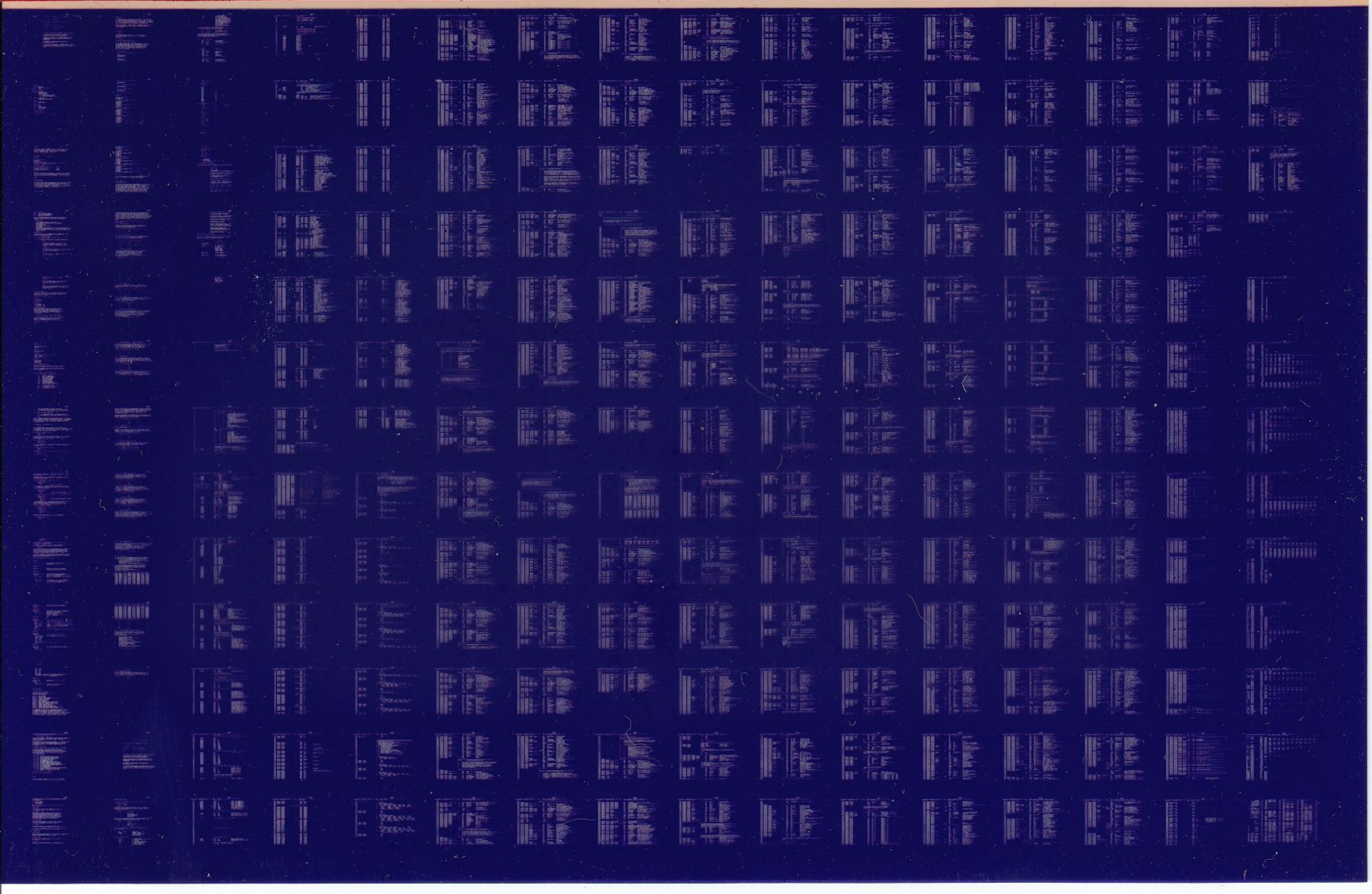
RM03,02

EXTENDED DRIVE TEST
CZRMFB0

AH-B007B-MC

FICHE 1 OF 2

JAN 1978
digital
MADE IN USA



RM03,02

EXTENDED DRIVE TEST
CZRMFB0

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FICHE 2 OF 2

JAN 1978
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PRODUCT CODE: AC-B0068-MC

PRODUCT NAME: CZRMFB0 RM03/RM02 EXTENDED DRIVE TEST

DATE CREATED: AUGUST 1977

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: H. BLACKSTONE

C01

CONTENTS

SEQ 0002

1. ABSTRACT

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

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 PROCESSOR
16K MEMORY
TELETYPE
PROGRAM LOADING DEVICE
KW11-L OR KW11-P (THE KW11-P IS REQUIRED FOR THE TIMING TESTS)
RH70 WITH 1 - 8 RM03 DISK DRIVES

2.2 PRELIMINARY PROGRAMS

RM03,RM02 DISKLESS CONTROLLER TEST	CZRMJB
RM03,RM02 FUNCTIONAL TEST I	CZRMCB
RM03,RM02 FNCTIONAL TEST II	CZRMDB
RM03,RM02 FUNCTIONAL TEST III	CZRMEB

2.3 MEDIA

THE PROGRAM REQUIRES THAT EACH DRIVE TO BE TESTED HAS A FORMATTED DISK PACK. THE PACK MAY BE FORMATTED IN EITHER 16-BIT OR 18-BIT MODE, DEPENDING ON THE TESTING REQUIREMENTS. NOTE THAT THE PROGRAM WILL NOT TEST A MIXTURE OF DRIVES WITH BOTH 16 AND 18 BIT MODE PACKS

3. LOADING PROCEDURE

THE PROGRAM MAY BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER OR IT MAY BE LOADED FROM THE APPROPRIATE 'XXDP' MEDIA USING THE ASSOCAITED LOADER. THE PROGRAM MAY BE INCLUDED IN AN 'XXDP' CHAIN. IF THE PROGRAM IS BEING RUN ON A PROCESSOR WITH 16K, THE 'XXDP' LOADER WILL NOT BE PRESERVED. THE PROGRAM MUST BE RUN ON A SYSTEM WITH 20K OR MORE TO PRESERVE THE 'XXDP' LOADER. THE 'ABSOLUTE' LOADER WILL BE PRESERVED IN A 16K SYSTEM, HOWEVER.

4. STARTING PROCEDURE

4.1 STARTING ADDRESSES

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

NOTE: STARTING ADDRESSES 210 AND 214 ARE AVAILABLE WHEN THE PROGRAM IS INITIALLY STARTED; THESE STARTING ADDRESSES ARE TREATED AS ADDRESSES 200 OR 204 RESPECTIVELY ON RESTARTS.

4.2 OPERATOR ACTION

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 5.)
6. PRESS START.
7. THE PROGRAM WILL TYPEOUT THE STATUS OF THE DRIVES ATTACHED TO THE SELECTED MASSBUS SUBSYSTEM. TO INHIBIT THIS TYPEOUT, DO NOT RESTART THE PROGRAM FROM ANY OF THE STARTING ADDRESSES; INSTEAD TYPE A 'CONTROL C' ON THE KEYBOARD TO RETURN THE PROGRAM TO COMMAND ENTRY MODE.

4.3 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

THE 'PERIOD PERIOD' TERMINATOR IS TYPED TO INDICATE THE END OF TEST PARAMETER MODIFICATION AND TO SIGNAL THE START OF TEST EXECUTION.

,<CR> COMMA

THE COMMA IS USED AS A SEPARATOR BETWEEN DRIVE NUMBERS AND TEST NUMBERS.

/ SLASH

A MODIFICATION INDICATOR: IF A SLASH FOLLOWS A TEST

NUMBER, THE PROGRAM WILL OPEN THAT TEST FOR PARAMETER MODIFICATION.

^U CONTROL-U

DELETE THE PRESENT INPUT STRING AND START A NEW LINE. TYPED BY DEPRESSING THE "CONTROL KEY" (CTRL) AND THEN STRIKING THE "U".

\ RUBOUT

DELETE THE LAST CHARACTER FROM THE INPUT STRING. TYPED BY STRIKING THE "RUBOUT" KEY. WHICH WILL BE ECHOED BY A BACKSLASH (\) FOLLOWED BY THE CHARACTER DELETED.

4.3.1 CONTROL SWITCH SELECTION

STARTING THE PROGRAM AT ANY OF THE POSSIBLE STARTING ADDRESSES WITH SW<07>=1 WILL RESULT IN ENTERING THE "CONTROL SWITCH SETTING" MODE. THUS, ALLOWING THE OPERATOR TO SPECIFY THE DESIRED STATE OF "C.SWR".

CONTROL SWITCH SELECTION EXAMPLES:

EXAMPLE #1

```
SET SW<07>=0
C.SWR=000000 / 400..
```

EXAMPLE #2

```
SET SW<07>=0
C.SWR=000000 / 220.
C.SWR=000000 / 220..
```

4.3.2 RH70 ADDRESS SELECTION

STARTING THE PROGRAM AT 200 WILL RESULT IN AUTOMATIC SELECT OF THE DEFAULT VALUES OF BUS ADDRESS (RMCS1), VECTOR ADDRESS, AND PRIORITY LEVEL OF THE RH70. IF THE DEFAULT VAULE OF THE BUS ADDRESS DOES NOT RESPOND (TIMES OUT) WHEN ADDRESSED, AN ERROR IS REPORTED. 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 ADDRESS OF THE RH70 AND THE VECTOR ADDRESS. STARTING ADDRESSES 210(8) AND 214(8) ARE TREATED AS ADDRESSES 200(8) OR 204(8) RESPECTIVELY.

ADDRESS SELECTION EXAMPLES

EXAMPLE #1

```
  RMCS1=176700 / 177200.
```

EXAMPLE #2

```
  RMCS1=176700 / 176300<CR>
  RHVEC=254 / 260<CR>
  RHPRIO=5 / 6.
```

EXAMPLE #3

```
  RMCS1=176700<CR>
  RHVEC=254 / 260.
```

EXAMPLE #4

```
  RH70/RM03 FAILED TO RESPOND TO ADDRESSING
  RMCS1    ERR PC
  176300   XXXXXX
  RMCS1=176300 / 176700.
```

EXAMPLE #5

```
  RMCS1=176700 / 1776\67\6300<CR>
  RHVEC=254<CR>
  RHPRIO=5<CR>
  RMCS1=176300.
```

4.3.3 DRIVE AND PARAMETER SELECTION

STARTING THE PROGRAM AT 200 OR 210 WILL RESULT IN AUTOMATIC SELECTION OF THE DRIVES TO TEST AND THE TESTS TO RUN.

STARTING THE PROGRAM AT 204 OR 214 ALLOWS THE OPERATOR TO SELECT THE DRIVE(S) TO BE TESTED, THE TESTS TO BE EXECUTED, AND THE PARAMETERS TO USE.

4.3.3.1 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 (TESTS 0 - 10)
#"T"	ALL TIMING TESTS (TESTS 12 - 15)
#"A"	ALL ADDRESS TESTS (TESTS 16 - 17)
#"D"	THE DATA TEST (TEST 20)
#"E"	THE EXERCISER (TEST 21)

```
        * USED BY THE OPERATOR TO SELECT TEST GROUPS
NOTE:    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 MODIFIED, THE REMAINING TESTS WILL BE UNCHANGED.


WHEN THE PROGRAM IS STARTED FROM LOCATION 200 OR 210, TESTS 0-10,
12-20 WILL BE RUN USING ALL AVAILABLE, ONLINE DRIVES.  IF THE OPERATOR
WISHES TO SELECT THE DRIVES TO BE TESTED, THE TESTS TO BE PERFORMED,
OR THE PARAMETERS TO BE USED, THE CONVERSATION MODE MAY BE ENTERED
BY TYPING A 'CONTROL C' OR BY STARTING THE PROGRAM FROM EITHER
LOCATION 204 OR 214.


THE PROGRAM WILL THEN RESPOND WITH:

         DRIVE(S)=

THE FOLLOWING EXAMPLES ASSUME THAT THE OPERATOR IS 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<CR>' WHICH SAYS 'THIS IS THE END OF DRIVE ENTRY'.
THE PROGRAM WILL THEN REQUEST TEST NUMBERS.

THE TRANSACTION APPEARS AS FOLLOWS:

         DRIVE(S)=3<CR>
         TEST=

THE OPERATOR MAY NOW ENTER DESIRED TEST NUMBERS.  IN THE EXAMPLE,
HE WANTS TESTS 2 THRU 7 AND TEST 11 SO HE TYPES 2-7<,> (THE 'COMMA'
SEPARATES ENTRIES), 11<.><CR> ('PERIOD' 'CARRIAGE RETURN' -
END OF CHANGES, START TEST EXECUTION.)

IT NOW LOOKS LIKE THIS

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

IN THE NEXT EXAMPLE, IT IS ASSUMED THAT THE OPERATOR WISHES TO TEST
DRIVE 4 AND TO RUN TESTS 1 AND 3 THRU 11, MODIFYING THE PARAMETERS
FOR TESTS 3 AND 10.

THE TRANSACTION WOULD BE AS FOLLOWS:

         DRIVE(S)=4<CR>
         TEST=

THE OPERATOR NOW ENTERS THE TEST NUMBERS.  THE TRANSACTION IS
GIVEN BELOW:

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

NOTICE THIS SAYS SELECT TEST 1, CONTINUE<,>; SELECT TEST 3, OPEN</>; SELECT TESTS 4-7, CONTINUE<,>; SELECT TEST 10, OPEN</>; SELECT TEST 11, END OF INPUT <.>.

THE PROGRAM SCANS THE TEST NUMBER INPUT AND DETERMINES THAT THE PARAMETERS FOR TEST 3 AND TEST 10 ARE TO BE CHANGED. THE OTHER TESTS WILL NOT BE ALTERED.

(THE ENTIRE TRANSACTION IS REPEATED FOR CLARITY)

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

THE NEW VALUE FOR 'R' MAY BE ENTERED. TERMINATING THE ENTRY WITH A <.> (PERIOD) WILL TERMINATE THE CHANGES FOR THIS TEST; TYPING A <CR> OR TERMINATING THE ENTRY WITH A <CR> WILL CAUSE THE PROGRAM TO MOVE TO 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
```

IF THE OPERATOR DOES NOT WISH TO CHANGE 'FC', THE FOLLOWING OCCURS:

```
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=822 /
```

THE PROGRAM RESPONDS WITH THE PREVIOUSLY ASSIGNED PARAMETER FOR LAST CYLINDER ADDRESS IN THIS CASE USING 822 AS THE EXAMPLE. THIS IS WHAT THE OPERATOR INTENDED TO MODIFY AND IS WHY TEST 3 WAS OPENED. TO CHANGE THE VALUE TO '20', THE NEW VALUE IS TYPED FOLLOWED BY A 'PERIOD' TERMINATOR (<.><CR>).

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= 822 / 20.<CR>
  TEST 10
    R=1 /
```

THE PROGRAM HAS LOADED TEST 3 WITH ITS NEW PARAMETERS AND THE PROGRAM IS WAITING FOR CHANGES TO TEST 10'S PARAMETERS.

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

```
          FC=0 / <CR>
          LC= 822 / 20.<CR>
        TEST 10
          R=1 / 10.<CR>
```

THE OPERATOR TYPES THE NEW VALUE (10) AND TERMINATES THE ENTRY WITH A 'PERIOD' 'CARRIAGE RETURN'.

THE PROGRAM NOW LOADS TEST 10 WITH THE NEW PARAMETERS (TEST 11 RETAINS THE PREVIOUSLY ASSIGNED PARAMETERS) AND RESPONDS WITH:

```
        DRIVE(S)=
```

SINCE THE USER DID NOT END THE CONVERSATION MODE WITH A 'PERIOD PERIOD', 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 PROGRAM, A 'PERIOD PERIOD' MUST BE TYPED.

IF A SINGLE 'PERIOD' IS TYPED WHILE DRIVE OR TEST NUMBERS ARE BEING ENTERED, THE PROGRAM WILL START EXECUTION IMMEDIATELY. A 'PERIOD PERIOD' MUST BE TYPED BEFORE THE PROGRAM WILL EXIT TEST PARAMETER CHANGE MODE TO GO TO EXECUTION.

4.3.3.2 DRIVE AND PARAMETER SELECTION EXAMPLES

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 AND 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=822 / 50..<CR>     ;TEST 10 IS STILL PENDING AND WILL BE
                          ;RETAIN ITS PRESENT PARAMETERS.
```

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/D<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 - 10 WILL RETAIN THEIR PREVIOUSLY
                           ;ASSIGNED PARAMETERS.

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

DRIVE=1<CR>
TEST=S/<CR>                ;OPEN THE SEEK TESTS (TESTS 0-10)
  TEST 0
    R=10 / 100.<CR>        ;CHANGE TO 100 ITERATIONS, TO TO THE 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, GO TO NEXT PARAMETER
    FC=0 / 50<CR>          ;CHANGE 'FC' TO 50, GO TO NEXT PARAMETER
    LC=822 / 51.<CR>       ;CHANGE 'LC' TO 51, GO TO THE NEXT TEST
  TEST 3
    R=1.<CR>               ;MOVE TO NEXT TEST
  TEST 4
    R=1../CR>              ;USE TEST 4'S PARAMETERS AND START PROGRAM EXECUTION

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

DRIVE=1<CR>
TEST=D,<CR>                ;SELECT AND OPEN THE DATA TEST
  TEST 20
    R=1 / 1000<CR>         ;DO 1000 ITERATION OF TEST PATTERN
    FC=0 / 10<CR>          ;#8 ON CYLINDER 10, TRACK 2, SECTOR 4
    LC=822 / 10<CR>
    IC=64 / 0<CR>
    FT=0 / 2<CR>
    LT=4 / 2<CR>
    IT=1 / <CR>
    FS=0 / 4<CR>
    LS=32 / 4<CR>
    PAT=177777 / 400..<CR> ;RUN WITH PATTERN #8

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

DRIVE=1<CR>                ;USE THE SAME PARAMETERS AS IN EXAMPLE
TEST=D/<CR>                ;#7, BUT ALSO SPECIFY A DATA PATTERN (PAT #0).
  TEST 20
    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 PATTERNS #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<CR>           ;TEST DRIVES 0,1, AND 4 IN SEQUENCE
TEST=0-5/<CR>             ;CHANGE TEST 5
  TEST 0
    R=10 / <CR>
    FC=0 / <CR>
    LC=822 / 1..<CR>      ;CHANGE LAST CYLINDER FROM 822 TO 1
                          ;START PROGRAM EXECUTION.
```

5. SWITCH SETTINGS

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<12>=1...TYPE OUT TEST NUMBER FOR EACH TEST
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 12-15)
SW<05>=1...REPORT ONE ERROR PER SECTOR (TESTS 16 & 17)
SW<04>=1...INHIBIT WRITES (TEST 20)
SW<03>=1...INHIBIT WRITE CHECKS (TEST 20)
SW<02>=1...INHIBIT READ AND SOFTWARE COMPARES (TEST 20)
SW<01>=1...INHIBIT SOFTWARE COMPARES (TEST 20)
SW<00>=1...PERFORM READ AFTER WRITE CHECK ERROR (TEST 20)
```

IF THE PROGRAM IS BEING RUN ON A SWITCHLESS PROCESSOR (I.E. AN 11/34)
THE PROGRAM WILL DETERMINE THAT THE HARDWARE SWITCH REGISTER IS
NOT PRESENT AND WILL USE A 'SOFTWARE' SWITCH REGISTER. THE
'SOFTWARE' SWITCH REGISTER IS LOCATED AT LOCATION 176 (8). THE
SETTINGS OF THE 'SOFTWARE' SWITCHES ARE CONTROLLED THROUGH A KEYBOARD
ROUTINE WHICH IS CALLED BY TYPING A 'CONTROL G'. THE PROGRAM WILL
RECOGNIZE THE 'CONTROL G' AT ANY TIME EXCEPT WHEN THE PROGRAM
IS AT A HIGHER PRIORITY PROCESSING AN RM03 INTERRUPT. THE

'SOFTWARE' SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER IN RESPONSE TO THE PROMPT FROM THE SWITCH ENTRY ROUTINE:


```
'SWR = NNNNNN    NEW ='
```

EACH TIME SWITCH SETTING ARE ENTERED, THE ENTIRE SWITCH REGISTER IMAGE MUST BE ENTERED. LEADING ZEROS ARE NOT REQUIRED. 'RUBOUT' AND 'CONTROL U' FUNCTIONS MAY BE USED TO CORRECT TYPING ERRORS DURING SWITCH ENTRY.

ON PROCESSORS WITH HARDWARE SWITCH REGISTERS, THE 'SOFTWARE' SWITCH REGISTER MAY BE USED. IF THE PROGRAM FINDS ALL 16 SWITCHES IN THE 'UP' POSITION, ALL SWITCH REGISTER REFERENCES WILL BE TO THE 'SOFTWARE' REGISTER AND THE PROCEDURES DESCRIBED ABOVE MUST BE FOLLOWED.

5.2 CONTROL SWITCH SETTINGS

THE CONTROL SWITCH SETTINGS ARE ENTERED THROUGH THE KEYBOARD.

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 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)
C.SWR<00>=0...OPERATE IN 22 SECTOR (16 BIT) MODE
         =1...OPERATE IN 20 SECTOR (13 BIT) MODE
```

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

PEFER TO 4.3.1 FOR C.SWR SELECTION

6. ERRORS

THERE ARE ANUMBER 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 TYPEOUT 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.

6.1 ERROR TYPES

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

6.1.1 DRIVER ERROR

THESE ERRORS WILL BE DETECTED BY THE RH70/RM03 DRIVER. THERE ARE TWO CLASSES OF DRIVER ERRORS; THOSE THAT CAN NOT BE IDENTIFIED IN A MANNER THAT ALLOWS 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.

6.1.2 NON-FATAL ERRORS

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.

6.1.3 FATAL ERRORS

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.

6.2 ERROR RECOVERY

6.2.1 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.

6.2.2 NON-FATAL ERROR

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

6.2.3 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

THE PROGRAM WILL TEST THE DRIVES IN EITHER 16 BIT MODE OR IN 18 BIT MODE DEPENDING ON THE SETTING OF 'S.SWR<00>'. IF 'C.SWR<00>' IS 0, ALL OF THE DRIVES WILL BE TESTED IN 16 BIT MODE; IF 'C.SWR<00> IS 1, ALL OF THE DRIVES WILL BE TESTED IN 18 BIT MODE. THE PROGRAM HAS NO PROVISIONS FOR TESTING DRIVES WITH INTERMIXED PACKS OR TESTING BOTH 16 BIT MODE AND 18 BIT MODE DRIVES ON THE SAME SYSTEM.

BEFORE THE PROGRAM IS STARTED, PROPERLY FORMATTED PACKS MUST BE MOUNTED ON THE DRIVES WHICH WILL BE TESTED. THE PROGRAM ASSUMES A PROPERLY FORMATTED PACK. THE FORMAT OF THE PACK IS NOT ALTERED BY THE PROGRAM.

8. MISCELLANEOUS

8.1 EXECUTION TIME

THE PROGRAM REQUIRES APPROXIMATELY 22 MINUTES TO MAKE ONE PASS PER DRIVE USING AN 11/70 CPU. THIS ASSUMES THE DEFAULT TEST SEQUENCE (TESTS 0-10, 12-21) AND DEFAULT TEST PARAMETERS.

8.2 STACK POINTER

THE STACK POINTER IS-INITIALLY SET TO 1100.

8.3 TIMING TESTS (TESTS 12-15) 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.

8.3.1 TIMING TOLERANCES

1. TEST 12 -- ROTATIONAL SPEED TIMES

60 HZ
MINIMUM=16260 US
MAXIMUM=17300 US
NOMINAL=16670 US

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

2. TEST 13 -- ONE CYLINDER SEEK TIMES

   MAXIMUM=8000 US
   NOMINAL=6000 US

3. TEST 14 -- ACCESS TIME MEASUREMENT

   MAXIMUM=32000 US
   NOMINAL=30000 US

4. TEST 15 -- MAXIMUM SEEK TIMES

   MAXIMUM=57000 US
   NOMINAL=55000 US

8.3.2. TIMING TESTS PRINTOUT EXAMPLES

EXAMPLE #1

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

ONE CYLINDER SEEK TIMES
 * FORWARD
MIN=5350 US
MAX=6920 US
AVG=5550 US   822 SEEKS TIMED
 * REVERSE
MIN=5140 US
MAX=5960 US
AVG=5430 US   822 SEEKS TIMED

ACCESS TIME MEASUREMENTS
 * FORWARD
MIN=27770 US
MAX=28640 US
AVG=28230 US   128 SEEKS TIMED
 * REVERSE
MIN=27990 US
MAX=28550 US
AVG=28220 US   128 SEEKS TIMED

MAXIMUM SEEK TIMES
 * FORWARD
MIN=56990 US
MAX=57980 US
AVG=57010 US   128 SEEKS TIMED
 * REVERSE
MIN=55120 US
MAX=57650 US
AVG=56340 US   128 SEEKS TIMED
```

EXAMPLE #2

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

ONE CYLINDER SEEK TIMES
 * FORWARD
MIN=5470 US
MAX=8940 US  3 ABOVE THE MAXIMUM OF 8000 US
AVG=5830 US  822 SEEKS TIMED
 * REVERSE
MIN=5040 US
MAX=5970 US
AVG=5330 US 822 SEEKS TIMED

ACCESS TIME MEASURMENTS
 * FORWARD
MIN=29730 US
MAX=32620 US  73 ABOVE THE MAXIMUM OF 32000 US
AVG=30320 US  128 SEEKS TIMED
 * REVERSE
MIN=28620
MAX=32230 US  128 ABOVE THE MAXIMUM OF 32000 US
AVG=32800 US  128 SEEKS TIMED

MAXIMUM SEEK TIMES
 * FORWARD
MIN=57510 US
MAX=57240 US  128 ABOVE THE MAXIMUM OF 57000 US
AVG=57020 US  128 SEEKS TIMED
 * REVERSE
MIN=57050 US
MAX=57550 US  128 ABOVE THE MAXIMUM OF 57000 US
AVG=57210 US  128 SEEKS TIMED
```

8.4 END OF TEST

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.

9. PROGRAM DESCRIPTION

THIS PROGRAM CONTAINS NINTEEN TESTS NUMBERED 0-22 IN OCTAL. TESTS 0-7 & 11 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. TESTS 12-15 WILL MEASURE THE ROTATIONAL SPEED, THE ONE CYLINDER SEEK, THE ACCESS TIME, AND THE MAXIMUM SEEK TIMES TO ENSURE THEY ARE ALL WITHIN THE TOLERANCES ALLOWED. TEST 16 AND 17 ENSURES THE SECTOR AND TRACK ADDRESSING CIRCUITRY WORKS PROPERLY. TEST 20 VERIFIES THE DATA STORAGE AND RETRIEVAL CAPABILITIES ARE FUNCTIONAL. AND TEST 21 WILL STRESS AND CHECK THE READ/WRITE AND SERVO SYSTEMS.

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 SEQUENTIAL ORDER. ALL OF THE DRIVES WILL BE TESTED. ONE PASS THROUGH THE TEST SEQUENCE (TESTS 0-10,12-20) WILL BE PERFORMED ON EACH DRIVE BEFORE MOVING TO THE NEXT DRIVE IN SEQUENCE. THE ADDRESS OF EACH 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 SECTIONS FOR DETAILED DESCRIPTIONS OF EACH TEST.

9.1 TEST 0 - RECAL/SEEK TEST

THIS TEST WILL CAUSE THE DRIVE TO EXECUTE A RECALIBRATE COMMAND CYCLE AND THEN SEEK FORWARD TO CYLINDER "LC". AT THE COMPLETION OF BOTH COMMANDS, STATUS INDICATIONS ARE CHECKED TO ENSURE NO ERRORS OCCURRED.

THE PARAMETERS USED BY THE TEST ARE GIVEN BELOW:

R	-	200
LC	-	822
FT	-	0
FS	-	0

9.2 TEST 1 - SEEK/SEEK TEST

THIS TEST WILL CAUSE THE DRIVE TO EXECUTE A FORWARD SEEK CYCLE TO "LC" "LT" "LS" FOLLOWED BY A REVERSE SEEK CYCLE TO "FC" "FT" "FS". AT THE COMPLETION OF EACH SEEK, THE PROPER INDICATORS ARE EXAMINED TO ENSURE PROPER OPERATION.

THE PARAMETERS USED BY THE TEST ARE GIVEN BELOW:

R	-	100
FC	-	0
LC	-	256
IC	-	0
FT	-	0
LT	-	0
FS	-	0
LS	-	0

9.3 TEST 2 - INCREMENTAL SEEK TEST

THIS TEST WILL COMMAND FORWARD SEEK CYCLES TO ADVANCE THE CYLINDER ADDRESS FROM "FC" TO "LC" BY THE INCREMENT "IC". WHEN THE RESULTANT CYLINDER ADDRESS (NC) EXCEEDS "LC" REVERSE SEEK CYCLES ARE INITIATED; STARTING AT THE LAST LEGAL "NC" AND DECREMENTING BY "IC" UNTIL "NC" IS LESS THAN "FC". AT THE COMPLETION OF EACH SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO ENSURE PROPER OPERATION.

THE PARAMETERS USED BY THE TEST ARE GIVEN BELOW:

```
R       -         1
FC      -         0
LC      -       822
IC      -         1
FT      -         0
FS      -         0
```

9.4 TEST 3 - STEPPING SEEK TEST

THIS TEST WILL COMMAND SEEK CYCLES TO CYLINDER 0,1,2,4, 8,16,32,64,128, AND 256. AT THE COMPLETION OF EACH SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO VERIFY PROPER OPERATION.

THE PARAMETERS USED BY THE TEST ARE GIVEN BELOW:

```
R       -         6
FC      -         0
LC      -       256
IC      -         1
FT      -         0
FS      -         0
```

9.5 TEST 4 - OSCILLATING SEEK TEST

THIS TEST WILL COMMAND SEEK CYCLES FROM "FC" TO "NC" AND BACK TO "FC". "NC" STARTS AT "FC" AND INCREMENTS BY "IC" UP TO CYLINDER "LC", THEN IS DECREMENTED BY "IC" BACK TO CYLINDER "FC". AT THE COMPLETION OF EVERY SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO ENSURE PROPER OPERATION.

THE FOLLOWING PARAMETERS ARE USED BY THE TEST:

```
R       -         1
FC      -         0
LC      -       822
IC      -         1
FT      -         0
FS      -         0
```

9.6 TEST 5 - CONVERGING/DIVERGING SEEK TEST

THIS TEST WILL CAUSE THE DRIVE TO EXECUTE FORWARD AND REVERSE SEEKS FROM "NC1" AND "NC2" RESPECTIVELY, "NC1" WILL BE INCREMENTED BY "IC" AND "NC2" WILL BE DECREMENTED BY "IC" UNTIL "NC1" IS GREATER THAN THE INITIAL VALUE OF "NC2" AND "NC2" IS LESS THAN THE INITIAL VALUE OF "NC1". AT THE COMPLETION OF EACH SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO ENSURE PROPER OPERATION. "NC1" AND "NC2" DEFAULT TO "FC" AND "LC" RESPECTIVELY.
THE FOLLOWING PARAMETERS ARE USED BY THE TEST:

```
R       -         1
FC      -         0
LC      -       822
IC      -         1
FT      -         0
FS      -         0
```

9.7 TEST 6 - SERVO ADDRESSING LOGIC NOISE GENERATOR TEST

IN THIS TEST A SEEk IS DONE TO CYL "NC" THEN A SEEK TO NC+4 THEN NC+1 THEN NC+3 THEN NC+2 THEN NC+5. NOW "NC" IS UPDATED BY "IC" AND THE ABOVE SEQUENCE IS REPEATED UNTIL "LC" IS EXCEEDED BY ANY OF THE ABOVE VALUES. THE INITIAL VALUE OF "NC" IS "FC". AT THE COMPLETION OF EACH SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO ENSURE PROPER OPERATION.

THE FOLLOWING PARAMETERS ARE USED BY THE TEST:

R	-	1
FC	-	0
LC	-	822
IC	-	1
FT	-	0
FS	-	0

9.8 TEST 7 - RANDOM SEEK TEST

THIS TEST PERFORMS RANDOM SEEK OPERATIONS BETWEEN CYLINDERS 'FC' 'LC'. AFTER EACH SEEK, THE POSITION OF THE DRIVE IS VERIFIED BY READING A SECTOR FROM THE CURRENTLY ADDRESSED CYLINDER AND TRACK. THE TRACK ADDRESS IS INCREMENTED FOR EACH SEEk SO THAT VERIFICATION OF POSITIONING OCCURS USING EACH HEAD. TRACK ADDRESSES ARE INCREMENTED BETWEEN PARAMATERS 'FT' AND 'LT'.

THE FOLLOWING PARAMETERS ARE USED BY THE TEST:

R	-	5000
FC	-	0
LC	-	822
FT	-	0
LT	-	18

9.9 TEST 10 - SERVO SETTLE DOWN TEST

THIS TEST VERIFIES THAT THE SERVO HAS SETTLED DOWN AND THAT THE DRIVE IS ON CYLINDER WHEN THE DRIVE INDICATES SEEK COMPLETE. RANDOM SEEKS ARE ISSUED BETWEEN CYLINDERS 'NC1' AND 'NC1+IC' ('NC1' STARTS AT VALUE 'FC'). AT THE COMPLETION OF 1000 (10) SEEKS. 'NC1' IS INCREMENTED BY VALUE 'IC' AND THE SEQUENCE IS REPEATED. THE TEST IS COMPLETED WHEN 'NC1' HAS BEEN INCREMENTED BEYOND 'LC'.

WHEN THE SEEK COMPLETES, THE PROGRAM READS THE DRIVE'S LOOK-AHEAD REGISTER (RMLA) TO DETERMINE THE ADDRESS OF THE SECTOR ROTATING INTO POSITION. THE PROGRAM THEN ISSUES A WRITE HEADER AND DATA COMMAND FOR THAT SECTOR. ERRORS IN THIS TEST INDICATE THAT THE SERVO SYSTEM MAY NOT BE ADJUSTED CORRECTLY, THAT THE DRIVE IS MALFUNCTIONING, OR THAT A PACK WITH MARGINAL SERVO TRACKS IS MOUNTED ON THE DRIVE.

THIS TEST IS VALID ONLY IF THE OPERATION IS STARTED WITHIN A FEW HUNDRED MICRO-SECONDS AFTER SEEK DONE OCCURS. THE NECESSARY TIME DEPENDENT PARAMETERS OCCUR WITHIN THE REQUIRED TIME RANGE FREQUENTLY ENOUGH TO PERMIT THIS TEST TO BE EFFECTIVE.

THE FOLLOWING PARAMETERS ARE USED BY THE TEST:

R	-	1
FC	-	0
LC	-	822
IC	-	100
FT	-	0

9.10 TEST 11 - ALL SEEKS TEST

THIS TEST VERIFIES THAT THE DISK DRIVE CAN SEEK FROM EACH CYLINDER TO ALL OTHER CYLINDERS.

BEGINNING WITH CYLINDER 'FC', THE TEST SEEKS TO EACH CYLINDER BETWEEN 'FC' AND 'LC' FROM CYINDER 'FC'. THE BEGINNING CYLINDER ADDRESS IS INCREMENTED AND THE TEST SEEKS BETWEEN THE NEW CYLINDER ADDRESS AND ALL CYLINDERS BETWEEN 'FC' AND 'LC'. THE SEQUENCE CONTINUES UNTIL ALL CYLINDERS HAVE BEEN CHECKED.

THE FOLLOWING PARAMETERS ARE USED BY THIS TEST:

R	-	1
FC	-	0
LC	-	822
IC	-	1
FT	-	0
FS	-	0

9.11 TEST 12 - 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 ENSURE IT IS WITHIN TOLERANCE:

16.67 MS/REV + 2% OR - 3.5% IF 60HZ
16.67 MS/REV + 2% OR - 3.5% IF 50HZ.

THE FOLLOWING PARAMETERS ARE USED BY THE TEST:

R	-	1
FC	-	0
FT	-	0
FS	-	0

9.12 TEST 13 - ONE CYLINDER SEEK TIMING TEST

THIS TEST WILL COMMAND FORWARD SEEK CYCLES TO ADVANCE THE CYLINDER BY ONE UNTIL THE INCREMENT IS GREATER THAN THE CYLINDER 'LC', THEN REVERSE SEEK TO CYLINDER 'FC'. THE TIME TO PERFORM EACH SEEK IS CHECKED TO ENSURE IT DOES NOT EXCEED THE MAXIMUM TIME PERMITTED FOR A ONE CYLINDER SEEK. THE TIME MUST BE LESS THAN 10MS.

THE TEST USES THE FOLLOWING PARAMETERS:

R	-	1
FC	-	0
LC	-	822

9.13 TEST 14 - ACCESS TIME MEASUREMENT

THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO CYLINDER 'LC', THEN A REVERSE SEEK FROM CYLINDER 'LC' TO CYLINDER 0. BOTH SEEKS ARE TIMED AND CHECKED TO ENSURE THEY ARE WITHIN THE TOLERANCE ALLOWED FOR THE ACCESS TIME MEASURMENT. THIS SEQUENCE IS REPEATED 128 TIMES (FOR A TOTAL OF 256 SEEKS). THE AVERAGE ACCESS TIME MUST BE LESS THAN 32 MS. CYLINDER 'LC' DEFAULTS TO 255 (10).

THE TEST USES THE FOLLOWING PARAMETERS:

R	-	1
FC	-	0
LC	-	255

9.14 TEST 15 - MAXIMUM SEEK TIMING TEST

THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO CYLINDER 'LC', THEN A REVERSE SEEK FROM CYLINDER 'LC' TO CYLINDER 0. BOTH SEEKS ARE TIMED AND CHECKED TO ENSURE THEY ARE WITHIN THE TOLERANCE ALLOWED FOR THE MAXIMUM SEEK TIME. THIS SEQUENCE IS REPEATED 128 TIMES (FOR A TOTAL OF 256 SEEKS). THE MAXIMUM SEEK TIME MUST BE LESS THAN 54 MS. 'LC' DEFAULTS TO 822 (10).

THE TEST USES THE FOLLOWING PARAMETERS:

R	-	1
FC	-	0
LC	-	822

9.15 TEST 16 - 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 - 31 ARE WRITE CHECKED. THEN SECTOR 1 IS REWRITTEN AND SECTORS 0 - 31 ARE WRITE CHECKED. THIS REWRITE AND WRITE CHECK PROCEDURE IS CONTINUED UP THROUGH REWRITE SECTOR 31 AND WRITE CHECK SECTORS 0-31.

THE TEST USES THE FOLLOWING PARAMETERS:

```
        R       -       1
        FC      -       0
        FT      -       0
```

9.16 TEST 17 - TRACK ADDRESSING TEST

THIS TEST WILL WRITE DATA IN THE FORM OF TRACK ADDRESSES
IN CYLINDER "FC" SECTOR "FS" OF EVERY TRACK WITH EACH TRACK
GETTING ITS OWN TRACK ADDRESS.
A WRITE CHECK IS THEN PERFORMED ON EACH TRACK TO INSURE
THE DATA IS VALID. THEN TRACK 0 IS REWRITTEN AND TRACK 1
THROUGH TRACK 4 IS WRITE CHECKED. THEN TRACK 1 IS
REWRITTEN AND TRACK 2 THROUGH TRACK 4 IS WRITE CHECKED.
THIS PROCEDURE IS CONTINUED UP THROUGH REWRITING TRACK 3
AND WRITE CHECKING TRACK 4.

THE TEST USES THE FOLLOWING PARAMETERS:

```
        R       -       1
        FC      -       0
        FS      -       0
```

9.17 TEST 20 - 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

THE TEST USES THE FOLLOWING PARAMETERS:

R	-	1
FC	-	0
LC	-	821
IC	-	64
FT	-	0
LT	-	4
IT	-	1
FS	-	1
LS	-	0
PAT	-	177777

9.18 TEST 21 - RANDOM ADDRESS AND RANDOM PATTERN TEST

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
10. DO A WRITE CHECK OF THE DATA WRITTEN IN 2

THE TEST USES THE FOLLOWING PARAMETERS:

R	-	20000

FC - 0
LC - 821

9.19 TEST 22 - RM03 ACCESS TIME TEST

THIS TEST PERFORMS SEEKS BETWEEN CYLINDERS 0 & 255 TO ALLOW THE OPERATOR TO ADJUST THE ACCESS TIME ON AN RM03 USING THE DDU. THE PROGRAM STALLS APPROXIMATELY 5 SECONDS BETWEEN SEEKS SO THAT THE ACCESS TIME INDICATORS ON THE DDU MAY BE OBSERVED.

THE TEST USES THE FOLLOWING PARAMETERS:

R - 5000
FC - 0
LC - 255

I D E N T I F I C A T I O N

PRODUCT NAME: RM03 SOFTWARE DRIVER MODULE

DATE CREATED: AUGUST 1977

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: J. LACEY/C. HESS/C. CHEN

10.1 RH70/RM03 DRIVER MODULE

SEQ 0025

THIS DOCUMENT IS THE USER'S GUIDE FOR THE RH70/RM03 DRIVER.

10.2 TO INITIALIZE THE DRIVER:

```
        JSR     PC,R%INIT
        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:

DRVSTA	DRIVE STATE
>0	ONLINE RM03
=0	OFFLINE RM03, DRIVE IS NOT AN RM03, OR NONEXISTENT DRIVE
<0	UNSAFE RM03

THE DRIVE TYPE IS DEFINED IN AN 8 BYTE LONG TABLE TAGGED 'DRVTYP'. THE TABLE CONTAINS ONE BYTE FOR EACH DRIVE AND IS INDEXED BY THE DRIVE NUMBER. ENTRIES ARE ENCODED AS FOLLOWS.

