A FUNCTION TO BE PERFORMED ON AN OFFLINE OR UNSAFE DRIVE
13(1)	USER MADE A REQUEST FOR A FUNCTION TO BE PERFORMED ON A DRIVE THAT HAS AN UNLOAD REQUEST IN QUEUE.
12(2)	PERSISTENT UNSAFE CONDITION EXIST.
11(2)	PARITY ERROR OCCURRED
10(2)(4)	FATAL PARITY ERROR. A MASSBUS CLEAR WAS PERFORMED, ALL QUEUES WERE EMPTIED, AND ALL DRVACT'S SET TO THE IDLE STATE

```
1080                    9(3)(4)         SOFTWARE TIMEOUT OCCURRED ON THIS DRIVE
1081
1082                    8(4)            SOFTWARE TIMEOUT OCCURRED ON ANOTHER DRIVE
1083
1084                    7               DONE
1085
1086                    6(2)            ERROR OCCURRED DURING AN I/O OPERATION
1087
1088                    5(2)            ERROR OCCURRED DURING AN OPERATION
1089                                    OTHER THAN I/O.
1090
1091                    4(2)            UNSAFE CONDITION OCCURRED
1092
1093                    3(2)            DRIVE ERROR OCCURRED THAT CAUSED AN
1094                                    AUTOMATIC "RECALIBRATE" SEQUENCE
1095
1096                    (1) =>          REQUEST WASN'T PUT IN QUEUE.  (RH70/RP04
1097                                    REGISTERS WERE NOT SAVED)
1098
1099                    (2) =>          REQUEST QUEUE HAS BEEN EMPTIED.  THE DRIVER
1100                                    ISSUED A "DRIVE CLEAR" TO THE DRIVE.
1101                                    NOTE: ALL RH70/RP04 REGISTERS ARE SAVED
1102                                    AS PER DPB+14 BEFORE THE "DRIVE CLEAR".
1103
1104                    (3) =>          REQUEST QUEUE HAS BEEN EMPTIED.  THE
1105                                    DRIVER ISSUED A MASSBUS INIT.  ALL
1106                                    RH70/RP04 REGISTERS FOR THE DRIVE WERE
1107                                    SAVED AS PER DPB+14 BEFORE THE INIT.
1108
1109                    (4) =>          A "RECALIBRATE" SHOULD BE ISSUED
1110                                    BEFORE ANY OTHER COMMAND.
1111
```

THERE ARE A FEW ERRORS THAT CAN OCCUR THAT CAN NOT BE INDICATED IN A CPB.

WHEN THIS TYPE OF ERROR IS DETECTED BY THE DRIVER IT WILL MAKE AN ERROR CALL OF THE FORM "ERROR N", WHERE "N" IS THE ERROR NUMBER AND THE ERROR WILL BE AN EMT INSTRUCTION.

N	TYPE	DATA AVAILABLE
1	ILLEGAL SUBSYSTEM INTERRUPT OCCURRED (SC=0)	*R4= RHCS1'S ADDRESS
2	ILLEGAL DRIVE INTERRUPT OCCURRED	R1= DRIVE NUMBER R3= ATA BIT *R4= RHCS1'S ADDRESS R5= (RHAS) RPERRS =RHDS1 RPERRS+2=RHER1 RPERRS+4=RHER2 RPERRS+6=RHER3
3	MASSBUS CONTROL BUS PARITY ERROR OCCURRED(MCPE=1)	RD.ADR= ADDRESS OF REG. READ RD.WRD= WORD READ
4	CONTROL BUS PARITY ERROR OCCURRED(PAR=1)	WRT.AD= ADDRESS OF REG. WRITTEN WRT.WD= WORD WRITTEN RD.WRD= WORD READ BACK
5	ATTENTION FROM AN OFFLINE, NONEXISTENT OR PREVIOUSLY DETECT UNSAFE DRIVE OCCURRED. NOTE: COULD HAVE BEEN CAUSED BY A BIT PICK OR DROP WHEN READING RHAS.	R1= DRIVE NUMBER R3= ATA BIT *R4= RHCS1'S ADDRESS R5= (RHAS) RPERRS =RHDS1 RPERRS+2=RHER1 RPERRS+4=RHER2 RPERRS+6=RHER3
6	RESERVED	
7.	RESERVED	

* THIS IS THE ACTUAL UNIBUS ADDRESS (177200)

9. PROGRAM DESCRIPTION

THIS PROGRAM CONTAINS SIXTEEN TESTS NUMBERED 0-17 IN OCTAL.
TESTS 0-6 WILL READ THE CYLINDER, TRACK, AND SECTOR INFORMATION
FROM THE HEADER, USING A "READ HEADER AND DATA" COMMAND, AND
THEN CHECK THE INFORMATION FOR VALIDITY. THUS, INSURING
THE SEEK OPERATION FUNCTIONS PROPERLY. TEST 7-12 WILL MEASURE
THE ROTATIONAL SPEED, THE ONE CYLINDER SEEK, THE AVERAGE SEEK,
AND THE MAXIMUM SEEK TIMES TO INSURE THEY ARE ALL WITHIN THE
TOLERANCES ALLOWED. TEST 13 AND 14 INSURES THE SECTOR AND
TRACK ADDRESSING CIRCUITRY WORKS PROPERLY. TEST 15 VERIFIES
THE DATA STORAGE AND RETRIEVAL CAPABILITIES ARE FUNCTIONAL.
AND TEST 16 WILL STRESS AND CHECK THE READ/WRITE AND SERVO
SYSTEMS. TEST 17 IS SIMILAR TO TEST 15 EXCEPT FOR THE FOLLOWING
1) ONLY LAST TWO CYLINDERS USED. 2) ONLY EIGHT PATTERNS USED.
3) ALL OF AVAILABLE MEMORY IS USED.

THE PROGRAM WILL START BY IDENTIFING ITSELF AND DETERMINING ALL
DRIVES THAT ARE AVAILABLE FOR TESTING. THEN BEGINNING WITH
THE LOWEST NUMBERICAL DRIVE AND PROCEEDING IN SEQUENCIAL ORDER
ALL OF THE DRIVES WILL BE TESTED. ONE PASS THROUGH THE TEST
SEQUENCE (TEST 0-15) WILL BE PERFORMED ON EACH DRIVE BEFORE
MOVING TO THE NEXT DRIVE IN SEQUENCE. THE DRIVE TO BE
TESTED WILL BE TYPED AT THE BEGINNING OF EACH PASS, AN "END
OF PASS" MESSAGE WILL BE TYPED AT THE COMPLETION OF EACH PASS,
AND AN "END OF TEST" MESSAGE WILL BE TYPED AFTER TESTING ALL
DRIVES.

REFER TO THE FOLLOWING SECTION FOR A DETAILED DESCRIPTION
OF EACH TEST.

```
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                                                DOCUMENT
                                               **************
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                                               **************
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                                3426    CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
                                3494    TTY INPUT ROUTINE
                                3624    SCOPE HANDLER ROUTINE
                                3680    SAVE AND RESTORE R0-R5 ROUTINES
                                3726    TRAP DECODER
                                3741    TRAP TABLE
                                3761    DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
                                3801    SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
                                3819    DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
                                3882    TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
                                3906    INTEGER DIVIDE ROUTINE
                                3988    RANDOM NUMBER GENERATOR ROUTINE
                                4035    ROUTINE TO SIZE MEMORY
                                4111    LP.AVL - LINE PRINTER AVAILABLE
                                4131    ST.CLK - CLOCK STARTUP ROUTINE
                                4201    LDCMD - LOAD COMMAND
                                4219    CALL.A - CALL RP04 DRIVER USING "DPB.A"
                                4250    CALL.B - CALL RP04 DRIVER USING "DPB.B"
                                4291    CALL.C - CALL RP04 DRIVER USING "DBP.C"
                                4331    DRVCAL - DRIVER (RP04) CALL USING "DTADPB"
                                4431    ERINDX - FORM ERROR INDEX
                                4483    STALL - USED TO STALL AFTER A DRIVE FUNCTION IS COMPLETE
```

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PROGRAM BY J. LACEY/C. HESS/SUB MALLICK

THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
PACKAGE (MAINDEC-11-DZQAC-A2).

```
                ;*********************************************************************
13              ; CONTROL SWITCH SETTINGS
                ;*********************************************************************
```

14

SWITCH	STATE	USE
15	0	WRITE PACK BEFORE TESTING (TEST 16)
	1	INHIBIT WRITING PACK BEFORE TESTING (TES
14	0	NO STALL BETWEEN DRIVE FUNCTIONS
	1	STALL AFTER EVERY DRIVE FUNCTION
13	0	USE SPECIFIC STALL TIME
	1	USE RANDOM STALL
12	0	NO INCREMENTING STALL IN TEST 4
	1	DO INCREMENTING STALL IN TEST 4
8	0	DO IMPLIED SEEKS WITH DATA TRANSFERS
	1	DO EXPLICIT SEEKS BEFORE DATA TRANSFERS
7	0	DO "READ HEADER AND DATA" IN TESTS 0-6
	1	DO EXPLICIT SEEKS IN TESTS 0-6
6	0	60 HZ
	1	50 HZ
5	0	RUN WATCHDOG TIMER
	1	INHIBIT WATCHDOG TIMER

```
                ;*********************************************************************
35              ; OPERATIONAL SWITCH SETTINGS
                ;*********************************************************************
```

36

SWITCH	USE
15	HALT ON ERROR
14	LOOP ON TEST
13	INHIBIT ERROR TYPEOUTS
11	INHIBIT ITERATIONS
10	BELL ON ERROR
9	LOOP ON ERROR
8	PRINT ERROR MESSAGE ON LINE PRINTER
7	READ CONTROL SWITCH SETTINGS FROM TTY
6	INHIBIT TIME REPORTS (TESTS 7-12)
5	REPORT ONE ERROR PER SECTOR (TESTS 13 &
4	INHIBIT WRITES (TEST 15)

```
                                                        3           INHIBIT WRITE CHECKS (TEST 15)
                                                        2           INHIBIT READ AND SOFTWARE COMPARES (TEST
```

```
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                                                    1           INHIBIT SOFTWARE COMPARES (TEST 15)
                                                    0           PERFORM READ AFTER WRITE CHECK ERROR (TE

                                ;*****************************************************************
                          57    ;TRAP CATCHER
                                ;*****************************************************************

                                60      ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                        SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                        LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS

                                ;*****************************************************************
                          64    ;STARTING ADDRESSES
                                ;*****************************************************************

                                66      200 = NORMAL START

                                68      204 = SELECT OPERATING PARAMETERS

                                70      210 = SELECT RH11/RP04 ADDRESSES

                                72      214 = COMBINATION OF 204 AND 210

                                ;*****************************************************************
                          76    ;BASIC DEFINITIONS
                                ;*****************************************************************

                                78      INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***

                                89      GENERAL PURPOSE REGISTER DEFINITIONS

                                101     PRIORITY LEVEL DEFINITIONS

                                111     "SWITCH REGISTER" SWITCH DEFINITIONS

                                139     DATA BIT DEFINITIONS (BIT00 TO BIT15)

                                167     BASIC "CPU" TRAP VECTOR ADDRESSES
```

```
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                                ;*********************************************************************
                          181   ;MEMORY MANAGEMENT DEFINITIONS
                                ;*********************************************************************

                                183     KT11 VECTOR ADDRESS

                                187     KT11 STATUS REGISTER ADDRESSES

                                194     KERNAL "I" PAGE DESCRIPTOR REGISTERS

                                205     KERNAL "I" PAGE ADDRESS REGISTERS

                                244     ;*********************************************************************

                                ;*****************************************
                              %
                        .ENABLE ABS,AMA
                        .TITLE  MAINDEC-11-DERPK-C "MECHANICAL AND READ/WRITE TEST"
                        ;*COPYRIGHT (C) 1974,1975
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY J. LACEY/C. HESS/SUB MALLICK
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-A2).
                        ;*

                        .SBTTL  CONTROL SWITCH SETTINGS
                        ;*
                        ;*    SWITCH  STATE               USE
                        ;*    ------  -----     ------------------------------------
                        ;*      15      0       WRITE PACK BEFORE TESTING (TEST 16)
                        ;*              1       INHIBIT WRITING PACK BEFORE TESTING (TEST 16)
                        ;*      14      0       NO STALL BETWEEN DRIVE FUNCTIONS
                        ;*              1       STALL AFTER EVERY DRIVE FUNCTION
                        ;*      13      0       USE SPECIFIC STALL TIME
                        ;*              1       USE RANDOM STALL
                        ;*      12      0       NO INCREMENTING STALL IN TEST 4
                        ;*              1       DO INCREMENTING STALL IN TEST 4
                        ;*       8      0       DO IMPLIED SEEKS WITH DATA TRANSFERS
                        ;*              1       DO EXPLICIT SEEKS BEFORE DATA TRANSFERS
                        ;*       7      0       DO "READ HEADER AND DATA" IN TESTS 0-6
                        ;*              1       DO EXPLICIT SEEKS IN TESTS 0-6
                        ;*       6      0       60 HZ
                        ;*              1       50 HZ
                        ;*       5      0       RUN WATCHDOG TIMER
                        ;*              1       INHIBIT WATCHDOG TIMER


                        .SBTTL  OPERATIONAL SWITCH SETTINGS
                        ;*
```

```
1588                                    ;*      SWITCH              USE
1589                                    ;*      ------          ------------------
1590                                    ;*        15            HALT ON ERROR
1591                                    ;*        14            LOOP ON TEST
1592                                    ;*        13            INHIBIT ERROR TYPEOUTS
1593                                    ;*        11            INHIBIT ITERATIONS
1594                                    ;*        10            BELL ON ERROR
1595                                    ;*         9            LOOP ON ERROR
1596                                    ;*         8            PRINT ERROR MESSAGE ON LINE PRINTER
1597                                    ;*         7            READ CONTROL SWITCH SETTINGS FROM TTY
1598                                    ;*         6            INHIBIT TIME REPORTS (TESTS 7-12)
1599                                    ;*         5            REPORT ONE ERROR PER SECTOR (TESTS 13 & 14)
1600                                    ;*         4            INHIBIT WRITES (TEST 15)
1601                                    ;*         3            INHIBIT WRITE CHECKS (TEST 15)
1602                                    ;*         2            INHIBIT READ AND SOFTWARE COMPARES (TEST 15)
1603                                    ;*         1            INHIBIT SOFTWARE COMPARES (TEST 15)
1604                                    ;*         0            PERFORM READ AFTER WRITE CHECK ERROR (TEST 15)
1605
1606
1607
1608                                    .SBTTL  TRAP CATCHER
1609
1610            000000                          .=0
1611                                    ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
1612                                    ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
1613                                    ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
1614
1615                                    .SBTTL  STARTING ADDRESSES
1616            000200                  .=200
1617                                    ;*200 = NORMAL START
1618  000200    000137  004154                JMP     @#START1
1619                                    ;*204 = SELECT OPERATING PARAMETERS
1620  000204    000137  004244                JMP     @#START2
1621                                    ;*210 = SELECT RH11/RP04 ADDRESSES
1622  000210    000137  004144                JMP     @#START3
1623                                    ;*214 = COMBINATION OF 204 AND 210
1624  000214    000137  004234                JMP     @#START4
1625
1626
1627                                    .SBTTL  BASIC DEFINITIONS
1628
1629                                    ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
1630            001100                  STACK=  1100
1631                                    .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
1632                                    .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL
1633            177776                  PS=     177776          ;;PROCESSOR STATUS WORD
1634                                    .EQUIV  PS,PSW
1635            177774                  STKLMT= 177774          ;;STACK LIMIT REGISTER
1636            177772                  PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
1637            177570                  SWR=    177570          ;;SWITCH REGISTER
1638            177570                  DISPLAY=SWR
1639
1640                                    ;*GENERAL PURPOSE REGISTER DEFINITIONS
1641            000000                  R0=     %0              ;;GENERAL REGISTER
1642            000001                  R1=     %1              ;;GENERAL REGISTER
1643            000002                  R2=     %2              ;;GENERAL REGISTER
```

```
1644            000003                  R3=     %3              ;;GENERAL REGISTER
1645            000004                  R4=     %4              ;;GENERAL REGISTER
1646            000005                  R5=     %5              ;;GENERAL REGISTER
1647            000006                  R6=     %6              ;;GENERAL REGISTER
1648            000007                  R7=     %7              ;;GENERAL REGISTER
1649                                    .EQUIV  R6,SP           ;;STACK POINTER
1650                                    .EQUIV  R7,PC           ;;PROGRAM COUNTER
1651
1652                                    ;*PRIORITY LEVEL DEFINITIONS
1653            000000                  PR0=    0               ;;PRIORITY LEVEL 0
1654            000040                  PR1=    40              ;;PRIORITY LEVEL 1
1655            000100                  PR2=    100             ;;PRIORITY LEVEL 2
1656            000140                  PR3=    140             ;;PRIORITY LEVEL 3
1657            000200                  PR4=    200             ;;PRIORITY LEVEL 4
1658            000240                  PR5=    240             ;;PRIORITY LEVEL 5
1659            000300                  RP6=    300             ;;PRIORITY LEVEL 6
1660            000340                  PR7=    340             ;;PRIORITY LEVEL 7
1661
1662                                    ;*"SWITCH REGISTER" SWITCH DEFINITIONS
1663            100000                  SW15=   100000
1664            040000                  SW14=   40000
1665            020000                  SW13=   20000
1666            010000                  SW12=   10000
1667            004000                  SW11=   4000
1668            002000                  SW10=   2000
1669            001000                  SW09=   1000
1670            000400                  SW08=   400
1671            000200                  SW07=   200
1672            000100                  SW06=   100
1673            000040                  SW05=   40
1674            000020                  SW04=   20
1675            000010                  SW03=   10
1676            000004                  SW02=   4
1677            000002                  SW01=   2
1678            000001                  SW00=   1
1679                                    .EQUIV  SW09,SW9
1680                                    .EQUIV  SW08,SW8
1681                                    .EQUIV  SW07,SW7
1682                                    .EQUIV  SW06,SW6
1683                                    .EQUIV  SW05,SW5
1684                                    .EQUIV  SW04,SW4
1685                                    .EQUIV  SW03,SW3
1686                                    .EQUIV  SW02,SW2
1687                                    .EQUIV  SW01,SW1
1688                                    .EQUIV  SW00,SW0
1689
1690                                    ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
1691            100000                  BIT15=  100000
1692            040000                  BIT14=  40000
1693            020000                  BIT13=  20000
1694            010000                  BIT12=  10000
1695            004000                  BIT11=  4000
1696            002000                  BIT10=  2000
1697            001000                  BIT09=  1000
1698            000400                  BIT08=  400
1699            000200                  BIT07=  200
```

```
                        
                        BIT06=  100
                        BIT05=  40
                        BIT04=  20
                        BIT03=  10
                        BIT02=  4
                        BIT01=  2
                        BIT00=  1
                        .EQUIV  BIT09,BIT9
                        .EQUIV  BIT08,BIT8
                        .EQUIV  BIT07,BIT7
                        .EQUIV  BIT06,BIT6
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0
                        
                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014                  TBITVEC=14              ;;"T" BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                  TRAPVEC=34              ;;"TRAP" TRAP
000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
```

```
                                .SBTTL  MEMORY MANAGEMENT DEFINITIONS

                                ;*KT11 VECTOR ADDRESS

000250                          MMVEC=  250

                                ;*KT11 STATUS REGISTER ADDRESSES

177572                          SR0=    177572
177574                          SR1=    177574
177576                          SR2=    177576
172516                          SR3=    172516

                                ;*KERNAL "I" PAGE DESCRIPTOR REGISTERS

172300                          KIPDR0= 172300
172302                          KIPDR1= 172302
172304                          KIPDR2= 172304
172306                          KIPDR3= 172306
172310                          KIPDR4= 172310
172312                          KIPDR5= 172312
172314                          KIPDR6= 172314
172316                          KIPDR7= 172316

                                ;*KERNAL "I" PAGE ADDRESS REGISTERS

172340                          KIPAR0= 172340
172342                          KIPAR1= 172342
172344                          KIPAR2= 172344
172346                          KIPAR3= 172346
172350                          KIPAR4= 172350
172352                          KIPAR5= 172352
172354                          KIPAR6= 172354
172356                          KIPAR7= 172356
```

```
1767                                    ;OP CODE DEFINITIONS
1768            000101                  NOOP=101
1769            000103                  UNLOAD=103
1770            000105                  SEEK=105
1771            000107                  RECAL=107
1772            000111                  DRVCLR=111
1773            000113                  RELEASE=113
1774            000115                  OFFSET=115
1775            000117                  RTC=117
1776            000121                  READIN=121
1777            000123                  PACK=123
1778            000131                  SEARCH=131
1779            000151                  WRCKD=151
1780            000153                  WRCKHD=153
1781            000161                  WRITE=161
1782            000163                  WRTHD=163
1783            000171                  READ=171
1784            000173                  READHD=173
1785            000141                  GETREG=141
1786            000143                  SETFORM=143
1787            000145                  SELDRV=145
1788
1789                                    ;OTHER EQUATES
1790
1791            165000                  TRCKWC = -(256.*22.)            ;WORD COUNT FOR TRACK
1792            177400                  SCTRWC = -256.                  ;WORD COUNT FOR SECTOR
1793            010000                  FMT22=10000                     ;FORMAT 22 BIT
1794
```

```
                        ;*****************************************************************

                        .SBTTL  COMMON TAGS

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

                            .=46
000046  001520              $ENDAD                  ;;LOGICAL END OF PROGRAM

                            .=1100

001100                  $CMTAG:                     ;;START OF COMMON TAGS
001100  000000          $PASS:  .WORD   0           ;;CONTAINS PASS COUNT
001102  000             $TSTNM: .BYTE   0           ;;CONTAINS THE TEST NUMBER
001103  000             $ERFLG: .BYTE   0           ;;CONTAINS ERROR FLAG
001104  000000          $ICNT:  .WORD   0           ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000          $LPADR: .WORD   0           ;;CONTAINS SCOPE LOOP
001110  000000          $LPERR: .WORD   0           ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000          $ERTTL: .WORD   0           ;;CONTAINS TOTAL ERRORS DETECTED
001114  000             $ITEMB: .BYTE   0           ;;CONTAINS ITEM CONTROL BYTE
001115  001             $ERMAX: .BYTE   1           ;;CONTAINS MAX. ERRORS PER TEST
001116  000000          $ERRPC: .WORD   0           ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000          $GDADR: .WORD   0           ;;CONTAINS  OF 'GOOD' DATA
001122  000000          $BDADR: .WORD   0           ;;CONTAINS  OF 'BAD' DATA
001124  000000          $GDDAT: .WORD   0           ;;CONTAINS 'GOOD' DATA
001126  000000          $BDDAT: .WORD   0           ;;CONTAINS 'BAD' DATA
001130  000000  000000  000000          .WORD   0,0,0   ;;RESERVED--NOT TO BE USED
001136  177560          $TKS:   177560              ;;TTY KBD STATUS
001140  177562          $TKB:   177562              ;;TTY KBD BUFFER
001142  177564          $TPS:   177564              ;;TTY PRINTER STATUS REG.
001144  177566          $TPB:   177566              ;;TTY PRINTER BUFFER REG.
001146  000             $NULL:  .BYTE   0           ;;CONTAINS NULL CHARACTER FOR FILLS
001147  002             $FILLS: .BYTE   2           ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001150  012             $FILLC: .BYTE   12          ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001151  000             $TPFLG: .BYTE   0           ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001152  000000          $REGAD: .WORD   0           ;;CONTAINS THE  FROM
                                                    ;;WHICH  ($REGO) WAS OBTAINED
001154  000000          $REGO:  .WORD   0           ;;CONTAINS (($REGAD)+0)
001156  000000          $REG1:  .WORD   0           ;;CONTAINS (($REGAD)+2)
001160  000000          $REG2:  .WORD   0           ;;CONTAINS (($REGAD)+4)
001162  000000          $REG3:  .WORD   0           ;;CONTAINS (($REGAD)+6)
001164  000000          $REG4:  .WORD   0           ;;CONTAINS (($REGAD)+10)
001166  000000          $REG5:  .WORD   0           ;;CONTAINS (($REGAD)+12)
001170  000000          $TMP0:  .WORD   0           ;;USER DEFINED
001172  000000          $TMP1:  .WORD   0           ;;USER DEFINED
001174  000000          $TMP2:  .WORD   0           ;;USER DEFINED
001176  000000          $TIMES: 0                   ;;MAX. NUMBER OF ITERATIONS
001200  000000          $ESCAPE:0                   ;;ESCAPE ON ERROR
001202  177607  000377  $BELL:  .ASCIZ  <207><377><377>  ;;CODE FOR BELL
001206  077             $QUES:  .ASCII  /?/         ;;QUESTION MARK
001207  015             $CRLF:  .ASCII  <15>        ;;CARRIAGE RETURN
001210  000012          $LF:    .ASCIZ  <12>        ;;LINE FEED
001212  000000          BUF:    0
001214  000000          TEMP1:  0
001216  000000          TEMP2:  0
```

```
1851  001220  000000                  TEMP3:  0
1852  001222  000000                  TEMP4:  0
1853  001224  000000                  TEMP5:  0
1854  001226  000000                  TEMP6:  0
1855  001230  000000                  TEMP7:  0
1856  001232  000000                  TEMP9:  0
1857  001234  000000                  TEMP10: 0       ;0=70    1=45
1858  001236  177740                  LERADD: 177740
1859  001240  177742                  HERADD: 177742
1860  001242  177744                  MEMERR: 177744
1861  001244  000001                  RPT17:  1
1862  001246  000000                  C.SWR:  .WORD   0               ;CONTROL SWITCHES
1863  001250  000000                  CNTRLC: .WORD   0               ;CONTROL "C" FLAG
1864  001252  000000                  BUSADR: .WORD   0               ;GET ADDRESSES F     E TTY FLAG (0=NO, -1=YES)
1865  001254  000000                  LPTAVL: .WORD   0               ;LPT AVAILABLE STATUS (0=NO,1=YES)
1866  001256  000000                  DRVSEL: .WORD   0               ;DRIVES SELECTED FOR TESTING
1867  001260  037777                  TSTNMS: .WORD   37777           ;RUN TESTS 0-15
1868  001262  000000                  CLKSTA: .WORD   0               ;CLOCK STATUS (0=NO CLOCK,+1=KW11-P,
1869                                                                  ;AND -1=KW11-L)
1870  001264  000020                  TICKMS: .WORD   ^D16            ;16 MILLISECONDS PER CLOCK TICK
1871  001266  040432                  TICKUS: .WORD   ^D16666         ;16666 MIRCOSECONDS PER CLOCK TICK
1872  001270  000000                  BYPASS: .WORD   0
1873  001272  000000                  CHKDRV: .WORD   0               ;DRIVE UNDER TEST
1874  001274  000000                  DRVMSK: .WORD   0               ;DRIVE MASK BIT
1875  001276  000000                  SVSTAT: .WORD   0               ;STATUS/ERROR INDICATOR IS
1876                                                                  ;SAVED HERE ON AN ERROR
1877  001300  000000                  CYL.RD: .WORD   0               ;CYLINDER READ
1878  001302  000000                  TRK.RD: .WORD   0               ;TRACK READ
1879  001304  000000                  SEC.RD: .WORD   0               ;SECTOR READ
1880  001306  000000                  CYL.DS: .WORD   0               ;CYLINDER DESIRED
1881  001310  000000                  SEC.DS: .WORD   0               ;SECTOR DESIRED
1882  001312  000000                  TRK.DS: .WORD   0               ;TRACK DESIRED
1883  001314  000000                  TIM.UP: .WORD   0               ;MINIMUM TIME
1884  001316  000000                          .WORD   0               ;NUMBER OF COUNTS BELOW MIN. LIMIT
1885  001320  000000                          .WORD   0               ;MAXIMUM TIME
1886  001322  000000                          .WORD   0               ;NUMBER OF COUNTS ABOVE MAX. LIMIT
1887  001324  000000  000000                  .WORD   0,0             ;TOTAL TIME OF ALL SEEKS
1888  001330  000000                          .WORD   0               ;NUMBER OF SEEKS PERFORMED
1889  001332  000000                  TIM.DN: .WORD   0               ;MINIMUM TIME
1890  001334  000000                          .WORD   0               ;NUMBER OF COUNTS BELOW MIN. LIMIT
1891  001336  000000                          .WORD   0               ;MAXIMUM TIME
1892  001340  000000                          .WORD   0               ;NUMBER OF COUNTS ABOVE MAX. LIMIT
1893  001342  000000  000000                  .WORD   0,0             ;TOTAL TIME OF ALL SEEKS
1894  001346  000000                          .WORD   0               ;NUMBER OF SEEKS PERFORMED
1895  001350  000000                  TIM.PT: .WORD   0               ;POINTS TO TABLE OF TIMES
1896  001352  000000                  WCEFLG: .WORD   0               ;FATAL WRITE CHECK ERROR FLAG (TST 15)
1897  001354  000000                  STALLO: .WORD   0               ;VARIABLE STALL (TEST 4)
1898  001356  000000  000000          SVADR:  .WORD   0,0             ;SAVE DISK ADDRESS (TST16)
1899
1900                                  ;CONSTANTS STORAGE
1901  001362  176700                  RH.ADR: .WORD   176700          ;RH11/RP04 CONTROL AND STATUS REG. #1
1902  001364  000254  000240          RHVEC:  .WORD   254,5*32.       ;RH11/RP04 VECTOR AND PRIORITY
1903  001370  000104  000106          PKV:    .WORD   104,106         ;KW11-P VECTOR ADDRESS
1904  001374  172540                  PKCS:   .WORD   172540          ;KW11-P CONTROL AND STATUS REG.
1905  001376  172542                  PKB:    .WORD   172542          ;KW11-P COUNT SET BUFFER
1906  001400  172544                  PKC:    .WORD   172544          ;KW11-P COUNTER
```

```
001907  001402  000100  000102          LKV:    .WORD   100,102          ;KW11-L VECTOR ADDRESS
001908  001406  177546                  LKS:    .WORD   177546          ;KW11-L STATUS REGISTER
001909  001410  177564                  TPS:    .WORD   177564          ;TTY PRINTER STATUS
001910  001412  177566                  TPB:    .WORD   177566          ;TTY PRINTER BUFFER
001911  001414  177514                  LPS:    .WORD   177514          ;LINE PRINTER STATUS
001912  001416  177516                  LPB:    .WORD   177516          ;LINE PRINTER BUFFER
001913  001420  000012                  STALL1: .WORD   ^D10            ;10 MILLISECONDS STALL (TEST 0-6)
001914  001422  000012                  STALL2: .WORD   ^D10            ;10 MILLISECONDS STALL (TEST 13-16)
001915  001424  000031                  MXSTAL: .WORD   ^D25            ;MAX. INCREMENTING STALL ALLOWED IN TEST 4
001916  001426     006                  ERR.CT: .BYTE   6               ;NUMBER OF ERRORS ALLOWED IN TESTS 13-16
001917                                                                  ;BEFORE GOING TO THE NEXT TEST
001918  001427     000                          .BYTE   0               ;RESERVED
001919
001920                                  ;BIT TABLE
001921  001430  000001                  BITS:   .WORD   BIT00
001922  001432  000002                          .WORD   BIT01
001923  001434  000004                          .WORD   BIT02
001924  001436  000010                          .WORD   BIT03
001925  001440  000020                          .WORD   BIT04
001926  001442  000040                          .WORD   BIT05
001927  001444  000100                          .WORD   BIT06
001928  001446  000200                          .WORD   BIT07
001929  001450  000400                          .WORD   BIT08
001930  001452  001000                          .WORD   BIT09
001931  001454  002000                          .WORD   BIT10
001932  001456  004000                          .WORD   BIT11
001933  001460  010000                          .WORD   BIT12
001934  001462  020000                          .WORD   BIT13
001935  001464  040000                          .WORD   BIT14
001936  001466  100000                          .WORD   BIT15
001937
001938
001939                                  ;COMMON STORAGE FOR TEST PARAMETER
001940  001470  000000                  PRM:    .WORD   0
001941  001472  000000                  RPT:    .WORD   0               ;REPEAT COUNTS FOR ALL TESTS
001942  001474  000000                  FC:     .WORD   0               ;FIRST CYLINDER
001943  001476  000000                  LC:     .WORD   0               ;LAST CYLINDER
001944  001500  000000                  IC:     .WORD   0               ;INCREMENT CYLINDER
001945  001502  000000                  FT:     .WORD   0               ;FIRST TRACK
001946  001504  000000                  LT:     .WORD   0               ;LAST TRACK
001947  001506  000000                  IT:     .WORD   0               ;INCREMENT TRACK
001948  001510  000000                  FS:     .WORD   0               ;FIRST SECTOR
001949  001512  000000                  LS:     .WORD   0               ;LAST SECTOR
001950  001514  000000                  PAT:    .WORD   0               ;PATTERN CODE
001951
001952                                  ;TABLE OF PARAMETER POINTERS
001953  001516  002116                  PRMPT:  .WORD   PRM0
001954  001520  002130                          .WORD   PRM1
001955  001522  002152                          .WORD   PRM2
001956  001524  002170                          .WORD   PRM3
001957  001526  002206                          .WORD   PRM4
001958  001530  002224                          .WORD   PRM5
001959  001532  002242                          .WORD   PRM6
001960  001534  002260                          .WORD   PRM7
001961  001536  002272                          .WORD   PRM10
001962  001540  002276                          .WORD   PRM11
```

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001542  002302                          .WORD   PRM12
001544  002306                          .WORD   PRM13
001546  002316                          .WORD   PRM14
001550  002326                          .WORD   PRM15
001552  002354                          .WORD   PRM16

                                ;PARAMETER UPPER LIMIT
001554  077777                PRMLMT: .WORD   ↑D32767         ;"R"
001556  000632                        .WORD   ↑D410           ;"FC"
001560  000632                        .WORD   ↑D410           ;"LC"
001562  000632                        .WORD   ↑D410           ;"IC"
001564  000022                        .WORD   ↑D18            ;"FT"
001566  000022                        .WORD   ↑D18            ;"LT"
001570  000022                        .WORD   ↑D18            ;"IT"
001572  000025                        .WORD   ↑D21            ;"FS"
001574  000025                        .WORD   ↑D21            ;"LS"
001576  177777                        .WORD   177777          ;"PAT"

                                ;TABLE OF MESSAGE POINTERS
001600  040006                PRMMSG: .WORD   MSG.R
001602  040010                        .WORD   MSG.FC
001604  040013                        .WORD   MSG.LC
001606  040016                        .WORD   MSG.IC
001610  040021                        .WORD   MSG.FT
001612  040024                        .WORD   MSG.LT
001614  040027                        .WORD   MSG.IT
001616  040032                        .WORD   MSG.FS
001620  040035                        .WORD   MSG.LS

                                ;STATUS/ERROR INDICATOR MESSAGES POINTER TABLE
001622  041431                STATBL: .WORD   MSGB14          ;OFFLINE OR UNSAFE DRIVE REQUESTED
001624  041473                        .WORD   MSGB13          ;UNLOAD DRIVE REQUESTED
001626  041524                        .WORD   MSGB12          ;PERSISTENT UNSAFE
001630  041546                        .WORD   MSGB11          ;PARITY ERROR OCCURRED
001632  041574                        .WORD   MSGB10          ;FATAL PARITY ERROR
001634  041617                        .WORD   MSGB09          ;SOFTWARE TIMEOUT ON THIS DRIVE
001636  041656                        .WORD   MSGB08          ;SOFTWARE TIMEOUT ON ANOTHER DRIVE
001640  041720                        .WORD   MSGB06          ;ERROR OCCURRED DURING I/O OPERATION
001642  041764                        .WORD   MSGB05          ;ERROR OCCURRED DURING NON-I/O OPERATION
001644  042034                        .WORD   MSGB04          ;UNSAFE OCCURRED
001646  042054                        .WORD   MSGB03          ;AUTOMATIC RECALIBRATE SEQUENCE OCCURRED

                                ;DEFAULT VALUES OF TESTS PARAMETERS
001650  000225  000012  000632  DFLT:   .WORD   225,10.,410.,0,0 ;RECAL/SEEK (T0)
001656  000000  000000
001662  000677  000144  000000         .WORD   677,100.,0,128.,0,0,0,0,0 ;SEEK/SEEK (T1)
001670  000200  000000  000000
001676  000000  000000  000000
001704  000237  000001  000000         .WORD   237,1,0,410.,1,0,0 ;INCREMENT SEEK (T2)
001712  000632  000001  000000
001720  000000
001722  000237  000001  000000         .WORD   237,1,0,256.,1,0,0 ;STEPPING SEEK (T3)
001730  000400  000001  000000
001736  000000
001740  000237  000001  000000         .WORD   237,1,0,410.,1,0,0 ;OSCILLATING SEEK (T4)
001746  000632  000001  000000
```

```
2019  001754  000000
2020  001756  000237  000001  000000          .WORD   237,1,0,410.,1,0,0 ;CONVERGING/DIVERGING SEEK (T5)
2021  001764  000632  000001  000000
2022  001772  000000
2023  001774  000237  000001  000000          .WORD   237,1,0,410.,1,0,0 ;SERVO ADDRESSING LOGIC NOISE (T6)
2024  002002  000632  000001  000000
2025  002010  000000
2026  002012  000223  000001  000000          .WORD   223,1,0,0,0     ;ROTATIONAL SPEED TIMING TEST (T7)
2027  002020  000000  000000
2028  002024  000001  000001                  .WORD   1,1             ;ONE CYLINDER SEEK TIMING TEST (T10)
2029  002030  000001  000001                  .WORD   1,1             ;AVERAGE SEEK TIMING TEST (T11)
2030  002034  000001  000001                  .WORD   1,1             ;MAXIMUM SEEK TIMEING TEST (T12)
2031  002040  000023  000001  000000          .WORD   23,1,0,0        ;SECTOR ADDRESSING TEST (T13)
2032  002046  000000
2033  002050  000203  000001  000000          .WORD   203,1,0,0       ;TRACK ADDRESSING TEST (T14)
2034  002056  000000
2035  002060  001777  000001  000000          .WORD   1777,1,0,410.,64.,0,18.,1,1,0,177777 ;DATA TEST (T15)
2036  002066  000632  000100  000000
2037  002074  000022  000001  000001
2038  002102  000000  177777
2039  002106  000007  047040  000000          .WORD   7,20000.,0,410. ;EXERCISER (T16)
2040  002114  000632
2041
2042                                  ;PARAMETER TABLES
2043
2044                                  ;RECAL/SEEK (T0)
2045  002116  000225                  PRM0:   .WORD   225
2046  002120  000012                  RPT0:   .WORD   10.
2047  002122  000632                  LC0:    .WORD   410.
2048  002124  000000                  FT0:    .WORD   0
2049  002126  000000                  FS0:    .WORD   0
2050
2051                                  ;SEEK/SEEK (T1)
2052  002130  000677                  PRM1:   .WORD   677
2053  002132  000144                  RPT1:   .WORD   100.
2054  002134  000000                  FC1:    .WORD   0
2055  002136  000200                  LC1:    .WORD   128.
2056  002140  000000                  IC1:    .WORD   0
2057  002142  000000                  FT1:    .WORD   0
2058  002144  000000                  LT1:    .WORD   0
2059  002146  000000                  FS1:    .WORD   0
2060  002150  000000                  LS1:    .WORD   0
2061
2062                                  ;INCREMENT SEEK (T2)
2063  002152  000237                  PRM2:   .WORD   237
2064  002154  000001                  RPT2:   .WORD   1
2065  002156  000000                  FC2:    .WORD   0
2066  002160  000632                  LC2:    .WORD   410.
2067  002162  000001                  IC2:    .WORD   1
2068  002164  000000                  FT2:    .WORD   0
2069  002166  000000                  FS2:    .WORD   0
2070
2071                                  ;STEPPING SEEK (T3)
2072  002170  000237                  PRM3:   .WORD   237
2073  002172  000001                  RPT3:   .WORD   1
2074  002174  000000                  FC3:    .WORD   0
```

```
2075  002176  000400                LC3:    .WORD   256.
2076  002200  000001                IC3:    .WORD   1
2077  002202  000000                FT3:    .WORD   0
2078  002204  000000                FS3:    .WORD   0
2079
2080                                ;OSCILLATING SEEK (T4)
2081  002206  000237                PRM4:   .WORD   237
2082  002210  000001                RPT4:   .WORD   1
2083  002212  000000                FC4:    .WORD   0
2084  002214  000632                LC4:    .WORD   410.
2085  002216  000001                IC4:    .WORD   1
2086  002220  000000                FT4:    .WORD   0
2087  002222  000000                FS4:    .WORD   0
2088
2089                                ;CONVERGING/DIVERGING SEEK (T5)
2090  002224  000237                PRM5:   .WORD   237
2091  002226  000001                RPT5:   .WORD   1
2092  002230  000000                FC5:    .WORD   0
2093  002232  000632                LC5:    .WORD   410.
2094  002234  000001                IC5:    .WORD   1
2095  002236  000000                FT5:    .WORD   0
2096  002240  000000                FS5:    .WORD   0
2097
2098                                ;SERVO ADDRESSING LOGIC NOISE GENERATOR (T6)
2099  002242  000237                PRM6:   .WORD   237
2100  002244  000001                RPT6:   .WORD   1
2101  002246  000000                FC6:    .WORD   0
2102  002250  000632                LC6:    .WORD   410.
2103  002252  000001                IC6:    .WORD   1
2104  002254  000000                FT6:    .WORD   0
2105  002256  000000                FS6:    .WORD   0
2106
2107                                ;ROTATIONAL SPEED TIMING TEST (T7)
2108  002260  000223                PRM7:   .WORD   223
2109  002262  000001                RPT7:   .WORD   1
2110  002264  000000                FC7:    .WORD   0
2111  002266  000000                FT7:    .WORD   0
2112  002270  000000                FS7:    .WORD   0
2113
2114                                ;ONE CYLINDER SEEK TIMING TEST (T10)
2115  002272  000001                PRM10:  .WORD   1
2116  002274  000001                RPT10:  .WORD   1
2117
2118                                ;AVERAGE SEEK TIMING TEST (T11)
2119  002276  000001                PRM11:  .WORD   1
2120  002300  000001                RPT11:  .WORD   1
2121
2122                                ;MAXIMUM SEEK TIMING TEST (T12)
2123  002302  000001                PRM12:  .WORD   1
2124  002304  000001                RPT12:  .WORD   1
2125
2126                                ;SECTOR ADDRESSING TEST (T13)
2127  002306  000023                PRM13:  .WORD   23
2128  002310  000001                RPT13:  .WORD   1
2129  002312  000000                FC13:   .WORD   0
2130  002314  000000                FT13:   .WORD   0
```

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2131
2132                                    ;TRACK ADDRESSING TEST (T14)
2133  002316  000203                    PRM14:  .WORD   203
2134  002320  000001                    RPT14:  .WORD   1
2135  002322  000000                    FC14:   .WORD   0
2136  002324  000000                    FS14:   .WORD   0
2137
2138                                    ;DATA TEST (T15)
2139  002326  001777                    PRM15:  .WORD   1777
2140  002330  000001                    RPT15:  .WORD   1
2141  002332  000000                    FC15:   .WORD   0
2142  002334  000632                    LC15:   .WORD   410.
2143  002336  000100                    IC15:   .WORD   64.
2144  002340  000000                    FT15:   .WORD   0
2145  002342  000022                    LT15:   .WORD   18.
2146  002344  000001                    IT15:   .WORD   1
2147  002346  000001                    FS15:   .WORD   1
2148  002350  000000                    LS15:   .WORD   0
2149  002352  177777                    PTRN15: .WORD   177777
2150
2151                                    ;EXERCISER (T16)
2152  002354  000007                    PRM16:  .WORD   7
2153  002356  047040                    RPT16:  .WORD   20000.
2154  002360  000000                    FC16:   .WORD   0
2155  002362  000632                    LC16:   .WORD   410.
2156
2157                                    ;SEEK TIMING LIMITS
2158
2159  002364  040126                    T7A:    .WORD   MSG7
2160  002366  000000                            .WORD   0
2161  002370  003142                            .WORD   1634.           ;(16.67-2%)**2
2162  002372  003244                            .WORD   1700.           ;(16.67+2%)**2
2163
2164  002374  040126                    T7B:    .WORD   MSG7
2165  002376  000000                            .WORD   0
2166  002400  003131                            .WORD   1625.           ;(16.67-2.5%)**2
2167  002402  003255                            .WORD   1709.           ;(16.67+2.5%)**2
2168
2169  002404  040160                    T10:    .WORD   MSG10A
2170  002406  040241                            .WORD   MSG10B
2171  002410  000454                            .WORD   300.            ;(7-4)**2
2172  002412  001750                            .WORD   1000.           ;(7+3)**2
2173
2174  002414  040274                    T11:    .WORD   MSG11A
2175  002416  040342                            .WORD   MSG11B
2176  002420  005050                            .WORD   2600.           ;(28-2)**2
2177  002422  005670                            .WORD   3000.           ;(28+2)**2
2178
2179  002424  040363                    T12:    .WORD   MSG12A
2180  002426  040431                            .WORD   MSG12B
2181  002430  010770                            .WORD   4600.           ;(50-4)**2
2182  002432  012120                            .WORD   5200.           ;(50+2)**2
2183
2184  002434  002474                    PAT.PT: .WORD   PAT0             ;TABLE OF POINTERS WHICH POINT TO THE
2185  002436  002534                            .WORD   PAT1             ;PATTERNS USED BY THE DATA TEST
2186  002440  002574                            .WORD   PAT2
```

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2187  002442  002634                        .WORD   PAT3
2188  002444  002674                        .WORD   PAT4
2189  002446  002734                        .WORD   PAT5
2190  002450  002774                        .WORD   PAT6
2191  002452  003034                        .WORD   PAT7
2192  002454  003074                        .WORD   PAT8
2193  002456  003134                        .WORD   PAT9
2194  002460  003174                        .WORD   PAT10
2195  002462  003234                        .WORD   PAT11
2196  002464  003274                        .WORD   PAT12
2197  002466  003334                        .WORD   PAT13
2198  002470  003374                        .WORD   PAT14
2199  002472  003434                        .WORD   PAT15
2200
2201                                ;PATTERNS 0 THRU 15
2202
2203  002474  165555                PAT0:   .WORD   165555          ;PATTERN 0
2204  002476  133333                        .WORD   133333
2205  002500  165555                        .WORD   165555
2206  002502  133333                        .WORD   133333
2207  002504  165555                        .WORD   165555
2208  002506  133333                        .WORD   133333
2209  002510  165555                        .WORD   165555
2210  002512  133333                        .WORD   133333
2211  002514  165555                        .WORD   165555
2212  002516  133333                        .WORD   133333
2213  002520  165555                        .WORD   165555
2214  002522  133333                        .WORD   133333
2215  002524  165555                        .WORD   165555
2216  002526  133333                        .WORD   133333
2217  002530  165555                        .WORD   165555
2218  002532  133333                        .WORD   133333
2219
2220  002534  000001                PAT1:   .WORD   000001          ;PATTERN 1
2221  002536  000003                        .WORD   000003
2222  002540  000007                        .WORD   000007
2223  002542  000017                        .WORD   000017
2224  002544  000037                        .WORD   000037
2225  002546  000077                        .WORD   000077
2226  002550  000177                        .WORD   000177
2227  002552  000377                        .WORD   000377
2228  002554  000777                        .WORD   000777
2229  002556  001777                        .WORD   001777
2230  002560  003777                        .WORD   003777
2231  002562  007777                        .WORD   007777
2232  002564  017777                        .WORD   017777
2233  002566  037777                        .WORD   037777
2234  002570  077777                        .WORD   077777
2235  002572  177777                        .WORD   177777
2236
2237  002574  177776                PAT2:   .WORD   177776          ;PATTERN 2
2238  002576  177774                        .WORD   177774
2239  002600  177770                        .WORD   177770
2240  002602  177760                        .WORD   177760
2241  002604  177740                        .WORD   177740
2242  002606  177700                        .WORD   177700
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2243  002610  177600                          .WORD   177600
2244  002612  177400                          .WORD   177400
2245  002614  177000                          .WORD   177000
2246  002616  176000                          .WORD   176000
2247  002620  174000                          .WORD   174000
2248  002622  170000                          .WORD   170000
2249  002624  160000                          .WORD   160000
2250  002626  140000                          .WORD   140000
2251  002630  100000                          .WORD   100000
2252  002632  000000                          .WORD   000000
2253
2254  002634  000000                  PAT3:   .WORD   000000          ;PATTERN 3
2255  002636  000000                          .WORD   000000
2256  002640  000000                          .WORD   000000
2257  002642  177777                          .WORD   177777
2258  002644  177777                          .WORD   177777
2259  002646  177777                          .WORD   177777
2260  002650  000000                          .WORD   000000
2261  002652  000000                          .WORD   000000
2262  002654  177777                          .WORD   177777
2263  002656  177777                          .WORD   177777
2264  002660  000000                          .WORD   000000
2265  002662  177777                          .WORD   177777
2266  002664  000000                          .WORD   000000
2267  002666  177777                          .WORD   177777
2268  002670  000000                          .WORD   000000
2269  002672  177777                          .WORD   177777
2270
2271  002674  000000                  PAT4:   .WORD   000000          ;PATTERN 4
2272  002676  010421                          .WORD   010421
2273  002700  021042                          .WORD   021042
2274  002702  031463                          .WORD   031463
2275  002704  042104                          .WORD   042104
2276  002706  052525                          .WORD   052525
2277  002710  063146                          .WORD   063146
2278  002712  073567                          .WORD   073567
2279  002714  104210                          .WORD   104210
2280  002716  114631                          .WORD   114631
2281  002720  125252                          .WORD   125252
2282  002722  135673                          .WORD   135673
2283  002724  146314                          .WORD   146314
2284  002726  156735                          .WORD   156735
2285  002730  167356                          .WORD   167356
2286  002732  177777                          .WORD   177777
2287
2288  002734  052525                  PAT5:   .WORD   052525          ;PATTERN 5
2289  002736  052525                          .WORD   052525
2290  002740  052525                          .WORD   052525
2291  002742  125252                          .WORD   125252
2292  002744  125252                          .WORD   125252
2293  002746  125252                          .WORD   125252
2294  002750  052525                          .WORD   052525
2295  002752  052525                          .WORD   052525
2296  002754  125252                          .WORD   125252
2297  002756  125252                          .WORD   125252
2298  002760  052525                          .WORD   052525
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2299  002762  125252                          .WORD   125252
2300  002764  052525                          .WORD   052525
2301  002766  125252                          .WORD   125252
2302  002770  052525                          .WORD   052525
2303  002772  125252                          .WORD   125252
2304
2305  002774  007417                PAT6:     .WORD   007417          ;PATTERN 6
2306  002776  007417                          .WORD   007417
2307  003000  007417                          .WORD   007417
2308  003002  170360                          .WORD   170360
2309  003004  170360                          .WORD   170360
2310  003006  170360                          .WORD   170360
2311  003010  007417                          .WORD   007417
2312  003012  007417                          .WORD   007417
2313  003014  170360                          .WORD   170360
2314  003016  170360                          .WORD   170360
2315  003020  007417                          .WORD   007417
2316  003022  170360                          .WORD   170360
2317  003024  007417                          .WORD   007417
2318  003026  170360                          .WORD   170360
2319  003030  007417                          .WORD   007417
2320  003032  170360                          .WORD   170360
2321
2322  003034  026455                PAT7:     .WORD   026455          ;PATTERN 7
2323  003036  026455                          .WORD   026455
2324  003040  026455                          .WORD   026455
2325  003042  151322                          .WORD   151322
2326  003044  151322                          .WORD   151322
2327  003046  151322                          .WORD   151322
2328  003050  026455                          .WORD   026455
2329  003052  026455                          .WORD   026455
2330  003054  151322                          .WORD   151322
2331  003056  151322                          .WORD   151322
2332  003060  026455                          .WORD   026455
2333  003062  151322                          .WORD   151322
2334  003064  026455                          .WORD   026455
2335  003066  151322                          .WORD   151322
2336  003070  026455                          .WORD   026455
2337  003072  151322                          .WORD   151322
2338
2339  003074  165555                PAT8:     .WORD   165555          ;PATTERN 8
2340  003076  133333                          .WORD   133333
2341  003100  165555                          .WORD   165555
2342  003102  133333                          .WORD   133333
2343  003104  165555                          .WORD   165555
2344  003106  133333                          .WORD   133333
2345  003110  165555                          .WORD   165555
2346  003112  133333                          .WORD   133333
2347  003114  165555                          .WORD   165555
2348  003116  133333                          .WORD   133333
2349  003120  165555                          .WORD   165555
2350  003122  133333                          .WORD   133333
2351  003124  165555                          .WORD   165555
2352  003126  133333                          .WORD   133333
2353  003130  165555                          .WORD   165555
2354  003132  133333                          .WORD   133333
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003134  000001          PAT9:   .WORD   000001          ;PATTERN 9
003136  000002                  .WORD   000002
003140  000004                  .WORD   000004
003142  000010                  .WORD   000010
003144  000020                  .WORD   000020
003146  000040                  .WORD   000040
003150  000100                  .WORD   000100
003152  000200                  .WORD   000200
003154  000400                  .WORD   000400
003156  001000                  .WORD   001000
003160  002000                  .WORD   002000
003162  004000                  .WORD   004000
003164  010000                  .WORD   010000
003166  020000                  .WORD   020000
003170  040000                  .WORD   040000
003172  100000                  .WORD   100000

003174  177776          PAT10:  .WORD   177776          ;PATTERN 10
003176  177775                  .WORD   177775
003200  177773                  .WORD   177773
003202  177767                  .WORD   177767
003204  177757                  .WORD   177757
003206  177737                  .WORD   177737
003210  177677                  .WORD   177677
003212  177577                  .WORD   177577
003214  177377                  .WORD   177377
003216  176777                  .WORD   176777
003220  175777                  .WORD   175777
003222  173777                  .WORD   173777
003224  167777                  .WORD   167777
003226  157777                  .WORD   157777
003230  137777                  .WORD   137777
003232  077777                  .WORD   077777

003234  172666          PAT11:  .WORD   172666          ;PATTERN 11
003236  155555                  .WORD   155555
003240  172666                  .WORD   172666
003242  155555                  .WORD   155555
003244  172666                  .WORD   172666
003246  155555                  .WORD   155555
003250  172666                  .WORD   172666
003252  155555                  .WORD   155555
003254  172666                  .WORD   172666
003256  155555                  .WORD   155555
003260  172666                  .WORD   172666
003262  155555                  .WORD   155555
003264  172666                  .WORD   172666
003266  155555                  .WORD   155555
003270  172666                  .WORD   172666
003272  155555                  .WORD   155555

003274  077777          PAT12:  .WORD   077777          ;PATTERN 12
003276  137777                  .WORD   137777
003300  157777                  .WORD   157777
003302  167777                  .WORD   167777
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2411  003304  173777                      .WORD   173777
2412  003306  175777                      .WORD   175777
2413  003310  176777                      .WORD   176777
2414  003312  177377                      .WORD   177377
2415  003314  177577                      .WORD   177577
2416  003316  177677                      .WORD   177677
2417  003320  177737                      .WORD   177737
2418  003322  177757                      .WORD   177757
2419  003324  177767                      .WORD   177767
2420  003326  177773                      .WORD   177773
2421  003330  177775                      .WORD   177775
2422  003332  177776                      .WORD   177776
2423
2424  003334  153333              PAT13:  .WORD   153333          ;PATTERN 13
2425  003336  066667                      .WORD   066667
2426  003340  153333                      .WORD   153333
2427  003342  066667                      .WORD   066667
2428  003344  153333                      .WORD   153333
2429  003346  066667                      .WORD   066667
2430  003350  153333                      .WORD   153333
2431  003352  066667                      .WORD   066667
2432  003354  153333                      .WORD   153333
2433  003356  066667                      .WORD   066667
2434  003360  153333                      .WORD   153333
2435  003362  066667                      .WORD   066667
2436  003364  153333                      .WORD   153333
2437  003366  066667                      .WORD   066667
2438  003370  153333                      .WORD   153333
2439  003372  066667                      .WORD   066667
2440
2441  003374  000000              PAT14:  .WORD   000000          ;PATTERN 14
2442  003376  177777                      .WORD   177777
2443  003400  177777                      .WORD   177777
2444  003402  177777                      .WORD   177777
2445  003404  177777                      .WORD   177777
2446  003406  177777                      .WORD   177777
2447  003410  177777                      .WORD   177777
2448  003412  177777                      .WORD   177777
2449  003414  177777                      .WORD   177777
2450  003416  177777                      .WORD   177777
2451  003420  177777                      .WORD   177777
2452  003422  177777                      .WORD   177777
2453  003424  177777                      .WORD   177777
2454  003426  177777                      .WORD   177777
2455  003430  177777                      .WORD   177777
2456  003432  177777                      .WORD   177777
2457
2458  003434  177777              PAT15:  .WORD   177777          ;PATTERN 15
2459  003436  000000                      .WORD   000000
2460  003440  000000                      .WORD   000000
2461  003442  000000                      .WORD   000000
2462  003444  000000                      .WORD   000000
2463  003446  000000                      .WORD   000000
2464  003450  000000                      .WORD   000000
2465  003452  000000                      .WORD   000000
2466  003454  000000                      .WORD   000000
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2467  003456  000000                    .WORD   000000
2468  003460  000000                    .WORD   000000
2469  003462  000000                    .WORD   000000
2470  003464  000000                    .WORD   000000
2471  003466  000000                    .WORD   000000
2472  003470  000000                    .WORD   000000
2473  003472  000000                    .WORD   000000
2474
2475                              ;DPB (DATA PARAMETER BLOCK)
2476
2477  003474      000             DPB.A:  .BYTE   0               ;(0) DRIVE NUMBER
2478  003475      000                     .BYTE   0               ;(1) OFFSET VALUE OR FMT22, ECT, AND HCI
2479  003476      000                     .BYTE   0               ;(2) COMMAND
2480  003477      000                     .BYTE   0               ;(3) PSEL AND A17 AND A16
2481  003500  000000                     .WORD   0               ;(4) WORD COUNT (MUST BE NEG.)
2482  003502  044134                     .WORD   BUFFER          ;(6) BUFFER ADDRESS OR
2483                                                             ;REGISTER TABLE POINTER
2484  003504      000                     .BYTE   0               ;(10) SECTOR ADDRESS OR
2485                                                             ;FIRST REG. INDEX
2486  003505      000                     .BYTE   0               ;(11) TRACK ADDRESS OR
2487                                                             ;LAST REG. INDEX
2488  003506  000000                     .WORD   0               ;(12) CYLINDER ADDRESS
2489  003510  003574                     .WORD   RP.REG          ;(14) ERROR TABLE POINTER
2490                                                             ;POINTS TO THE FIRST OF TWENTY
2491                                                             ;LOCATIONS OF WHERE THE DRIVER
2492                                                             ;IS TO STORE THE RH11/RP04
2493                                                             ;REGISTERS ON AN ERROR. IF LEFT
2494                                                             ;ZERO REGISTERS ARE NOT SAVED.
2495  003512  000000                     .WORD   0               ;(16) STATUS/ERROR INDICATOR
2496                                                             ;BIT15=1=>ERROR OCCURRED
2497                                                             ;BIT07=1=>DONE
2498                                                             ;BIT14-BIT09 AND BIT06-BIT03
2499                                                             ;INDICATE TYPE OF ERROR
2500
2501  003514      000             DPB.B:  .BYTE   0               ;(0) DRIVE NUMBER
2502  003515      000                     .BYTE   0               ;(1) OFFSET VALUE OR FMT22, ECT, AND HCI
2503  003516      000                     .BYTE   0               ;(2) COMMAND
2504  003517      000                     .BYTE   0               ;(3) PSEL AND A17 AND A16
2505  003520  177776                     .WORD   -2              ;(4) WORD COUNT (MUST BE NEG.)
2506  003522  044134                     .WORD   BUFFER          ;(6) BUFFER ADDRESS OR
2507                                                             ;REGISTER TABLE POINTER
2508  003524      000                     .BYTE   0               ;(10) SECTOR ADDRESS OR
2509                                                             ;FIRST REG. INDEX
2510  003525      000                     .BYTE   0               ;(11) TRACK ADDRESS OR
2511                                                             ;LAST REG. INDEX
2512  003526  000000                     .WORD   0               ;(12) CYLINDER ADDRESS
2513  003530  003574                     .WORD   RP.REG          ;(14) ERROR TABLE POINTER
2514                                                             ;POINTS TO THE FIRST OF TWENTY
2515                                                             ;LOCATIONS OF WHERE THE DRIVER
2516                                                             ;IS TO STORE THE RH11/RP04
2517                                                             ;REGISTERS ON AN ERROR. IF LEFT
2518                                                             ;ZERO REGISTERS ARE NOT SAVED.
2519  003532  000000                     .WORD   0               ;(16) STATUS/ERROR INDICATOR
2520                                                             ;BIT15=1=>ERROR OCCURRED
2521                                                             ;BIT07=1=>DONE
2522                                                             ;BIT14-BIT09 AND BIT06-BIT03
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                                                                ;INDICATE TYPE OF ERROR
                                                                ;
003534  000             DPB.C:  .BYTE   0               ;(0) DRIVE NUMBER
003535  000                     .BYTE   0               ;(1) OFFSET VALUE OR FMT22, ECT, AND HCI
003536  000                     .BYTE   0               ;(2) COMMAND
003537  000                     .BYTE   0               ;(3) PSEL AND A17 AND A16
003540  177776                  .WORD   -2              ;(4) WORD COUNT (MUST BE NEG.)
003542  044134                  .WORD   BUFFER          ;(6) BUFFER ADDRESS OR
                                                        ;REGISTER TABLE POINTER
003544  000                     .BYTE   0               ;(10) SECTOR ADDRESS OR
                                                        ;FIRST REG. INDEX
003545  000                     .BYTE   0               ;(11) TRACK ADDRESS OR
                                                        ;LAST REG. INDEX
003546  000000                  .WORD   0               ;(12) CYLINDER ADDRESS
003550  003574                  .WORD   RP.REG          ;(14) ERROR TABLE POINTER
                                                        ;POINTS TO THE FIRST OF TWENTY
                                                        ;LOCATIONS OF WHERE THE DRIVER
                                                        ;IS TO STORE THE RH11/RP04
                                                        ;REGISTERS ON AN ERROR. IF LEFT
                                                        ;ZERO REGISTERS ARE NOT SAVED.
003552  000000                  .WORD   0               ;(16) STATUS/ERROR INDICATOR
                                                        ;BIT15=1=>ERROR OCCURRED
                                                        ;BIT07=1=>DONE
                                                        ;BIT14-BIT09 AND BIT06-BIT03
                                                        ;INDICATE TYPE OF ERROR
                                                        ;
003554  000             DTADPB: .BYTE   0               ;(0) DRIVE NUMBER
003555  000                     .BYTE   0               ;(1) OFFSET VALUE OR FMT22, ECT, AND HCI
003556  000                     .BYTE   0               ;(2) COMMAND
003557  000                     .BYTE   0               ;(3) PSEL AND A17 AND A16
003560  000000                  .WORD   0               ;(4) WORD COUNT (MUST BE NEG.)
003562  044134                  .WORD   BUFFER          ;(6) BUFFER ADDRESS OR
                                                        ;REGISTER TABLE POINTER
003564  000                     .BYTE   0               ;(10) SECTOR ADDRESS OR
                                                        ;FIRST REG. INDEX
003565  000                     .BYTE   0               ;(11) TRACK ADDRESS OR
                                                        ;LAST REG. INDEX
003566  000000                  .WORD   0               ;(12) CYLINDER ADDRESS
003570  003574                  .WORD   RP.REG          ;(14) ERROR TABLE POINTER
                                                        ;POINTS TO THE FIRST OF TWENTY
                                                        ;LOCATIONS OF WHERE THE DRIVER
                                                        ;IS TO STORE THE RH11/RP04
                                                        ;REGISTERS ON AN ERROR. IF LEFT
                                                        ;ZERO REGISTERS ARE NOT SAVED.
003572  000000                  .WORD   0               ;(16) STATUS/ERROR INDICATOR
                                                        ;BIT15=1=>ERROR OCCURRED
                                                        ;BIT07=1=>DONE
                                                        ;BIT14-BIT09 AND BIT06-BIT03
                                                        ;INDICATE TYPE OF ERROR
                                                        ;
                                                        ;
                        ;SAVE RH11/RP04 REGISTERS HERE ON ERROR
                                                        ;
003574  000000  RP.REG:  .WORD   0               ;RHCS1 (776700) CONTROL & STATUS #1
003576  000000          .WORD   0               ;RHWC (776702) WORD COUNT
```

```
2579  003600  000000                .WORD   0       ;RHBA (776704) BUS ADDRESS
2580  003602  000000                .WORD   0       ;RHDA (776706) DESIRED SECTOR/TRACK
2581  003604  000000                .WORD   0       ;RHCS2 (776710) CONTROL & STATUS #2
2582  003606  000000                .WORD   0       ;RHDS1 (776712) DISK STATUS
2583  003610  000000                .WORD   0       ;RHER1 (776714) ERROR REG. #1
2584  003612  000000                .WORD   0       ;RHAS (776716) ATTENTION SUMMARY
2585  003614  000000                .WORD   0       ;RHLA (776720) LOOK AHEAD
2586  003616  000000                .WORD   0       ;RHDB (776722) DATA BUFFER
2587  003620  000000                .WORD   0       ;RHMR (776724) MAINTAINABILITY
2588  003622  000000                .WORD   0       ;RHDT (776726) DRIVE TYPE
2589  003624  000000                .WORD   0       ;RHSN (776730) SERIAL NUMBER
2590  003626  000000                .WORD   0       ;RHOF (776732) OFFSET
2591  003630  000000                .WORD   0       ;RHCA (776734) DESIRED CYLINDER
2592  003632  000000                .WORD   0       ;RHCC (776736) CURRENT CYLINDER
2593  003634  000000                .WORD   0       ;RHER2 (776740) ERROR REG #2
2594  003636  000000                .WORD   0       ;RHER3 (776742) ERROR REG #3
2595  003640  000000                .WORD   0       ;RHEC1 (776744) ECC POSITION
2596  003642  000000                .WORD   0       ;RHEC2 (776746) ECC PATTERN
```

```
                                ;*****************************************************************

                                .SBTTL  ERROR POINTER TABLE

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

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

003644                          $ERRTB:
                                ;*EM AND DH ARE ASCIZ MESSAGES, DT IS A STRING OF WORDS THAT POINT TO THE
                                ;*DATA TO BE TYPED AND DF IS A STRING OF DATA THAT TELL HOW THE DT WORDS
                                ;*ARE TO BE TYPED.  IF ANY OF THE POINTERS ARE NOT NEEDED FOR A PARTICULAR
                                ;*ERROR IT IS REPLACED WITH A ZERO.
                                ;*EACH OF THE ITEMS BELOW REFER TO THE ERROR NUMBER AND INDICATE
                                ;*THE INFORMATION THAT WILL BE TYPED WHEN THE ERROR OCCURS.
                                ;*UNLESS STATED OTHER ALL NUMBERS ARE OCTAL

                                ;*  ERROR ITEM 1
                                ;*    ILLEGAL RH11(SC=0)INTERRUPT OCCURRED
                                ;*    TEST    ERR PC
                                ;*    $TMP0   $ERRPC

003644  040615                          EM1
003646  042124                          DH1
003650  043364                          DT1
003652  043770                          DF1

                                ;*  ERROR ITEM 2
                                ;*    ILLEGAL RP04 INTERRUPT OCCURRED
                                ;*    TEST    ERR PC  DRIVE   RHAS    RHDS    RHER1     RHER2     RHER3
                                ;*    $TMP0   $ERRPC  $REG1   $REG5   RPERRS  RPERRS+2  RPERRS+4  RPERRS+6

003654  040663                          EM2
003656  042143                          DH2
003660  043370                          DT2
003662  043774                          DF2

                                ;*  ERROR ITEM 3
                                ;*    MASSBUS PARITY ERROR (MCPE=1)
                                ;*    TEST    ERR PC  ADDRESS DATA
                                ;*    $TMP0   $ERRPC  RD.ADR  RD.WRD

003664  040723                          EM3
003666  042241                          DH3
003670  043410                          DT3
003672  044000                          DF3

                                ;*  ERROR ITEM 4
```

```
                                        ;*    MASSBUS PARITY ERROR (PAR=1)
                                        ;*    TEST    ERR PC  ADDRESS GDDATA  BDDATA
                                        ;*    $TMPO   $ERRPC  WRT.ADR WRT.WD  RD.WRD

003674  040760                              EM4
003676  042276                              DH4
003700  043420                              DT4
003702  044004                              DF4

                                        ;*  ERROR ITEM 5
                                        ;*    OFFLINE, NONEXISTENT, OR UNSAFE DRIVE INTERRUPTED
                                        ;*    TEST    ERR PC  DRIVE   RHAS    RHDS    RHER1     RHER2    RHER3
                                        ;*    $TMPO   $ERRPC  $REGI   $REGS   RPERRS  RPERRS+2  RPERRS+4 RPERRS+6

003704  041014                              EM5
003706  042143                              DH2
003710  043370                              DT2
003712  043774                              DF2

                                        ;*  ERROR ITEM 6 -- NOT USED

003714  000000                              0
003716  000000                              0
003720  000000                              0
003722  000000                              0

                                        ;*  ERROR ITEM 7 -- NOT USED

003724  000000                              0
003726  000000                              0
003730  000000                              0
003732  000000                              0

                                        ;*  ERROR ITEM 10
                                        ;*    RH11/RP04 FAILED TO RESPOND TO ADDRESSING
                                        ;*    RHCS1   ERR PC
                                        ;*    RH.ADR  $ERRPC

003734  041077                              EM10
003736  042345                              DH10
003740  043452                              DT10
003742  044010                              DF10

                                        ;*  ERROR ITEM 11
                                        ;*    DRIVE SELECTED IS NOT ONLINE
                                        ;*    DRIVE   ERR PC
                                        ;*    $REG2   $ERRPC

003744  041151                              EM11
003746  042364                              DH11
003750  043456                              DT11
003752  044014                              DF11

                                        ;*  ERROR ITEM 12
                                        ;*    IMPROPER HEADER DATA
                                        ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
```

```
                                        ;*    $TMPO   $ERRPC  $REGO   CHKDRV  CYL.DS  TRK.DS  SEC.DS
                                        ;*        GDCYL   GDTRK   GDSCTR  BDCYL   BDTRK   BDSCTR
                                        ;*        CYL.DS  TRK.DS  SEC.DS  CYL.RD  TRK.RD  SEC.RD
                                        ;*    CYLNDR, TRACK, AND SECTOR ARE DECIMAL

003754  041206                            EM12
003756  042403                            DH12
003760  043462                            DT12
003762  044020                            DF12

                                        ;*  ERROR ITEM 13
                                        ;*    DATA COMPARE FAILURE
                                        ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
                                        ;*    $TMPO   $ERRPC  $REGO   CHKDRV  CYL.DS  TRK.DS  SEC.DS
                                        ;*        GDDAT   BDDAT   WRDCNT  GDADR   BDADR
                                        ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
                                        ;*      CYLNDR, TRACK, SECTOR, AND WRDCNT  ARE DECIMAL

003764  041233                            EM13
003766  042403                            DH12
003770  043514                            DT13
003772  044030                            DF13

                                        ;*  ERROR ITEM 14 -- FOLLOWS #13
                                        ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR

003774  000000                            0
003776  000000                            0
004000  043532                            DT13A
004002  044040                            DF14

                                        ;*  ERROR ITEM 15
                                        ;*    DATA COMPARE FAILURE
                                        ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
                                        ;*    $TMPO   $ERRPC  $REGO   CHKDRV  CYL.DS  TRK.DS  SEC.DS
                                        ;*        GDDAT   BDDAT   WRDCNT  GDADR   BDADR
                                        ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
                                        ;*        CYLNDR, TRACK, SECTOR, AND WRDCNT ARE DECIMAL

004004  041233                            EM13
004006  042403                            DH12
004010  043514                            DT13
004012  044030                            DF13

                                        ;*  ERROR ITEM 16 -- FOLLOWS #15
                                        ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR

004014  000000                            0
004016  000000                            0
004020  043532                            DT13A
004022  044040                            DF14

                                        ;*  ERROR ITEM 17
                                        ;*    DISK ERROR IN TIMING TEST
                                        ;*    TEST    ERR PC  DRIVE   RHCS1   RHDS      RHER1     RHER2     RHER3
                                        ;*    $TMPO   $ERRPC  CHKDRV  RP.REG  RP.REG+12 RP.REG+14 RP.REG+40 RP.REG+42
```