DRVTYP	CONDITION
0	NONEXISTENT DRIVE
4	RM03
-1	NOT AN RM03

THE 'RMINIT' ROUTINE WILL DO A READIN PRESET AND WILL SET FMT22.

10.3 AFTER THE DRIVER HAS BEEN INITIALIZED, IT IS CALLED USING THE FOLLOWING SEQUENCE.

CALL:

```
        JSR     R0,RM03         ;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 O? 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/RM03
                                    ;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
```

10.4 THE DRIVER PROVIDES A SOFTWARE TIMEOUT CAPABILITY.
TO UTILIZE THIS CAPABILITY YOU MUST SUPPLY THE "RM TIMER" ROUTINE
WITH THE ELAPSED TIME IN THE FOLLOWING MANNER:

```
        MOV     #16.,-(SP)      ;16 MILLISECONDS BETWEEN
                                ;CLOCK TICKS
        JSR     PC,RMTMR        ;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.

10.4.1 EXAMPLE - WRITE 1000. WORDS

```
1$:     JSR     R0,RM03         ;CALL THE DRIVER
        WRTDPB                  ;DPB ADDRESS
        BR      1$              ;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   ERRTBS          ;ERROR TABLE
        .WORD   0               ;STATUS/ERROR INDICATOR

        ALTERNATE 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,ERRTBS,0                                    SEQ 0028
```

10.5 RH70 RM03 REGISTERS

MNEMONIC	INDEX
RMCS1	0
RMWC	2
RMBA	4
RMDA	6
RMCS2	10
RMDS	12
RMER1	14
RMAS	16
RMLA	20
RMDB	22
RMMR1	24
RMDT	26
RMSN	30
RMOF	32
RMDC	34
RMHA	36
RMMR2	40
RMER2	42
RMEC1	44
RMEC2	46

10.6 COMMANDS PERFORMED BY THE DRIVER

COMMAND	CODE	COMMAND TYPE
NO OPERATION	101	N
UNLOAD	103	N
SEEK	105	P
RECALIBRATE	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
GET REGISTER(S)	141	S
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

10.7 DPB STATUS/ERROR INDICATOR WORD

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 .	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)	UNCORRECTABLE 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
9 3) (4)	SOFTWARE TIMEOUT OCCURRED ON THIS DRIVE
8 (4)	SOFTWARE TIMEOUT OCCURRED ON ANOTHER DRIVE
7	DONE
6 (2)	ERROR OCCURRED DURING AN I/O OPERATION
5 2)	ERROR OCCURRED DURING AN OPERATION OTHER THAN I/O.

4(2)	CORRECTABLE UNSAFE CONDITION OCCURRED
3(2)	DRIVE ERROR OCCURRED THAT CAUSED AN AUTOMATIC "RECALIBRATE" SEQUENCE
2	PORT REQUEST TIMEOUT. THE DRIVER REQUESTED THE DRIVE BUT THE OPPOSITE PORT DID NOT RELEASE THE DRIVE WITHIN 20 SECONDS.
1	NON-EXISTENT DRIVE REQUESTED. USER MADE A REQUEST FOR A NON-EXISTENT DRIVE.
(1) =>	REQUEST WASN'T PUT IN QUEUE. (rh70/RM03 REGISTERS WERE NOT SAVED)
(2) =>	REQUEST QUEUE HAS BEEN EMPTIED. THE DRIVER ISSUED A "DRIVE CLEAR" TO THE DRIVE. NOTE: ALL rh70/RM03 REGISTERS ARE SAVED AS PER DPB+14 BEFORE THE "DRIVE CLEAR".
(3) =>	REQUEST QUEUE HAS BEEN EMPTIED. THE DRIVER ISSUED A MASSBUS INIT. ALL rh70/RM03 REGISTERS FOR THE DRIVE WERE SAVED AS PER DPB+14 BEFORE THE INIT.
(4) =>	A "RECALIBRATE" SHOULD BE ISSUED BEFORE ANY OTHER COMMAND.

10.8 ERROR CALLS MADE BY THE DRIVER.

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

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	RH70 INTERRUPT OCCURRED (RHAS=0)	*R4= RMCS1'S ADDRESS
2	UNEXPECTED ATTENTION OCCURRED	R1= DRIVE NUMBER R3= ATA BIT *R4= RMCS1'S ADDRESS R5= (RMAS) RMERRS =RMDS RMERRS+2=RMER1 RMERRS+4=RMER2 RMERRS+6=RMMR2
3	MASSBUS PARITY ERROR (MCPF=1)	RD.ADR= ADDRESS OF REG. READ RD.WRD= WORD READ
4	MASSBUS PARITY ERROR (PAR=1)	WRT.AD= ADDRESS OF REG. WRITTEN WRT.WD= WORD WRITTEN RD.WRD= WORD READ BACK
5	ADDRESS PLUG CHANGE	R1= DRIVE NUMBER

```
        BIT SET ('OPE' ERROR)     R3= ATA BIT
                                 *R4= RMCS1'S ADDRESS                    SEQ 0031
                                  R5= (RMAS)
                                  RMERRS   =RMDS
                                  RMERRS+2=RMER1
                                  RMERRS+4=RMER2
                                  RMERRS+6=RMMR2
```

* THIS IS THE ACTUAL UNIBUS ADDRESS (176700)

11. PROGRAM LISTING

```
                        .TITLE  MD-11-DZRMF-B RM03/RM02 EXTENDED DRIVE TEST
                        ;*COPYRIGHT (C) 1977
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY H. BLACKSTONE
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-'1-DZQAC-C3), JAN 19, 1977.
                        ;*
```

```
                        .SBTTL  CONTROL SWITCH SETTINGS
                        ;*
                        ;*     SWITCH  STATE              USE
                        ;*     ------  -----  -----------------------------------
                        ;*       15      0    WRITE PACK BEFORE TESTING (TEST 21)
                        ;*               1    INHIBIT WRITING PACK BEFORE TESTING (TEST 21)
                        ;*       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 0-11
                        ;*               1    DO EXPLICIT SEEKS IN TESTS 0-11
                        ;*        6      0    60 HZ
                        ;*               1    50 HZ
                        ;*        5      0    RUN WATCHDOG TIMER
                        ;*               1    INHIBIT WATCHDOG TIMER
                        ;*        0      0    TEST DRIVE(S) IN 22 SECTOR (16 BIT) MODE
                        ;*               1    TEST DRIVE(S) IN 20 SECTOR (18 BIT) MODE

                        .SBTTL  OPERATIONAL SWITCH SETTINGS
                        ;*
                        ;*     SWITCH              USE
                        ;*     ------  -------------------
                        ;*       15    HALT ON ERROR
                        ;*       14    LOOP ON TEST
                        ;*       13    INHIBIT ERROR TYPEOUTS
                        ;*       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 12-15)
                        ;*        5    REPORT ONE ERROR PER SECTOR (TESTS 16 & 17)
                        ;*        4    INHIBIT WRITES (TEST 15)
                        ;*        3    INHIBIT WRITE CHECKS (TEST 20)
                        ;*        2    INHIBIT READ AND SOFTWARE COMPARES (TEST 20)
                        ;*        1    INHIBIT SOFTWARE COMPARES (TEST 20)
                        ;*        0    PERFORM READ AFTER WRITE CHECK ERROR (TEST 20.

                        .SBTTL  TRAP CATCHER

            000000              .=0
                        ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                        ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                        ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
            000174              .=174
  000174    000000    DISPREG: .WORD  0                ;;SOFTWARE DISPLAY REGISTER
  000176    000000    SWREG:   .WORD  0                ;;SOFTWARE SWITCH REGISTER

                        .SBTTL  ACT11 HOOKS

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

```
                        ;HOOKS REQUIRED BY ACT11
000200                          $SVPC=.                 ;SAVE PC
000046                          .=46
000046  021300                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
000052                          .=52
000052  000000                  .WORD   0               ;;2)SET LOC.52 TO ZERO
000200                          .=$SVPC                 ;; RESTORE PC

                        .SBTTL  STARTING ADDRESSES
000200                  .=200
                        ;*200 = NORMAL START
000200  000137  004740          JMP     @#START1
                        ;*204 = SELECT OPERATING PARAMETERS
000204  000137  004762          JMP     @#START2
                        ;*210 = SELECT RH70/RM03 ADDRESSES
000210  000137  004730          JMP     @#START3
                        ;*214 = COMBINATION OF 204 AND 210
000214  000137  004752          JMP     @#START4

                        .SBTTL  BASIC DEFINITIONS

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

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

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

                        ;*PRIORITY LEVEL DEFINITIONS
000000                  PR0=    0               ;;PRIORITY LEVEL 0
000040                  PR1=    40              ;;PRIORITY LEVEL 1
000100                  PR2=    100             ;;PRIORITY LEVEL 2
000140                  PR3=    140             ;;PRIORITY LEVEL 3
000200                  PR4=    200             ;;PRIORITY LEVEL 4
```

```
                        ;
                        ;
                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
000002                  SW01=   2
000001                  SW00=   1
                        .EQUIV  SW09,SW9
                        .EQUIV  SW08,SW8
                        .EQUIV  SW07,SW7
                        .EQUIV  SW06,SW6
                        .EQUIV  SW05,SW5
                        .EQUIV  SW04,SW4
                        .EQUIV  SW03,SW3
                        .EQUIV  SW02,SW2
                        .EQUIV  SW01,SW1
                        .EQUIV  SW00,SW0
                        ;
                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15=  100000
040000                  BIT14=  40000
020000                  BIT13=  20000
010000                  BIT12=  10000
004000                  BIT11=  4000
002000                  BIT10=  2000
001000                  BIT09=  1000
000400                  BIT08=  400
000200                  BIT07=  200
000100                  BIT06=  100
000040                  BIT05=  40
000020                  BIT04=  20
000010                  BIT03=  10
000004                  BIT02=  4
000002                  BIT01=  2
000001                  BIT00=  1
                        .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  RH70 REGISTERS

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

                        ;CONTROL AND STATUS REGISTER 1 (RMCS1)

000100                  IE=     100             ;INTERRUPT ENABLE (BIT #6)
000200                  RDY=    200             ;READY (BIT #7)
000400                  A16=    400             ;HIGH ORDER BUS ADDRESS BIT (BIT #8)
001000                  A17=    1000            ;HIGH ORDER BUS ADDRESS BIT (BIT #9)
002000                  PSEL=   2000            ;PORT SELECT (BIT #10)
020000                  MCPE=   20000           ;MASSBUSS PARITY ERROR (BIT #13)
040000                  TRE=    40000           ;TRANSFER ERROR (BIT #14)
                        ;SC=    100000          ;SPECIAL CONDITION (BIT #15)

                        ;WORD COUNT REGISTER (RMWC)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)

                        ;BUS ADDRESS REGISTER (RMBA)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)

                        ;CONTROL AND STATUS REGISTER 2 (RMCS2)

000001                  US1=    1               ;UNIT SELECT (BIT #0)
000002                  US2=    2               ;UNIT SELECT (BIT #1)
000004                  US4=    4               ;UNIT SELECT (BIT #2)
000010                  BAI=    10              ;BUS ADDRESS INCREMENT INHIBIT (BIT #3)
                        ;PAT=   20              ;MASSBUS PARITY TEST (BIT #4)
000040                  CLR=    40              ;CLEAR (BIT #5)
000100                  IR=     100             ;INPUT READY (BIT #6)
000200                  OR=     200             ;OUTPUT READY (BIT #7)
000400                  MPE=    400             ;MASS BUS PARITY ERROR (BIT #8)
001000                  MXF=    1000            ;MISSED TRANSFER ERROR (BIT #9)
002000                  PGE=    2000            ;PROGRAM ERROR (BIT #10)
004000                  NEM=    4000            ;NON EXISTENT MEMORY (BIT #11)
010000                  NED=    10000           ;NON EXISTENT DRIVE (BIT #12)
020000                  UPE=    20000           ;UNIBUS PARITY ERROR (BIT #13)
```

```
                        WCE=    40000           ;WRITE CHECK ERROR (BIT #14)
                        DLT=    100000          ;DATA LATE (BIT #15)

                        ;DATA BUFFER REGISTER (RMDB)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)


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

                        .SBTTL  RM03 REGISTERS

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

                        ;CONTROL AND STATUS 1 REGISTER. (#00)

                        GO=     1               ;GO BIT (BIT #0)
                        F1=     2               ;FUNCTION CODE BIT #1
                        F2=     4               ;FUNCTION CODE BIT #2
                        F3=     10              ;FUNCTION CODE BIT #3
                        F4=     20              ;FUNCTION CODE BIT #4
                        F5=     40              ;FUNCTION CODE BIT #5
                        DVA=    4000            ;DEVICE AVAILABLE (BIT #11)

                        ;DRIVE STATUS REGISTER (RMDS) (#01)

                        OM=     1               ;
                        VV=     100             ;VOLUME VALID (BIT #6)
                        DRY=    200             ;DRIVE READY (BIT #7)
                        DPR=    400             ;DRIVE PRESENT (BIT #8)
                        PGM=    1000            ;PROGRAMABLE (BIT #9)
                        LST=    2000            ;LAST SECTOR TRANSFERRED (BIT #10)
                        WRL=    4000            ;WRITE LOCK (BIT #11)
                        MOL=    10000           ;MEDIUM ON-LINE (BIT #12)
                        PIP=    20000           ;POSITIONING OPERATION IN PROGRESS (BIT #13)
                        ERR=    40000           ;COMPOSITE ERROR (BIT #14)
                        ATA=    100000          ;ATTENTION ACTIVE (BIT #15)

                        ;ERROR REGISTER #01 (RMER1) (#02)

                        ILF=    1               ;ILLEGAL FUNCTION (BIT #0)
                        ILR=    2               ;ILLEGAL REGISTER (BIT #1)
                        RMR=    4               ;REGISTER MODIFICATION REFUSED (BIT #2)
                        PAR=    10              ;PARITY ERROR (BIT #3)
                        FER=    20              ;FORMAT ERROR (BIT #4)
                        WCF=    40              ;WRITE CLOCK FAIL (BIT #5)
                        ECH=    100             ;ECC HARD ERROR (BIT #6)
                        HCE=    200             ;HEADER COMPARE ERROR (BIT #7)
                        HCRC=   400             ;HEADER CRC ERROR (BIT #8)
                        AOE=    1000            ;ADDRESS OVERFLOW ERROR (BIT #9)
                        IAE=    2000            ;INVALID ADDRESS ERROR (BIT #10)
                        WLE=    4000            ;WRITE LOCK ERROR (BIT #11)
                        DTE=    10000           ;DRIVE TIMING ERROR (BIT #12)
                        OPI=    20000           ;OPERATION INCOMPLETE (BIT #13)
                        UNS=    40000           ;DRIVE UNSAFE (BIT #14)
                        DCK=    100000          ;DATA CHECK ERROR (BIT 15
```

```
                        ;MAINTAINABILITY REGISTER #01 (RMMR1)(#03) - READ ONLY BITS

000001                  DMD=    1                       ;DIAGNOSTIC MODE
000002                  LSIT=   2
                        ;LS=4
000010                  WD=     10
000020                  EECC=   20
000040                  WC=     40
000100                  CONT=   100
000200                  PHA=    200
000400                  PDA=    400
001000                  ECRC=   1000
002000                  PLFS=   2000
004000                  ESRC=   4000
010000                  REX=    10000
020000                  EBL=    20000
                        ;R/G=   40000
100000                  OCC=    100000

                        ;MAINTAINABILITY REGISTER #01 (RMMR1) (#03) - WRITE ONLY BITS

000001                  DMD=    1                       ;DIAGNOSTIC MODE BIT
000002                  MSC=    2
000004                  MI=     4
000010                  MWP=    10
000020                  DTG=    20
000040                  MS=     40
000100                  MDF=    100
000200                  MSER=   200
000400                  MOC=    400
001000                  MUR=    1000
002000                  MRD=    2000
004000                  MCLK=   4000
010000                  MSEN=   10000
020000                  DTO=    20000
040000                  OBEN=40000
100000                  OBCK=   100000

                        ;ATTENTION SUMMARY PSEUDO-REGISTER (RMAS) (#04)

000001                  AT0=    1                       ;DEVICE 0 (BIT #0)
000002                  AT1=    2                       ;DEVICE 1 (BIT #1)
000004                  AT2=    4                       ;DEVICE 2 (BIT #2)
000010                  AT3=    10                      ;DEVICE 3 (BIT #3)
000020                  AT4=    20                      ;DEVICE 4 (BIT #4)
000040                  AT5=    40                      ;DEVICE 5 (BIT #5)
000100                  AT6=    100                     ;DEVICE 6 (BIT #6)
000200                  AT7=    200                     ;DEVICE 7 (BIT #7)

                        ;DESIRED SECTOR/TRACK ADDRESS REGISTER (RMDA) (#05)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)

                        ;DRIVE TYPE REGISTER (RMDT) (#06)

000001                  DT00=   1                       ;DRIVE TYPE NUMBER BIT 1
000002                  DT01=   2                       ;DRIVE TYPE NUMBER BIT 2
```

```
                        DT02=   4                       ;DRIVE TYPE NUMBER BIT 3
                        DT03=   10                      ;DRIVE TYPE NUMBER BIT 4
                        DT04=   20                      ;DRIVE TYPE NUMBER BIT 5
                        DT05=   40                      ;DRIVE TYPE NUMBER BIT 6
                        DT06=   100                     ;DRIVE TYPE NUMBER BIT 7
                        DT07=   200                     ;DRIVE TYPE NUMBER BIT 8
                        DT08=   400                     ;DRIVE TYPE NUMBER BIT 9
                        DRQ=    4000                    ;DRIVE REQUEST REQUIRED (BIT #11)
                        MOH=    20000                   ;MOVING HEAD (BIT #13)
                        TAP=    40000                   ;TAPE DRIVE (BIT #14)
                        NBA=    100000                  ;NOT BLOCK ADDRESSED (BIT #15)

                        ;LOOK-AHEAD REGISTER (RMLA) (#07)

                        SC0=    100                     ;SECTOR COUNT FIELD 0 (BIT #6)
                        SC1=    200                     ;SECTOR COUNT FIELD 1 (BIT #7)
                        SC2=    400                     ;SECTOR COUNT FIELD 2 (BIT #8)
                        ;SC3=   1000                    ;SECTOR COUNT FIELD 3 (BIT #9)
                        ;SC4=   2000                    ;SECTOR COUNT FIELD 4 (BIT #10)

                        ;RM03 MAINTAINABILITY REGISTER #2 (RMMR2) (#10)

                        ;RM03 ERROR REGISTER #02 (RMMR2) (#10)

                        ;OFFSET REGISTER (RMOF) (#11)

000001                  OFFDIR= 1                       ;RM03 OFFSET DIRECTION
002000                  HCI=    2000                    ;HEADER COMPARE INHIBIT (BIT #10)
004000                  ECI=    4000                    ;ERROR CORRECTION CODE INHIBIT (BIT #11)
010000                  FMT22=  10000                   ;FORMAT BIT (BIT #12

                        ;DESIRED CYLINDER ADDRESS (RMDC) (#12)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)
```

```
                        ;CURRENT CYLINDER ADDRESS (RMHR) (#13)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)

                        ;SERIAL NUMBER REGISTER (RMSN) (#14)
                        ;(EACH IS CALLED BY BIT NUMBER)


                        ;RM03 ERROR REGISTER #02 (RMER2) (#15)


020000                  OPE=    20000                   ;OPERATOR PLUG ERROR (BIT #13)
040000                  SKI=    40000                   ;SEEK INCOMPLETE (BIT #15)

                        ;ECC POSITION REGISTER (RMEC1) (#16)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)

                        ;ECC PATTERN REGISTER (RMEC2) (#17)
                        ;(EACH BIT IS CALLED BY BIT NUMBER)

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

                        ;OP CODE DEFINITIONS
000101                  NOOP=101
000103                  UNLOAD=103
000105                  SEEK=105
000107                  RECAL=107
000111                  DRVCLR=111
000113                  RELEASE=113
000115                  OFFSET=115
000117                  RTC=117
000121                  READIN=121
000123                  PACK=123
000131                  SEARCH=131
000151                  WRCKD=151
000153                  WRCKHD=153
000161                  WRITE=161
000163                  WRTHD=163
000171                  READ=171
000173                  READHD=173
000141                  GETREG=141
000142                  SETFORM=143
000145                  SELDRV=145

                        ;OTHER EQUATES

177400                  SCTRWC = -256.                  ;WORD COUNT FOR SECTOR
010000                  FMT22=10000                     ;FORMAT 22 BIT
```

```
                                .SBTTL  APT PARAMETER BLOCK

                                ;;*****************************************************************
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;*****************************************************************
000220                                  .$x=.       ;;SAVE CURRENT LOCATION
000024                                  .=24        ;;SET POWER FAIL TO POINT TO START OF PROGRAM
000024  000200                          200         ;;FOR APT START UP
000044                                  .=44        ;;POINT TO APT INDIRECT ADDRESS PNTR.
000044  000220                          $APTHDR     ;;POINT TO APT HEADER BLOCK
000220                                  .=.$X       ;;RESET LOCATION COUNTER
                                ;;*****************************************************************
                                ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                ;INTERFACE SPEC.

000220                          $APTHD:
000220  000000                  $HIBTS: .WORD   0           ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
000222  001220                  $MBADR: .WORD   $MAIL       ;;ADDRESS OF APT MAILBOX (BITS 0-15)
000224  001604                  $TSTM:  .WORD   900.        ;;RUN TIM OF LONGEST TEST
000226  001604                  $PASTM: .WORD   900.        ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
000230  001604                  $UNITM: .WORD   900.        ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
000232  000030                          .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS.
```

```
                                .SBTTL  COMMON TAGS

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

001100                                  .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                  .WORD   0
001102  000                     $TSTNM: .BYTE   0       ;;CONTAINS THE TEST NUMBER
001103  000                     $ERFLG: .BYTE   0       ;;CONTAINS ERROR FLAG
001104  000000                  $ICNT:  .WORD   0       ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000                  $LPADR: .WORD   0       ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000                  $LPERR: .WORD   0       ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000                  $ERTTL: .WORD   0       ;;CONTAINS TOTAL ERRORS DETECTED
001114  000                     $ITEMB: .BYTE   0       ;;CONTAINS ITEM CONTROL BYTE
001115  001                     $ERMAX: .BYTE   1       ;;CONTAINS MAX. ERRORS PER TEST
001116  000000                  $ERRPC: .WORD   0       ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000                  $GDADR: .WORD   0       ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000                  $BDADR: .WORD   0       ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000                  $GDDAT: .WORD   0       ;;CONTAINS 'GOOD' DATA
001126  000000                  $BDDAT: .WORD   0       ;;CONTAINS 'BAD' DATA
001130  000000                          .WORD   0       ;;RESERVED--NOT TO BE USED
001132  000000                          .WORD   0
001134  000                     $AUTOB: .BYTE   0       ;;AUTOMATIC MODE INDICATOR
001135  000                     $INTAG: .BYTE   0       ;;INTERRUPT MODE INDICATOR
001136  000000                          .WORD   0
001140  177570                  SWR:    .WORD   DSWR    ;;ADDRESS OF SWITCH REGISTER
001142  177570                  DISPLAY: .WORD  DDISP   ;;ADDRESS OF DISPLAY REGISTER
001144  177560                  $TKS:   177560          ;;TTY KBD STATUS
001146  177562                  $TKB:   177562          ;;TTY KBD BUFFER
001150  177564                  $TPS:   177564          ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566                  $TPB:   177566          ;;TTY PRINTER BUFFER REG. ADDRESS
001154  000                     $NULL:  .BYTE   0       ;;CONTAINS NULL CHARACTER FOR FILLS
001155  002                     $FILLS: .BYTE   2       ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156  012                     $FILLC: .BYTE   12      ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157  000                     $TPFLG: .BYTE   0       ;;"TERMINAL AVAILABLE" FLAG (BIT 07)=0=YES)
001160  000000                  $REGAD: .WORD   0       ;;CONTAINS THE ADDRESS FROM
                                                        ;;WHICH  ($REG0) WAS OBTAINED
001162  000000                  $REG0:  .WORD   0       ;;CONTAINS (($REGAD)+0)
001164  000000                  $REG1:  .WORD   0       ;;CONTAINS (($REGAD)+2)
001166  000000                  $REG2:  .WORD   0       ;;CONTAINS (($REGAD)+4)
001170  000000                  $REG3:  .WORD   0       ;;CONTAINS (($REGAD)+6)
001172  000000                  $REG4:  .WORD   0       ;;CONTAINS (($REGAD)+10)
001174  000000                  $REG5:  .WORD   0       ;;CONTAINS (($REGAD)+12)
001176  000000                  $TMP0:  .WORD   0       ;;USER DEFINED
001200  000000                  $TMP1:  .WORD   0       ;;USER DEFINED
001202  000000                  $TMP2:  .WORD   0       ;;USER DEFINED
001204  000000                  $TIMES: 0               ;;MAX  NUMBER OF ITERATIONS
001206  000000                  $ESCAPE:0               ;;ESCAPE ON ERROR ADDRESS
001210  177607  000377          $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001214  077                     $QUES:  .ASCII  /?/     ;;QUESTION MARK
001215  015                     $CRLF:  .ASCII  <15>    ;;CARRIAGE RETURN
001216  000012                  $LF:    .ASCIZ  <12>    ;;LINE FEED
                                ;;*****************************************************************
                                .SBTTL  APT MAILBOX-ETABLE
```

```
                                ;;*****************************************************************
                                .EVEN
001220                          $MAIL:                          ;;APT MAILBOX
001220  000000                  $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
001222  000000                  $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
001224  000000                  $TESTN: .WORD   ATESTN          ;;TEST NUMBER
001226  000000                  $PASS:  .WORD   APASS           ;;PASS COUNT
001230  000000                  $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
001232  000000                  $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
001234  000000                  $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
001236  000000                  $MSGLG: .WORD   AMSGLG          ;;MESSAGE LENGTH
001240                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
001240  000                     $ENV:   .BYTE   AENV            ;;ENVIRONMENT BYTE
001241  000                     $ENVM:  .BYTE   AENVM           ;;ENVIRONMENT MODE BITS
001242  000000                  $SWREG: .WORD   ASWREG          ;;APT SWITCH REGISTER
001244  000000                  $USWR:  .WORD   AUSWR           ;;USER SWITCHES
001246  000000                  $CPUOP: .WORD   ACPUOP          ;;CPU TYPE,OPTIONS
                                ;*                              BITS 15-11=CPU TYPE
                                ;*                                      11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
                                ;*                                      11/70=06,PDQ=07,Q=10
                                ;*                              BIT 10=REAL TIME CLOCK
                                ;*                              BIT  9=FLOATING POINT PROCESSOR
                                ;*                              BIT  8=MEMORY MANAGEMENT
001250  000                     $MAMS1: .BYTE   AMAMS1          ;;HIGH ADDRESS,M.S. BYTE
001251  000                     $MTYP1: .BYTE   AMTYP1          ;;MEM. TYPE,BLK#1
                                ;*                              MEM.TYPE BYTE   --  (HIGH BYTE)
                                ;*                                      900 NSEC CORE=001
                                ;*                                      300 NSEC BIPOLAR=002
                                ;*                                      500 NSEC MOS=003
001252  000000                  $MADR1: .WORD   AMADR1          ;;HIGH ADDRESS,BLK#1
                                ;*                              MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
001254  000                     $MAMS2: .BYTE   AMAMS2          ;;HIGH ADDRESS,M.S. BYTE
001255  000                     $MTYP2: .BYTE   AMTYP2          ;;MEM.TYPE,BLK#2
001256  000000                  $MADR2: .WORD   AMADR2          ;;MEM.LAST ADDRESS,BLK#2
001260  000                     $MAMS3: .BYTE   AMAMS3          ;;HIGH ADDRESS,M.S.BYTE
001261  000                     $MTYP3: .BYTE   AMTYP3          ;;MEM.TYPE,BLK#3
001262  000000                  $MADR3: .WORD   AMADR3          ;;MEM.LAST ADDRESS,BLK#3
001264  000                     $MAMS4: .BYTE   AMAMS4          ;;HIGH ADDRESS,M.S.BYTE
001265  000                     $MTYP4: .BYTE   AMTYP4          ;;MEM.TYPE,BLK#4
001266  000000                  $MADR4: .WORD   AMADR4          ;;MEM.LAST ADDRESS,BLK#4
001270  000000                  $VECT1: .WORD   AVECT1          ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
001272  000000                  $VECT2: .WORD   AVECT2          ;;INTERRUPT VECTOR#2BUS PRIORITY#2
001274  000000                  $BASE:  .WORD   ABASE           ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
001276  000000                  $DEVM:  .WORD   ADEVM           ;;DEVICE MAP
001300                          $ETEND:
                                .MEXIT
                        000015  CR      =       15
                        000012  LF      =       12
001300  000000                  C.SWR:  .WORD   0               ;CONTROL SWITCHES
001302  000000                  SAVCSW: .WORD   0               ;PREVIOUS CONTENTS OF 'C.SWR'
001304  000000                  CNTRLC: .WORD   0               ;CONTROL "C" FLAG
001306  000000                  BUSADR: .WORD   0               ;GET ADDRESSES FROM THE TTY FLAG (0=NO, -1=YES)
001310  000000                  LPTAVL: .WORD   0               ;LPT AVAILABLE STATUS (0=NO,1=YES)
001312  000000                  DRVSEL: .WORD   0               ;DRIVES SELECTED FOR TESTING
001314  176777  000003          TSTNMS: .WORD   176777.3        ;DEFAULT IS RUN TESTS 0-10 & 12-21
```

```
                                ;MODIFY TEST PARAMETER FLAGS
                                ;CLOCK STATUS (0=NO CLOCK,+1=KW11-P,
                                ;AND -1=KW11-L)
                                ;16 MILLISECONDS PER CLOCK TICK
                                ;16666 MIRCOSECONDS PER CLOCK TICK

                                ;DRIVE UNDER TEST
                                ;DRIVE MASK BIT
                                ;STATUS/ERROR INDICATOR IS
                                ;SAVED HERE ON AN ERROR
                                ;CYLINDER READ
                                ;TRACK READ
                                ;SECTOR READ
                                ;CYLINDER DESIRED
                                ;SECTOR DESIRED
                                ;TRACK DESIRED
                                ;MINIMUM TIME
                                ;NUMBER OF COUNTS BELOW MIN. LIMIT
                                ;MAXIMUM TIME
                                ;NUMBER OF COUNTS ABOVE MAX. LIMIT
                                ;TOTAL TIME OF ALL SEEKS
                                ;NUMBER OF SEEKS PERFORMED
                                ;MINIMUM TIME
                                ;NUMBER OF COUNTS BELOW MIN. LIMIT
                                ;MAXIMUM TIME
                                ;NUMBER OF COUNTS ABOVE MAX. LIMIT
                                ;TOTAL TIME OF ALL SEEKS
                                ;NUMBER OF SEEKS PERFORMED
                                ;POINTS TO TABLE OF TIMES
                                ;FATAL WRITE CHECK ERROR FLAG (TEST 20)
                                ;VARIABLE STALL (TEST 4)
                                ;SAVE DISK ADDRESS (TEST 22)
                                ;SEEK TIMER  (TEST 10)
                                ;SEEK COUNTER
                                ;TESTING RANGE FOR SERVO SETTLE DOWN TEST
                                ;WORD COUNT FOR A FULL TRACK IN 16 BIT MODE
                                ;10 MILLISECONDS STALL (TEST 0-11)
                                ;10 MILLISECONDS STALL (TEST 16-21)
                                ;5 SEC STALL (TEST 22)
                                ;MAX. INCREMENTING STALL ALLOWED IN TEST 4
                                ;NUMBER OF ERRORS ALLOWED IN TESTS 16 - 21
                                ;BEFORE GOING TO THE NEXT TEST
                                ;RESERVED
                        ;FLAG FOR DETECTING BAD SECTOR

                        ;ADDRESSES AND VECTORS
                                ;RH70 UNIBUS ADDRESS
                                ;RH70 VECTOR ADDRESS AND PRIORITY
                                ;KW11-P VECTOR ADDRESS
                                ;KW11-P CONTROL AND STATUS REG.
                                ;KW11-P COUNT SET BUFFER
                                ;KW11-P COUNTER
                                ;KW11-L VECTOR ADDRESS
                                ;KW11-L STATUS REGISTER
                                ;TTY PRINTER STATUS
                                ;TTY PRINTER BUFFER
```

```
                                LPS:    .WORD   177514          ;LINE PRINTER STATUS
                                LPB:    .WORD   177516          ;LINE PRINTER BUFFER

                                ;BIT TABLE
001506  000001                  BITS:   .WORD   BIT00
001510  000002                          .WORD   BIT01
001512  000004                          .WORD   BIT02
001514  000010                          .WORD   BIT03
001516  000020                          .WORD   BIT04
001520  000040                          .WORD   BIT05
001522  000100                          .WORD   BIT06
001524  000200                          .WORD   BIT07
001526  000400                          .WORD   BIT08
001530  001000                          .WORD   BIT09
001532  002000                          .WORD   BIT10
001534  004000                          .WORD   BIT11
001536  010000                          .WORD   BIT12
001540  020000                          .WORD   BIT13
001542  040000                          .WORD   BIT14
001544  100000                          .WORD   BIT15
001546  000001                          .WORD   BIT00
001550  000002                          .WORD   BIT01
001552  000004                          .WORD   BIT02
001554  000010                          .WORD   BIT03
001556  000020                          .WORD   BIT04
001560  000040                          .WORD   BIT05
001562  000100                          .WORD   BIT06
001564  000200                          .WORD   BIT07

                                ;COMMON STORAGE FOR TEST PARAMETER
001566  000000                  PRM:    .WORD   0               ;THIS WORD TELLS WHICH OF THE
                                                                ;FOLLOWING PARAMETERS ARE TO BE USED
001570  000000                  RPT:    .WORD   0               ;REPEAT COUNTS FOR ALL TESTS
001572  000000                  FC:     .WORD   0               ;FIRST CYLINDER
001574  000000                  LC:     .WORD   0               ;LAST CYLINDER
001576  000000                  IC:     .WORD   0               ;INCREMENT CYLINDER
001600  000000                  FT:     .WORD   0               ;FIRST TRACK
001602  000000                  LT:     .WORD   0               ;LAST TRACK
001604  000000                  IT:     .WORD   0               ;INCREMENT TRACK
001606  000000                  FS:     .WORD   0               ;FIRST SECTOR
001610  000000                  LS:     .WORD   0               ;LAST SECTOR
001612  000000                  PAT:    .WORD   0               ;PATTERN CODE
001614  000000                  NC1:    .WORD   0               ;NEW CYLINDER ADDRESS
001616  000000                  NC2:    .WORD   0               ;NEW CYLINDER ADDRESS

                                ;TABLE OF PARAMETER POINTERS
001620  002412                  PRMPT:  .WORD   PRM0
001622  002426                          .WORD   PRM1
001624  002454                          .WORD   PRM2
001626  002476                          .WORD   PRM3
001630  002520                          .WORD   PRM4
001632  002542                          .WORD   PRM5
001634  002564                          .WORD   PRM6
001636  002606                          .WORD   PRM7
001640  002626                          .WORD   PRM10
```

```
                                        .WORD   PRM11
                                        .WORD   PRM12
                                        .WORD   PRM13
                                        .WORD   PRM14
                                        .WORD   PRM15
                                        .WORD   PRM16
                                        .WORD   PRM17
                                        .WORD   PRM20
                                        .WORD   PRM21
                                        .WORD   PRM22
                                        .WORD   0               ;TERMINATOR

                                ;TABLE OF PARAMETER UPPER LIMITS
PRMLMT:                         .WORD   32767           ;"R"
                                .WORD   822.            ;"FC"
                                .WORD   822.            ;"LC"
                                .WORD   822.            ;"FC'"
                                .WORD   822.            ;"LC'"
                                .WORD   822.            ;"IC"
                                .WORD   4               ;"FT"
                                .WORD   4               ;"LT"
                                .WORD   4               ;"IT"
                                .WORD   31.             ;"FS"
                                .WORD   31.             ;"LS"
                                .WORD   177777          ;"PAT"

                                ;TABLE OF MESSAGE POINTERS
PRMMSG:                         .WORD   MSG.R
                                .WORD   MSG.FC
                                .WORD   MSG.LC
                                .WORD   MSGFCP
                                .WORD   MSGLCP
                                .WORD   MSG.IC
                                .WORD   MSG.FT
                                .WORD   MSG.LT
                                .WORD   MSG.IT
                                .WORD   MSG.FS
                                .WORD   MSG.LS


                                ;STATUS/ERROR INDICATOR MESSAGES POINTER TABLE
                                ;DEFAULT VALUES OF TEST PARAMETERS

001746 001125 000310 000632     DFLT:   .WORD   1125,200.,410.,822.,0,0         ;RECAL/SEEK (T0)
001754 001466 000000 000000
001762 003377 000144 000000             .WORD   3377,100.,0,128.,0,256.,0,0,0,0,0 ;SEEK/SEEK (T1)
001770 000200 000000 000400
001776 000000 000000 000000
002004 000000 000000
002010 001177 000001 000000             .WORD   1177,1,0,410.,0,822.,1,0,0      ;INCREMENT SEEK (T2)
002016 000632 000000 001466
002024 000001 000000 000000
002032 001177 000010 000000             .WORD   1177,10,0,256.,0,512.,1,0,0     ;STEPPING SEEK (T3)
002040 000400 000000 001000
002046 000001 000000 000000
```

```
                                .WORD   1177,1,0,410.,0,822.,1,0,0      ;OSCILLATING SEEK (T4)

                                .WORD   1177,1,0,410.,0,822.,1,0,0      ;CONVERGING/DIVERGING SEEK (T5)

                                .WORD   1177,1,0,410.,0,822.,1,0,0      ;SERVO ADDRESSING LOGIC NOISE (T6)

                                .WORD   337,5000.,0,410.,0,822.,0,4     ;RANDOM SEEK TEST (T7)

                                .WORD   177,1,0,410.,0,822.,100.,0      ;SERVO SETTLE DOWN TEST (T10)

                                .WORD   1177,1,0,410.,0,822.,1,0,0      ;ALL SEEKS TEST (T11)

                                .WORD   1113,1,0,0,0,0                  ;ROTATIONAL SPEED TIMING TEST (T12)

                                .WORD   37,1,0,410.,0,822.              ;ONE CYLINDER SEEK TIMING TEST (T13)

                                .WORD   37,1,0,136.,0,255.              ;ACCESS TIME MEASUREMENT TEST (T14)

                                .WORD   37,1,0,410.,0,822.              ;MAXIMUM SEEK TIMING TEST (T15)

                                .WORD   113,1,0,0,0                     ;SECTOR ADDRESSING TEST (T16)

                                .WORD   1013,1,0,0,0                    ;TRACK ADDRESSING TEST (T17)

                                .WORD   7777,1,0,410.,0,821.,64.,0,4,1,1,0,177777 ;DATA TEST (T20)

                                .WORD   37,1000.,0,410.,0,821.          ;EXERCISER (T21)

                                .WORD   37,5000.,0,136.,0,255.          ;RM03 ACCESS TIME ADJUSTMENT TEST (T22)


                        ;PARAMETER TABLES

                        ;RECAL/SEEK (T0)
                        PRM0:   .WORD   1125
                                .WORD   200.
                                .WORD   410.
                                .WORD   822.
                                .WORD   0
                                .WORD   0

                        ;SEEK/SEEK (T1)
                        PRM1:   .WORD   3377
                                .WORD   100.
                                .WORD   0
```

```
                                        .WORD   128.
                                        .WORD   0
                                        .WORD   256.
                                        .WORD   0
                                        .WORD   0
                                        .WORD   0
                                        .WORD   0
                                        .WORD   0

                                ;INCREMENT SEEK (T2)
                                PRM2:   .WORD   1177
                                        .WORD   1
                                        .WORD   0
                                        .WORD   410.
                                        .WORD   0
                                        .WORD   822.
                                        .WORD   1
                                        .WORD   0
                                        .WORD   0

                                ;STEPPING SEEK (T3)
                                PRM3:   .WORD   1177
                                        .WORD   1
                                        .WORD   0
                                        .WORD   256.
                                        .WORD   0
                                        .WORD   512.
                                        .WORD   1
                                        .WORD   0
                                        .WORD   0

                                ;OSCILLATING SEEK (T4)
                                PRM4:   .WORD   1177
                                        .WORD   1
                                        .WORD   0
                                        .WORD   410.
                                        .WORD   0
                                        .WORD   822.
                                        .WORD   1
                                        .WORD   0
                                        .WORD   0

                                ;CONVERGING/DIVERGING SEEK (T5)
                                PRM5:   .WORD   1177
                                        .WORD   1
                                        .WORD   0
                                        .WORD   410.
                                        .WORD   0
                                        .WORD   822.
                                        .WORD   1
                                        .WORD   0
                                        .WORD   0

                                ;SERVO ADDRESSING LOGIC NOISE GENERATOR (T6)
                                PRM6:   .WORD   1177
                                        .WORD   1
```

```
                                .WORD   0
                                .WORD   410.
                                .WORD   0
                                .WORD   822.
                                .WORD   1
                                .WORD   0
                                .WORD   0

                        ;RANDOM SEEK TEST (T7)
002606  000337          PRM7:   .WORD   337
002610  011610                  .WORD   5000.
002612  000000                  .WORD   0
002614  000632                  .WORD   410.
002616  000000                  .WORD   0
002620  001466                  .WORD   822.
002622  000000                  .WORD   0
002624  000004                  .WORD   4

                        ;SERVO SETTLE DOWN TEST (T10)
002626  000177          PRM10:  .WORD   177
002630  000001                  .WORD   1
002632  000000                  .WORD   0
002634  000632                  .WORD   410.
002636  000000                  .WORD   0
002640  001466                  .WORD   822.
002642  000144                  .WORD   100.
002644  000000                  .WORD   0

                        ;ALL SEEKS TEST (T11)
002646  001177          PRM11:  .WORD   1177
002650  000001                  .WORD   1
002652  000000                  .WORD   0
002654  000632                  .WORD   410.
002656  000000                  .WORD   0
002660  001466                  .WORD   822.
002662  000001                  .WORD   1
002664  000000                  .WORD   0
002666  000000                  .WORD   0

                        ;ROTATIONAL SPEED TIMING TEST (T12)
002670  001113          PRM12:  .WORD   1113
002672  000001                  .WORD   1
002674  000000                  .WORD   0
002676  000000                  .WORD   0
002700  000000                  .WORD   0
002702  000000                  .WORD   0

                        ;ONE CYLINDER SEEK TIMING TEST (T13)
002704  000037          PRM13:  .WORD   37
002706  000001                  .WORD   1
002710  000000                  .WORD   0
002712  000632                  .WORD   410.
002714  000000                  .WORD   0
002716  001466                  .WORD   822.

                        ;ACCESS TIME MEASUREMENT TEST (T14)
```

```
                                PRM14:  .WORD   37
                                        .WORD   1
                                        .WORD   0
                                        .WORD   136.
                                        .WORD   0
                                        .WORD   255.

                                ;MAXIMUM SEEK TIMING TEST (T15)
                                PRM15:  .WORD   37
                                        .WORD   1
                                        .WORD   0
                                        .WORD   410.
                                        .WORD   0
                                        .WORD   822.

                                ;SECTOR ADDRESSING TEST (T16)
                                PRM16:  .WORD   113
                                        .WORD   1
                                        .WORD   0
                                        .WORD   0
                                        .WORD   0

                                ;TRACK ADDRESSING TEST (T17)
                                PRM17:  .WORD   1013
                                        .WORD   1
                                        .WORD   0
                                        .WORD   0
                                        .WORD   0

                                ;DATA TEST (T20)
                                PRM20:  .WORD   7777
                                        .WORD   1
                                        .WORD   0
                                        .WORD   410.
                                        .WORD   0
                                        .WORD   821.
                                        .WORD   64.
                                        .WORD   0
                                        .WORD   4
                                        .WORD   1
                                        .WORD   1
                                        .WORD   0
                                PTRN15: .WORD   177777

                                ;EXERCISER (T21)
                                PRM21:  .WORD   37
                                        .WORD   1000.
                                        .WORD   0
                                        .WORD   410.
                                        .WORD   0
                                        .WORD   821.

                                ;RM03 ACCESS TIME ADJUSTMENT TEST (T22)
                                PRM22:  .WORD   37
                                        .WORD   5000.
                                        .WORD   0
```

```
  979  003050  000210                    .WORD   136.
  980  003052  000000                    .WORD   0
  981  003054  000377                    .WORD   255.
  982
  983
  984
  985                              ;TIMING LIMITS
  986
  987  003056  045520              T7A:  .WORD   MSG7
  988  003060  000000                    .WORD   0
  989  003062  003142                    .WORD   1634.          ;(16.67-2%)**2
  990  003064  003244                    .WORD   1700.          ;(16.67+2%)**2
  991
  992  003066  045520              T7B:  .WORD   MSG7
  993  003070  000000                    .WORD   0
  994  003072  003131                    .WORD   1625.          ;(16.67-2.5%)**2
  995  003074  003255                    .WORD   1709.          ;(16.67+2.5%)**2
  996
  997                                                         ;ROTATION TEST TABLES FOR RM02 DRIVE
  998  003076  045520              T7A1: .WORD   MSG7           ;
  999  003100  000000                    .WORD   0
 1000  003102  004622                    .WORD   2450.          ;25.00-2%  MS X 100.
 1001  003104  004766                    .WORD   2550.          ;25.00+2%  MS X 100.
 1002
 1003  003106  045520              T7B1: .WORD   MSG7           ;
 1004  003110  000000                    .WORD   0
 1005  003112  004605                    .WORD   2437.          ;25.00-2.5%
 1006  003114  005003                    .WORD   2563.          ;25.00+2.5%
 1007
 1008  003116  045552              T10:  .WORD   MSG10A
 1009  003120  045621                    .WORD   MSG10B
 1010  003122  000000                    .WORD   0              ;NO LOWER LIMIT
 1011  003124  001274                    .WORD   700.           ;(7)**2
 1012
 1013  003126  045636              T11:  .WORD   MSG11A
 1014  003130  045705                    .WORD   MSG11B
 1015  003132  000000                    .WORD   0              ;NO LOWER LIMIT
 1016  003134  006200                    .WORD   3200.          ;(32)**2
 1017
 1018  003136  045722              T12:  .WORD   MSG12A
 1019  003140  045764                    .WORD   MSG12B
 1020  003142  000000                    .WORD   0              ;NO LOWER LIMIT
 1021  003144  012574                    .WORD   5500.          ;(55)**2
 1022
 1023  003146  003206              PAT.PT: .WORD PAT0           ;TABLE OF POINTERS WHICH POINT TO THE
 1024  003150  003246                    .WORD   PAT1           ;PATTERNS USED BY THE DATA TEST
 1025  003152  003306                    .WORD   PAT2
 1026  003154  003346                    .WORD   PAT3
 1027  003156  003406                    .WORD   PAT4
 1028  003160  003446                    .WORD   PAT5
 1029  003162  003506                    .WORD   PAT6
 1030  003164  003546                    .WORD   PAT7
 1031  003166  003606                    .WORD   PAT8
 1032  003170  003646                    .WORD   PAT9
 1033  003172  003706                    .WORD   PAT10
 1034  003174  003746                    .WORD   PAT11
```

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1035  003176  000006                    .WORD   PAT12
1036  003200  004046                    .WORD   PAT13
1037  003202  004106                    .WORD   PAT14
1038  003204  004146                    .WORD   PAT15
1039
1040                                  ;PATTERNS 0 THRU 15
1041
1042  003206  066666                  PAT0:   .WORD   066666          ;PATTERN 0
1043  003210  066666                          .WORD   066666
1044  003212  066666                          .WORD   066666
1045  003214  066666                          .WORD   066666
1046  003216  066666                          .WORD   066666
1047  003220  066666                          .WORD   066666
1048  003222  066666                          .WORD   066666
1049  003224  066666                          .WORD   066666
1050  003226  066666                          .WORD   066666
1051  003230  066666                          .WORD   066666
1052  003232  066666                          .WORD   066666
1053  003234  066666                          .WORD   066666
1054  003236  066666                          .WORD   066666
1055  003240  066666                          .WORD   066666
1056  003242  066666                          .WORD   066666
1057  003244  066666                          .WORD   066666
1058
1059  003246  000001                  PAT1:   .WORD   000001          ;PATTERN 1
1060  003250  000003                          .WORD   000003
1061  003252  000007                          .WORD   000007
1062  003254  000017                          .WORD   000017
1063  003256  000037                          .WORD   000037
1064  003260  000077                          .WORD   000077
1065  003262  000177                          .WORD   000177
1066  003264  000377                          .WORD   000377
1067  003266  000777                          .WORD   000777
1068  003270  001777                          .WORD   001777
1069  003272  003777                          .WORD   003777
1070  003274  007777                          .WORD   007777
1071  003276  017777                          .WORD   017777
1072  003300  037777                          .WORD   037777
1073  003302  077777                          .WORD   077777
1074  003304  177777                          .WORD   177777
1075
1076  003306  177776                  PAT2:   .WORD   177776          ;PATTERN 2
1077  003310  177774                          .WORD   177774
1078  003312  177770                          .WORD   177770
1079  003314  177760                          .WORD   177760
1080  003316  177740                          .WORD   177740
1081  003320  177700                          .WORD   177700
1082  003322  177600                          .WORD   177600
1083  003324  177400                          .WORD   177400
1084  003326  177000                          .WORD   177000
1085  003330  176000                          .WORD   176000
1086  003332  174000                          .WORD   174000
1087  003334  170000                          .WORD   170000
1088  003336  160000                          .WORD   160000
1089  003340  140000                          .WORD   140000
1090  003342  100000                          .WORD   100000
```

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1091   003344   000000                          .WORD   000000
1092
1093   003346   000000                  PAT3:   .WORD   000000          ;PATTERN 3
1094   003350   000000                          .WORD   000000
1095   003352   000000                          .WORD   000000
1096   003354   177777                          .WORD   177777
1097   003356   177777                          .WORD   177777
1098   003360   177777                          .WORD   177777
1099   003362   000000                          .WORD   000000
1100   003364   000000                          .WORD   000000
1101   003366   177777                          .WORD   177777
1102   003370   177777                          .WORD   177777
1103   003372   000000                          .WORD   000000
1104   003374   177777                          .WORD   177777
1105   003376   000000                          .WORD   000000
1106   003400   177777                          .WORD   177777
1107   003402   000000                          .WORD   000000
1108   003404   177777                          .WORD   177777
1109
1110   003406   000000                  PAT4:   .WORD   000000          ;PATTERN 4
1111   003410   010421                          .WORD   010421
1112   003412   021042                          .WORD   021042
1113   003414   031463                          .WORD   031463
1114   003416   042104                          .WORD   042104
1115   003420   052525                          .WORD   052525
1116   003422   063146                          .WORD   063146
1117   003424   073567                          .WORD   073567
1118   003426   104210                          .WORD   104210
1119   003430   114631                          .WORD   114631
1120   003432   125252                          .WORD   125252
1121   003434   135673                          .WORD   135673
1122   003436   146314                          .WORD   146314
1123   003440   156735                          .WORD   156735
1124   003442   167356                          .WORD   167356
1125   003444   177777                          .WORD   177777
1126
1127   003446   052525                  PAT5:   .WORD   052525          ;PATTERN 5
1128   003450   052525                          .WORD   052525
1129   003452   052525                          .WORD   052525
1130   003454   125252                          .WORD   125252
1131   003456   125252                          .WORD   125252
1132   003460   125252                          .WORD   125252
1133   003462   052525                          .WORD   052525
1134   003464   052525                          .WORD   052525
1135   003466   125252                          .WORD   125252
1136   003470   125252                          .WORD   125252
1137   003472   052525                          .WORD   052525
1138   003474   125252                          .WORD   125252
1139   003476   052525                          .WORD   052525
1140   003500   125252                          .WORD   125252
1141   003502   052525                          .WORD   052525
1142   003504   125252                          .WORD   125252
1143
1144   003506   007417                  PAT6:   .WORD   007417          ;PATTERN 6
1145   003510   007417                          .WORD   007417
1146   003512   007417                          .WORD   007417
```

```
1147  003514  170360                    .WORD   170360
1148  003516  170360                    .WORD   170360
1149  003520  170360                    .WORD   170360
1150  003522  007417                    .WORD   007417
1151  003524  007417                    .WORD   007417
1152  003526  170360                    .WORD   170360
1153  003530  170360                    .WORD   170360
1154  003532  007417                    .WORD   007417
1155  003534  170360                    .WORD   170360
1156  003536  007417                    .WORD   007417
1157  003540  170360                    .WORD   170360
1158  003542  007417                    .WORD   007417
1159  003544  170360                    .WORD   170360
1160
1161  003546  026455            PAT7:   .WORD   026455          ;PATTERN 7
1162  003550  026455                    .WORD   026455
1163  003552  026455                    .WORD   026455
1164  003554  151322                    .WORD   151322
1165  003556  151322                    .WORD   151322
1166  003560  151322                    .WORD   151322
1167  003562  026455                    .WORD   026455
1168  003564  026455                    .WORD   026455
1169  003566  151322                    .WORD   151322
1170  003570  151322                    .WORD   151322
1171  003572  026455                    .WORD   026455
1172  003574  151322                    .WORD   151322
1173  003576  026455                    .WORD   026455
1174  003600  151322                    .WORD   151322
1175  003602  026455                    .WORD   026455
1176  003604  151322                    .WORD   151322
1177
1178  003606  165555            PAT8:   .WORD   165555          ;PATTERN 8
1179  003610  133333                    .WORD   133333
1180  003612  165555                    .WORD   165555
1181  003614  133333                    .WORD   133333
1182  003616  165555                    .WORD   165555
1183  003620  133333                    .WORD   133333
1184  003622  165555                    .WORD   165555
1185  003624  133333                    .WORD   133333
1186  003626  165555                    .WORD   165555
1187  003630  133333                    .WORD   133333
1188  003632  165555                    .WORD   165555
1189  003634  133333                    .WORD   133333
1190  003636  165555                    .WORD   165555
1191  003640  133333                    .WORD   133333
1192  003642  165555                    .WORD   165555
1193  003644  133333                    .WORD   133333
1194
1195  003646  000001            PAT9:   .WORD   000001          ;PATTERN 9
1196  003650  000002                    .WORD   000002
1197  003652  000004                    .WORD   000004
1198  003654  000010                    .WORD   000010
1199  003656  000020                    .WORD   000020
1200  003660  000040                    .WORD   000040
1201  003662  000100                    .WORD   000100
1202  003664  000200                    .WORD   000200
```

```
1203  003666  000400                    .WORD   000400
1204  003670  001000                    .WORD   001000
1205  003672  002000                    .WORD   002000
1206  003674  004000                    .WORD   004000
1207  003676  010000                    .WORD   010000
1208  003700  020000                    .WORD   020000
1209  003702  040000                    .WORD   040000
1210  003704  100000                    .WORD   100000
1211
1212  003706  177776            PAT10:  .WORD   177776          ;PATTERN 10
1213  003710  177775                    .WORD   177775
1214  003712  177773                    .WORD   177773
1215  003714  177767                    .WORD   177767
1216  003716  177757                    .WORD   177757
1217  003720  177737                    .WORD   177737
1218  003722  177677                    .WORD   177677
1219  003724  177577                    .WORD   177577
1220  003726  177377                    .WORD   177377
1221  003730  176777                    .WORD   176777
1222  003732  175777                    .WORD   175777
1223  003734  173777                    .WORD   173777
1224  003736  167777                    .WORD   167777
1225  003740  157777                    .WORD   157777
1226  003742  137777                    .WORD   137777
1227  003744  077777                    .WORD   077777
1228
1229  003746  172666            PAT11:  .WORD   172666          ;PATTERN 11
1230  003750  155555                    .WORD   155555
1231  003752  172666                    .WORD   172666
1232  003754  155555                    .WORD   155555
1233  003756  172666                    .WORD   172666
1234  003760  155555                    .WORD   155555
1235  003762  172666                    .WORD   172666
1236  003764  155555                    .WORD   155555
1237  003766  172666                    .WORD   172666
1238  003770  155555                    .WORD   155555
1239  003772  172666                    .WORD   172666
1240  003774  155555                    .WORD   155555
1241  003776  172666                    .WORD   172666
1242  004000  155555                    .WORD   155555
1243  004002  172666                    .WORD   172666
1244  004004  155555                    .WORD   155555
1245
1246  004006  077777            PAT12:  .WORD   077777          ;PATTERN 12
1247  004010  137777                    .WORD   137777
1248  004012  157777                    .WORD   157777
1249  004014  167777                    .WORD   167777
1250  004016  173777                    .WORD   173777
1251  004020  175777                    .WORD   175777
1252  004022  176777                    .WORD   176777
1253  004024  177377                    .WORD   177377
1254  004026  177577                    .WORD   177577
1255  004030  177677                    .WORD   177677
1256  004032  177737                    .WORD   177737
1257  004034  177757                    .WORD   177757
1258  004036  177767                    .WORD   177767
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1259  004040  177773                    .WORD   177773
1260  004042  177775                    .WORD   177775
1261  004044  177776                    .WORD   177776
1262
1263  004046  153333          PAT13:     WORD   153333          ;PATTERN 13
1264  004050  066667                    .WORD   066667
1265  004052  153333                    .WORD   153333
1266  004054  066667                    .WORD   066667
1267  004056  153333                    .WORD   153333
1268  004060  066667                    .WORD   066667
1269  004062  153333                    .WORD   153333
1270  004064  066667                    .WORD   066667
1271  004066  153333                    .WORD   153333
1272  004070  066667                    .WORD   066667
1273  004072  153333                    .WORD   153333
1274  004074  066667                    .WORD   066667
1275  004076  153333                    .WORD   153333
1276  004100  066667                    .WORD   066667
1277  004102  153333                    .WORD   153333
1278  004104  066667                    .WORD   066667
1279
1280  004106  000000          PAT14:    .WORD   000000          ;PATTERN 14
1281  004110  177777                    .WORD   177777
1282  004112  177777                    .WORD   177777
1283  004114  177777                    .WORD   177777
1284  004116  177777                    .WORD   177777
1285  004120  177777                    .WORD   177777
1286  004122  177777                    .WORD   177777
1287  004124  177777                    .WORD   177777
1288  004126  177777                    .WORD   177777
1289  004130  177777                    .WORD   177777
1290  004132  177777                    .WORD   177777
1291  004134  177777                    .WORD   177777
1292  004136  177777                    .WORD   177777
1293  004140  177777                    .WORD   177777
1294  004142  177777                    .WORD   177777
1295  004144  177777                    .WORD   177777
1296
1297  004146  177777          PAT15:    .WORD   177777          ;PATTERN 15
1298  004150  000000                    .WORD   000000
1299  004152  000000                    .WORD   000000
1300  004154  000000                    .WORD   000000
1301  004156  000000                    .WORD   000000
1302  004160  000000                    .WORD   000000
1303  004162  000000                    .WORD   000000
1304  004164  000000                    .WORD   000000
1305  004166  000000                    .WORD   000000
1306  004170  000000                    .WORD   000000
1307  004172  000000                    .WORD   000000
1308  004174  000000                    .WORD   000000
1309  004176  000000                    .WORD   000000
1310  004200  000000                    .WORD   000000
1311  004202  000000                    .WORD   000000
1312  004204  000000                    .WORD   000000
1313
1314                          ;DPB  DATA PARAMETER BLOCK
```

```
1315
1316  004206  000                DPB.A:  .BYTE   0          ;(0) DRIVE NUMBER
1317  004207  000                        .BYTE   0          ;(1) OFFSET VALUE OR FMT22, ECI, AND HCI
1318  004210  000                        .BYTE   0          ;(2) COMMAND
1319  004211  000                        .BYTE   0          ;(3) PSEL AND A17 AND A16
1320  004212  000000                     .WORD   0          ;(4) WORD COUNT (MUST BE NEG.)
1321  004214  051776                     .WORD   BUFFER     ;(6) BUFFER ADDRESS OR
1322                                                        ;REGISTER TABLE POINTER
1323  004216  000                        .BYTE   0          ;(10) SECTOR ADDRESS OR
1324                                                        ;FIRST REG. INDEX
1325  004217  000                        .BYTE   0          ;(11) TRACK ADDRESS OR
1326                                                        ;LAST REG. INDEX
1327  004220  000000                     .WORD   0          ;(12) CYLINDER ADDRESS
1328  004222  004306                     .WORD   RM.REG     ;(14) ERROR TABLE POINTER
1329                                                        ;POINTS TO THE FIRST OF TWENTY
1330                                                        ;LOCATIONS OF WHERE THE DRIVER
1331                                                        ;IS TO STORE THE RH70/RM03
1332                                                        ;REGISTERS ON AN ERROR. IF LEFT
1333                                                        ;ZERO REGISTERS ARE NOT SAVED.
1334  004224  000000                     .WORD   0          ;(16) STATUS/ERROR INDICATOR
1335                                                        ;BIT15=1=>ERROR OCCURRED
1336                                                        ;BIT07=1=>DONE
1337                                                        ;BIT14-BIT09 AND BIT06-BIT03
1338                                                        ;INDICATE TYPE OF ERROR
1339
1340  004226  000                DPB.B:  .BYTE   0          ;(0) DRIVE NUMBER
1341  004227  000                        .BYTE   0          ;(1) OFFSET VALUE OR FMT22, ECI, AND HCI
1342  004230  000                        .BYTE   0          ;(2) COMMAND
1343  004231  000                        .BYTE   0          ;(3) PSEL AND A17 AND A16
1344  004232  177776                     .WORD   -2         ;(4) WORD COUNT (MUST BE NEG.)
1345  004234  051776                     .WORD   BUFFER     ;(6) BUFFER ADDRESS OR
1346                                                        ;REGISTER TABLE POINTER
1347  004236  000                        .BYTE   0          ;(10) SECTOR ADDRESS OR
1348                                                        ;FIRST REG. INDEX
1349  004237  000                        .BYTE   0          ;(11) TRACK ADDRESS OR
1350                                                        ;LAST REG. INDEX
1351  004240  000000                     .WORD   0          ;(12) CYLINDER ADDRESS
1352  004242  004306                     .WORD   RM.REG     ;(14) ERROR TABLE POINTER
1353                                                        ;POINTS TO THE FIRST OF TWENTY
1354                                                        ;LOCATIONS OF WHERE THE DRIVER
1355                                                        ;IS TO STORE THE RH70/RM03
1356                                                        ;REGISTERS ON AN ERROR. IF LEFT
1357                                                        ;ZERO REGISTERS ARE NOT SAVED.
1358  004244  000000                     .WORD   0          ;(16) STATUS/ERROR INDICATOR
1359                                                        ;BIT15=1=>ERROR OCCURRED
1360                                                        ;BIT07=1=>DONE
1361                                                        ;BIT14-BIT09 AND BIT06-BIT03
1362                                                        ;INDICATE TYPE OF ERROR
1363
1364  004246  000                DPB.C:  .BYTE   0          ;(0) DRIVE NUMBER
1365  004247  000                        .BYTE   0          ;(1) OFFSET VALUE OR FMT22, ECI, AND HCI
1366  004250  000                        .BYTE   0          ;(2) COMMAND
1367  004251  000                        .BYTE   0          ;(3) PSEL AND A17 AND A16
1368  004252  177776                     .WORD   -2         ;(4) WORD COUNT (MUST BE NEG.
1369  004254  051776                     .WORD   BUFFER     ;(6) BUFFER ADDRESS OR
1370                                                        ;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   RM.REG          ;(14) ERROR TABLE POINTER
                                                                ;POINTS TO THE FIRST OF TWENTY
                                                                ;LOCATIONS OF WHERE THE DRIVER
                                                                ;IS TO STORE THE RH70/RM03
                                                                ;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

                        DTADPB: .BYTE   0               ;(0) DRIVE NUMBER
                                .BYTE   0               ;(1) OFFSET VALUE OR FMT22, ECT, AND MCI
                                .BYTE   0               ;(2) COMMAND
                                .BYTE   0               ;(3) PSEL AND A17 AND A16
                                .WORD   0               ;(4) WORD COUNT (MUST BE NEG.)
                                .WORD   BUFFER          ;(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   RM.REG          ;(14) ERROR TABLE POINTER
                                                        ;POINTS TO THE FIRST OF TWENTY
                                                        ;LOCATIONS OF WHERE THE DRIVER
                                                        ;IS TO STORE THE RH70/RM03
                                                        ;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


                        ;SAVE RH70/RM03 REGISTERS HERE ON ERROR

                        RM.REG: .WORD   0               ;RMCS1 (776700) CONTROL & STATUS #1
                                .WORD   0               ;RMWC (776702) WORD COUNT
                                .WORD   0               ;RMBA (776704) BUS ADDRESS
                                .WORD   0               ;RMDA (776706) DESIRED SECTOR TRACK
                                .WORD   0               ;RMCS2 (776710) CONTROL & STATUS #2
                                .WORD   0               ;RMDS (776712) DISK STATUS
                                .WORD   0               ;RMER1 (776714) ERROR REG. #1
                                .WORD   0               ;RMAS (776716) ATTENTION SUMMARY
                                .WORD   0               ;RMLA (776720) LOOK AHEAD
                                .WORD   0               ;RMDB (776722) DATA BUFFER
                                .WORD   0               ;RMMR1 (776724) MAINTAINABILITY
```

```
1427  004334  000000                  .WORD   0               ;RMDT (776726) DRIVE TYPE
1428  004336  000000                  .WORD   0               ;RMSN (776730) SERIAL NUMBER
1429  004340  000000                  .WORD   0               ;RMOF (776732) OFFSET
1430  004342  000000                  .WORD   0               ;RMDC (776734) DESIRED CYLINDER
1431  004344  000000                  .WORD   0               ;RMHR (776736) CURRENT CYLINDER
1432  004346  000000                  .WORD   0               ;RMMR2 (776740) ERROR REG #2
1433  004350  000000                  .WORD   0               ;RMER2 (776742) ERROR REG #3
1434  004352  000000                  .WORD   0               ;RMEC1 (776744) ECC POSITION
1435  004354  000000                  .WORD   0               ;RMEC2 (776746) ECC PATTERN
1436
1437                                  ;STATUS/ERROR MESSAGE POINTER TABLE
1438  004356  047013          STATBL: .WORD   MSGB14          ;OFFLINE OR UNSAFE DRIVE REQUESTED
1439  004360  047055                  .WORD   MSGB13          ;UNLOAD DRIVE REQUESTED
1440  004362  047106                  .WORD   MSGB12          ;PERSISTENT UNSAFE
1441  004364  047130                  .WORD   MSGB11          ;PARITY ERROR OCCURRED
1442  004366  047156                  .WORD   MSGB10          ;FATAL PARITY ERROR
1443  004370  047201                  .WORD   MSGB09          ;SOFTWARE TIMEOUT ON THIS DRIVE
1444  004372  047240                  .WORD   MSGB08          ;SOFTWARE TIMEOUT ON ANOTHER DRIVE
1445  004374  047302                  .WORD   MSGB06          ;ERROR OCCURRED DURING I/O OPERATION
1446  004376  047346                  .WORD   MSGB05          ;ERROR OCCURRED DURING NON-I/O OPERATION
1447  004400  047416                  .WORD   MSGB04          ;UNSAFE OCCURRED
1448  004402  047436                  .WORD   MSGB03          ;AUTOMATIC RECALIBRATE SEQUENCE OCCURRED
1449  004404  047506                  .WORD   MSGB02          ;DRIVE HAS NOT RESPONDED TO PORT REQUEST
1450  004406  047556                  .WORD   MSGB01          ;DRIVE HAS BECOME NONEXISTENT
```

```
                                .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


004410                          $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
                                ;*    RH70 INTERRUPT OCCURED (RMAS = 0)
                                ;*    ERR PC  RMAS
                                ;*    $ERRPC  $REG3

004410  046144                          EM1
004412  047614                          DH1
004414  051170                          DT1
004416  051622                          DF1

                                ;*  ERROR ITEM 2
                                ;*    UNEXPECTED ATTENTION OCCURRED
                                ;*    ERR PC  DRIVE   RMAS    RMDS    RMER1     RMMR2     RMER2
                                ;*    $ERRPC  $REG1   $REG3   RMERRS  RMERRS+2  RMERRS+4  RMERRS+6

004420  046207                          EM2
004422  047631                          DH2
004424  051174                          DT2
004426  051626                          DF2

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

004430  046245                          EM3
004432  047716                          DH3
004434  051212                          DT3
004436  051632                          DF3

                                ;*  ERROR ITEM 4
                                ;*    MASSBUS PARITY ERROR (PAR=1)
                                ;*    TEST    ERR PC  ADDRESS GDDATA  BDDATA
```

```
1507                                    ;*    $TMPO   $ERRPC  WRT.ADR WRT.WD  RD.WRD
1508
1509  004440  046302                            EM4
1510  004442  047753                            DH4
1511  004444  051222                            DT4
1512  004446  051636                            DF4
1513
1514                                    ;*  ERROR ITEM 5
1515                                    ;*    ADDRESS PLUG CHANGE BIT SET
1516                                    ;*    ERR PC  DRIVE   RMAS    RMDS   RMER1     RMMR2    RMER2
1517                                    ;*    $ERRPC  $REG1   $REG3   RMERRS  RMERRS+2  RMERRS+4 RMERRS+6
1518
1519  004450  046336                            EM5
1520  004452  047631                            DH2
1521  004454  051174                            DT2
1522  004456  051626                            DF2
1523
1524                                    ;*  ERROR ITEM 6 -- NOT USED
1525
1526  004460  000000                            0
1527  004462  000000                            0
1528  004464  000000                            0
1529  004466  000000                            0
1530
1531                                    ;*  ERROR ITEM 7 -  NOT USED
1532
1533  004470  000000                            0
1534  004472  000000                            0
1535  004474  000000                            0
1536  004476  000000                            0
1537
1538                                    ;*  ERROR ITEM 10
1539                                    ;*    RH70/RM03 FAILED TO RESPOND TO ADDRESSING
1540                                    ;*    RMCS1   ERR PC
1541                                    ;*    RH.ADR  $ERRPC
1542
1543  004500  046372                            EM10
1544  004502  050022                            DH10
1545  004504  051254                            DT10
1546  004506  051642                            DF10
1547
1548                                    ;*  ERROR ITEM 11
1549                                    ;*    DRIVE SELECTED IS NOT ONLINE
1550                                    ;*    DRIVE   ERR PC
1551                                    ;*    $REG2   $ERRPC
1552
1553  004510  046444                            EM11
1554  004512  050041                            DH11
1555  004514  051260                            DT11
1556  004516  051646                            DF11
1557
1558                                    ;*  ERROR ITEM 12
1559                                    ;*    IMPROPER HEADER DATA
1560                                    ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
1561                                    ;*    $TMPO   $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS  SEC.DS
1562                                    ;*        GDCYL   GDTRK   GDSCTR  BDCYL   BDTRK   BDSCTR
```

```
1563                                    ;*        CYL.DS  TRK.DS  SEC.DS  CYL.RD  TRK.RD  SEC.RD
1564                                    ;*    CYLNDR, TRACK, AND SECTOR ARE DECIMAL
1565
1566  004520  046501                          EM12
1567  004522  050060                          DH12
1568  004524  051264                          DT12
1569  004526  051652                          DF12
1570
1571                                    ;*  ERROR ITEM 13
1572                                    ;*    DATA COMPARE FAILURE
1573                                    ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
1574                                    ;*    $TMPO   $ERRPC  $REGO   CHKDRV  CYL.DS  TRK.DS  SEC.DS
1575                                    ;*        GDDAT   BDDAT   WRDCNT  GDADR   BDADR
1576                                    ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
1577                                    ;*      CYLNDR, TRACK, SECTOR, AND WRDCNT  ARE DECIMAL
1578
1579  004530  046526                          EM13
1580  004532  050060                          DH12
1581  004534  051316                          DT13
1582  004536  051662                          DF13
1583
1584                                    ;*  ERROR ITEM 14 -- FOLLOWS #13
1585                                    ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
1586
1587  004540  000000                          0
1588  004542  000000                          0
1589  004544  051334                          DT13A
1590  004546  051672                          DF14
1591
1592                                    ;*  ERROR ITEM 15
1593                                    ;*    DATA COMPARE FAILURE
1594                                    ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
1595                                    ;*    $TMPO   $ERRPC  $REGO   CHKDRV  CYL.DS  TRK.DS  SEC.DS
1596                                    ;*        GDDAT   BDDAT   WRDCNT  GDADR   BDADR
1597                                    ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
1598                                    ;*        CYLNDR, TRACK, SECTOR, AND WRDCNT ARE DECIMAL
1599
1600  004550  046526                          EM13
1601  004552  050060                          DH12
1602  004554  051316                          DT13
1603  004556  051662                          DF13
1604
1605                                    ;*  ERROR ITEM 16 -- FOLLOWS #15
1606                                    ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
1607
1608  004560  000000                          0
1609  004562  000000                          0
1610  004564  051334                          DT13A
1611  004566  051672                          DF14
1612
1613                                    ;*  ERROR ITEM 17
1614                                    ;*    DISK ERROR IN TIMING TEST
1615                                    ;*    TEST    ERR PC  DRIVE   RMCS1   RMDS     RMER1     RMMR2     RMER2
1616                                    ;*    $TMPO   $ERRPC  CHKDRV  RM.REG  RM.REG+12 RM.REG+14 RM.REG+40 RM.REG+42
1617
1618  004570  046553                          EM17
```

```
1619  004572  050274                          DH17
1620  004574  051346                          DT17
1621  004576  051676                          DF17
1622
1623                                  ;*  ERROR ITEM 20
1624                                  ;*    CLOCK (KW11-P) OVERFLOW IN TIMING TEST
1625                                  ;*    TEST    ERR PC  DRIVE   RMCS1   RMDS     RMER1     RMMR2     RMER2
1626                                  ;*    $TMP0   $ERRPC  CHKDRV  RM.REG  RM.REG+12 RM.REG+14 RM.REG+40 RM.REG+42
1627
1628  004600  046605                          EM20
1629  004602  050274                          DH17
1630  004604  051346                          DT17
1631  004606  051676                          DF17
1632
1633                                  ;*  ERROR ITEM 21
1634                                  ;*    DATA COMPARE FAILURE
1635                                  ;*    TEST      ERR PC  TST PC  DRIVE   CYLNDR  TRACK
1636                                  ;*    $TMP0     $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS
1637                                  ;*        GDDAT   BDDAT   WRDCNT  SECTOR
1638                                  ;*        $REG1   $BDDAT  $REG4   $REG1
1639                                  ;*        CYLINDR, TRACK, WRDCNT, AND SECTOR ARE DECIMAL
1640
1641  004610  046526                          EM13
1642  004612  050371                          DH21
1643  004614  051366                          DT21
1644  004616  051702                          DF21
1645
1646                                  ;*  ERROR ITEM 22--FOLLOWS #21
1647                                  ;*        $REG1   $BDDAT   $REG4   $REG1
1648
1649  004620  000000                          0
1650  004622  000000                          0
1651  004624  051402                          DT21A
1652  004626  051712                          DF22
1653
1654                                  ;*  ERROR ITEM 23
1655                                  ;*      DISK ERROR DURING SEEK
1656                                  ;*      TEST    ERR PC  DRIVE   CYLNDR  RMCS1   RMCS2     RMDS
1657                                  ;*      $TMP0   $ERRPC  CHKDRV  CYL.DS  RM.REG RM.REG+10 RM.REG+12
1658                                  ;*          RMER1     RMMR2     RMER2     RMDC      RMHR
1659                                  ;*          RM.REG+14 RM.REG+40 RM.REG+42 RM.REG+34 RM.REG+36
1660
1661  004630  046654                          EM23
1662  004632  050506                          DH23
1663  004634  051412                          DT23
1664  004636  051716                          DF23
1665
1666                                  ;*  ERROR ITEM 24
1667                                  ;*      SEEK NOT COMPLETE WITHIN 120 MS
1668                                  ;*      TEST    ERR PC  DRIVE   CYLNDR  RMCS1   RMCS2     RMDS
1669                                  ;*      $TMP0   $ERRPC  CHKDRV  CYL.DS  RM.REG RM.REG+10 RM.REG+12
1670                                  ;*          RMER1     RMMR2     RMER2     RMDC      RMHR
1671                                  ;*          RM.REG+14 RM.REG+40 RM.REG+42 RM.REG+34 RM.REG+36
1672
1673  004640  046703                          EM24
1674  004642  050506                          DH23
```