```
2765
2766  004024  041260                        EM17
2767  004026  042617                        DH17
2768  004030  043544                        DT17
2769  004032  044044                        DF17
2770
2771                                ;*  ERROR ITEM 20
2772                                ;*    CLOCK (KW11-P) OVERFLOW IN TIMING TEST
2773                                ;*    TEST    ERR PC  DRIVE   RHCS1   RHDS      RHER1     RHER2     RHER3
2774                                ;*    $TMP0   $ERRPC  CHKDRV  RP.REG  RP.REG+12 RP.REG+14 RP.REG+40 RP.REG+42
2775
2776  004034  041312                        EM20
2777  004036  042617                        DH17
2778  004040  043544                        DT17
2779  004042  044044                        DF17
2780
2781                                ;*  ERROR ITEM 21
2782                                ;*    DATA COMPARE FAILURE
2783                                ;*    TEST      ERR PC  TST PC  DRIVE   CYLNDR  TRACK
2784                                ;*    $TMP0     $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS
2785                                ;*        GDDAT   BDDAT   WRDCNT  SECTOR
2786                                ;*        $REG1   $BDDAT  $REG4   $REG1
2787                                ;*        CYLINDR, TRACK, WRDCNT, AND SECTOR ARE DECIMAL
2788
2789  004044  041233                        EM13
2790  004046  042715                        DH21
2791  004050  043564                        DT21
2792  004052  044050                        DF21
2793
2794                                ;*  ERROR ITEM 22--FOLLOWS #21
2795                                ;*        $REG1   $BDDAT   $REG4   $REG1
2796
2797  004054  000000                        0
2798  004056  000000                        0
2799  004060  043600                        DT21A
2800  004062  044060                        DF22
2801
2802                                ;*********************************************************************
2803                                ;*********************************************************************
2804                                ;*  ERROR ITEMS 23-40 NOT USED
2805                                ;*  ERROR ITEMS 41-46 WILL HAVE AN EM THAT
2806                                ;*  VARIES DEPENDING ON THE ERROR, IT WILL BE IN THE FORM:
2807                                ;*  RH11/RP04 ERROR (MESSAGE)
2808                                ;*  WHERE MESSAGE WILL BE ONE OR MORE OF THE FOLLOWING:
2809                                ;*  1)  OFFLINE OR UNSAFE DRIVE REQUESTED
2810                                ;*  2)  UNLOADED DRIVE REQUESTED
2811                                ;*  3)  PERSISTENT UNSAFE
2812                                ;*  4)  PARITY ERROR OCCURRED
2813                                ;*  5)  FATAL PARITY ERROR
2814                                ;*  6)  SOFTWARE TIMEOUT ON THIS DRIVE
2815                                ;*  7)  SOFTWARE TIMEOUT ON ANOTHER DRIVE
2816                                ;*  8)  ERROR OCCURRED DURING I/O OPERATION
2817                                ;*  9)  ERROR OCCURRED DURING NON-I/O OPERATION
2818                                ;*  10) UNSAFE OCCURRED
2819                                ;*  11) AUTOMATIC RECALIBRATE SEQUENCE OCCURRED
2820
```

```
2821  004064                          ITEM41:
2822
2823                                  ;*  ERROR ITEM 41
2824                                  ;*    RH11/RP04 ERROR (MESSAGE)
2825                                  ;*    TEST    ERR PC  TST PC  DRIVE
2826                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV
2827
2828  004064  041361                    EM41
2829  004066  043032                    DH41
2830  004070  043610                    DT41
2831  004072  044064                    DF41
2832
2833                                  ;*  ERROR ITEM 42
2834                                  ;*    RH11/RP04 ERROR (MESSAGE)
2835                                  ;*    TEST    ERR PC  TST PC  DRIVE   RHCS1   RHCS2     RHDS
2836                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV  RP.REG  RP.REG+10 RP.REG+12
2837
2838  004074  041361                    EM41
2839  004076  043070                    DH42
2840  004100  043620                    DT42
2841  004102  044070                    DF42
2842
2843                                  ;*  ERROR ITEM 43
2844                                  ;*    RH11/RP04 ERROR (MESSAGE)
2845                                  ;*    TEST    ERR PC  TST PC  DRIVE   RHCS1   RHCS2     RHDS
2846                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV  RP.REG  RP.REG+10 RP.REG+12
2847                                  ;*        RHER1     RHER2     RHER3
2848                                  ;*        RP.REG+14 RP.REG+40 RP.REG+42
2849
2850  004104  041361                    EM41
2851  004106  043070                    DH42
2852  004110  043636                    DT43
2853  004112  044074                    DF43
2854
2855                                  ;*  ERROR ITEM 44
2856                                  ;*    RH11/RP04 ERROR (MESSAGE)
2857                                  ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
2858                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS    SEC.DS
2859                                  ;*        RHCS1     RHCS2     RHDS      RHCC      RHCA      RHDA
2860                                  ;*        RP.REG    RP.REG+10 RP.REG+12 RP.REG+36 RP.REG+34 RP.REG+06
2861                                  ;*      RHER1       RHER2       RHER3
2862                                  ;*      RP.REG+14   RP.REG+40   RP.REG+42
2863                                  ;*      CYLNDR,TRACK, AND SECTOR ARE DECIMAL
2864
2865  004114  041361                    EM41
2866  004116  042403                    DH12
2867  004120  043662                    DT44
2868  004122  044104                    DF44
2869
2870                                  ;*  ERROR ITEM 45
2871                                  ;*    RH11/RP04 ERROR (MESSAGE)
2872                                  ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
2873                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS    SEC.DS
2874                                  ;*        RHCS1     RHCS2     RHDS      RHCC      RHCA      RHDA
2875                                  ;*        RP.REG    RP.REG+10 RP.REG+12 RP.REG+36 RP.REG+34 RP.REG+06
2876                                  ;*      RHER1       RHER2       RHER3       RHWC      RHBA      RHDB
```

```
2877                                    ;*      RP.REG+14   RP.REG+40   RP.REG+42   RP.REG+2   RP.REG+4 RP.REG+22
2878                                    ;*      CYLNDR,TRACK, AND SECTOR ARE DECIMAL
2879
2880  004124  041361                            EM41
2881  004126  042403                            DH12
2882  004130  043722                            DT45
2883  004132  044120                            DF45
2884
2885                                    ;*  ERROR ITEM 46
2886                                    ;*    FATAL WRITE CHECK ERROR (MESSAGE)
2887                                    ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
2888                                    ;*    $TMP0   $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS    SEC.DS
2889                                    ;*       RHCS1     RHCS2     RHDS      RHCC      RHCA      RHDA
2890                                    ;*       RP.REG    RP.REG+10 RP.REG+12 RP.REG+36 RP.REG+34 RP.REG+06
2891                                    ;*      RHER1     RHER2     RHER3     RHWC      RHBA     RHDB
2892                                    ;*      RP.REG+14   RP.REG+40   RP.REG+42   RP.REG+2   RP.REG+4 RP.REG+22
2893                                    ;*      CYLNDR,TRACK, AND SECTOR ARE DECIMAL
2894
2895  004134  041401                            EM46
2896  004136  042403                            DH12
2897  004140  043722                            DT45
2898  004142  044120                            DF45
2899
2900          000400                    A16=400
2901          001000                    A17=1000
2902          000114                    PARE70=114
```

```
                                        .SBTTL  START OF PROGRAM

004144  012737  177777  001252  START3: MOV     #-1,@#BUSADR    ;GET BUSADR FLAG
004152  000402                  START1A
004154  005037  001252          START1: CLR     @#BUSADR        ;CLR BUSADR FLAG
004160  012737  137777  001260  STRT1A: MOV     #137777,TSTNMS  ;SELECT TESTS 0-15 AND 17
004166  005037  001250                  CLR     @#CNTRLC        ;NO CONTROL "C"
004172  012700  001650                  MOV     #DFLT,R0        ;DEFAULT PARAMETERS POINTER
004176  012701  002116                  MOV     #PRM0,R1        ;TABLE POINTER
004202  010102                          MOV     R1,R2           ;STOP ADDRESS
004204  012021          .       1$:     MOV     (R0)+,(R1)+     ;MOVE DEFAULT PARAMETERS INTO
004206  020002                          CMP     R0,R2           ;RUN TIME TABLES ** DONE?
004210  103775                          BLO     1$              ;NO--BRANCH
004212  012700  003074                  MOV     #PAT8,R0        ;PAT0 DEFAULTS TO PATTERN 8
004216  012701  002474                  MOV     #PAT0,R1
004222  012021                  2$:     MOV     (R0)+,(R1)+
004224  020027  003134                  CMP     R0,#PAT9
004230  103774                          BLO     2$
004232  000411                          BR      START
004234  012737  177777  001252  START4: MOV     #-1,@#BUSADR    ;SET BUSADR FLAG
004242  000402                          BR      STRT2A
004244  005037  001252          START2: CLR     @#BUSADR        ;CLR BUSADR FLAG
004250  012737  177777  001250  STRT2A: MOV     #-1,@#CNTRLC    ;SET CONTROL "C" FLAG
004256  000005                  START:  RESET
004260  012737  000340  177776          MOV     #340,@#PS       ;;LOCK OUT ALL INTERRUPTS
004266  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
004272  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
004274  022706  001136                  CMP     #$TKS,R6        ;;DONE?
004300  001374                          BNE     .-6             ;;LOOP BACK IF NO
004302  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
004306  012737  020470  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
004314  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
004322  012737  015230  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
004330  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
004336  012737  021004  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
004344  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
004352  005037  001176                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
004356  005037  001200                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
004362  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
004370  012737  004370  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
004376  012737  004376  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
004404  012700  001152                  MOV     #$REGAD,R0      ;FIRST ADDRESS
004410  005020                  1$:     CLR     (R0)+           ;CLEAR VARIABLE STORAGE
004412  022700  001202                  CMP     #$BELL,R0       ;DONE?
004416  001374                          BNE     1$              ;NO--BRANCH
004420  013737  001410  001144          MOV     @#TPS,@#$TPB    ;SETUP THE STATUS AND BUFFER REG'S
004426  013737  001412  001144          MOV     @#TPB,@#$TPB    ;FOR THE TYPE ROUTINE
004434  063727  001250  000000          ADD     @#CNTRLC,#0     ;TYPE "ID" IF START AT 200 OR
004442  103433                          BCS     SRTINT          ;THE 1ST START AT 204
004444  104400  004452                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
004450  000430                          BR      64$             ;;GET OVER THE ASCIZ
                                        ;;.ASCIZ      <15><12>/MD-11-DERPK-C "MECHANICAL & READ-WRITE" TEST/
004532                          64$:
004532  004737  022340          SRTINT: JSR     PC,@#LP.AVL     ;CHECK FOR A LINE PRINTER
```

```
004536  004737  017734                  JSR     PC,@#$TKINT         ;TURN ON THE TTY KEYBOARD INTERRUPT
004542  005037  177776                  CLR     @#PS                ;INSURE THE PRIORITY = 0
                                ;*************************************************************************
                                ;*************************************************************************
                                ;*************************************************************************
                                ;*************************************************************************
                                ;*************            ***********************************************
                                ;*****************        ***********************************************
                                ;************************     *******************************************
                                ;*************************    *******************************************
                                ;*************************** ********************************************
004546  004737  022026                  JSR     PC,$SIZE
004552  104400  004560                  TYPE    ,.+4                ;;TYPE ASCIZ STRING
004556  000411                          BR      64$                 ;;GET OVER THE ASCIZ
                                        ;;.ASCIZ        <15><12>/TOTAL MEMORY  /
004602                          64$:
004602  013746  022334                  MOV     $LSTBK,-(SP)
004606  006216                          ASR     (SP)
004610  006216                          ASR     (SP)
004612  006216                          ASR     (SP)
004614  006216                          ASR     (SP)
004616  006216                          ASR     (SP)
004620  005216                          INC     (SP)
004622  011637  001214                  MOV     (SP),TEMP1
004626  006237  001214                  ASR     TEMP1
004632  042737  100000  001214          BIC     #100000,TEMP1
004640  006237  001214                  ASR     TEMP1
004644  104410                          TYPDS
004646  104400  004654                  TYPE    ,.+4                ;;TYPE ASCIZ STRING
004652  000401                          BR      65$                 ;;GET OVER THE ASCIZ
                                        ;;.ASCIZ        /K/
004656                          65$:
004656  004737  027372                  JSR     PC,@#GETADR         ;CHECK RH11/RP04 (RHCS1) ADDRESS
004662  004737  027304                  JSR     PC,@#GETSWR         ;GO CHECK FOR CONTROL SWITCHES
004666  004737  032376                  JSR     PC,@#RPINIT         ;SETUP DRIVE STATUS
004672  004737  022402                  JSR     PC,@#ST.CLK         ;INITIALIZE THE CLOCK
004676  012737  004732  000004          MOV     #9$,ERRVEC
004704  005777  174326                  TST     @LERADD
004710  005037  001234                  CLR     TEMP10
004714  012737  016566  000114          MOV     #PARITY,PARE70
004722  012737  000340  000116          MOV     #340,PARE70+2
004730  000403                          BR      10$
004732  012737  177777  001234  9$:     MOV     #-1,TEMP10
004740  012737  016426  000004  10$:    MOV     #TIEOUT,ERRVEC
004746  012737  000340  000006          MOV     #340,ERRVEC+2
004754  012737  016566  000114          MOV     #PARITY,PARE70
004762  005737  001250                  TST     @#CNTRLC            ;CONTROL "C" START/RESTART?
004766  001403                          BEQ     1$                  ;NO--BRANCH
004770  004737  027742                  JSR     PC,@#GT.PRM         ;YES--GET PARAMETERS
004774  000416                          BR      4$
004776  005037  001256          1$:     CLR     DRVSEL              ;NO DRIVES SELECTED
005002  005000                          CLR     R0                  ;DETERMINE THE DRIVES THAT
005004  012701  000001                  MOV     #1,R1               ;ARE AVAILABLE FOR TESTING
005010  105760  032242          2$:     TSTB    DRVSTA(R0)
005014  003403                          BLE     3$
005016  156037  032346  001256          BISB    ATABIT(R0),@#DRVSEL
```

```
3015  005024  005200                  3$:     INC     R0
3016  005026  106301                          ASLB    R1
3017  005030  001367                          BNE     2$
3018  005032  005037  032322          4$:     CLR     @#SEEKFG        ;CLEAR SEEK FLAG
3019  005036  032737  000400  001246          BIT     #SW08,@#C.SWR   ;DO SEEK BEFORE DATA TRANSFER?
3020  005044  001002                          BNE     5$              ;YES--BRANCH
3021  005046  005137  032322                  COM     @#SEEKFG        ;NO
3022  005052                          5$:
3023  005052  104400  005060                  TYPE    .+4             ;;TYPE ASCIZ STRING
3024  005056  000415                          BR      66$             ;;GET OVER THE ASCIZ
3025                                          ;;.ASCIZ    <15><12>/DRIVE(S) TO BE TESTED /
3026  005112                          66$:
3027  005112  005037  015126                  CLR     @#$ENDCT        ;DETERMINE PASSES TO MAKE AND
3028  005116  005000                          CLR     R0              ;THE DRIVES TO BE TESTED
3029  005120  013701  001256                  MOV     @#DRVSEL,R1     ;ANY DRIVES SELECTED?
3030  005124  001010                          BNE     6$              ;YES--BRANCH
3031  005126  104400  005134                  TYPE    .+4             ;;TYPE ASCIZ STRING
3032  005132  000403                          BR      67$             ;;GET OVER THE ASCIZ
3033                                          ;;.ASCIZ    /NONE/
3034  005142                          67$:
3035  005142  000137  014744                  JMP     @#$EOP          ;GO TO END OF PROGRAM
3036  005146  006201                  6$:     ASR     R1              ;REPORT THE DRIVES TO BE TESTED
3037  005150  103013                          BCC     7$
3038  005152  005237  015126                  INC     @#$ENDCT        ;GIVE THIS DRIVE A PASS
3039  005156  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3040  005160  104404                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3041  005162     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
3042  005163     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3043  005164  005701                          TST     R1              ;MORE DRIVES?
3044  005166  001406                          BEQ     8$              ;NO--BRANCH
3045  005170  104400  005176                  TYPE    .+4             ;;TYPE ASCIZ STRING
3046  005174  000401                          BR      68$             ;;GET OVER THE ASCIZ
3047                                          ;;.ASCIZ    ","
3048  005200                          68$:
3049  005200  005200                  7$:     INC     R0              ;FORM DRIVE NUMBER
3050  005202  000761                          BR      6$
3051  005204  013737  015126  015120  8$:     MOV     @#$ENDCT,@#$EOPCT
3052  005212  005737  001262                  TST     @#CLKSTA        ;KW11-P AVAILABLE
3053  005216  003041                          BGT     RSTRT1          ;YES--BRANCH
3054  005220  032737  003600  001260          BIT     #3600,@#TSTNMS  ;NO--ANY TIMING TESTS TO BE PERFORMED?
3055  005226  001435                          BEQ     RSTRT1          ;NO--BRANCH
3056  005230  104400  005236                  TYPE    .+4             ;;TYPE ASCIZ STRING
3057  005234  000432                          BR      69$             ;;GET OVER THE ASCIZ
3058                                          ;;.ASCIZ    <15><12>/NO KW11-P CLOCK--TEST 7-12 WILL NOT BE PERFORMED/
3059  005322                          69$:
3060  005322  005037  001272          RSTRT1: CLR     CHKDRV          ;INIT. THE CHECK DRIVE KEY
3061  005326  012737  000001  001274          MOV     #1,DRVMSK       ;START TO CHECK DESIRED DRIVES
3062  005334  033737  001274  001256  RSTRT2: BIT     DRVMSK,DRVSEL   ;IS THIS DRIVE SELECTED?
3063  005342  001006                  RSTRT3: BNE     DRVOK           ;YES--GO CHECK IF DRIVE IS READY FOR TESTING
3064  005344  005237  001272          RESTART:INC     CHKDRV          ;MOVE  TO NEXT DRIVE NUMBER
3065  005350  106337  001274                  ASLB    DRVMSK          ;POSITION THE MASK
3066  005354  103762                          BCS     RSTRT1          ;BRANCH IF THE DRIVE NUMBER NEEDS INITIALIZED
3067  005356  000766                          BR      RSTRT2
3068
3069  005360  013702  001272          DRVOK:  MOV     @#CHKDRV,R2     ;PICKUP THE DRIVE NUMBER
3070  005364  105762  032242                  TSTB    DRVSTA(R2)      ;IS DESIRED DRIVE ON-LINE?
```

```
3071  005370  003002                        BGT     1$              ;YES, BRANCH
3072  005372  104011                        ERROR   11              ;DRIVE SELECTED IS NOT ONLINE
3073  005374  000763                        BR      RESTART         ;NO-- RETURN
3074  005376  010237  003474          1$:   MOV     R2,@#DPB.A      ;SET THE DRIVE NUMBER INTO THE DPB'S
3075  005402  010237  003514                MOV     R2,@#DPB.B
3076  005406  010237  003534                MOV     R2,@#DPB.C
3077  005412  010237  003554                MOV     R2,@#DTADPB
3078  005416  004737  022660                JSR     PC,@#LDCMD      ;LOAD COMMAND INTO DPB.B AND DPB.C
3079  005422  012737  014744  001270        MOV     #$EOP,@#BYPASS  ;IF ERROR GO TO END OF PROGRAM
3080  005430  112737  000020  003475        MOVB    #FMT22/!D256,@#DPB.A+1
3081  005436  012737  000143  003476        MOV     #SETFORM,@#DPB.A+2      ;SETFORM=COMMAND
3082  005444  004037  022724                JSR     R0,@#CALL.A             ;GO EXECUTE THE COMMAND
3083  005450  012737  000107  003476        MOV     #RECAL,@#DPB.A+2        ;RECAL=COMMAND
3084  005456  004037  022724                JSR     R0,@#CALL.A             ;GO EXECUTE THE COMMAND
3085  005462  012737  000030  003504        MOV     #RHSN,@#DPB.A+10 ;FIRST REG. INDEX
3086  005470  112737  000030  003505        MOVB    #RHSN,@#DPB.A+11 ;LAST REG. INDEX
3087  005476  012737  000141  003476        MOV     #GETREG,@#DPB.A+2       ;GETREG=COMMAND
3088  005504  004037  022724                JSR     R0,@#CALL.A             ;GO EXECUTE THE COMMAND
3089  005510  104400  005516                TYPE    ,.+4            ;;TYPE ASCIZ STRING
3090  005514  000411                        BR      64$             ;;GET OVER THE ASCIZ
3091                                        ;;.ASCIZ      <15><12><12>/TESTING DRIVE /
3092  005540                          64$:
3093  005540  010246                        MOV     R2,-(SP)        ;;SAVE R2 FOR TYPEOUT
3094  005542  104404                        TYPOS                   ;;GO TYPE--OCTAL ASCII
3095  005544     001                        .BYTE   1               ;;TYPE 1 DIGIT(S)
3096  005545     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
3097  005546  104400  040612                TYPE    ,MSG.SP         ;TYPE SPACES
3098  005552  104400  005560                TYPE    ,.+4            ;;TYPE ASCIZ STRING
3099  005556  000410                        BR      65$             ;;GET OVER THE ASCIZ
3100                                        ;;.ASCIZ      /SERIAL NUMBER /
3101  005600                          65$:
3102  005600  012700  000004                MOV     #4,R0           ;FOUR DIGITS TO TYPE
3103  005604  013701  044134                MOV     @#BUFFER,R1     ;SERIAL NUMBER
3104  005610  005002                  2$:   CLR     R2              ;ZERO
3105  005612  006101                        ROL     R1              ;PUT THE NEXT DIGIT
3106  005614  006102                        ROL     R2              ;INTO R2
3107  005616  006101                        ROL     R1
3108  005620  006102                        ROL     R2
3109  005622  006101                        ROL     R1
3110  005624  006102                        ROL     R2
3111  005626  006101                        ROL     R1
3112  005630  006102                        ROL     R2
3113  005632  062702  000060                ADD     #'0,R2          ;MAKE IT ASCII
3114  005636  010227                        MOV     R2,(PC)+        ;SAVE IT
3115  005640  000000                  3$:   .WORD   0
3116  005642  104400  005640                TYPE    ,3$             ;TYPE
3117  005646  005300                        DEC     R0              ;ALL DIGITS TYPED?
3118  005650  003357                        BGT     2$              ;NO -- BRANCH
3119  005652  104400  001207                TYPE    ,$CRLF
```

```
3120
3121                                    .SBTTL  **** TESTS ****
3122

        ;/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:
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        ;*IN THE DESCRIPTIONS OF THE BELOW TESTS THE VARIABLES USED
        ;*AND THEIR DEFAULT VALUES (UNLESS SPECIFIED OTHERWISE) ARE:
        ;*
        ;*MNEMONIC      VALUE           VARIABLE
        ;*--------      -----           --------
        ;*
        ;*R             1               ITERATIONS (REPEATS)
        ;*FC            0               FIRST CYLINDER ADDRESS
        ;*LC            410             LAST CYLINDER ADDRESS
        ;*IC            1               INCREMENT VALUE
        ;*NC OF NC1     FC+IC           NEW OR MODIFIED CYLINDER
        ;*                              ADDRRESS
        ;*NC2           LC-IC           NEW OR MODIFIED CYLINDER
        ;*                              ADDRESS
        ;*
        ;*FT            0               FIRST TRACK ADDRESS
        ;*LT            18              LAST TRACK ADDRESS
        ;*IT            1               INCREMENT VALUE
        ;*NT            FT+IT           NEW OR MODIFIED TRACK ADDRESS
        ;*
        ;*FS            0               FIRST SECTOR ADDRESS
        ;*LS            21              LAST SECTOR ADDRESS

        ;/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*
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3155
3156                                    .SBTTL  *** SEEK TESTS (0-6) ***
3157

        ;/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:
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        ;*THE SEEK TESTS WILL BE EXCUTED USING IMPLIED SEEKS. THESE
        ;*IMPLIED SEEKS WILL BE PERFORMED BY "READ HEADER AND
        ;*DATA" COMMANDS TO TRACK "FT" SECTOR "FS" OF THE DESIRED CYLINDER.
        ;*THE WORD COUNT WILL BE SET SUCH THAT ONLY THE CYLINDER AND
        ;*TRACK/SECTOR WORDS OF THE HEADER ARE READ.

        ;/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*
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        ;/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*

3173
3174                                    ;*****************************************************************
3175                                    ;*TEST 0        RECAL/SEEK TEST
```

```
3176
3177                                    ;*      THIS TEST WILL CAUSE THE DRIVE TO EXECUTE A RECALIBRATE
3178                                    ;*      COMMAND CYCLE AND THEN SEEK FORWARD TO CYLINDER "LC" AT
3179                                    ;*      THE COMPLETION OF BOTH COMMANDS STATUS INDICATIONS ARE
3180                                    ;*      CHECKED TO INSURE NO ERRORS OCCURRED.
3181                                    ;*      THIS TEST WILL BE REPEATED 10 TIMES.
3182
3183                                    ;*****************************************************************
3184  005656                            TST0:
3185  005656  033737  001430  001260            BIT     @#BITS+<0*2>,TSTNMS ;DO THIS TEST?
3186  005664  001002                            BNE     64$             ;YES--BRANCH
3187  005666  000137  006004                    JMP     TST1            ;NO--GO TO THE NEXT TEST
3188  005672  013737  002120  001176  64$:     MOV     @#RPT0,$TIMES   ;GET THE ITERATION COUNT
3189  005700  012737  005766  001106            MOV     #TEST0,@#$LPADR
3190  005706  012737  005656  001110            MOV     #TST0,@#$LPERR  ;SETUP THE ERROR LOOP ADDRESS
3191  005714  012737  000000  001102            MOV     #0,@#$TSTNM             ;SET UP TEST NUMBER AND
3192                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
3193  005722  013737  001102  177570            MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3194  005730  012737  000107  003476            MOV     #RECAL,@#DPB.A+2        ;RECAL=COMMAND
3195  005736  113737  002126  003524            MOVB    @#FS0,@#DPB.B+10 ;FS
3196  005744  113737  002124  003525            MOVB    @#FT0,@#DPB.B+11 ;FT
3197  005752  013737  002122  003526            MOV     @#LC0,@#DPB.B+12 ;LC
3198  005760  012737  006002  001270            MOV     #EXIT0,@#BYPASS ;GO TO EXIT0 ON ERROR
3199  005766  012706  001100            TEST0:  MOV     #STACK,SP       ;SET UP STACK POINTER
3200  005772  004037  022724                    JSR     R0,@#CALL.A             ;GO EXECUTE THE COMMAND
3201  005776  004037  023032                    JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3202  006002  000004                    EXIT0:  SCOPE                   ;LOOP
3203
3204                                    ;*****************************************************************
3205                                    ;*TEST 1        SEEK/SEEK TEST
3206
3207                                    ;*      THIS TEST WILL CAUSE THE DRIVE TO EXECUTE A FORWARD SEEK
3208                                    ;*      CYCLE TO "LC", "LT", "LS" FOLLOWED BY A REVERSE SEEK CYCLE TO
3209                                    ;*      "FC", "FT", "FS".  AT THE COMPLETION OF EACH SEEK, THE PROPER
3210                                    ;*      INDICATORS ARE EXAMINED TO INSURE PROPER OPERATION.
3211                                    ;*      "LC" WILL DEFAULT TO 128 AND "FC", "FT", "LT", "FS", AND "LS"
3212                                    ;*      WILL DEFAULT TO 0
3213                                    ;*      THIS TEST WILL BE REPEATED 100 TIMES
3214
3215                                    ;*****************************************************************
3216  006004                            TST1:
3217  006004  033737  001432  001260            BIT     @#BITS+<1*2>,TSTNMS ;DO THIS TEST?
3218  006012  001002                            BNE     64$             ;YES--BRANCH
3219  006014  000137  006146                    JMP     TST2            ;NO--GO TO THE NEXT TEST
3220  006020  013737  002132  001176  64$:     MOV     @#RPT1,$TIMES   ;GET THE ITERATION COUNT
3221  006026  012737  006130  001106            MOV     #TEST1,@#$LPADR
3222  006034  012737  006004  001110            MOV     #TST1,@#$LPERR  ;SETUP THE ERROR LOOP ADDRESS
3223  006042  012737  000001  001102            MOV     #1,@#$TSTNM             ;SET UP TEST NUMBER AND
3224                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
3225  006050  013737  001102  177570            MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3226  006056  113737  002146  003524            MOVB    @#FS1,@#DPB.B+10 ;FS
3227  006064  113737  002150  003544            MOVB    @#LS1,@#DPB.C+10 ;LS
3228  006072  113737  002142  003525            MOVB    @#FT1,@#DPB.B+11 ;FT
3229  006100  113737  002144  003545            MOVB    @#LT1,@#DPB.C+11 ;LT
3230  006106  013737  002134  003526            MOV     @#FC1,@#DPB.B+12 ;FC
3231  006114  013737  002136  003546            MOV     @#LC1,@#DPB.C+12 ;LC
```

```
3232  006122  012737  006144  001270          MOV     #EXIT1,@#BYPASS ;GO TO EXIT1 ON ERROR
3233  006130  012706  001100          TEST1:  MOV     #STACK,SP       ;SET THE STACK POINTER
3234  006134  004037  023176                  JSR     R0,@#CALL.C             ;GO EXECUTE THE COMMAND
3235  006140  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3236  006144  000004                  EXIT1:  SCOPE                   ;LOOP
3237
3238                                  ;*****************************************************************
3239                                  ;*TEST 2        INCREMENT/SEEK TEST
3240
3241                                  ;*      THIS TEST WILL COMMAND FORWARD SEEK CYCLES TO ADVANCE THE
3242                                  ;*      CYLINDER ADDRESS FROM "FC" TO "LC" BY THE INCREMENT "IC".
3243                                  ;*      WHEN THE RESULTANT CYLINDER ADDRESS (NC) EXCEEDS
3244                                  ;*      "LC" REVERSE SEEK CYCLES ARE INITIATED; STARTING
3245                                  ;*      AT THE LAST LEGAL "NC" AND DECREMENTING BY "IC"
3246                                  ;*      UNTIL "NC" IS LESS THAN "FC". AT THE COMPLETION OF EACH
3247                                  ;*      SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO
3248                                  ;*      INSURE PROPER OPERATION.
3249
3250                                  ;*****************************************************************
3251  006146                          TST2:
3252  006146  033737  001434  001260          BIT     @#BITS+<2*2>,TSTNMS ;DO THIS TEST?
3253  006154  001002                          BNE     64$             ;YES--BRANCH
3254  006156  000137  006330                  JMP     TST3            ;NO--GO TO THE NEXT TEST
3255  006162  013737  002154  001176  64$:    MOV     @#RPT2,$TIMES   ;GET THE ITERATION COUNT
3256  006170  012737  006242  001106          MOV     #TEST2,@#$LPADR
3257  006176  012737  006146  001110          MOV     #TST2,@#$LPERR  ;SETUP THE ERROR LOOP ADDRESS
3258  006204  012737  000002  001102          MOV     #2,@#$TSTNM             ;SET UP TEST NUMBER AND
3259                                                                  ;CLEAR THE ERROR FLAG ($ERFLG)
3260  006212  013737  001102  177570          MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3261  006220  113737  002166  003524          MOVB    @#FS2,@#DPB.B+10 ;FS
3262  006226  113737  002164  003525          MOVB    @#FT2,@#DPB.B+11 ;FT
3263  006234  012737  006326  001270          MOV     #EXIT2,@#BYPASS ;GO TO EXIT2 ON ERROR
3264  006242  012706  001100          TEST2:  MOV     #STACK,SP       ;SET UP THE STACK POINTER
3265  006246  013737  002156  003526          MOV     @#FC2,@#DPB.B+12 ;FC
3266  006254                          INCSK:
3267  006254  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3268  006260  063737  002162  003526          ADD     @#IC2,@#DPB.B+12 ;MOVE TO NEXT CYLINDER
3269  006266  023737  002160  003526          CMP     @#LC2,@#DPB.B+12 ;OUT OF CYLINDERS?
3270  006274  002367                          BGE     INCSK           ;NO--BRANCH
3271  006276  013737  002160  003526          MOV     @#LC2,@#DPB.B+12
3272  006304                          DECSK:
3273  006304  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3274  006310  163737  002162  003526          SUB     @#IC2,@#DPB.B+12
3275  006316  023737  002156  003526          CMP     @#FC2,@#DPB.B+12
3276  006324  003767                          BLE     DECSK
3277  006326  000004                  EXIT2:  SCOPE                   ;LOOP
3278
3279                                  ;*****************************************************************
3280                                  ;*TEST 3        STEPPING SEEK TEST
3281
3282                                  ;*      THIS TEST WILL COMMAND SEEK CYCLES TO CYLINDER 0,1,2,4,
3283                                  ;*      8,16,32,64,128, AND 256.  AT THE COMPLETION OF EACH SEEK
3284                                  ;*      COMMAND THE PROPER INDICATORS ARE EXPLAINED TO INSURE PROPER
3285                                  ;*      OPERATION.
3286
3287                                  ;*****************************************************************
```

```
3288  006330                                  TST3:
3289  006330  033737  001436  001260            BIT     @#BITS+<3*2>,TSTNMS ;DO THIS TEST?
3290  006336  001002                            BNE     64$                 ;YES--BRANCH
3291  006340  000137  006470                    JMP     TST4                ;NO--GO TO THE NEXT TEST
3292  006344  013737  002172  001176  64$:      MOV     @#RPT3,$TIMES       ;GET THE ITERATION COUNT
3293  006352  012737  006424  001106            MOV     #TEST3,@#$LPADR
3294  006360  012737  006230  001110            MOV     #TST3,@#$LPERR  ;SETUP THE ERROR LOOP ADDRESS
3295  006366  012737  000003  001102            MOV     #3,@#$TSTNM                 ;SET UP TEST NUMBER AND
3296                                                                                ;CLEAR THE ERROR FLAG ($ERFLG)
3297  006374  013737  001102  177570            MOV     $TSTNM,@#DISPLAY            ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3298  006402  113737  002204  003524            MOVB    @#FS3,@#DPB.B+10 ;FS
3299  006410  113737  002202  003525            MOVB    @#FT3,@#DPB.B+11 ;FT
3300  006416  012737  006466  001270            MOV     #EXIT3,@#BYPASS ;GO TO BYPASS ON ERROR
3301  006424  012706  001100            TEST3:  MOV     #STACK,SP       ;SET UP THE STACK
3302  006430  013737  002174  003526            MOV     @#FC3,@#DPB.B+12 ;FC
3303  006436  004037  023032                    JSR     R0,@#CALL.B                 ;GO EXECUTE THE COMMAND
3304  006442  013701  002200                    MOV     IC3,R1          ;CYLINDER 1
3305  006446  010137  003526            1$:     MOV     R1,@#DPB.B+12   ;DESIRED CYLINDER
3306  006452  004037  023032                    JSR     R0,@#CALL.B                 ;GO EXECUTE THE COMMAND
3307  006456  006301                            ASL     R1              ;MOVE TO NEXT CYLINDER
3308  006460  020137  002176                    CMP     R1,@#LC3        ;DONE?
3309  006464  003770                            BLE     1$              ;NO--LOOP
3310  006466  000004                    EXIT3:  SCOPE
3311
3312                                      ;*****************************************************************
3313                                      ;*TEST 4        OSCILLATING SEEK TEST
3314
3315                                      ;*      THIS TEST WILL COMMAND SEEK CYCLES FROM "FC" TO "NC" AND BACK
3316                                      ;*      TO "FC".  "NC" STARTS AT "FC" AND INCREMENTS BY "IC" UP TO CYLINDER
3317                                      ;*      "LC", THEN IS DECREMENTED BY "IC" BACK TO CYLINDER "FC".  AT THE
3318                                      ;*      COMPLETION OF EVERY SEEK COMMAND THE PROPER INDICATORS ARE
3319                                      ;*      EXAMINED TO INSURE PROPER OPERATION.
3320
3321                                      ;*****************************************************************
3322  006470                              TST4:
3323  006470  033737  001440  001260            BIT     @#BITS+<4*2>,TSTNMS ;DO THIS TEST?
3324  006476  001002                            BNE     64$                 ;YES--BRANCH
3325  006500  000137  007022                    JMP     TST5                ;NO--GO TO THE NEXT TEST
3326  006504  013737  002210  001176  64$:      MOV     @#RPT4,$TIMES       ;GET THE ITERATION COUNT
3327  006512  012737  006600  001106            MOV     #TEST4,@#$LPADR
3328  006520  012737  006470  001110            MOV     #TST4,@#$LPERR  ;SETUP THE ERROR LOOP ADDRESS
3329  006526  012737  000004  001102            MOV     #4,@#$TSTNM                 ;SET UP TEST NUMBER AND
3330                                                                                ;CLEAR THE ERROR FLAG ($ERFLG)
3331  006534  013737  001102  177570            MOV     $TSTNM,@#DISPLAY            ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3332  006542  113737  002222  003524            MOVB    @#FS4,@#DPB.B+10 ;FS
3333  006550  113737  002220  003525            MOVB    @#FT4,@#DPB.B+11 ;FT
3334  006556  012737  007020  001270            MOV     #EXIT4,@#BYPASS ;GO TO EXIT4 ON ERROR
3335  006564  005002                            CLR     R2              ;CLEAR STALL SWITCH (NO STALL)
3336  006566  032737  010000  001246            BIT     #SW12,@#C.SWR   ;STALL REQUIRED?
3337  006574  001401                            BEQ     TEST4           ;NO--BRANCH
3338  006576  005102                            COM     R2              ;YES--SET SWITCH
3339  006600  012706  001100            TEST4:  MOV     #STACK,SP       ;SET UP THE STACK POINTER
3340  006604  013701  002212                    MOV     @#FC4,R1        ;SET NC TO FC
3341  006610  005037  001354                    CLR     @#STALLO        ;START AT ZERO IF STALLS REQUIRED
3342  006614  010137  003526            1$:     MOV     R1,@#DPB.B+12   ;NC
3343  006620  004037  023032                    JSR     R0,@#CALL.B                 ;GO EXECUTE THE COMMAND
```

```
3344  006624  005702                          TST     R2              ;STALL?
3345  006626  001403                          BEQ     2$              ;NO--BRANCH
3346  006630  004037  024144                  JSR     R0,@#STALL      ;YES-GO TO STALL ROUTINE
3347  006634  001354                          .WORD   STALLO          ;TIME POINTER
3348  006636  013737  002212  003526  2$:     MOV     FC4,@#DPB.B+12  ;FC
3349  006644  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3350  006650  005702                          TST     R2              ;STALL?
3351  006652  001413                          BEQ     3$              ;NO--BRANCH
3352  006654  004037  024144                  JSR     R0,@#STALL      ;YES--GO TO STALL ROUTINE
3353  006660  001354                          .WORD   STALLO          ;TIME POINTER
3354  006662  005237  001354                  INC     @#STALLO        ;UPDATE THE TIME
3355  006666  023737  001424  001354          CMP     @#MXSTAL,@#STALLO ;TIME TO BIG?
3356  006674  003347                          BGT     1$              ;NO--BRANCH
3357  006676  005037  001354                  CLR     @#STALLO        ;YES--START OVER AT ZERO
3358  006702  063701  002216          3$:     ADD     @#IC4,R1        ;MOVE TO NEXT CYLINDER
3359  006706  020137  002214                  CMP     R1,@#LC4        ;LAST CYLINDER COMPLETED?
3360  006712  003740                          BLE     1$              ;NO--BRANCH
3361  006714  013701  002214                  MOV     @#LC4,R1        ;SET NC TO LC
3362  006720  010137  003526          4$:     MOV     R1,@#DPB.B+12   ;NC
3363  006724  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3364  006730  005702                          TST     R2              ;STALL?
3365  006732  001403                          BEQ     5$              ;NO--BRANCH
3366  006734  004037  024144                  JSR     R0,@#STALL      ;YES--GO TO STALL ROUTINE
3367  006740  001354                          .WORD   STALLO          ;TIME POINTER
3368  006742  013737  002214  003526  5$:     MOV     @#LC4,@#DPB.B+12 ;LC
3369  006750  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3370  006754  005702                          TST     R2              ;STALL?
3371  006756  001413                          BEQ     6$              ;NO--BRANCH
3372  006760  004037  024144                  JSR     R0,@#STALL      ;YES--GO TO STALL ROUTINE
3373  006764  001354                          .WORD   STALLO          ;TIME POINTER
3374  006766  005237  001354                  INC     @#STALLO        ;UPDATE STALL TIME
3375  006772  023737  001424  001354          CMP     @#MXSTAL,@#STALLO ;TIME TOO BIG?
3376  007000  003347                          BGT     4$              ;NO--BRANCH
3377  007002  005037  001354                  CLR     @#STALLO        ;YES--SET STALL TIME BACK TO ZERO
3378  007006  163701  002216          6$:     SUB     @#IC4,R1        ;NEXT CYLINDER
3379  007012  020137  002212                  CMP     R1,@#FC4        ;DONE?
3380  007016  002373                          BGE     6$              ;NO--BRANCH
3381  007020  000004                  EXIT4:  SCOPE                   ;LOOP
3382
3383                                  ;*****************************************************************
3384                                  ;*TEST 5        CONVERING/DIVERGING SEEK TEST
3385
3386                                  ;*      THIS TEST WILL CAUSE THE DRIVE TO EXECUTE FORWARD AND REVERSE
3387                                  ;*      SEEKS FROM "NC1" AND "NC2" RESPECTIVELY, "NC1" WILL BE INCREMENTED
3388                                  ;*      BY "IC" AND "NC2" WILL BE DECREMENTED BY "IC" UNTIL "NC1" IS
3389                                  ;*      GREATER THAN THE INITIAL VALUE OF "NC2" AND "NC2" IS
3390                                  ;*      LESS THAN THE INITIAL VALUE OF "NC1".  AT THE COMPLETION OF
3391                                  ;*      EACH SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO
3392                                  ;*      INSURE PROPER OPERATION.  "NC1" AND "NC2" DEFAULT TO
3393                                  ;*      "FC" AND "LC" RESPECTIVELY.
3394
3395                                  ;*****************************************************************
3396  007022                          TST5:
3397  007022  033737  001442  001260          BIT     @#BITS+<5*2>,TSTNMS ;DO THIS TEST?
3398  007030  001002                          BNE     64$             ;YES--BRANCH
3399  007032  000137  007200                  JMP     TST6            ;NO--GO TO THE NEXT TEST
```

```
3400  007036  013737  002226  001176  64$:    MOV     @#RPT5,$TIMES   ;GET THE ITERATION COUNT
3401  007044  012737  007116  001106          MOV     #TEST5,@#$LPADR
3402  007052  012737  007022  001110          MOV     #TST5,@#$LPERR  ;SETUP THE ERROR LOOP ADDRESS
3403  007060  012737  000005  001102          MOV     #5,@#$TSTNM             ;SET UP TEST NUMBER AND
3404                                                                          ;CLEAR THE ERROR FLAG ($ERFLG)
3405  007066  013737  001102  177570          MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3406  007074  113737  002240  003524          MOVB    @#FS5,@#DPB.B+10 ;FS
3407  007102  113737  002236  003525          MOVB    @#FT5,@#DPB.B+11 ;FT
3408  007110  012737  007176  001270          MOV     #EXIT5,@#BYPASS ;GO TO EXIT5 ON ERROR
3409  007116  012706  001100          TEST5:  MOV     #STACK,SP
3410  007122  013701  002230                  MOV     @#FC5,R1        ;START NC1 AT FC
3411  007126  013702  002232                  MOV     @#LC5,R2        ;START NC2 AT LC
3412  007132  010137  003526          1$:     MOV     R1,@#DPB.B+12   ;NC1
3413  007136  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3414  007142  010237  003526                  MOV     R2,@#DPB.B+12   ;NC2
3415  007146  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3416  007152  063701  002234                  ADD     @#IC5,R1        ;NEXT NC1
3417  007156  163702  002234                  SUB     @#IC5,R2        ;NEXT NC2
3418  007162  020137  002232                  CMP     R1,@#LC5        ;DONE?
3419  007166  003003                          BGT     EXIT5           ;YES--BRANCH
3420  007170  020237  002230                  CMP     R2,@#FC5        ;?
3421  007174  002356                          BGE     1$              ;NO--BRANCH
3422  007176  000004                  EXIT5:  SCOPE                   ;LOOP
3423
3424                                  ;*****************************************************************
3425                                  ;*TEST 6        SERVO ADDRESSING LOGIC NOISE GENERATOR
3426
3427                                  ;*      IN THIS TEST A SEEK IS DONE TO CYL "NC" THEN A SEEK TO
3428                                  ;*      NC+4 THEN NC+1 THEN NC+3 THEN NC+2 THEN NC+5.  NOW "NC" IS UPDATED
3429                                  ;*      BY "IC" AND THE ABOVE SEQUENCE IS REPEATED UNITL "LC" IS
3430                                  ;*      EXCEEDED BY ANY OF THE ABOVE VALUES.  THE INITIAL VALUE OF "NC"
3431                                  ;*      IS "FC".  AT THE COMPLETION OF EACH SEEK COMMAND THE
3432                                  ;*      PROPER INDICATORS ARE EXAMINED TO INSURE PROPER OPERATION.
3433
3434                                  ;*****************************************************************
3435  007200                          TST6:
3436  007200  033737  001444  001260          BIT     @#BITS+(6*2),TSTNMS ;DO THIS TEST?
3437  007206  001002                          BNE     64$             ;YES--BRANCH
3438  007210  000137  007422                  JMP     TST7            ;NO--GO TO THE NEXT TEST
3439  007214  013737  002244  001176  64$:    MOV     @#RPT6,$TIMES   ;GET THE ITERATION COUNT
3440  007222  012737  007274  001106          MOV     #TEST6,@#$LPADR
3441  007230  012737  007200  001110          MOV     #TST6,@#$LPERR  ;SETUP THE ERROR LOOP ADDRESS
3442  007236  012737  000006  001102          MOV     #6,@#$TSTNM             ;SET UP TEST NUMBER AND
3443                                                                          ;CLEAR THE ERROR FLAG ($ERFLG)
3444  007244  013737  001102  177570          MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3445  007252  113737  002256  003524          MOVB    @#FS6,@#DPB.B+10 ;FS
3446  007260  113737  002254  003525          MOVB    @#FT6,@#DPB.B+11 ;FT
3447  007266  012737  007420  001270          MOV     #EXIT6,@#BYPASS ;GO TO EXIT6 ON ERROR
3448  007274  012706  001100          TEST6:  MOV     #STACK,SP       ;SETUP STACK
3449  007300  013701  002246                  MOV     @#FC6,R1        ;PICKUP "FC"
3450  007304  013702  002250                  MOV     @#LC6,R2                ;FORM LAST CYLINDER THAT
3451  007310  162702  000005                  SUB     #5,R2           ;IS AVAILABLE FOR TESTING
3452  007314  020102                  1$:     CMP     R1,R2           ;LAST CYLINDER
3453  007316  003040                          BGT     EXIT6           ;YES--BRANCH
3454  007320  010137  003526                  MOV     R1,@#DPB.B+12   ;NC
3455  007324  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
```

```
3456  007330  062737  000004  003526          ADD     #4,@#DPB.B+12   ;NC+4
3457  007336  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3458  007342  162737  000003  003526          SUB     #3,@#DPB.B+12   ;NC+1
3459  007350  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3460  007354  062737  000002  003526          ADD     #2,@#DPB.B+12   ;NC+3
3461  007362  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3462  007366  162737  000001  003526          SUB     #1,@#DPB.B+12   ;NC+2
3463  007374  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3464  007400  062737  000003  003526          ADD     #3,@#DPB.B+12   ;NC+5
3465  007406  004037  023032                  JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
3466  007412  063701  002252                  ADD     @#IC6,R1
3467  007416  000736                  BR      1$
3468  007420  000004          EXIT6:  SCOPE                   ;LOOP
```

```
                                .SBTTL  *** TIMING TESTS (7-12) ***

        ;/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:
        ;/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:
        ;/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:

        ;*THE TIMING TESTS WILL INSURE THAT THOSE FUNCTIONS BEING
        ;*TIMED ARE WITHIN THE TOLERANCES SPECIFIED IN THE "RP04
        ;*ENGINEERING SPECIFICATIONS".
        ;*THE SEEK TIMING WILL BE PERFORMED USING EXPLICIT SEEK
        ;*OPERATIONS. AT THE COMPLETION OF EACH OF THE TIMING
        ;*TESTS THE MINIMUM, MAXIMUM AND AVERAGE TIMES WILL BE
        ;*TYPED.

        ;/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*
        ;/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*
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                                ;*****************************************************************
                                ;*TEST 7         ROTATIONAL SPEED TIMING TEST
                                ;*
                                ;*      THIS TEST WILL START A SEARCH TO CYLINDER 0, TRACK 0, SECTOR
                                ;*      0.  AS SOON AS THE INTERRUPT OCCURS, THE GO BIT IS SET AGAIN
                                ;*      AND THE OPERATION IS TIMED.  THIS PROCEDURE IS REPEATED 10
                                ;*      TIMES THEN THE AVERAGE TIME IS CALCULATED AND CHECKED TO
                                ;*      INSURE IT IS WITHIN TOLERANCE:
                                ;*              16.67 MS/REV + OR - 2% IF 60HZ
                                ;*              16.67 MS/REV + OR - 2.5% IF 50HZ.
                                ;*****************************************************************
007422                          TST7:
007422  033737  001446  001260          BIT     @#BITS+<7*2>,TSTNMS ;DO THIS TEST?
007430  001002                        BNE     64$                 ;YES--BRANCH
007432  000137  010142                JMP     TST10               ;NO--GO TO THE NEXT TEST
007436  013737  002262  001176  64$:   MOV     @#RPT7,$TIMES       ;GET THE ITERATION COUNT
007444  012737  007422  001106          MOV     #TST7,@#$LPADR      ;SETUP THE SCOPE LOOP ADDRESS
007452  012737  007422  001110          MOV     #TST7,@#$LPERR      ;SETUP THE ERROR LOOP ADDRESS
007460  012737  000007  001102          MOV     #7,@#$TSTNM                 ;SET UP TEST NUMBER AND
                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
007466  013737  001102  177570          MOV     $TSTNM,@#DISPLAY            ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
007474  005737  001262                TST     @#CLKSTA            ;KW11-P CLOCK?
007500  003002                        BGT     1$                  ;YES--START TEST
007502  000137  010142                JMP     TST10               ;NO--GO TO NEXT TEST
007506  004037  024416          1$:   JSR     R0,@#SRCH00         ;DO A MASSBUS INIT & RECAL
007512  000401                        BR      2$                  ;RETURN HERE IF NO ERROR
007514  000563                        BR      EXIT7               ;RETURN HERE IF ERROR
007516  013764  002264  000034  2$:   MOV     @#FC7,RHCA(R4)      ;FC
007524  013746  002270                MOV     @#FS7,-(SP)         ;FS
007530  113766  002266  000001        MOVB    @#FT7,1(SP)         ;FT
007536  012664  000006                MOV     (SP)+,RHDA(R4)      ;LOAD FT/FS
007542  012737  010064  001200        MOV     #EXIT7,$ESCAPE      ;;ESCAPE TO EXIT7 ON ERROR
007550  005005                        CLR     R5                  ;COUNT UP
007552  012703  002364                MOV     #T7A,R3             ;60HZ PARAMETERS
```

```
3525  007556  032737  000100  001246          BIT     #SW06,@#C.SWR   ;60 HZ?
3526  007564  001402                          BEQ     TEST7           ;YES--BRANCH
3527  007566  012703  002374                  MOV     #T7B,R3         ;NO--50 HZ PARAMETERS
3528  007572  012706  001100          TEST7:  MOV     #STACK,SP       ;SETUP STACK
3529  007576  012701  000012                  MOV     #^D10,R1        ;TIME 10 SEARCHES
3530  007602  004737  024602                  JSR     PC,@#STRTMR     ;INITIALIZE THE TIMERS
3531  007606  012777  010014  171554          MOV     #7$,@PKV        ;SETUP VECTOR IN CASE OF OVERFLOW
3532  007614  012777  024600  022540          MOV     #DORTI,@RPVEC   ;SETUP RP04 VECTOR
3533  007622  005077  171550          1$:     CLR     @PKB            ;START COUNTING AT ZERO
3534  007626  012777  000131  171540          MOV     #131,@PKCS      ;INT.EN., COUNT UP AT 100KHZ
3535  007634  012714  000131                  MOV     #SEARCH,(R4)    ;START A SEARCH
3536  007640  000001                          WAIT                    ;WAIT ON INTERRUPT
3537  007642  042777  000101  171524          BIC     #101,@PKCS      ;STOP THE CLOCK
3538  007650  032764  040000  000012          BIT     #BIT14,RHDS1(R4) ;ERROR?
3539  007656  001415                          BEQ     2$              ;NO--BRANCH
3540  007660  104416                          SAVREG                  ;SAVE R0-R5
3541  007662  012702  003554                  MOV     #DTADPB,R2      ;DPB POINTER
3542  007666  004737  037044                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3543  007672  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3544  007700  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3545  007706  104420                          RESREG                  ;RESTORE R0-R5
3546  007710  104017                          ERROR   17
3547  007712  005077  171460          2$:     CLR     @PKB            ;START THE COUNT AT ZERO
3548  007716  012714  000131                  MOV     #SEARCH,(R4)    ;START A SEARCH
3549  007722  012777  000131  171444          MOV     #131,@PKCS      ;START THE CLOCK
3550  007730  000001                          WAIT                    ;WAIT ON INTERRUPT
3551  007732  042777  000101  171434          BIC     #101,@PKCS      ;STOP THE CLOCK
3552  007740  032764  040000  000012          BIT     #BIT14,RHDS1(R4) ;IS "ERR=1"?
3553  007746  001415                          BEQ     3$              ;NO--BRANCH
3554  007750  104416                          SAVREG                  ;SAVE R0-R5
3555  007752  012702  003554                  MOV     #DTADPB,R2      ;DPB POINTER
3556  007756  004737  037044                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3557  007762  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3558  007770  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3559  007776  104420                          RESREG                  ;RESTORE R0-R5
3560  010000  104017                          ERROR   17              ;DISK ERROR OCCURRED
3561  010002  004737  024646          3$:     JSR     PC,@#COUNT      ;UPDATE THE COUNT
3562  010006  005301                          DEC     R1              ;DONE?
3563  010010  003304                          BGT     1$              ;NO--BRANCH
3564  010012  000424                          BR      EXIT7           ;YES--GO TO THE EXIT
3565  010014  042777  000101  171352  7$:     BIC     #101,@PKCS      ;STOP THE CLOCK
3566  010022  005037  177776                  CLR     @#PS            ;DROP THE PRIORITY
3567  010026  012600                          MOV     (SP)+,R0        ;PC OF WAIT+2
3568  010030  005726                          TST     (SP)+           ;POP THE PS FROM THE STACK
3569  010032  104416                          SAVREG                  ;SAVE R0-R5
3570  010034  012702  003554                  MOV     #DTADPB,R2      ;DPB POINTER
3571  010040  004737  037044                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3572  010044  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3573  010052  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3574  010060  104420                          RESREG                  ;RESTORE R0-R5
3575  010062  104020                          ERROR   20              ;CLOCK OVERFLOWED
3576  010064  000004                  EXIT7:  SCOPE
3577  010066  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS INIT.
3578  010074  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3579  010102  004737  022402                  JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
3580  010106  012777  034766  022246          MOV     #ISR,@RPVEC     ;RESTORE RH11/RP04 INT. VECTOR
```

```
3581  010114  032737  000100  001246          BIT     #SW06,@#C.SWR   ;60 HZ?
3582  010122  001004                          BNE     1$              ;NO -- BRANCH
3583  010124  004037  025000                  JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
3584  010130  002364                          T7A                     ;POINTER
3585  010132  000403                          BR      TST10           ;GO TO NEXT TEST
3586  010134                          1$:
3587  010134  004037  025000                  JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
3588  010140  002374                          T7B                     ;POINTER
3589
3590
3591                                  ;*****************************************************************
3592                                  ;*TEST 10       ONE CYLINDER SEEK TIMING TEST
3593
3594                                  ;*      THIS TEST WILL COMMAND FORWARD SEEK CYCLES TO ADVANCE THE
3595                                  ;*      CYLINDER BY ONE UNTIL THE INCREMENT IS GREATER THAN THE
3596                                  ;*      NUMBER OF CYLINDERS TO CYLINDER 410, THEN REVERSE SEEK
3597                                  ;*      CYCLES TO RETRACT THE CYLINDER BY ONE UNTIL THE INCREMENT
3598                                  ;*      IS GREATER THAN THE NUMBER OF CYLINDERS TO CYLINDER 0.  THE
3599                                  ;*      TIME TO PERFORM EACH SEEK IS CHECKED TO INSURE IT DOES NOT
3600                                  ;*      EXCEED THE MAXIMUM TIME PERMITTED FOR A ONE CYLINDER SEEK.
3601                                  ;*      THE TIME MUST BE LESS THAN 10MS BUT GREATER THAN 3MS.
3602
3603                                  ;*****************************************************************
3604  010142                          TST10:
3605  010142  033737  001450  001260          BIT     @#BITS+<10*2>,TSTNMS ;DO THIS TEST?
3606  010150  001002                          BNE     64$             ;YES--BRANCH
3607  010152  000137  010564                  JMP     TST11           ;NO--GO TO THE NEXT TEST
3608  010156  013737  002274  001176  64$:   MOV     @#RPT10,$TIMES  ;GET THE ITERATION COUNT
3609  010164  012737  010142  001106          MOV     #TST10,@#$LPADR ;SETUP THE SCOPE LOOP ADDRESS
3610  010172  012737  010142  001110          MOV     #TST10,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
3611  010200  012737  000010  001102          MOV     #10,@#$TSTNM            ;SET UP TEST NUMBER AND
3612                                                                  ;CLEAR THE ERROR FLAG ($ERFLG)
3613  010206  013737  001102  177570          MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3614  010214  005737  001262                  TST     @#CLKSTA        ;KW11-P CLOCK?
3615  010220  003002                          BGT     1$              ;YES--START TEST
3616  010222  000137  010564                  JMP     TST11           ;NO--GO TO NEXT TEST
3617  010226  004037  024416          1$:     JSR     R0,@#SRCH00     ;DO A MASSBUS INIT. AND RECAL
3618  010232  000401                          BR      2$              ;NO ERROR RETURN
3619  010234  000534                          BR      EXIT10          ;ERROR RETURN--SCOPE LOOP CALL
3620  010236  012703  002404          2$:     MOV     #T10,R3         ;PARAMETER POINTER
3621  010242  012737  010526  001200          MOV     #EXIT10,$ESCAPE ;;ESCAPE TO EXIT10 ON ERROR
3622  010250  012706  001100          TEST10: MOV     #STACK,SP       ;SETUP STACK
3623  010254  012737  000001  003566          MOV     #1,@#DTADPB+12  ;START WITH CYLINDER #1
3624  010262  005005                          CLR     R5              ;SET THE UP/DOWN SWITCH TO UP
3625  010264  004737  024602                  JSR     PC,@#STRTMR     ;INITIALIZE THE TIMERS
3626  010270  012777  010456  171072          MOV     #7$,@PKV        ;SETUP INCASE OF OVERFLOW
3627  010276  012777  024600  022056          MOV     #DORTI,@RPVEC   ;SET RP04 VECTOR
3628  010304  005077  171066          1$:     CLR     @PKB            ;START THE COUNTER AT ZERO
3629  010310  013764  003566  000034          MOV     @#DTADPB+12,RHCA(R4) ;LOAD DESIRED CYLINDER
3630  010316  012714  000105                  MOV     #SEEK,(R4)      ;START A SEEK
3631  010322  012777  000131  171044          MOV     #131,@PKCS      ;START THE CLOCK
3632  010330  000001                          WAIT                    ;WAIT ON INTERRUPT
3633  010332  042777  000101  171034          BIC     #101,@PKCS      ;STOP THE CLOCK
3634  010340  032764  040000  000012          BIT     #BIT14,RHDS1(R4) ;ANY DISK ERRORS?
3635  010346  001415                          BEQ     2$              ;NO--BRANCH
3636  010350  104416                          SAVREG                  ;SAVE R0-R5
```

```
3637  010352  012702  003554                    MOV     #DTADPB,R2      ;DPB POINTER
3638  010356  004737  037044                    JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3639  010362  012764  000040  000010            MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3640  010370  013764  003554  000010            MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3641  010376  104420                            RESREG                  ;RESTORE R0-R5
3642  010400  104017                            ERROR   17              ;REPORT THE ERROR
3643  010402  004737  024646          2$:       JSR     PC,@#COUNT      ;COUNT THIS SEEKS TIME
3644  010406  004737  024226                    JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3645  010412  005705                            TST     R5              ;UP OR DOWN?
3646  010414  001011                            BNE     4$              ;DOWN--BRANCH
3647  010416  005237  003566          3$:       INC     @#DTADPB+12     ;MOVE TO NEXT CYLINDER
3648  010422  023727  003566  000632            CMP     @#DTADPB+12,#^D410 ;OUT OF CYLINDERS?
3649  010430  002725                            BLT     1$              ;NO--GO DO THE NEXT SEEK
3650  010432  012705  177777                    MOV     #-1,R5          ;SET UP/DOWN SWITCH TO DOWN
3651  010436  000722                            BR      1$              ;GO DO THE NEXT SEEK
3652  010440  005337  003566          4$:       DEC     @#DTADPB+12     ;MOVE TO NEXT CYLINDER
3653  010444  023727  003566  000000            CMP     @#DTADPB+12,#0  ;OUT OF CYLINDERS?
3654  010452  003314                            BGT     1$              ;NO--GO DO THE NEXT SEEK
3655  010454  000424                            BR      EXIT10          ;GO TO THE EXIT
3656  010456  042777  000101  170710  7$:       BIC     #101,@PKCS      ;STOP THE CLOCK
3657  010464  005037  177776                    CLR     @#PS            ;DROP THE PRIORITY
3658  010470  012600                            MOV     (SP)+,R0        ;PC OF WAIT+2
3659  010472  005726                            TST     (SP)+           ;POP THE PS FROM THE STACK
3660  010474  104416                            SAVREG                  ;SAVE R0-R5
3661  010476  012702  003554                    MOV     #DTADPB,R2      ;DPB POINTER
3662  010502  004737  037044                    JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3663  010506  012764  000040  000010            MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3664  010514  013764  003554  000010            MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3665  010522  104420                            RESREG                  ;RESTORE R0-R5
3666  010524  104020                            ERROR   20              ;REPORT CLOCK OVERFLOW
3667  010526  000004                  EXIT10:   SCOPE
3668  010530  012764  000040  000010            MOV     #BIT05,RHCS2(R4) ;MASSBUS INIT.
3669  010536  013764  003554  000010            MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3670  010544  004737  022402                    JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
3671  010550  012777  034766  021604            MOV     #ISR,@RPVEC     ;RESTORE RH11/RP04 INT. VECTOR
3672  010556  004037  025000                    JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
3673  010562  002404                            T10                     ;POINTER
3674
3675
3676                                    ;*****************************************************************
3677                                    ;*TEST 11       AVERAGE SEEK TIMING TEST
3678
3679                                    ;*      THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO
3680                                    ;*      CYLINDER 136, THEN A REVERSE SEEK FROM CYLINDER 136 TO
3681                                    ;*      CYLINDER 0.  BOTH SEEKS ARE TIMED AND CHECKED TO INSURE THEY
3682                                    ;*      ARE WITHIN THE TOLERANCE ALLOWED FOR THE AVERAGE SEEK TIME.
3683                                    ;*      THIS SEQUENCE IS REPEATED 128 TIMES (FOR A TOTAL
3684                                    ;*      OF 256 SEEKS).  THE AVERAGE SEEK TIME IS 28 MS + OR - 2MS.
3685
3686                                    ;*****************************************************************
3687  010564                            TST11:
3688  010564  033737  001452  001260            BIT     @#BITS+<11*2>,TSTNMS ;DO THIS TEST?
3689  010572  001002                            BNE     64$             ;YES--BRANCH
3690  010574  000137  011264                    JMP     TST12           ;NO--GO TO THE NEXT TEST
3691  010600  013737  002300  001176  64$:     MOV     @#RPT11,$TIMES  ;GET THE ITERATION COUNT
3692  010606  012737  010564  001106            MOV     #TST11,@#$LPADR ;SETUP THE SCOPE LOOP ADDRESS
```

```
3693  010614  012737  010564  001110          MOV     #TST11,@#$_PERR ;SETUP THE ERROR LOOP ADDRESS
3694  010622  012737  000011  001102          MOV     #11,@#$TSTNM            ;SET UP TEST NUMBER AND
3695                                                                    ;CLEAR THE ERROR FLAG (SERFLG)
3696  010630  013737  001102  177570          MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3697  010636  005737  001262                  TST     @#CLKSTA        ;KW11-P CLOCK?
3698  010642  003002                          BGT     1$              ;YES--START TEST
3699  010644  000137  011264                  JMP     TST12           ;NO--GO TO NEXT TEST
3700  010650  004037  024416          1$:     JSR     R0,@#SRCH00     ;DO A MASSBUS INIT & RECAL
3701  010654  000401                          BR      2$              ;RETURN HERE IF NO ERROR
3702  010656  000563                          BR      EXIT11          ;RETURN HERE ON ERROR
3703  010660  012703  002414          2$:     MOV     #T11,R3         ;PARAMETER POINTER
3704  010664  012737  011226  001200          MOV     #EXIT11,$ESCAPE ;;ESCAPE TO EXIT11 ON ERROR
3705  010672  012706  001100          TEST11: MOV     #STACK,SP       ;SETUP STACK
3706  010676  012701  000200                  MOV     #^D128,R1       ;REPEAT "0-136-0" 128 TIMES
3707  010702  004737  024602                  JSR     PC,@#STRTMR     ;INIT. THE COUNTERS
3708  010706  012777  011156  170454          MOV     #7$,@PKV        ;SET UP VECTOR IN CASE OF OVERFLOW
3709  010714  012777  024600  021440          MOV     #DORTI,@RPVEC   ;SETUP RP04 VECTOR
3710  010722  005077  170450          1$:     CLR     @PKB            ;START COUNT AT ZERO
3711  010726  012764  000210  000034          MOV     #^D136,RHCA(R4) ;CYLINDER=136
3712  010734  012764  000105  000000          MOV     #SEEK,RHCS1(R4) ;START A SEEK
3713  010742  012777  000131  170424          MOV     #131,@PKCS      ;START THE CLOCK
3714  010750  000001                          WAIT                    ;WAIT ON INTERRUPT
3715  010752  042777  000101  170414          BIC     #101,@PKCS      ;STOP CLOCK
3716  010760  032764  040000  000012          BIT     #BIT14,RHDS1(R4) ;ERR=1?
3717  010766  001415                          BEQ     2$              ;NO--BRANCH
3718  010770  104416                          SAVREG                  ;SAVE R0-R5
3719  010772  012702  003554                  MOV     #DTADPB,R2      ;DPB POINTER
3720  010776  004737  037044                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3721  011002  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3722  011010  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3723  011016  104420                          RESREG                  ;RESTORE R0-R5
3724  011020  104017                          ERROR   17
3725  011022  005005                  2$:     CLR     R5              ;SET UP/DOWN SWITCH TO UP
3726  011024  004737  024646                  JSR     PC,@#COUNT      ;UPDATE THE COUNT
3727  011030  004737  024226                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3728  011034  005077  170336                  CLR     @PKB            ;START THE COUNT AT ZERO
3729  011040  012764  000000  000034          MOV     #0,RHCA(R4)     ;CYLINDER=0
3730  011046  012764  000105  000000          MOV     #SEEK,RHCS1(R4) ;START A SEEK
3731  011054  012777  000131  170312          MOV     #131,@PKCS      ;START THE CLOCK
3732  011062  000001                          WAIT                    ;WAIT ON INTERPRUPT
3733  011064  042777  000101  170302          BIC     #101,@PKCS      ;STOP THE CLOCK
3734  011072  032764  040000  000012          BIT     #BIT14,RHDS1(R4) ;ERR=1?
3735  011100  001415                          BEQ     3$              ;NO--BRANCH
3736  011102  104416                          SAVREG                  ;SAVE R0-R5
3737  011104  012702  003554                  MOV     #DTADPB,R2      ;DPB POINTER
3738  011110  004737  037044                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3739  011114  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3740  011122  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3741  011130  104420                          RESREG                  ;RESTORE R0-R5
3742  011132  104017                          ERROR   17
3743  011134  012705  177777          3$:     MOV     #-1,R5          ;SET UP/DOWN SWITCH TO DOWN
3744  011140  004737  024646                  JSR     PC,@#COUNT      ;UPDATE THE COUNT
3745  011144  004737  024226                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3746  011150  005301                          DEC     R1              ;DONE?
3747  011152  003263                          BGT     1$              ;NO--BRANCH
3748  011154  000424                          BR      EXIT11          ;YES--EXIT
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```
 3749  011156  042777  000101  170210  7$:     BIC     #101,@PKCS      ;STOP THE CLOCK
 3750  011164  005037  177776                  CLR     @#PS            ;DROP THE PRIORITY
 3751  011170  012600                          MOV     (SP)+,R0        ;PC OF WAIT+2
 3752  011172  005726                          TST     (SP)+           ;POP THE PS FROM THE STACK
 3753  011174  104416                          SAVREG                  ;SAVE R0-R5
 3754  011176  012702  003554                  MOV     #DTADPB,R2      ;DPB POINTER
 3755  011202  004737  037044                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
 3756  011206  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
 3757  011214  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
 3758  011222  104420                          RESREG                  ;RESTORE R0-R5
 3759  011224  104020                          ERROR   20              ;CLOCK OVERFLOWED
 3760  011226  000004                  EXIT11: SCOPE
 3761  011230  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS INIT.
 3762  011236  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
 3763  011244  004737  022402                  JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
 3764  011250  012777  034766  021104          MOV     #ISR,@RPVEC     ;RESTORE RH11/RP04 INT. VECTOR
 3765  011256  004037  025000                  JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
 3766  011262  002414                          T11                     ;POINTER
 3767
 3768                                  ;*****************************************************************
 3769                                  ;*TEST 12       MAXIMUM SEEK TIMING TEST
 3770
 3771                                  ;*      THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO
 3772                                  ;*      CYLINDER 410, THEN A REVERSE SEEK FROM CYLINDER 410 TO
 3773                                  ;*      CYLINDER 0.  BOTH SEEKS ARE TIMED AND CHECKED TO INSURE
 3774                                  ;*      THEY ARE WITHIN THE TOLERANCE ALLOWED FOR THE MAXIMUM SEEK
 3775                                  ;*      TIME.  THIS SEQUENCE IS REPEATED 128 TIMES (FOR
 3776                                  ;*      A TOTAL OF 256 SEEKS).  THE MAXIMUM SEEK TIME IS 50MS + 4MS CR - 2MS.
 3777
 3778                                  ;*****************************************************************
 3779  011264                  ↑ST12:
 3780  011264  033737  001454  001260          BIT     @#BITS+(12*2),TSTNMS ;DO THIS TEST?
 3781  011272  001002                          BNE     64$             ;YES--BRANCH
 3782  011274  000137  011764                  JMP     TST13           ;NO--GO TO THE NEXT TEST
 3783  011300  013737  002304  001176  64$:     MOV     @#RPT12,$TIMES  ;GET THE ITERATION COUNT
 3784  011306  012737  011264  001106          MOV     #TST12,@#$LPADR ;SETUP THE SCOPE LOOP ADDRESS
 3785  011314  012737  011264  001110          MOV     #TST12,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
 3786  011322  012737  000012  001102          MOV     #12,@#$TSTNM            ;SET UP TEST NUMBER AND
 3787                                                                  ;CLEAR THE ERROR FLAG ($ERFLG)
 3788  011330  013737  001102  177570          MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 3789  011336  005737  001262                  TST     @#CLKSTA        ;KW11-P CLOCK
 3790  011342  003002                          BGT     1$              ;YES--START TEST
 3791  011344  000137  011764                  JMP     TST13           ;NO--GO TO NEXT TEST
 3792  011350  004037  024416          1$:     JSR     R0,@#SRCH00     ;DO A MASSBUS INIT & RECAL
 3793  011354  000401                          BR      2$              ;RETURN HERE IF NO ERROR
 3794  011356  000563                          BR      EXIT12          ;RETURN HERE ON ERROR
 3795  011360  012703  002424          2$:     MOV     #T12,R3         ;PARAMETER POINTER
 3796  011364  012737  011726  001200          MOV     #EXIT12,$ESCAPE ;;ESCAPE TO EXIT12 ON ERROR
 3797  011372  012706  001100          TEST12: MOV     #STACK,SP       ;SETUP STACK
 3798  011376  012701  000200                  MOV     #↑D128,R1       ;REPEAT "0-410-0" 128 TIMES
 3799  011402  004737  024602                  JSR     PC,@#STRTMR     ;INIT. THE TIMERS
 3800  011406  012777  011656  167754          MOV     #7$,@PKV        ;SETUP VECTOR IN CASE OF OVERFLOW
 3801  011414  012777  024600  020740          MOV     #DORTI,@RPVEC   ;SETUP RP04 VECTOR
 3802  011422  005077  167750          1$:     CLR     @PKB            ;START COUNTING FROM ZERO
 3803  011426  012764  000632  000034          MOV     #410.,RHCA(R4)  ;CYLINDER=410
 3804  011434  012764  000105  000000          MOV     #SEEK,RHCS1(R4) ;START A SEEK
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3805  011442  012777  000131  167724          MOV     #131,@PKCS      ;START THE CLOCK
3806  011450  000001                          WAIT                    ;WAIT ON INTERRUPT
3807  011452  042777  000101  167714          BIC     #101,@PKCS      ;STOP THE CLOCK
3808  011460  032764  040000  000012          BIT     #BIT14,RHDS1(R4) ;ERR=1?
3809  011466  001415                          BEQ     2$              ;NO--BRANCH
3810  011470  104416                          SAVREG                  ;SAVE R0-R5
3811  011472  012702  003554                  MOV     #DTADPB,R2      ;DPB POINTER
3812  011476  004737  037044                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3813  011502  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3814  011510  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3815  011516  104420                          RESREG                  ;RESTORE R0-R5
3816  011520  104017                          ERROR   17
3817  011522  005005                  2$:     CLR     R5              ;SET THE UP/DOWN SWITCH TO UP
3818  011524  004737  024646                  JSR     PC,@#COUNT      ;UP THE COUNT
3819  011530  004737  024226                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3820  011534  005077  167636                  CLR     @PKB            ;START COUNT AT ZERO
3821  011540  012764  000000  000034          MOV     #0,RHCA(R4)     ;CYLINDER=0
3822  011546  012764  000105  000000          MOV     #SEEK,RHCS1(R4) ;START A SEEK
3823  011554  012777  000131  167612          MOV     #131,@PKCS      ;START THE CLOCK
3824  011562  000001                          WAIT                    ;WAIT ON INTERRUPT
3825  011564  042777  000101  167602          BIC     #101,@PKCS      ;STOP THE CLOCK
3826  011572  032764  040000  000012          BIT     #BIT14,RHDS1(R4) ;"ERR"=1?
3827  011600  001415                          BEQ     3$              ;NO--BRANCH
3828  011602  104416                          SAVREG                  ;SAVE R0-R5
3829  011604  012702  003554                  MOV     #DTADPB,R2      ;DPB POINTER
3830  011610  004737  037044                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3831  011614  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3832  011622  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3833  011630  104420                          RESREG                  ;RESTORE R0-R5
3834  011632  104017                          ERROR   17              ;REPORT THE ERROR
3835  011634  012705  177777          3$      MOV     #-1,R5          ;SET THE UP/DOWN SWITCH TO DOWN
3836  011640  004737  024646                  JSR     PC,@#COUNT      ;UPDATE THE COUNT
3837  011644  004737  024226                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3838  011650  005301                          DEC     R1              ;DONE?
3839  011652  003263                          BGT     1$              ;NO--BRANCH
3840  011654  000424                          BR      EXIT12          ;YES--EXIT
3841  011656  042777  000101  167510  7$:     BIC     #101,@PKCS      ;STOP THE CLOCK
3842  011664  005037  177776                  CLR     @#PS            ;DROP THE PRIORITY
3843  011670  012600                          MOV     (SP)+,R0        ;PC OF WAIT+2
3844  011672  005726                          TST     (SP)+           ;POP THE PS FROM THE STACK
3845  011674  104416                          SAVREG                  ;SAVE R0-R5
3846  011676  012702  003554                  MOV     #DTADPB,R2      ;DPB POINTER
3847  011702  004737  037044                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
3848  011706  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS CLEAR
3849  011714  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3850  011722  104420                          RESREG                  ;RESTORE R0-R5
3851  011724  104020                          ERROR   20              ;CLOCK OVERFLOWED
3852  011726  000004                  EXIT12: SCOPE
3853  011730  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS INIT.
3854  011736  013764  003554  000010          MOV     @#DTADPB,RHCS2(R4) ;SELECT DRIVE
3855  011744  004737  022402                  JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
3856  011750  012777  034766  020404          MOV     #ISR,@RPVEC     ;RESTORE RH11/RP04 INT. VECTOR
3857  011756  004037  025000                  JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
3858  011762  002424                          T12                     ;POINTER
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                                .SBTTL  *** ADDRESSING TESTS (13-14) ***

;*THE ADDRESSING TESTS INSURES PROPER OPERATION OF THE TRACK
;*AND SECTOR ADDRESS CIRCUITRY.  BOTH ADDRESSING TESTS
;*WILL BE PERFORMED ON CYLINDER FC.