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1675  004644  051412                        DT23
1676  004646  051716                        DF23
1677
1678
1679
1680                                  ;;*****************************************************************
1681                                  ;;*****************************************************************
1682                                  ;*  ERROR ITEMS 23-40 NOT USED
1683                                  ;*  ERROR ITEMS 41-46 WILL HAVE AN EM THAT
1684                                  ;*  VARIES DEPENDING ON TYE ERROR, IT WILL BE IN THE FORM:
1685                                  ;*  RH70/RM03 ERROR (MESSAGE)
1686                                  ;*  WHERE MESSAGE WILL BE ONE OR MORE OF THE FOLLOWING:
1687                                  ;*  1)  OFFLINE OR UNSAFE DRIVE REQUESTED
1688                                  ;*  2)  UNLOADED DRIVE REQUESTED
1689                                  ;*  3)  PERSISTENT UNSAFE
1690                                  ;*  4)  PARITY ERROR OCCURRED
1691                                  ;*  5)  FATAL PARITY ERROR
1692                                  ;*  6)  SOFTWARE TIMEOUT ON THIS DRIVE
1693                                  ;*  7)  SOFTWARE TIMEOUT ON ANOTHER DRIVE
1694                                  ;*  8)  ERROR OCCURRED DURING I/O OPERATION
1695                                  ;*  9)  ERROR OCCURRED DURING NON-I/O OPERATION
1696                                  ;*  10) UNSAFE OCCURRED
1697                                  ;*  11) AUTOMATIC RECALIBRATE SEQUENCE OCCURRED
1698
1699  004650                          ITEM41:
1700
1701                                  ;*  ERROR ITEM 41
1702                                  ;*    RH70/RM03 ERROR (MESSAGE)
1703                                  ;*    TEST    ERR PC  TST PC  DRIVE
1704                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV
1705
1706  004650  046743                        EM41
1707  004652  050640                        DH41
1708  004654  051442                        DT41
1709  004656  051726                        DF41
1710
1711                                  ;*  ERROR ITEM 42
1712                                  ;*    RH70/RM03 ERROR (MESSAGE)
1713                                  ;*    TEST    ERR PC  TST PC  DRIVE   RMCS1   RMCS2   RMDS
1714                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV  RM.REG  RM.REG+10 RM.REG+12
1715
1716  004660  046743                        EM41
1717  004662  050676                        DH42
1718  004664  051452                        DT42
1719  004666  051732                        DF42
1720
1721                                  ;*  ERROR ITEM 43
1722                                  ;*    RH70/RM03 ERROR (MESSAGE)
1723                                  ;*    TEST    ERR PC  TST PC  DRIVE   RMCS1   RMCS2   RMDS
1724                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV  RM.REG  RM.REG+10 RM.REG+12
1725                                  ;*        RMER1       RMMR2       RMER2
1726                                  ;*        RM.REG+14 RM.REG+40 RM.REG+42
1727
1728  004670  046743                        EM41
1729  004672  050676                        DH42
1730  004674  051470                        DT43
```

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1731  004676  051736                        DF43
1732
1733                                  ;*  ERROR ITEM 44
1734                                  ;*    RH70/RM03 ERROR (MESSAGE)
1735                                  ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
1736                                  ;*    $TMPO   $ERRPC  $REGO   CHKDRV  CYL.DS  TRK.DS    SEC.DS
1737                                  ;*       RMCS1     RMCS2     RMDS      RMHR     RMDC     RMDA
1738                                  ;*       RM.REG    RM.REG+10 RM.REG+12 RM.REG+36 RM.REG+34 RM.REG+06
1739                                  ;*      RMER1      RMMR2     RMER2
1740                                  ;*      RM.REG+14  RM.REG+40 RM.REG+42
1741                                  ;*      CYLNDR,TRACK, AND SECTOR ARE DECIMAL
1742
1743  004700  046743                        EM41
1744  004702  050060                        DH12
1745  004704  051514                        DT44
1746  004706  051746                        DF44
1747
1748                                  ;*  ERROR ITEM 45
1749                                  ;*    RH70/RM03 ERROR (MESSAGE)
1750                                  ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
1751                                  ;*    $TMPO   $ERRPC  $REGO   CHKDRV  CYL.DS  TRK.DS    SEC.DS
1752                                  ;*       RMCS1     RMCS2     RMDS      RMHR     RMDC     RMDA
1753                                  ;*       RM.REG    RM.REG+10 RM.REG+12 RM.REG+36 RM.REG+34 RM.REG+06
1754                                  ;*      RMER1      RMMR2     RMER2     RMWC     RMBA     RMDB
1755                                  ;*      RM.REG+14  RM.REG+40 RM.REG+42 RM.REG+2 RM.REG+4 RM.REG+22
1756                                  ;*      CYLNDR,TRACK, AND SECTOR ARE DECIMAL
1757
1758  004710  046743                        EM41
1759  004712  050060                        DH12
1760  004714  051554                        DT45
1761  004716  051762                        DF45
1762
1763                                  ;*  ERROR ITEM 46
1764                                  ;*    FATAL WRITE CHECK ERROR (MESSAGE)
1765                                  ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
1766                                  ;*    $TMPO   $ERRPC  $REGO   CHKDRV  CYL.DS  TRK.DS    SEC.DS
1767                                  ;*       RMCS1     RMCS2     RMDS      RMHR     RMDC     RMDA
1768                                  ;*       RM.REG    RM.REG+10 RM.REG+12 RM.REG+36 RM.REG+34 RM.REG+06
1769                                  ;*      RMER1      RMMR2     RMER2     RMWC     RMBA     RMDB
1770                                  ;*      RM.REG+14  RM.REG+40 RM.REG+42 RM.REG+2 RM.REG+4 RM.REG+22
1771                                  ;*      CYLNDR,TRACK, AND SECTOR ARE DECIMAL
1772
1773  004720  046763                        EM46
1774  004722  050060                        DH12
1775  004724  051554                        DT45
1776  004726  051762                        DF45
1777
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1778
1779                                    .SBTTL  START OF PROGRAM
1780
1781
1782  004730  012737  177777  001306  START3: MOV     #-1,@#BUSADR    ;GET BUSADR FLAG
1783  004736  000402                          BR      STRT1A
1784  004740  005037  001306          START1: CLR     @#BUSADR        ;CLR BUSADR FLAG
1785  004744  005037  001304          STRT1A: CLR     @#CNTRLC        ;NO CONTROL "C"
1786  004750  000411                          BR      START
1787  004752  012737  177777  001306  START4: MOV     #-1,@#BUSADR    ;SET BUSADR FLAG
1788  004760  000402                          BR      STRT2A
1789  004762  005037  001306          START2: CLR     @#BUSADR        ;CLR BUSADR FLAG
1790  004766  012737  177777  001304  STRT2A: MOV     #-1,@#CNTRLC    ;SET CONTROL "C" FLAG
1791  004774  000005                  START:  RESET
1792                                    .SBTTL  INITIALIZE THE COMMON TAGS
1793                                    ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
1794  004776  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
1795  005002  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
1796  005004  022706  001140                  CMP     #$WR,R6 ;;DONE?
1797  005010  001374                          BNE     .-6             ;;LOOP BACK IF NO
1798  005012  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
1799                                    ;;INITIALIZE A FEW VECTORS
1800  005016  012737  024630  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
1801  005024  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
1802  005032  012737  021566  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
1803  005040  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
1804  005046  012737  025156  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
1805  005054  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
1806  005062  013737  021234  021226          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
1807  005070  012737  176543  025630          MOV     #176543,$HINUM  ;;PRIME THE RANDOM NUMBER GENERATOR
1808  005076  012737  123456  025632          MOV     #123456,$LONUM  ;;BOTH HIGH AND LOW WORDS
1809  005104  005037  001204                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
1810  005110  005037  001206                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
1811  005114  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
1812  005122  012737  005122  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
1813  005130  012737  005130  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
1814                                    ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
1815                                    ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
1816  005136  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
1817  005142  012737  005176  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
1818  005150  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
1819  005156  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
1820  005164  022777  177777  173746          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
1821  005172  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
1822                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
1823  005174  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
1824  005176  012716  005204          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
1825  005202  000002                          RTI
1826  005204  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
1827  005212  012737  000174  001142          MOV     #DISPREG,DISPLAY
1828  005220  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
1829
1830  005224  005037  001226                  CLR     $PASS           ;;CLEAR PASS COUNT
1831  005230  132737  000200  001241          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
1832  005236  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
1833  005240  012737  001242  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
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1834  005246                          67$:
1835  005246  012700  001160                MOV     #$REGAD,R0      ;FIRST ADDRESS
1836  005252  005020                1$:     CLR     (R0)+           ;CLEAR VARIABLE STORAGE
1837  005254  022700  001210                CMP     #$$BELL,R0      ;DONE?
1838  005260  001374                        BNE     1$              ;NO--BRANCH
1839  005262  013737  001476  001150        MOV     @#IPS,@#$IPS    ;SETUP THE STATUS AND BUFFER REG'S
1840  005270  013737  001500  001152        MOV     @#TPB,@#$TPB    ;FOR THE TYPE ROUTINE
1841  005276  005227  177777                INC     #-1             ;FIRST START ?
1842  005302  001027                        BNE     3$              ;BR IF NOT
1843  005304  104401  051776                TYPE    ,TITLE          ;TYPE THE PROGRAM'S TITLE
1844  005310  005737  000042                TST     42              ;AUTO ACCEPT OR CHAIN MODE ?
1845  005314  001007                        BNE     2$              ;BR IF EITHER
1846  005316  122737  000077  000041        CMPB    #77,41          ;LOADED FROM AN RM03 ?
1847  005324  001003                        BNE     2$              ;BR IF NOT
1848  005326  104401  052052                TYPE    ,LOADRV         ;INSTRUCT THE OPERATOR TO REMOVE THE PACK
1849                                                                ;ON DRIVE 0 IF DRIVE 0 IS TO BE TESTED
1850  005332  000000                        HALT                    ;HALT IF LOAD FROM RM03.RM02
1851  005334  105737  000041        2$:     TSTB    @#41            ;LOADED FROM PAPER TAPE ?
1852  005340  001410                        BEQ     3$              ;BR IF NOT
1853  005342  004737  052346                JSR     PC,$SIZE        ;SIZE THE MEMORY
1854  005346  023727  052442  100000        CMP     $LSTAD,#100000  ;16K OR MORE ON THE SYSTEM ?
1855  005354  103002                        BHIS    3$              ;BR IF YES
1856  005356  104401  052250                TYPE    ,NOLOAD         ;INFORM THE OPEATOR THAT THE 'XXDP' LOADER
1857                                                                ;WILL BE OVERWRITTEN
1858  005362  004737  023366        3$:     JSR     PC,$TKINT       ;TURN ON THE TTY KEYBOARD INTERRUPT
1859                                .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
1860  005366  005737  000042                TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
1861  005372  001012                        BNE     68$             ;;BRANCH IF YES
1862  005374  123727  001240  000001        CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
1863  005402  001406                        BEQ     68$             ;;BRANCH IF YES
1864  005404  023727  001140  000176        CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
1865  005412  001005                        BNE     69$             ;;BRANCH IF NO
1866  005414  104406                        GTSWR                   ;;GET SOFT-SWR SETTINGS
1867  005416  000403                        BR      69$
1868  005420  112737  000001  001134  68$:  MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
1869  005426                          69$:
1870  005426  005227  177777                INC     #-1             ;SEE IF FIRST START
1871  005432  001002                        BNE     SRTINT          ;BR IF NOT
1872  005434  004737  052444                JSR     PC,GETADR       ;GET OR CHECK THE RH70 ADDRESS
1873  005440  104401  001215        SRTINT: TYPE    ,$CRLF          ;CR-LF
1874  005444  004737  026054                JSR     PC,@#LP.AVL     ;CHECK FOR A LINE PRINTER
1875  005450  005037  177776                CLR     @#PS            ;ENSURE THE PRIORITY = 0
1876  005454  012737  000001  001104        MOV     #1,$ICNT        ;SET ITERATION COUNT TO 1
1877  005462  004737  033646                JSR     PC,@#GETSWR     ;GO CHECK FOR CONTROL SWITCHES
1878  005466  004737  026116                JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
1879  005472  004737  036754        SETVEC: JSR     PC,RMINIT       ;CHECK THE DRIVE STATUS
1880  005476  012737  177777  036676        MOV     #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
1881  005504  062727  177777  000000        ADD     #-1,#0          ;FIRST START ?
1882  005512  103003                        BCC     11$             ;BR IF YES
1883  005514  005737  001304                TST     CNTRLC          ;CONTROL 'C' SWITCH SET ?
1884  005520  001101                        BNE     SRTDRV          ;CONTINUE IF YES
1885  005522  012737  000340  177776  11$:  MOV     #PR7,PS         ;SET PRIORITY TO 7
1886  005530  005004                        CLR     R4              ;DRIVE TABLE POINTER
1887  005532  104401  001215                TYPE    ,$CRLF          ;CR-LF
1888  005536  104401  045204                TYPE    ,SYSTAT         ;TYPE STATUS HEADING
1889  005542                          1$:
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1890  005542  010446                          MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
1891                                                                  ;;TYPE DRIVE NUMBER
1892  005544  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
1893  005546     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
1894  005547     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
1895  005550  104401  046141                  TYPE    ,MSG.SP         ;SPACES
1896  005554  104401  046141                  TYPE    ,MSG.SP         ;SPACES
1897  005560  105764  036610                  TSTB    DRVSTA(R4)      ;CHECK DRIVE'S STATUS
1898  005564  100416                          BMI     4$              ;BR IF UNSAFE
1899  005566  001020                          BNE     5$              ;BR IF ONLINE
1900  005570  105764  036620                  TSTB    DRVTYP(R4)      ;SEE IF OFFLINE OR NONEXISTENT
1901  005574  001404                          BEQ     2$              ;BR IF NONEXISTENT
1902  005576  100006                          BPL     3$              ;BR IF OFFLINE
1903  005600  104401  045300                  TYPE    ,NOTRM          ;DRIVE NOT AN RM03
1904  005604  000437                          BR      9$              ;CHECK NEXT DRIVE
1905  005606  104401  045253          2$:     TYPE    ,NOTPRS         ;DRIVE NOT PRESENT
1906  005612  000434                          BR      9$              ;CHECK NEXT DRIVE
1907  005614  104401  045232          3$:     TYPE    ,UNTOFF         ;DRIVE OFFLINE
1908  005620  000405                          BR      6$              ;PRINT DRIVE TYPE
1909  005622  104401  045270          4$:     TYPE    ,NOTSAF         ;DRIVE UNSAFE
1910  005626  000402                          BR      6$              ;PRINT DRIVE TYPE
1911  005630  104401  045243          5$:     TYPE    ,UNTON          ;DRIVE ONLINE
1912  005634  104401  046141          6$:     TYPE    ,MSG.SP         ;SPACES
1913  005640  012737  045324  005702          MOV     #ISRM03,8$      ;ADDRESS OF RM03 MESSAGE
1914  005646  122764  000004  036620          CMPB    #4,DRVTYP(R4)   ;RM03 ?
1915  005654  001411                          BEQ     7$              ;TYPE IT IF YES
1916  005656  012737  045317  005702          MOV     #ISRM02,8$      ;MESSAGE OF RM02
1917  005664  122764  000005  036620          CMPB    #5,DRVTYP(R4)   ;RM02 ?
1918  005672  001402                          BEQ     7$              ;BRANCH IF SO
1919  005674  104401  045300                  TYPE    ,NOTRM          ;TYPE DRIVE NOT AN RM03 IF NOT
1920  005700  104401                  7$:     TYPE                    ;TYPE THE DRIVE TYPE MESSAGE
1921  005702  000000                  8$:     .WORD   0               ;MESSAGE ADDRESS HERE
1922  005704  104401  001215          9$:     TYPE    ,$CRLF          ;CR-LF
1923  005710  005204                          INC     R4              ;INCREMENT DRIVE NUMBER/TABLE POINTER
1924  005712  020427  000010                  CMP     R4,#8.          ;FINISHED ?
1925  005716  001311                          BNE     1$              ;BR IF NOT
1926  005720  005037  177776                  CLR     PS              ;SET PRIORITY BACK TO '0'
1927  005724  005737  001304          SRTDRV: TST     @#CNTRLC        ;CONTROL "C" START/RESTART?
1928  005730  001417                          BEQ     1$              ;NO--BRANCH
1929  005732  013746  001302                  MOV     SAVCSW,-(SP)    ;GET THE PREVIOUS 'C.SWR' CONTENTS
1930  005736  063716  001300                  ADD     C.SWR,(SP)      ;SET UP TO SEE IF 'BIT00' IS DIFFERENT
1931  005742  032726  000001                  BIT     #BIT00,(SP)+    ;IS 'BIT00' DIFFERENT ?
1932  005746  001405                          BEQ     9$              ;BR IF NOT
1933  005750  013737  001300  001302          MOV     C.SWR,SAVCSW    ;STORE PRESENT 'C.SWR' VALUE
1934  005756  004737  026374                  JSR     PC,LODFLT       ;RESET PARAMETERS TO THEIR DEFAULT VALUES
1935  005762  004737  034076          9$:     JSR     PC,@#GT.PRM     ;GET PARAMETERS
1936  005766  000420                          BR      4$
1937  005770  004737  026374          1$:     JSR     PC,LODFLT       ;SETUP DEFAULT PARAMETERS
1938  005774  005037  001312                  CLR     DRVSEL          ;NO DRIVES SELECTED
1939  006000  005000                          CLR     R0              ;DETERMINE THE DRIVES THAT
1940  006002  012701  000001                  MOV     #1,R1           ;ARE AVAILABLE FOR TESTING
1941  006006  105760  036610          2$:     TSTB    DRVSTA(R0)
1942  006012  003403                          BLE     3$
1943  006014  156037  036724  001312          BISB    ATABIT(R0),@#DRVSEL
1944  006022  005200                  3$:     INC     R0
1945  006024  106301                          ASLB    R1
```

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1946  006026  001367                        BNE     2$
1947  006030  005037  036700          4$:   CLR     @#SEEKFG          ;CLEAR SEEK FLAG
1948  006034  032737  000400  001300        BIT     #SW08,@#C.SWR     ;DO SEEK BEFORE DATA TRANSFER?
1949  006042  001002                        BNE     5$                ;YES--BRANCH
1950  006044  005137  036700                COM     @#SEEKFG          ;NO
1951  006050  122737  000011  000041  5$:   CMPB    #11,41  ;LOADED FROM AN RM03 ?
1952  006056  001003                        BNE     10$               ;BR IF NOT
1953  006060  042737  000001  001312        BIC     #BIT00,DRVSEL     ;CLEAR THE DRIVE 0 SELECTION BIT
1954  006066  104401  045331          10$:  TYPE    ,DRIVES           ;'DRIVES(S) TO BE TESTED'
1955  006072  005037  021234                CLR     @#$ENDCT          ;DETERMINE PASSES TO MAKE AND
1956  006076  005000                        CLR     R0                ;THE DRIVES TO BE TESTED
1957  006100  013701  001312                MOV     @#DRVSEL,R1       ;ANY DRIVES SELECTED?
1958  006104  001004                        BNE     6$                ;YES--BRANCH
1959  006106  104401  045362                TYPE    ,NONE             ;'NONE'
1960
1961  006112  000137  021052                JMP     @#$EOP            ;GO TO END OF PROGRAM
1962  006116  006201                  6$:   ASR     R1                ;REPORT THE DRIVES TO BE TESTED
1963  006120  103011                        BCC     7$
1964  006122  005237  021234                INC     @#$ENDCT          ;GIVE THIS DRIVE A PASS
1965  006126  010046                        MOV     R0,-(SP)          ;;SAVE R0 FOR TYPEOUT
1966  006130  104403                        TYPOS                     ;;GO TYPE--OCTAL ASCII
1967  006132     001                        .BYTE   1                 ;;TYPE 1 DIGIT(S)
1968  006133     000                        .BYTE   0                 ;;SUPPRESS LEADING ZEROS
1969  006134  005701                        TST     R1                ;MORE DRIVES?
1970  006136  001404                        BEQ     8$                ;NO--BRANCH
1971  006140  104401  045367                TYPE    ,COMMA            ;','
1972  006144  005200                  7$:   INC     R0                ;FORM DRIVE NUMBER
1973  006146  000763                        BR      6$
1974  006150  013737  021234  021226  8$:   MOV     @#$ENDCT,@#$EOPCT
1975  006156  005737  001324                TST     @#CLKSTA          ;KW11-P AVAILABLE
1976  006162  003006                        BGT     RSTRT1            ;YES--BRANCH
1977  006164  032737  036000  001314        BIT     #36000,@#TSTNMS   ;NO--ANY TIMING TESTS TO BE PERFORMED?
1978  006172  001402                        BEQ     RSTRT1            ;NO--BRANCH
1979  006174  104401  045371                TYPE    ,NOCLOK           ;'NO KW11-P CLOCK, TIMING TESTS WILL NOT BE PERFORMED'
1980  006200  005737  001312  RSTRT1:  TST   DRVSEL                   ;ANY DRIVES SELECTED ?
1981  006204  001002                        BNE     1$                ;BR IF YES
1982  006206  000137  004762                JMP     START2            ;GET DRIVE SELECTION ENTRY
1983                                                                  ;& RESTART AT BEGINNING ------------------->
1984
1985  006212  005037  001334          1$:   CLR     CHKDRV            ;INIT. THE CHECK DRIVE KEY
1986  006216  012737  000001  001336        MOV     #1,DRVMSK         ;START TO CHECK DESIRED DRIVES
1987  006224  033737  001336  001312  RSTRT2: BIT   DRVMSK,DRVSEL     ;IS THIS DRIVE SELECTED?
1988  006232  001010                        BNE     DRVOK             ;YES--GO CHECK IF DRIVE IS READY FOR TESTING
1989  006234  012706  001100          RESTART: MOV  #STACK,SP         ;SETUP THE STACK POINTER
1990  006240  005237  001334                INC     CHKDRV            ;MOVE  TO NEXT DRIVE NUMBER
1991  006244  106337  001336                ASLB    DRVMSK            ;POSITION THE MASK
1992  006250  103753                        BCS     RSTRT1            ;BRANCH IF THE DRIVE NUMBER NEEDS INITIALIZED
1993  006252  000764                        BR      RSTRT2
1994
1995  006254  013702  001334          DRVOK:  MOV   CHKDRV,R2         ;PICKUP THE DRIVE NUMBER
1996  006260  105762  036610                TSTB    DRVSTA(R2)        ;IS DESIRED DRIVE ON-LINE?
1997  006264  003005                        BGT     1$                ;YES, BRANCH
1998  006266  104011                        ERROR   11                ;DRIVE SELECTED IS NOT ONLINE
1999  006270  043737  001336  001312        BIC     DRVMSK,DRVSEL     ;CLEAR DRIVE'S SELECTION BIT
2000  006276  000756                        BR      RESTART           ;RETURN
2001  006300  010237  004206          1$:   MOV     R2,@#DPB.A        ;SET THE DRIVE NUMBER INTO THE DPB'S
```

```
2002  006304  010237  004226                  MOV     R2,@#DPB.B
2003  006310  010237  004246                  MOV     R2,@#DPB.C
2004  006314  010237  004266                  MOV     R2,@#DTADPB
2005  006320  004737  027010                  JSR     PC,@#LDCMD      ;LOAD COMMAND INTO DPB.B AND DPB.C
2006  006324  012737  021052  001332          MOV     #$EOP,@#BYPASS  ;IF ERROR GO TO END OF PROGRAM
2007  006332  112737  000020  004207          MOVB    #FMT22/256.,DPB.A+1  ;ASSUME 16 BIT FORMAT
2008  006340  032737  000001  001300          BIT     #BIT00,C.SWR    ;16 BIT FORMAT REQUESTED ?
2009  006346  001402                          BEQ     2$              ;BR IF YES
2010  006350  105037  004207                  CLRB    DPB.A+1         ;CLEAR THE 'FMT22' BIT
2011  006354  112737  000143  004210  2$:     MOVB    #SETFORM,DPB.A+2  ;SET THE FORMAT BIT PER DPB.A+1
2012  006362  004037  027054                  JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
2013  006366  112737  000107  004210          MOVB    #RECAL,@#DPB.A+2        ;RECAL=COMMAND
2014  006374  004037  027054                  JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
2015  006400  104401  045457                  TYPE    ,TESTNG         ;'TESTING DRIVE '
2016  006404  010246                          MOV     R2,-(SP)        ;;SAVE R2 FOR TYPEOUT
2017  006406  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
2018  006410     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
2019  006411     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
2020  006412  104401  046141                  TYPE    ,MSG.SP         ;TYPE SPACES
2021  006416  104401  045501                  TYPE    ,SERIAL         ;'SERIAL NUMBER '
2022  006422  012700  000004                  MOV     #4,R0           ;FOUR DIGITS TO TYPE
2023  006426  013701  004336                  MOV     RM.REG+30,R1    ;SERIAL NUMBER
2024  006432  005002                  3$:     CLR     R2              ;ZERO
2025  006434  006101                          ROL     R1              ;PUT THE NEXT DIGIT
2026  006436  006102                          ROL     R2              ;INTO R2
2027  006440  006101                          ROL     R1
2028  006442  006102                          ROL     R2
2029  006444  006101                          ROL     R1
2030  006446  006102                          ROL     R2
2031  006450  006101                          ROL     R1
2032  006452  006102                          ROL     R2
2033  006454  062702  000060                  ADD     #'0,R2          ;MAKE IT ASCII
2034  006460  010227                          MOV     R2,(PC)+        ;SAVE IT
2035  006462  000000                  4$:     .WORD   0
2036  006464  104401  006462                  TYPE    ,4$             ;TYPE
2037  006470  005300                          DEC     R0              ;ALL DIGITS TYPED?
2038  006472  003357                          BGT     3$              ;NO -- BRANCH
2039  006474  104401  001215                  TYPE    ,$CRLF
2040  006500  113737  001444  001115          MOVB    ERR.CT,$ERMAX   ;SETUP MAX ERROR COUNT
```

```
                                .SBTTL  **** TESTS ****

;*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:
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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 OR 814       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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                                .SBTTL  *** SEEK TESTS ***

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

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

                        ;;*******************************************************************
                        ;*TEST 0         RECAL/SEEK TEST
```

```
                                        ;*      THIS TEST WILL CAUSE THE DRIVE TO EXECUTE A RECALIBRATE
                                        ;*      COMMAND CYCLE AND THEN SEEK FORWARD TO CYLINDER "LC" AT
                                        ;*      THE COMPLETION OF BOTH COMMANDS STATUS INDICATIONS ARE
                                        ;*      CHECKED TO ENSURE NO ERRORS OCCURRED.

                                        ;;*****************************************************************
006506                                  TSTO:
006506  000240                          NOP
006510  033737  001506  001314          BIT     @#BITS+<0*2>,TSTNMS ;DO THIS TEST?
006516  001002                          BNE     64$                 ;YES--BRANCH
006520  000137  006714                  JMP     TST1                ;NO--GO TO THE NEXT TEST
006524  012737  000000  001102  64$:    MOV     #0,@#$TSTNM         ;SET UP TEST NUMBER AND
                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
006532  004737  026632                  JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
006536  012737  006676  001110          MOV     #TESTO,@#$LPERR     ;SETUP THE LOOP ON ERROR ADDRESS
006544  013777  001102  172370          MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
006552  013737  001570  001204          MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
006560  112737  000031  001115          MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
006566  012737  000000  001224          MOV     #0,$TESTN           ;;SET TEST NUMBER IN APT MAIL BOX

                                        ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
006574  032777  010000  172336          BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
006602  001413                          BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
006604  013700  001102                  MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
006610  042700  177000                  BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
006614  104401  001215                  TYPE    ,$CRLF
006620  010046                          MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
                                                                    ;;TEST NUMBER
006622  104403                          TYPOS                       ;;GO TYPE--OCTAL ASCII
006624     002                          .BYTE   2                   ;;TYPE 2 DIGIT(S)
006625     000                          .BYTE   0                   ;;SUPPRESS LEADING ZEROS
006626  104401  001215                  TYPE    ,$CRLF
006632                                  20$:

006632  112737  000107  004210          MOVB    #RECAL,@#DPB.A+2        ;RECAL=COMMAND
006640  113737  001606  004236          MOVB    @#FS,@#DPB.B+10 ;FS
006646  113737  001600  004237          MOVB    @#FT,@#DPB.B+11 ;FT
006654  013737  001574  004240          MOV     @#LC,@#DPB.B+12 ;LC
006662  012737  006712  001332          MOV     #EXITO,@#BYPASS ;GO TO EXITO ON ERROR
006670  012737  006676  001106          MOV     #TESTO,$LPADR   ;SETUP LOOP ADDRESS
006676  012706  001100                  TESTO:  MOV     #STACK,SP       ;SET UP STACK POINTER
006702  004037  027054                  JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
006706  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
006712  000004                          EXITO:  SCOPE           ;LOOP

                                        ;;*****************************************************************
                                        ;*TEST 1         SEEK/SEEK TEST

                                        ;*      THIS TEST WILL CAUSE THE DRIVE TO EXECUTE A FORWARD SEEK
                                        ;*      CYCLE TO "LC", "LT", "LS" FOLLOWED BY A REVERSE SEEK CYCLE TO
                                        ;*      "FC", "FT", "FS".  AT THE COMPLETION OF EACH SEEK, THE PROPER
                                        ;*      INDICATORS ARE EXAMINED TO ENSURE PROPER OPERATION.
                                        ;*      "LC" WILL DEFAULT TO 128 AND "FC", "FT", "LT", "FS", AND "LS"
                                        ;*      WILL DEFAULT TO 0
```

```
                                ;;*****************************************************************
006714                          TST1:
006714  000240                        NOP
006716  033737  001510  001314        BIT     @#BITS+(1*2),TSTNMS ;DO THIS TEST?
006724  001002                        BNE     64$                 ;YES--BRANCH
006726  000137  007142                JMP     TST2                ;NO--GO TO THE NEXT TEST
006732  012737  000001  001102  64$:  MOV     #1,@#$TSTNM         ;SET UP TEST NUMBER AND
                                                                  ;CLEAR THE ERROR FLAG ($ERFLG)
006740  004737  026632                JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
006744  012737  007124  001110        MOV     #TEST1,@#$LPERR     ;SETUP THE LOOP ON ERROR ADDRESS
006752  013777  001102  172162        MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
006760  013737  001570  001204        MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
006766  112737  000031  001115        MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
006774  012737  000001  001224        MOV     #1,$TESTN           ;;SET TEST NUMBER IN APT MAIL BOX
                                ;
                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
007002  032777  010000  172130        BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
007010  001413                        BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
007012  013700  001102                MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
007016  042700  177000                BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
007022  104401  001215                TYPE    ,$CRLF
007026  010046                        MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
                                                                  ;;TEST NUMBER
007030  104403                        TYPOS                       ;;GO TYPE--OCTAL ASCII
007032     002                        .BYTE   2                   ;;TYPE 2 DIGIT(S)
007033     000                        .BYTE   0                   ;;SUPPRESS LEADING ZEROS
007034  104401  001215                TYPE    ,$CRLF
007040                          20$:
                                ;
007040  005037  001446                CLR     BASFLG              ;CLEAR BAD SECTOR ENCOUNTER FOR THE DRIVE
007044  113737  001606  004236        MOVB    @#FS,@#DPB.B+10     ;FS
007052  113737  001610  004256        MOVB    @#LS,@#DPB.C+10     ;LS
007060  113737  001600  004237        MOVB    @#FT,@#DPB.B+11     ;FT
007066  113737  001602  004257        MOVB    @#LT,@#DPB.C+11     ;LT
007074  013737  001572  004240        MOV     @#FC,@#DPB.B+12     ;FC
007102  013737  001574  004260        MOV     @#LC,@#DPB.C+12     ;LC
007110  012737  007140  001332        MOV     #EXIT1,@#BYPASS     ;GO TO EXIT1 ON ERROR
007116  012737  007124  001106        MOV     #TEST1,$LPADR       ;SETUP LOOP ADDRESS
007124  012706  001100          TEST1:  MOV     #STACK,SP           ;SET THE STACK POINTER
007130  004037  027410                JSR     R0,@#CALL.C         ;GO EXECUTE THE COMMAND
007134  004037  027206                JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
007140  000004          EXIT1:  SCOPE                       ;LOOP
                                ;
                                ;;*****************************************************************
                                ;*TEST 2         INCREMENT/SEEK TEST
                                ;
                                ;*       THIS TEST WILL COMMAND FORWARD SEEK CYCLES TO ADVANCE THE
                                ;*       CYLINDER ADDRESS FROM "FC" TO "LC" BY THE INCREMENT "IC".
                                ;*       WHEN THE RESULTANT CYLINDER ADDRESS (NC) EXCEEDS
                                ;*       "LC" REVERSE SEEK CYCLES ARE INITIATED; STARTING
                                ;*       AT THE LAST LEGAL "NC" AND DECREMENTING BY "IC"
                                ;*       UNTIL "NC" IS LESS THAN "FC". AT THE COMPLETION OF EACH
                                ;*       SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO
                                ;*       ENSURE PROPER OPERATION.
                                ;
                                ;;*****************************************************************
```

```
2209  007142                                  TS 2:
2210  007142  000240                          NOP
2211  007144  033737  001512  001314          BIT     @#BITS+<2*2>,TSTNMS ,DO THIS TEST?
2212  007152  001002                          BNE     64$                 ;YES--BRANCH
2213  007154  000137  007424                  JMP     TST3                ;NO--GO TO THE NEXT TEST
2214  007160  012737  000002  001102  64$:    MOV     #2,@#$TSTNM         ;SET UP TEST NUMBER AND
2215                                                                      ;CLEAR THE ERROR FLAG ($ERFLG)
2216  007166  004737  026632                  JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
2217  007172  012737  007316  001110          MOV     #TEST2,@#$LPERR     ;SETUP THE LOOP ON ERROR ADDRESS
2218  007200  013777  001102  171734          MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2219  007206  013737  001570  001204          MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
2220  007214  112737  000031  001115          MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
2221  007222  012737  000002  001224          MOV     #2,$TESTN           ;;SET TEST NUMBER IN APT MAIL BOX
2222
2223                                          ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2224  007230  032777  010000  171702          BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
2225  007236  001413                          BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
2226  007240  013700  001102                  MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
2227  007244  042700  177000                  BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
2228  007250  104401  001215                  TYPE    ,$CRLF
2229  007254  010046                          MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
2230                                                                      ;;TEST NUMBER
2231  007256  104403                          TYPOS                       ;;GO TYPE--OCTAL ASCII
2232  007260     002                          .BYTE   2                   ;;TYPE 2 DIGIT(S)
2233  007261     000                          .BYTE   0                   ;;SUPPRESS LEADING ZEROS
2234  007262  104401  001215                  TYPE    ,$CRLF
2235  007266                                  20$:
2236
2237  007266  012737  007274  001106          MOV     #1$,$LPADR          ;SETUP LOOP ADDRESS
2238  007274  113737  001606  004236  1$:     MOVB    @#FS,@#DPB.B+10     ;FS
2239  007302  113737  001600  004237          MOVB    @#FT,@#DPB.B+11     ;FT
2240  007310  012737  007422  001332          MOV     #EXIT2,@#BYPASS     ;GO TO EXIT2 ON ERROR
2241  007316  013737  001572  004240  TEST2:  MOV     @#FC,@#DPB.B+12     ;FC
2242  007324  012737  007324  001110          MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
2243  007332  012706  001100                  MOV     #STACK,SP           ;LOAD THE STACK POINTER
2244  007336                                  INCSK:
2245  007336  004037  027206                  JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
2246  007342  063737  001576  004240          ADD     @#IC,@#DPB.B+12     ;MOVE TO NEXT CYLINDER
2247  007350  023737  001574  004240          CMP     @#LC,@#DPB.B+12     ;OUT OF CYLINDERS?
2248  007356  002367                          BGE     INCSK               ;NO--BRANCH
2249  007360  013737  001574  004 40          MOV     @#LC,@#DPB.B+12
2250  007366  012737  007366  001110          MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
2251  007374  012706  001100                  MOV     #STACK,SP           ;LOAD THE STACK POINTER
2252  007400                                  DECSK:
2253  007400  004037  027206                  JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
2254  007404  163737  001576  004240          SUB     @#IC,@#DPB.B+12
2255  007412  023737  001572  004240          CMP     @#FC,@#DPB.B+12
2256  007420  003767                          BLE     DECSK
2257  007422  000004                  EXIT2:  SCOPE                       ;LOOP
2258
2259                                          ;;*****************************************************************
2260                                          ;*TEST 3        STEPPING SEEK TEST
2261
2262                                          ;*      THIS TEST WILL COMMAND SEEK CYCLES TO CYLINDER 0,1,2,4,
2263                                          ;*      8,16,32,64,128, AND 256.  AT THE COMPLETION OF EACH SEEK
2264                                          ;*      COMMAND THE PROPER INDICATORS ARE EXAMINED TO ENSURE PROPER
```

```
                                        ;*      OPERATION.
                                        ;
                                        ;;*****************************************************************
007424                                  TST3:
007424  000240                          NOP
007426  033737  001514  001314          BIT     @#BITS+(3*2),TSTNMS ;DO THIS TEST?
007434  001002                          BNE     64$             ;YES--BRANCH
007436  000137  007664                  JMP     TST4            ;NO--GO TO THE NEXT TEST
007442  012737  000003  001102  64$:    MOV     #3,@#$TSTNM     ;SET UP TEST NUMBER AND
                                                                ;CLEAR THE ERROR FLAG ($ERFLG)
007450  004737  026632                  JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
007454  012737  007600  001110          MOV     #TEST3,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
007462  013777  001102  171452          MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
007470  013737  001570  001204          MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
007476  112737  000031  001115          MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
007504  012737  000003  001224          MOV     #3,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
                                        ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
007512  032777  010000  171420          BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
007520  001413                          BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
007522  013700  001102                  MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
007526  042700  177000                  BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
007532  104401  001215                  TYPE    ,$CRLF
007536  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                ;;TEST NUMBER
007540  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
007542     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
007543     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
007544  104401  001215                  TYPE    ,$CRLF
007550                                  20$:
007550  012737  007556  001106          MOV     #1$,$LPADR      ;SETUP TEST LOOP ADDRESS
007556  113737  001606  004236  1$:     MOVB    @#FS,@#DPB.B+10 ;FS
007564  113737  001600  004237          MOVB    @#FT,@#DPB.B+11 ;FT
007572  012737  007662  001332          MOV     #EXIT3,@#BYPASS ;GO TO BYPASS ON ERROR
007600  013737  001572  004240  TEST3:  MOV     @#FC,@#DPB.B+12 ;FC
007606  012737  007606  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
007614  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
007620  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
007624  013701  001576                  MOV     IC,R1           ;CYLINDER 1
007630  012737  007630  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
007636  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
007642  010137  004240          1$:     MOV     R1,@#DPB.B+12   ;DESIRED CYLINDER
007646  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
007652  006301                          ASL     R1              ;MOVE TO NEXT CYLINDER
007654  020137  001574                  CMP     R1,@#LC         ;DONE?
007660  003770                          BLE     1$              ;NO--LOOP
007662  000004                  EXIT3:  SCOPE
                                        ;;*****************************************************************
                                        ;*TEST 4         OSCILLATING SEEK TEST
                                        ;
                                        ;*      THIS TEST WILL COMMAND SEEK CYCLES FROM "FC" TO "NC" AND BACK
                                        ;*      TO "FC".  "NC" STARTS AT "FC" AND INCREMENTS BY "IC" UP TO CYLINDER
                                        ;*      "LC", THEN IS DECREMENTED BY "IC" BACK TO CYLINDER "FC".  AT THE
                                        ;*      COMPLETION OF EVERY SEEK COMMAND THE PROPER INDICATORS ARE
```