                                ;*****************************************************************
                                ;*TEST 13       SECTOR ADDRESSING TEST

                                ;*      THIS TEST WRITES DATA INTO ALL SECTORS OF TRACK "FT".  THE
                                ;*      DATA WILL BE 256 WORDS OF THE SECTOR ADDRESS OF THE SECTOR
                                ;*      BEING WRITTEN.  A WRITE CHECK IS PERFORMED, THE BUFFER IS
                                ;*      CLEARED (TO 177400) AND THE DATA IS READ AND COMPARED.  THEN SECTOR 0
                                ;*      IS REWRITTEN AND SECTORS 0 - 21 ARE WRITE CHECKED.  THEN
                                ;*      SECTOR 1 IS REWRITTEN AND SECTORS 0 - 21 ARE WRITE CHECKED.
                                ;*      THIS REWRITE AND WRITE CHECK PROCEDURE IS CONTINUED UP THROUGH
                                ;*      REWRITE SECTOR 21 AND WRITE CHECK SECTORS 0-21.

                                ;*****************************************************************
011764                          TST13:
011764  033737  001456  001260          BIT     @#BITS+<13*2>,TSTNMS ;DO THIS TEST?
011772  001002                        BNE     64$                 ;YES--BRANCH
011774  000137  012264               JMP     TST14               ;NO--GO TO THE NEXT TEST
012000  013737  002310  001176  64$:  MOV     @#RPT13,$TIMES      ;GET THE ITERATION COUNT
012006  012737  012044  001106        MOV     #TEST13,@#$LPADR
012014  012737  011764  001110        MOV     #TST13,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
012022  012737  000013  001102        MOV     #13,@#$TSTNM                ;SET UP TEST NUMBER AND
                                                                    ;CLEAR THE ERROR FLAG (SERFLG)
012030  013737  001102  177570        MOV     $TSTNM,@#DISPLAY            ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
012036  012737  012262  001270        MOV     #EXIT13,@#BYPASS
012044  012706  001100          TEST13: MOV     #STACK,SP           ;SET THE STACK POINTER
012050  004737  025406                JSR     PC,@#FILBUF         ;FILL THE BUFFER WITH SECTOR ADDRESSES
012054  012737  000161  003556        MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
012062  013737  002312  003566        MOV     @#FC13,@#DTADPB+12 ;CYLINDER
012070  113737  002314  003565        MOVB    @#FT13,@#DTADPB+11 ;TRACK
012076  105037  003564                CLRB    @#DTADPB+10         ;SECTOR
012102  012737  165000  003560        MOV     #TRCKWC,@#DTADPB+4 ;WORD COUNT
012110  012737  044134  003562        MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
012116  004037  023342                JSR     R0,@#DRVCAL         ;START A DATA TRANSFER
012122  012737  000151  003556        MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
012130  004037  023342                JSR     R0,@#DRVCAL         ;START A DATA TRANSFER
012134  004037  025450                JSR     R0,@#CLRBUF         ;CLEAR BUFFER
012140  012737  000171  003556        MOV     #READ,@#DTADPB+2 ;COMMAND = READ
012146  004037  023342                JSR     R0,@#DRVCAL         ;START A DATA TRANSFER
012152  004037  025522                JSR     R0,@#CKSCTR         ;CHECK THE SECTOR DATA READ
```

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3915  012156  012700  044134                    MOV     #BUFFER,R0      ;BUFFER ADDRESS
3916  012162  005001                            CLR     R1              ;FIRST SECTOR
3917  012164  012737  000161  003556  1$:       MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3918  012172  012737  177400  003560            MOV     #SCTRWC,@#DTADPB+4 ;WORD COUNT
3919  012200  010037  003562                    MOV     R0,@#DTADPB+6   ;BUFFER ADDRESS
3920  012204  110137  003564                    MOVB    R1,@#DTADPB+10  ;SECTOR
3921  012210  004037  023342                    JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3922  012214  012737  000151  003556            MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3923  012222  012737  165000  003560            MOV     #TRCKWC,@#DTADPB+4 ;WORD COUNT
3924  012230  012737  044134  003562            MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3925  012236  105037  003564                    CLRB    @#DTADPB+10     ;SECTOR
3926  012242  004037  023342                    JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3927  012246  062700  001000                    ADD     #^D256*2,R0     ;MOVE TO NEXT SECTOR
3928  012252  005201                            INC     R1
3929  012254  022701  000026                    CMP     #^D22,R1        ;DONE?
3930  012260  003341                            BGT     1$              ;NO--BRANCH
3931  012262  000004                EXIT13:     SCOPE                   ;LOOP
3932
3933                                ;*********************************************************************
3934                                ;*TEST 14       TRACK ADDRESSING TEST
3935
3936                                ;*      THIS TEST WILL WRITE DATA IN THE FORM OF TRACK ADDRESSES
3937                                ;*      IN CYLINDER "FC" SECTOR "FS" OF EVERY TRACK WITH EACH TRACK
3938                                ;*      GETTING ITS OWN TRACK ADDRESS.
3939                                ;*      A WRITE CHECK IS THEN PERFORMED ON EACH TRACK TO INSURE
3940                                ;*      THE DATA IS VALID.  THEN TRACK 0 IS REWRITTEN AND TRACK 1
3941                                ;*      THROUGH TRACK 18 IS WRITE CHECKED.  THEN TRACK 1 IS
3942                                ;*      REWRITTEN AND TRACK 2 THROUGH TRACK 18 IS WRITE CHECKED.
3943                                ;*      THIS PROCEDURE IS CONTINUED UP THROUGH REWRITING TRACK 17
3944                                ;*      AND WRITE CHECKING TRACK 18.
3945
3946                                ;*********************************************************************
3947  012264                        TST14:
3948  012264  033737  001460  001260            BIT     @#BITS+<14*2>,TSTNMS ;DO THIS TEST?
3949  012272  001002                            BNE     64$             ;YES--BRANCH
3950  012274  000137  012620                    JMP     TST15           ;NO--GO TO THE NEXT TEST
3951  012300  013737  002320  001176  64$:     MOV     @#RPT14,$TIMES  ;GET THE ITERATION COUNT
3952  012306  012737  012344  001106            MOV     #TEST14,@#SLPADR
3953  012314  012737  012264  001110            MOV     #TST14,@#SLPERR ;SETUP THE ERROR LOOP ADDRESS
3954  012322  012737  000014  001102            MOV     #14,@#$TSTNM            ;SET UP TEST NUMBER AND
3955                                                                    ;CLEAR THE ERROR FLAG (SERFLG)
3956  012330  013737  001102  177570            MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3957  012336  012737  012616  001270            MOV     #EXIT14,@#BYPASS
3958  012344  012706  001100                TEST14: MOV     #STACK,SP       ;SET THE STACK POINTER
3959  012350  004737  025406                    JSR     PC,@#FILBUF     ;FILL THE BUFFER WITH TRACK ADDRESS
3960  012354  012737  000161  003556            MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3961  012362  013737  002322  003566            MOV     @#FC14,@#DTADPB+12 ;CYLINDER
3962  012370  113737  002324  003564            MOVB    @#FS14,@#DTADPB+10 ;SECTOR
3963  012376  012737  177400  003560            MOV     #SCTRWC,@#DTADPB+4 ;WORD COUNT
3964  012404  012737  044134  003562            MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3965  012412  005000                            CLR     R0              ;TRACK=0
3966  012414  110037  003565            1$:     MOVB    R0,@#DTADPB+11  ;TRACK ADDRESS
3967  012420  004037  023342                    JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3968  012424  062737  001000  003562            ADD     #^D256*2,@#DTADPB+6 ;UPDATE BUFFER ADDRESS
3969  012432  005200                            INC     R0              ;UPDATE TRACK NUMBER
3970  012434  022700  000023                    CMP     #^D19,R0        ;OUT OF TRACKS?
```

```
3971  012440  003365                          BGT     1$                      ;NO--BRANCH
3972  012442  012737  044134  003562          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3973  012450  005000                          CLR     R0
3974  012452  012737  000151  003556          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK
3975  012460  110037  003565          2$:     MOVB    R0,@#DTADPB+11  ;TRACK ADDRESS
3976  012464  004037  023342                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3977  012470  062737  001000  003562          ADD     #^D256*2,@#DTADPB+6 ;UPDATE BUFFER ADDRESS
3978  012476  005200                          INC     R0              ;UPDATE TRACK NUMBER
3979  012500  022700  000023                  CMP     #^D19,R0        ;OUT OF TRACKS?
3980  012504  003365                          BGT     2$              ;NO--BRANCH
3981  012506  005000                          CLR     R0              ;FIRST TRACK ADDRESS
3982  012510  110037  003565          3$:     MOVB    R0,@#DTADPB+11  ;TRACK
3983  012514  010001                          MOV     R0,R1           ;FORM BUFFER ADDRESS
3984  012516  012737  044134  003562          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3985  012524  005301                  4$:     DEC     R1
3986  012526  002404                          BLT     5$
3987  012530  062737  001000  003562          ADD     #^D256*2,@#DTADPB+6
3988  012536  000772                          BR      4$
3989  012540  012737  000161  003556  5$:     MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3990  012546  004037  023342                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3991  012552  062737  001000  003562  6$:     ADD     #^D256*2,@#DTADPB+6 ;UPDATE BUFFER ADDRESS
3992  012560  105237  003565                  INCB    @#DTADPB+11     ;MOVE TO NEXT TRACK
3993  012564  012737  000151  003556          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3994  012572  004037  023342                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3995  012576  122737  000022  003565          CMPB    #^D18,@#DTADPB+11 ;OUT OF TRACKS?
3996  012604  003362                          BGT     6$              ;NO--BRANCH
3997  012606  005200                          INC     R0              ;NEXT TRACK TO WRITE
3998  012610  022700  000022                  CMP     #^D18,R0        ;OUT OF TRACKS?
3999  012614  003335                          BGT     3$              ;NO--BRANCH
4000  012616  000004                  EXIT14: SCOPE
```

```
                        .SBTTL  *** DATA TEST (15) ***

                        ;*****************************************************************
                        ;*TEST 15        DATA TEST

                        ;*      THIS TEST PERFORMS DATA STORAGE AND RETRIEVAL ON CYLINDERS
                        ;*      "FC" THROUGH "LC" BY THE INCREMENT "IC" USING THE DATA PATTERNS
                        ;*      SPECIFIED. THE FOLLOWING SEQUENCE OCCURS FOR EACH CYLINDER:
                        ;*      1.      SET "NT" TO "FT" THEN REPEAT 2-4 UNTIL "NT" > "LT"
                        ;*      2.      WRITE THEN WRITE CHECK "FS" THROUGH "LS" OF TRACK "NT"
                        ;*      3.      READ THEN SOFTWARE COMPARE "FS" THROUGH "LS" OF TRACK "NT"
                        ;*      4.      INCREMENT "NT" BY "IT"
                        ;*      5.      REPEAT STEPS 1-4 FOR EACH DATA PATTERN
                        ;*      6.      REPEAT STEPS 1-5 FOR "FC" THROUGH "LC" ADVANCING BY "IC"
                        ;*
                        ;*      IF A WRITE CHECK ERROR OCCURS THE ERROR IS REPORTED AND
                        ;*      THE TRACK IN ERROR IS REWRITTEN AND CHECKED. THIS CHECK IS
                        ;*      ACCOMPLISHED BY PERFORMING TWO(2) SUCCESSIVE ERROR FREE
                        ;*      WRITE CHECKS. IF THE CHECK FAILS THE ERROR IS REPORTED AS
                        ;*      FATAL AND NO READ OCCURS.
                        ;*      FS DEFAULTS TO 1 AND LS DEFAULTS TO 0
                        ;*      PAT DEFAULTS TO 177777 (ALL POSSIBLE PATTERNS)
                        ;*      THE POSSIBLE PATTERNS ARE:
                        ;*
                        ;*      PAT 0   PAT 1   PAT 2   PAT 3   PAT 4   PAT 5   PAT 6   PAT 7
                        ;*      ------  ------  ------  ------  ------  ------  ------  ------
                        ;*      165555  000001  177776  000000  000000  052525  007417  026455
                        ;*      133333  000003  177774  000000  010421  052525  007417  026455
                        ;*      165555  000007  177770  000000  021042  052525  007417  026455
                        ;*      133333  000017  177760  177777  031463  125252  170360  151322
                        ;*      165555  000037  177740  177777  042104  125252  170360  151322
                        ;*      133333  000077  177700  177777  052525  125252  170360  151322
                        ;*      165555  000177  177600  000000  063146  052525  007417  026455
                        ;*      133333  000377  177400  000000  073567  052525  007417  026455
                        ;*      165555  000777  177000  177777  104210  125252  170360  151322
                        ;*      133333  001777  176000  177777  114631  125252  170360  151322
                        ;*      165555  003777  174000  000000  125252  052525  007417  026455
                        ;*      133333  007777  170000  177777  135673  125252  170360  151322
                        ;*      165555  017777  160000  000000  146314  052525  007417  026455
                        ;*      133333  037777  140000  177777  156735  125252  170360  151322
                        ;*      165555  077777  100000  000000  167356  052525  007417  026455
                        ;*      133333  177777  000000  177777  177777  125252  170360  151322
                        ;*
                        ;*      PAT 8   PAT 9   PAT 10  PAT 11  PAT 12  PAT 13  PAT 14  PAT 15
                        ;*      ------  ------  ------  ------  ------  ------  ------  ------
                        ;*      165555  000001  177776  172666  077777  153333  000000  177777
                        ;*      133333  000002  177775  155555  137777  066667  177777  000000
                        ;*      165555  000004  177773  172666  157777  153333  177777  000000
                        ;*      133333  000010  177767  155555  167777  066667  177777  000000
                        ;*      165555  000020  177757  172666  173777  153333  177777  000000
                        ;*      133333  000040  177737  155555  175777  066667  177777  000000
                        ;*      165555  000100  177677  172666  176777  153333  177777  000000
                        ;*      133333  000200  177577  155555  177377  066667  177777  000000
                        ;*      165555  000400  177377  172666  177577  153333  177777  000000
                        ;*      133333  001000  176777  155555  177677  066667  177777  000000
                        ;*      165555  002000  175777  172666  177737  153333  177777  000000
```

```
                                        ;*      133333  004000  173777  155555  177757  066667  177777  000000
                                        ;*      165555  010000  167777  172666  177767  153333  177777  000000
                                        ;*      133333  020000  157777  155555  177773  066667  177777  000000
                                        ;*      165555  040000  137777  172666  177775  153333  177777  000000
                                        ;*      133333  100000  077777  155555  177776  066667  177777  000000
                                        ;*
                                        ;*****************************************************************
012620                                  TST15:
012620  033737  001462  001260                BIT     @#BITS+<15*2>,TSTNMS ;DO THIS TEST?
012626  001002                            BNE     64$             ;YES--BRANCH
012630  000137  013260                    JMP     TST16           ;NO--GO TO THE NEXT TEST
012634  013737  002330  001176  64$:     MOV     @#RPT15,$TIMES  ;GET THE ITERATION COUNT
012642  012737  013004  001106            MOV     #TEST15,@#$LPADR
012650  012737  012620  001110            MOV     #TST15,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
012656  012737  000015  001102            MOV     #15,@#$TSTNM            ;SET UP TEST NUMBER AND
                                                                        ;CLEAR THE ERROR FLAG ($ERFLG)
012664  013737  001102  177570            MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
012672  005000                            CLR     R0              ;CLEAR SWITCH
012674  005004                            CLR     R4              ;FORM WORD COUNT IN R4
012676  013701  002350                    MOV     @#LS15,R1
012702  163701  002346                    SUB     @#FS15,R1
012706  002003                            BGE     1$              ;BRANCH IF FS < OR = LS
012710  062701  000026                    ADD     #^D22,R1        ;MAKE DIFFERENCE POSITIVE
012714  005100                            COM     R0              ;SET SWITCH
012716  062704  000400            1$:     ADD     #^D256,R4
012722  005301                            DEC     R1
012724  002374                            BGE     1$
012726  005404                            NEG     R4
012730  010405                            MOV     R4,R5           ;COPY NORMAL WORD COUNT INTO SMALL WC
012732  005700                            TST     R0              ;SWITCH SET?
012734  001412                            BEQ     3$              ;NO--BRANCH
012736  005005                            CLR     R5              ;FORM WORD COUNT FOR LS < FS
012740  012701  000025                    MOV     #^D21,R1
012744  163701  002346                    SUB     @#FS15,R1
012750  062705  000400            2$:     ADD     #^D256,R5
012754  005301                            DEC     R1
012756  002374                            BGE     2$
012760  005405                            NEG     R5
012762  113737  002346  003564  3$:     MOVB    @#FS15,@#DTADPB+10 ;SECTOR
012770  012737  044134  003562            MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER
012776  012737  013256  001270            MOV     #EXIT15,@#BYPASS
013004  005037  001352            TEST15: CLR     @#WCEFLG        ;CLEAR THE WRITE CHECK ERROR FLAG
013010  013701  002332                    MOV     @#FC15,R1       ;PICKUP FIRST CYLINDER
013014  000407                            BR      2$
013016  005720                    1$:     TST     (R0)+           ;MOVE TO NEXT DATA PATTERN
013020  022700  000040                    CMP     #^D16*2,R0      ;OUT OF PATTERNS?
013024  003004                            BGT     3$              ;NO--BRANCH
013026  004037  025356                    JSR     R0,@#INCCYL     ;MOVE TO NEXT CYLINDER
013032  000511                            BR      EXIT15          ;OUT OF CYLINDERS
013034  005000                    2$:     CLR     R0              ;START WITH PATTERN 0
013036  036037  001430  002352  3$:     BIT     BITS(R0),@#PTRN15 ;THIS PATTERN SELECTED?
013044  001764                            BEQ     1$              ;NO--BRANCH
013046  013702  002340                    MOV     @#FT15,R2       ;FIRST TRACK
013052  010137  003566                    MOV     R1,@#DTADPB+12  ;CYLINDER
013056  110237  003565            4$:     MOVB    R2,@#DTADPB+11  ;TRACK
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 4113  013062  010437  003560                MOV     R4,@#DTADPB+4   ;WORD COUNT
 4114  013066  022701  000632                CMP     #410.,R1        ;LAST DISK CYLINDER?
 4115  013072  003005                        BGT     5$              ;NO--BRANCH
 4116  013074  022702  000022                CMP     #18.,R2         ;LAST DISK TRACK?
 4117  013100  003002                        BGT     5$              ;NO--BRANCH
 4118  013102  010537  003560                MOV     R5,@#DTADPB+4   ;SHORT WORD COUNT
 4119  013106  013703  177570        5$:     MOV     @#SWR,R3        ;INHIBIT WRITE AND
 4120  013112  005103                        COM     R3              ;WRITE CHECK?
 4121  013114  032703  000030                BIT     #SW04!SW03,R3
 4122  013120  001424                        BEQ     7$              ;YES--BRANCH
 4123  013122  004737  026076                JSR     PC,@#SETBUF     ;MOVE DATA PATTERN INTO THE BUFFER
 4124  013126  032737  000020  177570        BIT     #SW04,@#SWR     ;INHIBIT WRITE?
 4125  013134  001005                        BNE     6$              ;YES--BRANCH
 4126  013136  012737  000161  003556        MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
 4127  013144  004037  023342                JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 4128  013150  032737  000010  177570  6$:   BIT     #SW03,@#SWR     ;INHIBIT WRITE CHECK?
 4129  013156  001005                        BNE     7$              ;YES--BRANCH
 4130  013160  012737  000151  003556        MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
 4131  013166  004037  023342                JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 4132  013172  005737  001352        7$:     TST     @#WCEFLG        ;WRITE CHECK ERROR FLAG SET?
 4133  013176  001404                        BEQ     8$              ;NO--BRANCH
 4134  013200  032737  000001  177570        BIT     #SW00,@#SWR     ;PERFORM READ AFTER FATAL "WCE"?
 4135  013206  001417                        BEQ     9$              ;NO--BRANCH
 4136  013210  032737  000004  177570  8$:   BIT     #SW02,@#SWR     ;INHIBIT READ DATA AND SOFTWARE COMPARE?
 4137  013216  001013                        BNE     9$              ;YES--BRANCH
 4138  013220  012737  000171  003556        MOV     #READ,@#DTADPB+2 ;COMMAND=READ
 4139  013226  004037  023342                JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 4140  013232  032737  000002  177570        BIT     #SW01,@#SWR     ;COMPARE THE DATA?
 4141  013240  001002                        BNE     9$              ;NO--BRANCH
 4142  013242  004737  026206                JSR     PC,@#DATCMP     ;YES--DO IT
 4143  013246  004037  025326        9$:     JSR     R0,@#INCTRK     ;MOVE TO NEXT TRACK
 4144  013252  000661                        BR      1$              ;OUT OF TRACKS GO TO NEXT PATTERN
 4145  013254  000700                        BR      4$              ;LOOP
 4146  013256  000004                EXIT15: SCOPE                   ;SCOPE LOOP
 4147
 4148
 4149
 4150
 4151
 4152
```

```
                                .SBTTL  *** EXERCISE TEST (16) ***

                                ;*****************************************************************
                                ;*TEST 16       RANDOM ADDRESS AND RANDOM PATTERN TEST (TST16)

                                ;*      STARTING AT "FC" AND GOING THROUGH "LC" THE DISK PACK
                                ;*      IS WRITTEN WITH A RANDOM PATTERN. THE FIRST TWO WORDS
                                ;*      OF EACH SECTOR WILL BE THE BASE OF THE RANDOM GENERATOR
                                ;*      FOR THAT SECTOR.
                                ;*      THE TEST THEN PERFORMS THE FOLLOWING SEQUENCE "R" TIMES
                                ;*      "R" DEFAULTS TO 20,000.
                                ;*
                                ;*      1)      GENERATE A RANDOM ADDRESS
                                ;*      2)      WRITE A RANDOM PATTERN AT THE ADDRESS
                                ;*              GENERATED IN 1.
                                ;*      3)      GENERATE A RANDOM ADDRESS
                                ;*      4)      READ THE SECTOR AT THE ADDRESS
                                ;*              GENERATED IN 3.
                                ;*      5)      DO A SOFTWARE CHECK OF THE DATA READ IN 4.
                                ;*      6)      DO A WRITE CHECK OF THE DATA WRITTEN IN 2
                                ;*      7)      GENERATE A RANDOM ADDRRESS
                                ;*      8)      READ THE SECTOR AT THE ADDRESS
                                ;*              GENERATED IN 7.
                                ;*      9)      DO A SOFTWARE CHECK OF THE DATA READ IN 8
                                ;*      10)     DO A WRITE CHECK OF THE DATA WRITTEN IN 2

                                ;*****************************************************************
013260                          TST16:
013260  033737  001464  001260          BIT     @#BITS+<16*2>,TSTNMS ;DO THIS TEST?
013266  001002                          BNE     64$             ;YES--BRANCH
013270  000137  013726                  JMP     TST17           ;NO--GO TO THE NEXT TEST
013274  013737  002356  001176  64$:    MOV     @#RPT16,$TIMES  ;GET THE ITERATION COUNT
013302  012737  013260  001106          MOV     #TST16,@#$LPADR ;SETUP THE SCOPE LOOP ADDRESS
013310  012737  013260  001110          MOV     #TST16,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
013316  012737  000016  001102          MOV     #16,@#$TSTNM            ;SET UP TEST NUMBER AND
                                                                        ;CLEAR THE ERROR FLAG ($ERFLG)
013324  013737  001102  177570          MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
013332  012737  013724  001270          MOV     #EXIT16,@#BYPASS
013340  012737  176543  022022          MOV     #176543,@#$HINUM ;PRIME THE RANDOM NUMBER GENERATOR
013346  012737  123456  022024          MOV     #123456,@#$LONUM
013354  013737  002360  003566          MOV     @#FC16,@#DTADPB+12 ;CYLINDER
013362  012737  165000  003560          MOV     #TRCKWC,@#DTADPB+4 ;WORD COUNT
013370  012737  044134  003562          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
013376  012737  000161  003556          MOV     #WRITE,@#DTADPB+2 ;COMMMAND
013404  032737  100000  001246          BIT     #SW15,@#C.SWR   ;WRITE THE DISK PACK BEFORE TESTING?
013412  001022                          BNE     3$              ;NO--BRANCH
013414  004037  026562                  JSR     R0,@#FILRAN     ;FILL DATA BUFFER WITH RANDOM DATA
013420  005037  003564          1$:     CLR     @#DTADPB+10     ;SECTOR AND TRACK
013424                          2$:
013424  004037  023342                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
013430  105237  003565                  INCB    @#DTADPB+11     ;NEXT TRACK
013434  122737  000023  003565          CMPB    #^D19,@#DTADPB+11 ;TIME FOR NEXT CYLINDER
013442  003370                          BGT     2$              ;NO--BRANCH
```

```
4209  013444  005237  003566                  INC     @#DTADPB+12
4210  013450  023737  002362  003566          CMP     @#LC16,@#DTADPB+12 ;OUT OF CYLINDERS?
4211  013456  002360                          BGE     1$                 ;NO--BRANCH
4212  013460  012737  177400  003560  3$:     MOV     #SCTRWC,@#DTADPB+4 ;WORD COUNT
4213  013466  012737  013502  001106          MOV     #TEST16,@#$LPADR
4214  013474  012737  013502  001110          MOV     #TEST16,@#$LPERR
4215  013502  012706  001100          TEST16: MOV     #STACK,SP          ;SET STACK POINTER
4216  013506  004037  027122                  JSR     R0,@#RANADR        ;GENERATE A RANDOM ADDRESS
4217  013512  013737  003564  001356          MOV     @#DTADPB+10,@#SVADR ;SAVE THE TRACK/SECTOR
4218  013520  013737  003566  001360          MOV     @#DTADPB+12,@#SVADR+2 ;SAVE THE CYLINDER
4219  013526  012737  000161  003556          MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
4220  013534  012701  044134                  MOV     #BUFFER,R1         ;BUFFER ADDRESS
4221  013540  010137  003562                  MOV     R1,@#DTADPB+6
4222  013544  004037  027066                  JSR     R0,@#RANPAT        ;GENERATE RANDOM PATTERN
4223  013550  004037  023342                  JSR     R0,@#DRVCAL        ;START A DATA TRANSFER
4224  013554  004037  027122                  JSR     R0,@#RANADR
4225  013560  012737  000171  003556          MOV     #READ,@#DTADPB+2 ;COMMAND=READ DATA
4226  013566  012737  045134  003562          MOV     #BUFFER+512.,@#DTADPB+6 ;BUFFER ADDRESS
4227  013574  004037  023342                  JSR     R0,@#DRVCAL        ;START A DATA TRANSFER
4228  013600  004037  026620                  JSR     R0,@#RANCK         ;CHECK THE DATA
4229  013604  013737  001356  003564          MOV     @#SVADR,@#DTADPB+10 ;GET ADDRESS OF WHERE THE LAST
4230  013612  013737  001360  003566          MOV     @#SVADR+2,@#DTADPB+12 ;WRITE WAS PERFORMED
4231  013620  012737  000151  003556          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
4232  013626  012737  044134  003562          MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER ADDRESS
4233  013634  004037  023342                  JSR     R0,@#DRVCAL        ;START A DATA TRANSFER
4234  013640  004037  027122                  JSR     R0,@#RANADR        ;GENERATE A RANDOM ADDRESS
4235  013644  012737  000171  003556          MOV     #READ,@#DTADPB+2 ;COMMAND=READ
4236  013652  012737  045134  003562          MOV     #BUFFER+512.,@#DTADPB+6 ;DATA BUFFER ADDRESS
4237  013660  004037  023342                  JSR     R0,@#DRVCAL        ;START A DATA TRANSFER
4238  013664  004037  026620                  JSR     R0,@#RANCK         ;CHECK THE DATA
4239  013670  013737  001356  003564          MOV     @#SVADR,@#DTADPB+10 ;GET DISK ADDRESS OF THE
4240  013676  013737  001360  003566          MOV     @#SVADR+2,@#DTADPB+12 ;LAST WRITE
4241  013704  012737  000151  003556          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
4242  013712  012737  044134  003562          MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER ADDRESS
4243  013720  004037  023342                  JSR     R0,@#DRVCAL        ;START A DATA TRANSFER
4244  013724  000004                  EXIT16: SCOPE                      ;LOOP
```

```
                                .SBTTL  *** DATA TEST WITH ALL MEMORY (17) ***

                                ;*****************************************************************
                                ;*TEST 17       DATA TEST WITH ALL MEMORY

                                ;*      THIS TEST PERFORMS DATA STORAGE AND RETRIEVAL ON CYLINDERS
                                ;*      409 THROUGH 410 USING THE DATA PATTERNS
                                ;*      SPECIFIED. THE FOLLOWING SEQUENCE OCCURS FOR EACH CYLINDER:
                                ;*      1.      SET "NT" TO "FT" THEN REPEAT 2-4 UNTIL "NT" > "LT"
                                ;*      2.      WRITE THEN WRITE CHECK "FS" THROUGH "LS" OF TRACK "NT"
                                ;*      3.      READ THEN SOFTWARE COMPARE "FS" THROUGH "LS" OF TRACK "NT"
                                ;*      4.      INCREMENT "NT" BY "IT"
                                ;*      5.      REPEAT STEPS 1-4 FOR EACH DATA PATTERN
                                ;*      6.      REPEAT STEPS 1-5 FOR "FC" THROUGH "LC" ADVANCING BY "IC"
                                ;*
                                ;*      IF A WRITE CHECK ERROR OCCURS THE ERROR IS REPORTED AND
                                ;*      THE TRACK IN ERROR IS REWRITTEN AND CHECKED. THIS CHECK IS
                                ;*      ACCOMPLISHED BY PERFORMING TWO(2) SUCCESSIVE ERROR FREE
                                ;*      WRITE CHECKS. IF THE CHECK FAILS THE ERROR IS REPORTED AS
                                ;*      FATAL AND NO READ OCCURS.
                                ;*      FS DEFAULTS TO 1 AND LS DEFAULTS TO 0
                                ;*      PAT DEFAULTS TO 177777 (ALL POSSIBLE PATTERNS)
                                ;*      THE POSSIBLE PATTERNS ARE:
                                ;*
                                ;*      PAT 0   PAT 1   PAT 2   PAT 3   PAT 4   PAT 5   PAT 6   PAT 7
                                ;*      ------  ------  ------  ------  ------  ------  ------  ------
                                ;*      165555  000001  177776  000000  000000  052525  007417  026455
                                ;*      133333  000003  177774  000000  010421  052525  007417  026455
                                ;*      165555  000007  177770  000000  021042  052525  007417  026455
                                ;*      133333  000017  177760  177777  031463  125252  170360  151322
                                ;*      165555  000037  177740  177777  042104  125252  170360  151322
                                ;*      133333  000077  177700  177777  052525  125252  170360  151322
                                ;*      165555  000177  177600  000000  063146  052525  007417  026455
                                ;*      133333  000377  177400  000000  073567  052525  007417  026455
                                ;*      165555  000777  177000  177777  104210  125252  170360  151322
                                ;*      133333  001777  176000  177777  114631  125252  170360  151322
                                ;*      165555  003777  174000  000000  125252  052525  007417  026455
                                ;*      133333  007777  170000  177777  135673  125252  170360  151322
                                ;*      165555  017777  160000  000000  146314  052525  007417  026455
                                ;*      133333  037777  140000  177777  156735  125252  170360  151322
                                ;*      165555  077777  100000  000000  167356  052525  007417  026455
                                ;*      133333  177777  000000  177777  177777  125252  170360  151322
                                ;*

                                ;*****************************************************************
013726                          TST17:
013726  033737  001466  001260          BIT     @#BITS+<17*2>,TSTNMS ;DO THIS TEST?
013734  001002                        BNE     64$                 ;YES--BRANCH
013736  000137  014744                JMP     $EOP                ;NO--GO TO THE END OF THE PROGRAM
013742  013737  001244  001176  64$:  MOV     @#RPT17,$TIMES  ;GET THE ITERATION COUNT
013750  012737  014424  001106        MOV     #TEST17,@#$LPADR
013756  012737  013726  001110        MOV     #TST17,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
013764  012737  000017  001102        MOV     #17,@#$TSTNM                ;SET UP TEST NUMBER AND
                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
013772  013737  001102  177570        MOV     $TSTNM,@#DISPLAY        ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
                                ;*****************************************************************
```

```
4301                                    ;*****************************************************************
4302                                    ;*****************************************************************
4303                                    ;*****************************************************************
4304                                    ;*****************************************************************
4305                                    ;*****************************************************************
4306                                    ;*****************************************************************
4307                                    ;*****************************************************************
4308                                    ;*****************************************************************
4309  014000  032737  100000  022064            BIT     #100000,$KT11
4310  014006  001002                           BNE     1$
4311  014010  000137  014744                   JMP     $EOP
4312  014014                            1$:
4313  014014  005037  172340                   CLR     KIPAR0
4314  014020  012737  000200  172342           MOV     #200,KIPAR1
4315  014026  012737  000400  172344           MOV     #400,KIPAR2
4316  014034  012737  000600  172346           MOV     #600,KIPAR3
4317  014042  012737  001000  172350           MOV     #1000,KIPAR4
4318  014050  012737  001200  172352           MOV     #1200,KIPAR5
4319  014056  012737  001400  172354           MOV     #1400,KIPAR6
4320  014064  012737  177600  172356           MOV     #177600,KIPAR7
4321
4322
4323  014072  012746  077406                   MOV     #77406,-(SP)
4324  014076  011637  172300                   MOV     (SP),KIPDR0
4325  014102  011637  172302                   MOV     (SP),KIPDR1
4326  014106  011637  172304                   MOV     (SP),KIPDR2
4327  014112  011637  172306                   MOV     (SP),KIPDR3
4328  014116  011637  172310                   MOV     (SP),KIPDR4
4329  014122  011637  172312                   MOV     (SP),KIPDR5
4330  014126  011637  172314                   MOV     (SP),KIPDR6
4331  014132  011637  172316                   MOV     (SP),KIPDR7
4332
4333
4334  014136  012737  000020  172516           MOV     #20,SR3
4335  014144  012737  000001  177572           MOV     #1,SR0
4336  014152  012737  044134  001212  T15.1:   MOV     #BUFFER,BUF
4337  014160  032737  017776  001212           BIT     #17776,BUF
4338  014166  001406                           BEQ     4$
4339  014170  062737  020000  001212           ADD     #20000,BUF
4340  014176  042737  017776  001212           BIC     #17776,BUF
4341  014204  013746  001212            4$:    MOV     BUF,-(SP)
4342  014210  000316                           SWAB    (SP)
4343  014212  006216                           ASR     (SP)
4344  014214  006216                           ASR     (SP)
4345  014216  006216                           ASR     (SP)
4346  014220  006216                           ASR     (SP)
4347  014222  006216                           ASR     (SP)
4348  014224  005037  001220                   CLR     TEMP3
4349  014230  005037  172352                   CLR     KIPAR5
4350  014234  062737  000200  172352    5$:    ADD     #200,KIPAR5
4351  014242  005237  001220                   INC     TEMP3
4352  014246  005316                           DEC     (SP)
4353  014250  001371                           BNE     5$
4354  014252  005726                           TST     (SP)+
4355  014254  013737  :7235   172354           MOV     KIPAR5,KIPAR6
4356  014262  062737  00020   172354           ADD     #200,KIPAR6
```

```
 4357  014270  013737  001214  001216          MOV     TEMP1,TEMP2
 4358  014276  162737  000003  001216          SUB     #3,TEMP2
 4359  014304  012737  120000  001212  T15.2:  MOV     #120000,BUF
 4360  014312  005000                          CLR     R0              ;CLEAR SWITCH
 4361  014314  005004                          CLR     R4              ;FORM WORD COUNT IN R4
 4362  014316  013701  002350                  MOV     @#LS15,R1
 4363  014322  163701  002346                  SUB     @#FS15,R1
 4364  014326  002003                          BGE     1$              ;BRANCH IF FS < OR = LS
 4365  014330  062701  000026                  ADD     #^D22,R1        ;MAKE DIFFERENCE POSITIVE
 4366  014334  005100                          COM     R0              ;SET SWITCH
 4367  014336  062704  000400          1$:     ADD     #^D256,R4
 4368  014342  005301                          DEC     R1
 4369  014344  002374                          BGE     1$
 4370  014346  005404                          NEG     R4
 4371  014350  010405                          MOV     R4,R5           ;COPY NORMAL WORD COUNT INTO SMALL WC
 4372  014352  005700                          TST     R0              ;SWITCH SET?
 4373  014354  001412                          BEQ     3$              ;NO--BRANCH
 4374  014356  005005                          CLR     R5              ;FORM WORD COUNT FOR LS < FS
 4375  014360  012701  000025                  MOV     #^D21,R1
 4376  014364  163701  002346                  SUB     @#FS15,R1
 4377  014370  062705  000400          2$:     ADD     #^D256,R5
 4378  014374  005301                          DEC     R1
 4379  014376  002374                          BGE     2$
 4380  014400  005405                          NEG     R5
 4381  014402  113737  002346  003564  3$:     MOVB    @#FS15,@#DTADPB+10 ;SECTOR
 4382  014410  013737  001212  003562          MOV     BUF,@#DTADPB+6  ;DATA BUFFER
 4383  014416  012737  014676  001270          MOV     #EXIT17,@#B.PASS
 4384  014424  005037  001352          TEST17: CLR     @#WCEFLG        ;CLEAR THE WRITE CHECK ERROR FLAG
 4385  014430  012701  000631                  MOV     #409.,R1        ;PICKUP FIRST CYLINDER
 4386  014434  000407                          BR      2$
 4387  014436  005720                  1$:     TST     (R0)+           ;MOVE TO NEXT DATA PATTERN
 4388  014440  022700  000020                  CMP     #^D8*2,R0       ;OUT OF PATTERNS?
 4389  014444  003004                          BGT     3$              ;NO--BRANCH
 4390  014446  004037  025356                  JSR     R0,@#INCCYL     ;MOVE TO NEXT CYLINDER
 4391  014452  000511                          BR      EXIT17          ;OUT OF CYLINDERS
 4392  014454  005000                  2$:     CLR     R0              ;START WITH PATTERN 0
 4393  014456  036037  001430  002352  3$:     BIT     BITS(R0),@#PTRN15 ;THIS PATTERN SELECTED?
 4394  014464  001764                          BEQ     1$              ;NO--BRANCH
 4395  014466  013702  002340                  MOV     @#FT15,R2       ;FIRST TRACK
 4396  014472  010137  003566                  MOV     R1,@#DTADPB+12  ;CYLINDER
 4397  014476  110237  003565          4$:     MOVB    R2,@#DTADPB+11  ;TRACK
 4398  014502  010437  003560                  MOV     R4,@#DTADPB+4   ;WORD COUNT
 4399  014506  022701  000632                  CMP     #410.,R1        ;LAST DISK CYLINDER?
 4400  014512  003005                          BGT     5$              ;NO--BRANCH
 4401  014514  022702  000022                  CMP     #18.,R2         ;LAST DISK TRACK?
 4402  014520  003002                          BGT     5$              ;NO--BRANCH
 4403  014522  010537  003560                  MOV     R5,@#DTADPB+4   ;SHORT WORD COUNT
 4404  014526  013703  177570          5$:     MOV     @#SWR,R3        ;INHIBIT WRITE AND
 4405  014532  005103                          COM     R3              ;WRITE CHECK?
 4406  014534  032703  000030                  BIT     #SW04!SW03,R3
 4407  014540  001424                          BEQ     7$              ;YES--BRANCH
 4408  014542  004737  026076                  JSR     PC,@#SETBUF     ;MOVE DATA PATTERN INTO THE BUFFER
 4409  014546  032737  000020  177570          BIT     #SW04,@#SWR     ;INHIBIT WRITE?
 4410  014554  001005                          BNE     6$              ;YES--BRANCH
 4411  014556  012737  000161  003556          MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
 4412  014564  004037  023342                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
```

```
4413  014570  032737  000010  177570  6$:     BIT     #SW03,@#SWR     ;INHIBIT WRITE CHECK?
4414  014576  001005                          BNE     7$              ;YES--BRANCH
4415  014600  012737  000151  003556          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
4416  014606  004037  023342                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
4417  014612  005737  001352          7$:     TST     @#WCEFLG        ;WRITE CHECK ERROR FLAG SET?
4418  014616  001404                          BEQ     8$              ;NO--BRANCH
4419  014620  032737  000001  177570          BIT     #SW00,@#SWR     ;PERFORM READ AFTER FATAL "WCE"?
4420  014626  001417                          BEQ     9$              ;NO--BRANCH
4421  014630  032737  000004  177570  8$:     BIT     #SW02,@#SWR     ;INHIBIT READ DATA AND SOFTWARE COMPARE?
4422  014636  001013                          BNE     9$              ;YES--BRANCH
4423  014640  012737  000171  003556          MOV     #READ,@#DTADPB+2 ;COMMAND=READ
4424  014646  004037  023342                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
4425  014652  032737  000002  177570          BIT     #SW01,@#SWR     ;COMPARE THE DATA?
4426  014660  001002                          BNE     9$              ;NO--BRANCH
4427  014662  004737  026206                  JSR     PC,@#DATCMP     ;YES--DO IT
4428  014666  004037  025326          9$:     JSR     R0,@#INCTRK     ;MOVE TO NEXT TRACK
4429  014672  000661                          BR      1$              ;OUT OF TRACKS GO TO NEXT PATTERN
4430  014674  000700                          BR      4$              ;LOOP
4431  014676  023737  001216  001220  EXIT17: CMP     TEMP2,TEMP3
4432  014704  002002                          BGE     1$
4433  014706  000137  014736                  JMP     2$
4434  014712  005237  001220          1$:     INC     TEMP3
4435  014716  062737  000200  172352          ADD     #200,KIPAR5
4436  014724  062737  000200  172354          ADD     #200,KIPAR6
4437  014732  000137  014304                  JMP     T15.2
4438  014736                          2$:
4439  014736  000004                          SCOPE                   ;SCOPE LOOP
4440  014740  005037  177572                  CLR     SR0
```

```
                                ;*****************************************************************

                                .SBTTL  END OF PASS ROUTINE

                                ;*INCREMENT THE PASS NUMBER ($PASS)
                                ;*INDICATE END-OF-PROGRAM AFTER 8. PASSES THRU THE PROGRAM
                                ;*IF THERES A MONITOR GO TO IT
                                ;*IF THERE ISN'T JUMP TO RESTART

014744                          $EOP:
014744  104400  014752                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
014750  000410                          BR      64$             ;;GET OVER THE ASCIZ
                                        ;;.ASCIZ        <15><12><12>/END OF PASS/
014772                          64$:
014772  005737  001256                  TST     @#DRVSEL        ;ANY DRIVES SELECTED?
014776  001434                          BEQ     1$              ;NO--BRANCH
015000  104400  015006                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
015004  000405                          BR      65$             ;;GET OVER THE ASCIZ
                                        ;;.ASCIZ        / ON DRIVE/
015020                          65$:
015020  013746  001272                  MOV     @#CHKDRV,-(SP)  ;;SAVE @#CHKDRV FOR TYPEOUT
015024  104404                          TYPOS                   ;;GO TYPE--OCTAL ASCII
015026     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
015027     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
015030  104400  015036                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
015034  000412                          BR      66$             ;;GET OVER THE ASCIZ
                                        ;;.ASCIZ        /   ERRORS DETECTED=/
015062                          66$:
015062  013746  001112                  MOV     @#$ERTTL,-(SP)  ;;SAVE @#$ERTTL FOR TYPEOUT
015066  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
015070  005037  001112          1$:     CLR     @#$ERTTL        ;ZERO ERROR TOTAL
015074  005037  001102                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
015100  005037  001176                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
015104  005237  001100                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
015110  042737  100000  001100          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
015116  005327                          DEC     (PC)+           ;;LOOP?
015120  000010                  $EOPCT: .WORD   8.
015122  003036                          BGT     $DOAGN          ;;YES
015124  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
015126  000010                  $ENDCT: .WORD   8.
015130  015120                          $EOPCT
015132  104400  015140                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
015136  000407                          BR      64$             ;;GET OVER THE ASCIZ
                                        ;;.ASCIZ        <15><12>/END OF TEST/
015156                          64$:
015156  104400  015224                  TYPE    ,$ENULL         ;TYPE NULL CHARACTER
015162  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
015166  001414                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
015170  022700  015210                  CMP     #$ENDAD,R0      ;;IS MONITOR ACT11?
015174  001005                          BNE     $ENDAD          ;;NO--BRANCH
015176  022760  177777  000002          CMP     #-1,2(R0)       ;;YES--IS THIS THE LAST PASS?
015204  001005                          BNE     $DOAGN          ;;NO--MAKE ANOTHER PASS
015206  000005                          RESET                   ;;CLEAR THE WORLD
015210  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
```

```
  4497  015212  000240                          NOP                     ;;SAVE ROOM
  4498  015214  000240                          NOP                     ;;FOR
  4499  015216  000240                          NOP                     ;;ACT11
  4500  015220  000137  005344          $DOAGN: JMP     @#RESTART                       ;;RETURN
  4501  015224     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
  4502          015230                          .EVEN
```

```
                                        .SBTTL  *** SUBROUTINES ***
                                        ;*****************************************************************
                                        .SBTTL  ERROR HANDLER ROUTINE

                                        ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
                                        ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
                                        ;*AND GO TO TYPERR ON ERROR
                                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                        ;*SW15=1         HALT ON ERROR
                                        ;*SW13=1         INHIBIT ERROR TYPEOUTS
                                        ;*SW10=1         BELL ON ERROR
                                        ;*SW09=1         LOOP ON ERROR
                                        ;*CALL
                                        ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER

015230                                  $ERROR:
015230  032737  000400  177570            BIT     #SW08,@#SWR     ;SEND ERROR MESSAGE TO TTY?
015236  001411                            BEQ     7$              ;YES--BRANCH
015240  005737  001254                    TST     @#LPTAVL        ;IS THERE A LINE PRINTER AVAILABLE?
015244  001406                            BEQ     7$              ;NO--BRANCH
015246  013737  001414  001142            MOV     @#LPS,@#$TPS    ;YES--SETUP STATUS
015254  013737  001416  001144            MOV     @#LPB,@#$TPB    ;AND BUFFER REG.'S FOR LINE PRINTER
015262  105237  001103            7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
015266  001775                            BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
015270  013737  001102  177570            MOV     $TSTNM,@#DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
015276  032737  002000  177570            BIT     #BIT10,@#SWR    ;;BELL ON ERROR?
015304  001402                            BEQ     1$              ;;NO - SKIP
015306  104400  001202                    TYPE    ,$BELL          ;;RING BELL
015312  005237  001112            1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
015316  011637  001116                    MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
015322  162737  000002  001116            SUB     #2,$ERRPC
015330  117737  163562  001114            MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
015336  032737  020000  177570            BIT     #BIT13,@#SWR    ;;SKIP TYPEOUT IF SET
015344  001004                            BNE     2$              ;;SKIP TYPEOUTS
015346  004737  015432                    JSR     PC,@#TYPERR     ;;GO TO USER ERROR ROUTINE
015352  104400  001207                    TYPE    ,$CRLF
015356  005737  177570            2$:     TST     @#SWR           ;;HALT ON ERROR
015362  100001                            BPL     3$              ;;SKIP IF CONTINUE
015364  000000                            HALT                    ;;HALT ON ERROR!
015366  032737  001000  177570    3$:     BIT     #BIT09,@#SWR    ;;LOOP ON ERROR SWITCH SET?
015374  001402                            BEQ     4$              ;;BR IF NO
015376  013716  001110                    MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
015402  005737  001200            4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
015406  001402                            BEQ     5$              ;;BR IF NONE
015410  013716  001200                    MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
015414                                  5$:
015414  013737  001410  001142            MOV     @#TPS,@#$TPS    ;SET STATUS AND BUFFER REG.'S
015422  013737  001412  001144            MOV     @#TPB,@#$TPB    ;FOR TTY
015430  000002                            RTI                     ;RETURN FROM ERROR CALL

                                        ;*****************************************************************
                                        .SBTTL  TYPERR - TYPE ERROR ROUTINE
                                        ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE
                                        ;*WHICH ERROR IS TO BE REPORTED, IT THEN OBTAINS, FROM THE "ERROR
```

```
                                        ;*TABLE" ($ERRTB), AND REPORTS THE APPROPIATE INFORMATION
                                        ;*CONCERNING THE ERROR.
                                        ;*CALL
                                        ;*      JSR     PC,@#TYPERR
                                        ;*      RETURN

015432  113737  001102  001170  TYPERR: MOVB    @#$TSTNM,@#$TMPO ;SAVE THE TEST NUMBER
015440  004037  037744                  JSR     R0,@#SAVR05     ;SAVE R0-R5
015444  162700  000004                  SUB     #4,R0           ;FORM TEST PC
015450  010037  001154                  MOV     R0,@#$REG0      ;COPY R0-R5 IN $REG0-$REG5
015454  010137  001156                  MOV     R1,@#$REG1
015460  010237  001160                  MOV     R2,@#$REG2
015464  010337  001162                  MOV     R3,@#$REG3
015470  010437  001164                  MOV     R4,@#$REG4
015474  010537  001166                  MOV     R5,@#$REG5
015500  113700  001114                  MOVB    @#$ITEMB,R0     ;PICKUP ERROR ITEM NUMBER
015504  010001                          MOV     R0,R1           ;AND COPY IT INTO R1
015506  005300                          DEC     R0              ;FORM INDEX FOR ERROR TABLE
015510  106300                          ASLB    R0
015512  106300                          ASLB    R0
015514  106300                          ASLB    R0
015516  103002                          BCC     1$              ;IS ERROR > 37?
015520  062700  000220                  ADD     #ITEM41-$ERRTB,R0 ;YES--FORM OFFSET
015524  062700  003644          1$:     ADD     #$ERRTB,R0      ;FORM ADDRESS
015530  012037  015544                  MOV     (R0)+,2$        ;GET ERROR MESSAGE (EM) POINTER
015534  001447                          BEQ     7$              ;BRANCH IF THERE ISN'T ONE
015536  104400  001207                  TYPE    ,$CRLF          ;"CARRIAGE RETURN - LINE FEED
015542  104400                          TYPE
015544  000000          2$:     .WORD   0               ;"EM" POINTER GOES HERE
015546  162701  000041                  SUB     #41,R1          ;SPECIAL ERROR ITEM NUMBER?
015552  100440                          BMI     7$              ;NO--BRANCH
015554  013701  001276                  MOV     @#SVSTAT,R1     ;GET STATUS/ERROR INDICATOR
015560  106301                          ASLB    R1              ;STRIP "DONE" BIT (BIT07)
015562  006301                          ASL     R1              ;STRIP "ERROR" BIT (BIT15)
015564  012702  001622                  MOV     #STATBL,R2      ;1ST ADDRESS ON STATUS MESSAGE POINTERS
015570  005003                          CLR     R3              ;CARRIAGE RETURN-LINE FEED SWITCH
015572  104400  015600                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
015576  000402                          BR      64$             ;;GET OVER THE ASCIZ
                                        ;;.ASCIZ      / (/
015604          64$:
015604  012237  015626          3$:     MOV     (R2)+,5$        ;MESSAGE POINTER
015610  006301                          ASL     R1              ;TYPE THIS MESSAGE?
015612  103013                          BCC     6$              ;NO--BRANCH
015614  005103                          COM     R3              ;YES--TYPE A "CR" & "LF"?
015616  001002                          BNE     4$              ;NO--BRANCH
015620  104400  001207                  TYPE    ,$CRLF          ;YES
015624  104400          4$:     TYPE
015626  000000          5$:     .WORD   0               ;MESSAGE POINTER GOES HERE
015630  005701                          TST     R1              ;MORE TO TYPE?
015632  001403                          BEQ     6$              ;NO--BRANCH
015634  104400  040612                  TYPE    ,MSG.SP         ;YES--SPACES
015640  000761                          BR      3$              ;LOOP
015642  001360          6$:     BNE     3$              ;BRANCH IF NOT FINISHED
015644  104400  015652                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
015650  000401                          BR      65$             ;;GET OVER THE ASCIZ
                                        ;;.ASCIZ      /)/
```

```
 4615  015654                          65$:
 4616  015654  122737  000002  001114  7$:     CMPB    #2,$ITEMB
 4617  015662  001421                          BEQ     25$
 4618  015664  122737  000010  001114          CMPB    #10,$ITEMB
 4619  015672  001415                          BEQ     25$
 4620  015674  122737  000017  001114          CMPB    #17,$ITEMB
 4621  015702  001411                          BEQ     25$
 4622  015704  122737  000042  001114          CMPB    #42,$ITEMB
 4623  015712  001405                          BEQ     25$
 4624  015714  122737  000043  001114          CMPB    #43,$ITEMB
 4625  015722  001401                          BEQ     25$
 4626  015724  000436                          BR      26$
 4627  015726  005737  001234          25$:    TST     TEMP10
 4628  015732  001033                          BNE     26$
 4629  015734  010446                          MOV     R4,-(SP)
 4630  015736  013704  032360                  MOV     RPADR,R4
 4631  015742  104400  015750                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
 4632  015746  000405                          BR      66$             ;;GET OVER THE ASCIZ
 4633                                          ;;.ASCIZ      <15><12>/RHBAE= /
 4634  015762                          66$:
 4635  015762  016446  000050                  MOV     RHBAE(R4),-(SP)
 4636  015766  104402                          TYPOC
 4637  015770  104400  015776                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
 4638  015774  000406                          BR      67$             ;;GET OVER THE ASCIZ
 4639                                          ;;.ASCIZ      /   RHCS3= /
 4640  016012                          67$:
 4641  016012  016446  000052                  MOV     RHCS3(R4),-(SP)
 4642  016016  104402                          TYPOC
 4643  016020  012604                          MOV     (SP)+,R4
 4644  016022                          26$:
 4645  016022  012037  016036                  MOV     (R0)+,8$        ;PICK UP DATA HEADER (DH) POINTER
 4646  016026  001404                          BEQ     9$              ;BRANCH IF NONE
 4647  016030  104400  001207                  TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
 4648  016034  104400                          TYPE
 4649  016036  000000          8$:     .WORD   0               ;"DH" POINTER GOES HERE
 4650  016040  012001          9$:     MOV     (R0)+,R1        ;PICKUP DATA TABLE (DT) POINTER
 4651  016042  001500                          BEQ     20$             ;BRANCH IF NONE
 4652  016044  005005                          CLR     R5              ;SET INDENT SWITCH
 4653  016046  012000                          MOV     (R0)+,R0        ;DATA FORMAT (DF) POINTER
 4654  016050  012002                          MOV     (R0)+,R2        ;NUMBER OF DH'S TO TYPE
 4655  016052  001471                          BEQ     17$             ;BRANCH IF DH NUMBER IS 0
 4656  016054  005105                          COM     R5              ;NO INDENT
 4657  016056  104400  001207                  TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
 4658  016062  112003          10$:    MOVB    (R0)+,R3        ;NUMBER OF DATA WORDS TO TYPE
 4659  016064  112004                          MOVB    (R0)+,R4        ;AND HOW TO TYPE THEM
 4660  016066  006004          11$:    ROR     R4              ;OCTAL OR DECIMAL?
 4661  016070  103433                          BCS     12$             ;DECIMAL--BRANCH
 4662  016072  013146                          MOV     @(R1)+,-(SP)    ;SAVE @(R1)+ FOR TYPEOUT
 4663                                  ;*******************************************************************
 4664                                  ;*******************************************************************
 4665                                  ;*******************************************************************
 4666                                  ;*******************************************************************
 4667                                  ;*******************************************************************
 4668                                  ;*******************************************************************
 4669                                  ;*******************************************************************
 4670                                  ;*******************************************************************
```

```
4671  016074  122737  000017  001102          CMPB    #17,$TSTNM
4672  016102  001024                          BNE     21$
4673  016104  122737  000013  001114          CMPB    #13,$ITEMB
4674  016112  001007                          BNE     22$
4675  016114  022702  000001                  CMP     #1,R2
4676  016120  001015                          BNE     21$
4677  016122  022703  000001                  CMP     #1,R3
4678  016126  001012                          BNE     21$
4679  016130  000407                          BR      23$
4680  016132  122737  000014  001114  22$:    CMPB    #14,$ITEMB
4681  016140  001005                          BNE     21$
4682  016142  022703  000001                  CMP     #1,R3
4683  016146  001002                          BNE     21$
4684  016150  104422                  23$:    TYP22
4685  016152  000404                          BR      13$
4686
4687  016154  104402                  21$:    TYPOC                   ;GO TYPE--OCTAL ASCII(ALL DIGITS)
4688  016156  000402                          BR      13$
4689  016160                          12$:
4690  016160  013146                          MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
4691  016162  104410                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
4692  016164  005303                  13$:    DEC     R3              ;MORE NUMBERS TO TYPE?
4693  016166  001403                          BEQ     14$             ;NO--BRANCH
4694  016170  104400  040612                  TYPE    ,MSG.SP         ;YES--TYPE SEPERATORS
4695  016174  000734                          BR      11$             ;LOOP
4696  016176  005302                  14$:    DEC     R2              ;MORE DH'S?
4697  016200  003421                          BLE     20$             ;NO--BRANCH
4698  016202  104400  001207                  TYPE    ,$CRLF          ;YES--START A NEW LINE
4699  016206  005105                          COM     R5              ;INDENT?
4700  016210  001002                          BNE     15$             ;NO--BRANCH
4701  016212  104400  040612                  TYPE    ,MSG.SP         ;YES--TYPE SPACES
4702  016216  012037  016224          15$:    MOV     (R0)+,16$       ;GET NEXT DH
4703  016222  104400                          TYPE                    ;AND TYPE IT
4704  016224  000000                  16$:    .WORD   0               ;DH POINTER GOES HERE
4705  016226  104400  001207                  TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
4706  016232  005705                          TST     R5              ;INDENT?
4707  016234  001312                          BNE     10$             ;NO--BRANCH
4708  016236  104400  040612          17$:    TYPE    ,MSG.SP         ;YES--TYPE SPACES
4709  016242  000707                          BR      10$             ;LOOP
4710  016244  004037  037770          20$:    JSR     R0,@#GETR05     ;RESTORE R0-R5
4711  016250  000207                          RTS     PC              ;RETURN
4712
4713
4714
4715
4716
4717
4718
4719
4720
4721
4722  016252                  TYPE22:
4723  016252  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
4724  016254  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
4725  016256  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
4726  016260  016600  000012                  MOV     12(SP),R0
```

```
4727  016264  010037  001224                  MOV     R0,TEMP5
4728  016270  000300                          SWAB    R0
4729  016272  042700  177420                  BIC     #177420,R0
4730  016276  006200                          ASR     R0
4731  016300  006200                          ASR     R0
4732  016302  006200                          ASR     R0
4733  016304  006200                          ASR     R0
4734
4735
4736  016306  016002  172340                  MOV     KIPAR0(R0),R2
4737  016312  005003                          CLR     R3
4738  016314  006302                          ASL     R2
4739  016316  006103                          ROL     R3
4740  016320  006302                          ASL     R2
4741  016322  006103                          ROL     R3
4742  016324  006302                          ASL     R2
4743  016326  006103                          ROL     R3
4744  016330  006302                          ASL     R2
4745  016332  006103                          ROL     R3
4746  016334  006302                          ASL     R2
4747  016336  006103                          ROL     R3
4748  016340  006302                          ASL     R2
4749  016342  006103                          ROL     R3
4750
4751  016344  042737  160000  001224          BIC     #160000,TEMP5
4752  016352  050237  001224                  BIS     R2,TEMP5
4753  016356  010337  001226                  MOV     R3,TEMP6
4754  016362  012746  001224                  MOV     #TEMP5,-(SP)
4755  016366  004737  021050                  JSR     PC,$DB2O
4756  016372  062716  000003                  ADD     #3,(SP)
4757  016376  012637  016404                  MOV     (SP)+,1$
4758  016402  104400                          TYPE
4759  016404  000000                  1$:     .WORD   0
4760  016406  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
4761  016410  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
4762  016412  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
4763  016414  016666  000002  000004          MOV     2(SP),4(SP)
4764  016422  012616                          MOV     (SP)+,(SP)
4765  016424  000002                          RTI
4766
4767
4768
4769
4770
4771
4772
4773                            ;*****************************************************************
4774                            ;*      THIS ROUTINE HANDLES TIME OUT TRAPS THROUGH LOC. 4
4775                            ;*****************************************************************
4776
4777  016426                    TIEOUT:
4778  016426  104400  016434                  TYPE    .+4             ;;TYPE ASCIZ STRING
4779  016432  000433                          BR      64$             ;;GET OVER THE ASCIZ
4780                                          ;;.ASCIZ        <15><12>/TIMEOUT OCCURED THROUGH LOCATION 4 FROM PROGRAM PC/
4781  016522                    64$:
4782  016522  162716  000002                  SUB     #2,(SP)         ;TYPE PC
```

```
4783  016526  104402                        TYPOC
4784  016530  104400  016536                TYPE    ,.+4            ;;TYPE ASCIZ STRING
4785  016534  000410                        BR      65$             ;;GET OVER THE ASCIZ
4786                                        ;;.ASCIZ    <15><12>/PSW WAS    /
4787  016556                        65$:
4788  016556  104402                        TYPOC
4789  016560  013716  001106                MOV     $LPADR,(SP)     ;RETURN TO TEST
4790  016564  000002                        RTI
4791
4792
4793
4794
4795
4796
4797
4798
4799                                ;*****************************************************************
4800                                ;*      THIS ROUTINE HANDLES PARITY ERRORS
4801                                ;*****************************************************************
4802  016566                        PARITY:
4803  016566  104400  016574                TYPE    ,.+4            ;;TYPE ASCIZ STRING
4804  016572  000417                        BR      64$             ;;GET OVER THE ASCIZ
4805                                        ;;.ASCIZ    <15><12>/PARITY TRAP THRU VECTOR 114/
4806  016632                        64$:
4807  016632  104400  016640                TYPE    ,.+4            ;;TYPE ASCIZ STRING
4808  016636  000413                        BR      65$             ;;GET OVER THE ASCIZ
4809                                        ;;.ASCIZ    <15><12>/FROM PROGRAM PC   /
4810  016666                        65$:
4811  016666  162716  000002                SUB     #2,(SP)                 ;TYPE PC
4812  016672  104402                        TYPOC
4813  016674  104400  016702                TYPE    ,.+4            ;;TYPE ASCIZ STRING
4814  016700  000407                        BR      66$             ;;GET OVER THE ASCIZ
4815                                        ;;.ASCIZ    <15><12>/PSW WAS   /
4816  016720                        66$:
4817  016720  104402                        TYPOC
4818  016722  104400  016730                TYPE    ,.+4            ;;TYPE ASCIZ STRING
4819  016726  000421                        BR      67$             ;;GET OVER THE ASCIZ
4820                                        ;;.ASCIZ    <15><1>/HIGH ERROR ADDRESS REGISTER    /
4821  016772                        67$:
4822  016772  017746  162242                MOV     @HERADD,-(SP)           ;TYPE HIGH ERROR
4823  016776  104402                        TYPOC
4824  017000  104400  017006                TYPE    ,.+4            ;;TYPE ASCIZ STRING
4825  017004  000421                        BR      68$             ;;GET OVER THE ASCIZ
4826                                        ;;.ASCIZ    <15><12>/LOW ERROR ADDRESS REGISTER    /
4827  017050                        68$:
4828  017050  017746  162162                MOV     @LERADD,-(SP)           ;TYPE LOW ERROR
4829  017054  104402                        TYPOC
4830  017056  104400  017064                TYPE    ,.+4            ;;TYPE ASCIZ STRING
4831  017062  000422                        BR      69$             ;;GET OVER THE ASCIZ
4832                                        ;;.ASCIZ    <15><12>/MEMORY SYSTEM ERROR REGISTER    /
4833  017130                        69$:
4834  017130  017746  162106                MOV     @MEMERR,-(SP)
4835  017134  104402                        TYPOC
4836  017136  013716  001106                MOV     $LPADR,(SP)     ;RETURN TO TEST
4837  017142  000002                        RTI
4838
```

```
                                ;*******************************************************************

                                .SBTTL  TYPE ROUTINE

                                ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                                ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                                ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                ;*
                                ;*CALL:
                                ;*1) USING A TRAP INSTRUCTION
                                ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                ;*OR
                                ;*      TYPE
                                ;*      MESADR
                                ;*
                                ;*2) USING A JSR INSTRUCTION
                                ;*      MOV     PS,-(SP)        ;;PUSH PROCESSOR STATUS WORD ON THE STACK
                                ;*      JSR     PC,$TYPE        ;;CALL TYPE ROUTINE
                                ;*      MESADDR                 ;;FIRST ADRESS OF MESSAGE
                                
017144  105737  001151          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
017150  100002                          BPL     1$              ;;BR IF YES
017152  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
017154  000407                          BR      3$              ;;LEAVE
017156  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
017160  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
017164  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
017166  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
017170  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
017172  012600                          MOV     (SP)+,R0        ;;RESTORE R0
017174  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
017200  000002                          RTI                     ;;RETURN
017202  004737  017234          4$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
017206  123726  001150          5$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
017212  001364                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
017214  013746  001146                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
017220  105366  000001          6$:     DECB    1(SP)           ;;DOES A NUL. NEED TO BE TYPED?
017224  002770                          BLT     5$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
017226  004737  017234                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
017232  000772                          BR      6$              ;;LOOP
017234  105777  161702          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
017240  100375                          BPL     $TYPEC
```

```
 4895  017242  116677  000002  161674          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 4896  017250  000207                          RTS     PC
 4897                                ;*****************************************************************
 4898
 4899                                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
 4900
 4901                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
 4902                                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
 4903                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
 4904                                ;*CALL:
 4905                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 4906                                ;*      TYPOS                   ;;CALL FOR TYPEOUT
 4907                                ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
 4908                                ;*      .BYTE   M               ;;M=1 OR 0
 4909                                ;*                                      ;;1=TYPE LEADING ZEROS
 4910                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
 4911                                ;*
 4912                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
 4913                                ;*$TYPOS OR $TYPOC
 4914                                ;*CALL:
 4915                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 4916                                ;*      TYPON                   ;;CALL FOR TYPEOUT
 4917                                ;*
 4918                                ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
 4919                                ;*CALL:
 4920                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 4921                                ;*      TYPOC                   ;;CALL FOR TYPEOUT
 4922
 4923  017252  017646  000000        $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
 4924  017256  116637  000001  017475        MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
 4925  017264  112637  017477                MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
 4926  017270  062716  000002                ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
 4927  017274  000406                        BR      $TYPON
 4928  017276  112737  000001  017475  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
 4929  017304  112737  000006  017477        MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
 4930  017312  112737  000005  017474  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
 4931  017320  010346                        MOV     R3,-(SP)        ;;SAVE R3
 4932  017322  010446                        MOV     R4,-(SP)        ;;SAVE R4
 4933  017324  010546                        MOV     R5,-(SP)        ;;SAVE R5
 4934  017326  113704  017477                MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
 4935  017332  005404                        NEG     R4
 4936  017334  062704  000006                ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
 4937  017340  110437  017476                MOVB    R4,$OMODE       ;;SAVE IT FOR USE
 4938  017344  113704  017475                MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
 4939  017350  016605  000012                MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
 4940  017354  005003                        CLR     R3              ;;CLEAR THE OUTPUT WORD
 4941  017356  006105                1$:     ROL     R5              ;;ROTATE MSB INTO "C"
 4942  017360  000404                        BR      3$              ;;GO DO MSB
 4943  017362  006105                2$:     ROL     R5              ;;FORM THIS DIGIT
 4944  017364  006105                        ROL     R5
 4945  017366  006105                        ROL     R5
 4946  017370  010503                        MOV     R5,R3
 4947  017372  006103                3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
 4948  017374  105337  017476                DECB    $OMODE          ;;TYPE THIS DIGIT?
 4949  017400  100016                        BPL     7$              ;;BR IF NO
 4950  017402  042703  177770                BIC     #177770,R3      ;;GET RID OF JUNK
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 4951  017406  001002                        BNE     4$              ;;TEST FOR 0
 4952  017410  005704                        TST     R4              ;;SUPPRESS THIS 0?
 4953  017412  001403                        BEQ     5$              ;;BR IF YES
 4954  017414  005204                4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 4955  017416  052703  000060              5$:     BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 4956  017422  052703  000040                      BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 4957  017426  110337  017472                      MOVB    R3,8$           ;;SAVE FOR TYPING
 4958  017432  104400  017472                      TYPE    ,8$             ;;GO TYPE THIS DIGIT
 4959  017436  105337  017474              7$:     DECB    $OCNT           ;;COUNT BY 1
 4960  017442  003347                        BGT     2$              ;;BR IF MORE TO DO
 4961  017444  002402                        BLT     6$              ;;BR IF DONE
 4962  017446  005204                        INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 4963  017450  000744                        BR      2$              ;;GO DO THE LAST DIGIT
 4964  017452  012605                6$:     MOV     (SP)+,R5        ;;RESTORE R5
 4965  017454  012604                        MOV     (SP)+,R4        ;;RESTORE R4
 4966  017456  012603                        MOV     (SP)+,R3        ;;RESTORE R3
 4967  017460  016666  000002  000004        MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 4968  017466  012616                        MOV     (SP)+,(SP)
 4969  017470  000002                        RTI                     ;;RETURN
 4970  017472     000                8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 4971  017473     000                        .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 4972  017474     000                $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 4973  017475     000                $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 4974  017476  000000                $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 4975                                ;*****************************************************************
 4976
 4977                                .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
 4978
 4979                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
 4980                                ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
 4981                                ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
 4982                                ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
 4983                                ;*REPLACED WITH SPACES.
 4984                                ;*CALL:
 4985                                ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
 4986                                ;*      TYPDS                   ;;GO TO THE ROUTINE
 4987
 4988  017500                        $TYPDS:
 4989  017500  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 4990  017502  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 4991  017504  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 4992  017506  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 4993  017510  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 4994  017512  012746  020200                MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 4995  017516  016605  000020                MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 4996  017522  100004                        BPL     1$              ;;BR IF INPUT IS POS.
 4997  017524  005405                        NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 4998  017526  112766  000055  000001        MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 4999  017534  005000                1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 5000  017536  012703  017714                MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 5001  017542  112723  000040                MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 5002  017546  005002                2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
 5003  017550  016001  017704                MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 5004  017554  160105                3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
 5005  017556  002402                        BLT     4$              ;;BR IF DONE
 5006  017560  005202                        INC     R2              ;;INCREASE THE BCD DIGIT BY 1
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5007  017562  000774                        BR      3$
5008  017564  060105                4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
5009  017566  005702                        TST     R2              ;;CHECK IF BCD DIGIT=0
5010  017570  001002                        BNE     5$              ;;FALL THROUGH IF 0
5011  017572  105716                        TSTB    (SP)            ;;STILL DOING LEADING 0'S?
5012  017574  100407                        BMI     7$              ;;BR IF YES
5013  017576  106316                5$:     ASLB    (SP)            ;;MSD?
5014  017600  103003                        BCC     6$              ;;BR IF NO
5015  017602  116663  000001  177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
5016  017610  052702  000060          6$:   BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
5017  017614  052702  000040          7$:   BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
5018  017620  110223                        MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
5019  017622  005720                        TST     (R0)+           ;;JUST INCREMENTING
5020  017624  020027  000010                CMP     R0,#10          ;;CHECK THE TABLE INDEX
5021  017630  002746                        BLT     2$              ;;GO DO THE NEXT DIGIT
5022  017632  003002                        BGT     8$              ;;GO TO EXIT
5023  017634  010502                        MOV     R5,R2           ;;GET THE LSD
5024  017636  000764                        BR      6$              ;;GO CHANGE TO ASCII
5025  017640  105726                8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
5026  017642  100003                        BPL     9$              ;;BR IF NO
5027  017644  116663  177777  177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
5028  017652  105013                9$:     CLRB    (R3)            ;;SET THE TERMINATOR
5029  017654  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
5030  017656  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
5031  017660  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
5032  017662  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
5033  017664  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
5034  017666  104400  017714                TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
5035  017672  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
5036  017700  012616                        MOV     (SP)+,(SP)
5037  017702  000002                        RTI                     ;;RETURN TO USER
5038  017704  023420                $DTBL:  10000.
5039  017706  001750                        1000.
5040  017710  000144                        100.
5041  017712  000012                        10.
5042  017714  000004                $DBLK:  .BLKW   4
5043                                ;*****************************************************************
5044
5045                                .SBTTL  TTY INPUT ROUTINE
5046
5047  017724  000000                $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
5048  017726  000000                $TKQIN: .WORD   0               ;;INPUT POINTER
5049  017730  000000                $TKQOUT: .WORD  0               ;;OUTPUT POINTER
5050  017732  000002                $TKQSRT: .BLKB  2               ;;TTY KEYBOARD QUEUE
5051          017734                $TKQEND=.
5052
5053                                ;*TK INITIALIZE ROUTINE
5054                                ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
5055                                ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
5056                                ;
5057                                ;*CALL
5058                                ;*      JSR     PC,$TKINT
5059                                ;*      RETURN
5060                                ;
5061  017734  005037  017724        $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
5062  017740  012737  017732  017726        MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
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5063  017746  013737  017726  017730          MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
5064  017754  012737  020004  000060          MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
5065  017762  012737  000200  000062          MOV     #200,@#TKVEC+2  ;;"BR" LEVEL 4
5066  017770  005777  161144                  TST     @$TKB           ;;CLEAR DONE FLAG
5067  017774  012777  000100  161134          MOV     #BIT06,@$TKS    ;;ENABLE INTERRUPT
5068  020002  000207                          RTS     PC              ;;RETURN TO CALLER
5069
5070                                  ;*TK SERVICE ROUTINE
5071                                  ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
5072                                  ;
5073  020004  117746  161130          $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
5074  020010  042716  177600                  BIC     #^C177,(SP)     ;;STRIP THE JUNK
5075  020014  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL C?
5076  020020  001006                          BNE     1$              ;;BRANCH IF NO
5077  020022  104400  020463                  TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
5078  020026  004737  017734                  JSR     PC,$TKINT       ;;INIT THE KEYBOARD
5079  020032  000137  004244                  JMP     START2          ;;CONTROL C RESTART
5080  020036  022737  000002  017724  1$:     CMP     #2,$TKCNT       ;;IS THE QUEUE FULL?
5081  020044  001004                          BNE     2$              ;;BRANCH IF NO
5082  020046  104400  001202                  TYPE    ,$BELL          ;;RING THE TTY BELL
5083  020052  005726                          TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
5084  020054  000002                          RTI                     ;;RETURN
5085  020056  005237  017724          2$:     INC     $TKCNT          ;;COUNT THIS CHARACTER
5086  020062  112677  177640                  MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
5087  020066  005237  017726                  INC     $TKQIN          ;;UPDATE THE POINTER
5088  020072  023727  017726  017734          CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
5089  020100  001003                          BNE     3$              ;;BRANCH IF NO
5090  020102  012737  017732  017726          MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
5091  020110  000002                  3$:     RTI                     ;;RETURN
5092                                  ;*********************************************************
5093                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
5094                                  ;*CALL:
5095                                  ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
5096                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
5097                                  ;
5098
5099  020112  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
5100  020114  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE PS
5101  020122  005066  000004                  CLR     4(SP)           ;;GET READY FOR A CHARACTER
5102  020126  005037  177776                  CLR     @#PS            ;;ALLOW INTERRUPTS
5103  020132  005737  017724          1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
5104  020136  001775                          BEQ     1$
5105  020140  005337  017724                  DEC     $TKCNT          ;;DECREMENT THE COUNTER
5106  020144  117766  177560  000004          MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
5107  020152  005237  017730                  INC     $TKQOUT         ;;UPDATE THE POINTER
5108  020156  023727  017730  017734          CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
5109  020164  001003                          BNE     2$              ;;BRANCH IF NO
5110  020166  012737  017732  017730          MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
5111  020174  000002                  2$:     RTI                     ;;RETURN
5112                                  ;*********************************************************
5113                                  ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
5114                                  ;*CALL:
5115                                  ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
5116                                  ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
5117                                  ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
5118
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5119  020176  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
5120  020200  005046                          CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
5121  020202  012703  020437'          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
5122  020206  022703  020463          2$:     CMP     #$TTYIN+20.,R3  ;;BUFFER FULL?
5123  020212  101456                          BLOS    4$              ;;BR IF YES
5124  020214  104412                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
5125  020216  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
5126  020220  122713  000177                  CMPB    #177,(R3)       ;;IS IT A RUBOUT
5127  020224  001022                          BNE     5$              ;;BR IF NO
5128  020226  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
5129  020230  001007                          BNE     6$              ;;BR IF NO
5130  020232  112737  000134  020430          MOVB    #'\,9$          ;;TYPE A BACK SLASH
5131  020240  104400  020430                  TYPE    ,9$
5132  020244  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
5133  020250  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
5134  020252  020327  020437                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
5135  020256  103434                          BLO     4$              ;;BR IF YES
5136  020260  111337  020430                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
5137  020264  104400  020430                  TYPE    ,9$             ;;GO TYPE
5138  020270  000746                          BR      2$              ;;GO READ ANOTHER CHAR.
5139  020272  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
5140  020274  001406                          BEQ     7$              ;;BR IF NO
5141  020276  112737  000134  020430          MOVB    #'\,9$          ;;TYPE A BACK SLASH
5142  020304  104400  020430                  TYPE    ,9$
5143  020310  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
5144  020312  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
5145  020316  001003                          BNE     8$              ;;BR IF NO
5146  020320  104400  020432                  TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
5147  020324  000726                          BR      1$              ;;GO START OVER
5148  020326  122713  000012          8$:     CMPB    #12,(R3)        ;;IS CHARACTER A "LF"?
5149  020332  001011                          BNE     3$              ;;BRANCH IF NO
5150  020334  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
5151  020336  104400  001207                  TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
5152  020342  104400  020437                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
5153  020346  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
5154  020350  104400  001206          4$:     TYPE    ,$QUES          ;;TYPE A '?'
5155  020354  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
5156  020356  111337  020430          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
5157  020362  104400  020430                  TYPE    ,9$
5158  020366  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
5159  020372  001305                          BNE     2$              ;;LOOP IF NOT RETURN
5160  020374  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
5161  020400  104400  001210                  TYPE    ,$LF            ;;TYPE A LINE FEED
5162  020404  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
5163  020406  012603                          MOV     (SP)+,R3        ;;RESTORE R3
5164  020410  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
5165  020412  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
5166  020420  012766  020437  000004          MOV     #$TTYIN,4(SP)
5167  020426  000002                          RTI                     ;;RETURN
5168  020430     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
5169  020431     000                          .BYTE   0               ;;TERMINATOR
5170  020432  052536  005015     000  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
5171  020437  000024                  $TTYIN: .BLKB   20.             ;;RESERVE 20. BYTES FOR TTY INPUT
5172  020463     136  006503  000012  $CNTLC: .ASCIZ  /^C/<15><12>    ;;CONTROL "C"
5173                                  ;******************************************************************
5174
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                                .SBTTL  SCOPE HANDLER ROUTINE
                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                                ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW14=1         LOOP ON TEST
                                ;*SW11=1         INHIBIT ITERATIONS
                                ;*SW09=1         LOOP ON ERROR
                                ;*CALL
                                ;*      SCOPE           ;;SCOPE=IOT

020470                          $SCOPE:
020470  006137  177570                  ROL     @#SWR           ;;LOOP ON PRESENT TEST?
020474  100476                  BMI     $OVER           ;;YES IF SW14=1
                                ;#####START OF CODE FOR THE XOR TESTER#####
020476  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                        ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
020500  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
020504  012737  020524  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
020512  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
020516  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
020522  000450                  BR      $SVLAD          ;;GO TO THE NEXT TEST
020524  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
020526  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
020532  000413                  BR      7$              ;;LOOP ON THE PRESENT TEST
020534                          6$:;#####END OF CODE FOR THE XOR TESTER#####
020534  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
020540  001421                  BEQ     3$              ;;BR IF NO
020542  123737  001115  001103          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
020550  101015                  BHI     3$              ;;BR IF NO
020552  032737  001000  177570          BIT     #BIT09,@#SWR    ;;LOOP ON ERROR?
020560  001404                  BEQ     4$              ;;BR IF NO
020562  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
020570  000440                  BR      $OVER
020572  105037  001103          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
020576  005037  001176                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
020602  000412                  BR      1$              ;;ESCAPE TO THE NEXT TEST
020604  032737  004000  177570  3$:     BIT     #BIT11,@#SWR    ;;INHIBIT ITERATIONS?
020612  001006                  BNE     1$              ;;BR IF YES
020614  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
020620  023737  001176  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
020626  002021                  BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
020630  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
020636  013737  020706  001176          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
020644  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
020650  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
020654  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
020660  005037  001200                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
020664  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
020672  013737  001102  177570  $OVER:  MOV     $TSTNM,@#DISPLAY;;DISPLAY TEST NUMBER
020700  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
020704  000002                  RTI                     ;;FIXES PS
020706  000001                  $MXCNT: 1               ;;MAX. NUMBER OF ITERATIONS
                                ;*******************************************************************
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                                        .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES

                                        ;*SAVE R0-R5
                                        ;*CALL:
                                        ;*      SAVREG
                                        ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
                                        ;*
                                        ;*TOP---(+16)
                                        ;* +2---(+18)
                                        ;* +4---R5
                                        ;* +6---R4
                                        ;* +8---R3
                                        ;*+10---R2
                                        ;*+12---R1
                                        ;*+14---R0

020710                                  $SAVREG:
020710  010046                                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
020712  010146                                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
020714  010246                                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
020716  010346                                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
020720  010446                                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
020722  010546                                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
020724  016646  000022                         MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
020730  016646  000022                         MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
020734  016646  000022                         MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
020740  016646  000022                         MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
020744  000002                                  RTI

                                        ;*RESTORE R0-R5
                                        ;*CALL:
                                        ;*      RESREG
020746                                  $RESREG:
020746  012666  000022                         MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
020752  012666  000022                         MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
020756  012666  000022                         MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
020762  012666  000022                         MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
020766  012605                                  MOV     (SP)+,R5        ;;POP STACK INTO R5
020770  012604                                  MOV     (SP)+,R4        ;;POP STACK INTO R4
020772  012603                                  MOV     (SP)+,R3        ;;POP STACK INTO R3
020774  012602                                  MOV     (SP)+,R2        ;;POP STACK INTO R2
020776  012601                                  MOV     (SP)+,R1        ;;POP STACK INTO R1
021000  012600                                  MOV     (SP)+,R0        ;;POP STACK INTO R0
021002  000002                                  RTI
                                        ;*****************************************************************

                                        .SBTTL  TRAP DECODER

                                        ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
                                        ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                        ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                        ;*GO TO THAT ROUTINE.

021004  010046                          $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
021006  016600  000002                         MOV     2(SP),R0        ;;GET TRAP ADDRESS
021012  005740                                 TST     -(R0)           ;;BACKUP BY 2
```

```
5287  021014  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
5288  021016  016000  021024                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
5289  021022  000200                          RTS     R0              ;;GO TO ROUTINE
5290
5291
5292                                  .SBTTL  TRAP TABLE
5293
5294                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
5295                                  ;*BY THE "TRAP" INSTRUCTION.
5296
5297                                  ;       ROUTINE
5298                                  ;       -------
5299  021024                          $TRPAD:
5300  021024  017144                          $TYPE   ;;CALL=TYPE     TRAP+0(104400)  TTY TYPEOUT ROUTINE
5301  021026  017276                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
5302  021030  017252                          $TYPOS  ;;CALL=TYPOS    TRAP+4(104404)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
5303  021032  017312                          $TYPON  ;;CALL=TYPON    TRAP+6(104406)  TYPE OCTAL NUMBER (AS PER LAST CALL)
5304  021034  017500                          $TYPDS  ;;CALL=TYPDS    TRAP+10(104410) TYPE DECIMAL NUMBER (WITH SIGN)
5305  021036  020112                          $RDCHR  ;;CALL=RDCHR    TRAP+12(104412) TTY TYPEIN CHARACTER ROUTINE
5306  021040  020176                          $RDLIN  ;;CALL=RDLIN    TRAP+14(104414) TTY TYPEIN STRING ROUTINE
5307  021042  020710                          $SAVREG ;;CALL=SAVREG   TRAP+16(104416) SAVE R0-R5 ROUTINE
5308  021044  020746                          $RESREG ;;CALL=RESREG   TRAP+20(104420) RESTORE R0-R5 ROUTINE
5309  021046  016252                          TYP22   ;;CALL=TYP22    TRAP+22(104422) TYPE 22 BITS
5310                                  ;******************************************************************
5311
5312                                  .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
5313
5314                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
5315                                  ;*UNSIGNED OCTAL ASCIZ NUMBER.
5316                                  ;*CALL
5317                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
5318                                  ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
5319                                  ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
5320
5321
5322  021050  104416                  $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
5323  021052  016601  000002                  MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
5324  021056  012705  021167                  MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
5325  021062  012704  000014                  MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
5326  021066  012703  177770                  MOV     #^C7,R3         ;;MASK
5327  021072  012100                          MOV     (R1)+,R0        ;;LOWER WORD
5328  021074  012101                          MOV     (R1)+,R1        ;;HIGH WORD
5329  021076  005002                          CLR     R2              ;;TERMINATOR
5330  021100  110245                  1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
5331  021102  010002                          MOV     R0,R2           ;;GET THIS DIGIT
5332  021104  005304                          DEC     R4              ;;COUNT THIS CHARACTER
5333  021106  003007                          BGT     3$              ;;BR IF NOT THE LAST DIGIT
5334  021110  001405                          BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
5335  021112  005205                          INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
5336  021114  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
5337  021120  104420                          RESREG                  ;;RESTORE ALL REGISTERS
5338  021122  000207                          RTS     PC              ;;RETURN TO USER
5339  021124  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
5340  021126  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
5341  021130  006000                          ROR     R0              ;;      THE NEXT OCTAL DIGIT
5342  021132  006001                          ROR     R1
```

```
5343  021134  006000                          ROR     R0
5344  021136  006001                          ROR     R1
5345  021140  006000                          ROR     R0
5346  021142  040302                          BIC     R3,R2           ;;MASK OUT ALL JUNK
5347  021144  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
5348  021150  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
5349  021152  000016              $OCTVL: .BLKB   14.                 ;;RESERVE DATA TABLE
5350                                ;*****************************************************************
5351
5352                                .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
5353
5354                                ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
5355                                ;*UNSIGNED DECIMAL ASCIZ NUMBER.
5356                                ;*CALL
5357                                ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
5358                                ;*      JSR     PC,@#$SB2D      ;;CALL
5359                                ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
5360
5361
5362  021170  016637  000002  021214  $SB2D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
5363  021176  012746  021214                  MOV     #1$,-(SP)       ;;SET POINTER
5364  021202  004737  021220                  JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
5365  021206  012666  000002                  MOV     (SP)+,2(SP)     ;;PICKUP POINTER
5366  021212  000207                          RTS     PC              ;;RETURN
5367  021214  000000  000000          1$:     .WORD   0,0
5368                                ;*****************************************************************
5369
5370                                .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
5371
5372                                ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
5373                                ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
5374                                ;*POSITIVE.
5375                                ;*CALL
5376                                ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
5377                                ;*      JSR     PC,@#$DB2D
5378                                ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
5379                                                                ;;IS ON THE STACK
5380
5381
5382  021220  104416              $DB2D:  SAVREG                  ;;SAVE REGISTERS
5383  021222  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
5384  021226  012700  021400                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
5385  021232  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
5386  021236  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
5387  021240  012202                          MOV     (R2)+,R2
5388  021242  012737  000012  021316          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
5389  021250  012704  021330                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
5390  021254  012705  021332                  MOV     #$TNPWR+2,R5
5391  021260  005003              1$:     CLR     R3              ;;CLEAR PARTIAL
5392  021262  161401              2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
5393  021264  005602                          SBC     R2
5394  021266  161502                          SUB     (R5),R2
5395  021270  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE
5396  021272  005203                          INC     R3              ;;ADD 1 TO PARTIAL
5397  021274  000772                          BR      2$              ;;LOOP
5398  021276  062401              3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
```

```
5399   021300  005502                          ADC     R2
5400   021302  062402                          ADD     (R4)+,R2
5401   021304  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
5402   021306  052703  000060                  BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
5403   021312  110320                          MOVB    R3,(R0)+        ;;SAVE IT
5404   021314  005327                          DEC     (PC)+           ;;DONE?
5405   021316  000000                  4$:     .WORD   0
5406   021320  001357                          BNE     1$              ;;BR IF NO
5407   021322  105020                          CLRB    (R0)+           ;;TERMINATOR
5408   021324  104420                          RESREG                  ;;RESTORE REGISTERS
5409   021326  000207                          RTS     PC              ;;RETURN
5410   021330  145000                  $TNPWR: 145000                  ;;1.0E09
5411   021332  035632                          35632
5412   021334  160400                          160400                  ;;1.0E08
5413   021336  002765                          2765
5414   021340  113200                          113200                  ;;1.0E07
5415   021342  000230                          230
5416   021344  041100                          041100                  ;;1.0E06
5417   021346  000017                          17
5418   021350  103240                          103240                  ;;1.0E05
5419   021352  000001                          1
5420   021354  023420                          23420                   ;;1.0E04
5421   021356  000000                          0
5422   021360  001750                          1750                    ;;1.0E03
5423   021362  000000                          0
5424   021364  000144                          144                     ;;1.0E02
5425   021366  000000                          0
5426   021370  000012                          12                      ;;1.0E01
5427   021372  000000                          0
5428   021374  000001                          1                       ;;1.0E00
5429   021376  000000                          0
5430   021400  000014                  $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
5431                                  ;*****************************************************************
5432
5433                                  .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
5434
5435                                  ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
5436                                  ;*LEADING NUMBERS.
5437                                  ;*CALL
5438                                  ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
5439                                  ;*      JSR     PC,@#$SUPRS
5440
5441
5442   021414  010046                  $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
5443   021416  016600  000004                  MOV     4(SP),R0        ;;PICKUP THE POINTER
5444   021422  105710                  1$:     TSTB    (R0)            ;;TERMINATEOR?
5445   021424  001403                          BEQ     2$              ;;BR IF YES
5446   021426  122720  000060                  CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
5447   021432  001773                          BEQ     1$              ;;BR IF YES
5448   021434  005300                  2$:     DEC     R0              ;;BACKUP BY "1"
5449   021436  010037  021444                  MOV     R0,3$           ;;SAVE FOR TYPING
5450   021442  104400                          TYPE                    ;;GO TYPE
5451   021444  000000                  3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
5452   021446  012600                          MOV     (SP)+,R0        ;;RESTORE R0
5453   021450  012616                          MOV     (SP)+,(SP)      ;;RESTORE THE STACK
5454   021452  000207                          RTS     PC              ;;RETURN
```

```
                                ;*****************************************************************

                                .SBTTL  INTEGER DIVIDE ROUTINE

                                ;*THIS ROUTINE WILL DIVIDE A 32-BIT TWO'S COMPLEMENT INTEGER
                                ;*DIVIDEND BY A 16-BIT TWO'S COMPLEMENT INTEGER DIVISOR GIVING
                                ;*A 16-BIT TWO'S COMPLEMENT INTEGER QUOTIENT AND A 16-BIT REMAINDER.
                                ;*DIVISION WILL BE PERFORMED SO THAT THE REMAINDER IS OF THE
                                ;*SAVE SIGN AS THE DIVIDEND.
                                ;*CALL:
                                ;*      MOV     LOW DIVIDEND,-(SP) ;;THE HIGH DIVIDEND MUST BE < 1/2
                                ;*      MOV     HIGH DIVIDEND,-(SP);    AS LARGE AS THE DIVISOR
                                ;*      MOV     DIVISOR,-(SP)
                                ;*      JSR     PC,$DIV
                                ;*      RETURN                  ;;QUOTIENT & REMAINDER ARE ON THE STACK
                                ;*      "V"=0   IMPLIES NO ERROR
                                ;*      "V"=1   IMPLIES ERROR OCCURRED
                                ;*              "C"=0   DIVIDE OVERFLOW OCCURRED
                                ;*              "C"=1   ATTEMPTED TO DIVIDE BY ZERO
                                ;*
                                ;*
                                ;*      STACK   NO ERROR        OVERFLOW        DIVIDE BY ZERO
                                ;*      -----   --------        --------        --------------
                                ;*      TOP     REMAINDER       ALL ZEROS       ALL ONES
                                ;*      +2      QUOTIENT        ALL ZEROS       ALL ONES

021454 013746 177776            $DIV:   MOV     @#PS,-(SP)      ;;SAVE THE PROCESSOR STATUS
021460 042716 000017                    BIC     #17,(SP)        ;;STRIP AWAY CONDITION CODES
021464 010046                           MOV     R0,-(SP)        ;;PUSH R0 ON STACK
021466 010146                           MOV     R1,-(SP)        ;;PUSH R1 ON STACK
021470 010246                           MOV     R2,-(SP)        ;;PUSH R2 ON STACK
021472 010346                           MOV     R3,-(SP)        ;;PUSH R3 ON STACK
021474 005046                           CLR     -(SP)           ;;SAVE A PLACE FOR SIGNS
021476 012746 000021                    MOV     #17.,-(SP)      ;;SETUP THE ITERATION COUNTER
021502 016601 000024                    MOV     24(SP),R1       ;;PICKUP THE DIVIDEND
021506 016600 000022                    MOV     22(SP),R0
021512 100005                           BPL     1$              ;;CHECK THE SIGN
021514 105366 000003                    DECB    3(SP)           ;;KEEP TRACK OF THE SIGN
021520 005400                           NEG     R0              ;;AND NEGATE THE ORIGINAL
021522 005401                           NEG     R1              ;;NUMBER
021524 005600                           SBC     R0
021526 016602 000020            1$:     MOV     20(SP),R2       ;;PICKUP THE DIVISOR
021532 002407                           BLT     2$              ;;CHECK THE SIGN
021534 003011                           BGT     3$              ;;DIVISOR OF 0 IS A NO-NO
021536 052766 000003 000014             BIS     #3,14(SP)       ;;SET "V" & "C"
021544 012700 177777                    MOV     #-1,R0          ;;SET REMAINDER TO ALL ONES
021550 000424                           BR      7$              ;;EXIT
021552 005266 000002            2$:     INC     2(SP)           ;;KEEP TRACK OF DIVISORS SIGN
021556 000401                           BR      4$
021560 005402                   3$:     NEG     R2              ;;NEGATE THE ORIGINAL NUMBER
021562 000241                   4$:     CLC                     ;;CLEAR "C"
021564 000405                           BR      6$              ;;START FORMING QUOTIENT
021566 006100                   5$:     ROL     R0              ;;POSITION MSB'S
021570 010003                           MOV     R0,R3           ;;COPY
021572 060203                           ADD     R2,R3           ;;COMPARE DIVIDEND & DIVISOR
021574 103001                           BCC     6$              ;;BR IF DIVIDEND > DIVISOR
```

```
5511  021576  010300                        MOV     R3,R0           ;;REMAINDER AFTER THIS LOOP
5512  021600  006101                6$:     ROL     R1              ;;QUOTIENT BIT ENTERS HERE
5513  021602  005316                        DEC     (SP)            ;;DONE?
5514  021604  001370                        BNE     5$              ;;BR IF NO
5515  021606  005701                        TST     R1              ;;OVERFLOW?
5516  021610  100005                        BPL     8$              ;;BR IF NO
5517  021612  052766  000002  000014        BIS     #2,14(SP)       ;;SET "V" IN RETURN STATUS WORD
5518  021620  005000                        CLR     R0              ;;SET REMAINDER TO ALL ZEROS
5519  021622  010001                7$:     MOV     R0,R1           ;;COPY REMAINDER INTO QUOTIENT
5520  021624  005726                8$:     TST     (SP)+           ;;CLEAR COUNTER FROM STACK
5521  021626  005716                        TST     (SP)            ;;REMAINDER SIGN CORRECTION NEEDED?
5522  021630  002004                        BGE     9$              ;;BR IF NO
5523  021632  005400                        NEG     R0              ;;NEGATE REMAINDER
5524  021634  105066  000001                CLRB    1(SP)           ;;CLEAR SIGN
5525  021640  005316                        DEC     (SP)            ;;BUT DON'T FORGET QUOTIENT
5526  021642  005726                9$:     TST     (SP)+           ;;QUOTIENT SIGN CORRECTION NEEDED?
5527  021644  001401                        BEQ     10$             ;;BR IF NO
5528  021646  005401                        NEG     R1              ;;NEGATE QUOTIENT
5529  021650  010166  000020        10$:    MOV     R1,20(SP)       ;;RETURN QUOTIENT AND
5530  021654  010066  000016                MOV     R0,16(SP)       ;;REMAINDER TO USER
5531  021660  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
5532  021662  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
5533  021664  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
5534  021666  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
5535  021670  012666  000002                MOV     (SP)+,2(SP)     ;;SETUP TO RETURN CONDITION CODES
5536  021674  000002                        RTI                     ;;RETURN
5537                                ;*****************************************************************
5538
5539                                .SBTTL  RANDOM NUMBER GENERATOR ROUTINE
5540
5541                                ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
5542                                ;*WITH A RANGE OF 0 TO 2(+33)-1.
5543                                ;*CALL:
5544                                ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
5545                                ;*      RETURN                  ;;RETURN HERE THE RANDOM
5546                                ;*                              ;;NUMBER WILL BE IN
5547                                ;*                              ;;$HINUM,$LONUM
5548
5549  021676                        $RAND:
5550  021676  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
5551  021700  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5552  021702  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
5553  021704  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
5554  021706  013700  022024                MOV     $LONUM,R0       ;;SET R0 WITH LOW
5555  021712  013701  022022                MOV     $HINUM,R1       ;;SET R1 WITH HIGH
5556  021716  012703  177771                MOV     #-7,R3          ;;SET SHIFT COUNT
5557  021722  005002                        CLR     R2              ;;ZERO R2
5558  021724  006300                1$:     ASL     R0              ;;SHIFT R0 LEFT AND
5559  021726  006101                        ROL     R1              ;;ROTATE CARRY INTO R1 AND
5560  021730  006102                        ROL     R2              ;;ROTATE CARRY INTO R2
5561  021732  005203                        INC     R3              ;;CHECK FOR DONE
5562  021734  001373                        BNE     1$              ;;CONTINUE SHIFT LOOP
5563  021736  063700  022024                ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
5564  021742  005501                        ADC     R1              ;;PROPOGATE CARRY
5565  021744  063701  022022                ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
5566  021750  005502                        ADC     R2              ;;PROPOGATE CARRY
```

```
5567  021752  062700  001057                    ADD     #1057,R0        ;;ADD LOW CONSTANT
5568  021756  005501                            ADC     R1              ;;PROPOGATE CARRY
5569  021760  005502                            ADC     R2              ;;PROPOGATE CARRY
5570  021762  062701  047401                    ADD     #47401,R1       ;;ADD HIGH CONSTANT
5571  021766  005502                            ADC     R2              ;;PROPOGATE CARRY
5572  021770  062702  000006                    ADD     #6,R2           ;;ADD HIGHEST CONSTART
5573  021774  060200                            ADD     R2,R0           ;;REPRIME R0 WITH HIGHEST DIGIT
5574  021776  005501                            ADC     R1              ;;PROPOGATE CARRY
5575  022000  010037  022024                    MOV     R0,$LONUM       ;;SAVE R0
5576  022004  010137  022022                    MOV     R1,$HINUM       ;;SAVE R1
5577  022010  012603                            MOV     (SP)+,R3        ;;POP STACK INTO R3
5578  022012  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
5579  022014  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
5580  022016  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
5581  022020  000207                            RTS     PC              ;;RETURN
5582  022022  176543                $HINUM: .WORD   176543
5583  022024  123456                $LONUM: .WORD   123456
5584                                ;******************************************************************
5585
5586                                .SBTTL  ROUTINE TO SIZE MEMORY
5587
5588                                ;*CALL:
5589                                ;*      JSR     PC,$SIZE
5590                                ;*      RETURN
5591                                ;*$LSTAD WILL CONTAIN:
5592                                ;*      WITH KT11 OPTION        -- LAST VIRTUAL ADDRESS OF THE LAST BANK
5593                                ;*      WITHOUT KT11 OPTION     -- LAST ABSOLUTE ADDRESS OF AVAILABLE MEMORY
5594                                ;*$LSTBK WILL CONTAIN THE LAST BANK AS A SAF
5595                                ;*$KT11 IS THE MEMORY MANAGEMENT KEY
5596                                ;*BIT07 = 0 DON'T USE MEMORY MANAGEMENT
5597                                ;*      MUST BE SETUP BEFORE THE CALL
5598                                ;*BIT15 = 0 DON'T HAVE MEMORY MANAGEMENT OPTION
5599                                ;*      DETERMINED BY ROUTINE
5600
5601  022026  010046                $SIZE:  MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
5602  022030  010146                        MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
5603  022032  010246                        MOV     R2,-(SP)        ;;SAVE R2 ON THE STACK
5604  022034  010346                        MOV     R3,-(SP)        ;;SAVE R3 ON THE STACK
5605  022036  013746  000004                MOV     @#ERRVEC,-(SP)  ;;SAVE PRESENT ERROR VECTOR PS & PC
5606  022042  013746  000006                MOV     @#ERRVEC+2,-(SP)
5607  022046  010600                        MOV     SP,R0           ;;SAVE THE STACK POINTER
5608  022050  013737  177776  000006        MOV     @#PS,@#ERRVEC+2 ;;SET ERRVEC PS TO PRESENT PS
5609  022056  012701  003776                MOV     #3776,R1        ;;SETUP ADDRESS
5610  022062  105727                        TSTB    (PC)+           ;;USE MEMORY MANAGEMENT?
5611  022064  000200                $KT11:  .WORD   200             ;;SET TO USE MEMORY MANAGEMENT
5612  022066  100063                        BPL     $CORE           ;;BR IF NO
5613  022070  012737  022230  000004        MOV     #$KTNEX,@#ERRVEC ;;SET FOR TIMEOUT
5614  022076  005737  177572                TST     @#SR0           ;;KT11 ARE YOU THERE?
5615  022102  052737  100000  022064        BIS     #100000,$KT11   ;;YES--SET KT11 KEY
5616  022110  012737  022336  000250        MOV     #MMER,@#MMVEC   ;;SET IN CASE OF ERROR
5617  022116  012737  000340  000252        MOV     #340,@#MMVEC+2
5618  022124  005046                        CLR     -(SP)           ;;INITIALIZE FOR "PAR" LOADING
5619  022126  012702  172340                MOV     #KIPAR0,R2      ;;ADDRESS OF FIRST "PAR"
5620  022132  012703  000010                MOV     #^D8,R3         ;;LOAD EIGHT "PAR.'S" AND EIGHT "PDR.'S"
5621  022136  012762  077406  177740  1$:   MOV     #77406,-40(R2)  ;;PDR = 4K, UP, READ/WRITE
5622  022144  011622                        MOV     (SP),(R2)+      ;;LOAD "PAR"
```

```
5623  022146  062716  000200                    ADD     #200,(SP)       ;;UPDATE FOR NEXT "PAR"
5624  022152  077307                            SOB     R3,1$           ;;LOOP UNTIL ALL EIGHT ARE LOADED
5625  022154  012742  177600                    MOV     #177600,-(R2)   ;;SETUP KIPAR7 FOR I/O
5626  022160  005042                            CLR     -(R2)           ;;SETUP KIPAR6 FOR TESTING
5627  022162  012737  000020  172516            MOV     #20,@#SR3       ;;ENABLE 22 BIT MODE
5628  022170  005237  177572                    INC     @#SR0           ;;TURN ON MEMORY MANAGEMENT
5629  022174  012737  022220  000004            MOV     #$KTOUT,@#ERRVEC ;;SET FOR TIME OUT
5630  022202  005737  143776          2$:       TST     @#143776        ;;TRAP ON NON-EX-MEM
5631  022206  062712  000040                    ADD     #40,(R2)        ;;MAKE A 1K STEP
5632  022212  023712  172356                    CMP     @#KIPAR7,(R2)   ;;LAST ONE?
5633  022216  101371                            BHI     2$              ;;NO--TRY IT
5634  022220  011202                $KTOUT:     MOV     (R2),R2         ;;GET LAST BANK+1
5635  022222  005037  177572                    CLR     @#SR0           ;;TURN OFF MEMORY MANAGEMENT
5636  022226  000421                            BR      $SIZEX
5637  022230  042737  100000  022064  $KTNEX:   BIC     #100000,$KT11   ;;KT11 NON-EXISTENT
5638  022236  012737  022266  000004  $CORE:    MOV     #$CROUT,@#ERRVEC ;;SET FOR TIMEOUT
5639  022244  005002                            CLR     R2              ;;SET UP BANK
5640  022246  062701  004000          1$:       ADD     #4000,R1        ;;INCREMENT BY 1K
5641  022252  062702  000040                    ADD     #40,R2          ;;1K STEP
5642  022256  005711                            TST     (R1)            ;;TRAP ON TIME OUT
5643  022260  022701  177776                    CMP     #177776,R1      ;;LAST ONE
5644  022264  001370                            BNE     1$              ;;NO--TRY AGAIN
5645  022266  162701  004000          $CROUT:   SUB     #4000,R1
5646  022272  162702  000040          $SIZEX:   SUB     #40,R2          ;;DROP BACK
5647  022276  010006                            MOV     R0,SP           ;;RESTORE THE STACK
5648  022300  012637  000006                    MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
5649  022304  012637  000004                    MOV     (SP)+,@#ERRVEC
5650  022310  010137  022332                    MOV     R1,$LSTAD       ;;LAST ADDRESS
5651  022314  010237  022334                    MOV     R2,$LSTBK       ;;LAST BANK
5652  022320  012603                            MOV     (SP)+,R3        ;;RESTORE R3
5653  022322  012602                            MOV     (SP)+,R2        ;;RESTORE R2
5654  022324  012601                            MOV     (SP)+,R1        ;;RESTORE R1
5655  022326  012600                            MOV     (SP)+,R0        ;;RESTORE R0
5656  022330  000207                            RTS     PC
5657  022332  000000                $LSTAD:   .WORD   0               ;;CONTAINS THE LAST ADDRESS
5658  022334  000000                $LSTBK:   .WORD   0               ;;CONTAINS THE LAST BANK
5659  022336  000000                MMER:     HALT
5660
5661                                ;*****************************************************************
5662                                .SBTTL  LP.AVL - LINE PRINTER AVAILABLE
5663                                ;*THIS ROUTINE WILL CHECK IF THERE IS A LINE PRINTER AVAILABLE AND SET
5664                                ;*"LPTAVL" TO THE PROPER STATE.
5665                                ;* LPTAVL = 0 IF NO LINE PRINTER AVAILABLE
5666                                ;* LPTAVL = 1 IF LINE PRINTER IS AVAILABLE
5667                                ;*CALL
5668                                ;*      JSR     PC,@#LP.AVL
5669                                ;*      RETURN
5670
5671  022340  005037  001254        LP.AVL:   CLR     @#LPTAVL        ;START WITH NO PRINTER AVAIABLE
5672  022344  012737  022370  000004          MOV     #1$,@#ERRVEC    ;SETUP THE TIMEOUT VECTOR
5673  022352  005037  000006                  CLR     @#ERRVEC+2
5674  022356  005777  157032                  TST     @LPS            ;IS THERE A LINE PRINTER?
5675  022362  005237  001254                  INC     @#LPTAVL        ;YES--SET AVAILABLE SWITCH
5676  022366  000401                          BR      2$
5677  022370  022626                1$:       CMP     (SP)+,(SP)+     ;NO--POP STACK
5678  022372  012737  000006  000004  2$:     MOV     #ERRVEC+2,@#ERRVEC ;RESTORE TIMEOUT VECTOR
```

```
 5679  022400  000207                          RTS     PC              ;RETURN
 5680
 5681                                  ;*****************************************************************
 5682                                  .SBTTL  ST.CLK - CLOCK STARTUP ROUTINE
 5683                                  ;*THIS ROUTINE WILL DETERMINE IF THERE IS A CLOCK ON THE SYSTEM
 5684                                  ;*AND IF THERE IS IT WILL SETUP THE VECTOR AND START THE CLOCK
 5685                                  ;*"CLKSTA" WILL INDICATE THE CLOCK TYPE
 5686                                  ;* 0= NO CLOCK
 5687                                  ;*+1= KW11-P
 5688                                  ;*-1= KW11-L
 5689                                  ;*THIS ROUTINE WILL ALSO SETUP "TICKMS" (TIME
 5690                                  ;*PER CLOCK TICK IN MILLISECONDS) AND "TICKUS"
 5691                                  ;*(TIME PER CLOCK TICK IN MICROSECONDS) AS
 5692                                  ;*PER SW00.
 5693                                  ;*SW00=0 -- 60HZ
 5694                                  ;*SW00=1 -- 50HZ
 5695                                  ;*CALL
 5696                                  ;*      JSR     PC,@#ST.CLK
 5697                                  ;*      RETURN
 5698
 5699  022402  010146                  ST.CLK: MOV     R1,-(SP)        ;SAVE R1
 5700  022404  012701  000006                  MOV     #ERRVEC+2,R1    ;SAVE AND SETUP TIMEOUT VECTOR
 5701  022410  011146                          MOV     (R1),-(SP)
 5702  022412  005011                          CLR     (R1)            ;LEVEL 0
 5703  022414  014146                          MOV     -(R1),-(SP)
 5704  022416  012711  022446                  MOV     #1$,(R1)        ;GO TO 1$ ON TIMEOUT
 5705  022422  005037  001262                  CLR     CLKSTA          ;SET CLOCK STATUS TO NO CLOCK
 5706  022426  005777  156742                  TST     @PKCS           ;IS THERE A KW11-P?
 5707  022432  012737  000001  001262          MOV     #1,CLKSTA       ;YES--SET STATUS TO KW11-P
 5708  022440  004737  022550                  JSR     PC,ST.PCLK      ;START THE KW11-P
 5709  022444  000414                          BR      3$              ;GO TO EXIT
 5710  022446  022626                  1$:     CMP     (SP)+,(SP)+     ;CLEAN UP THE STACK
 5711  022450  012711  022474                  MOV     #2$,(R1)        ;IF TIMEOUT GO TO 2$
 5712  022454  005777  156726                  TST     @LKS            ;IS THERE A KW11-L?
 5713  022460  012737  177777  001262          MOV     #-1,CLKSTA      ;YES-- SET STATUS TO KW11-L
 5714  022466  004737  022612                  JSR     PC,ST.LCLK      ;START THE KW11-L
 5715  022472  000401                          BR      3$              ;EXIT
 5716  022474  022626                  2$:     CMP     (SP)+,(SP)+     ;CLEAN UP THE STACK
 5717  022476  012621                  3$:     MOV     (SP)+,(R1)+     ;RESTORE THE TIMEOUT VECTOR
 5718  022500  012621                          MOV     (SP)+,(R1)+
 5719  022502  012601                          MOV     (SP)+,R1        ;RESTORE R1
 5720  022504  032737  000100  001246          BIT     #SW06,@#C.SWR   ;50HZ OR 60HZ?
 5721  022512  001407                          BEQ     4$              ;BRANCH IF 60
 5722  022514  012737  000020  001264          MOV     #20,@#TICKMS    ;SETUP TIME PER
 5723  022522  012737  047040  001266          MOV     #20000.,@#TICKUS ;TICK FOR 50HZ
 5724  022530  000406                          BR      5$
 5725  022532  012737  000016  001264  4$:     MOV     #16,@#TICKMS    ;SETUP TIME PER
 5726  022540  012737  040432  001266          MOV     #16666.,@#TICKUS ;TICK FOR 60HZ
 5727  022546  000207                  5$:     RTS     PC              ;RETURN
 5728
 5729  022550                          ST.PCLK:
 5730  022550  032737  000040  001246          BIT     #SW05,@#C.SWR   ;ALLOW SOFTWARE TIMEOUTS?
 5731  022556  001014                          BNE     1$              ;NO--BRANCH
 5732  022560  012777  022646  156602          MOV     #SRVCLK,@PKV    ;SETUP THE KW11-P VECTOR
 5733  022566  012777  000300  156576          MOV     #300,@PKV+2
 5734  022574  012777  000001  156574          MOV     #1,@PKB         ;COUNT ONE TICK
```

```
 5735  022602  012777  000115  156564          MOV     #115,@PKCS      ;"INT.EN.", COUNT DOWN", "MODE 1 (REPEAT)",
 5736                                                                    ;"LINE FREQ", AND "RUN"
 5737  022610  000207                  1$:     RTS     PC              ;RETURN
 5738
 5739  022612                          ST.LCLK:
 5740  022612  032737  000040  001246          BIT     #SW05,@#C.SWR   ;ALLOW SOFTWARE TIMEOUTS?
 5741  022620  001011                          BNE     1$              ;NO--BRANCH
 5742  022622  012777  022646  156552          MOV     #SRVCLK,@LKV    ;SETUP THE KW11-L VECTOR
 5743  022630  012777  000300  156546          MOV     #300,@LKV+2
 5744  022636  012777  000100  156542          MOV     #100,@LKS       ;START THE KW11-L
 5745  022644  000207                  1$:     RTS     PC              ;RETURN
 5746
 5747  022646  013746  001264          SRVCLK: MOV     @#TICKMS,-(SP)  ;TIME PER TICK IN MILLISECONDS
 5748  022652  004037  036144                  JSR     R0,@#RPTMR      ;COUNT THE ELASPED TIME
 5749  022656  000002                          RTI                     ;RETURN AFTER INTERRUPT
 5750
 5751                                  ;*******************************************************************
 5752                                  .SBTTL  LDCMD - LOAD COMMAND
 5753                                  ;*THIS ROUTINE LOADS A READ HEADER AND DATA COMMAND OR A SEEK COMMAND
 5754                                  ;*INTO DPB.B+2 AND DPB.C+2, DEPENDING ON THE STATE OF "CONTROL SWITCH"
 5755                                  ;*BIT07.
 5756                                  ;*CALL
 5757                                  ;*      JSR     PC,@#LDCMD
 5758                                  ;*      RETURN
 5759
 5760  022660  032737  000200  001246  LDCMD:  BIT     #SW07,@#C.SWR   ;DO EXPLICIT SEEKS?
 5761  022666  001007                          BNE     1$              ;YES--BRANCH
 5762  022670  012737  000173  003516          MOV     #READHD,@#DPB.B+2 ;NO--SET UP FOR READ HEADER AND
 5763  022676  012737  000173  003536          MOV     #READHD,@#DPB.C+2 ;DATA COMMAND
 5764  022704  000406                          BR      2$
 5765  022706  012737  000105  003516  1$:     MOV     #SEEK,@#DPB.B+2 ;SETUP FOR SEEK COMMAND
 5766  022714  012737  000105  003536          MOV     #SEEK,@#DPB.C+2
 5767  022722  000207                  2$:     RTS     PC
 5768
 5769                                  ;*******************************************************************
 5770                                  .SBTTL  CALL.A - CALL RP04 DRIVER USING "DPB.A"
 5771                                  ;*THIS ROUTINE WILL CALL THE RP04 DRIVER AND THEN WAIT ON THE FUNCTION
 5772                                  ;*TO COMPLETE. IF AN ERROR OCCURS IT IS REPORTED.
 5773                                  ;*CALL
 5774                                  ;*      FILL "DPB" WITH COMMAND INFORMATION
 5775                                  ;*      JSR     R0,@#CALL.A
 5776                                  ;*      RETURN
 5777
 5778  022724  005037  001200          CALL.A: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
 5779  022730  004037  032766                  JSR     R0,@#RP04       ;CALL RP04 DRIVER
 5780  022734  003474                          DPB.A
 5781  022736  000772                          BR      CALL.A
 5782  022740  005737  003512          1$:     TST     @#DPB.A+16      ;DONE?
 5783  022744  001775                          BEQ     1$              ;NO--LOOP
 5784  022746  100030                          BPL     3$              ;BRANCH IF NO ERROR
 5785  022750  012737  023024  001200          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
 5786  022756  013737  003506  001306          MOV     @#DPB.A+12,@#CYL.DS ;CYLINDER
 5787  022764  113737  003505  001312          MOVB    @#DPB.A+11,@#TRK.DS ;TRACK
 5788  022772  113737  003504  001310          MOVB    @#DPB.A+10,@#SEC.DS ;SECTOR
 5789  023000  012746  003512                  MOV     #DPB.A+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
 5790  023004  004737  024026                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
```

```
5791  023010  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5792  023012  104041                          ERROR   41              ;
5793  023014  104042                          ERROR   42              ;PARITY ERROR
5794  023016  104043                          ERROR   43              ;UNSAFE ERROR
5795  023020  104044                          ERROR   44              ;NON-I/O ERROR
5796  023022  104045                          ERROR   45              ;I/O ERROR
5797  023024  013700  001270          2$:     MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
5798  023030  000200                  3$:     RTS     R0              ;RETURN
5799
5800                                  ;*****************************************************************
5801                                  .SBTTL  CALL.B - CALL RP04 DRIVER USING "DPB.B"
5802                                  ;*THIS ROUTINE IS THE SAME AS "CALL.A" EXCEPT FOR THE DPB USED AND IF
5803                                  ;*THE COMMAND IS A READ HEADER AND DATA THE HEADER (CYLINDER, TRACK,
5804                                  ;*AND SECTOR) READ IS CHECKED FOR VALIDITY.
5805                                  ;*CALL
5806                                  ;*      FILL DPB
5807                                  ;*      JSR     R0,@#CALL.B
5808                                  ;*      RETURN
5809
5810  023032  005037  001200          CALL.B: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5811  023036  004037  032766                  JSR     R0,@#RP04       ;CALL RP04 DRIVER
5812  023042  003514                          DPB.B
5813  023044  000772                          BR      CALL.B
5814  023046  005737  003532          1$:     TST     DPB.B+16        ;DONE?
5815  023052  001775                          BEQ     1$              ;NO--BRANCH
5816  023054  100031                          BPL     3$              ;BRANCH IF NO ERROR
5817  023056  012737  023132  001200          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
5818  023064  013737  003526  001306          MOV     @#DPB.B+12,@#CYL.DS ;CYLINDER
5819  023072  113737  003525  001312          MOVB    @#DPB.B+11,@#TRK.DS ;TRACK
5820  023100  113737  003524  001310          MOVB    @#DPB.B+10,@#SEC.DS ;SECTOR
5821  023106  012746  003532                  MOV     #DPB.B+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5822  023112  004737  024026                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5823  023116  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5824  023120  104041                          ERROR   41              ;
5825  023122  104042                          ERROR   42              ;PARITY ERROR
5826  023124  104043                          ERROR   43              ;UNSAFE ERROR
5827  023126  104044                          ERROR   44              ;NON-I/O ERROR
5828  023130  104045                          ERROR   45              ;I/O ERROR
5829  023132  013700  001270          2$:     MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
5830  023136  000407                          BR      4$
5831  023140  123727  003516  000173  3$:     CMPB    @#DPB.B+2,#READHD ;DOING IMPLIED SEEKS?
5832  023146  001003                          BNE     4$              ;NO--BRANCH
5833  023150  004037  024306                  JSR     R0,@#VERIFY     ;YES--GO CHECK THE DATA
5834  023154  003524                          DPB.B+10
5835  023156  032737  040000  001246  4$:     BIT     #SW14,@#C.SWR   ;STALL?
5836  023164  001403                          BEQ     5$              ;NO--BRANCH
5837  023166  004037  024144                  JSR     R0,@#STALL      ;YES--CALL STALL ROUTINE
5838  023172  001420                          .WORD   STALL1          ;STALL TIME POINTER
5839  023174  000200                  5$:     RTS     R0              ;RETURN
5840
5841                                  ;*****************************************************************
5842                                  .SBTTL  CALL.C - CALL RP04 DRIVER USING "DBP.C"
5843                                  ;*THIS ROUTINE IS THE SAME AS "CALL.B" EXCEPT FOR THE DPB USED.
5844                                  ;*CALL
5845                                  ;*      FILL DPB
5846                                  ;*      JSR     R0,@#CALL.C
```

```
                                        ;*      RETURN
                                        ;
023176  005037  001200          CALL.C: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
023202  004037  032766                  JSR     R0,@#RP04       ;CALL RP04 DRIVER
023206  003534                          DPB.C
023210  000772                          BR      CALL.C
023212  005737  003552          1$:     TST     @#DPB.C+16      ;DONE?
023216  001775                          BEQ     1$              ;NO--LOOP
023220  100031                          BPL     3$              ;YES--BRANCH IF NO ERROR
023222  012737  023276  001200          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
023230  013737  003546  001306          MOV     @#DPB.C+12,@#CYL.DS ;CYLINDER
023236  113737  003545  001312          MOVB    @#DPB.C+11,@#TRK.DS ;TRACK
023244  113737  003544  001310          MOVB    @#DPB.C+10,@#SEC.DS ;SECTOR
023252  012746  003552                  MOV     #DPB.C+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
023256  004737  024026                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
023262  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
023264  104041                          ERROR   41              ;
023266  104042                          ERROR   42              ;PARITY ERROR
023270  104043                          ERROR   43              ;UNSAFE ERROR
023272  104044                          ERROR   44              ;NON-I/O ERROR
023274  104045                          ERROR   45              ;I/O ERROR
023276  013700  001270          2$:     MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
023302  000400                          BR      3$
023304  123727  003536  000173  3$:     CMPB    @#DPB.C+2,#READHD ;DOING IMPLIED SEEK?
023312  001003                          BNE     4$              ;NO--EXIT
023314  004037  [illegible]              JSR     R0,@#VERIFY     ;YES--CHECK THE DATA
023320  003544                          DPB.C+10
023322  032737  040000  001246  4$:     BIT     #SW14,@#C.SWR   ;STALL?
023330  001403                          BEQ     5$              ;NO--BRANCH
023332  004037  024144                  JSR     R0,@#STALL      ;YES--CALL STALL ROUTINE
023336  001420                          .WORD   STALL1          ;STALL TIME POINTER
023340  000200                  5$:     RTS     R0

                                        ;*****************************************************************
                                        .SBTTL  DRVCAL - DRIVER (RP04) CALL USING "DTADPB"
                                        ;*THIS ROUTINE IS THE SAME AS "CALL.A" EXCEPT FOR THE DPB USED AND
                                        ;*ON AN ERROR LOCATION "ERR.CT" IS EXAMINED. IF ERR.CT IS EQUAL TO
                                        ;*$ERFLG EXIT IS TO THE NEXT TEST.
                                        ;*CALL
                                        ;*      FILL DPB
                                        ;*      JSR     R0,@#DRVCAL
                                        ;*      RETURN

023342  005037  001200          DRVCAL: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
023346  005037  001352                  CLR     @#WCEFLG        ;CLEAR WRITE CHECK ERROR FLAG
023352  004037  032766                  JSR     R0,@#RP04       ;CALL RP04 DRIVER
023356  003554                          DTADPB
023360  000770                          BR      DRVCAL
023362  005737  003572          1$:     TST     @#DTADPB+16     ;DONE
023366  001775                          BEQ     1$              ;NO--LOOP
023370  100001                          BPL     12$             ;YES--BRANCH IF NO ERRORS
023372  000402                          BR      13$
023374  000137  024006          12$:    JMP     10$
023400                          13$:
023400  012737  023454  001200          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
```

```
5903  023406  013737  003566  001306          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
5904  023414  113737  003565  001312          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
5905  023422  113737  003564  001310          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
5906  023430  012746  003572                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5907  023434  004737  024026                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5908  023440  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5909  023442  104041                          ERROR   41              ;
5910  023444  104042                          ERROR   42              ;PARITY ERROR
5911  023446  104043                          ERROR   43              ;UNSAFE ERROR
5912  023450  104044                          ERROR   44              ;NON-I/O ERROR
5913  023452  104045                          ERROR   45              ;I/O ERROR
5914  023454  122737  000015  001102  2$:     CMPB    #15,@#$TSTNM    ;TEST 15?
5915  023462  001137                          BNE     8$              ;NO--BRANCH
5916  023464  122737  000017  001102          CMPB    #17,@#$TSTNM    ;TEST 17 ?  MINE
5917  023472  001133                          BNE     8$              ;NO--BRANCH
5918  023474  122737  000151  003556          CMPB    #WRCKD,@#DTADPB+2 ;DOING A WRITE CHECK?
5919  023502  001127                          BNE     8$              ;NO--BRANCH
5920  023504  032737  040000  003604          BIT     #BIT14,@#RP.REG+10 ;IS "WCE"=1?
5921  023512  001523                          BEQ     8$              ;NO--BRANCH
5922  023514  032737  000020  177570          BIT     #SW04,@#SWR     ;INHIBIT WRITES?
5923  023522  001117                          BNE     8$              ;YES--BRANCH
5924  023524  112737  000161  003556          MOVB    #WRITE,@#DTADPB+2 ;SETUP FOR A WRITE
5925  023532  005037  001200                  CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5926  023536  004037  032766                  JSR     R0,@#RP04       ;DO THE WRITE
5927  023542  003554                          DTADPB
5928  023544  000240                          NOP
5929  023546  005737  003572          3$:     TST     @#DTADPB+16     ;DONE?
5930  023552  001775                          BEQ     3$              ;NO--LOOP
5931  023554  100026                          BPL     4$              ;YES--BRANCH IF NO ERROR
5932  023556  012737  023762  001200          MOV     #8$,$ESCAPE     ;;ESCAPE TO 8$ ON ERROR
5933  023564  013737  003566  001306          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
5934  023572  113737  003565  001312          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
5935  023600  113737  003564  001310          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
5936  023606  012746  003572                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5937  023612  004737  024026                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5938  023616  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5939  023620  104041                          ERROR   41              ;
5940  023622  104042                          ERROR   42              ;PARITY ERROR
5941  023624  104043                          ERROR   43              ;UNSAFE ERROR
5942  023626  104044                          ERROR   44              ;NON-I/O ERROR
5943  023630  104045                          ERROR   45              ;I/O ERROR
5944  023632  112737  000151  003556  4$:     MOVB    #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
5945  023640  004037  032766                  JSR     R0,@#RP04       ;DO THE WRITE CHECK
5946  023644  003554                          DTADPB
5947  023646  000240                          NOP
5948  023650  005737  003572          5$:     TST     @#DTADPB+16     ;DONE?
5949  023654  001775                          BEQ     5$              ;NO--LOOP
5950  023656  100410                          BMI     7$              ;YES--BRANCH IF ERROR
5951  023660  004037  032766                  JSR     R0,@#RP04       ;DO A 2ND WRITE CHECK
5952  023664  003554                          DTADPB
5953  023666  000240                          NOP
5954  023670  005737  003572          6$:     TST     @#DTADPB+16     ;DONE?
5955  023674  001775                          BEQ     6$              ;NO--LOOP
5956  023676  100031                          BPL     8$              ;YES--BRANCH IF NO ERROR
5957  023700  012737  000001  001352  7$:     MOV     #1,@#WCEFLG     ;SET THE WRITE CHECK ERROR FLAG
5958  023706  012737  023762  001200          MOV     #8$,$ESCAPE     ;;ESCAPE TO 8$ ON ERROR
```

```
5959  023714  013737  003566  001306          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
5960  023722  113737  003565  001312          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
5961  023730  113737  003564  001310          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
5962  023736  012746  003572                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5963  023742  004737  024026                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5964  023746  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5965  023750  104041                          ERROR   41              ;
5966  023752  104042                          ERROR   42              ;PARITY ERROR
5967  023754  104043                          ERROR   43              ;UNSAFE ERROR
5968  023756  104044                          ERROR   44              ;NON-I/O ERROR
5969  023760  104046                          ERROR   46              ;FATAL WRITE CHECK
5970  023762  032737  001000  177570  8$:     BIT     #SW09,@#SWR     ;LOOP ON ERROR?
5971  023770  001004                          BNE     9$              ;YES--BRANCH
5972  023772  126737  001426  001103          CMPB    @#ERR.CT,@#SERFLG ;GO TO NEXT TEST?
5973  024000  101002                          BHI     10$             ;NO--BRANCH
5974  024002  013700  001270          9$:     MOV     @#BYPASS,R0     ;YES--GET EXIT ADDRESS
5975  024006  032737  040000  001246  10$:    BIT     #SW14,@#C.SWR   ;STALL?
5976  024014  001403                          BEQ     11$             ;NO--BRANCH
5977  024016  004037  024144                  JSR     R0,@#STALL      ;YES--CALL STALL ROUTINE
5978  024022  001422                          .WORD   STALL2          ;STALL TIME POINTER
5979  024024  000200                  11$:    RTS     R0
5980
5981                                  ;*****************************************************************
5982                                  .SBTTL  ERINDX - FORM ERROR INDEX
5983                                  ;*THIS ROUTINE FORMS AN INDEX THAT WILL BE USED TO DISPATCH
5984                                  ;*TO THE PROPER ERROR CALL.  THE INDEX IS FORMED BY EXAMINING
5985                                  ;*THE STATUS/ERROR INDICATOR OF THE APPLICABLE DPB.
5986                                  ;*INDEX         STATUS/ERROR
5987                                  ;*-----         ------------
5988                                  ;*     0        BIT14!BIT13!BIT08
5989                                  ;*     2        BIT11!BIT10
5990                                  ;*     4        BIT12!BIT04
5991                                  ;*     6        BIT05!BIT03!<BIT09 & COMMAND=NON-I/O>
5992                                  ;*    10        BIT06!<BIT09 & COMMAND=I/O>
5993                                  ;*CALL
5994                                  ;*      JSR     #DPB+16,-(SP)   ;ADDRESS OF STATUS/ERROR INDICATOR
5995                                  ;*      JSR     PC,@#ERINDX     ;FORM INDEX
5996                                  ;*      RETURN                  ;INDEX IS ON THE STACK
5997
5998  024026  010046          ERINDX: MOV     R0,-(SP)        ;SAVE R0
5999  024030  010146                  MOV     R1,-(SP)        ;SAVE R1
6000  024032  016600  000006          MOV     6(SP),R0        ;GET STATUS/ERROR INDICATOR POINTER
6001  024036  011037  001276          MOV     (R0),@#SVSTAT   ;SAVE THE STATUS/ERROR INDICATOR
6002  024042  005001                  CLR     R1              ;START INDEX AT ZERO
6003  024044  032710                  BIT     (PC)+,(R0)      ;FORM INDEX OF 0?
6004  024046  060400                  .WORD   BIT14!BIT13!BIT08
6005  024050  001027                  BNE     5$              ;YES--BRANCH
6006  024052  032710                  BIT     (PC)+,(R0)      ;FORM PARITY ERROR INDEX (2)?
6007  024054  006000                  .WORD   BIT11!BIT10
6008  024056  001023                  BNE     4$              ;YES--BRANCH
6009  024060  032710                  BIT     (PC)+,(R0)      ;FORM UNSAFE INDEX (4)?
6010  024062  010020                  .WORD   BIT12!BIT04
6011  024064  001017                  BNE     3$              ;YES--BRANCH
6012  024066  032710                  BIT     (PC)+,(R0)      ;FORM NON-I/O ERROR INDEX (6)?
6013  024070  000650                  .WORD   BIT05!BIT03
6014  024072  001013                  BNE     2$              ;YES--BRANCH
```

```
                                        BIT     (PC)+,(R0)      ;FORM I/O ERROR INDEX (10)?
                                        .WORD   BIT06
                                        BNE     1$              ;YES--BRANCH
                                        BIT     (PC)+,(R0)      ;SOFTWARE TIMEOUT?
                                        .WORD   BIT09
                                        BEQ     5$              ;NO--FORM INDEX OF 0
                                        CMPB    #150,-16(R0)    ;YES--I/O?
                                        BGT     2$              ;NO--BRANCH
                                1$:     INC     R1              ;INDEX=10---ERROR=45 OR 46
                                2$:     INC     R1              ;INDEX=6---ERROR=44
                                3$:     INC     R1              ;INDEX=4---ERROR=43
                                4$:     INC     R1              ;INDEX=2---ERROR=42
                                5$:     ASL     R1              ;INDEX=0---ERROR=41
                                        MOV     R1,6(SP)        ;RETURN INDEX TO USER
                                        MOV     (SP)+,R1        ;RESTORE R1
                                        MOV     (SP)+,R0        ;RESTORE R0
                                        RTS     PC              ;RETURN FROM CALL

                        ;*****************************************************************
                        .SBTTL  STALL - USED TO STALL AFTER A DRIVE FUNCTION IS COMPLETE
                        ;*THIS ROUTINE WILL PROVIDE A STALL IN MILLISECONDS FOR A SPECIFIC
                        ;*AMOUNT OF TIME IF BIT13 OF C.SWR = 0 OR A RANDOM AMOUNT OF TIME
                        ;*IF BIT 13 OF C.SWR = 1.
                        ;*STALL1 CONTAINS SPECIFIED TIME FOR TESTS 0-6 AND STALL2
                        ;*CONTAINS THE TIME FOR TESTS 13-16.
                        ;*CALL
                        ;*      JSR     R0,@#STALL
                        ;*      TIME POINTER            ;WHERE TO FIND THE STALL TIME

                        STALL:  MOV     @(R0)+,-(SP)    ;PICKUP STALL TIME
                                BIT     #SW13,@#C.SWR   ;USE A RANDOM TIME?
                                BEQ     1$              ;NO--BRANCH
                                JSR     PC,@#$RAND      ;YES--FORM RANDOM NUMBER
                                MOV     @#$LONUM,(SP)   ;AND USE IT FOR THE STALL TIME
                                BIC     #^C77,(SP)      ;BUT NEVER > 64 MILLISECONDS
                        1$:     CLR     -(SP)           ;CLEAR TEMP. LOCATION
                        2$:     SUB     #1,2(SP)        ;MORE STALL REQUIRED?
                                BLO     4$              ;NO--BRANCH
                                MOV     #^D100,(SP)     ;STALL FOR ABOUT 1 MILLISECOND
                        3$:     TST     R0              ;NOP TO KILL TIME
                                DEC     0(SP)           ;COUNT
                                BNE     3$              ;LOOP IF MORE COUNTS NEEDED
                                BR      2$
                        4$:     CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
                                RTS     R0              ;EXIT


                        ;*****************************************************************
                        .SBTTL  TWOMS - STALL FOR 2 MS BETWEEN SEEKS IN TESTS 10- - 12
                        ;*ROUTINE TO PROVIDE A 2 MS STALL AFTER A SEEK OPERATION IN THE SEEK TIMING
                        ;*TESTS (TESTS 10, 11, & 12).  THIS STALL IS SPECIFIED BY THE VENDOR (ISS)
                        ;*OF THE DISK DRIVE.  THIS STALL TIME IS NOT INCLUDED IN THE CALCULATED
                        ;*SEEK TIMES.
                        ;*CALL
                        ;*      JSR     PC,@#TWOMS
                        ;*      RETURN
```

```
6071
6072  024226  013746  177776          TWOMS:  MOV     @#PS,-(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
6073  024232  012737  000240  177776          MOV     #<5*32.>,@#PS   ;SET THE PROCESSOR PRIORITY TO 5
6074  024240  017746  155124                  MOV     @PKV,-(SP)      ;SAVE THE OLD CLOCK VECTOR ADDRESS
6075  024244  012777  024270  155116          MOV     #1$,@PKV        ;SETUP NEW VECTOR ADDRESS
6076  024252  012777  000310  155116          MOV     #200.,@PKB      ;LOAD THE CLOCK BUFFER
6077  024260  012777  000101  155106          MOV     #101,@PKCS      ;START THE CLOCK
6078  024266  000001                          WAIT                    ;WAIT FOR 2 MS
6079  024270  062706  000004          1$:     ADD     #4,SP           ;INCREMENT STACK FOR RETURN
6080  024274  012677  155070                  MOV     (SP)+,@PKV      ;RESTORE OLD CLOCK VECTOR
6081  024300  012637  177776                  MOV     (SP)+,@#PS      ;RESTORE THE OLD PROCESSOR STATUS
6082  024304  000207                          RTS     PC              ;RETURN
6083
6084                                  ;*****************************************************************
6085                                  .SBTTL  VERIFY - VALIDATE HEADER ON IMPLIED SEEKS
6086                                  ;*ROUTINE TO SOFTWARE COMPARE HEADER ON IMPLIED SEEKS
6087                                  ;*CALL
6088                                  ;*      JSR     R0,@#VERIFY
6089                                  ;*      ADR POINTER             ;ADDRESS OF DPB+10 (SECTOR NUMBER)
6090                                  ;*      RETURN
6091
6092  024306  010146          VERIFY: MOV     R1,-(SP)        ;SAVE R1
6093  024310  012001                  MOV     (R0)+,R1        ;GET ADDRESS OF DPB+10
6094  024312  042737  010000  044134  BIC     #FMT22,@#BUFFER ;STRIP FORMAT BIT FROM CYLINDER NUMBER
6095  024320  023761  044134  000002  CMP     @#BUFFER,2(R1)  ;CYLINDER NUMBER OK?
6096  024326  001003                  BNE     1$              ;NO--BRANCH
6097  024330  023711  044136          CMP     @#BUFFER+2,(R1) ;YES--HOW ABOUT TRACK/SECTOR?
6098  024334  001426                  BEQ     3$              ;BRANCH IF GOOD
6099  024336  013737  044134  001300  1$:     MOV     @#BUFFER,@#CYL.RD ;SAVE THE EXPECTED AND THE
6100  024344  113737  044137  001302          MOVB    @#BUFFER+3,@#TRK.RD ;RECIEVED CYLINDER, TRACK,
6101  024352  113737  044136  001304          MOVB    @#BUFFER+2,@#SEC.RD ;AND SECTOR
6102  024360  112137  001310                  MOVB    (R1)+,@#SEC.DS
6103  024364  112137  001312                  MOVB    (R1)+,@#TRK.DS
6104  024370  011137  001306                  MOV     (R1),@#CYL.DS
6105  024374  012737  024406  001200          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
6106  024402  005740                          TST     -(R0)           ;MAKE IT TEST PC+4
6107  024404  104012                          ERROR   12              ;REPORT THE ERROR
6108  024406  013700  001270          2$:     MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
6109  024412  012601                  3$:     MOV     (SP)+,R1        ;RESTORE R1
6110  024414  000200                          RTS     R0              ;EXIT
6111
6112                                  ;*****************************************************************
6113                                  .SBTTL  SRCH00 - INITIALIZE THE DRIVE FOR THE TIMING TESTS
6114                                  ;*THIS ROUTINE WILL PERFORM A "MASSBUS" INIT. FOLLOWED BY
6115                                  ;*A "RECALIBRATE" ON THE DRIVE UNDER TEST.
6116                                  ;*NOTE: THIS ROUTINE DESTROYS R1 AND R4
6117                                  ;*CALL
6118                                  ;*      JSR     R0,SRCH00       ;DO A MASSBUS INIT. AND RECAL
6119                                  ;*      RETURN1                 ;RETURN HERE IF NO ERROR
6120                                  ;*      RETURN2                 ;RETURN HERE ON ERROR
6121
6122  024416  005001          SRCH00: CLR     R1              ;INCASE OF ERROR (TYPTIM)
6123  024420  005037  177776          CLR     @#PS
6124  024424  012777  034766  005730          MOV     #ISR,@RPVEC     ;SETUP INTERRUPT VECTOR
6125  024432  013704  032360                  MOV     @#RPADR,R4      ;PICKUP ADDRESS OF RHCS1
6126  024436  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;MASSBUS INIT.
```