```
                                        ;*      EXAMINED TO ENSURE PROPER OPERATION.
                                        ;;**************************************************************
007664                                  TST4:
007664  000240                          NOP
007666  033737  001516  001314          BIT     @#BITS+(4*2),TSTNMS ;DO THIS TEST?
007674  001002                          BNE     64$             ;YES--BRANCH
007676  000137  010316                  JMP     TST5            ;NO--GO TO THE NEXT TEST
007702  012737  000004  001102  64$:    MOV     #4,@#$TSTNM     ;SET UP TEST NUMBER AND
                                                                ;CLEAR THE ERROR FLAG (SERFLG)
007710  004737  026632                  JSR     PC,LOOPRM       ;LOAD THE PARMETERS FOR THE TEST
007714  012737  010054  001110          MOV     #TEST4,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
007722  013777  001102  171212          MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
007730  013737  001570  001204          MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
007736  112737  000031  001115          MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
007744  012737  000004  001224          MOV     #4,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
                                        ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
007752  032777  010000  171160          BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
007760  001413                          BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
007762  013700  001102                  MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
007766  042700  177000                  BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
007772  104401  001215                  TYPE    ,$CRLF
007776  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                ;;TEST NUMBER
010000  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
010002     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
010003     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
010004  104401  001215                  TYPE    ,$CRLF
010010                                  20$:
                                        ;
010010  012737  010016  001106          MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
010016  113737  001606  004236  1$:     MOVB    @#F$,@#DPB.B+10 ;FS
010024  113737  001600  004237          MOVB    @#FT,@#DPB.B+11 ;FT
010032  012737  010314  001332          MOV     #EXIT4,@#BYPASS ;GO TO EXIT4 ON ERROR
010040  005002                          CLR     R2              ;CLEAR STALL SWITCH (NO STALL)
010042  032737  010000  001300          BIT     #SW12,@#C.SWR   ;STALL REQUIRED?
010050  001401                          BEQ     TEST4           ;NO--BRANCH
010052  005102                          COM     R2              ;YES--SET SWITCH
010054  013701  001572          TEST4:  MOV     @#FC,R1         ;SET NC TO FC
010060  005037  001416                  CLR     @#STALLO        ;START AT ZERO IF STALLS REQUIRED
010064  012737  010064  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
010072  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
010076  010137  004240          1$:     MOV     R1,@#DPB.B+12   ;NC
010102  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
010106  005702                          TST     R2              ;STALL?
010110  001403                          BEQ     2$              ;NO--BRANCH
010112  004037  030606                  JSR     R0,@#STALL      ;YES-GO TO STALL ROUTINE
010116  001416                          .WORD   STALLO          ;TIME POINTER
010120  013737  001572  004240  2$:     MOV     FC,@#DPB.B+12   ;FC
010126  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
010132  005702                          TST     R2              ;STALL?
010134  001413                          BEQ     3$              ;NO--BRANCH
010136  004037  030606                  JSR     R0,@#STALL      ;YES--GO TO STALL ROUTINE
010142  001416                          .WORD   STALLO          ;TIME POINTER
010144  005237  001416                  INC     @#STALLO        ;UPDATE THE TIME
```

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2377  010150  023737  001442  001416          CMP     @#MXSTAL,@#STALLO ;TIME TO BIG?
2378  010156  003347                          BGT     1$                ;NO--BRANCH
2379  010160  005037  001416                  CLR     @#STALLO          ;YES--START OVER AT ZERO
2380  010164  063701  001576          3$:     ADD     @#IC,R1           ;MOVE TO NEXT CYLINDER
2381  010170  020137  001574                  CMP     R1,@#LC           ;LAST CYLINDER COMPLETED?
2382  010174  003740                          BLE     1$                ;NO--BRANCH
2383  010176  013701  001574                  MOV     @#LC,R1           ;SET NC TO LC
2384  010202  012737  010202  001110          MOV     #.,$LPERR         ;SETUP THE ERROR LOOP ADDRESS
2385  010210  012706  001100                  MOV     #STACK,SP         ;LOAD THE STACK POINTER
2386  010214  010137  004240          4$:     MOV     R1,@#DPB.B+12     ;NC
2387  010220  004037  027206                  JSR     R0,@#CALL.B       ;GO EXECUTE THE COMMAND
2388  010224  005702                          TST     R2                ;STALL?
2389  010226  001403                          BEQ     5$                ;NO--BRANCH
2390  010230  004037  030606                  JSR     R0,@#STALL        ;YES--GO TO STALL ROUTINE
2391  010234  001416                          .WORD   STALLO            ;TIME POINTER
2392  010236  013737  001574  004240  5$:     MOV     @#LC,@#DPB.B+12   ;LC
2393  010244  004037  027206                  JSR     R0,@#CALL.B       ;GO EXECUTE THE COMMAND
2394  010250  005702                          TST     R2                ;STALL?
2395  010252  001413                          BEQ     6$                ;NO--BRANCH
2396  010254  004037  030606                  JSR     R0,@#STALL        ;YES--GO TO STALL ROUTINE
2397  010260  001416                          .WORD   STALLO            ;TIME POINTER
2398  010262  005237  001416                  INC     @#STALLO          ;UPDATE STALL TIME
2399  010266  023737  001442  001416          CMP     @#MXSTAL,@#STALLO ;TIME TOO BIG?
2400  010274  003347                          BGT     4$                ;NO--BRANCH
2401  010276  005037  001416                  CLR     @#STALLO          ;YES--SET STALL TIME BACK TO ZERO
2402  010302  163701  001576          6$:     SUB     @#IC,R1           ;NEXT CYLINDER
2403  010306  020137  001572                  CMP     R1,@#FC           ;DONE?
2404  010312  002340                          BGE     4$                ;NO--BRANCH
2405  010314  000004                  EXIT4:  SCOPE                     ;LOOP
2406
2407                                  ;;*****************************************************************
2408                                  ;*TEST 5        CONVERGING/DIVERGING SEEK TEST
2409
2410                                  ;*      THIS TEST WILL CAUSE THE DRIVE TO EXECUTE FORWARD AND REVERSE
2411                                  ;*      SEEKS FROM "NC1" AND "NC2" RESPECTIVELY, "NC1" WILL BE INCREMENTED
2412                                  ;*      BY "IC" AND "NC2" WILL BE DECREMENTED BY "IC" UNTIL "NC1" IS
2413                                  ;*      GREATER THAN THE INITIAL VALUE OF "NC2" AND "NC2" IS
2414                                  ;*      LESS THAN THE INITIAL VALUE OF "NC1".  AT THE COMPLETION OF
2415                                  ;*      EACH SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO
2416                                  ;*      ENSURE PROPER OPERATION.  "NC1" AND "NC2" DEFAULT TO
2417                                  ;*      "FC" AND "LC" RESPECTIVELY.
2418
2419                                  ;;*****************************************************************
2420  010316                          TST5:
2421  010316  000240                          NOP
2422  010320  033737  001520  001314          BIT     @#BITS+<5*2>,TSTNMS ;DO THIS TEST?
2423  010326  001002                          BNE     64$               ;YES--BRANCH
2424  010330  000137  010562                  JMP     TST6              ;NO--GO TO THE NEXT TEST
2425  010334  012737  000005  001102  64$:     MOV     #5,@#$TSTNM       ;SET UP TEST NUMBER AND
2426                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
2427  010342  004737  026632                  JSR     PC,LODPRM         ;LOAD THE PARMETERS FOR THE TEST
2428  010346  012737  010472  001110          MOV     #TEST5,@#$LPERR   ;SETUP THE LOOP ON ERROR ADDRESS
2429  010354  013777  001102  170560          MOV     $TSTNM,@DISPLAY   ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2430  010362  013737  001570  001204          MOV     @#RPT,$TIMES      ;GET THE ITERATION COUNT
2431  010370  112737  000031  001115          MOVB    #25.,$ERMAX       ;MAX ERRORS ALLOWED FOR TEST
2432  010376  012737  000005  001224          MOV     #5,$TESTN         ;;SET TEST NUMBER IN APT MAIL BOX
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2433
2434                                                    ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2435  010404  032777  010000  170526                    BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
2436  010412  001413                                    BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
2437  010414  013700  001102                            MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
2438  010420  042700  177000                            BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
2439  010424  104401  001215                            TYPE    ,$CRLF
2440  010430  010046                                    MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
2441                                                                            ;;TEST NUMBER
2442  010432  104403                                    TYPOS                   ;;GO TYPE--OCTAL ASCII
2443  010434     002                                    .BYTE   2               ;;TYPE 2 DIGIT(S)
2444  010435     000                                    .BYTE   0               ;;SUPPRESS LEADING ZEROS
2445  010436  104401  001215                            TYPE    ,$CRLF
2446  010442                                  20$:
2447
2448  010442  012737  010450  001106                    MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
2449  010450  113737  001606  004236          1$:       MOVB    @#F$,@#DPB.B+10 ;FS
2450  010456  113737  001600  004237                    MOVB    @#FT,@#DPB.B+11 ;FT
2451  010464  012737  010560  001332                    MOV     #EXIT5,@#BYPASS ;GO TO EXIT5 ON ERROR
2452  010472  013701  001572                  TEST5:    MOV     @#FC,R1         ;START NC1 AT FC
2453  010476  013702  001574                            MOV     @#LC,R2         ;START NC2 AT LC
2454  010502  012737  010502  001110                    MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2455  010510  012706  001100                            MOV     #STACK,SP       ;LOAD THE STACK POINTER
2456  010514  010137  004240                  1$:       MOV     R1,@#DPB.B+12   ;NC1
2457  010520  004037  027206                            JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2458  010524  010237  004240                            MOV     R2,@#DPB.B+12   ;NC2
2459  010530  004037  027206                            JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2460  010534  063701  001576                            ADD     @#IC,R1         ;NEXT NC1
2461  010540  163702  001576                            SUB     @#IC,R2         ;NEXT NC2
2462  010544  020137  001574                            CMP     R1,@#LC         ;DONE?
2463  010550  003003                                    BGT     EXIT5           ;YES--BRANCH
2464  010552  020237  001572                            CMP     R2,@#FC ;?
2465  010556  002356                                    BGE     1$              ;NO--BRANCH
2466  010560  000004                          EXIT5:    SCOPE                   ;LOOP
2467
2468                                                    ;;*****************************************************************
2469                                                    ;*TEST 6        SERVO ADDRESSING LOGIC NOISE GENERATOR
2470
2471                                                    ;*      IN THIS TEST A SEEK IS DONE TO CYL "NC" THEN A SEEK TO
2472                                                    ;*      NC+4 THEN NC+1 THEN NC+3 THEN NC+2 THEN NC+5.  NOW "NC" IS UPDATED
2473                                                    ;*      BY "IC" AND THE ABOVE SEQUENCE IS REPEATED UNITL "LC" IS
2474                                                    ;*      EXCEEDED BY ANY OF THE ABOVE VALUES.  THE INITIAL VALUE OF "NC"
2475                                                    ;*      IS "FC".  AT THE COMPLETION OF EACH SEEK COMMAND THE
2476                                                    ;*      PROPER INDICATORS ARE EXAMINED TO ENSURE PROPER OPERATION.
2477
2478                                                    ;;*****************************************************************
2479  010562                                    TST6:
2480  010562  000240                                    NOP
2481  010564  033737  001522  001314                    BIT     @#BITS+<6*2>,TSTNMS ;DO THIS TEST?
2482  010572  001002                                    BNE     64$             ;YES--BRANCH
2483  010574  000137  011072                            JMP     TST7            ;NO--GO TO THE NEXT TEST
2484  010600  012737  000006  001102  64$:     MOV     #6,@#$TSTNM             ;SET UP TEST NUMBER AND
2485                                                                            ;CLEAR THE ERROR FLAG ($ERFLG)
2486  010606  004737  026632                            JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
2487  010612  012737  010736  001110                    MOV     #TEST6,@#$LPERR ;SETUP THE LOOP ON ERROR ADDRESS
2488  010620  013777  001102  170314                    MOV     $TSTNM,@DISPLAY ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
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2489  010626  013737  001570  001204          MOV     @#RPT$TIMES     ;GET THE ITERATION COUNT
2490  010634  112737  000031  001115          MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
2491  010642  012737  000006  001224          MOV     #6,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
2492
2493                                          ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2494  010650  032777  010000  170262          BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
2495  010656  001413                          BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
2496  010660  013700  001102                  MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
2497  010664  042700  177000                  BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
2498  010670  104401  001215                  TYPE    ,$CRLF
2499  010674  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
2500                                                                  ;;TEST NUMBER
2501  010676  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
2502  010700     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
2503  010701     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
2504  010702  104401  001215                  TYPE    ,$CRLF
2505  010706                          20$:
2506
2507  010706  012737  010714  001106          MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
2508  010714  113737  001606  004236  1$:     MOVB    @#FS,@#DPB.B+10 ;FS
2509  010722  113737  001600  004237          MOVB    @#FT,@#DPB.B+11 ;FT
2510  010730  012737  011070  001332          MOV     #EXIT6,@#BYPASS ;GO TO EXIT6 ON ERROR
2511  010736  013701  001572          TEST6:  MOV     @#FC,R1         ;PICKUP "FC"
2512  010742  013702  001574                  MOV     @#LC,R2         ;FORM LAST CYLINDER THAT
2513  010746  162702  000005                  SUB     #5,R2           ;IS AVAILABLE FOR TESTING
2514  010752  012737  010752  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2515  010760  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
2516  010764  020102                  1$:     CMP     R1,R2           ;LAST CYLINDER
2517  010766  003040                          BGT     EXIT6           ;YES--BRANCH
2518  010770  010137  004240                  MOV     R1,@#DPB.B+12   ;NC
2519  010774  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2520  011000  062737  000004  004240          ADD     #4,@#DPB.B+12   ;NC+4
2521  011006  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2522  011012  162737  000003  004240          SUB     #3,@#DPB.B+12   ;NC+1
2523  011020  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2524  011024  062737  000002  004240          ADD     #2,@#DPB.B+12   ;NC+3
2525  011032  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2526  011036  162737  000001  004240          SUB     #1,@#DPB.B+12   ;NC+2
2527  011044  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2528  011050  062737  000003  004240          ADD     #3,@#DPB.B+12   ;NC+5
2529  011056  004037  027206                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2530  011062  063701  001576                  ADD     @#IC,R1
2531  011066  000736                          BR      1$
2532  011070  000004                  EXIT6:  SCOPE                   ;LOOP
2533
2534                                  ;;**********************************************************************
2535                                  ;*TEST 7         RANDOM SEEK TEST
2536
2537                                  ;*      THIS TEST PERFORMS RANDOM SEEK OPERATIONS BETWEEN CYLINDERS 'FC'
2538                                  ;*      'LC'.  AFTER EACH SEEK, THE POSITION OF THE DRIVE IS VERIFIED BY
2539                                  ;*      READING A SECTOR FROM THE CURRENTLY ADDRESSED CYLINDER AND TRACK.
2540                                  ;*      THE TRACK ADDRESS IS INCREMENTED FOR EACH SEEK SO THAT VERIFICATION
2541                                  ;*      OF POSITIONING OCCURS USING EACH HEAD.  TRACK ADDRESSES ARE INCREMENTED
2542                                  ;*      BETWEEN PARAMTERS 'FT' AND 'LT'.
2543
2544                                  ;;**********************************************************************
```

```
2545  011072                                TST7:
2546  011072  000240                        NOP
2547  011074  033737  001524  001314        BIT     @#BITS+<7*2>,TSTNMS ;DO THIS TEST?
2548  011102  001002                        BNE     64$                 ;YES--BRANCH
2549  011104  000137  011516                JMP     TST10               ;NO--GO TO THE NEXT TEST
2550  011110  012737  000007  001102  64$:  MOV     #7,@#$TSTNM         ;SET UP TEST NUMBER AND
2551                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
2552  011116  004737  026632                JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
2553  011122  012737  011260  001110        MOV     #TEST7,@#$LPERR     ;SETUP THE LOOP ON ERROR ADDRESS
2554  011130  013777  001102  170004        MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2555  011136  013737  001570  001204        MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
2556  011144  112737  000031  001115        MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
2557  011152  012737  000007  001224        MOV     #7,$TESTN           ;;SET TEST NUMBER IN APT MAIL BOX
2558
2559                                        ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2560  011160  032777  010000  167752        BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
2561  011166  001413                        BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
2562  011170  013700  001102                MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
2563  011174  042700  177000                BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
2564  011200  104401  001215                TYPE    ,$CRLF
2565  011204  010046                        MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
2566                                                                    ;;TEST NUMBER
2567  011206  104403                        TYPOS                       ;;GO TYPE--OCTAL ASCII
2568  011210     002                        .BYTE   2                   ;;TYPE 2 DIGIT(S)
2569  011211     000                        .BYTE   0                   ;;SUPPRESS LEADING ZEROS
2570  011212  104401  001215                TYPE    ,$CRLF
2571  011216                          20$:
2572
2573  011216  113737  001600  004237        MOVB    FT,DPB.B+11         ;LOAD STARTING TRACK ADDRESS
2574  011224  112737  000105  004210        MOVB    #SEEK,@#DPB.A+2     ;SEEK=COMMAND
2575  011232  112737  000173  004230        MOVB    #READHD,DPB.B+2     ;READ HEADER & DATA COMMAN.
2576  011240  013704  036736                MOV     RMADR,R4            ;UNIBUS ADDRESS OF THE RH70
2577  011244  012737  011514  001332        MOV     #EXIT7,BYPASS       ;ERROR TERMINATION ADDRESS
2578  011252  012737  011260  001106        MOV     #TEST7,$LPADR       ;SETUP THE LOOP ON TEST ADDRESS
2579  011260  012706  001100          TEST7:MOV     #STACK,SP           ;SETUP THE STACK POINTER
2580  011264  013737  001572  004240        MOV     FC,DPB.B+12         ;INITIAL CYLINDER ADDRESS
2581  011272  023737  001572  001574        CMP     FC,LC               ;CYLINDER LIMITS THE SAME ?
2582  011300  001422                        BEQ     1$                  ;BR IF THEY ARE
2583  011302  004737  025532                JSR     PC,$RAND            ;CYCYLE THE RANDOM NUMBER GENERATOR
2584  011306  013746  025630                MOV     $HINUM,-(SP)        ;USE THE HIGH RANDOM NUMBER
2585  011312  005046                        CLR     -(SP)               ;UPPER DIVIDEND
2586  011314  013746  001574                MOV     LC,-(SP)            ;FORM THE DIVISOR
2587  011320  005216                        INC     (SP)                ;INCREMENT
2588  011322  163716  001572                SUB     FC,(SP)             ;SUBTRACT THE LOWER LIMIT
2589  011326  004737  025634                JSR     PC,$DIV             ;DIVIDE
2590  011332  062637  004240                ADD     (SP)+,DPB.B+12      ;ADD THE REMAINDER TO THE INITIAL CYLINDER
2591  011336  005726                        TST     (SP)+               ;DISCARD THE QUOTENT
2592  011340  013737  004240  004220        MOV     DPB.B+12,DPB.A+12   ;COPY NEW CYLINDER ADDRESS
2593  011346                           1$:
2594  011346  012737  011346  001110        MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
2595  011354  012706  001100                MOV     #STACK,SP           ;LOAD THE STACK POINTER
2596  011360  004037  027054                JSR     R0,@#CALL.A         ;GO EXECUTE THE COMMAND
2597  011364  012737  011364  001110        MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
2598  011372  012706  001100                MOV     #STACK,SP           ;LOAD THE STACK POINTER
2599  011376  113764  004206  000010        MOVB    DPB.A,RMCS2(R4)     ;SELECT THE DRIVE
2600  011404  016446  000020                MOV     RMLA(R4),-(SP)      ;GET THE LOOK AHEAD REGISTER
```

```
                                                ;ALIGN THE SECTOR ADDRESS
                                                ;ALIGN THE SECTOR ADDRESS
                                                ;PUT ADDRESS IN LOWER BYTE
                                                ;IN THE 1ST 20% OF SECTOR ?
                                                ;BR IF YES
                                                ;INCREMENT THE SECTOR ADDRESS
                                                ;INCREMENT THE SECTOR ADDRESS
                                                ;LOAD THE DPB
                                                ;PUT LAST SECTOR ADDRESS ON THE STACK
                                                ;INCREMENT IT
                                                ;NEW SECTOR ADDRESS TOO LARGE ?
                                                ;BR IF NOT
                                                ;BR IF ADDRESS IS 2 GREATER
                                                ;RESET TO SECTOR ADDRESS 0
                                                ;CONTINUE
                                                ;RESET ADDRESS TO SECTOR 1
                                                ;GO EXECUTE THE COMMAND
                                                ;INCREMENT THE TRACK ADDRESS
                                                ;MAXIMUM ?
                                                ;BR IF NOT
                                                ;RELOAD STARTING TRACK ADDRESS
                                                ;LOOP ?


;;*****************************************************************
;*TEST 10        SERVO SETTLE DOWN TEST

;*      THIS TEST VERIFIES THAT THE SERVO HAS SETTLED DOWN AND THAT
;*      THE DRIVE IS ON CYLINDER WHEN THE DRIVE INDICATES SEEK COMPLETE.
;*      RANDOM SEEKS ARE ISSUED BETWEEN CYLINDERS 'NC1' AND 'NC1+IC'
;*      ('NC1' STARTS AT VALUE 'FC').  AT THE COMPLETION OF 100C (10) SEEKS,
;*      'NC1' IS INCREMENTED BY VALUE 'IC' AND THE SEQUENCE IS REPEATED.
;*      THE TEST IS COMPLETED WHEN 'NC1' HAS BEEN INCREMENTED BEYOND 'LC'.
;*
;*      WHEN THE SEEK COMPLETES, THE PROGRAM READS THE DRIVE'S LOOK-AHEAD
;*      REGISTER (RMLA) TO DETERMINE THE ADDRESS OF THE SECTOR ROTATING  INTO
;*      POSITION.  THE PROGRAM THEN ISSUES A WRITE HEADER AND DATA COMMAND
;*      FOR THAT SECTOR.
;*      ERRORS IN THIS TEST INDICATE THAT THE SERVO SYSTEM MAY NOT BE ADJUSTED
;*      CORRECTLY, THAT THE DRIVE IS MALFUNCTIONING, OR THAT A PACK WITH
;*      MARGINAL SERVO TRACKS IS MOUNTED ON THE DRIVE.
;*
;*      THIS TEST IS VALID ONLY IF THE OPERATION IS STARTED WITHIN A FEW
;*      HUNDRED MICRO-SECONDS AFTER SEEK DONE OCCURS.  THE NECESSARY
;*      TIME DEPENDENT PARAMETERS OCCUR FREQUENTLY ENOUGH WITHIN THE REQUIRED
;*      RANGE TO PERMIT THIS TEST TO BE EFFECTIVE.

;;*****************************************************************
TST10:
                NOP
                BIT     @#BITS+<10*2>,TSTNMS ;DO THIS TEST?
                BNE     64$                  ;YES--BRANCH
                JMP     TST11                ;NO--GO TO THE NEXT TEST
64$:            MOV     #10,@#$TSTNM         ;SET UP TEST NUMBER AND
                                             ;CLEAR THE ERROR FLAG ($ERFLG)
```

```
                                                JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
                                                MOV     #TEST10,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
                                                MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
                                                MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
                                                MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
                                                MOV     #10,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

                                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
                                                BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
                                                BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
                                                MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
                                                BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
                                                TYPE    ,$CRLF
                                                MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                        ;;TEST NUMBER
                                                TYPOS                   ;;GO TYPE--OCTAL ASCII
                                                .BYTE   2               ;;TYPE 2 DIGIT(S)
                                                .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                                TYPE    ,$CRLF
                                        20$:

                                                MOV     #1$,$LPADR      ;SETUP THE LOOP ADDRESS
                                        1$:
                                                MOVB    #SEEK,@#DPB.A+2 ;SEEK=COMMAND
                                                MOVB    #WRITE,DTADPB+2 ;COMMAND
                                                MOVB    FT,DTADPB+11    ;TRACK ADDRESS FOR THE WRITE
                                                MOV     FC,DPB.A+12     ;CYLINDER ADDRESS FOR THE SEEK
                                                MOV     FC,DTADPB+12    ;CYLINDER ADDRESS FOR THE WRITE
                                                MOV     FC,NC1          ;STARTING CYLINDER
                                                MOV     IC,DELTA        ;CYLINDER INCREMENT VALUE
                                                MOV     #-(256.*4.),DTADPB+4  ;WORD COUNT
                                                MOV     #BUFFER,DTADPB+6  ;BUFFER ADDRESS
                                                CLR     R0              ;PATTERN POINTER (WC PATTERN)
                                                JSR     PC,SETBUF       ;LOAD THE WRITE BUFFER
                                                CLR     R1              ;CLEAR REGISTER
                                                MOVB    DPB.A,R1        ;LOAD DRIVE ADDRESS
                                                MOV     RMADR,R4        ;UNIBUS ADDRESS OF THE RH70
                                                JSR     PC,CLRQUE       ;CLEAR THE OPERATION QUEUES
                                                MOV     #EXIT10,BYPASS  ;ERROR EXIT FROM TEST
                                        TEST10:
                                                MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
                                                MOV     #STACK,SP       ;LOAD THE STACK POINTER
                                                MOV     #PR7,@#PS       ;SET PRIORITY TO 7
                                                TST     CLKSTA          ;SEE WHICH CLOCK ON SYSTEM
                                                BEQ     3$              ;BR IF NO CLOCK
                                                BMI     1$              ;BR IF KW11-L CLOCK
                                                MOV     @PKV,-(SP)      ;SAVE THE VECTOR
                                                MOV     PKV,-(SP)       ;SAVE THE VECTOR ADDRESS
                                                BR      2$              ;CONTINUE
                                        1$:     MOV     @LKV,-(SP)      ;SAVE THE 'L' CLOCK VECTOR
                                                MOV     LKV,-(SP)       ;SAVE THE VECTOR ADDRESS
                                        2$:     MOV     #TST10B,@(SP)   ;CHANGE THE VECTOR
                                        3$:     MOV     #DORTI,@RMVEC   ;CHANGE THE RM03 VECTOR
                                                MOV     #8.,SEKTMR      ;LOAD THE SEEK TIMER
                                                MOV     #BIT05,RMCS2(R4)  ;INIT THE MASSBUS
                                                MOVB    R1,RMCS2(R4)    ;RESELECT THE DRIVE
```