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6127  024444  005037  003564                  CLR     @#DTADPB+10     ;TRACK=0; SECTOR=0
6128  024450  005037  003566                  CLR     @#DTADPB+12     ;CYLINDER =0
6129  024454  012737  000107  003556          MOV     #RECAL,@#DTADPB+2 ;COMMAND = RECALIBRATE
6130  024462  005037  001200                  CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
6131  024466  004037  032766                  JSR     R0,@#RP04       ;CALL THE DRIVER
6132  024472  003554                          DTADPB                  ;DPB POINTER
6133  024474  000440                          BR      4$              ;QUEUE IS FULL
6134  024476  005737  003572          1$:     TST     DTADPB+16       ;WAIT ON DONE
6135  024502  001775                          BEQ     1$
6136  024504  100030                          BPL     3$              ;TAKE NORMAL EXIT IF NO ERROR
6137  024506  012737  024562  001200          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
6138  024514  013737  003566  001306          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
6139  024522  113737  003565  001312          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
6140  024530  113737  003564  001310          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
6141  024536  012746  003572                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
6142  024542  004737  024026                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
6143  024546  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
6144  024550  104041                          ERROR   41              ;
6145  024552  104042                          ERROR   42              ;PARITY ERROR
6146  024554  104043                          ERROR   43              ;UNSAFE ERROR
6147  024556  104044                          ERROR   44              ;NON-I/O ERROR
6148  024560  104045                          ERROR   45              ;I/O ERROR
6149  024562  005720                  2$:     TST     (R0)+           ;ADJUST FOR ERROR EXIT
6150  024564  000404                          BR      4$              ;GO TO THE EXIT
6151  024566  005064  000006          3$:     CLR     RHDA(R4)        ;TRACK AND SECTOR = 0
6152  024572  005064  000034                  CLR     RHCA(R4)        ;CYLINDER = 0
6153  024576  000200                  4$:     RTS     R0              ;RETURN
6154
6155                                  ;*****************************************************************
6156                                  .SBTTL  DORTI - RETURN FROM INTERRUPT
6157                                  ;*THIS IS AN RTI WHICH IS USED BY THE TIMING TESTS
6158
6159  024600  000002                  DORTI:  RTI                     ;RETURN FROM INTERRUPT
6160
6161                                  ;*****************************************************************
6162                                  .SBTTL  STRTMR - START THE TIMERS
6163                                  ;*THIS ROUTINE WILL INITIALIZE THE TIMERS
6164                                  ;*USED BY THE TIMING ROUTINES
6165                                  ;*CALL
6166                                  ;*      JSR     PC,@#STRTMR
6167                                  ;*      RETURN
6168
6169  024602  104416                  STRTMR: SAVREG                  ;SAVE R0-R5
6170  024604  012700  001314                  MOV     #TIM.UP,R0      ;START AT TIM.UP (MINIMUM)
6171  024610  012701  001350                  MOV     #TIM.PT,R1      ;STOP AT TIM.PT
6172  024614  005020                  1$:     CLR     (R0)+           ;CLEAR
6173  024616  020001                          CMP     R0,R1           ;DONE?
6174  024620  103775                          BLO     1$              ;NO--BRANCH
6175  024622  012710  044134                  MOV     #BUFFER,(R0)    ;SETUP POINTER
6176  024626  012737  077777  001314          MOV     #^CBIT15,@#TIM.UP ;SET MINIMUM TIME TO MAXIMUM
6177  024634  012737  077777  001332          MOV     #^CBIT15,@#TIM.DN ;POSITIVE NUMBER
6178  024642  104420                          RESREG                  ;RESTORE R0-R5
6179  024644  000207                          RTS     PC              ;RETURN
6180
6181                                  ;*****************************************************************
6182                                  .SBTTL  COUNT - THIS ROUTINE COUNTS THE ELAPSED TIME
```

```
6183                                    ;*THIS ROUTINE WILL ADD THE ELAPSED TIME TO THE AVERAGE COUNTER AND
6184                                    ;*MAINTAIN THE MINIMUM AND MAXIMUM TIMES.
6185                                    ;*NOTE: THIS ROUTINE DESTROYS R2
6186                                    ;*CALL
6187                                    ;*      MOV     #TP,R3          ;PARAMETER POINTER
6188                                    ;*      MOV     FLAG,R5         ;FLAG=0=COUNT UP
6189                                    ;*                              ;FLAG=-1=COUNT DOWN
6190                                    ;*      JSR     PC,@#COUNT
6191                                    ;*      RETURN
6192
6193  024646  012702  001314            COUNT:  MOV     #TIM.UP,R2      ;PICKUP THE "UP" POINTER
6194  024652  005705                            TST     R5              ;USE IT?
6195  024654  001402                            BEQ     1$              ;YES--BRANCH
6196  024656  012702  001332                    MOV     #TIM.DN,R2      ;NO--PICKUP "DOWN" POINTER
6197  024662  027722  154512            1$:     CMP     @PKC,(R2)+      ;LESS THAN PREVIOUS LOW?
6198  024666  002003                            BGE     2$              ;NO--BRANCH
6199  024670  017762  154504  177776            MOV     @PKC,-2(R2)     ;YES--SAVE IT
6200  024676  027763  154476  000004    2$:     CMP     @PKC,4(R3)      ;LESS THAN THE LOW LIMIT?
6201  024704  002001                            BGE     3$              ;NO--BRANCH
6202  024706  005212                            INC     (R2)            ;YES--COUNT IT
6203  024710  005722                    3$:     TST     (R2)+           ;ADVANCE THE POINTER
6204  024712  027722  154462                    CMP     @PKC,(R2)+      ;GREATER THAN PREVIOUS HIGH?
6205  024716  003403                            BLE     4$              ;NO--BRANCH
6206  024720  017762  154454  177776            MOV     @PKC,-2(R2)     ;YES--SAVE IT
6207  024726  027763  154446  000006    4$:     CMP     @PKC,6(R3)      ;GREATER THAN THE HIGH LIMIT?
6208  024734  003401                            BLE     5$              ;NO--BRANCH
6209  024736  005212                            INC     (R2)            ;YES--COUNT IT
6210  024740  005722                    5$:     TST     (R2)+           ;ADVANCE THE POINTER
6211  024742  067722  154432                    ADD     @PKC,(R2)+      ;ADD THIS COUNT TO THE TOTAL
6212  024746  005522                            ADC     (R2)+
6213  024750  005212                            INC     (R2)            ;COUNT THIS READING
6214  024752  022737  047304  001350            CMP     #BUFFER+<4*410.>,@#TIM.PT ;SAVE THIS COUNT?
6215  024760  101406                            BLOS    6$              ;NO--BRANCH
6216  024762  017777  154412  154360            MOV     @PKC,@TIM.PT    ;YES--WELL SAVE IT THEN
6217  024770  062737  000002  001350            ADD     #2,@#TIM.PT     ;ADVANCE THE POINTER
6218  024776  000207                    6$:     RTS     PC              ;RETURN
6219
6220                                    ;******************************************************************
6221                                    .SBTTL  TYPTIM - TYPE TIMES
6222                                    ;*THIS ROUTINE IS USED TO TYPE THE MINIMUM,
6223                                    ;*MAXIMUM, AND AVERAGE TIMES FOR TESTS 7,10,11, AND 12.
6224                                    ;*IT WILL ALSO CHECK THE TIMES TO INSURE
6225                                    ;*THEY ARE WITHIN TOLERANCE AND IF NOT FLAG THE BAD TIMES.
6226                                    ;*NOTE: THIS ROUTINE DESTROYS R2-R5
6227                                    ;*CALL
6228                                    ;*      JSR     R0,@#TYPTIM     ;GO REPORT THE TIMES
6229                                    ;*      TABLE                   ;POINT TO THE PROPER TABLE
6230                                    ;*      RETURN
6231                                    ;*
6232                                    ;*TABLE:MSGADR1                 ;ADDRESS OF ASCIZ MESSAGE NUMBER 1
6233                                    ;*      MSGADR2                 ;ADDRESS OF ASCIZ MESSAGE NUMBER 2
6234                                    ;*      MIN.ALLOWED             ;MINIMUM TIME ALLOWED
6235                                    ;*      MAX.ALLOWED             ;MAXIMUM TIME ALLOWED
6236
6237  025000  012002                    TYPTIM: MOV     (R0)+,R2        ;PICKUP THE TABLE POINTER
6238  025002  032737  000100  177570            BIT     #SW06,@#SWR     ;INHIBIT TIME REPORTS?
```

```
6239  025010  001145                        BNE     7$              ;YES--BRANCH
6240  025012  012237  025032                MOV     (R2)+,2$        ;ADDRESS OF MESSAGE NUMBER 1
6241  025016  012205                        MOV     (R2)+,R5        ;ADDRESS OF MESSAGE NUMBER 2
6242  025020  012203                        MOV     (R2)+,R3        ;PICKUP THE LOW LIMIT
6243  025022  011202                        MOV     (R2),R2         ;AND THE HIGH LIMIT
6244  025024  012704  001314                MOV     #TIM.UP,R4      ;PARAMETER POINTER
6245  025030  104400                1$:     TYPE                    ;TYPE THE MESSAGE
6246  025032  000000                2$:     .WORD   0               ;ASCIZ MESSAGE POINTER GOES HERE
6247  025034  005764  000014                TST     14(R4)          ;DID ANY COUNTS OCCUR?
6248  025040  001527                        BEQ     6$              ;NO--BRANCH
6249  025042  104400  040452                TYPE    ,MSGMIN         ;"MIN="
6250  025046  012446                        MOV     (R4)+,-(SP)             ;PUT (R4)+ ON THE STACK
6251  025050  004737  021170                JSR     PC,@#$SB2D      ;CHANGE (R4)+ TO DECIMAL ASCIZ
6252  025054  004737  021414                JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6253  025060  104400  040477                TYPE    ,MSGOUS         ;"0 US"
6254  025064  005724                        TST     (R4)+           ;ANY SEEKS BELOW THE LOW LIMIT
6255  025066  001421                        BEQ     3$              ;NO--BRANCH
6256  025070  104400  040612                TYPE    ,MSG.SP         ;" "
6257  025074  016446  177776                MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
6258  025100  004737  021170                JSR     PC,@#$SB2D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
6259  025104  004737  021414                JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6260  025110  104400  040504                TYPE    ,MBELOW         ;"BELOW THE MINIMUM OF"
6261  025114  010346                        MOV     R3,-(SP)                ;PUT R3 ON THE STACK
6262  025116  004737  021170                JSR     PC,@#$SB2D      ;CHANGE R3 TO DECIMAL ASCIZ
6263  025122  004737  021414                JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6264  025126  104400  040477                TYPE    ,MSGOUS
6265  025132  104400  040461        3$:     TYPE    ,MSGMAX         ;"MAX="
6266  025136  012446                        MOV     (R4)+,-(SP)             ;PUT (R4)+ ON THE STACK
6267  025140  004737  021170                JSR     PC,@#$SB2D      ;CHANGE (R4)+ TO DECIMAL ASCIZ
6268  025144  004737  021414                JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6269  025150  104400  040477                TYPE    ,MSGOUS
6270  025154  005724                        TST     (R4)+           ;ANY SEEKS ABOVE THE HIGH LIMIT
6271  025156  001421                        BEQ     4$              ;NO--BRANCH
6272  025160  104400  040612                TYPE    ,MSG.SP         ;YES--REPORT HOW MANY
6273  025164  016446  177776                MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
6274  025170  004737  021170                JSR     PC,@#$SB2D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
6275  025174  004737  021414                JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6276  025200  104400  040533                TYPE    ,MABOVE         ;"ABOVE THE MAXIMUM OF"
6277  025204  010246                        MOV     R2,-(SP)                ;PUT R2 ON THE STACK
6278  025206  004737  021170                JSR     PC,@#$SB2D      ;CHANGE R2 TO DECIMAL ASCIZ
6279  025212  004737  021414                JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6280  025216  104400  040477                TYPE    ,MSGOUS
6281  025222  104400  040470        4$:     TYPE    ,MSGAVG         ;"AVG="
6282  025226  012446                        MOV     (R4)+,-(SP)     ;FORM THE AVERAGE
6283  025230  012446                        MOV     (R4)+,-(SP)
6284  025232  012446                        MOV     (R4)+,-(SP)
6285  025234  004737  021454                JSR     PC,@#$DIV
6286  025240  006126                        ROL     (SP)+           ;IS THE REMAINDER OVER HALF?
6287  025242  100001                        BPL     5$              ;NO--BRANCH
6288  025244  005216                        INC     (SP)            ;YES--ROUND UP
6289  025246                        5$:
6290  025246  004737  021170                JSR     PC,@#$SB2D      ;CHANGE  TO DECIMAL ASCIZ
6291  025252  004737  021414                JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6292  025256  104400  040477                TYPE    ,MSGOUS
6293  025262  104400  040612                TYPE    ,MSG.SP
6294  025266  016446  177776                MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
```

```
6295  025272  004737  021170                  JSR     PC,@#$SB2D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
6296  025276  004737  021414                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6297  025302  104400  040562                  TYPE    ,MSGNUM         ;"SEEKS TIMED"
6298  025306  010537  025032                  MOV     R5,2$           ;NEXT MESSAGE POINTER
6299  025312  001404                          BEQ     7$              ;IF NONE EXIT
6300  025314  005005                          CLR     R5              ;NO MORE THAN 2
6301  025316  000644                          BR      1$
6302  025320  104400  040577          6$:     TYPE    ,MSGNON
6303  025324  000200                  7$:     RTS     R0              ;EXIT
6304
6305                                  ;*****************************************************************
6306                                  .SBTTL  INCTRK - INCREMENT TRACK NUMBER
6307                                  ;*THIS SUBROUTINE WILL INCREMENT THE TRACK
6308                                  ;*NUMBER (R2) BY THE AMOUNT SPECIFIED BY IT15.
6309                                  ;*CALL
6310                                  ;*      JSR     R0,@#INCTRK
6311                                  ;*      RETURN1                 ;TRACK NUMBER GREATER THAN LT15
6312                                  ;*      RETURN2                 ;TRACK NUMBER INCREMENTED
6313
6314  025326  020237  002342          INCTRK: CMP     R2,@#LT15       ;LAST TRACK COMPLETED?
6315  025332  001410                          BEQ     2$              ;YES--EXIT
6316  025334  063702  002344                  ADD     @#IT15,R2       ;NO--UPDATE TRACK
6317  025340  020237  002342                  CMP     R2,@#LT15       ;TRACK TO BIG?
6318  025344  003402                          BLE     1$              ;NO--EXIT
6319  025346  013702  002342                  MOV     @#LT15,R2       ;YES--SET TRACK TO LAST TRACK
6320  025352  005720                  1$:     TST     (R0)+           ;ADJUST FOR RETURN 2
6321  025354  000200                  2$:     RTS     R0              ;RETURN
6322
6323
6324                                  ;*****************************************************************
6325                                  .SBTTL  INCCYL - INCRMENT CYLINDER NUMBER
6326                                  ;*THIS SUBROUTINE WILL INCREMENT THE CYLINDER
6327                                  ;*NUMBER (R1) BY THE AMOUNT SPECIFIED BY IC15.
6328                                  ;*CALL
6329                                  ;*      JSR     R0,@#INCCYL
6330                                  ;*      RETURN1                 ;CYLINDER NUMBER GREATER THAN LC15
6331                                  ;*      RETURN2                 ;CYLINDER NUMBER INCREMENTED
6332
6333  025356  020137  002334          INCCYL: CMP     R1,@#LC15       ;LAST CYLINDER COMPLETED?
6334  025362  001410                          BEQ     2$              ;YES--EXIT
6335  025364  063701  002336                  ADD     @#IC15,R1       ;NO--UPDATE CYLINDER
6336  025370  020137  002334                  CMP     R1,@#LC15       ;CYLINDER TO BIG?
6337  025374  003402                          BLE     1$              ;NO--EXIT
6338  025376  013701  002334                  MOV     @#LC15,R1       ;YES--SET CYLINDER TO LAST CYLINDER
6339  025402  005720                  1$:     TST     (R0)+           ;ADJUST FOR RETURN 2
6340  025404  000200                  2$:     RTS     R0              ;RETURN
6341
6342                                  ;*****************************************************************
6343                                  .SBTTL  FILBUF - FILL BUFFER WITH ADDRESS DATA
6344                                  ;*THIS SUBROUTINE IS USED TO FILL THE DATA BUFFER
6345                                  ;*WITH ADDRESSES FROM 0 TO 21 WITH EACH ADDRESS
6346                                  ;*BEING STORED IN 256 CONSECUTIVE LOCATIONS
6347                                  ;*CALL
6348                                  ;*      JSR     PC,@#FILBUF
6349                                  ;*      RETURN
6350
```

```
 6351  025406  004037  037744          FILBUF: JSR     R0,@#SAVR05     ;SAVE R0-R5
 6352  025412  005000                          CLR     R0              ;FIRST DISK ADDRESS
 6353  025414  012701  044134                  MOV     #BUFFER,R1      ;START FILLING HERE
 6354  025420  012702  000400          1$:     MOV     #^D256,R2       ;DO 256 WORDS
 6355  025424  010021                  2$:     MOV     R0,(R1)+        ;STORE
 6356  025426  005302                          DEC     R2              ;MORE?
 6357  025430  003375                          BGT     2$              ;YES--BRANCH
 6358  025432  005200                          INC     R0              ;NO--UPDATE DISK ADDRESS
 6359  025434  022700  000026                  CMP     #^D22,R0        ;DONE?
 6360  025440  003367                          BGT     1$              ;NO--BRANCH
 6361  025442  004037  037770                  JSR     R0,@#GETR05     ;RESTORE R0-R5
 6362  025446  000207                          RTS     PC              ;RETURN
 6363
 6364                          ;*****************************************************************
 6365                          .SBTTL  CLRBUF - CLEAR BUFFER
 6366                          ;*THIS ROUTINE WILL CLEAR THE BUFFER BY
 6367                          ;*SETTING EACH WORD TO "177400".
 6368                          ;*CALL
 6369                          ;*      JSR     R0,@#CLRBUF
 6370                          ;*      RETURN
 6371
 6372  025450  004037  037744          CLRBUF: JSR     R0,@#SAVR15     ;SAVE R1-R5
 6373  025454  012701  177400                  MOV     #177400,R1      ;WORD TO FILL BUFFER WITH
 6374  025460  012702  044134                  MOV     #BUFFER,R2      ;FIRST ADDRESS OF BUFFER
 6375  025464  012703  072134                  MOV     #BUFFER+<512.*22.>,R3 ;LAST ADDRESS+2 OF BUFFER
 6376  025470  010122          1$:     MOV     R1,(R2)+        ;FILL WORDS 1, 9,...249,...5625
 6377  025472  010122                  MOV     R1,(R2)+        ;FILL WORDS 2,10,...250,...5626
 6378  025474  010122                  MOV     R1,(R2)+        ;FILL WORDS 3,11,...251,...5627
 6379  025476  010122                  MOV     R1,(R2)+        ;FILL WORDS 4,12,...252,...5628
 6380  025500  010122                  MOV     R1,(R2)+        ;FILL WORDS 5,13,...253,...5629
 6381  025502  010122                  MOV     R1,(R2)+        ;FILL WORDS 6,14,...254,...5630
 6382  025504  010122                  MOV     R1,(R2)+        ;FILL WORDS 7,15,...255,...5631
 6383  025506  010122                  MOV     R1,(R2)+        ;FILL WORDS 8,16,...256,...5632
 6384  025510  020203                  CMP     R2,R3           ;DONE?
 6385  025512  103766                  BLO     1$              ;NO--BRANCH
 6386  025514  004037  037764                  JSR     R0,@#GETR15     ;RESTORE R1-R5
 6387  025520  000200                          RTS     R0              ;RETURN FROM CALL
 6388
 6389                          ;*****************************************************************
 6390                          .SBTTL  CKSCTR - CHECK SECTOR DATA
 6391                          ;*THIS ROUTINE IS USED TO CHECK THE DATA BUFFER
 6392                          ;*FOR ADDRESSES 0 THROUGH 21 WITH EACH ADDRESS
 6393                          ;*BEING STORED IN 256 CONSECUTIVE LOCATIONS
 6394                          ;*CALL
 6395                          ;*      JSR     R0,@#CKSCTR
 6396                          ;*      RETURN
 6397
 6398  025522  004037  037744          CKSCTR: JSR     R0,@#SAVR15     ;SAVE R1-R5
 6399  025526  162706  000004                  SUB     #4,SP           ;RESERVE TEMP. STORAGE AREA
 6400  025532  005001                          CLR     R1              ;FIRST SECTOR
 6401  025534  012716  044134                  MOV     #BUFFER,(SP)    ;FIRST ADDRESS OF DATA BUFFER
 6402  025540  005066  000002                  CLR     2(SP)           ;NO ERRORS
 6403  025544  012702  000020          1$:     MOV     #^D16,R2        ;LOOP COUNT (16*16=256)
 6404  025550  011603                          MOV     (SP),R3         ;GET 1ST ADDRESS OF THIS SECTORS DATA
 6405  025552                          2$:
 6406  025552  020123                          CMP     R1,(R3)+        ;WORD 1
```

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 6407  025554  001064                        BNE     7$              ;BRANCH IF BAD
 6408  025556  020123                        CMP     R1,(R3)+        ;WORD 2
 6409  025560  001062                        BNE     7$              ;BRANCH IF BAD
 6410  025562  020123                        CMP     R1,(R3)+        ;WORD 3
 6411  025564  001060                        BNE     7$              ;BRANCH IF BAD
 6412  025566  020123                        CMP     R1,(R3)+        ;WORD 4
 6413  025570  001056                        BNE     7$              ;BRANCH IF BAD
 6414  025572  020123                        CMP     R1,(R3)+        ;WORD 5
 6415  025574  001054                        BNE     7$              ;BRANCH IF BAD
 6416  025576  020123                        CMP     R1,(R3)+        ;WORD 6
 6417  025600  001052                        BNE     7$              ;BRANCH IF BAD
 6418  025602  020123                        CMP     R1,(R3)+        ;WORD 7
 6419  025604  001050                        BNE     7$              ;BRANCH IF BAD
 6420  025606  020123                        CMP     R1,(R3)+        ;WORD 8
 6421  025610  001046                        BNE     7$              ;BRANCH IF BAD
 6422  025612  020123                        CMP     R1,(R3)+        ;WORD 9
 6423  025614  001044                        BNE     7$              ;BRANCH IF BAD
 6424  025616  020123                        CMP     R1,(R3)+        ;WORD 10
 6425  025620  001042                        BNE     7$              ;BRANCH IF BAD
 6426  025622  020123                        CMP     R1,(R3)+        ;WORD 11
 6427  025624  001040                        BNE     7$              ;BRANCH IF BAD
 6428  025626  020123                        CMP     R1,(R3)+        ;WORD 12
 6429  025630  001036                        BNE     7$              ;BRANCH IF BAD
 6430  025632  020123                        CMP     R1,(R3)+        ;WORD 13
 6431  025634  001034                        BNE     7$              ;BRANCH IF BAD
 6432  025636  020123                        CMP     R1,(R3)+        ;WORD 14
 6433  025640  001032                        BNE     7$              ;BRANCH IF BAD
 6434  025642  020123                        CMP     R1,(R3)+        ;WORD 15
 6435  025644  001030                        BNE     7$              ;BRANCH IF BAD
 6436  025646  020123                        CMP     R1,(R3)+        ;WORD 16
 6437  025650  001026                        BNE     7$              ;BRANCH IF BAD
 6438  025652  005302                        DEC     R2              ;FINISHED WITH THIS SECTORS DATA?
 6439  025654  001336                        BNE     2$              ;NO--BRANCH
 6440  025656  062716  001000          3$:   ADD     #^D512,(SP)     ;YES--FIRST ADDRESS OF NEXT SECTOR
 6441  025662  005201                        INC     R1              ;MOVE TO NEXT SECTOR
 6442  025664  022701  000026                CMP     #^D22,R1        ;DONE?
 6443  025670  003325                        BGT     1$              ;NO--BRANCH
 6444  025672  005766  000002          4$:   TST     2(SP)           ;ERROR OCCUR?
 6445  025676  001406                        BEQ     6$              ;NO--BRANCH
 6446  025700  123737  001426  001103        CMPB    @#ERR.CT,@#$ERFLG ;MAX. ERROR OCCURRED?
 6447  025706  101002                        BHI     6$              ;NO--BRANCH
 6448  025710  013700  001270          5$:   MOV     @#BYPASS R0     ;TAKE ERROR EXIT
 6449  025714  062706  000004          6$:   ADD     #4,SP           ;FREE TEMP. AREA
 6450  025720  004037  037764                JSR     R0,@#GETR1S     ;RESTORE R1-R5
 6451  025724  000200                        RTS     R0              ;RETURN FROM CALL
 6452  025726  010304                  7$:   MOV     R3,R4           ;FORM WORD NUMBER AND
 6453  025730  161604                        SUB     (SP),R4         ;ADDRESS TO CONTINUE FROM
 6454  025732  010405                        MOV     R4,R5
 6455  025734  006204                        ASR     R4              ;WORD NUMBER
 6456  025736  042705  177740                BIC     #^C37,R5
 6457  025742  001002                        BNE     8$              ;BRANCH IF NOT A MULTIPLE OF 16
 6458  025744  012705  000040                MOV     #40,R5          ;SET TO WORD 16
 6459  025750  006305                  8$:   ASL     R5
 6460  025752  062705  025552                ADD     #2$,R5          ;ADDRESS
 6461  025756  016337  177776  001126        MOV     -2(R3),@#$BDDAT ;SAVE BAD DATA
 6462  025764  005766  000002                TST     2(SP)           ;FIRST ERROR?
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 6463  025770  001015                          BNE     10$                 ;NO--BRANCH
 6464  025772  013737  003566  001306          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER NUMBER
 6465  026000  113737  003565  001312          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK NUMBER
 6466  026006  012737  026016  001200          MOV     #9$,$ESCAPE         ;;ESCAPE TO 9$ ON ERROR
 6467  026014  104021                          ERROR   21                  ;REPORT THE ERROR
 6468  026016  105166  000002          9$:     COMB    2(SP)               ;SET ERROR SWITCH
 6469  026022  000404                          BR      11$
 6470  026024                          10$:
 6471  026024  012737  026034  001200          MOV     #11$,$ESCAPE        ;;ESCAPE TO 11$ ON ERROR
 6472  026032  104022                          ERROR   22                  ;REPORT THE ERROR
 6473  026034  032737  001000  177570  11$:    BIT     #SW09,@#SWR         ;LOOP ON ERROR?
 6474  026042  001322                          BNE     5$                  ;YES
 6475  026044  032737  000002  177570          BIT     #SW01,@#SWR         ;STOP DATA COMPARE?
 6476  026052  001307                          BNE     4$                  ;YES--BRANCH
 6477  026054  123737  001426  001103          CMPB    @#ERR.CT,@#$ERFLG ;MAX. ERRORS?
 6478  026062  101712                          BLOS    5$                  ;YES--BRANCH
 6479  026064  032737  000040  177570          BIT     #SW05,@#SWR         ;REPORT ONLY 1ST ERROR PER SECTOR?
 6480  026072  001271                          BNE     3$                  ;YES--BRANCH
 6481  026074  000115                          JMP     (R5)
 6482
 6483                                  ;*******************************************************************
 6484                                  .SBTTL  SETBUF - SET BUFFER TO DATA PATTERN
 6485                                  ;*THIS ROUTINE WILL MOVE THE 16 WORDS OF THE
 6486                                  ;*DESIRED PATTERN INTO THE DATA BUFFER.
 6487                                  ;*CALL
 6488                                  ;*      MOV     #NX,R0              ;PATTERN NUMBER INDEX TO R0
 6489                                  ;*      JSR     PC,@#SETBUF
 6490
 6491  026076  004037  037744          SETBUF: JSR     R0,@#SAVR15         ;SAVE R1-R5
 6492  026102  012701  044134                  MOV     #BUFFER,R1          ;FIRST ADDRESS
 6493  026106  122737  000017  001102          CMPB    #17,$TSTNM
 6494  026114  001002                          BNE     2$
 6495  026116  013701  001212                  MOV     BUF,R1
 6496  026122  013702  003560          2$:     MOV     @#DTADPB+4,R2       ;WORD COUNT
 6497  026126  016003  002434          1$:     MOV     PAT.PT(R0),R3       ;PICKUP PATTERN POINTER
 6498  026132  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 1 INTO DATA BUFFER
 6499  026134  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 2 INTO DATA BUFFER
 6500  026136  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 3 INTO DATA BUFFER
 6501  026140  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 4 INTO DATA BUFFER
 6502  026142  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 5 INTO DATA BUFFER
 6503  026144  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 6 INTO DATA BUFFER
 6504  026146  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 7 INTO DATA BUFFER
 6505  026150  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 8 INTO DATA BUFFER
 6506  026152  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 9 INTO DATA BUFFER
 6507  026154  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 10 INTO DATA BUFFER
 6508  026156  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 11 INTO DATA BUFFER
 6509  026160  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 12 INTO DATA BUFFER
 6510  026162  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 13 INTO DATA BUFFER
 6511  026164  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 14 INTO DATA BUFFER
 6512  026166  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 15 INTO DATA BUFFER
 6513  026170  012321                          MOV     (R3)+,(R1)+         ;MOVE WORD 16 INTO DATA BUFFER
 6514  026172  062702  000020                  ADD     #^D16,R2            ;DONE?
 6515  026176  001353                          BNE     1$                  ;NO--BRANCH
 6516  026200  004037  037764                  JSR     R0,@#GETR15         ;YES--RESTORE R1-R5
 6517  026204  000207                          RTS     PC                  ;RETURN
 6518
```

```
6519                                    ;*****************************************************************
6520                                    .SBTTL  DATCMP - DATA COMPARE
6521                                    ;*THIS ROUTINE COMPARES A 16 WORD DATA PATTERN
6522                                    ;*AGAINST THE DATA BUFFER
6523                                    ;*CALL
6524                                    ;*      MOV     #NX,R0          ;PATTERN NUMBER INDEX TO R0
6525                                    ;*      JSR     PC,@#DATCMP
6526                                    ;*      RETURN
6527
6528  026206  004037  037744        DATCMP: JSR     R0,@#SAVR05     ;SAVE R0-R5
6529  026212  012701  044134                MOV     #BUFFER,R1      ;FIRST ADDRESS OF BUFFER
6530  026216  122737  000017  001102        CMPB    #17,$TSTNM
6531  026224  001002                        BNE     9$
6532  026226  013701  001212                MOV     BUF,R1
6533  026232  013702  003560          9$:   MOV     @#DTADPB+4,R2   ;WORD COUNT
6534  026236  005046                        CLR     -(SP)           ;NO ERROR
6535  026240  016003  002434          1$:   MOV     PAT.PT(R0),R3   ;PATTERN POINTER
6536  026244                          2$:
6537  026244  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 1
6538  026246  001045                        BNE     4$              ;BRANCH IF DIFFERENT
6539  026250  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 2
6540  026252  001043                        BNE     4$              ;BRANCH IF DIFFERENT
6541  026254  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 3
6542  026256  001041                        BNE     4$              ;BRANCH IF DIFFERENT
6543  026260  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 4
6544  026262  001037                        BNE     4$              ;BRANCH IF DIFFERENT
6545  026264  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 5
6546  026266  001035                        BNE     4$              ;BRANCH IF DIFFERENT
6547  026270  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 6
6548  026272  001033                        BNE     4$              ;BRANCH IF DIFFERENT
6549  026274  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 7
6550  026276  001031                        BNE     4$              ;BRANCH IF DIFFERENT
6551  026300  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 8
6552  026302  001027                        BNE     4$              ;BRANCH IF DIFFERENT
6553  026304  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 9
6554  026306  001025                        BNE     4$              ;BRANCH IF DIFFERENT
6555  026310  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 10
6556  026312  001023                        BNE     4$              ;BRANCH IF DIFFERENT
6557  026314  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 11
6558  026316  001021                        BNE     4$              ;BRANCH IF DIFFERENT
6559  026320  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 12
6560  026322  001017                        BNE     4$              ;BRANCH IF DIFFERENT
6561  026324  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 13
6562  026326  001015                        BNE     4$              ;BRANCH IF DIFFERENT
6563  026330  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 14
6564  026332  001013                        BNE     4$              ;BRANCH IF DIFFERENT
6565  026334  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 15
6566  026336  001011                        BNE     4$              ;BRANCH IF DIFFERENT
6567  026340  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 16
6568  026342  001007                        BNE     4$              ;BRANCH IF DIFFERENT
6569  026344  062702  000020                ADD     #^D16,R2        ;DONE ?
6570  026350  001333                        BNE     1$              ;NO--BRANCH
6571  026352  005726                3$:     TST     (SP)+           ;YES -- CLEAN UP STACK
6572  026354  004037  037770                JSR     R0,@#GETR05     ;RESTORE R0-R5
6573  026360  000207                        RTS     PC
6574  026362  010104                4$:     MOV     R1,R4           ;FORM THE WORD NUMBER
```

```
  6575  026364  122737  000017  001102          CMPB    #17.$TSTNM
  6576  026372  001403                          BEQ     10$
  6577  026374  162704  044134                  SUB     #BUFFER,R4
  6578  026400  000402                          BR      11$
  6579  026402  163704  001212          10$:    SUB     BUF,R4
  6580  026406                             11$:
  6581  026406  006204                          ASR     R4              ;WORD NUMBER
  6582  026410  010305                          MOV     R3,R5           ;FORM ADDRESS TO CONTINUE FROM
  6583  026412  166005  002434                  SUB     PAT.PT(R0),R5
  6584  026416  006305                          ASL     R5
  6585  026420  062705  026244                  ADD     #2$,R5          ;ADDRESS
  6586  026424  064341                          ADD     -(R3),-(R1)     ;RECONSTRUCT THE BAD WORD
  6587  026426  010137  001122                  MOV     R1,@#$BDADR     ;SAVE THE ERROR INFORMATION
  6588  026432  010337  001120                  MOV     R3,@#$GDADR     ;
  6589  026436  012137  001126                  MOV     (R1)+,@#$BDDAT  ;
  6590  026442  012337  001124                  MOV     (R3)+,@#$GDDAT  ;
  6591  026446  005716                          TST     (SP)            ;1ST DATA COMPARE ERROR?
  6592  026450  001023                          BNE     6$              ;NO--BRANCH
  6593  026452  013737  003566  001306          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
  6594  026460  113737  003565  001312          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
  6595  026466  113737  003564  001310          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
  6596  026474  016600  000016                  MOV     16(SP),R0       ;GET TEST PC+4
  6597  026500  012737  026510  001200          MOV     #5$,$ESCAPE     ;;ESCAPE TO 5$ ON ERROR
  6598  026506  104013                          ERROR   13              ;REPORT THE ERROR
  6599  026510  016600  000014          5$:     MOV     14(SP),R0       ;PATTERN NUMBER INDEX
  6600  026514  105116                          COMB    (SP)            ;SET THE ERROR SWITCH
  6601  026516  000404                          BR      7$
  6602  026520                             6$:
  6603  026520  012737  026530  001200          MOV     #7$,$ESCAPE     ;;ESCAPE TO 7$ ON ERROR
  6604  026526  104014                          ERROR   14              ;REPORT THE ERROR
  6605  026530  032737  000002  177570  7$:     BIT     #SW01,@#SWR     ;STOP DATA COMPARE?
  6606  026536  001305                          BNE     3$              ;YES--EXIT
  6607  026540  123737  001426  001103          CMPB    @#ERR.CT,@#$ERFLG ;MAX. ERRORS?
  6608  026546  101004                          BHI     8$              ;NO--BRANCH
  6609  026550  013766  001270  000016          MOV     @#$PASS,16(SP)  ;YES--ERROR EXIT
  6610  026556  000675                          BR      3$
  6611  026560  000115                    8$:   JMP     (R5)            ;NO--CONTINUE AT NEXT WORD
  6612
  6613                                       ;*****************************************************************
  6614                                       .SBTTL  FILRAN - FILL DATA BUFFER WITH RANDOM PATTERN
  6615                                       ;*THIS ROUTINE WILL FILL THE DATA BUFFER (256*22 WORDS) WITH
  6616                                       ;*A RANDOM PATTERN.  THE FIRST TWO WORDS OF EVERY 256 WILL
  6617                                       ;*BE THE BASE OF THE RANDOM NUMBER GENERATOR FOR THE
  6618                                       ;*NEXT 254 WORDS.
  6619                                       ;*NOTE: THIS ROUTINE DESTROYS R1 AND R2
  6620                                       ;*CALL
  6621                                       ;*      JSR     R0,@#FILRAN
  6622                                       ;*      RETURN
  6623
  6624  026562  012701  044134          FILRAN: MOV     #BUFFER,R1
  6625  026566  122737  000017  001102          CMPB    #17,$TSTNM
  6626  026574  001002                          BNE     2$
  6627  026576  013701  001212                  MOV     BUF,R1
  6628  026602  012702  000026          2$:     MOV     #^D22,R2
  6629  026606  004037  027066          1$:     JSR     R0,@#RANPAT
  6630  026612  005302                          DEC     R2
```

```
6631  026614  003374                          BGT     1$
6632  026616  000200                          RTS     R0
6633
6634                                  ;*****************************************************************
6635                                  .SBTTL  RANCK - RANDOM PATTERN BUFFER CHECK
6636                                  ;*THIS ROUTINE USES THE FIRST TWO WORDS OF THE
6637                                  ;*READ BUFFER TO GENERATED A RANDOM PATTERN.  THEN
6638                                  ;*THE READ BUFFER IS COMPARED TO THE PATTERN GENERATED.
6639                                  ;*NOTE: THIS ROUTINE DESTROYS R1-R4
6640                                  ;*CALL
6641                                  ;*      JSR     R0,@#RANCK
6642                                  ;*      RETURN
6643
6644  026620  013746  022022          RANCK:  MOV     @#$HINUM,-(SP)  ;SAVE THE PRESENT RANDOM NUMBER
6645  026624  013746  022024                  MOV     @#$LONUM,-(SP)
6646  026630  012702  045134                  MOV     #BUFFER+512.,R2 ;READ BUFFER ADDRESS
6647  026634  012701  046134                  MOV     #BUFFER+1024.,R1 ;RANDOM PATTERN ADDRESS
6648  026640  122737  000017  001102          CMPB    #17,$TSTNM
6649  026646  001007                          BNE     7$
6650  026650  013702  001212                  MOV     BUF,R2
6651  026654  010201                          MOV     R2,R1
6652  026656  062702  001000                  ADD     #512.,R2
6653  026662  062701  002000                  ADD     #1024.,R1
6654  026666  010103                  7$:     MOV     R1,R3           ;COPY IT INTO R3 FOR LATER USE
6655  026670  011237  022024                  MOV     (R2),@#$LONUM   ;PRIME THE RANDOM NUMBER GENERATOR
6656  026674  016237  000002  022022          MOV     2(R2),@#$HINUM
6657  026702  004037  027066                  JSR     R0,@#RANPAT     ;GENERATE A RANDOM PATTERN
6658  026706  012637  022024                  MOV     (SP)+,@#$LONUM  ;RESTORE PRESENT RANDOM NUMBER
6659  026712  012637  022022                  MOV     (SP)+,@#$HINUM
6660  026716  005046                          CLR     -(SP)           ;NO ERRORS
6661  026720  162322                  1$:     SUB     (R3)+,(R2)+     ;ARE THESE TWO WORDS DIFFERENT?
6662  026722  001452                          BEQ     4$              ;NO--BRANCH
6663  026724  012737  027020  001200          MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
6664  026732  064342                          ADD     -(R3),-(R2)     ;RECREATE THE BAD WORD
6665  026734  010237  001122                  MOV     R2,@#$BDADR     ;ADDRESS OF BAD DATA
6666  026740  010337  001120                  MOV     R3,@#$GDADR     ;ADDRESS OF GOOD DATA
6667  026744  012237  001126                  MOV     (R2)+,@#$BDDAT  ;BAD DATA
6668  026750  012337  001124                  MOV     (R3)+,@#$GDDAT  ;GOOD DATA
6669  026754  010204                          MOV     R2,R4           ;FORM WORD NUMBER (1 TO 256)
6670  026756  122737  000017  001102          CMPB    #17,$TSTNM
6671  026764  001005                          BNE     9$
6672  026766  163704  001212                  SUB     BUF,R4
6673  026772  162704  001000                  SUB     #512.,R4
6674  026776  000402                          BR      8$
6675  027000  162704  045134          9$:     SUB     #BUFFER+512.,R4
6676  027004  006204                  8$:     ASR     R4
6677  027006  005716                          TST     (SP)            ;FIRST ERROR
6678  027010  001002                          BNE     2$              ;NO--BRANCH
6679  027012  105116                          COMB    (SP)            ;YES--SET ERROR SWITCH
6680  027014  104015                          ERROR   15              ;REPORT THE ERROR
6681  027016  104016                  2$:     ERROR   16              ;REPORT THE ERROR
6682  027020  032737  001000  177570  3$:     BIT     #SW09,@#SWR     ;LOOP ON ERROR?
6683  027026  001012                          BNE     5$              ;YES--BRANCH
6684  027030  123737  001426  001103          CMPB    @#ERR.CT,@#$ERFLG ;MAX. ERRORS OCCURRED?
6685  027036  101406                          BLOS    5$              ;YES--BRANCH
6686  027040  032737  000002  177570          BIT     #SW01,@#SWR     ;STOP COMPARING?
```

```
6687  027046  001002                        BNE     5$              ;YES--BRANCH
6688  027050  020103                4$:     CMP     R1,R3           ;ALL DATA BEEN COMPARED?
6689  027052  101322                        BHI     1$              ;NO--BRANCH
6690  027054  005726                5$:     TST     (SP)+           ;ERROR OCCUR?
6691  027056  001402                        BEQ     6$              ;NO--BRANCH
6692  027060  013700  001270                MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
6693  027064  000200                6$:     RTS     R0              ;EXIT
6694
6695                                ;*****************************************************************
6696                                .SBTTL  RANPAT - RANDOM PATTERN GENERATOR
6697                                ;*THIS ROUTINE FILLS A 256 WORD BUFFER WITH A RANDOM
6698                                ;*PATTERN OF WHICH THE FIRST TWO WORDS ARE THE BASE
6699                                ;*OF THE PATTERN.
6700                                ;*CALL
6701                                ;*      MOV     #ADR,R1         ;ADDRESS OF THE BUFFER
6702                                ;*      JSR     R0,@#RANPAT
6703                                ;*      RETURN
6704
6705  027066  010246                RANPAT: MOV     R2,-(SP)        ;SAVE R2
6706  027070  012702  000200                MOV     #^D256/2,R2     ;GENERATE 256 WORDS
6707  027074  000402                        BR      2$
6708  027076  004737  021676        1$:     JSR     PC,@#$RAND      ;GENERATE A RANDOM NUMBER
6709  027102  013721  022024        2$:     MOV     @#$LONUM,(R1)+  ;PUT LOW WORD IN BUFFER
6710  027106  013721  022022                MOV     @#$HINUM,(R1)+  ;PUT HIGH WORD IN BUFFER
6711  027112  005302                        DEC     R2              ;DONE?
6712  027114  003370                        BGT     1$              ;NO--BRANCH
6713  027116  012602                        MOV     (SP)+,R2        ;RESTORE R2
6714  027120  000200                        RTS     R0              ;EXIT
6715
6716                                ;*****************************************************************
6717                                .SBTTL  RANADR - RANDOM ADDRESS GENERATOR
6718                                ;*THIS ROUTINE GENERATES RANDOM CYLINDER, TRACK, AND SECTOR
6719                                ;*ADDRESSES AND SAVES THEN IN THE DPB (DTADPB+10 AND DTADPB+12).
6720                                ;*NOTE: THIS ROUTINE DESTROYS R1-R3
6721                                ;*CALL
6722                                ;*      JSR     R0,@#RANADR
6723                                ;*      RETURN
6724
6725  027122  004737  021676        RANADR: JSR     PC,@#$RAND      ;GENERATE A RANDOM NUMBER
6726  027126  113701  022024                MOVB    @#$LONUM,R1     ;FORM SECTOR IN R1
6727  027132  113702  022025                MOVB    @#$LONUM+1,R2   ;FORM TRACK IN R2
6728  027136  013703  022022                MOV     @#$HINUM,R3     ;FORM CYLINDER IN R3
6729  027142  105701                        TSTB    R1              ;INSURE THE SECTOR IS BETWEEN 0 AND 21
6730  027144  002403                        BLT     2$
6731  027146  122701  000026        1$:     CMPB    #^D22,R1
6732  027152  003003                        BGT     3$
6733  027154  000241                2$:     CLC
6734  027156  106001                        RORB    R1
6735  027160  000772                        BR      1$
6736  027162  105702                3$:     TSTB    R2              ;INSURE THE TRACK IS BETWEEN 0 AND 18
6737  027164  002403                        BLT     5$
6738  027166  122702  000023        4$:     CMPB    #^D19,R2
6739  027172  003003                        BGT     6$
6740  027174  000241                5$:     CLC
6741  027176  106002                        RORB    R2
6742  027200  000772                        BR      4$
```

```
6743  027202  023703  002360          6$:     CMP     @#FC16,R3       ;INSURE THE CYLINDER IS BETWEEN FC AND LC
6744  027206  003413                          BLE     7$
6745  027210  000241                          CLC
6746  027212  006003                          ROR     R3
6747  027214  005503                          ADC     R3
6748  027216  001371                          BNE     6$
6749  027220  010103                          MOV     R1,R3
6750  027222  000303                          SWAB    R3
6751  027224  060203                          ADD     R2,R3
6752  027226  005203                          INC     R3
6753  027230  003364                          BGT     6$
6754  027232  005403                          NEG     R3
6755  027234  000762                          BR      6$
6756  027236  023703  002362          7$:     CMP     @#LC16,R3
6757  027242  002003                          BGE     8$
6758  027244  000241                          CLC
6759  027246  006003                          ROR     R3
6760  027250  000772                          BR      7$
6761  027252  023703  002360          8$:     CMP     @#FC16,R3
6762  027256  003403                          BLE     9$
6763  027260  005203                          INC     R3
6764  027262  000303                          SWAB    R3
6765  027264  000764                          BR      7$
6766  027266  110137  003564          9$:     MOVB    R1,@#DTADPB+10  ;SAVE SECTOR ADDRESS
6767  027272  110237  003565                  MOVB    R2,@#DTADPB+11  ;SAVE TRACK ADDRESS
6768  027276  010337  003566                  MOV     R3,@#DTADPB+12  ;SAVE CYLINDER ADDRESS
6769  027302  000200                          RTS     R0              ;RETURN
6770
6771                                  ;*****************************************************************
6772                                  .SBTTL  GETSWR - GET THE CONTROL SWITCH SETTINGS
6773                                  ;*THIS ROUTINE IS USED TO INPUT THE "CONTROL SWITCHES".
6774                                  ;*IF SWR<07>=1 THE PRESENT SETTING WILL BE TYPED AND THE NEW
6775                                  ;*SETTING IS READ AND STORED.
6776                                  ;*NOTE: THIS ROUTINE DESTROYS R3 AND R4
6777                                  ;*CALL
6778                                  ;*      JSR     PC,@#GETSWR
6779                                  ;*      RETURN                  ;(C.SWR)=DESIRED CONTROL SWITCHES
6780
6781  027304  032737  000200  177570  GETSWR: BIT     #SW07,@#SWR     ;READ CONTROL SWITCHES?
6782  027312  001426                          BEQ     2$              ;NO--BRANCH
6783  027314  104400  027322                  TYPE    ,.+4            ;;TYPE ASCIZ STRING
6784  027320  000410                          BR      64$             ;;GET OVER THE ASCIZ
6785                                          ;;.ASCIZ      <15><12>/SET SWR<07>=0/
6786  027342                          64$:
6787  027342  012703  040046          1$:     MOV     #MSG.CS,R3      ;"CONTROL SWITCHES="
6788  027346  013704  001246                  MOV     @#C.SWR,R4      ;PRESENT CONTROL SWITCH SETTINGS
6789  027352  004037  027612                  JSR     R0,@#GETNUM     ;GET THE NEW SWITCH SETTINGS
6790  027356  000771                          BR      1$              ; COMMA
6791  027360  000770                          BR      1$              ; PERIOD
6792  027362  010437  001246                  MOV     R4,@#C.SWR      ; DOUBLE PERIOD-SAVE NEW SWITCH SETTING
6793  027366  000746                          BR      GETSWR          ;LOOP
6794  027370  000207                  2$:     RTS     PC              ;RETURN FROM CALL
6795
6796                                  ;*****************************************************************
6797                                  .SBTTL  GETADR - GET BUS ADDRESS AND VECTOR ADDRESS
6798                                  ;*THIS ROUTINE IS USED TO INSURE THE BUS ADDRESS
```

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                                        ;*OF THE RH11/RP04 IS SETUP TO READ THE PROPER VALUE.
                                        ;*IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
                                        ;*REQUIRED.
                                        ;*NOTE: THIS ROUTINE DESTROYS R0-R4
                                        ;*CALL
                                        ;*
                                        ;*      JSR     PC,@#GETADR
                                        ;*      RETURN

027372  005737  001252          GETADR: TST     @#BUSADR        ;INPUT FROM TTY REQUESTED?
027376  001447                          BEQ     7$              ;NO--BRANCH
027400  005037  001252                  CLR     @#BUSADR        ;YES--CLEAR THE REQUEST FLAG
027404  012700  001362          1$:     MOV     #RH.ADR,R0      ;FIRST ADDRESS
027410  012703  040072                  MOV     #MRHCS1,R3      ;"RHCS1="
027414  011004                          MOV     (R0),R4         ;PRESENT RHCS1 ADDRESS
027416  004037  027612                  JSR     R0,@#GETNUM     ;GET NEW RHCS1
027422  000402                          BR      2$              ;COMMA
027424  000767                          BR      1$              ;PERIOD
027426  000430                          BR      5$              ;DOUBLE PERIOD
027430  010420          2$:     MOV     R4,(R0)+        ;SAVE NEW RHCS1
027432  012703  040103                  MOV     #MRHVEC,R3      ;"RHVEC="
027436  011004                          MOV     (R0),R4         ;PRESENT RH11 VECTOR ADDRESS
027440  004037  027612                  JSR     R0,@#GETNUM     ;GET NEW RHVEC
027444  000402                          BR      3$              ;COMMA
027446  000756                          BR      1$              ;PERIOD
027450  000417                          BR      5$              ;DOUBLE PERIOD
027452  010420          3$:     MOV     R4,(R0)+        ;SAVE NEW RHVEC
027454  012703  040114                  MOV     #MRHPRI,R3      ;"RHPRIO="
027460  011004                          MOV     (R0),R4         ;PRESENT RH11 PRIORITY LEVEL
027462  006304                          ASL     R4              ;POSITION FOR TYPEOUT
027464  006304                          ASL     R4
027466  006304                          ASL     R4
027470  000304                          SWAB    R4
027472  004037  027612                  JSR     R0,@#GETNUM     ;GET NEW RHPRIO
027476  000402                          BR      4$              ;COMMA
027500  000401                          BR      4$              ;PERIOD
027502  000404                          BR      6$              ;DOUBLE PERIOD
027504  010210          4$:     MOV     R2,(R0)         ;SAVE NEW RHPRIO
027506  000736                          BR      1$              ;LOOP
027510  010410          5$:     MOV     R4,(R0)         ;SAVE INPUT
027512  000401                          BR      7$
027514  010210          6$:     MOV     R2,(R0)         ;SAVE PRIORITY
027516  013701  000004  7$:     MOV     @#ERRVEC,R1     ;SAVE THE ERROR VECTOR
027522  012737  027560  000004          MOV     #8$,@#ERRVEC    ;SETUP FOR TRAP
027530  005777  151626                  TST     @RH.AD          ;CHECK FOR RH11/RP04
027534  010137  000004                  MOV     R1,@#ER VEC     ;RESTORE ERROR VECTOR
027540  012700  001362                  MOV     #RH.ADR,R0      ;FIRST ADDRESS OF NEW PARAMETERS
027544  012701  032360                  MOV     #RPADR,R1       ;FIRST ADDRESS OF WHERE TO PUT THEM
027550  012021                          MOV     (R0)+,(R1)+     ;BUS ADDRESS
027552  012021                          MOV     (R0)+,(R1)+     ;VECTOR ADDRESS
027554  012021                          MOV     (R0)+,(R1)+     ;PRIORITY LEVEL
027556  000207                          RTS     PC              ;RETURN
027560  010137  000004          8$:     MOV     R1,@#ERRVEC     ;RESTORE ERROR VECTOR
027564  022626                          CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
027566  104010                          ERROR   10              ;REPORT THE ERROR
027570  005737  000042                  TST     @#42            ;IS THERE A MONITOR?
```

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6855  027574  001703                  BEQ     1$              ;NO--GO ASK FOR ADDRESS
6856  027576  005037  001256          CLR     @#DRVSEL        ;YES--NO DRIVES SELECTED
6857  027602  005037  015120          CLR     @#$EOPCT        ;NO PASSES
6858  027606  000137  014744          JMP     @#$EOP          ;GO TO END OF PROGRAM
6859
6860                          ;*****************************************************************
6861                          .SBTTL  GETNUM - ROUTINE TO GET A NUMBER
6862                          ;*THIS ROUTINE WILL TYPE AN ASCIZ MESSAGE AND THEN
6863                          ;*INPUT AN ASCIZ STRING AND CHANGE THE STRING TO OCTAL
6864                          ;*IF REQUIRED.
6865                          ;*NOTE: THIS ROUTINE DESTROYS R1
6866                          ;*CALL
6867                          ;*      MOV     #ADR,R3         ;ADDRESS OF ASCIZ MESSAGE
6868                          ;*      MOV     #NUM,R4         ;OCTAL NUMBER
6869                          ;*      JSR     R0,@#GETNUM
6870                          ;*      RETURN1                 ;INPUT TERMINATED WITH A COMMA
6871                          ;*      RETURN2                 ;WITH A PERIOD
6872                          ;*      RETURN3                 ;WITH A DOUBLE PERIOD
6873                          ;*                              ;R4=INPUT NUMBER AND
6874                          ;*                              ;R2=R4*32 FOR ALL
6875                          ;*                              ;THREE RETURNS
6876
6877  027612  010337  027620  GETNUM: MOV     R3,2$           ;SAVE MESSAGE POINTER
6878  027616  104400          1$:     TYPE                    ;TYPE THE MESSAGE
6879  027620  000000          2$:     .WORD   0               ;MESSAGE POINTER GOES HERE
6880  027622  010446                  MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
6881  027624  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
6882  027626  104414                  RDLIN                   ;READ AN ASCIZ STRING
6883  027630  012601                  MOV     (SP)+,R1        ;ADDRESS OF FIRST CHARACTER
6884  027632  004037  031646          JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6885  027636  027616                  1$                      ;ILLEGAL CHARACTER
6886  027640  027616                  1$                      ;CARRIAGE RETURN
6887  027642  027652                  3$                      ;"/"
6888  027644  027676                  7$                      ;"'"
6889  027646  027704                  8$                      ;","
6890  027650  027616                  1$                      ;DIGIT 0-9
6891  027652                  3$:
6892  027652  004037  032102          JSR     R0,@#CK.NUM     ;CHECK THE NUMBER
6893  027656  027616                  1$                      ;ILLEGAL INPUT
6894  027660  027672                  6$                      ;TERMINATED WITH A ","
6895  027662  027670                  5$                      ;TERMINATED WITH A "."
6896  027664  027666                  4$                      ;TERMINATED WITH A ".."
6897  027666  005720          4$:     TST     (R0)+           ;DOUBLE PERIOD
6898  027670  005720          5$:     TST     (R0)+           ;SINGLE PERIOD
6899  027672  010204          6$:     MOV     R2,R4           ;COMMA--SAVE INPUT NUMBER
6900  027674  000414                  BR      10$             ;GO TO EXIT
6901  027676  105711          7$:     TSTB    (R1)            ;TERMINATOR AFTER A COMMA?
6902  027700  001346                  BNE     1$              ;NO--LOOP
6903  027702  000411                  BR      10$             ;YES--EXIT
6904  027704  105711          8$:     TSTB    (R1)            ;TERMINATOR AFTER A PERIOD?
6905  027706  001406                  BEQ     9$              ;YES--EXIT
6906  027710  122721  000056          CMPB    #'.,(R1)+       ;NO--DOUBLE PERIOD?
6907  027714  001340                  BNE     1$              ;NO--LOOP
6908  027716  105711                  TSTB    (R1)            ;YES--TERMINATOR?
6909  027720  001336                  BNE     1$              ;NO--LOOP
6910  027722  005720                  TST     (R0)+           ;DOUBLE PERIOD
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6911  027724  005720                  9$:     TST     (R0)+           ;PERIOD
6912  027726  010402                  10$:    MOV     R4,R2           ;COMMA--POSITION THE
6913  027730  000302                          SWAB    R2              ;NUMBER IN CASE IT
6914  027732  006202                          ASR     R2              ;IS THE PRIORITY LEVEL
6915  027734  006202                          ASR     R2
6916  027736  006202                          ASR     R2
6917  027740  000200                          RTS     R0              ;EXIT
6918
6919                                  ;*****************************************************************
6920                                  .SBTTL  GT.PRM - GET PARAMETERS
6921                                  ;*THIS ROUTINE IS USED TO CHANGE OR MODIFY
6922                                  ;*THE TEST PARAMETERS.  IT GIVES THE OPERATOR
6923                                  ;*THE CAPABILITY OF SPECIFYING WHICH DRIVES TO TEST, WHICH
6924                                  ;*TESTS TO RUN AND HOW MANY TIMES TO
6925                                  ;*REPEAT EACH TEST
6926  027742  004037  037744          GT.PRM: JSR     R0,@#SAVR05     ;SAVE R0-R5
6927  027746  005037  001256          GT.PR1: CLR     DRVSEL          ;NO DRIVE SELECTED
6928  027752  104400  027760                  TYPE    .+4             ;;TYPE ASCIZ STRING
6929  027756  000406                          BR      64$             ;;GET OVER THE ASCIZ
6930                                          ;;.ASCIZ      <15><12>/DRIVE(S)=/
6931  027774                          64$:
6932  027774  104414                          RDLIN                   ;READ TTY
6933  027776  012601                          MOV     (SP)+,R1        ;ADDRESS OF ASCIZ STRING
6934  030000  004037  031646                  JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6935  030004  027746                          GT.PR1                  ;ILLEGAL CHARACTER
6936  030006  027746                          GT.PR1                  ;CARRIAGE RETURN
6937  030010  027746                          GT.PR1                  ;"/"
6938  030012  027746                          GT.PR1                  ;","
6939  030014  027746                          GT.PR1                  ;"'"
6940  030016  030020                          1$                      ;DIGIT 0-9
6941  030020  005301                  1$:     DEC     R1
6942  030022                          2$:
6943  030022  012702  000007                  MOV     #7,R2   ;UPPER LIMIT OF INPUT
6944  030026  004037  031722                  JSR     R0,@#CK.DIG     ;CHECK THE DIGIT(S)
6945  030032  027746                          GT.PR1                  ;ILLEGAL INPUT
6946  030034  027746                          GT.PR1                  ;INPUT TO LARGE
6947  030036  030044                          3$                      ;TERMINATED WITH A ","
6948  030040  030064                          4$                      ;TERMINATED WITH A "'"
6949  030042  030064                          4$                      ;TERMINATED WITH A "."
6950  030044  156237  032346  001256  3$:     BISB    ATABIT(R2),DRVSEL ;SET THE DRIVE SELECTED BIT
6951  030052  105741                          TSTB    -(R1)           ;WAS THE LINE TERMINATED?
6952  030054  001362                          BNE     2$              ;NO-GET THE NEXT DRIVE
6953  030056  005037  001260                  CLR     @#TSTNMS        ;DESELECT ALL TESTS
6954  030062  000406                          BR      GTTST1          ;YES--SELECT TEST
6955  030064  156237  032346  001256  4$:     BISB    ATABIT(R2),DRVSEL ;SET THE SELECTED DRIVE BITS
6956  030072  004037  037770          GT.PR2: JSR     R0,@#GETR05     ;RESTORE R0-R5
6957  030076  000207                          RTS     PC              ;EXIT
6958
6959  030100                          GTTST1:
6960  030100  104400  030106                  TYPE    .+4             ;;TYPE ASCIZ STRING
6961  030104  000403                          BR      64$             ;;GET OVER THE ASCIZ
6962                                          ;;.ASCIZ      /TEST=/
6963  030114                          64$:
6964  030114  104414                          RDLIN                   ;READ AN ASCIZ STRING
6965  030116  012601                          MOV     (SP)+,R1        ;POINTER TO R1
6966  030120  122711  000056                  CMPB    #'.,(R1)        ;DOUBLE PERIOD?
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6967  030124  001007                          BNE     1$              ;NO--BRANCH
6968  030126  122761  000056  000001          CMPB    #'.,1(R1)
6969  030134  001003                          BNE     1$
6970  030136  105761  000002                  TSTB    2(R1)           ;"CR"?
6971  030142  001753                          BEQ     GT.PR2          ;YES--EXIT
6972  030144  005037  001260          1$:     CLR     TSTNMS          ;NO TEST SELECTED
6973  030150  005003                          CLR     R3              ;NO TEST TO BE OPENED
6974  030152  005004                  GTTST2: CLR     R4              ;NO TEST BITS SET
6975  030154  121127  000123                  CMPB    (R1),#'S        ;ALL SEEK TESTS?
6976  030160  001003                          BNE     1$              ;NO--BRANCH
6977  030162  012704  000177                  MOV     #177,R4         ;YES--SELECT TESTS 0-6
6978  030166  000512                          BR      GTTST3
6979  030170  121127  000124          1$:     CMPB    (R1),#'T        ;ALL TIMING TESTS?
6980  030174  001003                          BNE     2$              ;NO--BRANCH
6981  030176  012704  003600                  MOV     #3600,R4        ;YES--SELECT TESTS 7-12
6982  030202  000504                          BR      GTTST3
6983  030204  121127  000101          2$:     CMPB    (R1),#'A        ;ALL ADDRESSING TESTS?
6984  030210  001003                          BNE     3$              ;NO--BRANCH
6985  030212  012704  014000                  MOV     #14000,R4       ;YES--SELECT TESTS 13 & 14
6986  030216  000476                          BR      GTTST3
6987  030220  121127  000104          3$:     CMPB    (R1),#'D        ;DATA TEST?
6988  030224  001003                          BNE     4$              ;NO--BRANCH
6989  030226  012704  020000                  MOV     #20000,R4       ;YES--SELECT TEST 15
6990  030232  000470                          BR      GTTST3
6991  030234  121127  000105          4$:     CMPB    (R1),#'E        ;EXERCISER TEST?
6992  030240  001003                          BNE     5$              ;NO--BRANCH
6993  030242  012704  040000                  MOV     #40000,R4       ;YES--SELECT TEST 16
6994  030246  000462                          BR      GTTST3
6995  030250  004037  031572          5$:     JSR     R0,@#CK.OCT     ;OCTAL DIGIT?
6996  030254  000460                          BR      GTTST4          ;NO--BRANCH
6997  030256  010205                          MOV     R2,R5           ;YES--SAVE IT
6998  030260  005201                          INC     R1              ;MOVE TO NEXT CHARACTER
6999  030262  004037  031572                  JSR     R0,@#CK.OCT     ;OCTAL DIGIT
7000  030266  000405                          BR      6$              ;NO--BRANCH
7001  030270  005201                          INC     R1              ;MOVE TO NEXT CHARACTER
7002  030272  006305                          ASL     R5              ;SCALE HIGH DIGIT
7003  030274  006305                          ASL     R5
7004  030276  006305                          ASL     R5
7005  030300  060502                          ADD     R5,R2           ;COMBINE HIGH & LOW DIGITS
7006  030302  020227  000016          6$:     CMP     R2,#16          ;LEGAL TEST NUMBER?
7007  030306  003274                          BGT     GTTST1          ;NO--BRANCH
7008  030310  006302                          ASL     R2
7009  030312  016204  001430                  MOV     BITS(R2),R4     ;SELECT TEST
7010  030316  121127  000055                  CMPB    (R1),#'-        ;TEST STRING?
7011  030322  001035                          BNE     GTTST4          ;NO--BRANCH
7012  030324  005201                          INC     R1              ;YES--MOVE TO NEXT CHARACTER
7013  030326  004037  031572                  JSR     R0,@#CK.OCT     ;OCTAL DIGIT?
7014  030332  000662                          BR      GTTST1          ;NO--BRANCH
7015  030334  010205                          MOV     R2,R5           ;YES--SAVE IT
7016  030336  005201                          INC     R1              ;MOVE TO NEXT CHARACTER
7017  030340  004037  031572                  JSR     R0,@#CK.OCT     ;OCTAL DIGIT?
7018  030344  000405                          BR      7$              ;NO--BRANCH
7019  030346  005201                          INC     R1              ;YES--MOVE TO NEXT CHARACTER
7020  030350  006305                          ASL     R5              ;SCALE HIGH DIGIT
7021  030352  006305                          ASL     R5
7022  030354  006305                          ASL     R5
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7023  030356  060502                        ADD     R5,R2           ;COMBINE HIGH & LOW DIGIT
7024  030360  020227  000017        7$:     CMP     R2,#17          ;LEGAL TEST NUMBER?
7025  030364  003245                        BGT     GTTST1          ;NO--BRANCH
7026  030366  006302                        ASL     R2
7027  030370  020462  001430                CMP     R4,BITS(R2)     ;IS THE FIRST NUMBER OF THE
7028                                                                ;STRING SMALLER THAN THE LAST?
7029  030374  002241                        BGE     GTTST1          ;NO--BRANCH
7030  030376  056204  001430        8$:     BIS     BITS(R2),R4     ;YES--SET TEST SELECT BIT FOR SELECTED TESTS
7031  030402  005742                        TST     -(R2)           ;ADJUST POINTER
7032  030404  036204  001430                BIT     BITS(R2),R4     ;DONE?
7033  030410  001772                        BEQ     8$              ;NO--BRANCH
7034  030412  000401                        BR      GTTST4          ;SKIP THE INCREMENT
7035  030414  005201        GTTST3: INC     R1                      ;MOVE TO NEXT CHARACTER
7036  030416  050437  001260    GTTST4: BIS     R4,TSTNMS       ;SET SELECTED TEST BITS INTO
7037                                                                ;TEST SELECT WORD
7038  030422  121127  000056                CMPB    (R1),#'.        ;"PERIOD"?
7039  030426  001420                        BEQ     GTTST5          ;YES--BRANCH
7040  030430  005704                        TST     R4              ;ANY TEST SELECTED THIS CYCLE?
7041  030432  001622                        BEQ     GTTST1          ;NO--BRANCH
7042  030434  121127  000057                CMPB    (R1),#'/        ;"OPEN"?
7043  030440  001002                        BNE     1$              ;NO--BRANCH
7044  030442  050403                        BIS     R4,R3           ;YES--SET BITS FOR TEST TO OPEN
7045  030444  000403                        BR      2$
7046  030446  121127  000054        1$:     CMPB    (R1),#',        ;"COMMA"?
7047  030452  001212                        BNE     GTTST1          ;NO--BRANCH
7048  030454  005201        2$:     INC     R1                      ;MOVE TO NEXT CHARACTER
7049  030456  105711                        TSTB    (R1)            ;"CR"?
7050  030460  001234                        BNE     GTTST2          ;NO--GO GET NEXT CHARACTER
7051  030462  005703                        TST     R3              ;ANY TESTS TO OPEN?
7052  030464  001026                        BNE     OPNTST          ;YES--BRANCH
7053  030466  000604                        BR      GTTST1          ;NO--START AGAIN
7054  030470  005201        GTTST5: INC     R1                      ;MOVE TO NEXT CHARACTER
7055  030472  121127  000056                CMPB    (R1),#'.        ;"PERIOD"?
7056  030476  001410                        BEQ     GTTST6          ;YES--BRANCH
7057  030500  105711                        TSTB    (R1)            ;"CR"?
7058  030502  001402                        BEQ     1$              ;YES--BRANCH
7059  030504  000137  030100                JMP     GTTST1
7060  030510  005703        1$:     TST     R3                      ;ANY TEST TO BE OPENED?
7061  030512  001013                        BNE     OPNTST          ;YES--BRANCH
7062  030514  000137  030072                JMP     GT.PR2          ;NO--GO START TESTING
7063  030520  005201        GTTST6: INC     R1                      ;MOVE TO NEXT CHARACTER
7064  030522  105711                        TSTB    (R1)            ;"CR"?
7065  030524  001402                        BEQ     1$              ;YES--BRANCH
7066  030526  000137  030100                JMP     GTTST1          ;NO--GO ASK FOR TEST
7067  030532  005703        1$:     TST     R3                      ;ANY TEST TO BE OPENED?
7068  030534  001002                        BNE     OPNTST          ;YES--BRANCH
7069  030536  000137  030072                JMP     GT.PR2          ;NO--GO START TESTING
7070                        ;OPEN THE TEST FOR CHANGES
7071  030542  004037  037744    OPNTST: JSR     R0,@#SAVR05
7072  030546  005027                        CLR     (PC)+           ;START WITH TEST 0
7073  030550  000000        OPN.CT: .WORD   0                       ;COUNT STORED HERE
7074  030552  000412                        BR      OPN.2           ;SKIP THE INCREMENT
7075  030554  005237  030550    OPN.1:  INC     OPN.CT          ;MOVE TO THE NEXT TEST
7076  030560  022737  000016  030550        CMP     #16,OPN.CT      ;TEST NUMBER TO BIG?
7077  030566  002004                        BGE     OPN.2           ;NO--OPEN THE NEXT TEST
7078  030570  004037  037770                JSR     R0,@#GETR05
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7079  030574  000137  030100                    JMP     GTTST1          ;YES--GO ASK FOR MORE TESTS
7080  030600  013705  030550          OPN.2:    MOV     OPN.CT,R5       ;SETUP TO USE THE
7081  030604  006305                            ASL     R5              ;TEST NUMBER AS AN INDEX
7082  030606  036503  001430                    BIT     BITS(R5),R3     ;OPEN THIS TEST?
7083  030612  001760                            BEQ     OPN.1           ;NO--MOVE TO NEXT TEST
7084  030614  104400  030622                    TYPE    ,.+4            ;;TYPE ASCIZ STRING
7085  030620  000404                            BR      64$             ;;GET OVER THE ASCIZ
7086                                            ;;.ASCIZ      / TEST /
7087  030632                          64$:
7088  030632  013746  030550                    MOV     OPN.CT,-(SP)    ;;SAVE OPN.CT FOR TYPEOUT
7089                                                                    ;;TEST NUMBER
7090  030636  104404                            TYPOS                   ;;GO TYPE--OCTAL ASCII
7091  030640     002                            .BYTE   2               ;;TYPE 2 DIGIT(S)
7092  030641     000                            .BYTE   0               ;;SUPPRESS LEADING ZEROS
7093  030642  104400  001207                    TYPE    ,$CRLF          ;TYPE "CR" & "LF"
7094  030646  016500  001516                    MOV     PRMPT(R5),R0    ;PICKUP PARAMETER POINTER
7095  030652  011046                            MOV     (R0),-(SP)      ;SAVE THE VARIABLE INDICATOR
7096  030654  012702  001470                    MOV     #PRM,R2         ;FIRST ADDRESS OF TABLE
7097  030660  000405                            BR      2$
7098  030662  006216                  1$:       ASR     (SP)            ;CHECK FOR A VARIABLE
7099  030664  103403                            BCS     2$              ;GO MOVE THIS ONE
7100  030666  001404                            BEQ     OPNPRM          ;DONE
7101  030670  005722                            TST     (R2)+           ;BUMP THE POINTER
7102  030672  000773                            BR      1$
7103  030674  012022                  2$:       MOV     (R0)+,(R2)+     ;MOVE THIS VARIABLE INTO THE
7104  030676  000771                            BR      1$              ;COMMON AREA
7105  030700  013716  001470          OPNPRM:   MOV     @#PRM,(SP)      ;GET THE VARIABLE INDICATOR
7106  030704  005004                            CLR     R4              ;ZERO THE INDEX
7107  030706  006216                  1$:       ASR     (SP)            ;CHECK FOR A VARIABLE
7108  030710  103403                            BCS     3$              ;GO GET IT
7109  030712  001772                            BEQ     OPNPRM          ;OUT OF VARIABLES
7110  030714  005724                  2$:       TST     (R4)+           ;UPDATE THE INDEX
7111  030716  000773                            BR      1$
7112  030720  005764  001554          3$:       TST     PRMLMT(R4)      ;IS THE MAX. MAGNITUDE NEG?
7113  030724  100463                            BMI     OPNPAT          ;YES--THEN IT IS THE PATTERN
7114  030726  104400  040612                    TYPE    ,MSG.SP         ;TYPE SPACES
7115  030732  016437  001600  030742            MOV     PRMMSG(R4),4$   ;TYPE THE NAME OF THIS VARIABLE
7116  030740  104400                            TYPE
7117  030742  000000                  4$:       .WORD   0
7118  030744  104400  040044                    TYPE    ,MSG.EQ         ;TYPE "="
7119  030750  016446  001472                    MOV     RPT(R4),-(SP)           ;PUT RPT(R4) ON THE STACK
7120  030754  004737  021170                    JSR     PC,@#$SB2D      ;CHANGE RPT(R4) TO DECIMAL ASCIZ
7121  030760  004737  021414                    JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
7122  030764  104414                            RDLIN
7123  030766  012601                            MOV     (SP)+,R1        ;READ AN ASCIZ STRING
7124  030770  004037  031646                    JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
7125  030774  030720                            3$                      ;ILLEGAL CHARACTER
7126  030776  030720                            ;                       ;CARRIAGE RETURN
7127  031000  031044                            ;                       ;"/"
7128  031002  031010                            5$                      ;"."
7129  031004  031016                            6$                      ;"'"
7130  031006  030720                            3$                      ;DIGIT 0-9
7131  031010  105711                  5$:       TSTB    (R1)            ;"CR"?
7132  031012  001342                            BNE     3$              ;NO--STAY ON THIS VARIABLE
7133  031014  000737                            BR      2$              ;YES--MOVE TO NEXT VARIABLE
7134  031016  105711                  6$:       TSTB    (R1)            ;IS THERE A "CR" AFTER THE PERIOD?
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7135  031020  001002                        BNE     64$             ;NO
7136  031022  000137  031432                JMP     OPN.N2          ;YES--GO CLOSE THIS TEST
7137  031026  122721  000056        64$:    CMPB    #'.,(R1)+       ;DOUBLE PERIOD?
7138  031032  001332                        BNE     3$              ;NO--GO ASK FOR THIS VARIABLE
7139  031034  105711                        TSTB    (R1)            ;YES--IS A "CR" AFTER THE DOUBLE PERIOD?
7140  031036  001330                        BNE     3$              ;NO--ASK FOR THIS VARIABLE AGAIN
7141  031040  000137  031450                JMP     OPN.X2          ;YES--CLOSE ALL TEST
7142  031044                        7$:
7143  031044  016402  001554                MOV     PRMLMT(R4),R2   ;UPPER LIMIT OF INPUT
7144  031050  004037  031722                JSR     R0,@#CK.DIG     ;CHECK THE DIGIT(S)
7145  031054  030720                        3$                      ;ILLEGAL INPUT
7146  031056  030720                        3$                      ;INPUT TO LARGE
7147  031060  031066                        8$                      ;TERMINATED WITH A ","
7148  031062  031426                        OPN.N1                  ;TERMINATED WITH A "."
7149  031064  031444                        OPN.X1                  ;TERMINATED WITH A ".."
7150  031066  010264  001472        8$:     MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
7151  031072  000710                        BR      2$              ;MOVE TO NEXT VARIABLE
7152  031074  104400  040612        OPNPAT: TYPE    ,MSG.SP         ;TYPE SPACES
7153  031100  104400  040040                TYPE    ,MSG.PAT        ;TYPE "PAT"
7154  031104  104400  040044                TYPE    ,MSG.EQ         ;TYPE "="
7155  031110  016446  001472                MOV     RPT(R4),-(SP)   ;;SAVE RPT(R4) FOR TYPEOUT
7156  031114  104402                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
7157  031116  104414                        RDLIN                   ;READ ASCIZ STRING
7158  031120  012601                        MOV     (SP)+,R1        ;PICKUP POINTER
7159  031122  004037  031646                JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
7160  031126  031074                        OPNPAT                  ;ILLEGAL CHARACTER
7161  031130  031074                        OPNPAT                  ;CARRIAGE RETURN
7162  031132  031162                        2$                      ;"/"
7163  031134  030700                        OPNPRM                  ;"."
7164  031136  031142                        1$                      ;","
7165  031140  031074                        OPNPAT                  ;DIGIT 0-9
7166  031142  105711        1$:     TSTB    (R1)                    ;"CR" AFTER THE PERIOD?
7167  031144  001532                        BEQ     OPN.N2          ;YES--GO CLOSE THIS TEST
7168  031146  122721  000056                CMPB    #'.,(R1)+       ;NO--PERIOD?
7169  031152  001350                        BNE     OPNPAT          ;NO--LOOP
7170  031154  105711                        TSTB    (R1)            ;"CR" AFTER A DOUBLE PERIOD?
7171  031156  001534                        BEQ     OPN.X2          ;YES--GO START TESTING
7172  031160  000745                        BR      OPNPAT          ;NO--LOOP
7173  031162                        2$:
7174  031162  004037  032102                JSR     R0,@#CK.NUM     ;CHECK THE NUMBER
7175  031166  031074                        OPNPAT                  ;ILLEGAL INPUT
7176  031170  031176                        3$                      ;TERMINATED WITH A ","
7177  031172  031426                        OPN.N1                  ;TERMINATED WITH A "."
7178  031174  031444                        OPN.X1                  ;TERMINATED WITH A ".."
7179  031176  010264  001472        3$:     MOV     R2,RPT(R4)      ;SAVE THE INPUT NUMBER
7180  031202  006002                        ROR     R2              ;OPEN PATTERN 0?
7181  031204  103235                        BCC     OPNPRM          ;NO--START AT BEGINNING OF PARAMETER TABLE
7182  031206  004037  037744                JSR     R0,@#SAVR05     ;SAVE R1-R5
7183  031212  005000        OPNWDS: CLR     R0                      ;START WITH WORD 0
7184  031214  012704  002474                MOV     #PAT0,R4
7185  031220                        1$:
7186  031220  104400  031226                TYPE    .+4             ;;TYPE ASCIZ STRING
7187  031224  000403                        BR      64$             ;;GET OVER THE ASCIZ
7188                                        ;;.ASCIZ      /   WD/
7189  031234                        64$:
7190  031234  010046                        MOV     R0,-(SP)                ;PUT R0 ON THE STACK
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7191  031236  004737  021170          JSR     PC,@#$B2D       ;CHANGE R0 TO DECIMAL ASCIZ
7192  031242  004737  021414          JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
7193  031246  104400  040044          TYPE    ,MSG.EQ         ;TYPE "="
7194  031252  011446                  MOV     (R4),-(SP)      ;;SAVE (R4) FOR TYPEOUT
7195  031254  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
7196  031256  104414                  RDLIN                   ;READ ASCIZ STRING
7197  031260  012601                  MOV     (SP)+,R1        ;PICKUP THE POINTER
7198  031262  004037  031646          JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
7199  031266  031220                  1$                      ;ILLEGAL CHARACTER
7200  031270  031220                  1$                      ;CARRIAGE RETURN
7201  031272  031302                  2$                      ;"/"
7202  031274  031320                  4$                      ;"."
7203  031276  031334                  5$                      ;"'"
7204  031300  031220                  1$                      ;DIGIT 0-9
7205  031302                  2$:
7206  031302  004037  032102          JSR     R0,@#CK.NUM     ;CHECK THE NUMBER
7207  031306  031220                  1$                      ;ILLEGAL INPUT
7208  031310  031316                  3$                      ;TERMINATED WITH A ","
7209  031312  031354                  6$                      ;TERMINATED WITH A ":"
7210  031314  031370                  8$                      ;TERMINATED WITH A ".."
7211  031316  010214          3$:     MOV     R2,(R4)         ;SAVE THE INPUT
7212  031320  005724          4$:     TST     (R4)+           ;MOVE TO NEXT WORD
7213  031322  005200                  INC     R0              ;INCREMENT THE COUNT
7214  031324  022700  000020          CMP     #16.,R0         ;COUNT TO LARGE?
7215  031330  003333                  BGT     1$              ;NO--BRANCH
7216  031332  000727                  BR      OPNWDS          ;YES--BRANCH
7217  031334  105711          5$:     TSTB    (R1)            ;"CR" AFTER THE PERIOD?
7218  031336  001407                  BEQ     7$              ;YES--GO CLOSE THIS TEST
7219  031340  122721  000056          CMPB    #'.,(R1)+       ;NO--PERIOD?
7220  031344  001325                  BNE     1$              ;NO--BRANCH ILLEGAL INPUT STRING
7221  031346  105711                  TSTB    (R1)            ;"CR" AFTER THE "PERIOD-PERIOD"?
7222  031350  001410                  BEQ     9$              ;YES--GO START TESTING
7223  031352  000722                  BR      1$              ;NO--LOOP
7224  031354  010224          6$:     MOV     R2,(R4)+        ;SAVE THE INPUT
7225  031356  004737  031404  7$:     JSR     PC,@#CLSWDS     ;CLOSE THE DATA PATTERN
7226  031362  004037  037770          JSR     R0,@#GETR0S     ;GET R0-R5
7227  031366  000421                  BR      OPN.N2          ;MOVE TO NEXT TEST
7228  031370  010224          8$:     MOV     R2,(R4)+        ;SAVE THE INPUT
7229  031372  004737  031404  9$:     JSR     PC,@#CLSWDS     ;CLOSE THE DATA PATTERN
7230  031376  004037  037770          JSR     R0,@#GETR0S     ;GET R0-R5
7231  031402  000422                  BR      OPN.X2          ;START TESTING
7232  031404  012701  002474  CLSWDS: MOV     #PAT0,R1        ;FIRST ADDRESS OF DATA PATTERN
7233  031410  005200          1$:     INC     R0              ;COUNT THE LAST WORD THAT WAS STORED
7234  031412  022700  000017          CMP     #15.,R0         ;END OF TABLE
7235  031416  002402                  BLT     2$              ;YES--EXIT
7236  031420  012124                  MOV     (R1)+,(R4)+     ;COPY
7237  031422  000772                  BR      1$              ;LOOP
7238  031424  000207          2$:     RTS     PC              ;RETURN
7239  031426  010264  001472  OPN.N1: MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
7240  031432  005726          OPN.N2: TST     (SP)+           ;CLEAN OFF THE STACK
7241  031434  004737  031506          JSR     PC,CLOSE        ;CLOSE THIS TEST
7242  031440  000137  030554          JMP     OPN.1           ;GO OPEN THE NEXT TEST
7243  031444  010264  001472  OPN.X1: MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
7244  031450  005726          OPN.X2: TST     (SP)+           ;CLEAN OFF THE STACK
7245  031452  004737  031506  1$:     JSR     PC,CLOSE        ;CLOSE THIS TEST
7246  031456  005725          2$:     TST     (R5)+           ;UPDATE THE INDEX
```

```
7247  031460  020527  000034                  CMP     R5,#16*2        ;INDEX TO BIG?
7248  031464  002404                          BLT     3$              ;NO--BRANCH
7249  031466  004037  037770                  JSR     R0,@#GETR05     ;YES--RESTORE R0-R5
7250  031472  000137  030072                  JMP     GT.PR2          ;GO TO EXIT
7251  031476  036503  001430          3$:     BIT     BITS(R5),R3     ;IS THIS TEST OPEN FOR CHANGE?
7252  031502  001363                          BNE     1$              ;YES--GO CLOSE IT
7253  031504  000764                          BR      2$              ;NO--MOVE TO NEXT TEST
7254  031506  004037  037744          CLOSE:  JSR     R0,@#SAVR05     ;SAVE R0-R5
7255  031512  012700  001470                  MOV     #PRM,R0         ;"FROM" ADDRESS
7256  031516  016501  001516                  MOV     PRMPT(R5),R1    ;"TO" ADDRESS
7257  031522  012002                          MOV     (R0)+,R2        ;"FROM" INDICATOR
7258  031524  012103                          MOV     (R1)+,R3        ;"TO" INDICATOR
7259  031526  012704  000001                  MOV     #1,R4           ;TEST BIT START A "RPT"
7260  031532  030402                  1$:     BIT     R4,R2           ;PARAMETER TO BE MOVED?
7261  031534  001403                          BEQ     2$              ;NO--BRANCH
7262  031536  030403                          BIT     R4,R3           ;A PLACE TO PUT IT?
7263  031540  001404                          BEQ     3$              ;NO--BRANCH
7264  031542  011011                          MOV     (R0),(R1)       ;YES--MOVE "FROM" TO "TO"
7265  031544  030403                  2$:     BIT     R4,R3           ;"TO" PARAMETER?
7266  031546  001401                          BEQ     3$              ;NO--BRANCH
7267  031550  005721                          TST     (R1)+           ;YES--UPDATE THE POINTER
7268  031552  005720                  3$:     TST     (R0)+           ;UPDATE FROM POINTER
7269  031554  006304                          ASL     R4              ;POSITION THE TEST BIT
7270  031556  032704  002000                  BIT     #BIT10,R4       ;DONE?
7271  031562  001763                          BEQ     1$              ;NO--BRANCH
7272  031564  004037  037770                  JSR     R0,@#GETR05     ;YES--RESTORE R0-R5
7273  031570  000207                          RTS     PC              ;RETURN
7274                          ;*****************************************************************
7275                          .SBTTL  CK.OCT -- CHECK FOR OCTAL CHARACTER
7276                          ;*THIS ROUTINE IS USED TO CHECK IF AN
7277                          ;*ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
7278                          ;*CALL
7279                          ;*      MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
7280                          ;*      JSR     R0,@#CK.OCT     ;CHECK THE CHARACTER
7281                          ;*      RETURN1                 ;CHARACTER IS NOT BETWEEN 0-7
7282                          ;*      RETURN2                 ;CHARACTER IS IN R2 AS A
7283                          ;*                              ;OCTAL DIGIT
7284
7285  031572  121127  000060  CK.OCT: CMPB    (R1),#'0        ;LESS THAN ZERO?
7286  031576  103407                          BLO     1$              ;YES -- BRANCH
7287  031600  121127  000067                  CMPB    (R1),#'7        ;GREATER THAN SEVEN?
7288  031604  101004                          BHI     1$              ;YES -- BRANCH
7289  031606  111102                          MOVB    (R1),R2         ;GET THE CHARACTER
7290  031610  042702  177770                  BIC     #^C7,R2         ;STRIP AWAY THE ASCII
7291  031614  005720                          TST     (R0)+           ;ADJUST FOR RETURN
7292  031616  000200                  1$:     RTS     R0              ;RETURN
7293
7294                          ;*****************************************************************
7295                          .SBTTL  CK.DEC -- CHECK FOR DECIMAL CHARACTER
7296                          ;*THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
7297                          ;*AND DETERMINE IF IT IS A DIGIT BETWEEN 0 AND 9.
7298                          ;*CALL
7299                          ;*      MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
7300                          ;*      JSR     R0,@#CK.DEC     ;CHECK THE CHARACTER
7301                          ;*      RETURN1                 ;NOT BETWEEN 0 AND 9
7302                          ;*      RETURN2                 ;BETWEEN 0 AND 9
```

```
7303                                    ;*                              ;R2 = DIGIT
7304
7305  031620  121127  000060            CK.DEC: CMPB    (R1),#'0        ;LESS THAN ZERO?
7306  031624  103407                            BLO     1$              ;YES -- BRANCH
7307  031626  121127  000071                    CMPB    (R1),#'9                ;GREATER THAN NINE?
7308  031632  101004                            BHI     1$              ;YES -- BRANCH
7309  031634  111102                            MOVB    (R1),R2         ;GET THE CHARACTER
7310  031636  042702  000060                    BIC     #'0,R2          ;STRIP AWAY THE ASCII
7311  031642  005720                            TST     (R0)+           ;ADJUST FOR RETURN
7312  031644  000200                    1$:     RTS     R0              ;RETURN
7313
7314                                    ;******************************************************************
7315                                    .SBTTL  CK.CHR -- CHECK CHARACTER
7316                                    ;*THIS ROUTINE WILL CHECK AN ASCII CHARACTER TO
7317                                    ;*DETERMINE WHAT IT IS.
7318                                    ;*CALL
7319                                    ;*      MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
7320                                    ;*      JSR     R0,@#CK.CHR     ;CHECK CHARACTER
7321                                    ;*      RETURN  ADR1            ;UNKNOWN CHARACTER
7322                                    ;*      RETURN  ADR2            ;CARRIAGE RETURN * (R1)=ADR+1
7323                                    ;*      RETURN  ADR3            ;SLASH * (R1)=ADR+1
7324                                    ;*      RETURN  ADR4            ;COMMA * (R1)=ADR+1
7325                                    ;*      RETURN  ADR5            ;PERIOD * (R1)=ADR+1
7326                                    ;*      RETURN  ADR6            ;DIGIT BETWEEN 0 AND 9.
7327                                    ;*                              ;R2 = DIGIT * (R1)=ADR+1
7328
7329  031646  105711                    CK.CHR: TSTB    (R1)            ;"CARRIAGE RETURN"?
7330  031650  001420                            BEQ     4$              ;YES -- BRANCH
7331  031652  121127  000057                    CMPB    (R1),#'/        ;"SLASH"?
7332  031656  001414                            BEQ     3$              ;YES -- BRANCH
7333  031660  121127  000054                    CMPB    (R1),#',        ;"COMMA"?
7334  031664  001410                            BEQ     2$              ;YES -- BRANCH
7335  031666  121127  000056                    CMPB    (R1),#'.        ;"PERIOD"?
7336  031672  001404                            BEQ     1$              ;YES -- BRANCH
7337  031674  004037  031620                    JSR     R0,@#CK.DEC     ;"DIGIT"?
7338  031700  000406                            BR      5$              ;NO -- BRANCH
7339  031702  005720                            TST     (R0)+           ;DIGIT BETWEEN 0-9
7340  031704  005720                    1$:     TST     (R0)+           ;PERIOD
7341  031706  005720                    2$:     TST     (R0)+           ;COMMA
7342  031710  005720                    3$:     TST     (R0)+           ;SLASH
7343  031712  005720                    4$:     TST     (R0)+           ;CARRIAGE RETURN
7344  031714  005201                            INC     R1              ;MOVE POINTER TO NEXT CHARACTER
7345  031716  011000                    5$:     MOV     (R0),R0         ;UNKNOWN CHARACTER
7346  031720  000200                            RTS     R0              ;RETURN
7347
7348                                    ;******************************************************************
7349                                    .SBTTL  CK.DIG - CHECK DIGIT
7350                                    ;*THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
7351                                    ;*CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
7352                                    ;*CALL
7353                                    ;*      MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
7354                                    ;*      MOV     #NUM,R2         ;MAX. MAGNITUDE OF INPUT NUMBER
7355                                    ;*      JSR     R0,@#CK.DIG     ;CHECK DIGITS
7356                                    ;*      RETURN  ADR1            ;ILLEGAL CHARACTER -- R2=?
7357                                    ;*      RETURN  ADR2            ;INPUT NUMBER TO LARGE -- R2=?
7358                                    ;*      RETURN  ADR3            ;"COMMA" -- R2 = NUMBER
```

```
7359                                        ;*       RETURN  ADR4            ;"PERIOD" -- R2 = NUMBER
7360                                        ;*       RETURN  ADR5            ;"PERIOD-PERIOD" -- R2 = NUMBER
7361
7362  031722  010446                        CK.DIG:  MOV     R4,-(SP)        ;SAVE R4
7363  031724  010346                                 MOV     R3,-(SP)        ;SAVE R3
7364  031726  010246                                 MOV     R2,-(SP)        ;SAVE THE MAX. SIZE ON THE STACK
7365  031730  005002                                 CLR     R2              ;START WITH 0
7366  031732  005003                                 CLR     R3
7367  031734  005004                                 CLR     R4
7368  031736  004037  031646                        JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
7369  031742  032066                                 BS                      ;ILLEGAL CHARACTER
7370  031744  032066                                 BS                      ;CARRIAGE RETURN
7371  031746  032066                                 BS                      ;"/"
7372  031750  032066                                 BS                      ;"."
7373  031752  032066                                 BS                      ;","
7374  031754  031756                                 1$                      ;DIGIT 0-9
7375  031756  006303                        1$:      ASL     R3              ;*2
7376  031760  010346                                 MOV     R3,-(SP)        ;SAVE *2
7377  031762  006303                                 ASL     R3              ;*4
7378  031764  006303                                 ASL     R3              ;*8
7379  031766  062603                                 ADD     (SP)+,R3        ;(*8)+(*2)=*10.
7380  031770  060203                                 ADD     R2,R3           ;UPDATE THE INPUT NUMBER
7381  031772  004037  031646                        JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
7382  031776  032066                                 BS                      ;ILLEGAL CHARACTER
7383  032000  032066                                 BS                      ;CARRIAGE RETURN
7384  032002  032066                                 BS                      ;"/"
7385  032004  032014                                 3$                      ;"."
7386  032006  032012                                 2$                      ;","
7387  032010  031756                                 1$                      ;DIGIT 0-9
7388  032012  005724                        2$:      TST     (R4)+           ;"PERIOD"
7389  032014  005724                        3$:      TST     (R4)+           ;"COMMA"
7390  032016  004037  031646                        JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
7391  032022  032066                                 BS                      ;ILLEGAL CHARACTER
7392  032024  032056                                 6$                      ;CARRIAGE RETURN
7393  032026  032066                                 BS                      ;"/"
7394  032030  032066                                 BS                      ;"."
7395  032032  032036                                 4$                      ;","
7396  032034  032046                                 5$                      ;DIGIT 0-9
7397  032036  005724                        4$:      TST     (R4)+           ;"PERIOD-PERIOD"
7398  032040  105711                                 TSTB    (R1)            ;"CR"?
7399  032042  001405                                 BEQ     6$              ;YES--BRANCH
7400  032044  000410                                 BR      8$
7401  032046  126127  177776  000054        5$:      CMPB    -2(R1),#',      ;WAS CHARACTER BEFORE THE DIGIT A COMMA?
7402  032054  001004                                 BNE     8$              ;NO--EXIT
7403  032056  020316                        6$:      CMP     R3,(SP)         ;INPUT TO LARGE?
7404  032060  101001                                 BHI     7$              ;YES -- BRANCH
7405  032062  060400                                 ADD     R4,R0           ;ADJUST RETURN ADDRESS
7406  032064  005720                        7$:      TST     (R0)+
7407  032066  010302                        8$:      MOV     R3,R2           ;NUMBER TO R2
7408  032070  005726                                 TST     (SP)+           ;CLEAN MAX. SIZE OFF OF STACK
7409  032072  012603                                 MOV     (SP)+,R3        ;RESTORE R3
7410  032074  012604                                 MOV     (SP)+,R4        ;RESTORE R4
7411  032076  011000                                 MOV     (R0),R0         ;GET RETURN ADDRESS
7412  032100  000200                                 RTS     R0              ;RETURN
7413
7414                                        ;******************************************************************
```

```
                                        .SBTTL  CK.NUM - CHECK NUMBER (OCTAL)
                                        ;*THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
                                        ;*AND FORMS AN OCTAL NUMBER IN R2
                                        ;*CALL:
                                        ;*      MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRIN^
                                        ;*      JSR     R0,@#CK.NUM     ;GO FORM THE NUMBER
                                        ;*      RETURN  ADR1            ;ILLEGAL CHARACTER IN THE INPUT STRING
                                        ;*      RETURN  ADR2            ;"COMMA"--R2=NUMBER
                                        ;*      RETURN  ADR3            ;"PERIOD"--R2=NUMBER
                                        ;*      RETURN  ADR4            ;"PERIOD-PERIOD"--R2=NUMBER

032102  010346          CK.NUM: MOV     R3,-(SP)        ;SAVE R3
032104  005003                  CLR     R3              ;START NUMBER AT ZERO
032106  004037  031572          JSR     R0,@#CK.OCT     ;OCTAL DIGIT?
032112  000440                  BR      6$              ;NO--BRANCH
032114  005201          1$:     INC     R1              ;MOVE TO NEXT CHARACTER
032116  006303                  ASL     R3              ;FOR THE OCTAL NUMBER IN R3
032120  103435                  BCS     6$              ;DON'T LET IT GET TO BIG
032122  006303                  ASL     R3
032124  103433                  BCS     6$
032126  006303                  ASL     R3
032130  103431                  BCS     6$
032132  060203                  ADD     R2,R3
032134  004037  031572          JSR     R0,@#CK.OCT     ;IS THIS AN OCTAL DIGIT?
032140  000401                  BR      2$              ;NO--FIND OUT WHAT IT IS
032142  000764                  BR      1$              ;YES--MAKE IT PART OF THE NUMBER
032144  010302          2$:     MOV     R3,R2           ;SAVE THE OCTAL NUMBER
032146  005003                  CLR     R3              ;START WITH ZERO INDEX
032150  004037  031646          JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
032154  032214                  6$                      ;ILLEGAL CHARACTER
032156  032214                  6$                      ;CARRIAGE RETURN
032160  032214                  6$                      ;"/"
032162  032204                  5$                      ;"'"
032164  032170                  3$                      ;"."
032166  032214                  6$                      ;DIGIT 0-9
032170  005723          3$:     TST     (R3)+           ;"PERIOD"
032172  121127  000056          CMPB    (R1),#'.        ;"PERIOD-PERIOD"?
032176  001002                  BNE     5$              ;NO--BRANCH
032200  005201                  INC     R1              ;YES--ADVANCE THE POINTER
032202  005723          4$:     TST     (R3)+           ;"PERIOD-PERIOD"
032204  005723          5$:     TST     (R3)+           ;"COMMA"
032206  105711                  TSTB    (R1)            ;"CR"?
032210  001001                  BNE     6$              ;NO--BRANCH
032212  060300                  ADD     R3,R0           ;YES--SAVE THE OCTAL NUMBER
032214  012603          6$:     MOV     (SP)+,R3        ;RESTORE R3
032216  011000                  MOV     (R0),R0         ;PICKUP EXIT ADDRESS
032220  000200                  RTS     R0              ;RETURN
```