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2713  012076  013764  004220  000034          MOV     DPB.A+12,RMDC(R4)  ;LOAD THE CYLINDER ADDRESS
2714  012104  013737  004220  001350          MOV     DPB.A+12,CYL.DS ;CYLINDER ADDRESS FOR ERROR MESSAGE
2715  012112  112764  000105  000000          MOVB    #SEEK,RMCS1(R4) ;START THE SEEK
2716  012120  005037  177776                  CLR     @#PS            ;CLEAR THE PRIORITY
2717  012124  105764  000012          4$:     TSTB    RMDS(R4)        ;HAS THE DRIVE FINISHED ?
2718  012130  100402                          BMI     5$              ;BR IF IT HAS
2719  012132  000001                          WAIT                    ;WAIT FOR THE OPERATION TO COMPLETE
2720  012134  000773                          BR      4$              ;CONTINUE
2721  012136  012737  000340  177776  5$:     MOV     #PR7,@#PS       ;CHANGE PRIORITY TO MAX
2722  012144  032764  040000  000012          BIT     #BIT14,RMDS(R4)  ;ERROR ?
2723  012152  001412                          BEQ     6$              ;BR IF NOT
2724  012154  012702  004206                  MOV     #DPB.A,R2       ;DPB POINTER
2725  012160  004737  044134                  JSR     PC,SVR470       ;SAVE THE REGISTERS
2726  012164  104023                          ERROR   23              ;ERROR DURING SEEK
2727  012166  012764  000040  000010          MOV     #BIT05,RMCS2(R4)  ;INIT THE MASSBUS
2728  012174  110164  000010                  MOVB    R1,RMCS2(R4)    ;RESELECT THE DRIVE
2729  012200  012777  041566  024532  6$:     MOV     #ISR,@RMVEC     ;SETUP THE RM03 VECTOR
2730  012206  005737  001324                  TST     CLKSTA          ;WHICH CLOCK
2731  012212  001405                          BEQ     TST10A          ;BR IF NONE
2732  012214  016676  000002  000000          MOV     2(SP),@(SP)     ;RELOAD THE CLOCK VECTOR
2733  012222  062706  000004                  ADD     #4,SP           ;CORRECT THE STACK POINTER
2734  012226                          TST10A:
2735  012226  012737  012226  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2736  012234  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
2737  012240  110164  000010                  MOVB    R1,RMCS2(R4)    ;SELECT THE DRIVE
2738  012244  016446  000020                  MOV     RMLA(R4),-(SP)  ;GET THE LOOK AHEAD REGISTER
2739  012250  006316                          ASL     (SP)            ;ALIGN THE SECTOR ADDRESS
2740  012252  006316                          ASL     (SP)            ;ALIGN THE SECTOR ADDRESS
2741  012254  000316                          SWAB    (SP)            ;PUT ADDRESS IN LOWER BYTE
2742  012256  122766  000300  000001          CMPB    #300,1(SP)      ;IN THE LAST 20% OR SECTOR ?
2743  012264  001001                          BNE     2$              ;BR IF NOT
2744  012266  105216                          INCB    (SP)            ;INCREMENT THE SECTOR ADDRESS
2745  012270  105216                  2$:     INCB    (SP)            ;INCREMENT THE SECTOR ADDRESS
2746  012272  112637  004276                  MOVB    (SP)+,DTADPB+10 ;LOAD THE DPB
2747  012276  013746  001712                  MOV     PRMLMT+22.,-(SP)  ;PUT MAXIMUM SECTOR ADDRESS ON THE STACK
2748  012302  005216                          INC     (SP)            ;INCREMENT PAST THE MAXIMUM ADDRESS
2749  012304  122637  004276                  CMPB    (SP)+,DTADPB+10 ;NEW SECTOR ADDRESS TOO LARGE ?
2750  012310  101007                          BHI     4$              ;BR IF NOT
2751  012312  103403                          BLO     3$              ;BR IF ADDRESS IS 2 GREATER THAN MAXIMUM
2752  012314  105037  004276                  CLRB    DTADPB+10       ;RESET TO SECTOR ADDRESS 0
2753  012320  000403                          BR      4$              ;CONTINUE
2754  012322  112737  000001  004276  3$:     MOVB    #1,DTADPB+10    ;RESET ADDRESS TO SECTOR 1
2755  012330  012703  004272          4$:     MOV     #DTADPB+4,R3    ;POINTER
2756  012334  012764  000111  000000          MOV     #DRVCLR,RMCS1(R4)  ;CLEAR THE DRIVE
2757  012342  012364  000002                  MOV     (R3)+,RMWC(R4)  ;LOAD THE WORD COUNT
2758  012346  012364  000004                  MOV     (R3)+,RMBA(R4)  ;LOAD THE BUFFER ADDRESS
2759  012352  012364  000006                  MOV     (R3)+,RMDA(R4)  ;LOAD THE TRACK/SECTOR ADDR
2760  012356  005037  004304                  CLR     DTADPB+16       ;RESET 'DONE' INDICATOR
2761  012362  012737  004266  036650          MOV     #DTADPB,TRNSWT  ;LOAD 'TRANSFER' DPB ADDRESS
2762  012370  010137  036722                  MOV     R1,DTUW         ;ADDRESS OF DRIVE TRANSFERING
2763  012374  112761  000001  036600          MOVB    #1,DRVACT(R1)   ;SET DRIVE ACTIVE INDICATOR
2764  012402  006301                          ASL     R1              ;SHIFT DRIVE ADDRESS
2765  012404  012761  001750  036702          MOV     #1000.,TIMER(R1)  ;SETUP THE OPERATION TIMER
2766  012412  006201                          ASR     R1              ;RESTORE R1
2767  012414  013764  004270  000000          MOV     DTADPB+2,RMCS1(R4)  ;START THE OPERATION
2768  012422  005037  177776                  CLR     @#PS            ;CLEAR THE PRIORITY
```

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2769  012426  004037  027632                    JSR     R0,DRVCL1       ;WAIT FOR OPERATION TO COMPLETE
2770  012432  023727  001426  001750  5$:       CMP     SEKCNT,#1000.   ;FINISHED SEEKS ?
2771  012440  001026                            BNE     6$              ;BR IF NOT
2772  012442  005037  001426                    CLR     SEKCNT          ;CLEAR THE SEEK COUNT
2773  012446  063737  001576  001614            ADD     IC,NC1          ;ADD THE INCREMENT
2774  012454  023737  001614  001574            CMP     NC1,LC          ;EXCEEDED THE CYLINDER LIMIT ?
2775  012462  103100                            BHIS    EXIT10          ;BR IF IT HAS
2776  012464  013737  001574  001430            MOV     LC,DELTA        ;GET THE NEXT 'ZONE' ADDRESS
2777  012472  163737  001614  001430            SUB     NC1,DELTA       ;CHECK THE DIFFERENCE
2778  012500  023737  001576  001430            CMP     IC,DELTA        ;DIFFERENCE GREATER THAN THE INCREMENT ?
2779  012506  101003                            BHI     6$              ;BR IF IT IS
2780  012510  013737  001576  001430            MOV     IC,DELTA        ;USE THE ICREMENT PARAMETER
2781  012516  005237  001426          6$:       INC     SEKCNT          ;COUNT THE NEXT SEEK
2782  012522  023737  001572  001574            CMP     FC,LC           ;BEGINNING AND ENDING CYLINDERS THE SAME ?
2783  012530  001002                            BNE     7$              ;BR IF NOT
2784  012532  000137  011770                    JMP     TEST10          ;BR IF THEY ARE
2785  012536  013737  001614  004220  7$:       MOV     NC1,DPB.A+12    ;RESET THE CYLINDER ADDRESS
2786  012544  004737  025532                    JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
2787  012550  013746  025630                    MOV     $HINUM,-(SP)    ;USE THE HIGH RANDOM NUMBER
2788  012554  005046                            CLR     -(SP)           ;CLEAR THE UPPER DIVIDEND
2789  012556  013746  001430                    MOV     DELTA,-(SP)     ;FORM THE DIVISOR
2790  012562  005216                            INC     (SP)            ;INCREMENT
2791  012564  004737  025634                    JSR     PC,$DIV         ;DIVIDE
2792  012570  062637  004220                    ADD     (SP)+,DPB.A+12  ;ADD THE REMAINDER TO THE INITIAL CYLINDER
2793  012574  005726                            TST     (SP)+           ;DISCARD THE QUOTENT
2794  012576  023737  004220  004300            CMP     DPB.A+12,DTADPB+12  ;SAME CYLINDER SELECTED AS LAST TIME ?
2795  012604  001754                            BEQ     7$              ;BR IF IT WAS
2796  012606  013737  004220  004300            MOV     DPB.A+12,DTADPB+12  ;COPY NEW CYLINDER ADDRESS
2797  012614  000137  011770                    JMP     TEST10          ;CONTINUE
2798  012620  005337  001424          TST10B:   DEC     SEKTMR          ;DECREMENT THE SEEK TIMER
2799  012624  001016                            BNE     1$              ;CONTINUE IF NOT DONE
2800  012626  012702  004206                    MOV     #DPB.A,R2       ;DPB ADDRESS
2801  012632  004737  044134                    JSR     PC,SVRH70       ;SAVE THE REGISTERS
2802  012636  104024                            ERROR   24              ;TIMEOUT DURING SEEK
2803  012640  012764  000040  000010            MOV     #BIT05,RMCS2(R4)  ;INIT THE MASSBUS
2804  012646  110164  000010                    MOVB    R1,RMCS2(R4)    ;RESELECT THE DRIVE
2805  012652  016676  000002  000000            MOV     2(SP),@(SP)     ;RESTORE THE CLOCK VECTOR ADDRESS
2806  012660  000401                            BR      EXIT10          ;ABORT THE TEST
2807  012662  000002                    1$:     RTI                     ;RETURN
2808  012664  000004                    EXIT10: SCOPE                   ;LOOP ?
2809
2810                                    ;;*****************************************************************
2811                                    ;*TEST 11        ALL SEEKS TEST
2812
2813                                    ;*       THIS TEST VERIFIES THAT THE DISK DRIVE CAN SEEK FROM EACH CYLINDER
2814                                    ;*       TO ALL OTHER CYLINDERS.
2815                                    ;*
2816                                    ;*       BEGINNING WITH CYLINDER 'FC', THE TEST SEEKS TO EACH CYLINDER
2817                                    ;*       BETWEEN 'FC' AND 'LC' FROM CYINDER 'FC'.  THE BEGINNING CYLINDER
2818                                    ;*       ADDRESS IS INCREMENTED AND THE TEST SEEKS BETWEEN THE NEW CYLINDER
2819                                    ;*       ADDRESS AND ALL CYLINDERS BETWEEN 'FC' AND 'LC'.  THE SEQUENCE
2820                                    ;*       CONTINUES UNTIL ALL CYLINDERS HAVE BEEN CHECKED.
2821
2822                                    ;;*****************************************************************
2823  012666                            ST11:
2824  012666  000240                           NOP
```

```
2825  012670  033737  001530  001314          BIT     @#BITS+(11*2),TSTNMS ;DO THIS TEST?
2826  012676  001002                          BNE     64$                  ;YES--BRANCH
2827  012700  000137  013152                  JMP     TST12                ;NO--GO TO THE NEXT TEST
2828  012704  012737  000011  001102  64$:    MOV     #11,@#$TSTNM         ;SET UP TEST NUMBER AND
2829                                                                       ;CLEAR THE ERROR FLAG ($ERFLG)
2830  012712  004737  026632                  JSR     PC,LODPRM            ;LOAD THE PARMETERS FOR THE TEST
2831  012716  012737  013072  001110          MOV     #TEST11,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
2832  012724  013777  001102  166210          MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2833  012732  013737  001570  001204          MOV     @#RPT,$TIMES         ;GET THE ITERATION COUNT
2834  012740  112737  000031  001115          MOVB    #25.,$ERMAX          ;MAX ERRORS ALLOWED FOR TEST
2835  012746  012737  000011  001224          MOV     #11,$TESTN           ;;SET TEST NUMBER IN APT MAIL BOX
2836
2837                                          ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2838  012754  032777  010000  166156          BIT     #SW12,@SWR           ;CHECK FOR SWITCH 12 SET
2839  012762  001413                          BEQ     20$                  ;IF = 0, THEN DON'T TYPE TEST NUMBER
2840  012764  013700  001102                  MOV     $TSTNM,R0            ;ELSE, TYPE THE NUMBER
2841  012770  042700  177000                  BIC     #177000,R0           ;MASK OUT THE HIGH ORDER BYTE
2842  012774  104401  001215                  TYPE    ,$CRLF
2843  013000  010046                          MOV     R0,-(SP)             ;;SAVE R0 FOR TYPEOUT
2844                                                                       ;;TEST NUMBER
2845  013002  104403                          TYPOS                        ;;GO TYPE--OCTAL ASCII
2846  013004     002                          .BYTE   2                    ;;TYPE 2 DIGIT(S)
2847  013005     000                          .BYTE   0                    ;;SUPPRESS LEADING ZEROS
2848  013006  104401  001215                  TYPE    ,$CRLF
2849  013012                          20$:
2850
2851  013012  012737  013020  001106          MOV     #1$,$LPADR           ;SETUP THE LOOP ADDRESS
2852  013020  113737  001606  004236  1$:     MOVB    FS,DPB.B+10          ;SECTOR ADDRESS
2853  013026  113737  001606  004256          MOVB    FS,DPB.C+10          ;SECTOR ADDRESS
2854  013034  113737  001600  004237          MOVB    FT,DPB.B+11          ;TRACK ADDRESS
2855  013042  113737  001600  004257          MOVB    FT,DPB.C+11          ;TRACK ADDRESS
2856  013050  013737  001572  004240          MOV     FC,DPB.B+12          ;STARTING CYLINDER ADDRESS
2857  013056  013737  001572  004260          MOV     FC,DPB.C+12          ;STARTING CYLINDER ADDRESS
2858  013064  012737  013150  001332          MOV     #EXIT11,BYPASS       ;TEST ABORT EXIT
2859  013072  012706  001100          TEST11: MOV     #STACK,SP            ;SETUP THE STACK POINTER
2860  013076                          1$:
2861  013076  004037  027410                  JSR     R0,@#CALL.C          ;GO EXECUTE THE COMMAND
2862  013102  004037  027206                  JSR     R0,@#CALL.B          ;GO EXECUTE THE COMMAND
2863  013106  063737  001576  004260          ADD     IC,DPB.C+12          ;INCREMENT THE ENDING CYLINDER ADDRESS
2864  013114  023737  001574  004260          CMP     LC,DPB.C+12          ;CHECK IF EXCEEDING MAXIMUM
2865  013122  002365                          BGE     1$                   ;BR IF NOT
2866  013124  013737  001572  004260          MOV     FC,DPB.C+12          ;RESET ENDING CYLINDER ADDRESS
2867  013132  063737  001576  004240          ADD     IC,DPB.B+12          ;INCREMENT THE STARTING ADDRESS
2868  013140  023737  001574  004240          CMP     LC,DPB.B+12          ;EXCEEDING MAXIMUM ?
2869  013146  002353                          BGE     1$                   ;BR IF NOT
2870  013150  000004                  EXIT11: SCOPE                        ;LOOP ?
2871
```

```
                                .SBTTL  *** TIMING TESTS ***

        ;*THE TIMING TESTS WILL ENSURE THAT THOSE FUNCTIONS BEING
        ;*TIMED ARE WITHIN THE TOLERANCES SPECIFIED IN THE "RM03
        ;*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.

                                ;;*****************************************************************
                                ;*TEST 12       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
                                ;*      ENSURE IT IS WITHIN TOLERANCE:
                                ;*              16.67 MS/REV + OR - 2% IF 60HZ
                                ;*              16.67 MS/REV + OR - 2.5% IF 50HZ.
                                ;;*****************************************************************
013152                          TST12:
013152  000240                  NOP
013154  033737  001532  001314  BIT     @#BITS+<12*2>,TSTNMS ;DO THIS TEST?
013162  001002                  BNE     64$                 ;YES--BRANCH
013164  000137  014042          JMP     TST13               ;NO--GO TO THE NEXT TEST
013170  012737  000012  001102  64$:    MOV     #12,@#$TSTNM        ;SET UP TEST NUMBER AND
                                                            ;CLEAR THE ERROR FLAG ($ERFLG)
013176  004737  026632          JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
013202  012737  013152  001110  MOV     #TST12,@#$LPERR     ;SETUP THE ERROR LOOP ADDRESS
013210  013777  001102  165724  MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
013216  013737  001570  001204  MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
013224  112737  000031  001115  MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST

                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
013232  032777  010000  165700  BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
013240  001413                  BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
013242  013700  001102          MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
013246  042700  177000          BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
013252  104401  001215          TYPE    ,$CRLF
013256  010046                  MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
                                                            ;;TEST NUMBER
013260  104403                  TYPOS                       ;;GO TYPE--OCTAL ASCII
013262     002                  .BYTE   2                   ;;TYPE 2 DIGIT(S)
```

```
2928  013263  000                       .BYTE   0               ;;SUPPRESS LEADING ZEROS
2929  013264  104401  001215            TYPE    ,$CRLF
2930  013270                    20$:
2931
2932  013270  005737  001324            TST     @#CLKSTA        ;KW11-P CLOCK?
2933  013274  003002                     BGT     1$              ;YES--START TEST
2934  013276  000137  014042            JMP     TST13           ;NO--GO TO NEXT TEST
2935  013302  012737  013302  001106 1$: MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
2936  013310  004037  031112            JSR     R0,@#SRCH00     ;DO A MASSBUS INIT & RECAL
2937  013314  000402                     BR      2$              ;RETURN HERE IF NO ERROR
2938  013316  000137  014040            JMP     EXIT12          ;RETURN HERE IF ERROR
2939  013322  013764  001572  000034 2$: MOV     @#FC,RMDC(R4)   ;FC
2940  013330  013746  001606            MOV     @#FS,-(SP)      ;FS
2941  013334  113766  001600  000001     MOVB    @#FT,1(SP)      ;FT
2942  013342  012664  000006            MOV     (SP)+,RMDA(R4)  ;LOAD FT/FS
2943  013346  012737  014040  001206     MOV     #EXIT12,$ESCAPE ;;ESCAPE TO EXIT12 ON ERROR
2944  013354  005005                     CLR     R5              ;COUNT UP
2945                            ;        MOV     #T7A,R3         ;60HZ PARAMETERS
2946                            ;        BIT     #SW06,@#C.SWR   ;60 HZ?
2947                            ;        BEQ     TEST12          ;YES--BRANCH
2948                            ;        MOV     #T7B,R3         ;NO--50 HZ PARAMETERS
2949                                                             ;SETUP PRAMETER TABLE FOR RM02/RM03
2950  013356  010046                     MOV     R0,-(SP)        ;SAVE R0
2951  013360  113700  004266            MOVB    DTADPB,R0       ;DRIVE ADDRESS
2952  013364  032737  000100  001300     BIT     #SW06,@#C.SWR   ;60 HZ ?
2953  013372  001417                     BEQ     3$              ;BRANCH IF SO
2954  013374  012703  003066            MOV     #T7B,R3         ;50 HZ TABLE FOR RM03
2955  013400  012737  003066  014036     MOV     #T7B,TP50       ;50 HZ TABLE FOR RM03
2956  013406  122760  000004  036620     CMPB    #4,DRVTYP(R0)   ;A RM03 DRIVE ?
2957  013414  001424                     BEQ     4$              ;BRANCH IF SO
2958  013416  012703  003106            MOV     #T7B1,R3        ;OTHERWISE LOAD THE TABLE FOR RM02
2959  013422  012737  003106  014036     MOV     #T7B1,TP50      ;
2960  013430  000416                     BR      4$              ;EXIT
2961  013432  012737  003056  014026 3$: MOV     #T7A,TP60       ;60 HZ TABLE FOR RM03
2962  013440  012703  003056            MOV     #T7A,R3         ;60 HZ TABLE FOR RM03
2963  013444  122760  000004  036620     CMPB    #4,DRVTYP(R0)   ;A RM03 DRIVE ?
2964  013452  001405                     BEQ     4$              ;BRANCH IF SO
2965  013454  012737  003076  014026     MOV     #T7A1,TP60      ;OTHERWISE LOAD THE TABLE FOR RM02
2966  013462  012703  003076            MOV     #T7A1,R3        ;
2967  013466  012600                4$:  MOV     (SP)+,R0        ;RESTORE R0
2968  013470  000240                     NOP                     ;EXIT
2969  013472  012706  001100       TEST12: MOV   #STACK,SP       ;SETUP STACK
2970  013476  012701  000012            MOV     #10.,R1         ;TIME 10 SEARCHES
2971  013502  004737  031276            JSR     PC,@#STRTMR     ;INITIALIZE THE TIMERS
2972  013506  012777  013714  165742     MOV     #7$,@PKV        ;SETUP VECTOR IN CASE OF OVERFLOW
2973  013514  012777  031274  023216     MOV     #DORTI,@RMVEC   ;SETUP RM03 VECTOR
2974  013522  005077  165736       1$:  CLR     @PKB            ;START COUNTING AT ZERO
2975  013526  012777  000131  165726     MOV     #131,@PKCS      ;INT.EN., COUNT UP AT 100KHZ
2976  013534  012714  000131            MOV     #SEARCH,(R4)    ;START A SEARCH
2977  013540  000001                     WAIT                    ;WAIT ON INTERRUPT
2978  013542  042777  000101  165712     BIC     #101,@PKCS      ;STOP THE CLOCK
2979  013550  032764  040000  000012     BIT     #BIT14,RMDS(R4) ;ERROR?
2980  013556  001415                     BEQ     2$              ;NO--BRANCH
2981  013560  104412                     SAVREG                  ;SAVE R0-R5
2982  013562  012702  004266            MOV     #DTADPB,R2      ;DPB POINTER
2983  013566  004737  044134            JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
```

```
 2984  013572  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
 2985  013600  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
 2986  013606  104413                          RESREG                  ;RESTORE R0-R5
 2987  013610  104017                          ERROR   17
 2988  013612  005077  165646          2$:     CLR     @PKB            ;START THE COUNT AT ZERO
 2989  013616  012714  000131                  MOV     #SEARCH,(R4)    ;START A SEARCH
 2990  013622  012777  000131  165632          MOV     #131,@PKCS      ;START THE CLOCK
 2991  013630  000001                          WAIT                    ;WAIT ON INTERRUPT
 2992  013632  042777  000101  165622          BIC     #101,@PKCS      ;STOP THE CLOCK
 2993  013640  032764  040000  000012          BIT     #BIT14,RMDS(R4) ;IS "ERR=1"?
 2994  013646  001415                          BEQ     3$              ;NO--BRANCH
 2995  013650  104412                          SAVREG                  ;SAVE R0-R5
 2996  013652  012702  004266                  MOV     #DTADPB,R2      ;DPB POINTER
 2997  013656  004737  044134                  JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
 2998  013662  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
 2999  013670  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
 3000  013676  104413                          RESREG                  ;RESTORE R0-R5
 3001  013700  104017                          ERROR   17              ;DISK ERROR OCCURRED
 3002  013702  004737  031342          3$:     JSR     PC,@#COUNT      ;UPDATE THE COUNT
 3003  013706  005301                          DEC     R1              ;DONE?
 3004  013710  003304                          BGT     1$              ;NO--BRANCH
 3005  013712  000424                          BR      8$              ;YES--GO TO THE EXIT
 3006  013714  042777  000101  165540  7$:     BIC     #101,@PKCS      ;STOP THE CLOCK
 3007  013722  005037  177776                  CLR     @#PS            ;DROP THE PRIORITY
 3008  013726  012600                          MOV     (SP)+,R0        ;PC OF WAIT+2
 3009  013730  005726                          TST     (SP)+           ;POP THE PS FROM THE STACK
 3010  013732  104412                          SAVREG                  ;SAVE R0-R5
 3011  013734  012702  004266                  MOV     #DTADPB,R2      ;DPB POINTER
 3012  013740  004737  044134                  JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
 3013  013744  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
 3014  013752  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
 3015  013760  104413                          RESREG                  ;RESTORE R0-R5
 3016  013762  104020                          ERROR   20              ;CLOCK OVERFLOWED
 3017  013764                          8$:
 3018  013764  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS INIT.
 3019  013772  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
 3020  014000  004737  026116                  JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
 3021  014004  012777  041566  022726          MOV     #ISR,@RMVEC     ;RESTORE RH70/RM03 INT. VECTOR
 3022  014012  032737  000100  001300          BIT     #SW06,@#C.SWR   ;60 HZ?
 3023                                  ;       BNE     9$              ;NO -- BRANCH
 3024                                  ;       REPORT  T7A             ;REPORT THE TIMES
 3025                                  ;       BR      EXIT12          ;GO TO EXIT
 3026                                  ;9$:    REPORT  T7B
 3027  014020  001004                          BNE     EXIT.A          ;NO-BRANCH
 3028  014022  004037  031474                  JSR     R0,@#TYPTIM     ;TYPE THE TIMING
 3029  014026  003056                  TP60:   T7A                     ;TABLE ADDRESS
 3030  014030  000403                          BR      EXIT12          ;EXIT
 3031  014032  004037  031474          EXIT.A: JSR     R0,@#TYPTIM     ;TYPE THE TIMING
 3032  014036  003066                  TP50:   T7B                     ;TABLE ADDRESS
 3033  014040  000004                  EXIT12: SCOPE                   ;LOOP ?
 3034
 3035
 3036                                  ;;*****************************************************************
 3037                                  ;*TEST 13        ONE CYLINDER SEEK TIMING TEST
 3038
 3039                                  ;*      THIS TEST WILL COMMAND FORWARD SEEK CYCLES TO ADVANCE THE
```

```
                                        ;*      CYLINDER BY ONE UNTIL THE INCREMENT IS GREATER THAN THE
                                        ;*      CYLINDER 'LC', THEN REVERSE SEEK TO CYLINDER 'FC'.  THE
                                        ;*      TIME TO PERFORM EACH SEEK IS CHECKED TO ENSURE IT DOES NOT
                                        ;*      EXCEED THE MAXIMUM TIME PERMITTED FOR A ONE CYLINDER SEEK.
                                        ;*      THE TIME MUST BE LESS THAN 10MS.

                                        ;;*****************************************************************
014042                                  TST13:
014042  000240                                  NOP
014044  033737  001534  001314                  BIT     @#BITS+<13*2>,TSTNMS ;DO THIS TEST?
014052  001002                                  BNE     64$                 ;YES--BRANCH
014054  000137  014552                          JMP     TST14               ;NO--GO TO THE NEXT TEST
014060  012737  000013  001102  64$:            MOV     #13,@#$TSTNM        ;SET UP TEST NUMBER AND
                                                                            ;CLEAR THE ERROR FLAG ($ERFLG)
014066  004737  026632                          JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
014072  012737  014042  001110                  MOV     #TST13,@#$LPERR     ;SETUP THE ERROR LOOP ADDRESS
014100  013777  001102  165034                  MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
014106  013737  001570  001204                  MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
014114  112737  000031  001115                  MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
014122  012737  000013  001224                  MOV     #13,$TESTN          ;;SET TEST NUMBER IN APT MAIL BOX

                                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
014130  032777  010000  165002                  BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
014136  001413                                  BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
014140  013700  001102                          MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
014144  042700  177000                          BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
014150  104401  001215                          TYPE    ,$CRLF
014154  010046                                  MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
                                                                            ;;TEST NUMBER
014156  104403                                  TYPOS                       ;;GO TYPE--OCTAL ASCII
014160     002                                  .BYTE   2                   ;;TYPE 2 DIGIT(S)
014161     000                                  .BYTE   0                   ;;SUPPRESS LEADING ZEROS
014162  104401  001215                          TYPE    ,$CRLF
014166                                  20$:
                                        ;
014166  005737  001324                          TST     @#CLKSTA            ;KW11-P CLOCK?
014172  003002                                  BGT     1$                  ;YES--START TEST
014174  000137  014552                          JMP     TST14               ;NO--GO TO NEXT TEST
014200  012737  014200  001106  1$:            MOV     #1$,$LPADR          ;SETUP THE LOOP ADDRESS
014206  004037  031112                          JSR     R0,@#SRCH00         ;DO A MASSBUS INIT. AND RECAL
014212  000402                                  BR      2$                  ;NO ERROR RETURN
014214  000137  014550                          JMP     EXIT13              ;ERROR RETURN--SCOPE LOOP CALL
014220  012703  003116          2$:             MOV     #T10,R3             ;PARAMETER POINTER
014224  012737  014550  001206                  MOV     #EXIT13,$ESCAPE     ;;ESCAPE TO EXIT13 ON ERROR
014232  012706  001100          TEST13:         MOV     #STACK,SP           ;SETUP STACK
014236  013737  001572  004300                  MOV     FC,@#DTADPB+12      ;START WITH BEGINNING CYLINDER
014244  005237  004300                          INC     DTADPB+12           ;INCREMENT THE BEGINNING CYLINDER
014250  005005                                  CLR     R5                  ;SET THE UP/DOWN SWITCH TO UP
014252  004737  031276                          JSR     PC,@#STRTMR         ;INITIALIZE THE TIMERS
014256  012777  014444  165172                  MOV     #7$,@PKV            ;SETUP INCASE OF OVERFLOW
014264  012777  031274  022446                  MOV     #DORTI,@RMVEC       ;SET RM03 VECTOR
014272  005077  165166          1$:             CLR     @PKB                ;START THE COUNTER AT ZERO
014276  013764  004300  000034                  MOV     @#DTADPB+12,RMDC(R4) ;LOAD DESIRED CYLINDER
014304  012714  000105                          MOV     #SEEK,(R4)          ;START A SEEK
014310  012777  000131  165144                  MOV     #131,@PKCS          ;START THE CLOCK
014316  000001                                  WAIT                        ;WAIT ON INTERRUPT
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3096  014320  042777  000101  165134          BIC     #101,@PKCS      ;STOP THE CLOCK
3097  014326  032764  040000  000012          BIT     #BIT14,RMDS(R4) ;ANY DISK ERRORS?
3098  014334  001415                          BEQ     2$              ;NO--BRANCH
3099  014336  104412                          SAVREG                  ;SAVE R0-R5
3100  014340  012702  004266                  MOV     #DTADPB,R2      ;DPB POINTER
3101  014344  004737  044134                  JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
3102  014350  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
3103  014356  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3104  014364  104413                          RESREG                  ;RESTORE R0-R5
3105  014366  104017                          ERROR   17              ;REPORT THE ERROR
3106  014370  004737  031342          2$:     JSR     PC,@#COUNT      ;COUNT THIS SEEKS TIME
3107  014374  004737  030570                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3108  014400  005705                          TST     R5              ;UP OR DOWN?
3109  014402  001011                          BNE     4$              ;DOWN--BRANCH
3110  014404  005237  004300          3$:     INC     @#DTADPB+12     ;MOVE TO NEXT CYLINDER
3111  014410  023737  004300  001574          CMP     @#DTADPB+12,LC  ;OUT OF CYLINDERS?
3112  014416  002725                          BLT     1$              ;NO--GO DO THE NEXT SEEK
3113  014420  012705  177777                  MOV     #-1,R5          ;SET UP/DOWN SWITCH TO DOWN
3114  014424  000722                          BR      1$              ;GO DO THE NEXT SEEK
3115  014426  005337  004300          4$:     DEC     @#DTADPB+12     ;MOVE TO NEXT CYLINDER
3116  014432  023727  004300  000000          CMP     @#DTADPB+12,#0  ;OUT OF CYLINDERS?
3117  014440  003314                          BGT     1$              ;NO--GO DO THE NEXT SEEK
3118  014442  000424                          BR      8$              ;GO TO THE EXIT
3119  014444  042777  000101  165010  7$:     BIC     #101,@PKCS      ;STOP THE CLOCK
3120  014452  005037  177776                  CLR     @#PS            ;DROP THE PRIORITY
3121  014456  012600                          MOV     (SP)+,R0        ;PC OF WAIT+2
3122  014460  005726                          TST     (SP)+           ;POP THE PS FROM THE STACK
3123  014462  104412                          SAVREG                  ;SAVE R0-R5
3124  014464  012702  004266                  MOV     #DTADPB,R2      ;DPB POINTER
3125  014470  004737  044134                  JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
3126  014474  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
3127  014502  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3128  014510  104413                          RESREG                  ;RESTORE R0-R5
3129  014512  104020                          ERROR   20              ;REPORT CLOCK OVERFLOW
3130  014514                          8$:
3131  014514  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS INIT.
3132  014522  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3133  014530  004737  026116                  JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
3134  014534  012777  041566  022176          MOV     #ISR,@RMVEC     ;RESTORE RH70/RM03 INT. VECTOR
3135  014542  004037  031474                  JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
3136  014546  003116                          T10                     ;POINTER
3137  014550  000004                  EXIT13: SCOPE                   ;LOOP ?
3138
3139
3140                                  ;;*****************************************************************
3141                                  ;*TEST 14        ACCESS TIME MEASUREMENT TEST
3142
3143                                  ;*      THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO
3144                                  ;*      CYLINDER 'LC'.  THEN A REVERSEK FROM CYLINDER 'LC' TO
3145                                  ;*      CYLINDER 0.  BOTH SEEKS ARE TIMED AND CHECKED TO ENSURE THEY
3146                                  ;*      ARE WITHIN THE TOLERANCE ALLOWED FOR THE ACCESS TIME MEASUREMENT.
3147                                  ;*      THIS SEQUENCE IS REPEATED 128 TIMES (FOR A TOTAL
3148                                  ;*      OF 256 SEEKS).  THE AVERAGE ACCESS TIME MUST BE LESS THAN 30 MS.
3149                                  ;*      CYLINDER 'LC' DEFAULTS TO 136 (10) FOR AN RM03/5 OR TO 255 (10)
3150                                  ;*      FOR AN RM03.
3151
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3152                                    ;;*****************************************************************
3153  014552                            TST14:
3154  014552  000240                    NOP
3155  014554  033737  001536  001314    BIT     @#BITS+<14*2>,TSTNMS ;DO THIS TEST?
3156  014562  001002                    BNE     64$                 ;YES--BRANCH
3157  014564  000137  015334            JMP     TST15               ;NO--GO TO THE NEXT TEST
3158  014570  012737  000014  001102  64$:    MOV     #14,@#$TSTNM        ;SET UP TEST NUMBER AND
3159                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
3160  014576  004737  026632            JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
3161  014602  012737  014552  001110    MOV     #TST14,@#$LPERR     ;SETUP THE ERROR LOOP ADDRESS
3162  014610  013777  001102  164324    MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3163  014616  013737  001570  001204    MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
3164  014624  112737  000031  001115    MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
3165  014632  012737  000014  001224    MOV     #14,$TESTN          ;;SET TEST NUMBER IN APT MAIL BOX
3166
3167                                    ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
3168  014640  032777  010000  164272    BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
3169  014646  001413                    BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
3170  014650  013700  001102            MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
3171  014654  042700  177000            BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
3172  014660  104401  001215            TYPE    ,$CRLF
3173  014664  010046                    MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
3174                                                                ;;TEST NUMBER
3175  014666  104403                    TYPOS                       ;;GO TYPE--OCTAL ASCII
3176  014670     002                    .BYTE   2                   ;;TYPE 2 DIGIT(S)
3177  014671     000                    .BYTE   0                   ;;SUPPRESS LEADING ZEROS
3178  014672  104401  001215            TYPE    ,$CRLF
3179  014676                          20$:
3180
3181  014676  005737  001324            TST     @#CLKSTA            ;KW11-P CLOCK?
3182  014702  003002                    BGT     1$                  ;YES--START TEST
3183  014704  000137  015334            JMP     TST15               ;NO--GO TO NEXT TEST
3184  014710  012737  014710  001106  1$:     MOV     #1$,$LPADR          ;SET THE LOOP ADDRESS
3185  014716  004037  031112            JSR     R0,@#SRCH00         ;DO A MASSBUS INIT & RECAL
3186  014722  000402                    BR      2$                  ;RETURN HERE IF NO ERROR
3187  014724  000137  015332            JMP     EXIT14              ;RETURN HERE ON ERROR
3188  014730  012703  003126          2$:     MOV     #T11,R3             ;PARAMETER POINTER
3189  014734  012737  015332  001206        MOV     #EXIT14,$ESCAPE     ;;ESCAPE TO EXIT14 ON ERROR
3190  014742  012706  001100          TEST14: MOV     #STACK,SP           ;SETUP STACK
3191  014746  012701  000200            MOV     #128.,R1            ;REPEAT "0-136-0" 128 TIMES
3192  014752  004737  031276            JSR     PC,@#STRTMR         ;INIT. THE COUNTERS
3193  014756  012777  015226  164472    MOV     #7$,@PKV            ;SET UP VECTOR IN CASE OF OVERFLOW
3194  014764  012777  031274  021746    MOV     #DORTI,@RMVEC       ;SETUP RM03 VECTOR
3195  014772  005077  164466          1$:     CLR     @PKB                ;START COUNT AT ZERO
3196  014776  013764  001574  000034    MOV     LC,RMDC(R4)         ;'MIDDLE' CYLINDER
3197  015004  012764  000105  000000    MOV     #SEEK,RMCS1(R4)     ;START A SEEK
3198  015012  012777  000131  164442    MOV     #131,@PKCS          ;START THE CLOCK
3199  015020  000001                    WAIT                        ;WAIT ON INTERRUPT
3200  015022  042777  000101  164432    BIC     #101,@PKCS          ;STOP CLOCK
3201  015030  032764  040000  000012    BIT     #BIT14,RMDS(R4)     ;ERR=1?
3202  015036  001415                    BEQ     2$                  ;NO--BRANCH
3203  015040  104412                    SAVREG                      ;SAVE R0-R5
3204  015042  012702  004266            MOV     #DTADPB,R2          ;DPB POINTER
3205  015046  004737  044134            JSR     PC,@#SVRH70         ;SAVE ALL THE RH70/RM03 REGISTERS
3206  015052  012764  000040  000010    MOV     #BIT05,RMCS2(R4)    ;MASSBUS CLEAR
3207  015060  013764  004266  000010    MOV     @#DTADPB,RMCS2(R4)  ;SELECT DRIVE
```

```
3208  015066  104413                          RESREG                  ;RESTORE R0-R5
3209  015070  104017                          ERROR   17
3210  015072  005005                  2$:     CLR     R5              ;SET UP/DOWN SWITCH TO UP
3211  015074  004737  031342                  JSR     PC,@#COUNT      ;UPDATE THE COUNT
3212  015100  004737  030670                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3213  015104  005077  164354                  CLR     @PKB            ;START THE COUNT AT ZERO
3214  015110  013764  001572  000034          MOV     FC,RMDC(R4)     ;BEGINNING CYLINDER
3215  015116  012764  000105  000000          MOV     #SEEK,RMCS1(R4) ;START A SEEK
3216  015124  012777  000131  164330          MOV     #131,@PKCS      ;START THE CLOCK
3217  015132  000001                          WAIT                    ;WAIT ON INTERRUPT
3218  015134  042777  000101  164320          BIC     #101,@PKCS      ;STOP THE CLOCK
3219  015142  032764  040000  000012          BIT     #BIT14,RMDS(R4) ;ERR=1?
3220  015150  001415                          BEQ     3$              ;NO--BRANCH
3221  015152  104412                          SAVREG                  ;SAVE R0-R5
3222  015154  012702  004266                  MOV     #DTADPB,R2      ;DPB POINTER
3223  015160  004737  044134                  JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
3224  015164  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
3225  015172  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3226  015200  104413                          RESREG                  ;RESTORE R0-R5
3227  015202  104017                          ERROR   17
3228  015204  012705  177777          3$:     MOV     #-1,R5          ;SET UP/DOWN SWITCH TO DOWN
3229  015210  004737  031342                  JSR     PC,@#COUNT      ;UPDATE THE COUNT
3230  015214  004737  030670                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3231  015220  005301                          DEC     R1              ;DONE?
3232  015222  003263                          BGT     1$              ;NO--BRANCH
3233  015224  000424                          BR      8$              ;YES--EXIT
3234  015226  042777  000101  164226  7$:     BIC     #101,@PKCS      ;STOP THE CLOCK
3235  015234  005037  177776                  CLR     @#PS            ;DROP THE PRIORITY
3236  015240  012600                          MOV     (SP)+,R0        ;PC OF WAIT+2
3237  015242  005726                          TST     (SP)+           ;POP THE PS FROM THE STACK
3238  015244  104412                          SAVREG                  ;SAVE R0-R5
3239  015246  012702  004266                  MOV     #DTADPB,R2      ;DPB POINTER
3240  015252  004737  044134                  JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
3241  015256  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
3242  015264  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3243  015272  104413                          RESREG                  ;RESTORE R0-R5
3244  015274  104020                          ERROR   20              ;CLOCK OVERFLOWED
3245  015276                          8$:
3246  015276  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS INIT.
3247  015304  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELCCT DRIVE
3248  015312  004737  026116                  JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
3249  015316  012777  041566  021414          MOV     #ISR,@RMVEC     ;RESTORE RH70/RM03 INT. VECTOR
3250  015324  004037  031474                  JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
3251  015330  003126                          TI1                     ;POINTER
3252  015332  000004                  EXIT14: SCOPE                   ;LOOP ?
3253
3254                                          ;;*****************************************************************
3255                                          ;*TEST 15        MAXIMUM SEEK TIMING TEST
3256
3257                                          ;*      THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO
3258                                          ;*      CYLINDER 'LC'.  THEN A REVERSE SEEK FROM CYLINDER 'LC' TO
3259                                          ;*      CYLINDER 0.  BOTH SEEKS ARE TIMED AND CHECKED TO ENSURE
3260                                          ;*      THEY ARE WITHIN THE TOLERANCE ALLOWED FOR THE MAXIMUM SEEK
3261                                          ;*      TIME.  THIS SEQUENCE IS REPEATED 128 TIMES (FOR
3262                                          ;*      A TOTAL OF 256 SEEKS).  THE MAXIMUM SEEK TIME MUST BE LESS THAN
3263                                          ;*      54 MS.  'LC' DEFAULTS TO 410 (10) FOR RM03/5'S AND TO 814 (10)
```

```
                                        :*      FOR RM03'S.
                                        ;;**********************************************************************
015334                                  TST15:
015334  000240                                  NOP
015336  033737  001540  001314                  BIT     @#BITS+<15*2>,TSTNM ;DO THIS TEST?
015344  001002                                  BNE     64$             ;YES--BRANCH
015346  000137  016116                          JMP     TST16           ;NO--GO TO NEXT TEST
015352  012737  000015  001102          64$:    MOV     #15,@#$TSTNM    ;SET UP TEST NUMBER AND
                                                                        ;CLEAR THE ERROR FLAG ($ERFLG)
015360  004737  026632                          JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
015364  012737  015334  001110                  MOV     #TST15,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
015372  013777  001102  163542                  MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
015400  013737  001570  001204                  MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
015406  112737  000031  001115                  MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
015414  012737  000015  001224                  MOV     #15,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
                                                
                                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
015422  032777  010000  163510                  BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
015430  001413                                  BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
015432  013700  001102                          MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
015436  042700  177000                          BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
015442  104401  001215                          TYPE    ,$CRLF
015446  010046                                  MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                        ;;TEST NUMBER
015450  104403                                  TYPOS                   ;;GO TYPE--OCTAL ASCII
015452     002                                  .BYTE   2               ;;TYPE 2 DIGIT(S)
015453     000                                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
015454  104401  001215                          TYPE    ,$CRLF
015460                                  20$:
                                                
015460  005737  001324                          TST     @#CLKSTA        ;KW11-P CLOCK
015464  003002                                  BGT     1$              ;YES--START TEST
015466  000137  016116                          JMP     TST16           ;NO--GO TO NEXT TEST
015472  012737  015472  001106          1$:     MOV     #1$,$LPADR      ;SETUP THE LOOP ADDRESS
015500  004037  031112                          JSR     R0,@#SRCH00     ;DO A MASSBUS INIT & RECAL
015504  000402                                  BR      2$              ;RETURN HERE IF NO ERROR
015506  000137  016114                          JMP     EXIT15          ;RETURN HERE ON ERROR
015512  012703  003136                  2$:     MOV     #T12,R3         ;PARAMETER POINTER
015516  012737  016114  001206                  MOV     #EXIT15,$ESCAPE ;;ESCAPE TO EXIT15 ON ERROR
015524  012706  001100                  TEST15: MOV     #STACK,SP       ;SETUP STACK
015530  012701  000200                          MOV     #128.,R1        ;REPEAT "0-'LC'-0" 128 TIMES
015534  004737  031276                          JSR     PC,@#STRTMR     ;INIT. THE TIMERS
015540  012777  016010  163710                  MOV     #7$,@PKV        ;SETUP VECTOR IN CASE OF OVERFLOW
015546  012777  031274  021164                  MOV     #DORTI,@RMVEC   ;SETUP RM03 VECTOR
015554  005077  163704                  1$:     CLR     @PKB            ;START COUNTING FROM ZERO
015560  013764  001574  000034                  MOV     LC,RMDC(R4)     ;MAXIMUM CYLINDER
015566  012764  000105  000000                  MOV     #SEEK,RMCS1(R4) ;START A SEEK
015574  012777  000131  163660                  MOV     #131,@PKCS      ;START THE CLOCK
015602  000001                                  WAIT                    ;WAIT ON INTERRUPT
015604  042777  000101  163650                  BIC     #101,@PKCS      ;STOP THE CLOCK
015612  032764  040000  000012                  BIT     #BIT14,RMDS(R4) ;ERR=1?
015620  001415                                  BEQ     2$              ;NO--BRANCH
015622  104412                                  SAVREG                  ;SAVE R0-R5
015624  012702  004266                          MOV     #CTADPB,R2      ;DPB POINTER
015630  004737  044134                          JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
```

```
3320  015634  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
3321  015642  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3322  015650  104413                          RESREG                  ;RESTORE R0-R5
3323  015652  104017                          ERROR   17
3324  015654  005005                  2$:     CLR     R5              ;SET THE UP/DOWN SWITCH TO UP
3325  015656  004737  031342                  JSR     PC,@#COUNT      ;UP THE COUNT
3326  015662  004737  030670                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3327  015666  005077  163572                  CLR     @PKB            ;START COUNT AT ZERO
3328  015672  013764  001572  000034          MOV     FC,RMDC(R4)     ;BEGINNING CYLINDER
3329  015700  012764  000105  000000          MOV     #SEEK,RMCS1(R4) ;START A SEEK
3330  015706  012777  000131  163546          MOV     #131,@PKCS      ;START THE CLOCK
3331  015714  000001                          WAIT                    ;WAIT ON INTERRUPT
3332  015716  042777  000101  163536          BIC     #101,@PKCS      ;STOP THE CLOCK
3333  015724  032764  040000  000012          BIT     #BIT14,RMDS(R4) ;"ERR"=1?
3334  015732  001415                          BEQ     3$              ;NO--BRANCH
3335  015734  104412                          SAVREG                  ;SAVE R0-R5
3336  015736  012702  004266                  MOV     #DTADPB,R2      ;DPB POINTER
3337  015742  004737  044134                  JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
3338  015746  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
3339  015754  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3340  015762  104413                          RESREG                  ;RESTORE R0-R5
3341  015764  104017                          ERROR   17              ;REPORT THE ERROR
3342  015766  012705  177777          3$:     MOV     #-1,R5          ;SET THE UP/DOWN SWITCH TO DOWN
3343  015772  004737  031342                  JSR     PC,@#COUNT      ;UPDATE THE COUNT
3344  015776  004737  030670                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3345  016002  005301                          DEC     R1              ;DONE?
3346  016004  003263                          BGT     1$              ;NO--BRANCH
3347  016006  000424                          BR      8$              ;YES--EXIT
3348  016010  042777  000101  163444  7$:     BIC     #101,@PKCS      ;STOP THE CLOCK
3349  016016  005037  177776                  CLR     @#PS            ;DROP THE PRIORITY
3350  016022  012600                          MOV     (SP)+,R0        ;PC OF WAIT+2
3351  016024  005726                          TST     (SP)+           ;POP THE PS FROM THE STACK
3352  016026  104412                          SAVREG                  ;SAVE R0-R5
3353  016030  012702  004266                  MOV     #DTADPB,R2      ;DPB POINTER
3354  016034  004737  044134                  JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
3355  016040  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
3356  016046  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3357  016054  104413                          RESREG                  ;RESTORE R0-R5
3358  016056  104020                          ERROR   20              ;CLOCK OVERFLOWED
3359  016060                          8$:
3360  016060  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS INIT.
3361  016066  013764  004266  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3362  016074  004737  026116                  JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
3363  016100  012777  041566  020632          MOV     #ISR,@RMVEC     ;RESTORE RH70/RM03 INT. VECTOR
3364  016106  004037  031474                  JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
3365  016112  003136                          T12                     ;POINTER
3366  016114  000004                  EXIT15: SCOPE                   ;LOOP ?
```

```
3367
3368                                    .SBTTL  *** ADDRESSING TESTS ***
3369

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

3383
3384                                    ;;*****************************************************************
3385                                    ;*TEST 16       SECTOR ADDRESSING TEST
3386
3387                                    ;*      THIS TEST WRITES DATA INTO ALL SECTORS OF TRACK "FT".  THE
3388                                    ;*      DATA WILL BE 256 WORDS OF THE SECTOR ADDRESS OF THE SECTOR
3389                                    ;*      BEING WRITTEN.  A WRITE CHECK IS PERFORMED, THE BUFFER IS
3390                                    ;*      CLEARED (TO 177400) AND THE DATA IS READ AND COMPARED.  THEN SECTOR 0
3391                                    ;*      IS REWRITTEN AND SECTORS 0 - 21 ARE WRITE CHECKED.  THEN
3392                                    ;*      SECTOR 1 IS REWRITTEN AND SECTORS 0 - 21 ARE WRITE CHECKED.
3393                                    ;*      THIS REWRITE AND WRITE CHECK PROCEDURE IS CONTINUED UP THROUGH
3394                                    ;*      REWRITE SECTOR 21 AND WRITE CHECK SECTORS 0-21.
3395
3396                                    ;;*****************************************************************
3397  016116                            ST16:
3398  016116  000240                           NOP
3399  016120  033737  001542  001314           BIT     @#BITS+<16*2>,TSTNMS ;DO THIS TEST?
3400  016126  001002                           BNE     64$                 ;YES--BRANCH
3401  016130  000137  016560                   JMP     TST17               ;NO--GO TO THE NEXT TEST
3402  016134  012737  000016  001102  64$:     MOV     #16,@#$TSTNM        ;SET UP TEST NUMBER AND
3403                                                                        ;CLEAR THE ERROR FLAG ($ERFLG)
3404  016142  004737  026632                   JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
3405  016146  012737  016256  001110           MOV     #TEST16,@#$LPERR    ;SETUP THE LOOP ON ERROR ADDRESS
3406  016154  013777  001102  162760           MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3407  016162  013737  001570  001204           MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
3408  016170  113737  001444  001115           MOVB    ERR.CT,$ERMAX       ;MAX ERRORS ALLOWED FOR TEST
3409  016176  012737  000016  001224           MOV     #16,$TESTN          ;;SET TEST NUMBER IN APT MAIL BOX
3410
3411                                    .THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
3412  016204  032777  010000  162726           BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
3413  016212  001413                           BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
3414  016214  013700  001102                   MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
3415  016220  042700  177000                   BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
3416  016224  104401  001215                   TYPE    ,$CRLF
3417  016230  010046                           MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
3418                                                                        ;;TEST NUMBER
3419  016232  104403                           TYPOS                       ;;GO TYPE--OCTAL ASCII
3420  016234     002                           .BYTE   2                   ;;TYPE 2 DIGIT(S)
3421  016235     000                           .BYTE   0                   ;;SUPPRESS LEADING ZEROS
3422  016236  104401  001215                   TYPE    .$CRLF
```

```
3423  016242                                  20$:
3424
3425  016242  012737  016556  001332            MOV     #EXIT16,@#BYPASS
3426  016250  012737  016256  001106            MOV     #TEST16,$LPADR  ;SETUP THE LOOP ADDRESS
3427  016256  012706  001100            TEST16: MOV     #STACK,SP       ;SET THE STACK POINTER
3428  016262  004737  032126                    JSR     PC,@#FILBUF     ;FILL THE BUFFER WITH SECTOR ADDRESSES
3429  016266  013737  001572  004300            MOV     @#FC,@#DTADPB+12 ;CYLINDER
3430  016274  113737  001600  004277            MOVB    @#FT,@#DTADPB+11 ;TRACK
3431  016302  105037  004276                    CLRB    @#DTADPB+10     ;SECTOR
3432  016306  013737  001432  004272            MOV     TRCKWC,@#DTADPB+4 ;WORD COUNT
3433  016314  012737  051776  004274            MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3434  016322  012737  016322  001110            MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3435  016330  012706  001100                    MOV     #STACK,SP       ;LOAD THE STACK POINTER
3436  016334  012737  000161  004270            MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3437  016342  004037  027612                    JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3438  016346  012737  000151  004270            MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3439  016354  012737  016354  001110            MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3440  016362  012706  001100                    MOV     #STACK,SP       ;LOAD THE STACK POINTER
3441  016366  004037  027612                    JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3442  016372  012737  016372  001110            MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3443  016400  012706  001100                    MOV     #STACK,SP       ;LOAD THE STACK POINTER
3444  016404  004037  032164                    JSR     R0,@#CLRBUF     ;CLEAR BUFFER
3445  016410  012737  000171  004270            MOV     #READ,@#DTADPB+2 ;COMMAND = READ
3446  016416  004037  027612                    JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3447  016422  004037  032232                    JSR     R0,@#CKSCTR     ;CHECK THE SECTOR DATA READ
3448  016426  012700  051776                    MOV     #BUFFER,R0      ;BUFFER ADDRESS
3449  016432  005001                            CLR     R1              ;FIRST SECTOR
3450  016434  012737  016434  001110            MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3451  016442  012706  001100                    MOV     #STACK,SP       ;LOAD THE STACK POINTER
3452  016446  012737  000161  004270  1$:       MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3453  016454  012737  177400  004272            MOV     #SCTRWC,@#DTADPB+4 ;WORD COUNT
3454  016462  010037  004274                    MOV     R0,@#DTADPB+6   ;BUFFER ADDRESS
3455  016466  110137  004276                    MOVB    R1,@#DTADPB+10  ;SECTOR
3456  016472  004037  027612                    JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3457  016476  012737  016476  001110            MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3458  016504  012706  001100                    MOV     #STACK,SP       ;LOAD THE STACK POINTER
3459  016510  012737  000151  004270            MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3460  016516  013737  001432  004272            MOV     TRCKWC,@#DTADPB+4 ;WORD COUNT
3461  016524  012737  051776  004274            MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3462  016532  105037  004276                    CLRB    @#DTADPB+10     ;SECTOR
3463  016536  004037  027612                    JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3464  016542  062700  001000                    ADD     #512.,R0        ;MOVE TO NEXT SECTOR
3465  016546  005201                            INC     R1
3466  016550  023701  001712                    CMP     PRMLMT+22,R1    ;DONE?
3467  016554  103334                            BHIS    1$              ;NO--BRANCH
3468  016556  000004                    EXIT16: SCOPE                   ;LOOP ?
3469
3470                                          ;;*****************************************************************
3471                                          ;*TEST 17        TRACK ADDRESSING TEST
3472
3473                                          ;*      THIS TEST WILL WRITE DATA IN THE FORM OF TRACK ADDRESSES
3474                                          ;*      IN CYLINDER "FC" SECTOR "FS" OF EVERY TRACK WITH EACH TRACK
3475                                          ;*      GETTING ITS OWN TRACK ADDRESS.
3476                                          ;*      A WRITE CHECK IS THEN PERFORMED ON EACH TRACK TO ENSURE
3477                                          ;*      THE DATA IS VALID.  THEN TRACK 0 IS REWRITTEN AND TRACK 1
3478                                          ;*      THROUGH TRACK 18 IS WRITE CHECKED.  THEN TRACK 1 IS
```

```
                                        ;*      REWRITTEN AND TRACK 2 THROUGH TRACK 18 IS WRITE CHECKED.
                                        ;*      THIS PROCEDURE IS CONTINUED UP THROUGH REWRITING TRACK 17
                                        ;*      AND WRITE CHECKING TRACK 18.
                                        ;
                                        ;;*****************************************************************
016560                                  TST17:
016560  000240                          NOP
016562  033737  001544  001314          BIT     @#BITS+<17*2>,TSTNMS ;DO THIS TEST?
016570  001002                          BNE     64$                 ;YES--BRANCH
016572  000137  017244                  JMP     TST20               ;NO--GO TO THE NEXT TEST
016576  012737  000017  001102  64$:    MOV     #17,@#$TSTNM        ;SET UP TEST NUMBER AND
                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
016604  004737  026632                  JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
016610  012737  016720  001110          MOV     #TEST17,@#$LPERR    ;SETUP THE LOOP ON ERROR ADDRESS
016616  013777  001102  162316          MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
016624  013737  001570  001204          MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
016632  113737  001444  001115          MOVB    ERR.CT,$ERMAX       ;MAX ERRORS ALLOWED FOR TEST
016640  012737  000017  001224          MOV     #17,$TESTN          ;;SET TEST NUMBER IN APT MAIL BOX
                                        ;
                                        ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SE
016646  032777  010000  162264          BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
016654  001413                          BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
016656  013700  001102                  MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
016662  042700  177000                  BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
016666  104401  001215                  TYPE    ,$CRLF
016672  010046                          MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
                                                                    ;;TEST NUMBER
016674  104403                          TYPOS                       ;;GO TYPE--OCTAL ASCII
016676     002                          .BYTE   2                   ;;TYPE 2 DIGIT(S)
016677     000                          .BYTE   0                   ;;SUPPRESS LEADING ZEROS
016700  104401  001215                  TYPE    ,$CRLF
016704                                  20$:
                                        ;
016704  012737  017242  001332          MOV     #EXIT17,@#BYPASS
016712  012737  016720  001106          MOV     #TEST17,$LPADR      ;SETUP THE LOOP ADDRESS
016720  012706  001100          TEST17: MOV     #STACK,SP           ;SET THE STACK POINTER
016724  004737  032126                  JSR     PC,@#FILBUF         ;FILL THE BUFFER WITH TRACK ADDRESS
016730  012737  000161  004270          MOV     #WRITE,@#DTADPB+2   ;COMMAND=WRITE DATA
016736  013737  001572  004300          MOV     @#FC,@#DTADPB+12    ;CYLINDER
016744  113737  001606  004276          MOVB    @#FS,@#DTADPB+10    ;SECTOR
016752  012737  177400  004272          MOV     #SCTRWC,@#DTADPB+4  ;WORD COUNT
016760  012737  051776  004274          MOV     #BUFFER,@#DTADPB+6  ;BUFFER ADDRESS
016766  005000                          CLR     R0                  ;TRACK=0
016770  012737  016770  001110          MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
016776  012706  001100                  MOV     #STACK,SP           ;LOAD THE STACK POINTER
017002  110037  004277          1$:     MOVB    R0,@#DTADPB+11      ;TRACK ADDRESS
017006  004037  027612                  JSR     R0,@#DRVCAL         ;START A DATA TRANSFER
017012  062737  001000  004274          ADD     #256.*2.,@#DTADPB+6 ;UPDATE BUFFER ADDRESS
017020  005200                          INC     R0                  ;UPDATE TRACK NUMBER
017022  022700  000005                  CMP     #5,R0               ;OUT OF TRACKS?
017026  003365                          BGT     1$                  ;NO--BRANCH
017030  012737  051776  004274          MOV     #BUFFER,@#DTADPB+6  ;BUFFER ADDRESS
017036  005000                          CLR     R0
017040  012737  017040  001110          MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
017046  012706  001100                  MOV     #STACK,SP           ;LOAD THE STACK POINTER
017052  012737  000151  004270          MOV     #WRCKD,@#DTADPB+2   ;COMMAND=WRITE CHECK
```

```
 3535  017060  110037  004277          2$:     MOVB    R0,@#DTADPB+11  ;TRACK ADDRESS
 3536  017064  004037  027612                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 3537  017070  062737  001000  004274          ADD     #256.*2.,@#DTADPB+6 ;UPDATE BUFFER ADDRESS
 3538  017076  005200                          INC     R0              ;UPDATE TRACK NUMBER
 3539  017100  022700  000005                  CMP     #5,R0           ;OUT OF TRACKS?
 3540  017104  003365                          BGT     2$              ;NO--BRANCH
 3541  017106  005000                          CLR     R0              ;FIRST TRACK ADDRESS
 3542  017110  110037  004277          3$:     MOVB    R0,@#DTADPB+11  ;TRACK
 3543  017114  010001                          MOV     R0,R1           ;FORM BUFFER ADDRESS
 3544  017116  012737  051776  004274          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
 3545  017124  005301                  4$:     DEC     R1
 3546  017126  002411                          BLT     5$
 3547  017130  062737  001000  004274          ADD     #256.*2.,@#DTADPB+6
 3548  017136  000772                          BR      4$
 3549  017140  012737  017140  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
 3550  017146  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 3551  017152  012737  000161  004270  5$:     MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
 3552  017160  004037  027612                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 3553  017164  062737  001000  004274  6$:     ADD     #256.*2.,@#DTADPB+6 ;UPDATE BUFFER ADDRESS
 3554  017172  105237  004277                  INCB    @#DTADPB+11     ;MOVE TO NEXT TRACK
 3555  017176  012737  017176  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
 3556  017204  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 3557  017210  012737  000151  004270          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
 3558  017216  004037  027612                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 3559  017222  122737  000004  004277          CMPB    #4,@#DTADPB+11  ;OUT OF TRACKS?
 3560  017230  003355                          BGT     6$              ;NO--BRANCH
 3561  017232  005200                          INC     R0              ;NEXT TRACK TO WRITE
 3562  017234  022700  000004                  CMP     #4,R0           ;OUT OF TRACKS?
 3563  017240  003323                          BGT     3$              ;NO--BRANCH
 3564  017242  000004                  EXIT17: SCOPE
```

```
                        .SBTTL  *** DATA TEST ***

                        ;;*****************************************************************
                        ;*TEST 20        DATA TEST

                        ;*      THIS TEST PERFORMS DATA STORAGE AND RETRIEVAL ON CYLINDERS
                        ;*      "FC" THROUGH "LC" BY THE INCREMENT "IC" USING THE DATA PATTEPNS
                        ;*      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 TS
                        ;*      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
                                        ;*

                                        ;;*****************************************************************
017244                                  TST20:
017244  000240                                  NOP
017246  033737  001506  001316                  BIT     BITS+<20*2-40>,TSTNMS+2  ;DO THIS TEST ?
017254  001002                                  BNE     64$                     ;YES--BRANCH
017256  000137  020044                          JMP     TST21                   ;NO--GO TO THE NEXT TEST
017262  012737  000020  001102          64$:    MOV     #20,@#$TSTNM            ;SET UP TEST NUMBER AND
                                                                                ;CLEAR THE ERROR FLAG ($ERFLG)
017270  004737  026632                          JSR     PC,LODPRM               ;LOAD THE PARMETERS FOR THE TEST
017274  012737  017512  001110                  MOV     #TEST20,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
017302  013777  001102  161632                  MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
017310  013737  001570  001204                  MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
017316  113737  001444  001115                  MOVB    ERR.CT,$ERMAX   ;MAX ERRORS ALLOWED FOR TEST
017324  012737  000020  001224                  MOV     #20,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
                                                
                                                .THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
017332  032777  010000  161600                  BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
017340  001413                                  BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
017342  013700  001102                          MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
017346  042700  177000                          BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
017352  104401  001215                          TYPE    ,$CRLF
017356  010046                                  MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                        ;;TEST NUMBER
017360  104403                                  TYPOS                   ;;GO TYPE--OCTAL ASCII
017362     002                                  .BYTE   2               ;;TYPE 2 DIGIT(S)
017363     000                                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
017364  104401  001215                          TYPE    ,$CRLF
017370                                  20$:
                                                
                                                ;SET UP THE TRACK WORD COUNT FOR DATA TRANFER

017370  012737  017370  001106                  MOV     #.,$LPADR       ;SETUP THE LOOP ADDRESS
017376  005000                                  CLR     R0              ;CLEAR SWITCH
017400  005004                                  CLR     R4              ;FORM WORD COUNT IN R4
017402  013701  001610                          MOV     @#LS,R1         ;LOAD LAST SECTOR
017406  163701  001606                          SUB     @#FS,R1         ;COMPARE WITH FIRST SECTOR
017412  002004                                  BGE     1$              ;SKIP NEXT IF FS < OR = LS

017414  063701  001712                          ADD     PRMLMT+22,R1    ;ADD MAXIMUM SECTOR ADDRESS TO
017420  005201                                  INC     R1              ;MAKE THE DIFFERENCE POSITIVE
017422  005100                                  COM     R0              ;SET SWITCH FOR FS > LS

017424  062704  000400          1$:     ADD     #256.,R4        ;WORDS/SECTOR
017430  005301                          DEC     R1              ;LS - FS SECTORS MINUS ONE
017432  002374                          BGE     1$              ;INCR. WORD COUNT IF NO. SECTORS STILL +
017434  005404                          NEG     R4              ;FORM NEGATIVE WORD COUNT
017436  010405                          MOV     R4,R5           ;COPY NORMAL WORD COUNT INTO SMALL WC
017440  005700                          TST     R0              ;FS > LS SWITCH SET?
```