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

                                .SBTTL  RH11/RP04 DRIVER (REV. 0.9)

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                                ;*MAYNARD, MA 01754
                                ;*AUTHOR: JIM LACEY


                                ;*STORAGE FOR RHDS1, RHER1, RHER2, AND RHER3 ON AN ERROR "2" OR "5"
                                        ;*RPERRS   = RHDS1
                                        ;*RPERRS+2 = RHER1
                                        ;*RPERRS+4 = RHER2
                                        ;*RPERRS+6 = RHER3

032222  000000                  RPERRS: .WORD   0
032224  000000                          .WORD   0
032226  000000                          .WORD   0
032230  000000                          .WORD   0

                                ;*TABLE OF DRIVE ACTIVE INDICATORS (DRVACT=8 BYTES)
                                        ;*DRVACT=0 IMPLIES DRIVE IS IDLE
                                        ;*DRVACT>0 IMPLIES DRIVE IS ACTIVE WITH A COMMAND
                                        ;*DRVACT<0 IMPLIES DRIVE IS ACTIVE WITH AN ERROR RECOVERY OPERATION

032232      000                 DRVACT: .BYTE   0               ;DRIVE 0
032233      000                         .BYTE   0               ;DRIVE 1
032234      000                         .BYTE   0               ;DRIVE 2
032235      000                         .BYTE   0               ;DRIVE 3
032236      000                         .BYTE   0               ;DRIVE 4
032237      000                         .BYTE   0               ;DRIVE 5
032240      000                         .BYTE   0               ;DRIVE 6
032241      000                         .BYTE   0               ;DRIVE 7

                                ;*TABLE OF DRIVE STATUS INDICATORS (DRVSTA=8 BYTES)
                                        ;*DRVSTA=0 IMPLIES DRIVE IS OFFLINE
                                        ;*DRVSTA>0 IMPLIES DRIVE IS ONLINE
                                        ;*DRVSTA<0 IMPLIES DRIVE IS UNSAFE OR NONEXISTENT

032242      000                 DRVSTA: .BYTE   0               ;DRIVE 0
032243      000                         .BYTE   0               ;DRIVE 1
032244      000                         .BYTE   0               ;DRIVE 2
032245      000                         .BYTE   0               ;DRIVE 3
032246      000                         .BYTE   0               ;DRIVE 4
032247      000                         .BYTE   0               ;DRIVE 5
032250      000                         .BYTE   0               ;DRIVE 6
032251      000                         .BYTE   0               ;DRIVE 7

                                ;*TABLE OF DRIVE TYPES (DRVTYP=8 WORDS)
                                        ;*DRVTYP WILL CONTAIN THE DRIVE TYPE OF ALL ONLINE, OFFLINE, AND
                                        ;*UNSAFE DRIVES. IF A DRIVE IS NONEXISTENT DRVTYP WILL BE ZERO.

032252  000000                  DRVTYP: .WORD   0               ;DRIVE 0
032254  000000                          .WORD   0               ;DRIVE 1
032256  000000                          .WORD   0               ;DRIVE 2
```

```
7518  032260  000000                          .WORD   0               ;DRIVE 3
7519  032262  000000                          .WORD   0               ;DRIVE 4
7520  032264  000000                          .WORD   0               ;DRIVE 5
7521  032266  000000                          .WORD   0               ;DRIVE 6
7522  032270  000000                          .WORD   0               ;DRIVE 7
7523
7524                                  ;*TRANSFER WAIT FLAG (TRNSWT=1 WORD)
7525                                          ;*THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
7526                                          ;*"DPB" OF THE I/O OPERATION.
7527
7528  032272  000000                  TRNSWT: .WORD   0
7529
7530                                  ;*SEARCH WAIT KEYS (SRCHWT=1 WORD)
7531                                          ;*THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
7532                                          ;*THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
7533                                          ;*REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
7534                                          ;*EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
7535
7536  032274  000000                  SRCHWT: .WORD   0
7537
7538                                  ;*RP04 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
7539                                          ;*ACTDRV=0 IMPLIES DRIVER IS INACTIVE
7540                                          ;*ACTDRV>0 IMPLIES DRIVER IS ACTIVE
7541
7542  032276  000                     ACTDRV: .BYTE   0
7543
7544                                  ;*SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
7545                                          ;*ACTSTR=0 IMPLIES SOFTWARE TIMER ROUTINE IS INACTIVE
7546                                          ;*ACTSTR>0 IMPLIES SOFTWARE TIMER ROUTINE IS ACTIVE
7547
7548  032277  000                     ACTSTR: .BYTE   0
7549
7550                                  ;*UNLOAD FLAG (ULDFLG=8 BYTES)
7551                                          ;*ULDFLG=0 IMPLIES NO UNLOAD COMMAND
7552                                          ;*ULDFLG>0 IMPLIES UNLOAD COMMAND IN PROGRESS
7553                                          ;*ULDFLG<0 IMPLIES UNLOAD COMMAND IN WAIT QUEUE
7554
7555  032300  000                     ULDFLG: .BYTE   0               ;DRIVE 0
7556  032301  000                             .BYTE   0               ;DRIVE 1
7557  032302  000                             .BYTE   0               ;DRIVE 2
7558  032303  000                             .BYTE   0               ;DRIVE 3
7559  032304  000                             .BYTE   0               ;DRIVE 4
7560  032305  000                             .BYTE   0               ;DRIVE 5
7561  032306  000                             .BYTE   0               ;DRIVE 6
7562  032307  000                             .BYTE   0               ;DRIVE 7
7563
7564                                  ;*LOOK AHEAD COUNT (LACNT=8 BYTES)
7565                                          ;*LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED
7566
7567  032310  000                     LACNT:  .BYTE   0               ;DRIVE 0
7568  032311  000                             .BYTE   0               ;DRIVE 1
7569  032312  000                             .BYTE   0               ;DRIVE 2
7570  032313  000                             .BYTE   0               ;DRIVE 3
7571  032314  000                             .BYTE   0               ;DRIVE 4
7572  032315  000                             .BYTE   0               ;DRIVE 5
7573  032316  000                             .BYTE   0               ;DRIVE 6
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7574  032317  000                     .BYTE   0               ;DRIVE 7
7575
7576                          ;*SAVE REGISTERS FLAG (SAVEFG =1 WORD)
7577                                  ;*SAVEFG <0 IMPLIES SAVE THE RH11/RP04 REGISTERS WHEN THE
7578                                  ;*OPERATION IS COMPLETED AS PER (DPB+14).
7579                                  ;*SAVEFG=0 IMPLIES SAVE THE RH11/RP04 REGISTERS, AS PER
7580                                  ;*(DPB+14), AFTER AN ERROR.
7581
7582  032320  000000                SAVEFG: .WORD   0
7583
7584                          ;*SEEK FLAG (SEEKFG=1 WORD)
7585                                  ;*SEEKFG=0 IMPLIES WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
7586                                  ;*FOR A DATA TRANSFER START A SEARCH COMMAND
7587                                  ;*SEEKFG<0 IMPLIES DATA TRANSFER WILL DO IMPLIED SEEKS,
7588                                  ;*DISREGARD THE WINDOW
7589
7590  032322  000000                SEEKFG: .WORD   0
7591
7592                          ;*TIMEOUT TABLE (TIMER=8 WORDS)
7593                                  ;*THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
7594
7595  032324  177777                TIMER:  .WORD   -1      ;DRIVE 0
7596  032326  177777                        .WORD   -1      ;DRIVE 1
7597  032330  177777                        .WORD   -1      ;DRIVE 2
7598  032332  177777                        .WORD   -1      ;DRIVE 3
7599  032334  177777                        .WORD   -1      ;DRIVE 4
7600  032336  177777                        .WORD   -1      ;DRIVE 5
7601  032340  177777                        .WORD   -1      ;DRIVE 6
7602  032342  177777                        .WORD   -1      ;DRIVE 7
7603
7604                          ;*DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
7605                                  ;*DTUW<0 IMPLIES NO DATA TRANSFER UNDERWAY
7606                                  ;*DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
7607
7608  032344  177777                DTUW:   .WORD   -1
7609
7610                          ;*ATTENTION BITS TABLE (ATABIT=8 BYTES)
7611                                  ;*THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
7612                                  ;*ATTENTION BIT
7613
7614  032346  001                   ATABIT: .BYTE   1       ;DRIVE 0
7615  032347  002                           .BYTE   2       ;DRIVE 1
7616  032350  004                           .BYTE   4       ;DRIVE 2
7617  032351  010                           .BYTE   10      ;DRIVE 3
7618  032352  020                           .BYTE   20      ;DRIVE 4
7619  032353  040                           .BYTE   40      ;DRIVE 5
7620  032354  100                           .BYTE   100     ;DRIVE 6
7621  032355  200                           .BYTE   200     ;DRIVE 7
7622
7623                          ;*RP04 TO RH11 "MASS CONTROL BUS PARITY ERRORS" (MCPE) ALLOWED BEFORE
7624                          ;*CALLING IT FATAL (MCPEMX=1 WORD)
7625
7626  032356  000003                MCPEMX: .WORD   3
7627
7628                          ;*STORAGE FOR RPADR (THE FIRST ADDRESS (776700) OF THE RH11/RP04),
7629                          ;*RPVEC (THE VECTOR ADDRESS (254)), AND RPVEC+2 (THE BR LEVEL (5)).
```

```
 7630  032360  176700                  RPADR:  .WORD   176700
 7631  032362  000254  000240          RPVEC:  .WORD   254,5*32.
 7632
 7633                                  ;*MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)
 7634  032366  000004                  MXLACT: .WORD   4
 7635                                  ;*MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)
 7636  032370  001000                  MXDLTA: .WORD   8.*64.
 7637                                  ;*MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)
 7638  032372  000200                  MNDLTA: .WORD   2*64.
 7639                                  ;*MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)
 7640  032374  000005                  MXWNDW: .WORD   5
 7641
 7642                                  ;*DEFINITIONS OF THE RH11/RP04 ADDRESS INDEXES
 7643
 7644          000000                  RHCS1=0                 ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
 7645          000002                  RHWC=2                  ;WORD COUNT REGISTER (NOT A DRIVE REG)
 7646          000004                  RHBA=4                  ;UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
 7647          000006                  RHDA=6                  ;DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
 7648          000010                  RHCS2=10                ;CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
 7649          000012                  RHDS1=12                ;DRIVE STATUS REGISTER (DRIVE REG 01)
 7650          000014                  RHER1=14                ;ERROR REGISTER #1 (DRIVE REG. 02)
 7651          000016                  RHAS=16                 ;ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG. 04)
 7652          000020                  RHLA=20                 ;LOOK AHEAD REGISTER (DRIVE REG. 07)
 7653          000022                  RHDB=22                 ;DATA BUFFER REGISTER (NOT A DRIVE REG.)
 7654          000024                  RHMR=24                 ;MAINTAINABILITY REGISTER (DRIVE REG. 03)
 7655          000026                  RHDT=26                 ;DRIVE TYPE REGISTER (DRIVE REG. 06)
 7656          000030                  RHSN=30                 ;SERIAL NUMBER REGISTER (DRIVE REG. 10)
 7657          000032                  RHOF=32                 ;OFFSET REGISTER (DRIVE REG. 11)
 7658          000034                  RHCA=34                 ;DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG. 12)
 7659          000036                  RHCC=36                 ;CURRENT CYLINDER ADDRESS REGISTER (DRIVE REG. 13)
 7660          000040                  RHER2=40                ;ERROR REGISTER #2 (DRIVE REG. 14)
 7661          000042                  RHER3=42                ;ERROR REGISTER #3 (DRIVE REG. 15)
 7662          000044                  RHEC1=44                ;ECC POSITION REGISTER (DRIVE REG. 16)
 7663          000046                  RHEC2=46                ;ECC PATTERN REGISTER (DRIVE REG.  17)
 7664          000050                  RHBAE=50
 7665          000052                  RHCS3=52
 7666
 7667                                  ;*RH11/RP04 DRIVER INIT. CODE
 7668                                          ;*THIS ROUTINE WILL DETERMINE WHICH RP04 DRIVES ARE
 7669                                          ;*AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
 7670                                          ;*TO THE PROPER STATE FOR EACH DRIVE.
 7671                                          ;*NOTE: THIS ROUTINE CALLS DRVINT
 7672                                  ;
 7673                                  ;*CALL
 7674                                  ;
 7675                                  ;*      JSR     PC,RPINIT
 7676                                  ;*      RETURN
 7677                                  ;
 7678  032376  013746  177776          RPINIT: MOV     @#PS,-(SP)      ;SAVE PROCESSOR STATUS
 7679  032402  013737  032364  177776          MOV     RPVEC+2,@#PS    ;SET PROCESSOR STATUS TO RH11/RP04 LEVEL
 7680  032410  004037  037744                  JSR     R0,SAVR15       ;GO SAVE R1-R5
 7681  032414  004737  037502                  JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
 7682  032420  012701  032222                  MOV     #RPERRS,R1      ;FIRST ADDRESS TO BE CLEARED
 7683  032424  012702  032322                  MOV     #SEEKFG,R2      ;LAST ADDRESS TO BE CLEARED
 7684  032430  005021                  1$:     CLR     (R1)+           ;CLEAR
 7685  032432  020102                          CMP     R1,R2           ;ARE WE DONE?
```

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7686  032434  101775                          BLOS    1$              ;BRANCH IF NO
7687  032436  012702  032344                  MOV     #DTUW,R2        ;LAST ADDRESS
7688  032442  012721  177777          2$:     MOV     #-1,(R1)+       ;INITIALIZE
7689  032446  020102                          CMP     R1,R2           ;DONE?
7690  032450  101774                          BLOS    2$              ;LOOP IF NO
7691  032452  005001                          CLR     R1              ;DRIVE NUMBER WILL BE IN R1
7692  032454  013704  032360                  MOV     RPADR,R4        ;FIRST ADDRESS OF RH11/RP04
7693  032460  012764  000040  000010          MOV     #BIT05,RHCS2(R4)        ;MASSBUS INIT.
7694  032466  004037  032540          3$:     JSR     R0,DRVINT       ;GO INIT. A DRIVE
7695  032472  000417                          BR      7$
7696  032474  005201                  4$:     INC     R1              ;MOVE TO THE NEXT DRIVE
7697  032476  042701  177770                  BIC     #^C7,R1         ;DON'T LET THE DRIVE NUMBER GET TO BIG
7698  032502  001371                          BNE     3$              ;BRANCH IF MORE DRIVES TO INIT.
7699  032504  013703  032362                  MOV     RPVEC,R3        ;SETUP THE RH11/RP04 VECTOR
7700  032510  012723  034766                  MOV     #ISR,(R3)+
7701  032514  013713  032364                  MOV     RPVEC+2,(R3)
7702  032520  004037  037764                  JSR     R0,GETR15       ;RESTORE R1-R5
7703  032524  012637  177776                  MOV     (SP)+,@#PS      ;RESTORE THE PROCESSOR STATUS
7704  032530  000207                          RTS     PC              ;BYE-BYE
7705  032532  105061  032242          7$:     CLRB    DRVSTA(R1)      ;SET THE DRIVE STATUS TO OFFLINE
7706  032536  000756                          BR      4$              ;GO DO THE NEXT DRIVE
7707
7708                                  ;*DRIVE INIT. ROUTINE
7709                                  ;*THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
7710                                  ;*AN RP04. IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT22
7711                                  ;*IS SET TO A "1". THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
7712                                  ;*INSURE THEY ARE ALL ON A "1". AND DEPENDING ON THEIR STATE,
7713                                  ;*DRVSTA IS SET TO THE PROPER CONDITION.
7714                                  ;*CALL
7715                                  ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
7716                                  ;*      MOV     RPADR,R4        ;UNIBUS ADDRESS OF RH11/RP04 (RHCS1)
7717                                  ;*      JSR     R0,DRVINT       ;CALLED BY A JSR
7718                                  ;*      RETURN1                 ;ERROR OCCURRED (PARITY)
7719                                  ;*      RETURN2                 ;NORMAL RETURN
7720                                  ;
7721  032540  004037  037744          DRVINT: JSR     R0,SAVR15       ;SAVE R1-R5
7722  032544  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT A DRIVE
7723  032550  010103                          MOV     R1,R3           ;COPY THE DRIVE NUMBER INTO
7724  032552  006303                          ASL     R3              ;R3 AND POSITION IT FOR TABLE INDEXING
7725  032554  112761  177777  032242          MOVB    #-1,DRVSTA(R1)  ;START DRIVE STATUS AS NONEXISTENT
7726  032562  005063  032252                  CLR     DRVTYP(R3)      ;CLEAR THE DRIVE TYPE INDICATOR
7727  032566  112777  000111  177564          MOVB    #111,@RPADR     ;DO A "DRIVE CLEAR" COMMAND
7728  032574  032764  010000  000010          BIT     #BIT12,RHCS2(R4) ;NONEXISTENT DRIVE?
7729  032602  001403                          BEQ     1$              ;NO---BRANCH
7730  032604  004737  037136                  JSR     PC,SET.IE       ;GO SET "IE" WITHOUT A "TRE"
7731  032610  000462                          BR      6$              ;LEAVE THIS ROUTINE
7732  032612  004037  036544          1$:     JSR     R0,RD.RP        ;READ THE DRIVE TYPE REG.
7733  032616  000026                          RHDT
7734  032620  032760                          7$                      ;ERROR RETURN ADDRESS
7735  032622  012605                          MOV     (SP)+,R5        ;PUT DRIVE TYPE IN R5
7736  032624  010563  032252                  MOV     R5,DRVTYP(R3)   ;SAVE THE DRIVE TYPE
7737  032630  022705  020020                  CMP     #20020,R5       ;IS IT A SINGLE PORT RP04?
7738  032634  001403                          BEQ     2$              ;BRANCH IF YES
7739  032636  022705  024020                  CMP     #24020,R5       ;IS IT A DUAL PORT RP04?
7740  032642  001043                          BNE     5$              ;BRANCH IF NO
7741  032644  012746  000121          2$:     MOV     #121,-(SP)      ;DO A "READ-IN PRESET"
```

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7742  032650  004037  036702                  JSR     RO,WRT.RP
7743  032654  000000                          RHCS1
7744  032656  032760                          7$
7745  032660  012746  010000                  MOV     #BIT12,-(SP)    ;SET FMT22=1
7746  032664  004037  036702                  JSR     RO,WRT.RP
7747  032670  000032                          RHOF
7748  032672  032760                          7$
7749  032674  004037  036544                  JSR     RO,RD.RP        ;READ RHDS1
7750  032700  000012                          RHDS1
7751  032702  032760                          7$
7752  032704  012605                          MOV     (SP)+,R5        ;AND SAVE IT IN R5
7753  032706  100011                          BPL     4$              ;BRANCH IF ATA=0
7754  032710  116164  032346  000016          MOVB    ATABIT(R1),RHAS(R4) ;CLEAR ATTENTION BIT
7755  032716  004037  036544                  JSR     RO,RD.RP        ;FIND OUT WHY ATA=1
7756  032722  000014                          RHER1
7757  032724  032760                          7$
7758  032726  006126                          ROL     (SP)+           ;IS IT UNSAFE?
7759  032730  100412                          BMI     6$              ;BRANCH IF YES
7760  032732  005105                  4$:     COM     R5              ;CHECK MOL, DPR, DRY, AND VV
7761  032734  042705  167077                  BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
7762  032740  001004                          BNE     5$              ;BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
7763  032742  112761  000001  032242          MOVB    #1,DRVSTA(R1)   ;SET DRIVE STATUS TO ONLINE
7764  032750  000402                          BR      6$
7765  032752  105061  032242          5$:     CLRB    DRVSTA(R1)      ;DRIVE STATUS = OFFLINE
7766  032756  005720                  6$:     TST     (R0)+           ;STEP OVER THE ERROR RETURN
7767  032760  004037  037764          7$:     JSR     R0,GETR1S       ;RESTORE R1-R5
7768  032764  000200                          RTS     R0              ;RETURN
7769
7770                                  ;*REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
7771                                  ;
7772                                  ;*CALL
7773                                  ;
7774                                  ;*      JSR     R0,@#RP04       ;CALL THE RP04 DRIVER
7775                                  ;*      PNTADR                  ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
7776                                  ;*      RETURN1                 ;RETURN HERE IF QUEUE IS FULL
7777                                  ;*      RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
7778                                  ;                               ;IS AN ERROR CONDITION
7779
7780  032766  013746  177776          RP04:   MOV     @#PS,-(SP)      ;SAVE THE CALLING STATUS
7781  032772  013737  032364  177776          MOV     RPVEC+2,@#PS    ;DON'T ALLOW ANY RP04 INTERRUPTS
7782  033000  112737  000001  032276          MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
7783  033006  004037  037744                  JSR     R0,SAVR1S       ;SAVE R1-R5
7784  033012  012002                          MOV     (R0)+,R2        ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
7785  033014  005062  000016                  CLR     16(R2)          ;CLEAR THE STATUS/ERROR INDICATOR
7786  033020  111201                          MOVB    (R2),R1         ;PICKUP THE DRIVE NUMBER
7787  033022  105761  032242                  TSTB    DRVSTA(R1)      ;CHECK DRIVES STATUS
7788  033026  003017                          BGT     1$              ;BRANCH IF ONLINE
7789  033030  105761  032300                  TSTB    ULDFLG(R1)      ;UNLOAD COMMAND IN QUEUE?
7790  033034  001034                          BNE     3$              ;BRANCH IF YES
7791  033036  013704  032360                  MOV     RPADR,R4        ;UNIBUS ADDRESS OF RHCS!
7792  033042  004037  032540                  JSR     R0,DRVINT       ;GO INIT. THE DRIVE
7793  033046  000442                          BR      6$              ;ERROR RETURN
7794  033050  105761  032242                  TSTB    DRVSTA(R1)      ;IS DRIVE STATUS ONLINE?
7795  033054  003004                          BGT     1$              ;BRANCH IF YES
7796  033056  052762  140000  000016          BIS     #BIT15!BIT14,16(R2) ;ERROR--DRIVE IS OFFLINE OR NONEXISTENT
7797  033064  000423                          BR      4$              ;GO TO EXIT
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7798  033066  004037  037604          1$:     JSR     R0,DRVQUE       ;PUT THIS REQUEST IN QUEUE
7799  033072  000421                          BR      5$              ;QUEUE IS FULL
7800  033074  122762  000103  000002          CMPB    #103,2(R2)      ;IS THIS REQ. FOR AN UNLOAD?
7801  033102  001003                          BNE     2$              ;BR IF NO
7802  033104  112761  177777  032300          MOVB    #-1,ULDFLG(R1)  ;SET THE "UNLOAD IN QUEUE" FLAG
7803  033112  105761  032232          2$:     TSTB    DRVACT(R1)      ;IS THIS DRIVE ACTIVE?
7804  033116  001006                          BNE     4$              ;BR IS YES
7805  033120  004737  033162                  JSR     PC,OPT          ;CALL THE OPTIMIZER
7806  033124  000403                          BR      4$
7807  033126  052762  120000  000016  3$:     BIS     #BIT15!BIT13,16(R2)     ;SET THE "UNLOAD IN QUEUE" ERROR FLAG
7808  033134  005720                  4$:     TST     (R0)+
7809  033136  004037  037764          5$:     JSR     R0,GETR15       ;RESTORE R1-R5
7810  033142  105037  032276                  CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
7811  033146  012637  177776                  MOV     (SP)+,@#PS      ;RETURN "PS" TO USER LEVEL
7812  033152  000200                          RTS     R0              ;RETURN TO CALLER
7813  033154  004737  034402          6$:     JSR     PC,CI7          ;GO HANDLE THE PARITY ERROR
7814  033160  000765                          BR      4$
7815
7816                                  ;*OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
7817                                  ;
7818                                  ;*CALL
7819                                  ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
7820                                  ;*      JSR     PC,OPT          ;SETUP A COMMAND
7821                                  ;
7822  033162  004037  037744          OPT:    JSR     R0,SAVR15       ;SAVE R1-R5
7823  033166  013746  177776                  MOV     @#PS,-(SP)      ;SAVE PROC. STATUS
7824  033172  146137  032346  032274          BICB    ATABIT(R1),SRCHWT       ;CLEAR "SEARCH WAIT" KEY
7825  033200  004737  037660                  JSR     PC,GETREQ       ;GET "DPB" POINTER OF REQUEST
7826  033204  005702                          TST     R2              ;IS THERE A REQUEST IN QUEUE?
7827  033206  001444                          BEQ     6$              ;NO--BRANCH TO EXIT
7828  033210  105761  032242                  TSTB    DRVSTA(R1)      ;IS DRIVE ONLINE?
7829  033214  003006                          BGT     1$              ;YES--BRANCH
7830  033216  004737  037702                  JSR     PC,POPQUE       ;NO--REMOVE REQUEST FROM QUEUE
7831  033222  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)     ;SET ERROR BIT OF STATUS/ERROR INDICATOR
7832  033230  000426                          BR      5$              ;BRANCH TO EXIT
7833  033232  122762  000150  000002  1$:     CMPB    #150,2(R2)      ;IS THE REQUEST FOR I/O?
7834  033240  002403                          BLT     2$              ;YES--BRANCH
7835  033242  004737  033760                  JSR     PC,CI4          ;CALL THE COMMAND INITIATOR
7836  033246  000417                          BR      5$              ;BRANCH TO EXIT
7837  033250  005737  032344          2$:     TST     DTUW            ;DATA TRANSFER UNDERWAY?
7838  033254  002012                          BGE     4$              ;YES--GO START A SEARCH
7839  033256  005737  032322                  TST     SEEKFG          ;DO IMPLIED SEEKS?
7840  033262  100404                          BMI     3$              ;YES---BRANCH
7841  033264  004037  034630                  JSR     R0,LA           ;NO--DO LOOK AHEAD
7842  033270  000406                          BR      5$              ;RETURN HERE ON A PARITY ERROR
7843  033272  000403                          BR      4$              ;GO START A SEARCH
7844  033274  004737  033326          3$:     JSR     PC,CI1          ;START A DATA TRANSFER
7845  033300  000402                          BR      5$
7846  033302  004737  033652          4$:     JSR     PC,CI3          ;START A SEARCH
7847  033306  012637  177776          5$:     MOV     (SP)+,@#PS      ;RESTORE PROC. STATUS
7848  033312  004037  037764                  JSR     R0,GETR15       ;RESTORE R1-R5
7849  033316  000207                          RTS     PC
7850  033320  004737  037136          6$:     JSR     PC,SET.IE       ;SET "IE" WITHOUT A "TRE"
7851  033324  000770                          BR      5$              ;EXIT THE ROUTINE
7852
7853                                  ;*COMMAND INITIATOR
```

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                                        ;
                                        ;*CALL
                                        ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER
                                        ;*      MOV     #DPB,R2         ;ADDRESS OF DPB
                                        ;*      JSR     PC,CI?          ;CI?= CI1,CI3, OR CI4
                                        ;*                              ;WHERE:
                                        ;*                              ;CI1=DATA TRANSFER
                                        ;*                              ;CI2=SEARCH REQUESTED BY DATA XFER
                                        ;*                              ;CI4=NOT DATA TRANSFER

033326  004737  037702          CI1:    JSR     PC,POPQUE       ;REMOVE REQUEST FROM "DRIVES WAIT" QUEUE
033332  010237  032272                  MOV     R2,TRNSWT       ;PUT REQ. IN TRANSFER WAIT QUEUE
033336  010203                  CI2:    MOV     R2,R3           ;DPB ADDRESS TO R3
033340  013704  032360                  MOV     RPADR,R4        ;RHCS1 ADDRESS
033344  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT DRIVE
033350  062703  000004                  ADD     #4,R3           ;DESIRED WORD COUNT
033354  062704  000002                  ADD     #2,R4           ;RHWC ADDRESS
033360  012324                          MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
033362  005037  001232                  CLR     TEMP9
033366  122737  000017  001102          CMPB    #17,$TSTNM
033374  001072                          BNE     1$
033376  012337  001222                  MOV     (R3)+,TEMP4
033402  004037  037744                  JSR     R0,SAVR15
033406  013701  001222                  MOV     TEMP4,R1
033412  000301                          SWAB    R1
033414  042701  177400                  BIC     #177400,R1
033420  006201                          ASR     R1
033422  006201                          ASR     R1
033424  006201                          ASR     R1
033426  006201                          ASR     R1
033430  016102  172340                  MOV     KIPAR0(R1),R2
033434  005003                          CLR     R3
033436  006302                          ASL     R2
033440  006103                          ROL     R3
033442  006302                          ASL     R2
033444  006103                          ROL     R3
033446  006302                          ASL     R2
033450  006103                          ROL     R3
033452  006302                          ASL     R2
033454  006103                          ROL     R3
033456  006302                          ASL     R2
033460  006103                          ROL     R3
033462  006302                          ASL     R2
033464  006103                          ROL     R3
033466  042737  160000  001222          BIC     #160000,TEMP4
033474  050237  001222                  BIS     R2,TEMP4
033500  013704  032360                  MOV     RPADR,R4
033504  005737  001234                  TST     TEMP10
033510  001002                          BNE     8$
033512  010364  000050                  MOV     R3,RHBAE(R4)
033516  032703  000001          8$:     BIT     #1,R3
033522  001403                          BEQ     6$
033524  052737  000400  001232          BIS     #A16,TEMP9
033532  032703  000002          6$:     BIT     #2,R3
033536  001403                          BEQ     7$
033540  052737  001000  001232          BIS     #A17,TEMP9
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7910  033546                                        7$:
7911  033546  013764  001222  000004                      MOV     TEMP4,RHBA(R4)
7912                                          ;XYZ ABOVE R3 HAS VALUE FOR RHBAE IN 11/70
7913                                          ;IN 11/45 LOWER 2 BITS MUST BE PUT IN A16 AND A17 POSITIONS IN 2(R2)
7914                                          ;LOOK AT A FEW LINES DOWN AT LOCATION TAGED 5$:
7915                                          ;THAT 2(R2) MUST GET A16 A17 BY A BIS INSTRUCTION AND NOT A MOV INSTRUCTION
7916                                          ;*****************************************************************
7917                                          ;*****************************************************************
7918                                          ;*****************************************************************
7919                                          ;*****************************************************************
7920                                          ;*****************************************************************
7921                                          ;*****************************************************************
7922  033554  004037  037764                      JSR     R0,GETR15
7923  033560  000401                              BR      2$
7924  033562  012324                      1$:     MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
7925  033564  012346                      2$:     MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
7926  033566  004037  036702                      JSR     R0,WRT.RP       ;CALL THE LOAD(WRITE) ROUTINE
7927  033572  000006                              RHDA                    ;INDEX OF REGISTER TO LOAD
7928  033574  034402                              CI7                     ;ERROR RETURN ADDRESS
7929  033576  012346                              MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
7930  033600  004037  036702                      JSR     R0,WRT.RP
7931  033604  000034                              RHCA
7932  033606  034402                              CI7
7933  033610  122737  000017  001102              CMPB    #17,$TSTNM
7934  033616  001003                              BNE     5$
7935  033620  053762  001232  000002              BIS     TEMP9,2(R2)
7936  033626                                5$:
7937  033626  016246  000002                      MOV     2(R2),-(SP)     ;LOAD "COMMAND+GO", "A17&A16", AND "PSEL"
7938  033632  004037  036702                      JSR     R0,WRT.RP
7939  033636  000000                              RHCS1
7940  033640  034402                              CI7
7941  033642  010137  032344                      MOV     R1,DTUW         ;SET "DATA TRANSFER UNDERWAY"
7942  033646  000137  034336                      JMP     CI5
7943  033652  013704  032360              CI3:    MOV     RPADR,R4        ;RHCS1 ADDRESS
7944  033656  010164  000010                      MOV     R1,RHCS2(R4)    ;SELECT DRIVE
7945  033662  016246  000012                      MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
7946  033666  004037  036702                      JSR     R0,WRT.RP
7947  033672  000034                              RHCA
7948  033674  034402                              CI7
7949  033676  116203  000010                      MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
7950  033702  163703  032374                      SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
7951  033706  002002                              BGE     1$
7952  033710  062703  000026                      ADD     #22.,R3
7953  033714  010346                      1$:     MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
7954  033716  116266  000011  000001              MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
7955  033724  004037  036702                      JSR     R0,WRT.RP       ;LOAD DESIRED TRACK & SECTOR
7956  033730  000006                              RHDA
7957  033732  034402                              CI7
7958  033734  012746  000131                      MOV     #131,-(SP)      ;START A SEARCH
7959  033740  004037  036702                      JSR     R0,WRT.RP
7960  033744  000000                              RHCS1
7961  033746  034402                              CI7
7962  033750  156137  032346  032274              BISB    ATABIT(R1),SRCHWT       ;SET "SEARCH WAIT" KEY
7963  033756  000567                              BR      CI5
7964  033760  013704  032360              CI4:    MOV     RPADR,R4        ;RHCS1 ADDRESS
7965  033764  010164  000010                      MOV     R1,RHCS2(R4)    ;SELECT DRIVE
```