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3677  017442  001412                          BEQ     3$              ;NO, SKIP NEXT
3678
3679  017444  005005                          CLR     R5              ;FORM WORD COUNT FOR FS > LS
3680  017446  013701  001712                  MOV     PRMLMT+22,R1    ;MAX SECTOR ADDRESS
3681  017452  163701  001606                  SUB     @#FS,R1         ;SUBTRACT THE FIRST SECTOR
3682  017456  062705  000400          2$:     ADD     #256.,R5        ;WORDS/SECTOR
3683  017462  005301                          DEC     R1              ;NO SECTORS MINUS ONE
3684  017464  002374                          BGE     2$              ;INCR. WORD COUNT IF NO. SECTORS STILL +
3685  017466  005405                          NEG     R5              ;FORM NEGATIVE WORD COUNT FOR THIS CASE
3686
3687                                          ;SET UP FOR DATA TRANSFERS AND PATTERN VARIATIONS
3688
3689  017470  113737  001606  004276  3$:     MOVB    @#FS,@#DTADPB+10 ;SECTOR
3690  017476  012737  051776  004274          MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER
3691  017504  012737  020042  001332          MOV     #EXIT20,@#BYPASS
3692  017512  012706  001100          TEST20: MOV     #STACK,SP       ;LOAD THE STACK POINTER
3693  017516  005037  001414                  CLR     @#WCEFLG        ;CLEAR THE WRITE CHECK ERROR FLAG
3694  017522  013701  001572                  MOV     @#FC,R1         ;PICKUP FIRST CYLINDER
3695  017526  000407                          BR      2$              ;SKIP PATTERN SET-UP FIRST TIME THRU
3696
3697  017530  005720                  1$:     TST     (R0)+           ;MOVE TO NEXT DATA PATTERN
3698  017532  022700  000040                  CMP     #16.*2.,R0      ;OUT OF PATTERNS?
3699  017536  003004                          BGT     3$              ;NO, STAY ON THIS CYLINDER UNTIL DONE
3700  017540  004037  032052                  JSR     R0,@#INCCYL     ;MOVE TO NEXT CYLINDER
3701  017544  000536                          BR      EXIT20          ;OUT OF CYLINDERS ---------------------------,
3702
3703                                          ;DO NEXT CYLINDER
3704
3705  017546  005000                  2$:     CLR     R0              ;START WITH PATTERN 0
3706  017550  036037  001506  001612  3$:     BIT     BITS(R0),@#PAT  ;THIS PATTERN SELECTED?
3707  017556  001764                          BEQ     1$              ;NO, GO BACK AND GET ONE THAT WAS
3708  017560  013702  001600                  MOV     @#FT,R2         ;FIRST TRACK
3709  017564  010137  004300                  MOV     R1,@#DTADPB+12  ;LOAD THE CYLINDER
3710  017570  110237  004277          4$:     MOVB    R2,@#DTADPB+11  ;LOAD THE TRACK
3711
3712  017574  020127  001466                  CMP     R1,#822.        ;CHECK FOR LAST DISK CYLINDER
3713  017600  001003                          BNE     10$             ;SKIP LAST TRACK CHECK IF NOT
3714  017602  020227  000004                  CMP     R2,#4           ;LAST DISK TRACK ?
3715  017606  001515                          BEQ     EXIT20          ;DON'T TEST LAST TRACK AS IT HAS BAD
3716  017610                          10$:                            ;BLOCK INFORMATION STORED ON IT ------------,
3717
3718  017610  010437  004272                  MOV     R4,@#DTADPB+4   ;LOAD THE WORD COUNT
3719  017614  023701  001574                  CMP     LC,R1           ;LAST DISK CYLINDER TO TEST ?
3720  017620  003005                          BGT     5$              ;NO, SKIP TRACK CHECK
3721  017622  022702  000004                  CMP     #4,R2           ;LAST DISK TRACK TO TEST ?
3722  017626  003002                          BGT     5$              ;NO, SKIP NEXT
3723  017630  010537  004272                  MOV     R5,@#DTADPB+4   ;SHORT WORD COUNT
3724  017634  017703  161300          5$:     MOV     @SWR,R3         ;INHIBIT WRITE AND
3725  017640  005103                          COM     R3              ;WRITE CHECK?
3726  017642  032703  000030                  BIT     #SW04!SW03,R3
3727  017646  001436                          BEQ     7$              ;YES--BRANCH
3728  017650  004737  032602                  JSR     PC,@#SETBUF     ;MOVE DATA PATTERN INTO THE BUFFER
3729  017654  032777  000020  161256          BIT     #SW04,@SWR      ;INHIBIT WRITE?
3730  017662  001012                          BNE     6$              ;YES, DO NEXT PORTION OF TESTING
3731  017664  012737  017664  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3732  017672  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
```

```
3733  017676  012737  000161  004270          MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3734
3735                                          ;DO A DATA TRANSFER
3736
3737  017704  004037  027612                  JSR     R0,@#DRVCAL       ;START A DATA TRANSFER
3738  017710  032777  000010  161222  6$:     BIT     #SW03,@SWR        ;INHIBIT WRITE CHECK?
3739  017716  001012                          BNE     7$                ;YES--BRANCH
3740  017720  012737  017720  001110          MOV     #.,$LPERR         ;SETUP THE ERROR LOOP ADDRESS
3741  017726  012706  001100                  MOV     #STACK,SP         ;LOAD THE STACK POINTER
3742  017732  012737  000151  004270          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3743  017740  004037  027612                  JSR     R0,@#DRVCAL       ;START A DATA TRANSFER
3744  017744  005737  001414          7$:     TST     @#WCEFLG          ;WRITE CHECK ERROR FLAG SET?
3745  017750  001404                          BEQ     8$                ;NO--BRANCH
3746  017752  032777  000001  161160          BIT     #SW00,@SWR        ;PERFORM READ AFTER FATAL "WCE"?
3747  017760  001424                          BEQ     9$                ;NO--BRANCH
3748  017762  032777  000004  161150  8$:     BIT     #SW02,@SWR        ;INHIBIT READ DATA AND SOFTWARE COMPARE?
3749  017770  001020                          BNE     9$                ;YES--BRANCH
3750  017772  012737  017772  001110          MOV     #.,$LPERR         ;SETUP THE ERROR LOOP ADDRESS
3751  020000  012706  001100                  MOV     #STACK,SP         ;LOAD THE STACK POINTER
3752  020004  012737  000171  004270          MOV     #READ,@#DTADPB+2  ;COMMAND=READ
3753  020012  004037  027612                  JSR     R0,@#DRVCAL       ;START A DATA TRANSFER
3754  020016  032777  000002  161114          BIT     #SW01,@SWR        ;COMPARE THE DATA?
3755  020024  001002                          BNE     9$                ;NO--BRANCH
3756  020026  004737  032672                  JSR     PC,@#DATCMP       ;YES--DO IT
3757  020032  004037  032022          9$:     JSR     R0,@#INCTRK       ;MOVE TO NEXT TRACK
3758  020036  000634                          BR      1$                ;OUT OF TRACKS GO TO NEXT PATTERN
3759  020040  000653                          BR      4$                ;LOOP
3760  020042  000004                  EXIT20: SCOPE                     ;SCOPE LOOP
```

```
                                .SBTTL  *** EXERCISE TEST ***

                                ;;*****************************************************************
                                ;*TEST 21        RANDOM ADDRESS AND RANDOM PATTERN TEST

                                ;*      STARTING AT "FC" AND GOING SEQUENTIALLY TO "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 1000.
                                ;*
                                ;*      1)      GENERATE A RANDOM SECTOR ADDRESS
                                ;*      2)      WRITE A RANDOM PATTERN AT THE ADDRESS
                                ;*              GENERATED IN 1.
                                ;*      3)      GENERATE A NEW RANDOM SECTOR ADDRESS
                                ;*      4)      READ THE SECTOR AT THE ADDRESS
                                ;*              GENERATED IN 3.
                                ;*      5)      DO A SOFTWARE CHECK OF THE DATA READ IN 4 AGAINST
                                ;*              THE ORIGINAL RANDOM PACK DATA.
                                ;*      6)      DO A WRITE CHECK OF THE DATA WRITTEN IN 2
                                ;*      7)      GENERATE A NEW RANDOM SECTOR ADDRESS
                                ;*      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

                                ;;*****************************************************************
020044                          TST21:
020044  000240                          NOP
020046  033737  001510  001316          BIT     BITS+<21*2-40>,TSTNMS+2  ;DO THIS TEST ?
020054  001002                          BNE     64$                     ;YES--BRANCH
020056  000137  020702                  JMP     TST22                   ;NO--GO TO THE NEXT TEST
020062  012737  000021  001102  64$:    MOV     #21,@#$TSTNM            ;SET UP TEST NUMBER AND
                                                                        ;CLEAR THE ERROR FLAG ($ERFLG)
020070  004737  026632                  JSR     PC,LODPRM               ;LOAD THE PARMETERS FOR THE TEST
020074  012737  020360  001110          MOV     #TEST21,@#$LPERR        ;SETUP THE LOOP ON ERROR ADDRESS
020102  013777  001102  161032          MOV     $TSTNM,@DISPLAY         ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
020110  013737  001570  001204          MOV     @#RPT,$TIMES            ;GET THE ITERATION COUNT
020116  113737  001444  001115          MOVB    ERR.CT,$ERMAX           ;MAX ERRORS ALLOWED FOR TEST
020124  012737  000021  001224          MOV     #21,$TESTN              ;;SET TEST NUMBER IN APT MAIL BOX

                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
020132  032777  010000  161000          BIT     #SW12,@SWR              ;CHECK FOR SWITCH 12 SET
020140  001413                          BEQ     20$                     ;IF = 0, THEN DON'T TYPE TEST NUMBER
020142  013700  001102                  MOV     $TSTNM,R0               ;ELSE, TYPE THE NUMBER
020146  042700  177000                  BIC     #177000,R0              ;MASK OUT THE HIGH ORDER BYTE
020152  104401  001215                  TYPE    ,$CRLF
020156  010046                          MOV     R0,-(SP)                ;;SAVE R0 FOR TYPEOUT
                                                                        ;;TEST NUMBER
020160  104403                          TYPOS                           ;;GO TYPE--OCTAL ASCII
020162     002                          .BYTE   2                       ;;TYPE 2 DIGIT(S)
020163     000                          .BYTE   0                       ;;SUPPRESS LEADING ZEROS
020164  104401  001215                  TYPE    ,$CRLF
020170                          20$:
```

```
3817
3818  020170  012737  020170  001106          MOV     #.,$LPADR       ;SETUP THE LOOP ADDRESS
3819  020176  012737  020700  001332          MOV     #EXIT21,@#BYPASS
3820  020204  012737  176543  025630          MOV     #176543,@#$HINUM ;PRIME THE RANDOM NUMBER GENERATOR
3821  020212  012737  123456  025632          MOV     #123456,@#$LONUM
3822  020220  013737  001572  004300          MOV     @#FC,@#DTADPB+12 ;CYLINDER
3823  020226  013737  001432  004272          MOV     TRCKWC,@#DTADPB+4 ;WORD COUNT FOR 32/30 SECTORS (FULL TRACK)
3824  020234  012737  051776  004274          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3825  020242  012737  000161  004270          MOV     #WRITE,@#DTADPB+2 ;COMMMAND
3826  020250  032737  100000  001300          BIT     #SW15,@#C.SWR   ;WRITE THE DISK PACK BEFORE TESTING?
3827  020256  001027                          BNE     3$              ;NO--BEGIN TESTING
3828  020260  004037  033210                  JSR     R0,@#FILRAN     ;FILL DATA BUFFER WITH RANDOM DATA
3829  020264  005037  004276          1$:     CLR     @#DTADPB+10     ;SECTOR AND TRACK
3830  020270  012737  020270  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3831  020276  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3832  020302                          2$:
3833  020302  004037  027612                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3834  020306  105237  004277                  INCB    @#DTADPB+11     ;NEXT TRACK
3835  020312  122737  000005  004277          CMPB    #5,@#DTADPB+11  ;TIME FOR NEXT CYLINDER ?
3836  020320  003370                          BGT     2$              ;NO--DO NEXT TRACK ON THIS CYL.
3837  020322  005237  004300                  INC     @#DTADPB+12     ;INCR CYLINDER ADDRESS
3838  020326  023737  001574  004300          CMP     @#LC,@#DTADPB+12 ;OUT OF CYLINDERS?
3839  020334  002353                          BGE     1$              ;NO--CONTINUE SEQUENTIAL RANDOM WRITE
3840
3841
3842  020336  012737  177400  004272  3$:     MOV     #SCTRWC,@#DTADPB+4 ;WORD COUNT
3843  020344  012737  020360  001106          MOV     #TEST21,@#$LPADR
3844  020352  012737  020360  001110          MOV     #TEST21,@#$LPERR
3845  020360  012706  001100          TEST21: MOV     #STACK,SP       ;SET STACK POINTER
3846
3847  020364  004037  033464                  JSR     R0,@#RANADR     ;GENERATE A RANDOM ADDRESS
3848  020370  013737  004276  001420          MOV     @#DTADPB+10,@#SVADR ;SAVE THE TRACK/SECTOR
3849  020376  013737  004300  001422          MOV     @#DTADPB+12,@#SVADR+2 ;SAVE THE CYLINDER
3850  020404  012737  000161  004270          MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3851  020412  012701  051776                  MOV     #BUFFER,R1      ;WRITE BUFFER ADDRESS FOR "RANPAT"
3852  020416  010137  004274                  MOV     R1,@#DTADPB+6   ;INTO THE DATA PARAMETER BLOCK
3853  020422  004037  033430                  JSR     R0,@#RANPAT     ;GENERATE RANDOM 256 WORD PATTERN
3854                                                                  ;AND PUT INTO THE WRITE BUFFER
3855  020426  012737  020426  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3856  020434  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3857  020440  004037  027612                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3858
3859  020444  004037  033464                  JSR     R0,@#RANADR     ;GENERATE A NEW RANDOM ADDRESS
3860  020450  012737  000171  004270          MOV     #READ,@#DTADPB+2 ;COMMAND=READ DATA
3861  020456  012737  052776  004274          MOV     #BUFFER+512.,@#DTADPB+6 ;READ BUFFER ADDRESS
3862  020464  012737  020464  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3863  020472  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3864  020476  004037  027612                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3865  020502  005737  001446                  TST     BASFLG          ;IF BAD SECTOR ENCOUNTERED,SKIP NEXT CALL
3866  020506  100402                          BMI     .+6             ;DON'T COMPARE DATA
3867  020510  004037  033232                  JSR     R0,@#RANCK      ;SOFTWARE CHECK THE DATA
3868
3869  020514  013737  001420  004276          MOV     @#SVADR,@#DTADPB+10 ;GET ADDRESS OF WHERE THE LAST
3870  020522  013737  001422  004300          MOV     @#SVADR+2,@#DTADPB+12 ;WRITE WAS PERFORMED
3871  020530  012737  000151  004270          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3872  020536  012737  051776  004274          MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER ADDRESS FOR HARDWARE
```

```
                                                        ;CHECK OF THE DATA
020544  012737  020544  001110        MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
020552  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
020556  004037  027612                JSR     R0,@#DRVCAL     ;START A DATA TRANSFER

020562  004037  033464                JSR     R0,@#RANADR     ;GENERATE A NEW RANDOM ADDRESS
020566  012737  000171  004270        MOV     #READ,@#DTADPB+2 ;COMMAND=READ
020574  012737  052776  004274        MOV     #BUFFER+512.,@#DTADPB+6 ;DATA BUFFER ADDRESS
020602  012737  020602  001110        MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
020610  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
020614  004037  027612                JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
020620  005737  001446                TST     BASFLG          ;ENCOUNTER BAD SECTOR ?
020624  100402                        BMI     .+6             ;DON'T COMPARE DATA IF SO
020626  004037  033232                JSR     R0,@#RANCK      ;SOFTWARE CHECK THE DATA

020632  013737  001420  004276        MOV     @#SVADR,@#DTADPB+10 ;GET DISK ADDRESS OF THE
020640  013737  001422  004300        MOV     @#SVADR+2,@#DTADPB+12 ;LAST WRITE
020646  012737  000151  004270        MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
020654  012737  051776  004274        MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER ADDRESS
020662  012737  020662  001110        MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
020670  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
020674  004037  027612                JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
020700  000004                EXIT21: SCOPE                   ;LOOP ?

                                .SBTTL  *** RM03 ACCESS TIME ADJUSTMENT TEST ***

                                ;;*****************************************************************
                                ;*TEST 22       RM03 ACCESS TIME ADJUSTMENT TEST

                                ;*      THIS TEST PERFORMS SEEKS BETWEEN CYLINDERS 0 & 136 TO ALLOW THE
                                ;*      OPERATOR TO ADJUST THE ACCESS TIME ON AN RM03 USING THE
                                ;*      DDU.  THE PROGRAM STALLS APPROXIMATELY 5 SECONDS BETWEEN SEEKS
                                ;*      SO THAT THE ACCESS TIME INDICATORS ON THE DDU MAY BE OBSERVED.

                                ;;*****************************************************************
020702                          ;T$T22:
020702  000240                        NOP
020704  033737  001512  001316        BIT     BITS+<22*2-40>,TSTNMS+2  ;DO THIS TEST ?
020712  001002                        BNE     64$             ;YES--BRANCH
020714  000137  021052                JMP     $EOP            ;NO--GO TO THE END OF  4E PROGRAM
020720  012737  000022  001102  64$:  MOV     #22,@#$TSTNM    ;SET UP TEST NUMBER AND
                                                        ;CLEAR THE ERROR FLAG ($ERFLG)
020726  004737  026632                JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
020732  012737  020770  001110        MOV     #TEST22,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
020740  013777  001102  160174        MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
020746  013737  001570  001204        MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
020754  112737  000144  001115        MOVB    #100.,$ERMAX    ;MAX ERRORS ALLOWED FOR TEST
020762  012737  020770  001106        MOV     #TEST22,$LPADR  ;SETUP THE LOOP ADDRESS
020770  012706  001100        TEST22: MOV     #STACK,SP       ;SETUP THE STACK POINTER
020774  013737  001574  004220        MOV     LC,DPB.A+12     ;ENDING CYLINDER
021002  112737  000105  004210        MOVB    #SEEK,@#DPB.A+2 ;SEEK=COMMAND
021010  004037  027054                JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
021014  004037  030606                JSR     R0,STALL        ;STALL
021020  001440                        .WORD   STALL3          ;ADDRESS OF STALL VALUE
021022  013737  001572  004220        MOV     FC,DPB.A+12     ;STARTING CYLINDER
021030  112737  000105  004210        MOVB    #SEEK,@#DPB.A+2 ;SEEK=COMMAND
```

```
3929  021036  004037  027054          JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
3930  021042  004037  030606          JSR     R0,STALL        ;STALL
3931  021046  001440                  .WORD   STALL3          ;ADDRESS OF STALL VALUE
3932  021050  000004          EXIT22: SCOPE                   ;LOOP ?
3933
3934
3935
3936                          .SBTTL  END OF PASS ROUTINE
3937
3938                          ;;*****************************************************************
3939                          ;*INCREMENT THE PASS NUMBER ($PASS)
3940                          ;*INDICATE END-OF-PROGRAM AFTER 8. PASSES THRU THE PROGRAM
3941                          ;*IF THERES A MONITOR GO TO IT
3942                          ;*IF THERE ISN'T JUMP TO RESTART
3943
3944  021052                  $EOP:
3945  021052  104401  021060          TYPE    ,65$            ;;TYPE ASCIZ STRING
3946  021056  000410                  BR      64$             ;;GET OVER THE ASCIZ
3947                          ;;65$:  .ASCIZ  <CR><LF><LF>/END OF PASS/
3948  021100                  64$:
3949  021100  005737  001312          TST     @#DRVSEL        ;ANY DRIVES SELECTED?
3950  021104  001434                  BEQ     1$              ;NO--BRANCH
3951  021106  104401  021114          TYPE    ,67$            ;;TYPE ASCIZ STRING
3952  021112  000405                  BR      66$             ;;GET OVER THE ASCIZ
3953                          ;;67$:  .ASCIZ  / ON DRIVE/
3954  021126                  66$:
3955  021126  013746  001334          MOV     @#CHKDRV,-(SP)  ;;SAVE @#CHKDRV FOR TYPEOUT
3956  021132  104403                  TYPOS                   ;;GO TYPE--OCTAL ASCII
3957  021134     002                  .BYTE   2               ;;TYPE 2 DIGIT(S)
3958  021135     000                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
3959  021136  104401  021144          TYPE    ,69$            ;;TYPE ASCIZ STRING
3960  021142  000412                  BR      68$             ;;GET OVER THE ASCIZ
3961                          ;;69$:  .ASCIZ  /   ERRORS DETECTED=/
3962  021170                  68$:
3963  021170  013746  001112          MOV     @#$ERTTL,-(SP)  ;;SAVE @#$ERTTL FOR TYPEOUT
3964  021174  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3965  021176  005037  001112  1$:     CLR     @#$ERTTL        ;ZERO ERROR TOTAL
3966  021202  005037  001102          CLR     $TSTNM          ;;ZERO THE TEST NUMBER
3967  021206  005037  001204          CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
3968  021212  005237  001226          INC     $PASS           ;;INCREMENT THE PASS NUMBER
3969  021216  042737  100000  001226  BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
3970  021224  005327                  DEC     (PC)+           ;;LOOP?
3971  021226  000010          $EOPCT: .WORD   8.
3972  021230  003027                  BGT     $DOAGN          ;;YES
3973  021232  012737                  MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
3974  021234  000010          $ENDCT: .WORD   8.
3975  021236  021226                  $EOPCT
3976  021240  104401  021246          TYPE    ,65$            ;;TYPE ASCIZ STRING
3977  021244  000407                  BR      64$             ;;GET OVER THE ASCIZ
3978                          ;;65$:  .ASCIZ  <CR><LF>/END OF TEST/
3979  021264                  64$:
3980  021264  104401  021314          TYPE    ,$ENULL         ;TYPE NULL CHARACTER
3981  021270  013700  000042  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
3982  021274  001405                  BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
3983  021276  000005                  RESET                   ;;CLEAR THE WORLD
3984  021300  004710          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
```

```
 3985  021302  000240                          NOP                     ;;SAVE ROOM
 3986  021304  000240                          NOP                     ;;FOR
 3987  021306  000240                          NOP                     ;;ACT11
 3988  021310                        $DOAGN:
 3989  021310  000137                          JMP     @(PC)+          ;;RETURN
 3990  021312  006234                $RTNAD:   .WORD   RESTART
 3991  021314     377      377      000  $ENULL:  .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
 3992          021320                          .EVEN
```

```
                                        .SBTTL  *** SYSMAC SUBROUTINES ***

                                        .SBTTL  APT COMMUNICATIONS ROUTINE

                                        ;;*****************************************************************
021320  112737  000001  021564  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
021326  112737  000001  021562  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
021334  000403                        BR      $ATYC
021336  112737  000001  021564  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
021344                          $ATYC:
021344  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
021346  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
021350  105737  021562                TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
021354  001450                        BEQ     5$              ;;IF NOT:  BR
021356  122737  000001  001240        CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
021364  001031                        BNE     3$              ;;IF NOT:  BR
021366  132737  000100  001241        BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
021374  001425                        BEQ     3$              ;;IF NOT:  BR
021376  017600  000004                MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
021402  062766  000002  000004        ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
021410  005737  001220          1$:   TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
021414  001375                        BNE     1$              ;;IF NOT:  WAIT
021416  010037  001234                MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
021422  105720                  2$:   TSTB    (R0)+           ;;FIND END OF MESSAGE
021424  001376                        BNE     2$
021426  163700  001234                SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
021432  006200                        ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
021434  010037  001236                MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
021440  012737  000004  001220        MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
021446  000413                        BR      5$
021450  017637  000004  021474  3$:   MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
021456  062766  000002  000004        ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
021464  013746  177776                MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
021470  004737  022422                JSR     PC,$TYPE        ;;CALL TYPE MACRO
021474  000000                  4$:   .WORD   0
021476                          5$:
021476  105737  021564          10$:  TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
021502  001416                        BEQ     12$             ;;IF NOT:  BR
021504  005737  001240                TST     $ENV            ;;RUNNING UNDER APT?
021510  001413                        BEQ     12$             ;;IF NOT:  BR
021512  005737  001220          11$:  TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
021516  001375                        BNE     11$             ;;IF NOT:  WAIT
021520  017637  000004  001222        MOV     @4(SP),$FATAL   ;;GET ERROR #
021526  062766  000002  000004        ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
021534  005237  001220                INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
021540  105037  021564          12$:  CLRB    $FFLG           ;;CLEAR FATAL FLAG
021544  105037  021563                CLRB    $LFLG           ;;CLEAR LOG FLAG
021550  105037  021562                CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
021554  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
021556  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
021560  000207                        RTS     PC              ;;RETURN
021562     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
021563     000          $LFLG:  .BYTE   0               ;;LOG FLAG
021564     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
            021566                  .EVEN
```

```
  4049            000200                  APTSIZE=200
  4050            000001                  APTENV=001
  4051            000100                  APTSPOOL=100
  4052            000040                  APTCSUP=040
  4053                                    .SBTTL  ERROR HANDLER ROUTINE
  4054
  4055                                    ;;*****************************************************************
  4056                                    ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
  4057                                    ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
  4058                                    ;*AND GO TO TYPERR ON ERROR
  4059                                    ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
  4060                                    ;*SW15=1        HALT ON ERROR
  4061                                    ;*SW13=1        INHIBIT ERROR TYPEOUTS
  4062                                    ;*SW10=1        BELL ON ERROR
  4063                                    ;*SW09=1        LOOP ON ERROR
  4064                                    ;*CALL
  4065                                    ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
  4066
  4067  021566                           $ERROR:
  4068  021566  104407                           CKSWR
  4069  021570  032777  000400  157342           BIT     #SW08,@SWR      ;;SEND ERROR MESSAGE TO TTY?
  4070  021576  001411                           BEQ     7$              ;;YES--BRANCH
  4071  021600  005737  001310                   TST     @#LPTAVL        ;;IS THERE A LINE PRINTER AVAILABLE
  4072  021604  001406                           BEQ     7$              ;;NO--BRANCH
  4073  021606  013737  001502  001150           MOV     @#LPS,@#$TPS    ;;YES--SETUP STATUS
  4074  021614  013737  001504  001152           MOV     @#LPB,@#$TPB    ;;AND BUFFER REG.'S FOR LINE PRINTER
  4075  021622  105237  001103          7$:      INCB    $ERFLG          ;;SET THE ERROR FLAG
  4076  021626  001775                           BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
  4077  021630  013777  001102  157304           MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
  4078  021636  032777  002000  157274           BIT     #BIT10,@SWR     ;;BELL ON ERROR?
  4079  021644  001402                           BEQ     1$              ;;NO - SKIP
  4080  021646  104401  001210                   TYPE    ,$BELL          ;;RING BELL
  4081  021652  005237  001112          1$:      INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
  4082  021656  011637  001116                   MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
  4083  021662  162737  000002  001116           SUB     #2,$ERRPC
  4084  021670  117737  157222  001114           MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
  4085  021676  032777  020000  157234           BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
  4086  021704  001004                           BNE     20$             ;;SKIP TYPEOUTS
  4087  021706  004737  022034                   JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
  4088  021712  104401  001215                   TYPE    ,$CRLF
  4089  021716                           20$:
  4090  021716  122737  000001  001240           CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
  4091  021724  001007                           BNE     2$              ;;NO,SKIP APT ERROR REPORT
  4092  021726  113737  001114  021740           MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
  4093  021734  004737  021336                   JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
  4094  021740     000                  21$:     .BYTE   0
  4095  021741     000                           .BYTE   0
  4096  021742  000777                  22$:     BR      22$             ;;APT ERROR LOOP
  4097  021744  005777  157170          2$:      TST     @SWR            ;;HALT ON ERROR
  4098  021750  100002                           BPL     3$              ;;SKIP IF CONTINUE
  4099  021752  000000                           HALT                    ;;HALT ON ERROR!
  4100  021754  104407                           CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
  4101  021756  032777  001000  157154  3$:      BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
  4102  021764  001402                           BEQ     4$              ;;BR IF NO
  4103  021766  013716  001110                   MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
  4104  021772  005737  001206          4$:      TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
```

```
                        001402                          BEQ     5$                      ;;BR IF NONE
                        013716  001206                  MOV     $ESCAPE,(SP)            ;;FUDGE RETURN ADDRESS FOR ESCAPE
                                                5$:
                        022737  021300  000042          CMP     #$ENDAD,@#42            ;;ACT-11 AUTO-ACCEPT?
                        001001                          BNE     6$                      ;;BRANCH IF NO
                        000000                          HALT                            ;;YES
                                                6$:
                        013737  001476  001150          MOV     @#TPS,@#$TPS            ;SET STATUS AND BUFFER REG.'S
                        013737  001500  001152          MOV     @#TPB,@#$TPB            ;FOR TTY
                        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

                        113737  001102  001176  TYPERR: MOVB    @#$TSTNM,@#$TMPO ;SAVE THE TEST NUMBER
                        104412                          SAVREG                  ;SAVE R0 - R5
                        162700  000004                  SUB     #4,R0           ;FORM TEST PC
                        010037  001162                  MOV     R0,@#$REG0      ;COPY R0-R5 IN $REG0-$REG5
                        010137  001164                  MOV     R1,@#$REG1
                        010237  001166                  MOV     R2,@#$REG2
                        010337  001170                  MOV     R3,@#$REG3
                        010437  001172                  MOV     R4,@#$REG4
                        010537  001174                  MOV     R5,@#$REG5
                        113700  001114                  MOVB    @#$ITEMB,R0     ;PICKUP ERROR ITEM NUMBER
                        010001                          MOV     R0,R1           ;AND COPY IT INTO R1
                        005300                          DEC     R0              ;FORM INDEX FOR ERROR TABLE
                        106300                          ASLB    R0
                        106300                          ASLB    R0
                        106300                          ASLB    R0
                        103002                          BCC     1$              ;IS ERROR > 37?
                        062700  000240                  ADD     #ITEM41-$ERRTB,R0 ;YES--FORM OFFSET
                        062700  004410          1$:     ADD     #$ERRTB,R0      ;FORM ADDRESS
                        012037  022144                  MOV     (R0)+,2$        ;GET ERROR MESSAGE (EM) POINTER
                        001447                          BEQ     7$              ;BRANCH IF THERE ISN'T ONE
                        104401  001215                  TYPE    ,$CRLF          ;"CARRIAGE RETURN - LINE FEED
                        104401                          TYPE
                        000000                  2$:     .WORD   0               ;"EM" POINTER GOES HERE
                        162701  000041                  SUB     #41,R1          ;SPECIAL ERROR ITEM NUMBER?
                        100440                          BMI     7$              ;NO--BRANCH
                        013701  001340                  MOV     @#SVSTAT,R1     ;GET STATUS/ERROR INDICATOR
                        106301                          ASLB    R1              ;STRIP "DONE" BIT (BIT07)
                        006301                          ASL     R1              ;STRIP "ERROR" BIT (BIT15)
                        012702  004356                  MOV     #STATBL,R2      ;1ST ADDRESS ON STATUS MESSAGE POINTERS
                        005003                          CLR     R3              ;CARRIAGE RETURN-LINE FEED SWITCH
                        104401  022200                  TYPE    ,65$            ;;TYPE ASCIZ STRING
                        000402                          BR      64$             ;;GET OVER THE ASCIZ
                                                ;;65$:  .ASCIZ  <
                                                64$:
                        012237  022226          3$:     MOV     (R2)+,5$        ;MESSAGE POINTER
```

```
 4161  022210  006301                        ASL     R1              ;TYPE THIS MESSAGE?
 4162  022212  103013                        BCC     6$              ;NO--BRANCH
 4163  022214  005103                        COM     R3              ;YES--TYPE A "CR" & "LF"?
 4164  022216  001002                        BNE     4$              ;NO--BRANCH
 4165  022220  104401  001215                TYPE    ,$CRLF          ;YES
 4166  022224  104401                4$:     TYPE
 4167  022226  000000                5$:     .WORD   0               ;MESSAGE POINTER GOES HERE
 4168  022230  005701                        TST     R1              ;MORE TO TYPE?
 4169  022232  001403                        BEQ     6$              ;NO--BRANCH
 4170  022234  104401  046141                TYPE    ,MSG.SP         ;YES--SPACES
 4171  022240  000761                        BR      3$              ;LOOP
 4172  022242  001360                6$:     BNE     3$              ;BRANCH IF NOT FINISHED
 4173  022244  104401  022252                TYPE    ,67$            ;;TYPE ASCIZ STRING
 4174  022250  000401                        BR      66$             ;;GET OVER THE ASCIZ
 4175                                67$:    .ASCIZ  /)/
 4176  022254                        66$:
 4177  022254  012037  022270        7$:     MOV     (R0)+,8$        ;PICK UP DATA HEADER (DH) POINTER
 4178  022260  001404                        BEQ     9$              ;BRANCH IF NONE
 4179  022262  104401  001215                TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
 4180  022266  104401                        TYPE
 4181  022270  000000                8$:     .WORD   0               ;"DH" POINTER GOES HERE
 4182  022272  012001                9$:     MOV     (R0)+,R1        ;PICKUP DATA TABLE (DT) POINTER
 4183  022274  001450                        BEQ     20$             ;BRANCH IF NONE
 4184  022276  005005                        CLR     R5              ;SET INDENT SWITCH
 4185  022300  012000                        MOV     (R0)+,R0        ;DATA FORMAT (DF) POINTER
 4186  022302  012002                        MOV     (R0)+,R2        ;NUMBER OF DH'S TO TYPE
 4187  022304  001441                        BEQ     17$             ;BRANCH IF DH NUMBER IS 0
 4188  022306  005105                        COM     R5              ;NO INDENT
 4189  022310  104401  001215                TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
 4190  022314  112003                10$:    MOVB    (R0)+,R3        ;NUMBER OF DATA WORDS TO TYPE
 4191  022316  112004                        MOVB    (R0)+,R4        ;AND HOW TO TYPE THEM
 4192  022320  006004                11$:    ROR     R4              ;OCTAL OR DECIMAL?
 4193  022322  103403                        BCS     12$             ;DECIMAL--BRANCH
 4194  022324  013146                        MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
 4195  022326  104402                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS.
 4196  022330  000402                        BR      13$
 4197  022332                        12$:
 4198  022332  013146                        MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
 4199  022334  104405                        TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 4200  022336  005303                13$:    DEC     R3              ;MORE NUMBERS TO TYPE?
 4201  022340  001403                        BEQ     14$             ;NO--BRANCH
 4202  022342  104401  046141                TYPE    ,MSG.SP         ;YES--TYPE SEPERATORS
 4203  022346  000764                        BR      11$             ;LOOP
 4204  022350  005302                14$:    DEC     R2              ;MORE DH'S?
 4205  022352  003421                        BLE     20$             ;NO--BRANCH
 4206  022354  104401  001215                TYPE    ,$CRLF          ;YES--START A NEW LINE
 4207  022360  005105                        COM     R5              ;INDENT?
 4208  022362  001002                        BNE     15$             ;NO--BRANCH
 4209  022364  104401  046141                TYPE    ,MSG.SP         ;YES--TYPE SPACES
 4210  022370  012037  022376        15$:    MOV     (R0)+,16$       ;GET NEXT DH
 4211  022374  104401                        TYPE                    ;AND TYPE IT
 4212  022376  000000                16$:    .WORD   0               ;DH POINTER GOES HERE
 4213  022400  104401  001215                TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
 4214  022404  005705                        TST     R5              ;INDENT?
 4215  022406  001342                        BNE     10$             ;NO--BRANCH
 4216  022410  104401  046141        17$:    TYPE    ,MSG.SP         ;YES--TYPE SPACES
```

```
                        BR      10$             ;LOOP
022416  104413  20$:    RESREG                  ;RESTORE R0 - R5
022420  000207          RTS     PC              ;RETURN

                .SBTTL  TYPE ROUTINE

                ;;*********************************************************************
                ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                ;*THE ROUTINE  ILL 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
                ;*