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 7966  033770  116203  000002                MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
 7967  033774  122703  000131                CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
 7968  034000  001007                        BNE     1$              ;BRANCH IF NO
 7969  034002  016246  000010                MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
 7970  034006  004037  036702                JSR     R0,WRT.RP
 7971  034012  000006                        RHDA
 7972  034014  034402                        CI7
 7973  034016  000403                        BR      2$              ;GO LOAD CYLINDER
 7974  034020  122703  000105          1$:   CMPB    #105,R3         ;IS IT A SEEK COMMAND
 7975  034024  001007                        BNE     3$              ;BRANCH IF NO
 7976  034026  016246  000012          2$:   MOV     12(R2),-(SP)    ;LOAD DESIRED CYLINDER
 7977  034032  004037  036702                JSR     R0,WRT.RP
 7978  034036  000034                        RHCA
 7979  034040  034402                        CI7
 7980  034042  000546                        BR      CI6
 7981  034044  122703  000115          3$:   CMPB    #115,R3         ;IS IT AN "OFFSET" COMMAND?
 7982  034050  001013                        BNE     4$              ;BR IF NO
 7983  034052  004037  036544                JSR     R0,RD.RP        ;MERGE THE OFFSET VALUE INTO RHOF
 7984  034056  000032                        RHOF                    ;BUT DON'T CHANGE THE UPPER
 7985  034060  034402                        CI7
 7986  034062  116216  000001                MOVB    1(R2),(SP)      ;BYTE WHEN LOADING THE
 7987  034066  004037  036702                JSR     R0,WRT.RP       ;REGISTER (RHOF)
 7988  034072  000032                        RHOF
 7989  034074  034402                        CI7
 7990  034076  000530                        BR      CI6             ;GO START THE COMMAND
 7991  034100  122703  000107          4$:   CMPB    #107,R3         ;IS IT A "RECALIBRATE" COMMAND?
 7992  034104  001525                        BEQ     CI6             ;BRANCH IF YES
 7993  034106  122703  000117                CMPB    #117,R3         ;IS IT A RETURN TO CENTER?
 7994  034112  001522                        BEQ     CI6             ;BRANCH IF YES
 7995  034114  122703  000103                CMPB    #103,R3         ;IS IT AN "UNLOAD" COMMAND?
 7996  034120  001016                        BNE     5$              ;BRANCH IF NO
 7997  034122  112761  000001  032232        MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE INDICATOR
 7998  034130  105061  032242                CLRB    DRVSTA(R1)      ;PUT DRIVE STATUS TO OFFLINE
 7999  034134  112761  000001  033300        MOVB    #1,ULDFLG(R1)   ;SET "UNLOAD IN PROGRESS" FLAG
 8000  034142  010346                        MOV     R3,-(SP)        ;START THE "UNLOAD" COMMAND
 8001  034144  004037  036702                JSR     R0,WRT.RP
 8002  034150  000000                        RHCS1
 8003  034152  034402                        CI7
 8004  034154  000207                        RTS     PC              ;RETURN TO USER
 8005  034156  122703  000143          5$:   CMPB    #143,R3         ;IS IT A "SET FORMAT" COMMAND?
 8006  034162  001014                        BNE     6$              ;BRANCH IF NO
 8007  034164  004037  036544                JSR     R0,RD.RP        ;READ THE OFFSET REGISTER
 8008  034170  000032                        RHOF
 8009  034172  034402                        CI7
 8010  034174  116266  000001  000001        MOVB    1(R2),1(SP)     ;COMBINE "FMT22","ECI", AND "HCI"
 8011  034202  004037  036702                JSR     R0,WRT.RP       ;LOAD "FMT22", "ECI", AND/OR "HCI".
 8012  034206  000032                        RHOF
 8013  034210  034402                        CI7
 8014  034212  000436                        BR      12$
 8015  034214  122703  000141          6$:   CMPB    #141,R3         ;IS IT A "GET REGISTER" COMMAND?
 8016  034220  001023                        BNE     10$             ;BRANCH IF NO
 8017  034222  016203  000006          7$:   MOV     6(R2),R3        ;POINTS TO 1ST ADDRESS OF WHERE
 8018                                                                ;TO PUT THE REGISTER(S)
 8019  034226  116237  000010  034244        MOVB    10(R2),9$       ;INIT. THE INDEX FOR THE FIRST REG.
 8020  034234  116205  000011                MOVB    11(R2),R5       ;INDEX OF LAST REG. TO MOVE
 8021  034240  004037  036544          8$:   JSR     R0,RD.RP        ;READ RP04 REGISTER
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 8022  034244  000000                  9$:     RHCS1                   ;INDEX OF REG. TO READ
 8023  034246  034402                          CI7
 8024  034250  012623                          MOV     (SP)+,(R3)+     ;GET THE CONTENTS OF RH11/RP04 REG.
 8025  034252  023705  034244                  CMP     9$,R5           ;LAST REG. BEEN READ?
 8026  034256  001414                          BEQ     12$             ;GET OUT IF YES
 8027  034260  062737  000002  034244          ADD     #2,9$           ;INCREASE THE INDEX BY 2
 8028  034266  000764                          BR      8$              ;LOOP--MORE TO READ
 8029  034270  122703  000145          10$:    CMPB    #145,R3         ;IS IT A "SELECT DRIVE" COMMAND?
 8030  034274  001405                          BEQ     12$             ;BRANCH IF YES
 8031  034276  010346                  11$:    MOV     R3,-(SP)        ;LOAD THE COMMAND
 8032  034300  004037  036702                  JSR     R0,WRT.RP
 8033  034304  000000                          RHCS1
 8034  034306  034402                          CI7
 8035  034310  004737  037702          12$:    JSR     PC,POPQUE       ;REMOVE REQ. FROM QUEUE
 8036  034314  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET THE "DONE" BIT
 8037  034322  005737  032320                  TST     SAVEFG          ;SAVE THE RH11/RP04 REGISTERS?
 8038  034326  100002                          BPL     13$             ;BRANCH IF NO
 8039  034330  004737  037044                  JSR     PC,SVRH11       ;YES--GO SAVE THE REGISTERS
 8040  034334  000207                  13$:    RTS     PC              ;RETURN TO USER
 8041  034336  006301                  CI5:    ASL     R1
 8042  034340  012761  001750  032324          MOV     #1000.,TIMER(R1)        ;SET A ONE SECOND TIMER
 8043  034346  006201                          ASR     R1
 8044  034350  112761  000001  032232          MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE
 8045  034356  000207                          RTS     PC              ;RETURN TO THE USER
 8046  034360  010346                  CI6:    MOV     R3,-(SP)        ;LOAD THE COMMAND
 8047  034362  004037  036702                  JSR     R0,WRT.RP
 8048  034366  000000                          RHCS1
 8049  034370  034402                          CI7
 8050  034372  000761                          BR      CI5
 8051  034374  105761  032232          CI7A:   TSTB    DRVACT(R1)              ;IS THE DRIVE ACTIVE?
 8052  034400  001405                          BEQ     CI7B                    ;BRANCH IF NO
 8053  034402  012762  104000  000016  CI7:    MOV     #BIT15!BIT11,16(R2)     ;SET "PARITY" ERROR INDICATOR
 8054  034410  004737  037044                  JSR     PC,SVRH11       ;GO SAVE THE RH11/RP04 REGISTERS
 8055  034414  012746  000111          CI7B:   MOV     #111,-(SP)      ;DO A "DRIVE CLEAR"
 8056  034420  004C37  036702                  JSR     R0,WRT.RP
 8057  034424  000C00                          RHCS1
 8058  034426  034466                          CI8
 8059  034430  004737  037564                  JSR     PC,EMPTYQ       ;EMPTY THE QUEUE
 8060  034434  105061  032300                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD IN QUEUE FLAG
 8061  034440  105061  032232                  CLRB    DRVACT(R1)      ;DRIVE IS IDLE
 8062  034444  020137  032344                  CMP     R1,DTUW         ;IF THIS DRIVE HAD AN I/O REQUEST
 8063  034450  001005                          BNE     1$              ;IN PROGRESS CLEAR ALL OF THE FLAGS
 8064  034452  005037  032272                  CLR     TRNSWT
 8065  034456  012737  177777  032344          MOV     #-1,DTUW
 8066  034464  000207                  1$:     RTS     PC
 8067  034466  004037  037744          CI8:    JSR     R0,SAVR15       ;SAVE R1-R5
 8068  034472  013704  032360                  MOV     RPADR,R4        ;PICKUP THE ADDRESS OF THE FIRST REGISTER
 8069  034476  005001                          CLR     R1
 8070  034500  005003                          CLR     R3
 8071  034502  105761  032232          1$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE?
 8072  034506  001421                          BEQ     3$              ;BRANCH IF NO
 8073  034510  013702  032272                  MOV     TRNSWT,R2       ;GET THE "TRANSFER WAIT" QUEUE
 8074  034514  020137  032344                  CMP     R1,DTUW         ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
 8075  034520  001402                          BEQ     2$              ;BRANCH IF YES
 8076  034522  004737  037660                  JSR     PC,GETREQ       ;GET THE DPB POINTER
 8077  034526  004737  037044          2$:     JSR     PC,SVRH11       ;SAVE RH11/RP04 REGISTERS
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8078  034532  052762  102000  000016          BIS     #BIT15!BIT10,16(R2) ;SET "NON-CLEARABLE PARITY" ERROR INDICATOR
8079  034540  012763  177777  032324          MOV     #-1,TIMER(R3)   ;STOP THE TIMER
8080  034546  105061  032232                  CLRB    DRVACT(R1)      ;SET "DRIVE ACTIVE" TO IDLE
8081  034552  105061  032300          3$:     CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
8082  034556  005201                          INC     R1              ;MOVE TO THE NEXT DRIVE
8083  034560  062703  000002                  ADD     #2,R3
8084  034564  042701  177770                  BIC     #^C7,R1
8085  034570  001344                          BNE     1$              ;BRANCH IF MORE DRIVES
8086  034572  012737  177777  032344          MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
8087  034600  005037  032272                  CLR     TRNSWT          ;CLEAR THE "TRANSFER WAIT" QUEUE
8088  034604  004737  037502                  JSR     PC,CLRQUE       ;CLEAR ALL OF THE REQUEST QUEUES
8089  034610  012764  000040  000010          MOV     #BITOS,RHCS2(R4) ;DO A MASSBUS INIT.
8090  034616  004737  037136                  JSR     PC,SET.IE       ;SET "IE" WITHOUT "TRE"
8091  034622  004037  037764                  JSR     R0,GETR1S       ;RESTORE THE REGISTERS
8092  034626  000207                          RTS     PC              ;RETURN
8093
8094                                  ;*LOOK AHEAD ROUTINE
8095                                  ;
8096                                  ;*CALL
8097                                  ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER
8098                                  ;*      MOV     #DPB,R2         ;POINT TO DPB
8099                                  ;*      JSR     R0,LA           ;GO CHECK THE WINDOW
8100                                  ;*      RETURN1                 ;ERROR RETURN
8101                                  ;*      RETURN2                 ;START A SEARCH
8102                                  ;*      RETURN3                 ;START A DATA TRANSFER
8103
8104  034630  013704  032360          LA:     MOV     RPADR,R4        ;GET RHCS1'S ADDRESS
8105  034634  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT DRIVE
8106  034640  004037  036544                  JSR     R0,RD.RP        ;READ CURRENT CYLINDER
8107  034644  000036                          RHCC
8108  034646  034760                          4$                      ;ERROR RETURN ADDRESS
8109  034650  022662  000012                  CMP     (SP)+,12(R2)    ;IS CURRENT CYLINDER=DESIRED
8110                                                                  ;CYLINDER?
8111  034654  001037                          BNE     3$              ;EXIT IF NO
8112  034656  105261  032310                  INCB    LACNT(R1)       ;INCREMENT THE LOOK AHEAD COUNT
8113  034662  126137  032310  032366          CMPB    LACNT(R1),MXLACT ;EXCEED MAX?
8114  034670  003026                          BGT     2$              ;BRANCH IF YES
8115  034672  116203  000010                  MOVB    10(R2),R3       ;GET DESIRED SECTOR ADDRESS AND
8116  034676  000303                          SWAB    R3              ;MULT. BY 64--ALIGN WITH
8117  034700  006203                          ASR     R3              ;LOOK AHEAD REGISTER
8118  034702  006203                          ASR     R3
8119  034704  012737  000340  177776          MOV     #340,@#PS       ;PRIORITY LEVEL "7"
8120  034712  004037  036544                  JSR     R0,RD.RP        ;READ LOOK AHEAD REGISTER
8121  034716  000020                          RHLA
8122  034720  034760                          4$
8123  034722  162603                          SUB     (SP)+,R3        ;CALCULATE THE DELTA
8124  034724  002002                          BGE     1$
8125  034726  062703  002600                  ADD     #<22.*64.>,R3   ;MAKE THE DELTA POSITIVE
8126  034732  023703  032370          1$:     CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
8127  034736  002406                          BLT     3$              ;IF IT IS WITHIN THE
8128  034740  023703  032372                  CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
8129  034744  002003                          BGE     3$              ;THE LOOK AHEAD COUNT
8130  034746  105061  032310          2$:     CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
8131  034752  005720                          TST     (R0)+
8132  034754  005720                  3$:     TST     (R0)+           ;ADJUST THE RETURN ADDRESS
8133  034756  000200                          RTS     R0
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8134  034760  004737  034402          4$:     JSR     PC,CI7          ;PROCESS THE ERROR
8135  034764  000200                          RTS     R0              ;TAKE ERROR RET
8136
8137                                  ;*INTERRUPT SERVICE ROUTINE
8138
8139  034766  112737  000001  032276  ISR:    MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
8140  034774  004037  037744          ISR:    JSR     R0,SAVR15       ;SAVE R1-R5
8141  035000  013704  032360                  MOV     RPADR,R4        ;ADDRESS OF RHSCS1
8142  035004  013701  032344                  MOV     DTUW,R1         ;GET "DATA TRANSFER UNDERWAY" INDICATOR
8143  035010  002403                          BLT     1$              ;BRANCH IF NO DATA TRANSFER UNDERWAY
8144  035012  004737  035036                  JSR     PC,TD           ;CALL TRANSFER DONE
8145  035016  000402                          BR      2$              ;EXIT
8146  035020  004737  035164          1$:     JSR     PC,SC           ;CALL SPECIAL CONDITIONS
8147  035024  004037  037764          2$:     JSR     R0,GETR15       ;RESTORE R1-R5
8148  035030  105037  032276                  CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
8149  035034  000002                          RTI                     ;RETURN
8150
8151                                  ;*TRANSFER DONE ROUTINE
8152
8153  035036  105061  032232          TD:     CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
8154  035042  012737  177777  032344          MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
8155  035050  006301                          ASL     R1
8156  035052  012761  177777  032324          MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
8157  035060  006201                          ASR     R1
8158  035062  013702  032272                  MOV     TRNSWT,R2       ;GET "DPB" ADDRESS FROM THE
8159  035066  005037  032272                  CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
8160  035072  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET DONE
8161  035100  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT THE DRIVE
8162  035104  004037  036544                  JSR     R0,RD.RP        ;TRANSFER ERROR(TRE=1)?
8163  035110  000000                          RHCS1
8164  035112  034402                          CI7
8165  035114  006126                          ROL     (SP)+
8166  035116  100410                          BMI     2$              ;BR IF YES
8167  035120  005737  032320                  TST     SAVEFG          ;SAVE THE RH11/RP04 REGISTERS?
8168  035124  100002                          BPL     1$              ;BRANCH IF NO
8169  035126  004737  037044                  JSR     PC,SVRH11       ;YES--SAVE THE REGISTERS
8170  035132  004737  033162          1$:     JSR     PC,OPT          ;CALL OPTIMIZER
8171  035136  000456                          BR      SC2             ;SPECIAL CONDITION (ENTRY #2)
8172  035140  052762  100100  000016  2$:     BIS     #BIT15!BIT06,16(R2) ;SET DATA ERROR FLAG
8173  035146  004737  037564                  JSR     PC,EMPTYQ       ;EMPTY THE "DRIVES WAIT" QUEUE
8174  035152  004737  037044                  JSR     PC,SVRH11       ;SAVE THE RH11/RP04 REGISTERS
8175  035156  012714  040111                  MOV     #40111,(R4)     ;ISSUE A "DRIVE CLEAR"
8176  035162  000444                          BR      SC2             ;SPECIAL CONDITION (ENTRY #2)
8177
8178                                  ;*SPECIAL CONDITION ROUTINE
8179
8180  035164  005001          SC:     CLR     R1              ;START WITH DRIVE 0
8181  035166  012702  000001                  MOV     #1,R2
8182  035172  105761  032242          1$:     TSTB    DRVSTA(R1)      ;NONEXISTENT?
8183  035176  002016                          BGE     2$              ;NO--BRANCH
8184  035200  005201                          INC     R1              ;YES--MOVE TO THE NEXT DRIVE
8185  035202  106302                          ASLB    R2              ;MORE DRIVES?
8186  035204  103372                          BCC     1$              ;YES--BRANCH
8187  035206  013746  032322                  MOV     SEEKFG,-(SP)    ;SAVE THE "SEEK FLAG"
8188  035212  013746  032320                  MOV     SAVEFG,-(SP)    ;SAVE THE "SAVE FLAG"
8189  035216  004737  032376                  JSR     PC,RPINIT       ;GO INIT. THE SUBSYSTEM
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8190  035222  012637  032320                  MOV     (SP)+,SAVEFG    ;RESTORE THE "SAVE FLAG"
8191  035226  012637  032322                  MOV     (SP)+,SEEKFG    ;RESTORE THE "SEEK FLAG"
8192  035232  000405                          BR      SC1             ;TAKE ERROR EXIT
8193  035234  010164  000010          2$:     MOV     R1,RHCS2(R4)    ;SELECT DRIVE
8194  035240  116405  000001                  MOVB    1(R4),R5        ;IS "SC"=1?
8195  035244  100413                          BMI     SC2             ;BRANCH IF YES
8196  035246  012701  000010          SC1:    MOV     #8.,R1          ;DO EIGHT DRIVES
8197  035252  005301                  1$:     DEC     R1              ;NEXT DRIVE
8198  035254  002743                          BLT     SC              ;BRANCH IF OUT OF DRIVES
8199  035256  105761  032232                  TSTB    DRVACT(R1)      ;IS THIS DRIVE IDLE?
8200  035262  001373                          BNE     1$              ;BRANCH IF NO
8201  035264  104001                          ERROR   1               ;REPORT THE ERROR
8202  035266  004737  037136                  JSR     PC,SET.IE       ;GO SET INTERRUPT ENABLE
8203  035272  000207                          RTS     PC
8204  035274  012701  000003          SC2:    MOV     #3,R1           ;READ RHAS UP TO THREE TIMES
8205  035300  116403  000016          1$:     MOVB    RHAS(R4),R3     ;READ "RHAS"
8206  035304  001011                          BNE     2$              ;BRANCH IF ANY ATA BITS = 1
8207  035306  005301                          DEC     R1              ;COUNT THIS READ
8208  035310  003373                          BGT     1$              ;LOOP IF MORE READS ALLOWED
8209  035312  004037  036544                  JSR     R0,RD.RP        ;READ CONTROL AND STATUS REGISTER
8210  035316  000000                          RHCS1
8211  035320  034466                          CIB
8212  035322  106126                          ROLB    (SP)+           ;IS "IE"=1?
8213  035324  100350                          BPL     SC1             ;NO--TAKE ERROR EXIT
8214  035326  000207                          RTS     PC              ;YES--RETURN
8215  035330  005046                  2$:     CLR     -(SP)           ;PROCESS ALL DRIVES THAT HAVE
8216  035332  110316                          MOVB    R3,(SP)         ;ON "ATA"=1
8217  035334  012703  000001                  MOV     #1,R3
8218  035340  005001                          CLR     R1
8219  035342  030316                  SC4:    BIT     R3,(SP)         ;ATA=1?
8220  035344  001005                          BNE     SC5             ;YES--BRANCH
8221  035346  005201                  SC3:    INC     R1              ;MOVE TO THE NEXT DRIVE
8222  035350  106303                          ASLB    R3
8223  035352  001373                          BNE     SC4             ;BRANCH IF MORE TO CHECK?
8224  035354  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
8225  035356  000207                          RTS     PC              ;RETURN TO USER
8226  035360  023701  032344          SC5:    CMP     DTUW,R1         ;IS THIS DRIVE SETUP FOR I/O?
8227  035364  001002                          BNE     1$              ;NO---BRANCH
8228  035366  005726                          TST     (SP)+           ;YES---CLEAN OFF THE STACK (RHAS)
8229  035370  000622                          BR      TD              ;BRANCH TO "TRANSFER DONE"
8230  035372  105761  032242          1$:     TSTB    DRVSTA(R1)      ;CHECK THE DRIVE STATUS
8231  035376  003030                          BGT     SC6             ;BRANCH IF ONLINE
8232  035400  105761  032300                  TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS?
8233  035404  003420                          BLE     2$              ;BRANCH IF NO
8234  035406  004737  037660                  JSR     PC,GETREQ       ;GET DPB POINTER
8235  035412  004737  037044                  JSR     PC,SVRH11       ;SAVE THE RH11/RP04 REGISTERS
8236  035416  004737  036074                  JSR     PC,SC12         ;SAVE RHDS1, RHER1, RHER2, AND RHER3
8237                                                                  ;ALSO DO A DRIVE INIT (DRVINT)
8238  035422  105761  032242                  TSTB    DRVSTA(R1)      ;DID DRIVE COME ONLINE?
8239  035426  003411                          BLE     3$              ;NO---BRANCH
8240  035430  032737  040000  032222          BIT     #BIT14,RPERRS   ;WAS THERE AN ERROR?
8241  035436  001565                          BEQ     SC11            ;NO -- BRANCH
8242  035440  013705  032224                  MOV     RPERRS+2,R5     ;YES -- PICKUP RHER1 AND
8243  035444  000447                          BR      SC6A            ;GO PROCESS THE ERROR
8244  035446  004737  036074          2$:     JSR     PC,SC12         ;SAVE RHDS1, RHER1, RHER2, AND RHER3
8245                                                                  ;ALSO DO A DRVINT
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8246  035452  011605                  3$:     MOV     (SP),R5         ;PICKUP (RHAS) BEFORE THE ERROR CALL
8247  035454  104005                          ERROR   5               ;REPORT THE ERROR
8248  035456  000733                          BR      SC3             ;GO CHECK FOR MORE ATA'S
8249  035460  006301                  SC6:    ASL     R1
8250  035462  012761  177777  032324          MOV     #-1,TIMER(R1)   ;STOP THE TIMER
8251  035470  006201                          ASR     R1
8252  035472  004737  037660                  JSR     PC,GETREQ       ;GET THE DPB POINTER FROM THE QUEUE
8253  035476  010364  000016                  MOV     R3,RHAS(R4)     ;CLEAR ATTENTION
8254  035502  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT DRIVE
8255  035506  004037  036544                  JSR     R0,RD.RP        ;READ THE RP04'S STATUS REG.
8256  035512  000012                          RHDS1
8257  035514  035732                          SC8
8258  035516  011605                          MOV     (SP),R5         ;AND PUT IT IN R5
8259  035520  006126                          ROL     (SP)+           ;WAS THERE AN ERROR?
8260  035522  100115                          BPL     SC9             ;BR IF NO
8261  035524  105761  032232                  TSTB    DRVACT(R1)      ;CHECK THE DRIVE ACTIVE INDICATOR
8262  035530  001522                          BEQ     SC10            ;BRANCH IF IDLE
8263  035532  004037  036544                  JSR     R0,RD.RP        ;READ ERROR REGISTER #1
8264  035536  000014                          RHER1
8265  035540  035732                          SC8
8266  035542  012605                          MOV     (SP)+,R5        ;AND SAVE IT IN R5
8267  035544  004737  037044                  JSR     PC,SVRH11       ;SAVE RH11/RP04 REGISTERS
8268  035550  012746  000111                  MOV     #111,-(SP)      ;ISSUE A DRIVE CLEAR
8269  035554  004037  036702                  JSR     R0,WRT.RP
8270  035560  000000                          RHCS1
8271  035562  035732                          SC8
8272  035564  006105                  SC6A:   ROL     R5              ;WAS "UNSAFE" CONDITION =1?
8273  035566  100404                          BMI     1$              ;BRANCH IF YES
8274  035570  052762  100240  000016          BIS     #BIT15!BIT07!BIT05,16(R2)       ;INFORM USER OF ERROR
8275  035576  000443                          BR      SC7
8276  035600  004037  036544          1$:     JSR     R0,RD.RP        ;READ DRIVE STATUS REG. #1
8277  035604  000012                          RHDS1
8278  035606  035732                          SC8
8279  035610  011605                          MOV     (SP),R5         ;SAVE RHDS1 IN R5
8280  035612  006126                          ROL     (SP)+           ;"ERR"=1?
8281  035614  100013                          BPL     2$              ;BR IF NO--UNSAFE CLEARED
8282  035616  112761  177777  032242          MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
8283  035624  004737  037044                  JSR     PC,SVRH11       ;SAVE RH11/RP04 REGISTERS
8284  035630  010364  000016                  MOV     R3,RHAS(R4)     ;CLEAR ATTENTION
8285  035634  052762  110000  000016          BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
8286  035642  000421                          BR      SC7
8287  035644  105705                  2$:     TSTB    R5              ;"DRY" =1?
8288  035646  100414                          BMI     3$              ;BRANCH IF YES
8289  035650  112761  177777  032232          MOVB    #-1,DRVACT(R1)  ;ACTIVE ERROR RECOVER
8290  035656  112761  000001  032242          MOVB    #1,DRVSTA(R1)   ;ONLINE
8291  035664  006301                          ASL     R1
8292  035666  012761  072460  032324          MOV     #30000.,TIMER(R1) ;START 30 SECOND TIMER
8293  035674  006201                          ASR     R1
8294  035676  000623                          BR      SC3
8295  035700  052762  100220  000016  3$:     BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
8296  035706  105061  032232          SC7:    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
8297  035712  004737  037564                  JSR     PC,EMPTYQ       ;DUMP THE QUEUE
8298  035716  105761  032300                  TSTB    ULDFLG(R1)      ;UNLOAD IN PROGRESS OR QUEUE?
8299  035722  001611                          BEQ     SC3             ;BR IF NO
8300  035724  105061  032300                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
8301  035730  000606                          BR      SC3
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8302  035732  005726                    SC8:    TST     (SP)+           ;REMOVE (RHAS) FROM THE STACK
8303  035734  105761  032232                    TSTB    DRVACT(R1)      ;IS DRIVE IDLE?
8304  035740  001404                            BEQ     1$              ;YES--BRANCH
8305  035742  004737  037660                    JSR     PC,GETREQ       ;GET DPB POINTER
8306  035746  000137  034402                    JMP     CI7             ;PROCESS THE PARITY ERROR
8307  035752  000137  034414            1$:     JMP     CI7B            ;PROCESS THE PARITY ERROR
8308  035756  105761  032232            SC9:    TSTB    DRVACT(R1)      ;TEST DRIVE ACTIVE
8309  035762  003013                            BGT     SC11            ;BRANCH IF DRIVE IS ACTIVE
8310  035764  001404                            BEQ     SC10            ;BRANCH IF DRIVE IS IDLE
8311  035766  052762  100210  000016            BIS     #BIT15!BIT07!BIT03,16(R2) ;INFORM USER OF ERROR RECOVER COMPLETION
8312  035774  000744                            BR      SC7
8313  035776  011605                    SC10:   MOV     (SP),R5 ;PUT (RHAS) IN R5
8314  036000  004737  036074                    JSR     PC,SC12         ;SAVE RHDS1, RHER1, RHER2, AND RHER3
8315  036004  104002                            ERROR   2               ;REPORT THE ERROR
8316  036006  000137  035346                    JMP     SC3             ;GO CHECK FOR MORE ATA'S
8317  036012  105761  032300            SC11:   TSTB    ULDFLG(R1)      ;"UNLOAD IN PROGRESS"?
8318  036016  003402                            BLE     1$              ;BRANCH IF NO
8319  036020  105061  032300                    CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
8320  036024  105061  032232            1$:     CLRB    DRVACT(R1)      ;SET DRIVE IDLE
8321  036030  136137  032346  032274            BITB    ATABIT(R1),SRCHWT       ;DOING A SEARCH OPERATION FOR
8322                                                                    ;AN I/O COMMAND?
8323  036036  001012                            BNE     2$              ;BRANCH IF YES
8324  036040  004737  037702                    JSR     PC,POPQUE       ;REMOVE REQUEST FROM QUEUE
8325  036044  052762  000200  000016            BIS     #BIT07,16(R2)   ;SET "DONE" BIT
8326  036052  005737  032320                    TST     SAVEFG          ;SAVE THE RH11/RP04 REGISTERS?
8327  036056  100002                            BPL     2$              ;BRANCH IF NO
8328  036060  004737  037044                    JSR     PC,SVRH11       ;YES--SAVE ALL OF THE RH11/RP04 REG'S
8329  036064  004737  033162            2$:     JSR     PC,OPT          ;START A REQUEST
8330  036070  000137  035346                    JMP     SC3
8331  036074  010164  000010            SC12:   MOV     R1,RHCS2(R4)    ;SELECT DRIVE
8332  036100  016437  000012  032222            MOV     RHDS1(R4),RPERRS        ;SAVE THE FOUR REGISTERS THAT
8333  036106  016437  000014  032224            MOV     RHER1(R4),RPERRS+2      ;WILL TELL US SOMETHING
8334  036114  016437  000040  032226            MOV     RHER2(R4),RPERRS+4
8335  036122  016437  000042  032230            MOV     RHER3(R4),RPERRS+6
8336  036130  004037  032540                    JSR     R0,DRVINT       ;INIT. THE STATE OF THE DRIVE
8337  036134  000401                            BR      1$              ;TAKE ERROR EXIT
8338  036136  000207                            RTS     PC              ;RETURN
8339  036140  005726                    1$:     TST     (SP)+           ;POP PC OFF OF THE STACK
8340  036142  000673                            BR      SC8             ;PROCESS THE PARITY ERROR
8341
8342                                    ;*RP04 TIMER ROUTINE
8343                                    ;*CALL
8344                                    ;*      MOV     #TIME,-(SP)     ;ELASPED TIME IN MILLISECONDS ON THE STACK
8345                                    ;*      JSR     R0,RPTMR        ;CALL RP04 TIME ROUTINE
8346
8347  036144  005737  032276            RPTMR:  TST     ACTDRV          ;CHECK "ACTDRV & ACTSTR"
8348  036150  001032                            BNE     4$              ;IF NON ZERO EXIT
8349  036152  112737  000001  032277            MOVB    #1,ACTSTR       ;SET "ACTSTR"
8350  036160  004037  037744                    JSR     R0,SAVR15       ;SAVE R1-R5
8351  036164  005001                            CLR     R1              ;START WITH DRIVE 0
8352  036166  005003                            CLR     R3
8353  036170  005763  032324            1$:     TST     TIMER(R3)       ;IS THE TIMER RUNNING?
8354  036174  002407                            BLT     2$              ;BRANCH IF NO
8355  036176  166663  000016  032324            SUB     16(SP),TIMER(R3) ;COUNT THE INTERVAL
8356  036204  003003                            BGT     2$              ;BR IF NO SOFTWARE TIMEOUT
8357  036206  004037  036242                    JSR     R0,STO          ;CALL SOFTWARE TIMEOUT ROUTINE
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8358  036212  000405                          BR      3$              ;GO TO THE EXIT
8359  036214  005201                  2$:     INC     R1              ;MOVE TO NEXT DRIVE
8360  036216  005723                          TST     (R3)+
8361  036220  022701  000010                  CMP     #8.,R1          ;OUT OF DRIVES?
8362  036224  003361                          BGT     1$              ;BRANCH IF NO
8363  036226  004037  037764          3$:     JSR     R0,GETR15       ;RESTORE R1-R5
8364  036232  105037  032277                  CLRB    ACTSTR          ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
8365  036236  012616                  4$:     MOV     (SP)+,(SP)      ;ADJUST THE STACK
8366  036240  000200                          RTS     R0              ;RETURN
8367
8368                                  ;*SOFTWARE TIMEOUT ROUTINE
8369                                  ;*
8370                                  ;*CALL: STO
8371                                  ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER
8372                                  ;*      JSR     R0,STO          ;CALL--DRVACT MUST BE NONZERO
8373                                  ;*      RETURN
8374
8375  036242  013746  177776          STO:    MOV     @#PS,-(SP)      ;SAVE THE PROCESSOR STATUS
8376  036246  013737  032364  177776          MOV     RPVEC+2,@#PS    ;SET THE "PS" TO RP04 BR LEVEL
8377  036254  004037  037744                  JSR     R0,SAVR15       ;SAVE R1-R5
8378  036260  013704  032360                  MOV     RPADR,R4        ;GET ADDRESS OF "RHCS1"
8379  036264  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT THE DRIVE
8380  036270  004037  036544                  JSR     R0,RD.RP        ;READ "DRIVE STATUS REG"
8381  036274  000012                          RHDS1
8382  036276  036536                          STO5
8383  036300  105726                          TSTB    (SP)+           ;IS "DRY"=1?
8384  036302  100471                          BMI     STO2            ;BR IF YES
8385  036304  013702  032272          STO1:   MOV     TRNSWT,R2       ;PICKUP TRANSFER WAIT QUEUE
8386  036310  020137  032344                  CMP     R1,DTUW         ;TRANSFER UNDERWAY ON THIS DRIVE?
8387  036314  001402                          BEQ     1$              ;BRANCH IF YES
8388  036316  004737  037660                  JSR     PC,GETREQ       ;GET DPB ADDRESS
8389  036322  052762  101000  000016  1$:     BIS     #BIT15!BIT09,16(R2) ;SET THE ERROR FLAGS
8390  036330  004737  037044                  JSR     PC,SVRH11       ;SAVE RH11/RP04 REGISTERS
8391  036334  012764  000040  000010          MOV     #BIT05,RHCS2(R4) ;"INIT" THE MASS BUS
8392  036342  105061  032232                  CLRB    DRVACT(R1)      ;DRIVE IS IDLE
8393  036346  105061  032300                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
8394  036352  005001                          CLR     R1              ;START WITH DRIVE 0
8395  036354  005003                          CLR     R3
8396  036356  004037  032540          2$:     JSR     R0,DRVINT       ;INIT. THIS DRIVE
8397  036362  000465                          BR      STO5            ;PARITY ERROR RETURN
8398  036364  105761  032232                  TSTB    DRVACT(R1)      ;DRIVE IDLE BEFORE THE INIT.?
8399  036370  001414                          BEQ     4$              ;YES--BRANCH
8400  036372  013702  032272                  MOV     TRNSWT,R2       ;GET TRANSFER WAIT QUEUE
8401  036376  023701  032344                  CMP     DTUW,R1         ;WAS THERE I/O ON THIS DRIVE?
8402  036402  001402                          BEQ     3$              ;YES--BRANCH
8403  036404  004737  037660                  JSR     PC,GETREQ       ;GET THE DPB POINTER FROM QUEUE
8404  036410  052762  100400  000016  3$:     BIS     #BIT15!BIT08,16(R2) ;INFORM USER OF INIT.
8405  036416  105061  032232                  CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE TO IDLE
8406  036422  105061  032300          4$:     CLRB    ULDFLG(R1)      ;NO UNLOAD
8407  036426  012763  177777  032324          MOV     #-1,TIMER(R3)   ;STOP THE TIMER
8408  036434  005723                          TST     (R3)+           ;UPDATE THE INDEX
8409  036436  005201                          INC     R1              ;INCREMENT THE DRIVE NUMBER
8410  036440  022701  000010                  CMP     #8.,R1          ;LAST DRIVE BEEN CHECKED?
8411  036444  003344                          BGT     2$              ;NO--LOOP
8412  036446  012737  177777  032344          MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
8413  036454  005037  032272                  CLR     TRNSWT          ;CLEAR TRANSFER WAIT QUEUE
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8414  036460  004737  037502                  JSR     PC,CLRQUE       ;CLEAR ALL REQUEST QUEUES
8415  036464  000417                          BR      ST04            ;EXIT
8416  036466  016405  000016          ST02:   MOV     RHAS(R4),R5     ;IS ATTENTION FOR THIS
8417  036472  136105  032346                  BITB    ATABIT(R1),R5   ;DRIVE UP?
8418  036476  001011                          BNE     ST03            ;YES--BRANCH
8419  036500  020137  032344                  CMP     R1,DTUW         ;DATA TRANSFER UNDERWAY FOR THIS DRIVE
8420  036504  001277                          BNE     ST01            ;BR IF NO
8421  036506  004037  036544                  JSR     R0,RD.RP        ;YES--CHECK "RDY"
8422  036512  000000                          RHCS1
8423  036514  036536                          ST05
8424  036516  105726                          TSTB    (SP)+
8425  036520  100271                          BPL     ST01            ;BR IF "RDY"=0
8426  036522  005720          ST03:   TST     (R0)+           ;ADJUST FOR THE PROPER RETURN
8427  036524  004037  037764  ST04:   JSR     R0,GETR15       ;RESTORE R1-R5
8428  036530  012637  177776                  MOV     (SP)+,@#PS      ;RESTORE PROCESSOR STATUS
8429  036534  000200                          RTS     R0              ;RETURN
8430  036536  004737  034466  ST05:   JSR     PC,CI8          ;GO HANDLE THE PARITY ERROR
8431  036542  000770                          BR      ST04
8432
8433                                  ;*ROUTINE TO READ A RH11/RP04 REGISTER
8434                                  ;
8435                                  ;*CALL
8436                                  ;*      JSR     R0,RD.RP        ;GO READ A REGISTER
8437                                  ;*      INDEX                   ;REG. INDEX FROM BASE
8438                                  ;*      ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
8439                                  ;*                              ;AT THIS ADDRESS
8440                                  ;*      RETURN                  ;CONTENTS OF REG. IS ON THE STACK
8441                                  ;
8442  036544  013737  032356  036670  RD.RP:  MOV     MCPEMX,RD.RP2   ;MAX. RETRYS ALLOWED
8443  036552  011646                  MOV     (SP),-(SP)      ;SAVE R0 FOR RETURN
8444  036554  013737  032360  036570          MOV     RPADR,RD.ADR    ;FORM THE DESIRED ADDRESS
8445  036562  062037  036570                  ADD     (R0)+,RD.ADR    ;USING THE BASE AND THE INDEX
8446  036566  013727                  RD.RP1: MOV     @(PC)+,(PC)+    ;READ THE DESIRED REGISTER OF THE RP04
8447  036570  000000                  RD.ADR: .WORD   0               ;ADDRESS IS FORMED HERE
8448  036572  000000                  RD.WRD: .WORD   0               ;REG. CONTENTS PUT HERE
8449  036574  013766  036572  000002          MOV     RD.WRD,2(SP)    ;RETURN IT TO THE USER
8450  036602  017746  173552                  MOV     @RPADR,-(SP)    ;READ RHCS1
8451  036606  032716  020000                  BIT     #BIT13,(SP)     ;DID MCPE SET?
8452  036612  001002                          BNE     1$              ;BRANCH IF YES
8453  036614  022620                          CMP     (SP)+,(R0)+     ;ADJUST FOR RETURN
8454  036616  000200                          RTS     R0              ;RETURN IF NO
8455  036620                          1$:
8456  036620  104003                          ERROR   3               ;REPORT THE ERROR
8457  036622  005737  032344                  TST     DTUW            ;DATA TRANSFER UNDERWAY?
8458  036626  100405                          BMI     2$              ;NO--BRANCH
8459  036630  032716  040000                  BIT     #BIT14,(SP)     ;NO--"TRE"=1?
8460  036634  001402                          BEQ     2$              ;NO--BRANCH
8461  036636  005726                          TST     (SP)+           ;YES--CLEAN OFF THE STACK AND
8462  036640  000415                          BR      RD.RP3          ;TAKE THE FATAL ERROR EXIT
8463  036642  052716  040000          2$:     BIS     #BIT14,(SP)     ;CLEAR "MCPE" BY SENDING A "1" TO "TRE"
8464  036646  000316                          SWAB    (SP)            ;POSITION BEFORE WRITING
8465  036650  013737  032360  036664          MOV     RPADR,3$        ;FORM ADDRESS OF HIGH BYTE
8466  036656  005237  036664                  INC     3$
8467  036662  112637                          MOVB    (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RHCS1
8468  036664  000000                  3$:     .WORD   0               ;ADDRESS STORAGE
8469  036666  005327                          DEC     (PC)+           ;EXCEEDED MAX. RETRYS
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8470  036670  000003                    RD.RP2: .WORD   3
8471  036672  002335                            BGE     RD.RP1          ;BRANCH IF NO
8472  036674  011000                    RD.RP3: MOV     (R0),R0         ;FATAL ERROR EXIT
8473  036676  012616                            MOV     (SP)+,(SP)
8474  036700  000200                            RTS     R0
8475
8476                                    ;*ROUTINE TO WRITE A RH11/RP04 REGISTER
8477                                    ;
8478                                    ;*CALL
8479                                    ;*      MOV     DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
8480                                    ;*      JSR     R0,WRT.RP       ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
8481                                    ;*      INDEX                   ;INDEX OF THE REGISTER TO BE LOADED
8482                                    ;*      ERRADR                  ;ADDRESS TO RETURN TO ON AN ERROR
8483                                    ;*      RETURN                  ;ERROR FREE RETURN
8484
8485  036702  016637  000002  036770    WRT.RP: MOV     2(SP),WRT.WD    ;SAVE THE WORD TO WRITE
8486  036710  012616                            MOV     (SP)+,(SP)      ;ADJUST THE STACK
8487  036712  012037  036772                    MOV     (R0)+,WRT.AD    ;GET INDEX OF REGISTER TO BE WRITTEN
8488  036716  001020                            BNE     2$              ;BRANCH IF NOT RHCS1
8489  036720  122737  000150  036770          CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
8490  036726  002414                            BLT     2$              ;YES--DON'T GET THE OLD A16&A17, & PSEL
8491  036730  004037  036544                    JSR     R0,RD.RP        ;NO---COMBINE A16&A17, & PSEL WITH
8492  036734  000000                            RHCS1                   ;THE COMMAND BEFORE SENDING IT TO
8493  036736  036754                            1$                      ;THE RH11/RP04
8494  036740  000316                            SWAB    (SP)
8495  036742  042716  177770                    BIC     #^C7,(SP)
8496  036746  112637  036771                    MOVB    (SP)+,WRT.WD+1
8497  036752  000402                            BR      2$
8498  036754  011000                    1$:     MOV     (R0),R0         ;TAKE THE ERROR EXIT
8499  036756  000200                            RTS     R0
8500  036760  063737  032360  036772  2$:     ADD     RPADR,WRT.AD    ;FORM THE ADDRESS OF THE DISK REG.
8501  036766  012737                            MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
8502  036770  000000                    WRT.WD: .WORD   0               ;WORD TO WRITE GOES HERE
8503  036772  000000                    WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
8504  036774  004037  036544                    JSR     R0,RD.RP        ;CHECK FOR PARITY ERROR ON WRITE
8505  037000  000014                            RHER1
8506  037002  037034                            2$
8507  037004  032726  000010                    BIT     #BIT03,(SP)+
8508  037010  001413                            BEQ     3$              ;BRANCH IF "PAR=0"
8509  037012  016037  177776  037024          MOV     -2(R0),1$       ;PICKUP THE INDEX
8510  037020  004037  036544                    JSR     R0,RD.RP        ;READ THE REG.
8511  037024  000000                    1$:     .WORD   0               ;       REG. INDEX
8512  037026  037034                            2$                      ;RETURN TO THIS ADDRESS ON ERROR
8513  037030  104004                            ERROR   4               ;REPORT THE ERROR
8514  037032  005726                            TST     (SP)+           ;CLEAN OFF THE STACK
8515  037034  011000                    2$:     MOV     (R0),R0         ;TAKE THE "PARITY ON WRITE" ERROR EXIT
8516  037036  000200                            RTS     R0
8517  037040  005720                    3$:     TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
8518  037042  000200                            RTS     R0
8519
8520                                    ;*ROUTINE TO SAVE THE RH11/RP04 REGISTERS AS PER DPB+14
8521                                    ;
8522                                    ;*CALL
8523                                    ;*      MOV     #DPBNUM,R2      ;DPB POINTER TO R2
8524                                    ;*      JSR     PC,SVRH11       ;SAVE THE DRIVES REG'S
8525
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8526  037044  004037  037744          SVRH11: JSR     R0,SAVR15       ;SAVE REG.'S R1-R5
8527  037050  013704  032360                  MOV     RPADR,R4
8528  037054  111264  000010                  MOVB    (R2),RHCS2(R4)  ;SELECT DRIVE
8529  037060  016202  000014                  MOV     14(R2),R2       ;GET THE ERROR TABLE POINTER
8530  037064  001421                          BEQ     4$              ;EXIT IF 0
8531  037066  005003                          CLR     R3              ;COUNTER & POINTER
8532  037070  012705  000022                  MOV     #RHDB,R5        ;PROBLEM REGISTER
8533  037074  020305                  1$:     CMP     R3,R5           ;REACHED RHDB?
8534  037076  001005                          BNE     2$              ;BR IF NO
8535  037100  105764  000010                  TSTB    RHCS2(R4)       ;CHECK "OR"
8536  037104  100402                          BMI     2$              ;BRANCH IF RHDB CAN BE READ
8537  037106  005022                          CLR     (R2)+           ;ELSE SAVE IT AS 0'S
8538  037110  000403                          BR      3$
8539  037112  010446                  2$:     MOV     R4,-(SP)        ;FORM RH11/RP04 ADDRESS THAT IS
8540  037114  060316                          ADD     R3,(SP)         ;TO BE READ
8541  037116  013622                          MOV     @(SP)+,(R2)+    ;AND READ IT
8542  037120  005723                  3$:     TST     (R3)+           ;MOVE TO NEXT REG INDEX
8543  037122  020327  000046                  CMP     R3,#RHEC2       ;DONE?
8544  037126  003762                          BLE     1$              ;BRANCH IF NO
8545  037130  004037  037764          4$:     JSR     R0,GETR15       ;GET REGISTERS R1-R5
8546  037134  000207                          RTS     PC              ;RETURN TO USER
8547
8548                                  ;*ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A "TRE"
8549                                  ;*CALL
8550                                  ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
8551                                  ;*      JSR     PC,SET.IE       ;SET "IE"
8552                                  ;*      RETURN
8553
8554  037136  010446                  SET.IE: MOV     R4,-(SP)        ;SAVE R4
8555  037140  013704  032360                  MOV     RPADR,R4        ;PICKUP ADDRESS OF RHCS1
8556  037144  010164  000010                  MOV     R1,RHCS2(R4)    ;SELECT DRIVE
8557  037150  011446                          MOV     (R4),-(SP)      ;READ RHCS1
8558  037152  052716  040000                  BIS     #BIT14,(SP)     ;SET THE "TRE" BIT OF THE WORD READ
8559  037156  000316                          SWAB    (SP)            ;ADJUST FOR DATO
8560  037160  112714  000100                  MOVB    #BIT06,(R4)     ;SET "IE"
8561  037164  032764  010000  000010          BIT     #BIT12,RHCS2(R4) ;IS "NED"=1?
8562  037172  001002                          BNE     1$              ;YES--CLEAR "TRE"
8563  037174  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
8564  037176  000402                          BR      2$
8565  037200  112664  000001          1$:     MOVB    (SP)+,1(R4)     ;CLEAR "TRE"
8566  037204  012604                  2$:     MOV     (SP)+,R4        ;RESTORE R4
8567  037206  000207                          RTS     PC              ;RETURN TO CALLER
8568
8569                                  ;*QUEUE COUNT
8570  037210      000                 QCNT:   .BYTE   0               ;DRIVE 0
8571  037211      000                         .BYTE   0               ;DRIVE 1
8572  037212      000                         .BYTE   0               ;DRIVE 2
8573  037213      000                         .BYTE   0               ;DRIVE 3
8574  037214      000                         .BYTE   0               ;DRIVE 4
8575  037215      000                         .BYTE   0               ;DRIVE 5
8576  037216      000                         .BYTE   0               ;DRIVE 6
8577  037217      000                         .BYTE   0               ;DRIVE 7
8578
8579                                  ;QUEUE INPUT POINTERS
8580
8581  037220  037302                  QINPT:  .WORD   QDRV0            ;DRIVE 0
```

```
 8582  037222  037322                        .WORD   QDRV1           ;DRIVE 1
 8583  037224  037342                        .WORD   QDRV2           ;DRIVE 2
 8584  037226  037362                        .WORD   QDRV3           ;DRIVE 3
 8585  037230  037402                        .WORD   QDRV4           ;DRIVE 4
 8586  037232  037422                        .WORD   QDRV5           ;DRIVE 5
 8587  037234  037442                        .WORD   QDRV6           ;DRIVE 6
 8588  037236  037462                        .WORD   QDRV7           ;DRIVE 7
 8589
 8590                                ;QUEUE OUTPUT POINTERS
 8591
 8592  037240  037302                QOUTPT: .WORD   QDRV0           ;DRIVE 0
 8593  037242  037322                        .WORD   QDRV1           ;DRIVE 1
 8594  037244  037342                        .WORD   QDRV2           ;DRIVE 2
 8595  037246  037362                        .WORD   QDRV3           ;DRIVE 3
 8596  037250  037402                        .WORD   QDRV4           ;DRIVE 4
 8597  037252  037422                        .WORD   QDRV5           ;DRIVE 5
 8598  037254  037442                        .WORD   QDRV6           ;DRIVE 6
 8599  037256  037462                        .WORD   QDRV7           ;DRIVE 7
 8600
 8601  037260  037302                QSTART: .WORD   QDRV0           ;DRIVE 0 START ADDRESS
 8602  037262  037322                QSTOP:  .WORD   QDRV1           ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
 8603  037264  037342                        .WORD   QDRV2           ;STOP DRIVE 1--START DRIVE 2
 8604  037266  037362                        .WORD   QDRV3           ;STOP DRIVE 2--START DRIVE 3
 8605  037270  037402                        .WORD   QDRV4           ;STOP DRIVE 3--START DRIVE 4
 8606  037272  037422                        .WORD   QDRV5           ;STOP DRIVE 4--START DRIVE 5
 8607  037274  037442                        .WORD   QDRV6           ;STOP DRIVE 5--START DRIVE 6
 8608  037276  037462                        .WORD   QDRV7           ;STOP DRIVE 6--START DRIVE 7
 8609  037300  037502                        .WORD   QTERM           ;STOP DRIVE 7
 8610
 8611                                ;DRIVE REQUEST QUEUES
 8612
 8613  037302  000010                QDRV0:  .BLKW   10
 8614  037322  000010                QDRV1:  .BLKW   10
 8615  037342  000010                QDRV2:  .BLKW   10
 8616  037362  000010                QDRV3:  .BLKW   10
 8617  037402  000010                QDRV4:  .BLKW   10
 8618  037422  000010                QDRV5:  .BLKW   10
 8619  037442  000010                QDRV6:  .BLKW   10
 8620  037462  000010                QDRV7:  .BLKW   10
 8621          037502                QTERM=.
 8622
 8623                                ;*ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
 8624                                ;
 8625                                ;*CALL
 8626                                ;*      JSR     PC,CLRQUE
 8627
 8628  037502  004037  037744        CLRQUE: JSR     R0,SAVR15       ;SAVE R1-R5
 8629  037506  012702  037210                MOV     #QC  ,R2        ;ZERO THE QUEUE COUNTS
 8630  037512  005022                        CLR     (R2)+           ;DRIVES 0 & 1
 8631  037514  005022                        CLR     (R2)+           ;DRIVES 2 & 3
 8632  037516  005022                        CLR     (R2)+           ;DRIVES 4 & 5
 8633  037520  005022                        CLR     (R2)+           ;DRIVES 6 & 7
 8634  037522  012703  000010                MOV     #8.,R3          ;MOVE THE STARTING
 8635  037526  012701  037260                MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
 8636  037532  012122                1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
 8637  037534  005303                        DEC     R3
```

```
                                                BNE     1$
                                                MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
                                                MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
                                        2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
                                                DEC     R3
                                                BNE     2$
                                                JSR     R0,GETR15       ;RESTORE R1-R5
                                                RTS     PC

                                ;*EMPTY THE QUEUE SPECIFIED BY R1
                                ;
                                ;*CALL
                                ;*      MOV     DRVNUM,R1       ;DRIVE NUMBER TO R1
                                ;*      JSR     PC,EMPTYQ

                                EMPTYQ: CLRB    QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
                                        ASL     R1
                                        MOV     QINPT(R1),QOUTPT(R1) ;SET OUTPUT QUEUE POINTER=INPUT POINTER
                                        ASR     R1
                                        RTS     PC

                                ;*ROUTINE TO PUT A REQUEST IN QUEUE
                                ;
                                ;*CALL
                                ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER
                                ;*      MOV     #DPB,R2         ;ADDRESS OF PARAMETER BLOCK
                                ;*      JSR     R0,DRVQUE       ;GO PUT REQUEST IN QUEUE
                                ;*      RETURN1                 ;RETURN HERE IF QUEUE IS FULL
                                ;*      RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE

                                DRVQUE: CMPB    #10,QCNT(R1)    ;IS QUEUE FULL?
                                        BEQ     2$              ;BR IF YES-TAKE RETURN1
                                        INCB    QCNT(R1)        ;INCREMENT QUEUE COUNT
                                        ASL     R1
                                        MOV     R2,@QINPT(R1)   ;PUT THIS REQUEST IN QUEUE
                                        ADD     #2,QINPT(R1)    ;UPDATE THE QUEUE POINTER
                                        CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
                                        BNE     1$              ;BRANCH IF NO
                                        MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
                                1$:     ASR     R1
                                        TST     (R0)+           ;TAKE RETURN 2
                                2$:     RTS     R0              ;RETURN TO USER

                                ;*ROUTINE TO GET THE "DPB" ADDRESS OF NEXT REQUEST IN QUEUE
                                ;
                                ;*CALL
                                ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
                                ;*      JSR     PC,GETREQ       ;GO GET THE REQUEST
                                ;*      RETURN                  ;R2="DPB" ADDRESS OF THE REQUEST
                                ;*                              ;R2=0 IF NO REQUEST IN QUEUE

                                GETREQ: CLR     R2
                                        TSTB    QCNT(R1)        ;IS THERE ANY REQUEST IN QUEUE?
                                        BEQ     2$              ;NO---BRANCH
                                1$:     ASL     R1
                                        MOV     @QOUTPT(R1),R2  ;PICKUP "DPB" POINTER FOR THIS DRIVE
```

```
 8694  037676  006201                          ASR     R1
 8695  037700  000207                2$:       RTS     PC              ;RETURN TO USER
 8696
 8697                                ;*ROUTINE TO "POP" THE REQUEST FROM QUEUE
 8698                                ;*
 8699                                ;*CALL
 8700                                ;*      MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
 8701                                ;*      JSR     PC,POPQUE       ;CALL TO REMOVE REQUEST
 8702                                ;*      RETURN                  ;R2=ADDRESS OF DPB REMOVED
 8703
 8704  037702  105361  037210       POPQUE: DECB    QCNT(R1)        ;DECREMENT QUEUE COUNT
 8705  037706  006301                        ASL     R1
 8706  037710  017102  037240               MOV     @QOUTPT(R1),R2  ;GET THE "DPB" POINTER
 8707  037714  062761  000002  037240       ADD     #2,QOUTPT(R1)   ;UPDATE THE QUEUE POINTER
 8708  037722  026161  037240  037262       CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
 8709  037730  001003                        BNE     1$              ;NO--BRANCH TO EXIT
 8710  037732  016161  037260  037240       MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
 8711  037740  006201                1$:     ASR     R1
 8712  037742  000207                        RTS     PC              ;RETURN TO USER
 8713
 8714                                ;*ROUTINES TO SAVE R0-R5 AND R1-R5
 8715                                ;*
 8716                                ;*CALL: SAVR05
 8717                                ;*      JSR     R0,SAVR05
 8718                                ;*      RETURN                  ;R0-R5 IS ON THE STACK
 8719                                ;*
 8720                                ;*CALL: SAVR15
 8721                                ;*      JSR     R0,SAVR15
 8722                                ;*      RETURN                  ;R1-R5 IS ON THE STACK
 8723                                ;*
 8724                                ;*UPON RETURN FROM SAVR05 AND SAVR15 THE STACK WILL LOOK LIKE:
 8725                                ;*
 8726                                ;*+12   R0
 8727                                ;*+10   R1
 8728                                ;*+06   R2
 8729                                ;*+04   R3
 8730                                ;*+02   R4
 8731                                ;*TOP   R5
 8732
 8733  037744                        SAVR05:                         ;SAVE R0 BY THE JSR INST.
 8734  037744  010146                SAVR15: MOV     R1,-(SP)        ;SAVE R1
 8735  037746  010246                        MOV     R2,-(SP)        ;SAVE R2
 8736  037750  010346                        MOV     R3,-(SP)        ;SAVE R3
 8737  037752  010446                        MOV     R4,-(SP)        ;SAVE R4
 8738  037754  010546                        MOV     R5,-(SP)        ;SAVE R5
 8739  037756  016646  000012               MOV     12(SP),-(SP)    ;GET R0
 8740  037762  000200                        RTS     R0
 8741
 8742                                ;*ROUTINES TO RESTORE R0-R5 AND R1-R5
 8743                                ;*
 8744                                ;*CALL: GETR05
 8745                                ;*      JSR     R0,GETR05
 8746                                ;*      RETURN                  ;R0-R5 HAVE BEEN RESTORED
 8747                                ;*
 8748                                ;*CALL: GETR15
 8749                                ;*      JSR     R0,GETR15
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                                        ;*      RETURN                  ;R1-R5 HAVE BEEN RESTORED
                                        ;
                                        GETR15: MOV     (SP),14(SP)     ;POSITION R0
                                        GETR05: TST     (SP)+           ;POP R0 OF THE JSR OFF OF THE STACK
                                                MOV     (SP)+,R5        ;RESTORE R5
                                                MOV     (SP)+,R4        ;RESTORE R4
                                                MOV     (SP)+,R3        ;RESTORE R3
                                                MOV     (SP)+,R2        ;RESTORE R2
                                                MOV     (SP)+,R1        ;RESTORE R1
                                                RTS     R0              ;RESTORE R0


                                        .SBTTL  ASCIZ MESSAGES

                                        MSG.R:  .ASCIZ  /R/
                                        MSG.FC: .ASCIZ  /FC/
                                        MSG.LC: .ASCIZ  /LC/
                                        MSG.IC: .ASCIZ  /IC/
                                        MSG.FT: .ASCIZ  /FT/
                                        MSG.LT: .ASCIZ  /LT/
                                        MSG.IT: .ASCIZ  /IT/
                                        MSG.FS: .ASCIZ  /FS/
                                        MSG.LS: .ASCIZ  /LS/
                                        MSG.PAT:        .ASCIZ  /PAT/
                                        MSG.EQ: .ASCIZ  /=/
                                        MSG.CS: .ASCIZ  <15><12>/CONTROL SWITCHES=/
                                        MRHCS1: .ASCIZ  <15><12>/RHCS1=/
                                        MRHVEC: .ASCIZ  <15><12>/RHVEC=/
                                        MRHPRI: .ASCIZ  <15><12>/RHPRIO=/

                                        MSG7:   .ASCIZ  <15><12><12>/ROTATIONAL SPEED TIMES/

                                        MSG10A: .ASCIZ  <15><12><12>/ONE CYLINDER SEEK TIMES/<15><12>/** 0, 1, 2,...410 **/

                                        MSG10B: .ASCIZ  <15><12>/** 410, 409, 408,...0 **/

                                        MSG11A: .ASCIZ  <15><12><12>/AVERAGE SEEK TIMES/<15><12>/** 0 TO 136 **/
```

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8806  040302  040522  042507  051440
8807  040310  042505  020113  044524
8808  040316  042515  006523  025012
8809  040324  020052  020060  047524
8810  040332  030440  033063  025040
8811  040340  000052
8812  040342  005015  025052  030440  MSG11B: .ASCIZ  <15><12>/** 136 TO 0 **/
8813  040350  033063  052040  020117
8814  040356  020060  025052     000
8815  040363     015  005012  040515  MSG12A: .ASCIZ  <15><12><12>/MAXIMUM SEEK TIMES/<15><12>/** 0 TO 410 **/
8816  040370  044530  052515  020115
8817  040376  042523  045505  052040
8818  040404  046511  051505  005015
8819  040412  025052  030040  052040
8820  040420  020117  030464  020060
8821  040426  025052     000
8822  040431     015  025012  020052  MSG12B: .ASCIZ  <15><12>/** 410 TO 0 **/
8823  040436  030464  020060  047524
8824  040444  030040  025040  000052
8825
8826  040452  005015  044515  036516  MSGMIN: .ASCIZ  <15><12>/MIN=/
8827  040460     000
8828  040461     015  046412  054101  MSGMAX: .ASCIZ  <15><12>/MAX=/
8829  040466  000075
9830  040470  005015  053101  036507  MSGAVG: .ASCIZ  <15><12>/AVG=/
8831  040476     000
8832  040477     060  052440  000123  MSGOUS: .ASCIZ  /0 US/
8833  040504  041040  046105  053517  MBELOW: .ASCIZ  / BELOW THE MINIMUM OF /
8834  040512  052040  042510  046440
8835  040520  047111  046511  046525
8836  040526  047440  020106     000
8837  040533     040  0'1101  053117  MABOVE: .ASCIZ  / ABOVE THE MAXIMUM OF /
8838  040540  020105  04.'24  020105
8839  040546  040515  0445.'1  052515
8840  040554  020115  04311,  000040
8841  040562  051440  042505  051513  MSGNUM: .ASCIZ  / SEEKS TIMED/
8842  040570  052040  046511  042105
8843  040576     000
8844  040577     040  047516  020124  MSGNON: .ASCIZ  / NOT TIMED/
8845  040604  044524  042515  000104
8846  040612  020040     000          MSG.SP: .ASCIZ  /  /            ;TWO (2) SPACES
8847
8848                                  .SBTTL  ERROR HEADER (EM) MESSAGES
8849
8850  040615     111  046114  043505  EM1:    .ASCIZ  /ILLEGAL RH11(SC=0),INTERRUPT OCCURRED/
8851  040622  046101  051040  030510
8852  040630  024061  041523  030075
8853  040636  026051  047111  042524
8854  040644  051122  050125  020124
8855  040652  041517  052503  051122
8856  040660  042105     000
8857  040663     111  046114  043505  EM2:    .ASCIZ  /ILLEGAL RP04 INTERRUPT OCCURRED/
8858  040670  046101  051040  030120
8859  040676  020064  047111  042524
8860  040704  051122  050125  020124
8861  040712  041517  052503  051122
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8862  040720  042105     000
8863  040723     115  051501  041123  EM3:    .ASCIZ  /MASSBUS PARITY ERROR(MCPE=1)/
8864  040730  051525  050040  051101
8865  040736  052111  020131  051105
8866  040744  047522  024122  041515
8867  040752  042520  030475  000051
8868  040760  040515  051523  052502  EM4:    .ASCIZ  /MASSBUS PARITY ERROR(PAR=1)/
8869  040766  020123  040520  044522
8870  040774  054524  042440  051122
8871  041002  051117  050050  051101
8872  041010  030475  000051
8873  041014  043117  046106  047111  EM5:    .ASCIZ  /OFFLINE, NON-EXISTENT, OR UNSAFE DRIVE INTERRUPTED/
8874  041022  026105  047040  047117
8875  041030  042455  044530  052123
8876  041036  047105  026124  047440
8877  041044  020122  047125  040523
8878  041052  042506  042040  044522
8879  041060  042526  044440  052116
8880  041066  051105  052522  052120
8881  041074  042105     000
8882  041077     122  030510  027461  EM10:   .ASCIZ  "RH11/RP04 FAILED TO RESPOND TO ADDRESSING"
8883  041104  050122  032060  043040
8884  041112  044501  042514  020104
8885  041120  047524  051040  051505
8886  041126  047520  042116  052040
8887  041134  020117  042101  051104
8888  041142  051505  044523  043516
8889  041150     000
8890  041151     104  044522  042526  EM11:   .ASCIZ  /DRIVE SELECTED IS NOT ONLINE/
8891  041156  051440  046105  041505
8892  041164  042524  020104  051511
8893  041172  047040  052117  047440
8894  041200  046116  047111  000105
8895  041206  046511  051120  050117  EM12:   .ASCIZ  /IMPROPER HEADER DATA/
8896  041214  051105  044040  040505
8897  041222  042504  020122  040504
8898  041230  040524     000
8899  041233     104  052101  020101  EM13:   .ASCIZ  /DATA COMPARE FAILURE/
8900  041240  047503  050115  051101
8901  041246  020105  040506  046111
8902  041254  051125  000105
8903  041260  044504  045523  042440  EM17:   .ASCIZ  /DISK ERROR IN TIMING TEST/
8904  041266  051122  051117  044440
8905  041274  020116  044524  044515
8906  041302  043516  052040  051505
8907  041310  000124
8908  041312  046103  041517  020113  EM20:   .ASCIZ  /CLOCK (KW11-P) OVERFLOW IN TIMING TEST/
8909  041320  045450  030527  026461
8910  041326  024520  047440  042526
8911  041334  043122  047514  020127
8912  041342  047111  052040  046511
8913  041350  047111  020107  042524
8914  041356  052123     000
8915  041361     122  030510  027461  EM41:   .ASCIZ  "RH11/RP04 ERROR"
8916  041366  050122  032060  042440
8917  041374  051122  051117     000
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 8918  041401     106  052101  046101  EM46:   .ASCIZ  /FATAL WRITE CHECK ERROR/
 8919  041406  053440  044522  042524
 8920  041414  041440  042510  045503
 8921  041422  042440  051122  051117
 8922  041430     000
 8923
 8924                                  .SBTTL  STATUS/ERROR INDICATOR MESSAGES
 8925
 8926  041431     117  043106  044514  MSGB14: .ASCIZ  /OFFLINE OR UNSAFE DRIVE REQUESTED/
 8927  041436  042516  047440  020122
 8928  041444  047125  040523  042506
 8929  041452  042040  044522  042526
 8930  041460  051040  050505  042525
 8931  041466  052123  042105     000
 8932  041473     125  046116  040517  MSGB13: .ASCIZ  /UNLOADED DRIVE REQUESTED/
 8933  041500  042504  020104  051104
 8934  041506  053111  020105  042522
 8935  041514  052521  051505  042524
 8936  041522  000104
 8937  041524  042520  051522  051511  MSGB12: .ASCIZ  /PERSISTENT UNSAFE/
 8938  041532  042524  052116  052440
 8939  041540  051516  043101  000105
 8940  041546  040520  044522  054524  MSGB11: .ASCIZ  /PARITY ERROR OCCURRED/
 8941  041554  042440  051122  051117
 8942  041562  047440  041503  051125
 8943  041570  042522  000104
 8944  041574  040506  040524  020114  MSGB10: .ASCIZ  /FATAL PARITY ERROR/
 8945  041602  040520  044522  054524
 8946  041610  042440  051122  051117
 8947  041616     000
 8948  041617     123  043117  053524  MSGB09: .ASCIZ  /SOFTWARE TIMEOUT ON THIS DRIVE/
 8949  041624  051101  020105  044524
 8950  041632  042515  052517  020124
 8951  041640  047117  052040  044510
 8952  041646  020123  051104  053111
 8953  041654  000105
 8954  041656  047523  052106  040527  MSGB08: .ASCIZ  /SOFTWARE TIMEOUT ON ANOTHER DRIVE/
 8955  041664  042522  052040  046511
 8956  041672  047505  052125  047440
 8957  041700  020116  047101  052117
 8958  041706  042510  020122  051104
 8959  041714  053111  000105
 8960  041720  051105  047522  020122  MSGB06: .ASCIZ  "ERROR OCCURRED DURING I/O OPERATION"
 8961  041726  041517  052503  051122
 8962  041734  042105  042040  051125
 8963  041742  047111  020107  027511
 8964  041750  020117  050117  051105
 8965  041756  052101  047511  000116
 8966  041764  051105  047522  020122  MSGB05: .ASCIZ  "ERROR OCCURRED DURING NON-I/O OPERATION"
 8967  041772  041517  052503  051122
 8968  042000  042105  042040  051125
 8969  042006  047111  020107  047516
 8970  042014  026516  027511  020117
 8971  042022  050117  051105  052101
 8972  042030  047511  000116
 8973  042034  047125  040523  042506  MSGB04: .ASCIZ  /UNSAFE OCCURRED/
```

```
 8974  042042  047440  041503  051125
 8975  042050  042522  000104
 8976  042054  052501  047524  040515  MSGB03: .ASCIZ  /AUTOMATIC RECALIBRATE SEQUENCE OCCURRED/
 8977  042062  044524  020103  042522
 8978  042070  040503  044514  051102
 8979  042076  052101  020105  042523
 8980  042104  052521  047105  042503
 8981  042112  047440  041503  051125
 8982  042120  042522  000104
 8983
 8984                                  .SBTTL  DATA HEADER (DT) MESSAGES
 8985
 8986  042124  042524  052123  020040  DH1:    .ASCIZ  /TEST    ERR PC/
 8987  042132  020040  051105  020122
 8988  042140  041520     000
 8989  042143     124  051505  020124  DH2:    .ASCIZ  /TEST    ERR PC  DRIVE   RHAS    RHDS    RHER1   RHER2   RHER3/
 8990  042150  020040  042440  051122
 8991  042156  050040  020103  042040
 8992  042164  044522  042526  020040
 8993  042172  051040  040510  020123
 8994  042200  020040  051040  042110
 8995  042206  020123  020040  051040
 8996  042214  042510  030522  020040
 8997  042222  051040  042510  031122
 8998  042230  020040  051040  042510
 8999  042236  031522     000
 9000  042241     124  051505  020124  DH3:    .ASCIZ  /TEST    ERR PC  ADDRESS DATA/
 9001  042246  020040  042440  051122
 9002  042254  050040  020103  040440
 9003  042262  042104  042522  051523
 9004  042270  042040  052101  000101
 9005  042276  042524  052123  020040  DH4:    .ASCIZ  /TEST    ERR PC  ADDRESS GDDATA  BDDATA/
 9006  042304  020040  051105  020122
 9007  042312  041520  020040  042101
 9008  042320  051104  051505  020123
 9009  042326  042107  040504  040524
 9010  042334  020040  042102  040504
 9011  042342  040524     000
 9012  042345     122  041510  030523  DH10:   .ASCIZ  /RHCS1   ERR PC/
 9013  042352  020040  042440  051122
 9014  042360  050040  000103
 9015  042364  051104  053111  020105  DH11:   .ASCIZ  /DRIVE   ERR PC/
 9016  042372  020040  051105  020122
 9017  042400  041520     000
 9018  042403     124  051505  020124  DH12:   .ASCIZ  /TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR/
 9019  042410  020040  042440  051122
 9020  042416  050040  020103  052040
 9021  042424  052123  050040  020103
 9022  042432  042040  044522  042526
 9023  042440  020040  041440  046131
 9024  042446  042116  020122  052040
 9025  042454  040522  045503  020040
 9026  042462  051440  041505  047524
 9027  042470  000122
 9028  042472  042107  054503  020114  DH12A:  .ASCIZ  /GDCYL   GDTRK   GDSCTR  BDCYL   BDTRK   BDSCTR/
 9029  042500  020040  042107  051124
```

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9030  042505  020113  020040  042107
9031  042514  041523  051124  020040
9032  042522  042102  054503  020114
9033  042530  020040  042102  051124
9034  042536  020113  020040  042102
9035  042544  041523  051124     000
9036  042551     107  042104  052101  DH13A:  .ASCIZ  /GDDAT   BDDAT   WRDCNT  GDADR   BDADR/
9037  042556  020040  041040  042104
9038  042564  052101  020040  053440
9039  042572  042122  047103  020124
9040  042600  043440  040504  051104
9041  042606  020040  041040  040504
9042  042614  051104     000
9043  042617     124  051505  020124  DH17:   .ASCIZ  /TEST    ERR PC  DRIVE   RHCS1   RHDS    RHER1   RHER2   RHER3/
9044  042624  020040  042440  051122
9045  042632  050040  020103  042040
9046  042640  044522  042526  020040
9047  042646  051040  041510  030523
9048  042654  020040  051040  042110
9049  042662  020123  020040  051040
9050  042670  042510  030522  020040
9051  042676  051040  042510  031122
9052  042704  020040  051040  042510
9053  042712  031522     000
9054  042715     124  051505  020124  DH21:   .ASCIZ  /TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK/
9055  042722  020040  042440  051122
9056  042730  050040  020103  052040
9057  042736  052123  050040  020103
9058  042744  042040  044522  042526
9059  042752  020040  041440  046131
9060  042760  042116  020122  052040
9061  042766  040522  045503     000
9062  042773     107  042104  052101  DH21A:  .ASCIZ  /GDDAT   BDDAT   WRDCNT  SECTOR/
9063  043000  020040  041040  042104
9064  043006  052101  020040  053440
9065  043014  042122  047103  020124
9066  043022  051440  041505  047524
9067  043030  000122
9068  043032  042524  052123  020040  DH41:   .ASCIZ  /TEST    ERR PC  TST PC  DRIVE/
9069  043040  020040  051105  020122
9070  043046  041520  020040  051524
9071  043054  020124  041520  020040
9072  043062  051104  053111  000105
9073  043070  042524  052123  020040  DH42:   .ASCIZ  /TEST    ERR PC  TST PC  DRIVE   RHCS1   RHCS2   RHDS/
9074  043076  020040  051105  020122
9075  043104  041520  020040  051524
9076  043112  020124  041520  020040
9077  043120  051104  053111  020105
9078  043126  020040  044122  051503
9079  043134  020061  020040  044122
9080  043142  051503  020062  020040
9081  043150  044122  051504     000
9082  043155     122  042510  030522  DH43A:  .ASCIZ  /RHER1   RHER2   RHER3/
9083  043162  020040  051040  042510
9084  043170  031122  020040  051040
9085  043176  042510  031522     000
```

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 9086  043203     122  041510  030523  DH44A:  .ASCIZ  /RHCS1   RHCS2   RHDS    RHCC    RHCA    RHDA/
 9087  043210  020040  051040  041510
 9088  043216  031123  020040  051040
 9089  043224  042110  020123  020040
 9090  043232  051040  041510  020103
 9091  043240  020040  051040  041510
 9092  043246  020101  020040  051040
 9093  043254  042110  000101
 9094  043260  044122  051105  020061  DH44B:  .ASCIZ  /RHER1   RHER2   RHER3/
 9095  043266  020040  044122  051105
 9096  043274  020062  020040  044122
 9097  043302  051105  000063
 9098  043306  044122  051105  020061  DH45A:  .ASCIZ  /RHER1   RHER2   RHER3   RHWC    RHBA    RHDB/
 9099  043314  020040  044122  051105
 9100  043322  020062  020040  044122
 9101  043330  051105  020063  020040
 9102  043336  044122  041527  020040
 9103  043344  020040  044122  040502
 9104  043352  020040  020040  044122
 9105  043360  041104     000
 9106
 9107
 9108          043364                  .EVEN
 9109
 9110                                  .SBTTL  DATA TABLE (DT)
 9111
 9112  043364  001170  001116          DT1:    .WORD   $TMPO,$ERRPC
 9113  043370  001170  001116  001156  DT2:    .WORD   $TMPO,$ERRPC,$REG1,$REG5,PPERRS,RPERRS+2,RPERRS+4,RPERRS+6
 9114  043376  001166  032222  032224
 9115  043404  032226  032230
 9116  043410  001170  001116  036570  DT3:    .WORD   $TMPO,$ERRPC,RD.ADR,RD.WRD
 9117  043416  036572
 9118  043420  001170  001116  036772  DT4:    .WORD   $TMPO,$ERRPC,WRT.ADR,WRT.WD,RD.WRD
 9119  043426  036770  036572
 9120  043432  001170  001116  001156  DT5:    .WORD   $TMPO,$ERRPC,$REG1,$REG5,RPERRS,RPERRS+2,RPERRS+4,RPERRS+6
 9121  043440  001166  032222  032224
 9122  043446  032226  032230
 9123  043452  001362  001116          DT10:   .WORD   RH.ADR,$ERRPC
 9124  043456  001160  001116          DT11:   .WORD   $REG2,$ERRPC
 9125  043462  001170  001116  001154  DT12:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS,SEC.DS
 9126  043470  001272  001306  001312
 9127  043476  001310
 9128  043500  001306  001312  001310  DT12A:  .WORD   CYL.DS,TRK.DS,SEC.DS,CYL.RD,TRK.RD,SEC.RD
 9129  043506  001300  001302  001304
 9130  043514  001170  001116  001154  DT13:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS,SEC.DS
 9131  043522  001272  001306  001312
 9132  043530  001310
 9133  043532  001124  001126  001164  DT13A:  .WORD   $GDDAT,$BDDAT,$REG4,$GDADR,$BDADR
 9134  043540  001120  001122
 9135  043544  001170  001116  001272  DT17:   .WORD   $TMPO,$ERRPC,CHKDRV,RP.REG,RP.REG+12,RP.REG+14,RP.REG+40,RP.REG+42
 9136  043552  003574  003606  003610
 9137  043560  003634  003636
 9138  043564  001170  001116  001154  DT21:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS
 9139  043572  001272  001306  001312
 9140  043600  001156  001126  001164  DT21A:  .WORD   $REG1,$BDDAT,$REG4,$REG1
 9141  043606  001156
```

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 9142  043610  001170  001116  001154  DT41:   .WORD   $TMPO,$ERRPC,$REGO,CHKDRV
 9143  043616  001272
 9144  043620  001170  001116  001154  DT42:   .WORD   $TMPO,$ERRPC,$REGO,CHKDRV,RP.REG,RP.REG+10,RP.REG+12
 9145  043626  001272  003574  003604
 9146  043634  003606
 9147  043636  001170  001116  001154  DT43:   .WORD   $TMPO,$ERRPC,$REGO,CHKDRV,RP.REG,RP.REG+10,RP.REG+12
 9148  043644  001272  003574  003604
 9149  043652  003606
 9150  043654  003610  003634  003636  DT43A:  .WORD   RP.REG+14,RP.REG+40,RP.REG+42
 9151  043662  001170  001116  001154  DT44:   .WORD   $TMPO,$ERRPC,$REGO,CHKDRV,CYL.DS,TRK.DS,SEC.DS
 9152  043670  001272  001306  001312
 9153  043676  001310
 9154  043700  003574  003604  003606  DT44A:  .WORD   RP.REG,RP.REG+10,RP.REG+12,RP.REG+36,RP.REG+34,RP.REG+06
 9155  043706  003632  003630  003602
 9156  043714  003610  003634  003636  DT44B:  .WORD   RP.REG+14,RP.REG+40,RP.REG+42
 9157  043722  001170  001116  001154  DT45:   .WORD   $TMPO,$ERRPC,$REGO,CHKDRV,CYL.DS,TRK.DS,SEC.DS
 9158  043730  001272  001306  001312
 9159  043736  001310
 9160  043740  003574  003604  003606  DT45A:  .WORD   RP.REG,RP.REG+10,RP.REG+12,RP.REG+36,RP.REG+34,RP.REG+06
 9161  043746  003632  003630  003602
 9162  043754  003610  003634  003636  DT45B:  .WORD   RP.REG+14,RP.REG+40,RP.REG+42,RP.REG+2,RP.REG+4,RP.REG+22
 9163  043762  003576  003600  003616
 9164
 9165                                  .SBTTL  DATA FORMAT (DF) TABLE
 9166
 9167  043770  000001                  DF1:    .WORD   1               ;NUMBER OF DATA HEADERS
 9168  043772     002                          .BYTE   2               ;NUMBER OF WORDS IN DATA TABLE
 9169  043773     000                          .BYTE   0               ;BOTH NUMBERS ARE OCTAL
 9170
 9171  043774  000001                  DF2:    .WORD   1
 9172  043776     010                          .BYTE   ^D8
 9173  043777     000                          .BYTE   0
 9174
 9175  044000  000001                  DF3:    .WORD   1
 9176  044002     004                          .BYTE   4
 9177  044003     000                          .BYTE   0
 9178
 9179  044004  000001                  DF4:    .WORD   1
 9180  044006     005                          .BYTE   5
 9181  044007     000                          .BYTE   0
 9182
 9183  044010  000001                  DF10:   .WORD   1
 9184  044012     002                          .BYTE   2
 9185  044013     000                          .BYTE   0
 9186
 9187  044014  000001                  DF11:   .WORD   1
 9188  044016     002                          .BYTE   2
 9189  044017     000                          .BYTE   0
 9190
 9191  044020  000002                  DF12:   .WORD   2               ;2 DH'S TO BE TYPED
 9192  044022     007                          .BYTE   7               ;7 DATA WORDS FOLLOW THE 1ST DH
 9193  044023     160                          .BYTE   160             ;WORDS 1-4 ARE OCTAL 5-7 ARE DECIMAL
 9194  044024  042472                          .WORD   DH12A           ;ADDRESS OF 2ND DH
 9195  044026     006                          .BYTE   6               ;6 DATA WORDS FOLLOW THE 2ND DH
 9196  044027     000                          .BYTE   0               ;ALL WORDS ARE OCTAL
 9197
```

```
9198  044030  000002          DF13:   .WORD   2
9199  044032     007                  .BYTE   7
9200  044033     160                  .BYTE   160
9201  044034  042551                  .WORD   DH13A
9202  044036     005                  .BYTE   5
9203  044037     004                  .BYTE   4               ;WORD 3 IS DECIMAL
9204
9205  044040  000000          DF14:   .WORD   0
9206  044042     005                  .BYTE   5
9207  044043     004                  .BYTE   4               ;WORD 3 IS DECIMAL
9208
9209  044044  000001          DF17:   .WORD   1
9210  044046     010                  .BYTE   ^D8
9211  044047     000                  .BYTE   0
9212
9213  044050  000002          DF21:   .WORD   2
9214  044052     006                  .BYTE   6
9215  044053     060                  .BYTE   60
9216  044054  042773                  .WORD   DH21A
9217  044056     004                  .BYTE   4
9218  044057     014                  .BYTE   14
9219
9220  044060  000000          DF22:   .WORD   0
9221  044062     004                  .BYTE   4
9222  044063     014                  .BYTE   14
9223
9224  044064  000001          DF41:   .WORD   1
9225  044066     004                  .BYTE   4
9226  044067     000                  .BYTE   0
9227
9228  044070  000001          DF42:   .WORD   1
9229  044072     007                  .BYTE   7
9230  044073     000                  .BYTE   0
9231
9232  044074  000002          DF43:   .WORD   2
9233  044076     007                  .BYTE   7
9234  044077     000                  .BYTE   0
9235  044100  043155                  .WORD   DH43A
9236  044102     003                  .BYTE   3
9237  044103     000                  .BYTE   0
9238
9239  044104  000003          DF44:   .WORD   3
9240  044106     007                  .BYTE   7
9241  044107     160                  .BYTE   160
9242  044110  043203                  .WORD   DH44A
9243  044112     006                  .BYTE   6
9244  044113     000                  .BYTE   0
9245  044114  043260                  .WORD   DH44B
9246  044116     003                  .BYTE   3
9247  044117     000                  .BYTE   0
9248
9249  044120  000003          DF45:   .WORD   3
9250  044122     007                  .BYTE   7
9251  044123     160                  .BYTE   160
9252  044124  043203                  .WORD   DH44A
9253  044126     006                  .BYTE   6
```

```
 9254  044127  000                          .BYTE   0
 9255  044130  043306                       .WORD   DH45A
 9256  044132  006                          .BYTE   6
 9257  044133  000                          .BYTE   0
 9258
 9259                                .EVEN
 9260          044134                BUFFER=.
 9261
 9262          000001                .END
```

DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
ACTDRV  032276          7542*  7782*  7810*  8139*  8148*  8347
ACTSTR  032277          7548*  8349*  8364*
ATABIT  032346          3014   6950   6955   7614*  7754   7824   7962   8321   8417
A16   = 000400          2900*  7906
A17   = 001000          2901*  7909
BITS    001430          1921*  3185   3217   3252   3289   3323   3397   3436   3503   3605   3688   3780   3890
                        3948   4066   4108   4184   4291   4393   7009   7027   7030   7032   7082   7251
BIT0  = 000001          1716*
BIT00 = 000001          1706*  1716   1921
BIT01 = 000002          1705*  1715   1922
BIT02 = 000004          1704*  1714   1923
BIT03 = 000010          1703*  1713   1924   6013   8311   8507
BIT04 = 000020          1702*  1712   1925   6010   8295
BIT05 = 000040          1701*  1711   1926   3543   3557   3572   3577   3639   3663   3668   3721   3739   3756
                        3761   3813   3831   3848   3853   6013   6126   7693   8089   8274   8391
BIT06 = 000100          1700*  1710   1927   5067   6016   7761   8172   8560
BIT07 = 000200          1699*  1709   1928   7761   8036   8160   8274   8295   8311   8325
BIT08 = 000400          1698*  1708   1929   6004   7761   8404
BIT09 = 001000          1697*  1707   1930   4544   5206   6019   8389
BIT1  = 000002          1715*
BIT10 = 002000          1696*  1931   4530   6007   7270   8078
BIT11 = 004000          1695*  1932   5213   6007   8053
BIT12 = 010000          1694*  1933   6010   7728   7745   7761   8285   8561
BIT13 = 020000          1693*  1934   4537   6004   7807   8451
BIT14 = 040000          1692*  1935   3538   3552   3634   3716   3734   3808   3826   5920   6004   7796   7831
                        8240   8459   8463   8558
BIT15 = 100000          1691*  1936   6176   6177   7796   7807   7831   8053   8078   8172   8274   8285   8295
                        8311   8389   8404
BIT2  = 000004          1714*
BIT3  = 000010          1713*
BIT4  = 000020          1712*
BIT5  = 000040          1711*
BIT6  = 000100          1710*
BIT7  = 000200          1709*
BIT8  = 000400          1708*
BIT9  = 001000          1707*
BPTVEC= 000014          1723*
BUF     001212          1848*  4336*  4337   4339*  4340*  4341   4359*  4382   6495   6532   6579   6627   6650
                        6672
BUFFER= 044134          2482   2506   2530   2554   3103   3907   3915   3924   3964   3972   3984   4097   4198
                        4220   4226   4232   4236   4242   4336   6094*  6095   6097   6099   6100   6101   6175
                        6214   6353   6374   6375   6401   6492   6529   6577   6624   6646   6647   6675   9260*
BUSADR  001252          1864*  2907*  2909*  2924*  2926*  6808   6810*
BYPASS  001270          1872*  3079*  3198*  3232*  3263*  3300*  3334*  3408*  3447*  3899*  3957*  4098*  4193*
                        4383*  5797   5829   5868   5974   6108   6448   6609   6692
CALL.A  022724          3082   3084   3088   3200   5778*  5781
CALL.B  023032          3201   3235   3267   3273   3303   3306   3343   3349   3363   3369   3413   3415   3455
                        3457   3459   3461   3463   3465   5810*  5813
CALL.C  023176          3234   5849*  5852
CHKDRV  001272          1873*  3060*  3064*  3069   4463   9125   9130   9135   9138   9142   9144   9147   9151
                        9157
CI1     033326          7844   7864*
CI2     033336          7866*
CI3     033652          7846   7943*
CI4     033760          7835   7964*
CI5     034336          7942   7963   8041*  8050
```

```
CI6     034360          7980    7990    7992    7994    8046#
CI7     034402          7813    7928    7932    7940    7948    7957    7961    7972    7979    7985    7989    8003    8009
                        8013    8023    8034    8049    8053#   8134    8164    8306
CI7A    034374          8051#
CI7B    034414          8052    8055#   8307
CI8     034466          8058    8067#   8211    8430
CASCTR  025522          3914    6398#
CK.CHR  031646          6884    6934    7124    7159    7198    7329#   7368    7381    7390    7443
CK.DEC  031620          7305#   7337
CK.DIG  031722          6544    7144    7362#
CK.NUM  032102          6892    7174    7206    7426#
CK.OCT  031572          6995    6999    7013    7017    7285#   7428    7438
CLKSTA  001262          1858#   3052    3512    3614    3697    3789    5705*   5707*   5713*
CLOSE   031506          7241    7245    7254#
CLRBUF  025453          3911    6372#
CLRQUE  037502          7681    8089    8414    8628#
CLSWDS  031404          7225    7229    7232#
CNTRLC  001250          1863#   2911*   2927*   2952    3005
COUNT   024646          3561    3543    3726    3744    3818    3836    6193#
CYL.DS  001306          1880#   5786*   5818*   5857*   5903*   5933*   5959*   6104*   6138*   6464*   6593*   9125    9128
                        9130    9138    9151    9157
CYL.RD  001300          1877#   6099*   9128
C.SWR   001246          1962#   3019    3336    3525    3581    4200    5720    5730    5740    5760    5835    5874    5975
                        6045    6788    6792*
DATCMP  026206          4142    4427    6528#
DECSK   006304          3272#   3276
DFLT    001650          2006#   2912
DF1     043770          2630    9167#
DF10    044010          2694    9183#
DF11    044014          2704    9187#
DF12    044020          2717    9191#
DF13    044030          2730    2751    9198#
DF14    044040          2738    2759    9205#
DF17    044044          2769    2779    9209#
DF2     043774          2640    2670    9171#
DF21    044050          2792    9213#
DF22    044060          2800    9220#
DF3     044000          2650    9175#
DF4     044004          2660    9179#
DF41    044064          2831    9224#
DF42    044070          2841    9228#
DF43    044074          2853    9232#
DF44    044104          2868    9239#
DF45    044120          2883    2898    9249#
DH1     042124          2628    8986#
DH10    042345          2692    9012#
DH11    042364          2702    9015#
DH12    042403          2715    2728    2749    2866    2881    2896    9018#
DH12A   042472          9028#   9194
DH13A   042551          9036#   9201
DH17    042617          2767    2777    9043#
DH2     042143          2638    2668    8989#
DH21    042715          2790    9054#
DH21A   042773          9062#   9216
DH3     042241          2648    9000#
DH4     042276          2658    9005#
```

DERPkC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
DH41    043032          2829    9068#
DH42    043070          2839    2851    9073#
DH43A   043155          9082#   9235
DH44A   043203          9086#   9242    9252
DH44B   043260          9094#   9245
DH45A   043306          9098#   9255
DISPLA= 177570          1638#   3193*   3225*   3260*   3297*   3331*   3405*   3444*   3511*   3613*   3696*   3788*   3898*
                        3956*   4074*   4192*   4299*   4529*   5225*
DORTI   024600          3532    3627    3709    3801    6159#
DPB.A   003474          2477#   3074*   3080*   3081*   3083*   3085*   3086*   3087*   3194*   5780    5782    5786    5787
                        5788    5789
DPB.B   003514          2501#   3075*   3195*   3196*   3197*   3226*   3228*   3230*   3261*   3262*   3265*   3268*   3269
                        3271*   3274*   3275    3298*   3299*   3302*   3305*   3332*   3333*   3342*   3348*   3362*   3368*
                        3406*   3407*   3412*   3414*   3445*   3446*   3454*   3456*   3458*   3460*   3462*   3464*   5762*
                        5765*   5812    5814    5818    5819    5820    5821    5831    5834
DPB.C   003534          2525#   3076*   3227*   3229*   3231*   5763*   5766*   5851    5853    5857    5858    5859    5860
                        5870    5873
DRVACT  032232          7488#   7803    7997*   8044*   8051    8061*   8071    8080*   8153*   8199    8261    8289*   8296*
                        8303    8308    8320*   8392*   8398    8405*
DRVCAL  023342          3908    3910    3913    3921    3926    3967    3976    3990    3994    4127    4131    4139    4205
                        4223    4227    4233    4237    4243    4412    4416    4424    5891#   5895
DRVCLR= 000111          1772#
DRVINT  032540          7694    7721#   7792    8336    8396
DRVMSK  001274          1874#   3061*   3062    3065*
DRVOK   005360          3063    3069#
DRVQUE  037604          7798    8668#
DRVSEL  001256          1866#   3009*   3014*   3029    3062    4457    6856*   6927*   6950*   6955*
DRVSTA  032242          3012    3070    7502#   7705*   7725*   7763*   7765*   7787    7794    7828    7998*   8182    8230
                        8238    8282*   8290*
DRVTYP  032252          7515#   7726*   7736*
DTADPB  003554          2549#   3077*   3541    3544    3555    3558    3570    3573    3578    3623*   3629    3637    3640
                        3647*   3648    3652*   3653    3661    3664    3669    3719    3722    3737    3740    3754    3757
                        3762    3811    3814    3829    3832    3846    3849    3854    3902*   3903*   3904*   3905*   3906*
                        3907*   3909*   3912*   3917*   3918*   3919*   3920*   3922*   3923*   3924*   3925*   3960*   3961*
                        3962*   3963*   3964*   3966*   3968*   3972*   3974*   3975*   3977*   3982*   3984*   3987*   3989*
                        3991*   3992*   3993*   3995    4096*   4097*   4111*   4112*   4113*   4118*   4126*   4130*   4138*
                        4196*   4197*   4198*   4199*   4203*   4206*   4207    4209*   4210    4212*   4217    4218    4219*
                        4221*   4225*   4226*   4229*   4230*   4231*   4232*   4235*   4236*   4239*   4240*   4241*   4242*
                        4381*   4382*   4396*   4397*   4398*   4403*   4411*   4415*   4423*   5894    5896    5903    5904
                        5905    5906    5918    5924*   5927    5929    5933    5934    5935    5936    5944*   5946    5948
                        5952    5954    5959    5960    5961    5962    6127*   6128*   6129*   6132    6134    6138    6139
                        6140    6141    6464    6465    6496    6533    6593    6594    6595    6766*   6767*   6768*
DTJW    032344          7608#   7687    7837    7941*   8062    8065*   8074    8086*   8142    8154*   8226    8386    8401
                        8412*   8419    8457
DT1     043364          2629    9112#
DT10    043452          2693    9123#
DT11    043456          2703    9124#
DT12    043462          2716    9125#
DT12A   043630          9128#
DT13    043514          2729    2750    9130#
DT13A   043532          2737    2758    9133#
DT17    043544          2768    2778    9135#
DT2     043370          2639    2669    9113#
DT21    043564          2791    9138#
DT21A   043600          2799    9140#
DT3     043410          2649    9116#
```

```
DT4     043420          2659    9118#
DT41    043610          2830    9142#
DT42    043620          2840    9144#
DT43    043636          2852    9147#
DT43A   043654          9150#
DT44    043662          2867    9151#
DT44A   043700          9154#
DT44B   043714          9156#
DT45    043722          2882    2897    9157#
DT45A   043740          9160#
DT45B   043754          9162#
DTE     043432          9120#
EMPTYQ  037564          8059    8173    8297    8653#
EMTVEC= 000030          1726#   2937*   2938*
EM1     040615          2627    8850#
EM10    041077          2691    8882#
EM11    041151          2701    8890#
EM12    041206          2714    8895#
EM13    041233          2727    2748    2789    8899#
EM17    041260          2766    8903#
EM2     040663          2637    8857#
EM20    041312          2776    8908#
EM3     040723          2647    8863#
EM4     040760          2657    8868#
EM41    041361          2828    2638    2850    2865    2880    8915#
EM46    041401          2895    8918#
EM5     041014          2667    8873#
ERINDX  024026          5790    5822    5861    5907    5937    5963    5998#   6142
ERR     = ****** U      7463
ERRVEC= 000004          1719#   2995*   3002*   3003*   5193    5194*   5196*   5199*   5605    5606    5608*   5613*   5629*
                        5638*   5648*   5649*   5672*   5673*   5678*   5700    6841    6842*   6844*   6851*
ERR.CT  001426          1916#   5972    6446    6477    6607    6684
EXIT0   006002          3198    3202#
EXIT1   006144          3232    3236#
EXIT10  010526          3619    3621    3655    3667#
EXIT11  011226          3702    3704    3748    3760#
EXIT12  011726          3794    3796    3840    3852#
EXIT13  012262          3899    3931#
EXIT14  012616          3957    4000#
EXIT15  013256          4098    4106    4146#
EXIT16  013724          4193    4244#
EXIT17  014676          4383    4391    4431#
EXIT2   006326          3263    3277#
EXIT3   006466          3300    3310#
EXIT4   007020          3334    3381#
EXIT5   007176          3408    3419    3422#
EXIT6   007420          3447    3453    3468#
EXIT7   010064          3517    3522    3564    3576#
FC      001474          1942#
FC1     002134          2054#   3230
FC13    002312          2129#   3903
FC14    002322          2135#   3961
FC15    002332          2141#   4100
FC16    002360          2154#   4196    6743    6761
FC2     002156          2065#   3265    3275
FC3     002174          2074#   3302
```

DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
FC4      002212            2083#   3340    3348    3379
FC5      002230            2092#   3410    3420
FC6      002246            2101#   3449
FC7      002264            2110#   3518
FILBUF   025406            3901    3959    6351#
FILRAN   026562            4202    6624#
FMT22 =  010000            1793#   3080    6094
FS       001510            1948#
FS0      002126            2049#   3195
FS1      002146            2059#   3226
FS14     002324            2136#   3962
FS15     002346            2147#   4078    4091    4096    4363    4376    4381
FS2      002166            2069#   3261
FS3      002204            2078#   3298
FS4      002222            2087#   3332
FS5      002240            2096#   3406
FS6      002256            2105#   3445
FS7      002270            2112#   3519
FT       001502            1945#
FT0      002124            2048#   3196
FT1      002142            2057#   3228
FT13     002314            2130#   3904
FT15     002340            2144#   4110    4395
FT2      002164            2068#   3262
FT3      002202            2077#   3299
FT4      002220            2086#   3333
FT5      002236            2095#   3407
FT6      002254            2104#   3446
FT7      002266            2111#   3520
GETADR   027372            2991    6808#
GETNUM   027612            6789    6814    6821    6832    6877#
GETREG=  000141            1785#   3087
GETREQ   037660            7825    8076    8234    8252    8305    8388    8403    8689#
GETR05   037770            4710    6361    6572    6956    7078    7226    7230    7249    7272    8753#
GETR15   037764            6386    6450    6516    7702    7767    7809    7848    7922    8091    8147    8363    8427    8545
                           8644    8752#
GETSWR   027304            2992    6781#   6793
GNS   =  ****** U          1614    2956    2973    2989    3025    3033    3047    3058    3091    3100    4455    4461    4469
                           4486    4597    4614    4633    4639    4780    4786    4805    4809    4815    4820    4826    4832
                           5300    5301    5302    5303    5304    5305    5306    5307    5308    5309    6785    6930    6962
                           7086    7188
GTTST1   030100            6954    6959#   7007    7014    7025    7029    7041    7047    7053    7059    7066    7079
GTTST2   030152            6974#   7050
GTTST3   030414            6978    6982    6986    6990    6994    7035#
GTTST4   030416            6996    7011    7034    7036#
GTTST5   030470            7039    7054#
GTTST6   030520            7056    7063#
GT.PRM   027742            3007    6926#
GT.PR1   027746            6927#   6935    6936    6937    6938    6939    6945    6946
GT.PR2   030072            6956#   6971    7062    7069    7250
HERADD   001240            1859#   4822
IC       001500            1944#
IC1      002140            2056#
IC15     002336            2143#   6335
IC2      002162            2067#   3268    3274
IC3      002200            2076#   3304
```

DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
IC4      002216            2085#   3358    3378
IC5      002234            2094#   3416    3417
IC6      002252            2103#   3466
INCCYL   025356            4105    4390    6333#
INCSK    006254            3266#   3270
INCTRK   025326            4143    4428    6314#
IOTVEC=  000020            1724#   2935*   2936*
ISR      034766            3580    3671    3764    3856    6124    7700    8139#
IT       001506            1947#
ITEM41   004064            2821#   4581
IT15     002344            2146#   6316
KIPAR0=  172340            1758#   4313*   4736    5591    5619    7884
KIPAR1=  172342            1759#   4314*
KIPAR2=  172344            1760#   4315*
KIPAR3=  172346            1761#   4316*
KIPAR4=  172350            1762#   4317*
KIPAR5=  172352            1763#   4318*   4349*   4350*   4355    4435*
KIPAR6=  172354            1764#   4319*   4355*   4356*   4436*
KIPAR7=  172356            1765#   4320*   5632
KIPDR0=  172300            1747#   4324*
KIPDR1=  172302            1748#   4325*
KIPDR2=  172304            1749#   4326*
KIPDR3=  172306            1750#   4327*
KIPDR4=  172310            1751#   4328*
KIPDR5=  172312            1752#   4329*
KIPDR6=  172314            1753#   4330*
KIPDR7=  172316            1754#   4331*
LA       034630            7841    8104#
LACNT    032310            7567#   8112*   8113    8130*
LC       001476            1943#
LC0      002122            2047#   3197
LC1      002136            2055#   3231
LC15     002334            2142#   6333    6336    6338
LC16     002362            2155#   4210    6756
LC2      002160            2066#   3269    3271
LC3      002176            2075#   3308
LC4      002214            2084#   3359    3361    3368
LC5      002232            2093#   3411    3418
LC6      002250            2102#   3450
LDCMD    022660            3078    5760#
LERADD   001236            1858#   2996    4828
LKS      001406            1908#   5712    5744*
LKV      001402            1907#   5742*   5743*
LPB      001416            1912#   4526
LPS      001414            1911#   4525    5674
LPTAVL   001254            1865#   4523    5671*   5675*
LP.AVL   022340            2958    5671#
LS       001512            1949#
LS1      002150            2060#   3227
LS15     002350            2148#   4077    4362
LT       001504            1946#
LT1      002144            2058#   3229
LT15     002342            2145#   6314    6317    6319
MABOVE   040533            6276    8837#
MBELOW   040504            6260    8833#
MCPEMX   032356            7626#   8442
```

DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
MEMERR  001242          1860#   4834
MMER    022336          5616    5659#
MMVEC = 000250          1736#   5616*   5617*
MNDLTA  032372          7638#   8128
MRHCSI  040072          6812    8779#
MRHPRI  040114          6826    8783#
MRHVEC  040103          6819    8781#
MSGAVG  040470          6281    8830#
MSGB03  042054          2003    8976#
MSGB04  042034          2002    8973#
MSGB05  041764          2001    8966#
MSGB06  041720          2000    8960#
MSGB08  041656          1999    8954#
MSGB09  041617          1998    8948#
MSGB10  041574          1997    8944#
MSGB11  041546          1996    8940#
MSGB12  041524          1995    8937#
MSGB13  041473          1994    8932#
MSGB14  041431          1993    8926#
MSGMAX  040461          6265    8828#
MSGMIN  040452          6249    8826#
MSGNON  040577          6302    8844#
MSGNUM  040562          6297    8841#
MSG.CS  040046          6787    8775#
MSG.EQ  040044          7118    7154    7193    8774#
MSG.FC  040010          1983    8765#
MSG.FS  040032          1989    8771#
MSG.FT  040021          1986    8768#
MSG.IC  040016          1985    8767#
MSG.IT  040027          1988    8770#
MSG.LC  040013          1984    8766#
MSG.LS  040035          1990    8772#
MSG.LT  040024          1987    8769#
MSG.PA  040040          7153    8773#
MSG.R   040006          1982    8764#
MSG.SP  040612          3097    4609    4694    4701    4708    6256    6272    6293    7114    7152    8846#
MSGOUS  040477          6253    6264    6269    6280    6292    8832#
MSG10A  040160          2169    8791#
MSG10B  040241          2170    8800#
MSG11A  040274          2174    8805#
MSG11B  040342          2175    8812#
MSG12A  040363          2179    8815#
MSG12B  040431          2180    8822#
MSG7    040126          2159    2164    8786#
MXDLTA  032370          7636#   8126
MXLACT  032366          7634#   8113
MXSTAL  001424          1915#   3355    3375
MXWNDW  032374          7640#   7950
NOOP  = 000101          1768#
OFFSET= 000115          1774#
OPNPAT  031074          7113    7152#   7160    7161    7165    7169    7172    7175
OPNPRM  030700          7100    7105#   7109    7163    7181
OPNTST  030542          7052    7061    7068    7071#
OPNWDS  031212          7183#   7216
OPN.CT  030550          7073#   7075*   7076    7090    7088
OPN.N1  031426          7148    7177    7239#
```

```
OPN.N2   031432          7136    7167    7227    7240#
OPN.X1   031444          7149    7178    7243#
OPN.X2   031450          7141    7171    7231    7244#
OPN.1    030554          7075#   7083    7242
OPN.2    030600          7074    7077    7080#
OPT      033162          7805    7822#   8170    8329
PACK  =  000123          1777#
PARE70=  000114          2902#   2998#   2999#   3004#
PARITY   016566          2998    3004    4802#
PAT      001571          1950#
PAT.PT   002434          2184#   6497    6535    6583
PAT0     002474          2184    2203#   2919    7184    7232
PAT1     002534          2185    2220#
PAT10    003174          2194    2373#
PAT11    003234          2195    2390#
PAT12    003274          2196    2407#
PAT13    003334          2197    2424#
PAT14    003374          2198    2441#
PAT15    003434          2199    2458#
PAT2     002574          2186    2237#
PAT3     002634          2187    2254#
PAT4     002674          2188    2271#
PAT5     002734          2189    2288#
PAT6     002774          2190    2305#
PAT7     003034          2191    2322#
PAT8     003074          2192    2339#   2918
PAT9     003134          2193    2356#   2921
PC    =  000007          1650#   2958#   2959#   2970#   2991#   2992#   2993#   2994#   3007#   3078#   3114#   3530#   3542#
                         3556#   3561#   3571#   3579#   3625#   3638#   3643#   3644#   3662#   3670#   3707#   3720#   3726#
                         3727#   3738#   3744#   3745#   3755#   3763#   3799#   3812#   3818#   3819#   3830#   3836#   3837#
                         3847#   3855#   3901#   3959#   4123#   4142#   4408#   4427#   4478#   4481#   4496#   4539#   4711#
                         4755#   4884#   4891#   4896#   5068#   5078#   5338#   5364#   5366#   5404#   5409#   5454#   5581#
                         5610    5656#   5679#   5708#   5714#   5727#   5737#   5745#   5767#   5790#   5791#   5822#   5823#
                         5861#   5862#   5907#   5908#   5937#   5938#   5963#   5964#   6003    6006    6009    6012    6015
                         6018    6031#   6047#   6082#   6142#   6143#   6179#   6218#   6251#   6252#   6258#   6259#   6262#
                         6263#   6267#   6268#   6274#   6275#   6278#   6279#   6285#   6290#   6291#   6295#   6296#   6362#
                         6517#   6573#   6708#   6725#   6794#   6850#   6957#   7072#   7120#   7121#   7191#   7192#   7225#
                         7229#   7238#   7241#   7245#   7273#   7681#   7704#   7730#   7805#   7813#   7825#   7830#   7835#
                         7844#   7846#   7849#   7850#   7864#   8004#   8035#   8039#   8040#   8045#   8054#   8059#   8066#
                         8076#   8077#   8088#   8090#   8092#   8134#   8144#   8146#   8169#   8170#   8173#   8174#   8189#
                         8202#   8203#   8214#   8225#   8234#   8235#   8236#   8244#   8252#   8267#   8283#   8297#   8305#
                         8314#   8324#   8328#   8329#   8338#   8388#   8390#   8403#   8414#   8430#   8446#   8467#   8469#
                         8501#   8546#   8567#   8645#   8657#   8695#   8712#
PIRQ  =  177772          1636#
PIRQVE=  000240          1730#
PKB      001376          1905#   3533#   3547#   3628#   3710#   3728#   3802#   3820#   5734#   6076#
PKC      001400          1906#   6197    6199    6200    6204    6206    6207    6211    6216
PKCS     001374          1904#   3534#   3537#   3549#   3551#   3565#   3631#   3633#   3656#   3713#   3715#   3731#   3733#
                         3749#   3805#   3807#   3823#   3825#   3841#   5706    5735#   6077#
PKV      001370          1903#   3531#   3626#   3708#   3800#   5732#   5733#   6074    6075#   6080#
POPQUE   037702          7830    7864    8035    8324    8704#
PRM      001470          1940#   7096    7105    7255
PRMLMT   001554          1970#   7112    7143
PRMMSG   001600          1982#   7115
PRMPT    001516          1953#   7094    7256
PRMO     002116          1953    2045#   2913
```

DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
PRM1    002130          1954    2052#
PRM10   002272          1961    2115#
PRM11   002276          1962    2119#
PRM12   002302          1963    2123#
PRM13   002306          1964    2127#
PRM14   002316          1965    2133#
PRM15   002326          1966    2139#
PRM16   002354          1967    2152#
PRM2    002152          1955    2063#
PRM3    002170          1956    2072#
PRM4    002206          1957    2081#
PRM5    002224          1958    2090#
PRM6    002242          1959    2099#
PRM7    002260          1960    2108#
PR0   = 000000          1653#
PR1   = 000040          1654#
PR2   = 000100          1655#
PR3   = 000140          1656#
PR4   = 000200          1657#
PR5   = 000240          1658#
PR7   = 000340          1660#
PS    = 177776          1633#   1634    2929#   2960#   3566#   3657#   3750#   3842#   5102#   5481    5608    6072    6073#
                        6081#   6123#   7678    7679#   7703#   7780    7781#   7811#   7823    7847#   8119#   8375    8376#
                        8428#
PSW   = 177776          1634#
PTRN15  002352          2149#   4108    4393
PWRVEC= 000024          1725#
QCNT    037210          8570#   8629    8653#   8668    8670#   8690    8704#
QDRV0   037302          8581    8592    8601    8613#
QDRV1   037322          8582    8593    8602    8614#
QDRV2   037342          8583    8594    8603    8615#
QDRV3   037362          8584    8595    8604    8616#
QDRV4   037402          8585    8596    8605    8617#
QDRV5   037422          8586    8597    8606    8618#
QDRV6   037442          8587    8598    8607    8619#
QDRV7   037462          8588    8599    8608    8620#
QINPT   037220          8581#   8655    8672#   8673#   8674    8676#
QOUTPT  037240          8592#   8655#   8693    8706    8707#   8708    8710#
QSTART  037260          8601#   8635    8640    8676    8710
QSTOP   037262          8602#   8674    8708
QTERM = 037502          8609    8621#
RANADR  027122          4216    4224    4234    6725#
RANCK   026620          4228    4238    6644#
RANPAT  027066          4222    6629    6657    6705#
RDCHR = 104412          5124    5305#
RDLIN = 104414          5306#   6882    6932    6964    7122    7157    7196
RD.ADR  036570          8444#   8445#   8447#   9116
RD.RP   036544          7732    7749    7755    7983    8007    8021    8106    8120    8162    8209    8255    8263    8276
                        8380    8421    8442#   8491    8504    8510
RD.RP1  036566          8446#   8471
RD.RP2  036670          8442#   8470#
RD.RP3  036674          8462    8472#
RD.WRD  036572          8448#   8449    9116    9118
READ  = 000171          1783#   3912    4138    4225    4235    4423
READHD= 000173          1784#   5762    5763    5831    5870
READIN= 000121          1776#
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DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
RECAL = 000107          1771*   3083    3194    6129
RELEAS= 000113          1773*
RESREG= 104420          3545    3559    3574    3641    3665    3723    3741    3758    3815    3833    3850    5308*   5337
                        5408    6178
RESTAR  005244          3064*   3073    4500
RESVEC= 000010          1720*
RHAS  = 000016          7651*   7754*   8205    8253*   8284*   8416
RHBA  = 000004          7646*   7911*
RHBAE = 000050          4635    7664*   7903*
RHCA  = 000034          3518*   3629*   3711*   3729*   3803*   3821*   6152*   7658*   7931    7947    7978
RHCC  = 000036          7659*   8107
RHCS1 = 000000          3712*   3730*   3804*   3822*   7644*   7743    7939    7960    8002    8022    8033    8048    8057
                        8163    8210    8270    8422    8492
RHCS2 = 000010          3543*   3544*   3557*   3558*   3572*   3573*   3577*   3578*   3639*   3640*   3663*   3664*   3668*
                        3669*   3721*   3722*   3739*   3740*   3756*   3757*   3761*   3762*   3813*   3814*   3831*   3832*
                        3848*   3849*   3853*   3854*   6126*   7648*   7693*   7722*   7728    7868*   7944*   7965*   8089*
                        8105*   8161*   8193*   8254*   8331*   8379*   8391*   8528*   8535    8556*   8561
RHCS3 = 000052          4641    7665*
RHDA  = 000006          3521*   6151*   7647*   7927    7956    7971
RHDB  = 000022          7653*   8532
RHDS1 = 000012          3538    3552    3634    3716    3734    3808    3826    7649*   7750    8256    8277    8332    8381
RHDT  = 000026          7655*   7733
RHEC1 = 000044          7662*
RHEC2 = 000046          7663*   8543
RHER1 = 000014          7650*   7756    8264    8333    8505
RHER2 = 000040          7660*   8334
RHER3 = 000042          7661*   8335
RHLA  = 000020          7652*   8121
RHMR  = 000024          7654*
RHOF  = 000032          7657*   7747    7984    7988    8008    8012
RHSN  = 000030          3085    3086    7656*
RHVEC   001364          1902*
RHWC  = 000002          7645*
RH.ADR  001362          1901*   6811    6843    6845    9123
RPADR   032360          4630    6125    6846    7630*   7692    7727*   7791    7867    7900    7943    7964    8068    8104
                        8141    8378    8444    8450    8465    8500    8527    8555
RPERRS  032222          7478*   7682    8240    8242    8332*   8333*   8334*   8335*   9113    9120
RPINIT  032376          2993    7678*   8189
RPT     001472          1941*   7119    7150*   7155    7179*   7239*   7243*
RPTMR   036144          5748    8347*
RPT0    002120          2046*   3188
RPT1    002132          2053*   3220
RPT10   002274          2116*   3608
RPT11   002300          2120*   3691
RPT12   002304          2124*   3783
RPT13   002310          2128*   3893
RPT14   002320          2134*   3951
RPT15   002330          2140*   4069
RPT16   002356          2153*   4187
RPT17   001244          1861*   4294
RPT2    002154          2064*   3255
RPT3    002172          2073*   3292
RPT4    002210          2082*   3326
RPT5    002226          2091*   3400
RPT6    002244          2100*   3439
RPT7    002262          2109*   3506
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DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

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RPVEC   032362          3532* 3580* 3627* 3671* 3709* 3764* 3801* 3856* 6124* 7631* 7679  7699  7701
                        7781  8376
RP.REG  003574          2489  2513  2537  2561  2577* 5920  9135  9144  9147  9150  9154  9156  9160
                        9162
RP04    032766          5779  5811  5850  5893  5926  5945  5951  6131  7780*
RP6   = 000300          1659*
RSTRT1  005322          3053  3055  3060* 3066
RSTRT2  005334          3062* 3067
RSTRT3  005342          3063*
RTC   = 000117          1775*
R0    =%000000          1641* 2912* 2915  2916  2918* 2920  2921  2946* 2947* 2948  3010* 3012  3014
                        3015* 3028* 3039  3049* 3082* 3084* 3088* 3102* 3117* 3200* 3201* 3234* 3235*
                        3267* 3273* 3303* 3306* 3343* 3346* 3349* 3352* 3363* 3366* 3369* 3372* 3413*
                        3415* 3455* 3457* 3459* 3461* 3463* 3465* 3515* 3567* 3583* 3587* 3617* 3658*
                        3672* 3700* 3751* 3765* 3792* 3843* 3857* 3908* 3910* 3911* 3913* 3914* 3915*
                        3919  3921* 3926* 3927* 3965* 3966  3967* 3969* 3970  3973* 3975  3976* 3978*
                        3979  3981* 3982  3983  3990* 3994* 3997* 3998  4075* 4081* 4087  4102  4103
                        4105* 4107* 4108  4127* 4131* 4139* 4143* 4202* 4205* 4216* 4222* 4223* 4224*
                        4227* 4228* 4233* 4234* 4237* 4238* 4243* 4360* 4366* 4372  4387  4388  4390*
                        4392* 4393  4412* 4416* 4424* 4428* 4489* 4491  4493  4496  4566* 4567* 4568
                        4574* 4575  4576* 4577* 4578* 4579* 4581* 4582* 4583  4645  4650  4653* 4654
                        4658  4659  4702  4710* 4723  4726* 4727  4728* 4729* 4730* 4731* 4732* 4733*
                        4736  4762* 4876  4877* 4878  4881* 4989  4999* 5003  5019  5020  5033* 5248
                        5273* 5284  5285* 5286  5287* 5288* 5289* 5327* 5331  5341* 5343* 5345* 5384*
                        5385  5403* 5407* 5442  5443* 5444  5446  5448* 5449  5452* 5483  5490* 5493*
                        5495* 5500* 5507* 5508  5511* 5518* 5519  5523* 5530  5534* 5550  5554* 5558*
                        5563* 5567* 5573* 5575  5580* 5601  5607* 5647  5655* 5748* 5779* 5797* 5798*
                        5811* 5829* 5833* 5837* 5839* 5850* 5868* 5872* 5876* 5878* 5893* 5926* 5945*
                        5951* 5974* 5977* 5979* 5998  6000* 6001  6003  6006  6009  6012  6015  6018
                        6021  6030* 6044  6054  6059* 6093  6106  6108* 6110* 6131* 6149  6153* 6170*
                        6172* 6173  6175* 6237  6303* 6320  6321* 6339  6340* 6351* 6352* 6355  6358*
                        6359  6361* 6372* 6386* 6387* 6398* 6448* 6450* 6451* 6491* 6497  6516* 6528*
                        6535  6572* 6583  6596* 6599* 6629* 6632* 6657* 6692* 6693* 6714* 6769* 6789*
                        6811* 6813  6814* 6818* 6820  6821* 6825* 6827  6832* 6836* 6838* 6840* 6845*
                        6847  6848  6849  6884* 6892* 6897  6898  6910  6911  6917* 6926* 6934* 6944*
                        6956* 6995* 6999* 7013* 7017* 7071* 7078* 7094* 7095  7103  7124* 7144* 7159*
                        7174* 7182* 7183* 7190  7198* 7206* 7213* 7214  7226* 7230* 7233* 7234  7249*
                        7254* 7255* 7257  7264  7268  7272* 7291  7292* 7311  7312* 7337* 7339  7340
                        7341  7342  7343  7345* 7346* 7368* 7381* 7390* 7405* 7406  7411* 7412* 7428*
                        7438* 7443* 7458* 7460* 7461* 7680* 7694* 7702* 7721* 7732* 7742* 7746* 7749*
                        7755* 7766  7767* 7768* 7783* 7784  7792* 7798* 7808  7809* 7812* 7822* 7841*
                        7848* 7876* 7922* 7926* 7930* 7938* 7946* 7955* 7959* 7970* 7977* 7983* 7987*
                        8001* 8007* 8011* 8021* 8032* 8047* 8056* 8067* 8091* 8106* 8120* 8131  8132
                        8133* 8135* 8140* 8147* 8162* 8209* 8255* 8263* 8269* 8276* 8336* 8350* 8357*
                        8363* 8366* 8377* 8380* 8396* 8421* 8426  8427* 8429* 8445  8453  8454* 8472*
                        8474* 8487  8491* 8498* 8499* 8504* 8509  8510* 8515* 8516* 8517  8518* 8526*
                        8545* 8628* 8644* 8678  8679* 8740* 8759*
R1    =%000001          1642* 2913* 2914  2915* 2919* 2920* 3011* 3016* 3029* 3036* 3043  3103* 3105*
                        3107* 3109* 3111* 3304* 3305  3307* 3308  3340* 3342  3358* 3359  3361* 3362
                        3378* 3379  3410* 3412  3416* 3418  3449* 3452  3454  3466* 3529* 3562* 3706*
                        3746* 3798* 3838* 3916* 3920  3928* 3929  3983* 3985* 4077* 4078* 4080* 4083*
                        4090* 4091* 4093* 4100* 4111  4114  4220* 4221  4362* 4363* 4365* 4368* 4375*
                        4376* 4378* 4385* 4396  4399  4569  4575* 4588* 4590* 4591* 4592* 4600* 4607
                        4650* 4662  4690  4990  5003* 5004  5008  5032* 5249  5272* 5323* 5327  5328*
                        5340* 5342* 5344* 5386* 5392* 5398* 5484  5489* 5494* 5512* 5515  5519* 5528*
                        5529  5533* 5551  5555* 5559* 5564* 5565* 5568* 5570* 5574* 5576  5579* 5602
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		5609*	5640*	5642	5643	5645*	5650	5654*	5699	5700*	5701	5702*	5703	5704*
		5711*	5717*	5718*	5719*	5999	6002*	6023*	6024*	6025*	6026*	6027*	6028	6029*
		6092	6093*	6095	6097	6102	6103	6104	6109*	6122*	6171*	6173	6333	6335*
		6336	6338*	6353*	6355*	6373*	6376	6377	6378	6379	6380	6381	6382	6383
		6400*	6406	6408	6410	6412	6414	6416	6418	6420	6422	6424	6426	6428
		6430	6432	6434	6436	6441*	6442	6492*	6495*	6498*	6499*	6500*	6501*	6502*
		6503*	6504*	6505*	6506*	6507*	6508*	6509*	6510*	6511*	6512*	6513*	6529*	6532*
		6537*	6539*	6541*	6543*	6545*	6547*	6549*	6551*	6553*	6555*	6557*	6559*	6561*
		6563*	6565*	6567*	6574	6586*	6587	6589	6624*	6627*	6647*	6651*	6653*	6654
		6688	6709*	6710*	6726*	6729	6731	6734*	6749	6766	6841*	6844	6846*	6847*
		6848*	6849*	6851	6883*	6901	6904	6906	6908	6933*	6941*	6951	6965*	6966
		6968	6970	6975	6979	6983	6987	6991	6998*	7001*	7010	7012*	7016*	7019*
		7035*	7038	7042	7046	7048*	7049	7054*	7055	7057	7063*	7064	7123*	7131
		7134	7137	7139	7158*	7166	7168	7170	7197*	7217	7219	7221	7232*	7236
		7256*	7258	7264*	7267	7285	7287	7289	7305	7307	7309	7329	7331	7333
		7335	7344*	7398	7401	7430*	7451	7453*	7456	7682*	7684*	7685	7688*	7689
		7691*	7696*	7697*	7705*	7722	7723	7725*	7754	7763*	7765*	7786*	7787	7789
		7794	7802*	7803	7824	7828	7868	7877*	7878*	7879*	7880*	7881*	7882*	7883*
		7884	7941	7944	7962	7965	7997*	7998*	7999*	8041*	8042*	8043*	8044*	8051
		8060*	8061*	8062	8069*	8071	8074	8080*	8081*	8082*	8084*	8105	8112*	8113
		8130*	8142*	8153*	8155*	8156*	8157*	8161	8180*	8182	8184*	8193	8196*	8197*
		8199	8204*	8207*	8218*	8221*	8226	8230	8232	8238	8249*	8250*	8251*	8254
		8261	8282*	8289*	8290*	8291*	8292*	8293*	8296*	8298	8300*	8303	8308	8317
		8319*	8320*	8321	8331	8351*	8359*	8361	8379	8386	8392*	8393*	8394*	8398
		8401	8405*	8406*	8409*	8410	8417	8419	8556	8635*	8636	8640*	8641	8653*
		8654*	8655*	8656*	8668	8670*	8671*	8672*	8673*	8674	8676*	8677*	8690	8692*
		8693	8694*	8704*	8705*	8706	8707*	8708	8710*	8711*	8734	8758*		
R2	=%000002	1643*	2914*	2916	3069*	3070	3074	3075	3076	3077	3093	3104*	3106*	3108*
		3110*	3112*	3113*	3114	3335*	3338*	3344	3350	3364	3370	3411*	3414	3417*
		3420	3450*	3451*	3452	3541*	3555*	3570*	3637*	3661*	3719*	3737*	3754*	3811*
		3829*	3846*	4110*	4112	4116	4395*	4397	4401	4570	4593*	4599	4654*	4675
		4696*	4724	4736*	4738*	4740*	4742*	4744*	4746*	4748*	4752	4761*	4991	5002*
		5006*	5009	5016*	5017*	5018	5023*	5031*	5250	5271*	5329*	5330	5331*	5346*
		5347*	5383*	5386	5387*	5393*	5394*	5399*	5400*	5485	5496*	5504*	5509	5532*
		5552	5557*	5560*	5566*	5569*	5571*	5572*	5573	5578*	5603	5619*	5621*	5622*
		5625*	5626*	5631*	5632	5634*	5639*	5641*	5646*	5651	5653*	6193*	6196*	6197
		6199*	6202*	6203	6204	6206*	6209*	6210	6211*	6212*	6213*	6237*	6240	6241
		6242	6243*	6277	6314	6316*	6317	6319*	6354*	6356*	6374*	6376*	6377*	6378*
		6379*	6380*	6381*	6382*	6383*	6384	6403*	6438*	6496*	6514*	6533*	6569*	6628*
		6630*	6646*	6650*	6651	6652*	6655	6656	6661*	6664*	6665	6667	6669	6705
		6706*	6711*	6713*	6727*	6736	6738	6741*	6751	6767	6836	6840	6899	6912*
		6913*	6914*	6915*	6916*	6943*	6950	6955	6997	7005*	7006	7008*	7009	7015
		7023*	7024	7026*	7027	7030	7031	7032	7096*	7101	7103*	7143*	7150	7179
		7180*	7211	7224	7228	7239	7243	7257*	7260	7289*	7290*	7309*	7310*	7364
		7365*	7380	7407*	7437	7441*	7683*	7685	7687*	7689	7784*	7785*	7786	7796*
		7800	7807*	7826	7831*	7833	7865	7866	7884*	7886*	7888*	7890*	7892*	7894*
		7896*	7899	7935*	7937	7945	7949	7954	7966	7969	7976	7986	8010	8017
		8019	8020	8036*	8053*	8073*	8078*	8109	8115	8158*	8160*	8172*	8181*	8185*
		8274*	8285*	8295*	8311*	8325*	8385*	8389*	8400*	8404*	8528	8529*	8537*	8541*
		8629*	8630*	8631*	8632*	8633*	8636*	8641*	8672	8689*	8693*	8706*	8735	8757*
R3	=%000003	1644*	3524*	3527*	3620*	3703*	3795*	4119*	4120*	4121	4404*	4405*	4406	4571
		4594*	4602*	4658*	4677	4682	4692*	4725	4737*	4739*	4741*	4743*	4745*	4747*
		4749*	4753	4760*	4931	4940*	4946*	4947*	4950*	4955*	4956*	4957	4966*	4992
		5000*	5001*	5015*	5018*	5027*	5028*	5030*	5119	5121*	5122	5125*	5126	5133*
		5134	5136	5144	5148	5150*	5156	5158	5160*	5163*	5251	5270*	5326*	5339*
		5346	5391*	5396*	5402*	5403	5486	5508*	5509*	5511	5531*	5553	5556*	5561*

```
                    5577*  5604   5620*  5624*  5652*  6200   6207   6242*  6261   6375*  6384   6404*  6406
                    6408   6410   6412   6414   6416   6418   6420   6422   6424   6426   6428   6430   6432
                    6434   6436   6452   6461   6497*  6498   6499   6500   6501   6502   6503   6504   6505
                    6506   6507   6508   6509   6510   6511   6512   6513   6535*  6537   6539   6541   6543
                    6545   6547   6549   6551   6553   6555   6557   6559   6561   6563   6565   6567   6582
                    6586   6588   6590   6654*  6661   6664   6666   6668   6688   6728*  6743   6746*  6747*
                    6749*  6750*  6751*  6752*  6754*  6756   6759*  6761   6763*  6764*  6768   6787*  6812*
                    6819*  6826*  6877   6973*  7044*  7051   7060   7067   7082   7251   7258*  7262   7265
                    7363   7366*  7375*  7376   7377*  7378*  7379*  7380*  7403   7407   7409*  7426   7427*
                    7431*  7433*  7435*  7437*  7441   7442*  7450   7454   7455   7458   7459*  7699*  7700*
                    7701*  7723*  7724*  7726*  7736*  7866*  7869*  7871   7875   7885*  7887*  7889*  7891*
                    7893*  7895*  7897*  7903   7904   7907   7924   7925   7929   7949*  7950*  7952*  7953
                    7966*  7967   7974   7981   7991   7993   7995   8000   8005   8015   8017*  8024*  8029
                    8031   8046   8070*  8079*  8083*  8115*  8116*  8117*  8118*  8123*  8125*  8126   8128
                    8205*  8216   8217*  8219   8222*  8253   8284   8352*  8353   8355*  8360   8395*  8407*
                    8408   8531*  8533   8540   8542   8543   8634*  8637*  8639*  8642*  8736   8756*
R4      =%000004    1645#  3518*  3521*  3535*  3538   3543*  3544*  3548*  3552   3557*  3558*  3572*  3573*
                    3577*  3578*  3629*  3630*  3634   3639*  3640*  3663*  3664*  3668*  3669*  3711*  3712*
                    3716   3721*  3722*  3729*  3730*  3734   3739*  3740*  3756*  3757*  3761*  3762*  3803*
                    3804*  3808   3813*  3814*  3821*  3822*  3826   3831*  3832*  3848*  3849*  3853*  3854*
                    4076*  4082*  4085*  4086   4113   4361*  4367*  4370*  4371   4398   4572   4629   4630*
                    4635   4641   4643*  4659*  4660*  4932   4934*  4935*  4936*  4937   4938*  4952   4954*
                    4962*  4965*  5252   5269*  5325*  5332*  5389*  5392   5398   5400   6125*  6126*  6151*
                    6152*  6244*  6247   6250   6254   6257   6266   6270   6273   6282   6283   6284   6294
                    6452*  6453*  6454   6455*  6574*  6577*  6579*  6581*  6669*  6672*  6673*  6675*  6676*
                    6788*  6792   6813*  6818   6820*  6825   6827*  6828*  6829*  6830*  6831*  6838   6880
                    6899*  6912   6974*  6977*  6981*  6985*  6989*  6993*  7009*  7027   7030*  7032   7036
                    7040   7044   7106*  7110   7112   7115   7119   7143   7150*  7155   7179*  7184*  7194
                    7211*  7212   7224*  7228*  7236*  7239*  7243*  7259*  7260   7262   7265   7269*  7270
                    7362   7367*  7388   7389   7397   7405   7410*  7692*  7693*  7722*  7728   7754*  7791*
                    7867*  7868*  7870*  7871*  7900*  7903*  7911*  7924*  7943*  7944*  7964*  7965*  8068*
                    8089*  8104*  8105*  8141*  8151*  8175*  8193*  8194   8205   8253*  8254*  8284*  8331*
                    8332   8333   8334   8335   8378*  8379*  8391*  8416   8527*  8528*  8535   8539   8554
                    8555*  8556*  8557   8560*  8561   8565*  8566*  8737   8755*
R5      =%000005    1646#  3523*  3624*  3645   3650*  3725*  3743*  3817*  3835*  4086*  4089*  4092*  4095*
                    4118   4371*  4374*  4377*  4380*  4403   4573   4652*  4656*  4699*  4706   4933   4939*
                    4941*  4943*  4944*  4945*  4946   4964*  4993   4995*  4997*  5004*  5008*  5023   5029*
                    5253   5268*  5324*  5330*  5335*  5336   5390*  5394   5401   6194   6241*  6298   6300*
                    6454*  6456*  6458*  6459*  6460*  6481   6582*  6583*  6584*  6585*  6611   6997*  7002*
                    7003*  7004*  7005   7015*  7020*  7021*  7022*  7023   7080*  7081*  7082   7094   7246
                    7247   7251   7256   7735*  7736   7737   7739   7752*  7760*  7761*  8020*  8025   8194*
                    8242*  8246*  8258*  8266*  8272*  8279*  8287   8313*  8416*  8417   8532*  8533   8738
                    8754*
R6      =%000006    1647#  1649   2930*  2931*  2932
R7      =%000007    1648#  1650
SAVEFG  032320      7582#  8037   8167   8188   8190*  8326
SAVREG= 104416      3540   3554   3569   3636   3660   3718   3736   3753   3810   3828   3845   5307#  5322
                    5382   6169
SAVR05  037744      4566   6351   6528   6926   7071   7182   7254   8733#
SAVR15  037744      6372   6398   6491   7680   7721   7783   7822   7876   8067   8140   8350   9377   8526
                    8628   8734#
SC      035164      8146   8180#  8198
SCTRWC= 177400      1792#  3918   3963   4212
SC1     035246      8192   8196#  8213
SC10    035776      8262   8310   8313#
SC11    036012      8241   8309   8317#
```

DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
SC12    036074          8236    8244    8314    8331#
SC2     035274          8171    8176    8195    8204#
SC3     035346          8221#   8248    8294    8299    8301    8316    8330
SC4     035342          8219#   8223
SC5     035360          8220    8226#
SC6     035460          8231    8249#
SC6A    035564          8243    8272#
SC7     035706          8275    8286    8296#   8312
SC8     035732          8257    8265    8271    8278    8302#   8340
SC9     035756          8260    8308#
SEARCH= 000131          1778#   3535    3548
SEC.DS  001310          1881#   5788#   5820*   5859*   5905*   5935*   5961*   6102*   6140*   6595*   9125    9128    9130
                        9151    9157
SEC.RD  001304          1879#   6101*   9128
SEEK  = 000105          1770#   3630    3712    3730    3804    3822    5765    5766
SEEKFG  032322          3018*   3021*   7590#   7683    7839    8187    8191*
SELDRV= 000145          1787#
SETBUF  026076          4123    4408    6491#
SETFOR= 000143          1786#   3080    3081    3083    3087    3194
SET.IE  037136          7730    7850    8090    8202    8554#
SP.   =%000006          1649#   2934*   2975*   2976*   2977*   2978*   2979*   2980*   2981*   2982    3039*   3093*   3199*
                        3233*   3264*   3301*   3339*   3409*   3448*   3519*   3520*   3521    3528*   3567    3568    3622*
                        3658    3659    3705*   3751    3752    3797*   3843    3844    3900*   3958*   4215*   4323*   4324
                        4325    4326    4327    4328    4329    4330    4331    4341*   4342*   4343*   4344*   4345*   4346*
                        4347*   4352*   4354    4463*   4471*   4534    4546*   4549*   4629*   4635*   4641*   4643    4662*
                        4690*   4723*   4724*   4725*   4726    4754*   4756*   4757    4760    4761    4762    4763*   4764*
                        4782*   4789*   4811*   4822*   4828*   4834*   4836*   4876*   4877    4878*   4880    4881    4882*
                        4885    4887*   4889*   4895    4923*   4924    4925    4926*   4931*   4932*   4933*   4939    4964
                        4965    4966    4967*   4968*   4989*   4990*   4991*   4992*   4993*   4994*   4995    4998*   5011
                        5013*   5015    5025    5027    5029    5030    5031    5032    5033    5035*   5036*   5073*   5074*
                        5075    5083    5086    5099*   5100*   5101*   5106*   5119*   5120*   5125    5128    5132*   5139
                        5143*   5162    5163    5164*   5165*   5166*   5193*   5196    5198    5199    5221    5222    5226*
                        5248*   5249*   5250*   5251*   5252*   5253*   5254*   525     5256*   5257*   5264*   5265*   5266*
                        5267*   5268    5269    5270    5271    5272    5273    52E     5285    5323    5336*   5362    5363*
                        5365*   5383    5385*   5442*   5443    5452    5453*   5481*   5482*   5483*   5484*   5485*   5486*
                        5487*   5488*   5489    5490    5492*   5496    5499*   5502*   5513*   5517*   5520    5521    5524*
                        5525*   5526    5529*   5530*   5531    5532    5533    5534    5535*   55E0*   5551*   5552*   5553*
                        5577    5578    5579    5580    5601*   5602*   5603*   5604*   5605*   5606*   5607    5618*   5622
                        5623*   5647*   5648    5649    5652    5653    5654    5655    5677    5699*   5701*   5703*   5710
                        5716    5717    5718    5719    5747*   5789*   5791    5821*   5823    5860*   5862    5906*   5908
                        5936*   5938    5962*   5964    5998*   5999*   6000    6028*   6029    6030    6044*   6048*   6049*
                        6050*   6051*   6053*   6055*   6058    6072*   6074*   6079*   6080    6081    6092*   6109    6141*
                        6143    6250*   6257*   6261*   6266*   6273*   6277*   6282*   6283*   6284*   6286*   6288*   6294*
                        6399*   6401*   6402*   6404    6440*   6444    6449*   6453    6462    6468*   6534*   6571    6591
                        6596    6599    6600*   6609*   6644*   6645*   6658    6659    6660*   6677    6679*   6690    6705*
                        6713    6852    6880*   6883    6933    6965    7088*   7095*   7098*   7105*   7107*   7119*   7123
                        7155*   7158    7190*   7194*   7197    7240    7244    7362*   7363*   7364*   7376*   7379    7403
                        7408    7409    7410    7426*   7459    7678*   7703    7735    7741*   7745*   7752    7758*   7780*
                        7811    7823*   7847    7925*   7929*   7937*   7945*   7953*   7954*   7958*   7969*   7976*   7986*
                        8000*   8010*   8024    8031*   8046*   8055*   8109    8123    8165*   8187*   8188*   8190    8191
                        8212*   8215*   8216*   8219    8224    8228    8246    8258    8259*   8266    8268*   8279    8280*
                        8302    8313    8339    8355    8365*   8375*   8383    6424    8428    8443*   8449*   8450*   8451
                        8453    8459    8461    8463*   8464*   8467    8473*   8485    8486*   8494*   8495*   8496    8507
                        8514    8539*   8540*   8541    8554*   8557*   8558*   8559*   8563    8565    8566    8734*   8735*
                        8736*   8737*   8738*   8739*   8752*   8753    8754    8755    8756    8757    875E

SRCHWT  032274          7536#   7824*   7962*   8321
```

```
SRC400  024416          3515    3617    3700    3792    6122#
SRTINT  004532          2953    2958#
SRVCLK  023646          5732    5742    5747#
SR0     = 177572        1740#   4335*   4440*   5614    5628*   5635*
SR1     = 177574        1741#
SR2     = 177576        1742#
SR3     = 172516        1743#   4334*   5627*
STACK   = 001100        1630#   2934    3133    3233    3264    3301    3309    3409    3448    3528    3622    3705    3797
                        3900    3958    4215
STALL   024144          3346    3352    3366    3372    5837    5876    5977    6044#
STALLO  001354          1897#   3341*   3347    3353    3354*   3355    3357*   3367    3373    3374*   3375    3377*
STALL1  001420          1913#   5838    5877
STALL2  001422          1914#   5972
START   004256          2923    2928#
START1  004154          1618    2909#
START2  004244          1620    2926#   5079
START3  004144          1622    2907#
START4  004234          1624    2924#
STATBL  001622          1993#   4593
STKLMT= 177774          1635#
STO     036242          8357    8375#
STO1    036304          8385#   8420    8425
STO2    036466          8384    8416#
STO3    036522          8418    8426#
STO4    036524          8415    8427#   8431
STO5    036536          8382    8397    8423    8430#
STRTMR  024602          3530    3625    3707    3799    6169#
STRT1A  004160          2908    2910#
STRT2A  004250          2925    2927#
ST.CLK  022402          2994    3579    3670    3763    3855    5699#
ST.LCL  022612          5714    5739#
ST.PCL  022550          5708    5729#
SVADR   001356          1898#   4217*   4218*   4229    4230    4239    4240
SVRH11  037044          3542    3556    3571    3638    3662    3720    3738    3755    3812    3830    3847    8039    8054
                        8077    8169    8174    8235    8267    8293    8328    8390    8526#
SVSTAT  001276          1875#   4590    6001*
SWR     = 177570        1637#   1638    4119    4124    4128    4134    4136    4140    4404    4409    4413    4419    4421
                        4425    4521    4530    4537    4541    4544    5188*   5206    5213    5922    5970    6238    6473
                        6475    6479    6505    6682    6686    6781
SW0     = 000001        1688#
SW00    = 000001        1578#   1688    4134    4419
SW01    = 000002        1677#   1687    4140    4425    6475    6605    6686
SW02    = 000004        1676#   1686    4136    4421
SW03    = 000010        1675#   1685    4121    4128    4406    4413
SW04    = 000020        1674#   1684    4121    4124    4406    4409    5922
SW05    = 000040        1673#   1683    5730    5740    6479
SW06    = 000100        1672#   1682    3525    3581    5720    6238
SW07    = 000200        1671#   1681    5760    6781
SW08    = 000400        1670#   1680    3019    4521
SW09    = 001000        1669#   1679    5970    6473    6682
SW1     = 000002        1687#
SW10    = 002000        1668#
SW11    = 004000        1667#
SW12    = 010000        1666#   3336
SW13    = 020000        1665#   6045
SW14    = 040000        1664#   5835    5874    5975
```

DERPAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
SW15  = 100000          1663#   4200
SW2   = 000004          1696#
SW3   = 000010          1685#
SW4   = 000020          1684#
SW5   = 000040          1683#
SW6   = 000100          1682#
SW7   = 000200          1681#
SW8   = 000400          1680#
SW9   = 001000          1679#
TBITVE= 000014          1721#
TD      035036          8144    8152#   8229
TEMP1   001214          1849#   2982*   2983*   2984*   2985*   4357
TEMP10  001234          1857#   2997*   3001*   4627    7901
TEMP2   001216          1850#   4357*   4358*   4431
TEMP3   001220          1851#   4348*   4351*   4431    4434*
TEMP4   001222          1852#   7875*   7877    7898*   7899*   7911
TEMP5   001224          1853#   4727*   4751*   4752*   4754
TEMP6   001226          1854#   4753*
TEMP7   001230          1855#
TEMP9   001232          1856#   7872*   7906*   7909*   7935
TEST0   005766          3189    3199#
TEST1   006130          3221    3233#
TEST10  010250          3622#
TEST11  010672          3705#
TEST12  011372          3797#
TEST13  012044          3894    3900#
TEST14  012344          3952    3958#
TEST15  013004          4070    4099#
TEST16  013502          4213    4214    4215#
TEST17  014424          4295    4384#
TEST2   006242          3256    3264#
TEST3   006424          3293    3301#
TEST4   006600          3327    3337    3339#
TEST5   007116          3401    3409#
TEST6   007274          3440    3448#
TEST7   007572          3526    3528#
TICKMS  001264          1870#   5722*   5725*   5747
TICKUS  001266          1871#   5723*   5726*
TIEOUT  016426          3002    4777#
TIMER   032324          7595#   8042*   8079*   8156*   8250*   8292*   8353    8355*   8407*
TIM.DN  001332          1889#   6177*   6196
TIM.PT  001350          1895#   6171    6214    6216*   6217*
TIM.UP  001314          1883#   6170    6176*   6193    6244
TKVEC = 000060          1728#   5064*   5065*
TPB     001412          1910#   2951    4552
TPS     001410          1909#   2950    4551
TPVEC = 000064          1729#
TRAPVE= 000034          1727#   2939*   2940*
TRCKWC= 165000          1791#   3906    3923    4197
TRK.DS  001312          1882#   5787*   5819*   5858*   5904*   5934*   5960*   6103*   6139*   6465*   6594*   9125    9128
                        9130    9138    9151    9157
TRK.RD  001302          1878#   6100*   9128
TRKSW   032272          7528#   7865*   8064*   8073    8087*   8158    8159*   8385    8400    8413*
TRT.EC= 000014          1722#
TSTMMS  001260          1867#   2910*   3054    3185    3217    3252    3289    3323    3397    3436    3503    3605    3698
                        3780    3890    3948    4066    4184    4291    6953*   6972*   7036*
```

DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
TST0    005656          3184*   3190
TST1    006004          3187    3216*   3222
TST10   010142          3505    3514    3585    3604*   3609    3610
TST11   010564          3607    3616    3687*   3692    3693
TST12   011264          3690    3699    3779*   3784    3785
TST13   011764          3782    3791    3889*   3895
TST14   012264          3892    3947*   3953
TST15   012620          3950    4065*   4071
TST16   013260          4068    4183*   4188    4189
TST17   013726          4186    4290*   4296
TST2    006146          3219    3251*   3257
TST3    006330          3254    3288*   3294
TST4    006470          3291    3322*   3328
TST5    007022          3325    3396*   3402
TST6    007200          3399    3435*   3441
TST7    007422          3438    3502*   3507    3508
TWOMS   024226          3644    3727    3745    3819    3837    6072*
TYPDS = 104410          2986    4691    5304*
TYPE  = 104400          2954    2971    2987    3023    3031    3045    3056    3089    3097    3098    3116    3119    4453
                        4459    4467    4484    4488    4532    4540    4585    4586    4595    4604    4605    4609    4612
                        4631    4637    4647    4648    4657    4694    4698    4701    4703    4705    4708    4758    4778
                        4784    4803    4807    4813    4818    4824    4830    4958    5034    5077    5082    5131    5137
                        5142    5146    5151    5152    5154    5157    5161    5300*   5450    6245    6249    6253    6256
                        6260    6264    6265    6269    6272    6276    6280    6281    6292    6293    6297    6302    6783
                        6878    6928    6960    7084    7093    7114    7116    7118    7152    7153    7154    7186    7193
TYPERR  015432          4539    4565*
TYPE22  016252          4722*   5309
TYPOC = 104402          4472    4636    4642    4687    4783    4788    4812    4817    4823    4829    4835    5301*   6881
                        7156    7195
TYPON = 104406          5303*
TYPOS = 104404          3040    3094    4464    5302*   7090
TYPTIM  025000          3583    3587    3672    3765    3857    6237*
TYP22 = 104422          4684    5309*
T10     002404          2169*   3620    3673
T11     002414          2174*   3703    3766
T12     002424          2179*   3795    3858
T15.1   014152          4336*
T15.2   014304          4359*   4437
T7A     002364          2159*   3524    3584
T7B     002374          2164*   3527    3588
ULDFLG  032300          7555*   7789    7802*   7999*   8060*   8081*   8232    8298    8300*   8317    8319*   8393*   8406*
UNLOAD= 000103          1769*
VERIFY  024306          5833    5872    6092*
WCEFLG  001352          1896*   4099*   4132    4384*   4417    5892*   5957*
WRCKD = 000151          1779*   3909    3922    3974    3993    4130    4231    4241    4415    5918    5944
WRCKHD= 000153          1780*
WRITE = 000161          1781*   3902    3917    3960    3989    4126    4199    4219    4411    5924
WRTHD = 000163          1782*
WRT.AD  036772          8487*   8500*   8503*   9118
WRT.RP  036702          7742    7746    7926    7930    7938    7946    7955    7959    7970    7977    7987    8001    8011
                        8032    8047    8056    8269    8485*
WRT.WD  036770          8485*   8489    8496*   8502*   9118
$BDADR  001122          1819*   6587*   6665*   9133
$BDDAT  001126          1821*   6461*   6589*   6667*   9133    9140
$BELL   001202          1844*   2948    4532    4554    5082    5172
$CMTAG  001100          1807*   2929    2930    2937    2941    2942
```

DERPkC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
$CM1   = 000006          1833#  1834#  1835#  1836#  1837#  1838#  1839#
$CM2   = 000014          1933#  1934#  1835#  1836#  1937#  1838#  1839#
$CM3   = 000006          1831#  1833
$CMM   = 000003          1839#  1840#  1841#  1842#
$CNTLC  020463           5077   5172#
$CNTLU  020432           5146   5170#
$CORE   022236           5612   5638#
$CRLF   001207           1846#  3119   4540   4554   4585   4604   4647   4657   4698   4705   5151   5172   7093
$CROUT  022266           5638   5645#
$DBLK   017714           5000   5034   5042#
$DB20   021220           5364   5382#
$DB220  021050           4755   5322#
$DECVL  021400           5384   5430#
$DIV    021454           5481#  6285
$DOAGN  015220           4480   4490   4494   4500#
$DTBL   017704           5003   5038#
$ENDAD  015210           1801   1803   4491   4492   4496#
$ENDCT  015126           3027*  3038*  3051   4482#
$ENULL  015224           4488   4501#
$EOP    014744           3035   3079   4293   4311   4452#  6858
$EOPCT  015120           3051*  4479#  4483   6857*
$ERFLG  001103           1810#  4527*  4554   5179   5202   5204   5210*  5229   5972   6446   6477   6607   6684
$ERMAX  001115           1816#  2943*  5204   5224*  5229
$ERROR  015230           2937   4520#
$ERRPC  001116           1817#  4534*  4535*  4536   4554   9112   9113   9116   9118   9120   9123   9124   9125
                         9130   9135   9138   9142   9144   9147   9151   9157
$ERRTB  003644           2613#  4581   4582
$ERTTL  001112           1814#  4471   4473*  4533*  4554
$ESCAP  001200           1843#  2942*  3522*  3621*  3704*  3796*  4547   4549   4554   5223*  5778*  5785*  5810*
                         5817*  5849*  5856*  5891*  5902*  5925*  5932*  5958*  6105*  6130*  6137*  6466*  6471*
                         6597*  6603*  6663*
$FILLC  001150           1829#  4885   4897
$FILLS  001147           1828#  4897
$GDADR  001120           1818#  6588*  6666*  9133
$GDDAT  001124           1820#  6590*  6668*  9133
$GET42  015162           4489#
$HD    = 000000          1563
$HINUM  022022           4194*  5555   5565   5576*  5582#  6644   6656*  6659*  6710   6728
$ICNT   001104           1811#  5215*  5216   5219*  5228
$ITEMB  001114           1815#  4536*  4554   4574   4616   4618   4620   4622   4624   4673   4680
$KTNEX  022230           5613   5637#
$KTOUT  022220           5629   5634#
$KT11   022064           4309   5611#  5615*  5637*
$LF     001210           1847#  4554   5161   5172
$LONUM  022024           4195*  5554   5563   5575*  5583#  6048   6645   6655*  6658*  6709   6726   6727
$LPADR  001106           1812#  2944*  3189*  3221*  3256*  3293*  3327*  3401*  3440*  3507*  3609*  3692*  3784*
                         3894*  3952*  4070*  4188*  4213*  4295*  4789   4836   5208*  5221*  5226   5228
$LPERR  001110           1813#  2945*  3190*  3222*  3257*  3294*  3328*  3402*  3441*  3508*  3610*  3693*  3785*
                         3895*  3953*  4071*  4189*  4214*  4296*  4546   5208   5222*  5228
$LSTAD  022332           5650#  5657#
$LSTBK  022334           2975   5651*  5658#
$MXCNT  020706           5219   5228#
$NULL   001146           1827#  4887   4897
$NWTST= 000001           3174#  3176   3204#  3206   3238#  3240   3279#  3281   3312#  3314   3383#  3385   3424#
                         3426   3490#  3492   3591#  3593   3676#  3678   3768#  3770   3876#  3878   3933#  3935
                         4003#  4005   4158#  4160   4247#  4249
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$OCTVL  021152          5324   5349#
$OMODE  017476          4925*  4929*  4934   4937*  4948*  4974#
$OVER   020672          5189   5209   5217   5225#
$PASS   001100          1808#  4476*  4477*  4501
$QUES   001206          1845#  4554   5154   5172
$RAND   021676          5549#  6047   6708   6725
$RDCHR  020112          5099#  5305
$RDDEC= ****** U        5307
$RDLIN  020176          5119#  5306
$RDOCT= ****** U        5307
$RDSZ = 000024          5112#
$REGAD  001152          1831#  2946
$REGO   001154          1833#  4568*  9125   9130   9138   9142   9144   9147   9151   9157
$REG1   001156          1834#  4569*  9113   9120   9140
$REG2   001160          1835#  4570*  9124
$REG3   001162          1836#  4571*
$REG4   001164          1837#  4572*  9133   9140
$REG5   001166          1838#  4573*  9113   9120
$RESRE  020746          5263#  5308
$SAVRE  020710          5247#  5307
$SB2D   021170          5362#  6251   6258   6262   6267   6274   6278   6290   6295   7120   7191
$SCOPE  020470          2935   5187#
$SETUP= 000007          2907#  2935   2937   2939   2941   2942   2944   4474
$SIZE   022026          2970   5601#
$SIZEX  022272          5636   5646#
$STUP = 177777          2907#
$SUPRS  021414          5442#  6252   6259   6263   6268   6275   6279   6291   6296   7121   7192
$SVLAD  020644          5197   5220#
$SWR  = 167000          1552#  1563   1590   1591   1592   1593   1594   1595   1596   1842   1843   1844   2941
                        2942   2944   2945   3194   3226   3261   3298   3332   3406   3445   3512   3614   3697
                        3789   3899   3957   4075   4193   4300   4449   4475   4489   4501   4512   4513   4514
                        4515   4516   4530   4537   4541   4544   4554   5180   5181   5182   5183   5184   5188
                        5200   5202   5203   5204   5211   5212   5213   5222   5225   5228
$SWRMK= 000000          5184
$TIMES  001176          1842#  2941*  3188*  3220*  3255*  3292*  3326*  3400*  3439*  3506*  3608*  3691*  3783*
                        3893*  3951*  4069*  4187*  4294*  4475*  5211*  5216   5219*  5228
$TKB    001140          1824#  5047   5066   5073
$TKCNT  017724          5047#  5061*  5080   5085*  5103   5105*
$TKINT  017734          2959   5061#  5078
$TKQEN= 017734          5051#  5088   5108
$TKQIN  017726          5048#  5062*  5063   5086*  5087*  5088   5090*
$TKQOU  017730          5049#  5063*  5106   5107*  5108   5110*
$TKQSR  017732          5050#  5062   5090   5110
$TKS    001136          1823#  2932   5047   5067*
$TKSRV  020004          5064   5073#
$TMP0   001170          1839#  4565*  9112   9113   9116   9118   9120   9125   9130   9135   9138   9142   9144
                        9147   9151   9157
$TMP1   001172          1840#
$TMP2   001174          1841#
$TN   = 000020          1552#  1563   3174   3184   3194#  3204   3216   3226#  3238   3251   3261#  3279   3288
                        3298#  3312   3322   3332#  3383   3396   3406#  3424   3435   3445#  3490   3502   3512*
                        3591   3604   3614#  3676   3687   3697#  3768   3779   3789#  3876   3889   3899#  3933
                        3947   3957#  4003   4065   4075#  4158   4183   4193#  4247   4290   4300#
$TNPWR  021330          5389   5390   5410#
$TPB    001144          1826#  2950*  2951*  4526*  4552*  4895*  4897
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DERPKC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

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$TPFLG  001151          1830#  4872   4897
$TPS    001142          1825#  4525#  4551#  4893   4897
$TRAP   021004          2939   5284#
$TRP  = 000024          5291#  5301#  5302#  5303#  5304#  5305#  5306#  5307#  5308#  5309#  5310#
$TRPAD  021024          5288   5299#
$TSTNM  001102          1809#  3191#  3193   3223#  3225   3258#  3260   3295#  3297   3329#  3331   3403#  3405
                        3442#  3444   3509#  3511   3611#  3613   3694#  3696   3786#  3788   3896#  3698   3954#
                        3956   4072#  4074   4190#  4192   4297#  4299   4474#  4529   4554   4565   4671   5179
                        5220#  5225   5229   5914   5916   6493   6530   6575   6625   6648   6670   7873   7933
$TTYIN  020437          5121   5122   5134   5152   5166   5171#
$TYPBN= ****** U        5305
$TYPDS  017500          4988#  5304
$TYPE   017144          4872#  52?1   5300
$TYPEC  017234          4884   48 1   4893#  4894
$TYPOC  017276          4928#  5301
$TYPON  017312          4927   4930#  5303
$TYPOS  017252          4923#  5302
$XTSTR  020476          5191#
$STRP = 000002          5290#  5301   5302   5303   5304   5305   5306   5307   5308   5309   5310
$CFILL  017475          4924#  4928#  4938   4973#
.     = 044134          1610#  1614   1616#  1802#  1805#  1848   2933   2944   2945   2954   2957#  2971   2974#
                        2987   3023   3026#  3031   3034#  3045   3056   3059#  3089   3098   3101#  4453   4456#
                        4459   4467   4484   4501   4502#  4554   4595   4598#  4612   4631   4637   4640#  4778
                        4781#  4784   4787#  4803   4807   4810#  4813   4816#  4818   4824   4827#  4830   4833#
                        4897   5042#  5047   5050#  5051   5052   5171#  5172   5173   5228   5229   5349#  5430#
                        6783   6928   6960   7084   7087#  7186   8613#  8614#  8615#  8616#  8617#  8618#  8619#
                        8620#  8621   9108#  9260
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CKCHR    2903#  6884   6934   7124   7159   7198   7368   7381   7390   7443
CKDIG    2903#  6942   7142
CKNUM    2903#  6891   7173   7205
COMMEN      1#  1731#  3123   3158   3472   3862
COMND    2903#  3080   3083   3087   3194
DO       2903#  3082   3084   3088   3200   3201   3234   3235   3267   3273   3303   3306   3343   3349   3363
         3369   3413   3415   3455   3457   3459   3461   3463   3465
DODTA    2903#  3908   3910   3913   3921   3926   3967   3976   3990   3994   4127   4131   4139   4204   4223
         4227   4233   4237   4243   4412   4416   4424
DRV.IN   2903#  3577   3668   3761   3853
ENDCOM      1#  1731#  3151   3169   3485   3871
ENDPAS   2903#  4484
ERRCNT   7463#  8201   8247   8315   8455   8513
ERREND   2903#  4551
ERROR    1631#  3072   3546   3560   3575   3642   3666   3724   3742   3759   3816   3834   3851   5792   5793
         5794   5795   5796   5824   5825   5826   5827   5828   5863   5864   5865   5866   5867   5909   5910
         5911   5912   5913   5939   5940   5941   5942   5943   5965   5966   5967   5968   5969   6107   6144
         6145   6146   6147   6148   6467   6472   6598   6604   6680   6681   6853   8201   8247   8315   8456
         8513
ERRTYP   2903#  4521
ER.NDX   2903#  5786   5818   5857   5903   5933   5959   6138
ESCAPE      1#  1731#  3522   3621   3704   3796   5785   5817   5856   5902   5932   5958   6105   6137   6456
         6470   6597   6602   6663
MORETA   1795#  1848
MORE.S   2903#  3184   3216   3251   3288   3322   3396   3435   3502   3604   3687   3779   3889   3947   4065
         4183   4290
MSG      3174#  3176   3204#  3206   3238#  3240   3279#  3281   3312#  3314   3383#  3385   3424#  3426   3489#
         3492   3591#  3593   3676#  3678   3768#  3770   3876#  3878   3933#  3935   4003#  4005   4158#  4160
         4247#  4249
MULT        1#  1731#
NEWTST      1#  1731#  3174   3204   3238   3279   3312   3383   3424   3490   3591   3676   3768   3876   3933
         4003   4158   4247
POP         1#  1731#  4760   5029   5268   5531   5577
PUSH        1#  1731#  4722   4988   5248   5483   5549
REPORT   2903#  3583   3586   3672   3765   3857
RPOY.D   1552#  7463
SAV.RH   2903#  3540   3554   3569   3636   3660   3718   3736   3753   3810   3828   3845
SCOPE    1632#  3202   3236   3277   3310   3381   3422   3468   3576   3667   3760   3852   3931   4000   4146
         4244   4439
SETTRA   5291#  5301   5302   5303   5304   5305   5306   5307   5308   5309
SETUP       1#  1731#  2929
SET.TN   2903#  3185   3217   3252   3289   3323   3397   3436   3503   3605   3688   3780   3890   3948   4066
         4184   4291
SKIP        1#  1731#
SLASH       1#  1731#
SPACE    1731#
STARS       1#  1731#  1795   2597   2802   3174   3183   3204   3215   3238   3250   3279   3287   3312   3321
         3383   3395   3424   3434   3490   3501   3591   3603   3676   3686   3768   3778   3876   3888   3933
         3946   4003   4064   4158   4182   4247   4289   4443   4505   4555   4773   4775   4799   4801   4850
         4897   4975   5043   5092   5112   5173   5229   5275   5310   5350   5368   5431   5455   5537   5584
         5661   5681   5751   5769   5800   5841   5881   5981   6033   6062   6084   6112   6155   6161   6181
         6220   6305   6324   6342   6364   6389   6483   6519   6613   6634   6695   6716   6771   6796   6860
         6919   7274   7294   7314   7348   7414   7462
TRMTRP   5291#
TYPBIN      1#  1731#
TYPB2D   2903#  6250   6257   6261   6266   6273   6277   6289   6294   7119   7190
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DERPKC.P11 CROSS REFERENCE TABLE -- MACRO NAMES

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TYPDEC     1#   1731#  4689
TYPEND  2903#   4453
TYPNUM     1#   1731#
TYPOCS     1#   1731#  3039   3093   4463   7088
TYPOCT     1#   1731#  4471   6880   7155   7194
TYPTXT     1#   1731#  2954   2971   2987   3022   3031   3045   3056   3089   3098   4453   4459   4467   4484
        4595    4612   4631   4637   4777   4784   4802   4807   4813   4818   4824   4830   6783   6928   6959
        7084    7185
$SCMRE  1795#   1833   1834   1835   1836   1837   1838
$SCMTM  1795#   1839   1840   1841
$SESCA     1#   1731#
$SNEWT     1#   1731#  3174   3204   3238   3279   3312   3383   3424   3490   3591   3676   3768   3876   3933
        4003    4158   4247
$SSET   5291#   5301   5302   5303   5304   5305   5306   5307   5308   5309
$SSKIP     1#   1731#
.EQUAT     1#   1552#  1626
.HEADE     1#   1552#  1553
.KT11      1#   1552#  1731
.SETUP     1#   1552#  2907
.SWRHI     1#   1552#  1585
.SWRLO  1597#   1598   1599   1600   1601   1602   1603   1604
.SCATC     1#   1552#  1607
.SCMTA     1#   1552#  1795
.SDB2D     1#   1552#  5368
.SDB2O     1#   1552#  5310
.SDIV      1#   1552#  5455
.SEOP      1#   1552#  4443
.SERRO     1#   1552#  4505
.SERRT     1#
.SMULT     1#
.SPOWE     1#
.SRAND     1#   1552#  5537
.SRDDE     1#   1552#
.SRDOC     1#   1552#
.SREAD     1#   1552#  5043
.SSAVE     1#   1552#  5229
.SSB2D     1#   1552#  5350
.SSB2O     1#
.SSCOP     1#   1552#  5173
.SSIZE     1#   1552#  5584
.SSUPR     1#   1552#  5431
.STRAP     1#   1552#  5275
.STYPB     1#
.STYPD     1#   1552#  4975
.STYPE     1#   1552#  4850
.STYPO     1#   1552#  4897
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DERPKC.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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ADC     5399  5564  5566  5568  5569  5571  5574  6212  6747
ADD     2952  3113  3268  3358  3416  3456  3460  3464  3466  3927  3968  3977  3987  3991  4080
        4082  4092  4339  4350  4356  4365  4367  4377  4435  4436  4581  4582  4756  4882  4926
        4936  5008  5347  5398  5400  5509  5563  5565  5567  5570  5572  5573  5623  5631  5640
        5641  5791  5823  5862  5908  5938  5964  6079  6143  6211  6217  6316  6335  6440  6449
        6460  6514  6569  6585  6586  6652  6653  6664  6751  7005  7023  7379  7380  7405  7437
        7458  7869  7870  7952  8027  8083  8125  8445  8500  8540  8673  8707
ASL     3307  4592  4600  4738  4740  4742  4744  4746  4748  5558  6027  6459  6584  6828  6829
        6830  7002  7003  7004  7008  7020  7021  7022  7026  7081  7269  7375  7377  7378  7431
        7433  7435  7724  7886  7888  7890  7892  7894  7896  8041  8155  8249  8291  8654  8671
        8692  8705
ASLB    3016  3065  4577  4578  4579  4591  5013  8185  8222
ASR     2976  2977  2978  2979  2980  2983  2985  3036  4343  4344  4345  4346  4347  4730  4731
        4732  4733  5339  6455  6581  6676  6914  6915  6916  7098  7107  7880  7881  7882  7883
        8043  8117  8118  8157  8251  8293  8656  8677  8694  8711
BCC     3037  4580  4601  5014  5510  7181  8186
BCS     2953  3066  4661  7099  7108  7432  7434  7436
BEQ     3006  3044  3055  3337  3345  3351  3365  3371  3526  3539  3553  3635  3717  3735  3809
        3827  4088  4109  4122  4133  4135  4338  4373  4394  4407  4418  4420  4458  4490  4522
        4524  4528  4531  4545  4548  4584  4608  4617  4619  4621  4623  4625  4646  4651  4655
        4693  4953  5104  5140  5203  5207  5334  5445  5447  5527  5721  5783  5815  5836  5854
        5875  5897  5921  5930  5949  5955  5976  6020  6046  6098  6135  6195  6248  6255  6271
        6299  6315  6334  6445  6576  6662  6691  6782  6809  6855  6905  6971  7033  7039  7041
        7056  7058  7065  7083  7100  7109  7167  7171  7218  7222  7261  7263  7266  7271  7330
        7332  7334  7336  7399  7729  7738  7827  7905  7908  7992  7994  8026  8030  8052  8072
        8075  8241  8262  8299  8304  8310  8387  8399  8402  8460  8508  8530  8669  8691
BGE     3270  3380  3421  4079  4084  4094  4211  4364  4369  4379  4432  5217  5522  6198  6201
        6757  7029  7077  7838  7951  8124  8129  8183  8471
BGT     3053  3071  3118  3356  3376  3419  3453  3513  3563  3615  3654  3698  3747  3790  3839
        3930  3971  3980  3996  3999  4104  4115  4117  4208  4389  4400  4402  4480  4960  5022
        5333  5498  6022  6357  6360  6443  6631  6712  6732  6739  6753  7007  7025  7215  7788
        7795  7829  8114  8208  8231  8309  8356  8362  8411
BHI     5205  5633  5973  6447  6608  6689  7288  7308  7404
BIC     2984  3537  3551  3565  3633  3656  3715  3733  3749  3807  3825  3841  4340  4477  4729
        4751  4950  5074  5346  5482  5637  6049  6094  6456  7290  7310  7697  7761  7879  7898
        8084  8495
BICB    7824
BIS     4752  4955  4956  5016  5017  5402  5499  5517  5615  7030  7036  7044  7796  7807  7831
        7899  7906  7909  7935  8036  8078  8160  8172  8274  8285  8295  8311  8325  8389  8404
        8463  8558
BISB    3014  6950  6955  7962
BIT     3019  3054  3062  3185  3217  3252  3289  3323  3336  3397  3436  3503  3525  3538  3552
        3581  3605  3634  3688  3716  3734  3780  3808  3826  3890  3948  4066  4108  4121  4124
        4128  4134  4136  4140  4184  4200  4291  4309  4337  4393  4406  4409  4413  4419  4421
        4425  4521  4530  4537  4544  5206  5213  5720  5730  5740  5760  5835  5874  5920  5922
        5970  5975  6003  6006  6009  6012  6015  6018  6045  6238  6473  6475  6479  6605  6682
        6686  6781  7032  7082  7251  7260  7262  7265  7270  7728  7904  7907  8219  8240  8451
        8459  8507  8561
BITB    8321  8417
BLE     3013  3276  3309  3360  4697  6205  6208  6318  6337  6744  6762  8233  8239  8318  8544
BLO     2917  2922  5135  6052  6174  6385  7286  7306
BLOS    5123  6215  6478  6685  7686  7690
BLT     3649  3986  4890  4961  5005  5021  5395  5497  6730  6737  7235  7248  7834  8127  8143
        8198  8354  8490
BMI     4589  5012  5189  5950  7113  7759  7840  8166  8195  8273  8288  8384  8458  8536
BNE     2333  2949  3017  3020  3030  3063  3186  3218  3253  3290  3324  3398  3437  3504  3582
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        3606  3646  3689  3781  3891  3949  4067  4125  4129  4137  4141  4185  4201  4292  4310
        4353  4410  4414  4422  4426  4492  4494  4538  4603  4611  4628  4672  4674  4676  4678
        4681  4683  4700  4707  4879  4886  4951  5010  5076  5081  5089  5109  5127  5129  5145
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DERPKC.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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RESET   2928  4495
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ROLB    8212
ROR     4660  5340  5341  5342  5343  5344  5345  6746  6759  7180
RORB    6734  6741
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DERPKC.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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DERPKC.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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                5978  6004  6007  6010  6013  6016  6019  6246  6879  7073  7117  7478  7479  7480  7481
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```

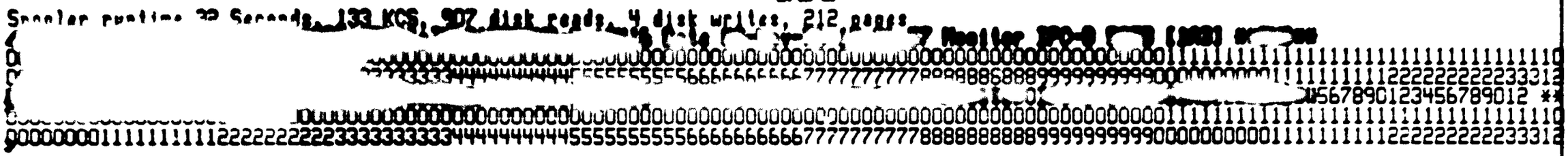
F01

7598	7599	7600	7601	7602	7608	7626	7630	7631	7634	7636	7638	7640	8447	8448
8468	8470	8502	8503	8511	8581	8582	8583	8584	8585	8586	8587	8588	8592	8593
8594	8595	8596	8597	8598	8599	8601	8602	8603	8604	8605	8606	8607	8608	8609
9112	9113	9116	9118	9120	9123	9124	9125	9128	9130	9133	9135	9138	9140	9142
9144	9147	9150	9151	9154	9156	9157	9160	9162	9167	9171	9175	9179	9183	9187
9191	9194	9198	9201	9205	9209	9213	9216	9220	9224	9228	9232	9235	9239	9242
9245	9249	9252	9255											

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

*,DERPKC.SEQ/SOL/CRF/NL:TOC/DS:ERFZ/PAGNUM=DERPKC.SML,DERPKC.P11
RUN-TIME: 59 94 15 SECONDS
RUN-TIME RATIO: 234/169=1.3
CORE USED: 41K (81 PAGES)

G01


Spooler runtime 32 Seconds, 133 KCS, 307 disk reads, 4 disk writes, 212 pages
0000000011111111112222222222333333333344444444445555555555666666666677777777778888888888999999999900000000011111111112222222222333123456789012 **