022422  105737  001157  $TYPE:   TSTB    $TPFLG          ;;IS THERE A TERMINAL?
022426  100002                  BPL     1$              ;;BR IF YES
022430  000000                  HALT                    ;;HALT HERE IF NO TERMINAL
022432  000430                  BR      3$              ;;LEAVE
022434  010046          1$:     MOV     R0,-(SP)        ;;SAVE R0
022436  017600  000002          MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
022442  122737  000001  001240  CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
022450  001011                  BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
022452  132737  000100  001241  BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
022460  001405                  BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
022462  010037  022472          MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
022466  004737  021326          JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
022472  000000          61$:    .WORD   0               ;;MESSAGE ADDRESS
022474  132737  000040  001241  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
022502  001003                  BNE     60$             ;;YES,SKIP TYPE OUT
022504  112046          2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
022506  001005                  BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
022510  005726                  TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
022512  012600          60$:    MOV     (SP)+,R0        ;;RESTORE R0
022514  062716  000002  3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
022520  000002                  RTI                     ;;RETURN
022522  122716  000011  4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
022526  001430                  BEQ     8$
022530  122716  000200          CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
022534  001006                  BNE     5$
022536  005726                  TST     (SP)+           ;;POP  <CR><LF> EQUIV
022540  104401                  TYPE                    ;;TYPE A CR AND LF
022542  001215                  $CRLF
022544  105037  022700          CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
022550  000755                  BR      2$              ;;GET NEXT CHARACTER
022552  004737  022634  5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
022556  123726  001156  6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
022562  001350                  BNE     2$              ;;IF NO GO GET NEXT CHAR.
022564  013746  001154          MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                        ;;AND THE NULL CHAR.
```

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4273  022570  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
4274  022574  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
4275  022576  004737  022634                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
4276  022602  105337  022700                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
4277  022606  000770                          BR      7$              ;;LOOP
4278
4279                                  ;HORIZONTAL TAB PROCESSOR
4280
4281  022610  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
4282  022614  004737  022634          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
4283  022620  132737  000007  022700          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
4284  022626  001372                          BNE     9$              ;;TAB STOP
4285  022630  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
4286  022632  000724                          BR      2$              ;;GET NEXT CHARACTER
4287  022634  105777  156310          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
4288  022640  100375                          BPL     $TYPEC
4289  022642  116677  000002  156302          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
4290  022650  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
4291  022656  001003                          BNE     1$              ;;BRANCH IF NO
4292  022660  105037  022700                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
4293  022664  000406                          BR      $TYPEX          ;;EXIT
4294  022666  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
4295  022674  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
4296  022676  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
4297  022700  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
4298  022702  000207          $TYPEX: RTS     PC
4299
4300
4301                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
4302
4303                                  ;;**************************************************************
4304                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
4305                                  ;*OCTAL (ASCII) NUMBER AND TYPE IT.
4306                                  ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
4307                                  ;*CALL:
4308                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
4309                                  ;*      TYPOS                   ;;CALL FOR TYPEOUT
4310                                  ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
4311                                  ;*      .BYTE   M               ;;M=1 OR 0
4312                                  ;*                                      ;;1=TYPE LEADING ZEROS
4313                                  ;*                                      ;;0=SUPPRESS LEADING ZEROS
4314                                  ;*
4315                                  ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
4316                                  ;*$TYPOS OR $TYPOC
4317                                  ;*CALL:
4318                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
4319                                  ;*      TYPON                   ;;CALL FOR TYPEOUT
4320                                  ;*
4321                                  ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
4322                                  ;*CALL:
4323                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
4324                                  ;*      TYPOC                   ;;CALL FOR TYPEOUT
4325
4326  022704  017646  000000  023127  $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
4327  022710  116637  000001          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
4328  022716  112637  023131          MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
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 4329  022722  062716  000002                 ADD     #2,(SP)          ;;ADJUST RETURN ADDRESS
 4330  022726  000406                         BR      $TYPON
 4331  022730  112737  000001  023127 $TYPOC: MOVB    #1,$OFILL        ;;SET THE ZERO FILL SWITCH
 4332  022736  112737  000006  023131         MOVB    #6,$OMODE+1      ;;SET FOR SIX(6) DIGITS
 4333  022744  112737  000005  023126 $TYPON: MOVB    #5,$OCNT         ;;SET THE ITERATION COUNT
 4334  022752  010346                         MOV     R3,-(SP)         ;;SAVE R3
 4335  022754  010446                         MOV     R4,-(SP)         ;;SAVE R4
 4336  022756  010546                         MOV     R5,-(SP)         ;;SAVE R5
 4337  022760  113704  023131                 MOVB    $OMODE+1,R4      ;;GET THE NUMBER OF DIGITS TO TYPE
 4338  022764  005404                         NEG     R4
 4339  022766  062704  000006                 ADD     #6,R4            ;;SUBTRACT IT FOR MAX. ALLOWED
 4340  022772  110437  023130                 MOVB    R4,$OMODE        ;;SAVE IT FOR USE
 4341  022776  113704  023127                 MOVB    $OFILL,R4        ;;GET THE ZERO FILL SWITCH
 4342  023002  016605  000012                 MOV     12(SP),R5        ;;PICKUP THE INPUT NUMBER
 4343  023006  005003                         CLR     R3               ;;CLEAR THE OUTPUT WORD
 4344  023010  006105                 1$:     ROL     R5               ;;ROTATE MSB INTO "C"
 4345  023012  000404                         BR      3$               ;;GO DO MSB
 4346  023014  006105                 2$:     ROL     R5               ;;FORM THIS DIGIT
 4347  023016  006105                         ROL     R5
 4348  023020  006105                         ROL     R5
 4349  023022  010503                         MOV     R5,R3
 4350  023024  006103                 3$:     ROL     R3               ;;GET LSB OF THIS DIGIT
 4351  023026  105337  023130                 DECB    $OMODE           ;;TYPE THIS DIGIT?
 4352  023032  100016                         BPL     7$               ;;BR IF NO
 4353  023034  042703  177770                 BIC     #177770,R3       ;;GET RID OF JUNK
 4354  023040  001002                         BNE     4$               ;;TEST FOR 0
 4355  023042  005704                         TST     R4               ;;SUPPRESS THIS 0?
 4356  023044  001403                         BEQ     5$               ;;BR IF YES
 4357  023046  005204                 4$:     INC     R4               ;;DON'T SUPPRESS ANYMORE 0'S
 4358  023050  052703  000060                 BIS     #'0,R3           ;;MAKE THIS DIGIT ASCII
 4359  023054  052703  000040         5$:     BIS     #' ,R3           ;;MAKE ASCII IF NOT ALREADY
 4360  023060  110337  023124                 MOVB    R3,8$            ;;SAVE FOR TYPING
 4361  023064  104401  023124                 TYPE    ,8$              ;;GO TYPE THIS DIGIT
 4362  023070  105337  023126         7$:     DECB    $OCNT            ;;COUNT BY 1
 4363  023074  003347                         BGT     2$               ;;BR IF MORE TO DO
 4364  023076  002402                         BLT     6$               ;;BR IF DONE
 4365  023100  005204                         INC     R4               ;;INSURE LAST DIGIT ISN'T A BLANK
 4366  023102  000744                         BR      2$               ;;GO DO THE LAST DIGIT
 4367  023104  012605                 6$:     MOV     (SP)+,R5         ;;RESTORE R5
 4368  023106  012604                         MOV     (SP)+,R4         ;;RESTORE R4
 4369  023110  012603                         MOV     (SP)+,R3         ;;RESTORE R3
 4370  023112  016666  000002  000004         MOV     2(SP),4(SP)      ;;SET THE STACK FOR RETURNING
 4371  023120  012616                         MOV     (SP)+,(SP)
 4372  023122  000002                         RTI                      ;;RETURN
 4373  023124     000                 8$:     .BYTE   0                ;;STORAGE FOR ASCII DIGIT
 4374  023125     000                         .BYTE   0                ;;TERMINATOR FOR TYPE ROUTINE
 4375  023126     000                 $OCNT:  .BYTE   0                ;;OCTAL DIGIT COUNTER
 4376  023127     000                 $OFILL: .BYTE   0                ;;ZERO FILL SWITCH
 4377  023130  000000                 $OMODE: .WORD   0                ;;NUMBER OF DIGITS TO TYPE
 4378
 4379                                 .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
 4380
 4381                                 ;;**************************************************************
 4382                                 ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
 4383                                 ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
 4384                                 ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
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                                        ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
                                        ;*REPLACED WITH SPACES.
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
                                        ;*      TYPDS                   ;;GO TO THE ROUTINE
                                        
023132                                  $TYPDS:
023132  010046                         MOV     R0,-(SP)        ;;PUSH R0 ON STACK
023134  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
023136  010246                         MOV     R2,-(SP)        ;;PUSH R2 ON STACK
023140  010346                         MOV     R3,-(SP)        ;;PUSH R3 ON STACK
023142  010546                         MOV     R5,-(SP)        ;;PUSH R5 ON STACK
023144  012746  020200                 MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
023150  016605  000020                 MOV     20(SP),R5       ;;GET THE INPUT NUMBER
023154  100004                         BPL     1$              ;;BR IF INPUT IS POS.
023156  005405                         NEG     R5              ;;MAKE THE BINARY NUMBER POS.
023160  112766  000055  000001         MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
023166  005000                 1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
023170  012703  023346                 MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
023174  112723  000040                 MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
023200  005002                 2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
023202  016001  023336                 MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
023206  160105                 3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
023210  002402                         BLT     4$              ;;BR IF DONE
023212  005202                         INC     R2              ;;INCREASE THE BCD DIGIT BY 1
023214  000774                         BR      3$
023216  060105                 4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
023220  005702                         TST     R2              ;;CHECK IF BCD DIGIT=0
023222  001002                         BNE     5$              ;;FALL THROUGH IF 0
023224  105716                         TSTB    (SP)            ;;STILL DOING LEADING 0'S?
023226  100407                         BMI     7$              ;;BR IF YES
023230  106316                 5$:     ASLB    (SP)            ;;MSD?
023232  103003                         BCC     6$              ;;BR IF NO
023234  116663  000001  177777         MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
023242  052702  000060         6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
023246  052702  000040         7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
023252  110223                         MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
023254  005720                         TST     (R0)+           ;;JUST INCREMENTING
023256  020027  000010                 CMP     R0,#10          ;;CHECK THE TABLE INDEX
023262  002746                         BLT     2$              ;;GO DO THE NEXT DIGIT
023264  003002                         BGT     8$              ;;GO TO EXIT
023266  010502                         MOV     R5,R2           ;;GET THE LSD
023270  000764                         BR      6$              ;;GO CHANGE TO ASCII
023272  105726                 8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
023274  100003                         BPL     9$              ;;BR IF NO
023276  116663  177777  177776         MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
023304  105013                 9$:     CLRB    (R3)            ;;SET THE TERMINATOR
023306  012605                         MOV     (SP)+,R5        ;;POP STACK INTO R5
023310  012603                         MOV     (SP)+,R3        ;;POP STACK INTO R3
023312  012602                         MOV     (SP)+,R2        ;;POP STACK INTO R2
023314  012601                         MOV     (SP)+,R1        ;;POP STACK INTO R1
023316  012600                         MOV     (SP)+,R0        ;;POP STACK INTO R0
023320  104401  023346                 TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
023324  016666  000002  000004         MOV     2(SP),4(SP)     ;;ADJUST THE STACK
023332  012616                         MOV     (SP)+,(SP)
023334  000002                         RTI                     ;;RETURN TO USER
```

```
                                        $DTBL:  10000.
                                                1000.
                                                100.
                                                10.
                                        $DBLK:  .BLKW   4

                                        .SBTTL  TTY INPUT ROUTINE

                                        ;;*****************************************************************
                                        .ENABL  LSB
                                        $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
                                        $TKQIN: .WORD   0               ;;INPUT POINTER
                                        $TKQOUT: .WORD  0               ;;OUTPUT POINTER
                                        $TKQSRT: .BLKB  2               ;;TTY KEYBOARD QUEUE
                                        $TKQEND=.

                                        ;*TK INITIALIZE ROUTINE
                                        ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
                                        ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
                                        ;
                                        ;*CALL:
                                        ;*      JSR     PC,$TKINT
                                        ;*      RETURN
                                        ;
023366  005037  023356          $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
023372  012737  023364  023360          MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
023400  013737  023360  023362          MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
023406  012737  023436  000060          MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
023414  012737  000200  000062          MOV     #200,@#TKVEC+2  ;;"BR" LEVEL 4
023422  005777  155520                  TST     @$TKB           ;;CLEAR DONE FLAG
023426  012777  000100  155510          MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
023434  000207                          RTS     PC              ;;RETURN TO CALLER

                                        ;*TK SERVICE ROUTINE
                                        ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
                                        ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
                                        ;*IT IN THE QUEUE.
                                        ;*IF THE CHARACTER IS A "CONTROL-C" (↑C) $TKINT IS CALLED AND
                                        ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (START2)
                                        ;
023436  117746  155504          $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
023442  042716  177600                  BIC     #↑C177,(SP)     ;;STRIP THE JUNK
023446  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL C?
023452  001007                          BNE     1$              ;;BRANCH IF NO
023454  104401  024566                  TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (↑C)
023460  004737  023366                  JSR     PC,$TKINT       ;;INIT THE KEYBOARD
023464  005726                          TST     (SP)+           ;;CLEAN UP STACK
023466  000137  004762                  JMP     START2          ;;CONTROL C RESTART
023472  021627  000007          1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
023476  001004                          BNE     2$              ;;BRANCH IF NO
023500  022737  000176  001140          CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
023506  001500                          BEQ     6$              ;;GO TO SWR CHANGE

023510                          2$:
023510  022737  000002  023356          CMP     #2,$TKCNT       ;;IS THE QUEUE FULL?
023516  001004                          BNE     3$              ;;BRANCH IF NO
```

```
4497  023520  104401  001210            TYPE    $BELL           ;;RING THE TTY BELL
4498  023524  005726                    TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
4499  023526  000451                    BR      5$              ;;EXIT
4500  023530  021627  000023    3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
4501  023534  001021                    BNE     32$             ;;BRANCH IF NO
4502  023536  005077  155402            CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
4503  023542  005726                    TST     (SP)+           ;;CLEAN CHAR OFF STACK
4504  023544  105777  155374    31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
4505  023550  100375                    BPL     31$             ;;LOOP UNTIL ITS THERE
4506  023552  117746  155370            MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
4507  023556  042716  177600            BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
4508  023562  022627  000021            CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
4509  023566  001366                    BNE     31$             ;;BRANCH IF NO
4510  023570  012777  000100  155346    MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
4511  023576  000002                    RTI                     ;;RETURN
4512  023600  005237  023356    32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
4513  023604  021627  000140            CMP     (SP),#140       ;;IS IT UPPER CASE?
4514  023610  002405                    BLT     4$              ;;BRANCH IF YES
4515  023612  021627  000175            CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
4516  023616  003002                    BGT     4$              ;;BRANCH IF YES
4517  023620  042716  000040            BIC     #40,(SP)        ;;MAKE IT UPPER CASE
4518  023624  112677  177530    4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
4519  023630  005237  023360            INC     $TKQIN          ;;UPDATE THE POINTER
4520  023634  023727  023360  023366    CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
4521  023642  001003                    BNE     5$              ;;BRANCH IF NO
4522  023644  012737  023364  023360    MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
4523  023652  000002            5$:     RTI                     ;;RETURN
4524
4525                                    ;;*****************************************************************
4526                                    ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
4527                                    ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
4528                                    ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
4529                                    ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
4530  023654  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
4531  023662  001124                    BNE     15$             ;;EXIT IF NOT
4532  023664  105777  155254            TSTB    @$TKS           ;;IS A CHAR WAITING?
4533  023670  100121                    BPL     15$             ;;IF NOT, EXIT
4534  023672  117746  155250            MOVB    @$TKB,-(SP)     ;;YES
4535  023676  042716  177600            BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
4536  023702  021627  000007            CMP     (SP),#7         ;;IS IT A CONTROL-G?
4537  023706  001300                    BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
4538                                                            ;;AND EXIT
4539
4540                                    ;;*****************************************************************
4541                                    ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
4542                                    ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
4543                                    ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
4544  023710  123727  001134  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
4545  023716  001674                    BEQ     2$              ;;BRANCH IF YES
4546  023720  005726                    TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
4547  023722  004737  023366            JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
4548  023726  005077  155212            CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
4549  023732  112737  000001  001135    MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
4550
4551  023740  104401  024600            TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
4552  023744  104401  024605    $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
```

```
 4553  023750  013746  000176                 MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOU
 4554  023754  104402                         TYPOC                   ;;GO TYPE--OCTAL ASCII ALL DIGITS
 4555  023756  104401  024616                 TYPE    ,SMNEW          ;;PROMPT FOR NEW SWR
 4556  023762  005046                 19$:    CLR     -(SP)           ;;CLEAR COUNTER
 4557  023764  005046                         CLR     -(SP)           ;;THE NEW SWR
 4558  023766  105777  155152         7$:     TSTB    @$TKS           ;;CHAR THERE?
 4559  023772  100375                         BPL     7$              ;;IF NOT TRY AGAIN
 4560
 4561  023774  117746  155146                 MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 4562  024000  042716  177600                 BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 4563
 4564  024004  021627  000003                 CMP     (SP),#3         ;;IS IT A CONTROL-C?
 4565  024010  001015                         BNE     9$              ;;BRANCH IF NOT
 4566  024012  104401  024566                 TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
 4567  024016  062706  000006                 ADD     #6,SP           ;;CLEAN UP STACK
 4568  024022  123727  001136  000001         CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
 4569  024030  001003                         BNE     8$              ;;BRANCH IF NO
 4570  024032  012777  000100  155104         MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
 4571  024040  000137  004762         8$:     JMP     START2          ;;CONTROL-C RESTART
 4572
 4573
 4574  024044  021627  000025         9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 4575  024050  001005                         BNE     10$             ;;BRANCH IF NOT
 4576  024052  104401  024573                 TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
 4577  024056  062706  000006         20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 4578  024062  000737                         BR      19$             ;;LET'S TRY IT AGAIN
 4579
 4580
 4581  024064  021627  000015         10$:    CMP     (SP),#15        ;;IS IT A <CR>?
 4582  024070  001022                         BNE     16$             ;;BRANCH IF NO
 4583  024072  005766  000004                 TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 4584  024076  001403                         BEQ     11$             ;;BRANCH IF YES
 4585  024100  016677  000002  155032         MOV     2(SP),@SWR      ;;SAVE NEW SWR
 4586  024106  062706  000006         11$:    ADD     #6,SP           ;;CLEAR UP STACK
 4587  024112  104401  001215         14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 4588  024116  123727  001136  000001         CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 4589  024124  001003                         BNE     15$             ;;BRANCH IF NOT
 4590  024126  012777  000100  155010         MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
 4591  024134  000002                 15$:    RTI                     ;;RETURN
 4592  024136  004737  022634         16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
 4593  024142  021627  000060                 CMP     (SP),#60        ;;CHAR < 0?
 4594  024146  002420                         BLT     18$             ;;BRANCH IF YES
 4595  024150  021627  000067                 CMP     (SP),#67        ;;CHAR > 7?
 4596  024154  003015                         BGT     18$             ;;BRANCH IF YES
 4597  024156  042726  000060                 BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 4598  024162  005766  000002                 TST     2(SP)           ;;IS THIS THE FIRST CHAR
 4599  024166  001403                         BEQ     17$             ;;BRANCH IF YES
 4600  024170  006316                         ASL     (SP)            ;;NO, SHIFT PRESENT
 4601  024172  006316                         ASL     (SP)            ;;    CHAR OVER TO MAKE
 4602  024174  006316                         ASL     (SP)            ;;    ROOM FOR NEW ONE.
 4603  024176  005266  000002         17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 4604  024202  056616  177776                 BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 4605  024206  000667                         BR      7$              ;;GET THE NEXT ONE
 4606  024210  104401  001214         18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 4607  024214  000720                         BR      20$             ;;SIMULATE CONTROL-U
 4608                                 .DSABL  LSB
```

```
4609
4610
4611                                    ;;*****************************************************************
4612                                    ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
4613                                    ;*CALL:
4614                                    ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
4615                                    ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
4616                                    ;*                              ;;WITH PARITY BIT STRIPPED OFF
461?                                    ;
4618
4619  024216  011646                    $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
4620  024220  016666  000004  000002            MOV     4(SP),2(SP)     ;;THE PS
4621  024226  005066  000004                    CLR     4(SP)           ;;GET READY FOR A CHARACTER
4622  024232  005046                            CLR     -(SP)           ;;PUT NEW PS ON STACK
4623  024234  012746  024242                    MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
4624  024240  000002                            RTI                     ;;POP NEW PC AND PS
4625  024242                            64$:
4626  024242  005737  023356            1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
4627  024246  001775                            BEQ     1$
4628  024250  005337  023356                    DEC     $TKCNT          ;;DECREMENT THE COUNTER
4629  024254  117766  177102  000004            MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
4630  024262  005237  023362                    INC     $TKQOUT         ;;UPDATE THE POINTER
4631  024266  023727  023362  023366            CMP     $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
4632  024274  001003                            BNE     2$              ;;BRANCH IF NO
4633  024276  012737  023364  023362            MOV     #$TKQSRT,$TKQOUT ;;RESET THE POINTER
4634  024304  000002                    2$:     RTI                     ;;RETURN
4635                                    ;;*****************************************************************
4636                                    ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
4637                                    ;*CALL:
4638                                    ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
4639                                    ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
4640                                    ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
4641
4642  024306  010346                    $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
4643  024310  005046                            CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
4644  024312  012703  024542            1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
4645  024316  022703  024566            2$:     CMP     #$TTYIN+20.,R3  ;;BUFFER FULL?
4646  024322  101456                            BLOS    4$              ;;BR IF YES
4647  024324  104410                            RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
46 `  024326  112613                            MOVB    (SP)+,(R3)      ;;GET CHARACTER
4649  024330  122713  000177            10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
4650  024334  001022                            BNE     5$              ;;BR IF NO
4651  024336  005716                            TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
4652  024340  001007                            BNE     6$              ;;BR IF NO
4653  024342  112737  000134  024540            MOVB    #'\,9$          ;;TYPE A BACK SLASH
4654  024350  104401  024540                    TYPE    ,9$
4655  024354  012716  177777                    MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
4656  024360  005303                    6$:     DEC     R3              ;;BACKUP BY ONE
4657  024362  020327  024542                    CMP     R3,#$TTYIN      ;;STACK EMPTY?
4658  024366  103434                            BLO     4$              ;;BR IF YES
4659  024370  111337  024540                    MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
4660  024374  104401  024540                    TYPE    ,9$             ;;GO TYPE
4661  024400  000746                            BR      2$              ;;GO READ ANOTHER CHAR.
4662  024402  005716                    5$:     TST     (SP)            ;;RUBOUT KEY SET?
4663  024404  001406                            BEQ     7$              ;;BR IF NO
4664  024406  112737  000134  024540            MOVB    #'  ,9$         ;;TYPE A BACK SLASH
```

```
4665  024414  104401  024540            TYPE    ,9$
4666  024420  005016                    CLR     (SP)            ;;CLEAR THE RUBOUT KEY
4667  024422  122713  000025    7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
4668  024426  001003                    BNE     8$              ;;BR IF NO
4669  024430  104401  024573            TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
4670  024434  000726                    BR      1$              ;;GO START OVER
4671  024436  122713  000022    8$:     CMPB    #22,(R3)        ;;IS CHARACTER A "↑R"?
4672  024442  001011                    BNE     3$              ;;BRANCH IF NO
4673  024444  105013                    CLRB    (R3)            ;;CLEAR THE CHARACTER
4674  024446  104401  001215            TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
4675  024452  104401  024542            TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
4676  024456  000717                    BR      2$              ;;GO PICKUP ANOTHER CHACTER
4677  024460  104401  001214    4$:     TYPE    ,$QUES          ;;TYPE A '?'
4678  024464  000712                    BR      1$              ;;CLEAR THE BUFFER AND LOOP
4679  024466  111337  024540    3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
4680  024472  104401  024540            TYPE    ,9$
4681  024476  122723  000015            CMPB    #15,(R3)+       ;;CHECK FOR RETURN
4682  024502  001305                    BNE     2$              ;;LOOP IF NOT RETURN
4683  024504  105063  177777            CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
4684  024510  104401  001216            TYPE    ,$LF            ;;TYPE A LINE FEED
4685  024514  005726                    TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
4686  024516  012603                    MOV     (SP)+,R3        ;;RESTORE R3
4687  024520  011646                    MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
4688  024522  016666  000004  000002    MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
4689  024530  012766  024542  000004    MOV     #$TTYIN,4(SP)
4690  024536  000002                    RTI                     ;;RETURN
4691  024540     000    9$:     .BYTE   0                       ;;STORAGE FOR ASCII CHAR. TO TYPE
4692  024541     000            .BYTE   0                       ;;TERMINATOR
4693  024542  000024    $TTYIN: .BLKB   20.                     ;;RESERVE 20. BYTES FOR TTY INPUT
4694  024566  041536  005015  000  $CNTLC: .ASCIZ  /↑C/<15><12>    ;;CONTROL "C"
4695  024573     136  006525  000012 $CNTLU: .ASCIZ /↑U/<15><12>   ;;CONTROL "U"
4696  024600  043536  005015  000  $CNTLG: .ASCIZ  /↑G/<15><12>    ;;CONTROL "G"
4697  024605     015  051412  051127 $MSWR:  .ASCIZ  <15><12>/SWR = /
4698  024612  036440  000040
4699  024616  020040  042516  020127 $MNEW:  .ASCIZ  /  NEW = /
4700  024624  020075     000
4701          024630            .EVEN
4702
4703                            .SBTTL  SCOPE HANDLER ROUTINE
4704
4705                            ;;*****************************************************************
4706                            ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
4707                            ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
4708                            ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
4709                            ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
4710                            ;*SW14=1         LOOP ON TEST
4711                            ;*SW11=1         INHIBIT ITERATIONS
4712                            ;*SW09=1         LOOP ON ERROR
4713                            ;*CALL
4714                            ;*      SCOPE           ;;SCOPE=IOT
4715
4716  024630                    $SCOPE:
4717  024630  104407                    CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
4718  024632  032777  040000  154300 1$:  BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
4719  024640  001101                    BNE     $OVER           ;;YES IF SW14=1
4720                            ;*****START OF CODE FOR THE XOR TESTER*****
```

```
4721  024642  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
4722                                          ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
4723  024644  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
4724  024650  012737  024670  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
4725  024656  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
4726  024662  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
4727  024666  000450                          BR      $SVLAD          ;;GO TO THE NEXT TEST
4728  024670  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
4729  024672  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
4730  024676  000413                          BR      7$              ;;LOOP ON THE PRESENT TEST
4731  024700                          6$:;*****END OF CODE FOR THE XOR TESTER*****
4732  024700  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
4733  024704  001421                          BEQ     3$              ;;BR IF NO
4734  024706  123737  001115  001103          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
4735  024714  101015                          BHI     3$              ;;BR IF NO
4736  024716  032777  001000  154214          BIT     #BIT09,@$SWR    ;;LOOP ON ERROR?
4737  024724  001404                          BEQ     4$              ;;BR IF NO
4738  024726  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
4739  024734  000443                          BR      $OVER
4740  024736  105037  001103          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
4741  024742  005037  001204                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
4742  024746  000412                          BR      1$              ;;ESCAPE TO THE NEXT TEST
4743  024750  032777  004000  154162  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
4744  024756  001006                          BNE     1$              ;;BR IF YES
4745  024760  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
4746  024764  023737  001204  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
4747  024772  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
4748  024774  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
4749  025002  013737  025060  001204          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
4750  025010  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
4751  025014  113737  001102  001224          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
4752  025022  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
4753  025026  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
4754  025032  005037  001206                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
4755  025036  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
4756  025044  013777  001102  154070  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
4757  025052  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
4758  025056  000002                          RTI                     ;;FIXES PS
4759  025060  000001                  $MXCNT: 1                       ;;MAX. NUMBER OF ITERATIONS
4760
4761                                  .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
4762
4763                                  ;;******************************************************************
4764                                  ;*SAVE R0-R5
4765                                  ;*CALL:
4766                                  ;*      SAVREG
4767                                  ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
4768                                  ;*
4769                                  ;*TOP---(+16)
4770                                  ;*  +2---(+18)
4771                                  ;*  +4---R5
4772                                  ;*  +6---R4
4773                                  ;*  +8---R3
4774                                  ;*+10---R2
4775                                  ;*+12---R1
4776                                  ;*+14---R0
```

```
4777
4778  025062                          $SAVREG:
4779  025062  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
4780  025064  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
4781  025066  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
4782  025070  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
4783  025072  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
4784  025074  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
4785  025076  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
4786  025102  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
4787  025106  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
4788  025112  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
4789  025116  000002                          RTI
4790
4791                                  ;*RESTORE R0-R5
4792                                  ;*CALL:
4793                                  ;*      RESREG
4794  025120                          $RESREG:
4795  025120  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
4796  025124  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
4797  025130  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
4798  025134  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
4799  025140  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
4800  025142  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
4801  025144  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
4802  025146  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
4803  025150  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
4804  025152  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
4805  025154  000002                          RTI
4806
4807                                  .SBTTL  TRAP DECODER
4808
4809                                  ;;**************************************************************
4810                                  ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
4811                                  ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
4812                                  ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
4813                                  ;*GO TO THAT ROUTINE.
4814
4815  025156  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
4816  025160  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
4817  025164  005740                          TST     -(R0)           ;;BACKUP BY 2
4818  025166  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
4819  025170  006300                          ASL     R0              ;;POSITION FOR INDEXING
4820  025172  016000  025212                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
4821  025176  000200                          RTS     R0              ;;GO TO ROUTINE
4822
4823
4824                                  ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
4825
4826  025200  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
4827  025202  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
4828  025210  000002                          RTI                     ;;RESTORE THE PSW
4829
4830                                  .SBTTL  TRAP TABLE
4831
4832                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
```

```
                                        ;*BY THE "TRAP" INSTRUCTION.
                                        ;
                                        ;       ROUTINE
                                        ;       -------
025212  025200                  $TRPAD: .WORD   $TRAP2
025214  022422                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
025216  022730                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
025220  022704                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
025222  022744                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
025224  023132                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

025226  023744                          $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

025230  023654                          $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
025232  024216                          $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
025234  024306                          $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
025236  025062                          $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
025240  025120                          $RESREG ;;CALL=RESREG   TRAP+13(104413) RESTORE R0-R5 ROUTINE

                                        .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE

                                        ;;*****************************************************************
                                        ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
                                        ;*UNSIGNED DECIMAL ASCIZ NUMBER.
                                        ;*CALL
                                        ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
                                        ;*      JSR     PC,@#$SB2D      ;;CALL
                                        ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK

025242  016637  000002  025272   $SB2D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
025250  012746  025272                  MOV     #1$,-(SP)       ;;SET POINTER
025254  004737  025276                  JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
025260  062716  000005                  ADD     #5,(SP)         ;;ONLY ALLOW FIVE CHARACTERS
025264  012666  000002                  MOV     (SP)+,2(SP)     ;;PICKUP POINTER
025270  000207                          RTS     PC              ;;RETURN
025272  000000  000000           1$:     .WORD   0,0

                                        .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

                                        ;;*****************************************************************
                                        ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
                                        ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
                                        ;*POSITIVE.
                                        ;*CALL
                                        ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                        ;*      JSR     PC,@#$DB2D
                                        ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
                                                                        ;;IS ON THE STACK

025276  104412                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
025300  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
025304  012700  025456                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
025310  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
025314  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
```

```
 4889  025316  012202                        MOV     (R2)+,R2
 4890  025320  012737  000012  025374        MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
 4891  025326  012704  025406                MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
 4892  025332  012705  025410                MOV     #$TNPWR+2,R5
 4893  025336  005003                1$:     CLR     R3              ;;CLEAR PARTIAL
 4894  025340  161401                2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
 4895  025342  005602                        SBC     R2
 4896  025344  161502                        SUB     (R5),R2
 4897  025346  002402                        BLT     3$              ;;BR IF TEN POWER TO LARGE
 4898  025350  005203                        INC     R3              ;;ADD 1 TO PARTIAL
 4899  025352  000772                        BR      2$              ;;LOOP
 4900  025354  062401                3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
 4901  025356  005502                        ADC     R2
 4902  025360  062402                        ADD     (R4)+,R2
 4903  025362  022525                        CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
 4904  025364  052703  000060                BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
 4905  025370  110320                        MOVB    R3,(R0)+        ;;SAVE IT
 4906  025372  005327                        DEC     (PC)+           ;;DONE?
 4907  025374  000000                4$:     .WORD   0
 4908  025376  001357                        BNE     1$              ;;BR IF NO
 4909  025400  105020                        CLRB    (R0)+           ;;TERMINATOR
 4910  025402  104413                        RESREG                  ;;RESTORE REGISTERS
 4911  025404  000207                        RTS     PC              ;;RETURN
 4912  025406  145000                $TNPWR: 145000                  ;;1.0E09
 4913  025410  035632                        35632
 4914  025412  160400                        160400                  ;;1.0E08
 4915  025414  002765                        2765
 4916  025416  113200                        113200                  ;;1.0E07
 4917  025420  000230                        230
 4918  025422  041100                        041100                  ;;1.0E06
 4919  025424  000017                        17
 4920  025426  103240                        103240                  ;;1.0E05
 4921  025430  000001                        1
 4922  025432  023420                        23420                   ;;1.0E04
 4923  025434  000000                        0
 4924  025436  001750                        1750                    ;;1.0E03
 4925  025440  000000                        0
 4926  025442  000144                        144                     ;;1.0E02
 4927  025444  000000                        0
 4928  025446  000012                        12                      ;;1.0E01
 4929  025450  000000                        0
 4930  025452  000001                        1                       ;;1.0E00
 4931  025454  000000                        0
 4932  025456  000014                $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
 4933
 4934                                  .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
 4935
 4936                                  ;;*****************************************************************
 4937                                  ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
 4938                                  ;*LEADING NUMBERS.
 4939                                  ;*CALL
 4940                                  ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
 4941                                  ;*      JSR     PC,@#$SUPRS
 4942
 4943
 4944  025472  010046                $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
```

```
                                        MOV     4(SP),R0        ;;PICKUP THE POINTER
                                1$:     TSTB    (R0)            ;;TERMINATEOR?
                                        BEQ     2$              ;;BR IF YES
                                        CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
                                        BEQ     1$              ;;BR IF YES
                                2$:     DEC     R0              ;;BACKUP BY "1"
                                        MOV     R0,3$           ;;SAVE FOR TYPING
                                        TYPE                    ;;GO TYPE
                                3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
                                        MOV     (SP)+,R0        ;;RESTORE R0
                                        MOV     (SP)+,(SP)      ;;RESTORE THE STACK
                                        RTS     PC              ;;RETURN

                                .SBTTL  RANDOM NUMBER GENERATOR ROUTINE

                                ;;*****************************************************************
                                ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
                                ;*WITH A RANGE OF 0 TO 2(+33)-1.
                                ;*CALL:
                                ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
                                ;*      RETURN                  ;;RETURN HERE THE RANDOM
                                ;*                              ;;NUMBER WILL BE IN
                                ;*                              ;;$HINUM,$LONUM

                                $RAND:
                                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
                                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
                                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
                                        MOV     $LONUM,R0       ;;SET R0 WITH LOW
                                        MOV     $HINUM,R1       ;;SET R1 WITH HIGH
                                        MOV     #-7,R2          ;;SET SHIFT COUNT
                                1$:     ASL     R0              ;;SHIFT R0 LEFT AND
                                        ROL     R1              ;;ROTATE CARRY INTO R1 AND
                                        INC     R2              ;;CHECK FOR DONE
                                        BNE     1$              ;;CONTINUE SHIFT LOOP
                                        ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
                                        ADC     R1              ;;PROPOGATE CARRY
                                        ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
                                        ADD     #1057,R0        ;;ADD LOW CONSTANT
                                        ADC     R1              ;;PROPOGATE CARRY
                                        ADD     #47401,R1       ;;ADD HIGH CONSTANT
                                        MOV     R0,$LONUM       ;;SAVE R0
                                        MOV     R1,$HINUM       ;;SAVE R1
                                        MOV     (SP)+,R2        ;;POP STACK INTO R2
                                        MOV     (SP)+,R1        ;;POP STACK INTO R1
                                        MOV     (SP)+,R0        ;;POP STACK INTO R0
                                        RTS     PC              ;;RETURN
                                $HINUM: .WORD   176543
                                $LONUM: .WORD   123456

                                .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

025634                          $DIV:
025634  104400                          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
025636  042716  000017                  BIC     #17,(SP)        ;;STRIP AWAY CONDITION CODES
025642  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
025644  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
025646  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
025650  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
025652  005046                          CLR     -(SP)           ;;SAVE A PLACE FOR SIGNS
025654  012746  000021                  MOV     #17.,-(SP)      ;;SETUP THE ITERATION COUNTER
025660  016601  000024                  MOV     24(SP),R1       ;;PICKUP THE DIVIDEND
025664  016600  000022                  MOV     22(SP),R0
025670  100005                          BPL     1$              ;;CHECK THE SIGN
025672  105366  000003                  DECB    3(SP)           ;;KEEP TRACK OF THE SIGN
025676  005400                          NEG     R0              ;;AND NEGATE THE ORIGINAL
025700  005401                          NEG     R1              ;;NUMBER
025702  005600                          SBC     R0
025704  016602  000020          1$:     MOV     20(SP),R2       ;;PICKUP THE DIVISOR
025710  002407                          BLT     2$              ;;CHECK THE SIGN
025712  003011                          BGT     3$              ;;DIVISOR OF 0 IS A NO-NO
025714  052766  000003  000014          BIS     #3,14(SP)       ;;SET "V" & "C"
025722  012700  177777                  MOV     #-1,R0          ;;SET REMAINDER TO ALL ONES
025726  000424                          BR      7$              ;;EXIT
025730  005266  000002          2$:     INC     2(SP)           ;;KEEP TRACK OF DIVISORS SIGN
025734  000401                          BR      4$
025736  005402                  3$:     NEG     R2              ;;NEGATE THE ORIGINAL NUMBER
025740  000241                  4$:     CLC                     ;;CLEAR "C"
025742  000405                          BR      6$              ;;START FORMING QUOTIENT
025744  006100                  5$:     ROL     R0              ;;POSITION MSB'S
025746  010003                          MOV     R0,R3           ;;COPY
025750  060203                          ADD     R2,R3           ;;COMPARE DIVIDEND & DIVISOR
025752  103001                          BCC     6$              ;;BR IF DIVIDEND > DIVISOR
025754  010300                          MOV     R3,R0           ;;REMAINDER AFTER THIS LOOP
025756  006101                  6$:     ROL     R1              ;;QUOTIENT BIT ENTERS HERE
025760  005316                          DEC     (SP)            ;;DONE?
025762  001370                          BNE     5$              ;;BR IF NO
025764  005701                          TST     R1              ;;OVERFLOW?
025766  100005                          BPL     8$              ;;BR IF NO
```

```
5057  025770  052766  000002  000014          BIS     #2,14(SP)       ;;SET "V" IN RETURN STATUS WORD
5058  025776  005000                          CLR     R0              ;;SET REMAINDER TO ALL ZEROS
5059  026000  010001                  7$:     MOV     R0,R1           ;;COPY REMAINDER INTO QUOTIENT
5060  026002  005726                  8$:     TST     (SP)+           ;;CLEAR COUNTER FROM STACK
5061  026004  005716                          TST     (SP)            ;;REMAINDER SIGN CORRECTION NEEDED?
5062  026006  002004                          BGE     9$              ;;BR IF NO
5063  026010  005400                          NEG     R0              ;;NEGATE REMAINDER
5064  026012  105066  000001                  CLRB    1(SP)           ;;CLEAR SIGN
5065  026016  005316                          DEC     (SP)            ;;BUT DON'T FORGET QUOTIENT
5066  026020  005726                  9$:     TST     (SP)+           ;;QUOTIENT SIGN CORRECTION NEEDED?
5067  026022  001401                          BEQ     10$             ;;BR IF NO
5068  026024  005401                          NEG     R1              ;;NEGATE QUOTIENT
5069  026026  010166  000020          10$:    MOV     R1,20(SP)       ;;RETURN QUOTIENT AND
5070  026032  010066  000016                  MOV     R0,16(SP)       ;;REMAINDER TO USER
5071  026036  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
5072  026040  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
5073  026042  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
5074  026044  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
5075  026046  012666  000002                  MOV     (SP)+,2(SP)     ;;SETUP TO RETURN CONDITION CODES
5076  026052  000002                          RTI                     ;;RETURN
5077
5078                                  .SBTTL  *** PROGRAM SUBROUTINES ***
5079
5080                                  ;SET "LPTAVL" TO THE PROPER STATE.
5081                                  ; LPTAVL = 0 IF NO LINE PRINTER AVAILABLE
5082                                  ; LPTAVL = 1 IF LINE PRINTER IS AVAILABLE
5083                                  ;CALL
5084                                  ;       JSR     PC,@#LP.AVL
5085                                  ;       RETURN
5086
5087  026054  005037  001310          LP.AVL: CLR     @#LPTAVL        ;START WITH NO PRINTER AVAIABLE
5088  026060  012737  026104  000004          MOV     #1$,@#ERRVEC    ;SETUP THE TIMEOUT VECTOR
5089  026066  005037  000006                  CLR     @#ERRVEC+2
5090  026072  005777  153404                  TST     @LPS            ;IS THERE A LINE PRINTER?
5091  026076  005237  001310                  INC     @#LPTAVL        ;YES--SET AVAILABLE SWITCH
5092  026102  000401                          BR      2$
5093  026104  022626                  1$:     CMP     (SP)+,(SP)+     ;NO--POP STACK
5094  026106  012737  000006  000004  2$:     MOV     #ERRVEC+2,@#ERRVEC ;RESTORE TIMEOUT VECTOR
5095  026114  000207                          RTS     PC              ;RETURN
5096
5097                                  ;THIS ROUTINE WILL DETERMINE IF THERE IS A CLOCK ON THE SYSTEM
5098                                  ;AND IF THERE IS IT WILL SETUP THE VECTOR AND START THE CLOCK
5099                                  ;"CLKSTA" WILL INDICATE THE CLOCK TYPE
5100                                  ; 0= NO CLOCK
5101                                  ;+1= KW11-P
5102                                  ;-1= KW11-L
5103                                  ;THIS ROUTINE WILL ALSO SETUP "TICKMS" (TIME
5104                                  ;PER CLOCK TICK IN MILLISECONDS) AND "TICKUS"
5105                                  ;(TIME PER CLOCK TICK IN MICROSECONDS) AS
5106                                  ;PER SW00.
5107                                  ;SW00=0 -- 60HZ
5108                                  ;SW00=1 -- 50HZ
5109                                  ;CALL
5110                                  ;       JSR     PC,@#ST.CLK
5111                                  ;       RETURN
5112
```

```
5113  026116  010146                  ST.CLK: MOV     R1,-(SP)        ;SAVE R1
5114  026120  012701  000006                  MOV     #ERRVEC+2,R1    ;SAVE AND SETUP TIMEOUT VECTOR
5115  026124  011146                          MOV     (R1),-(SP)
5116  026126  005011                          CLR     (R1)            ;LEVEL 0
5117  026130  014146                          MOV     -(R1),-(SP)
5118  026132  012711  026162                  MOV     #1$,(R1)        ;GO TO 1$ ON TIMEOUT
5119  026136  005037  001324                  CLR     CLKSTA          ;SET CLOCK STATUS TO NO CLOCK
5120  026142  005777  153314                  TST     @PKCS           ;IS THERE A KW11-P?
5121  026146  012737  000001  001324          MOV     #1,CLKSTA       ;YES--SET STATUS TO KW11-P
5122  026154  004737  026264                  JSR     PC,ST.PCLK      ;START THE KW11-P
5123  026160  000414                          BR      3$              ;GO TO EXIT
5124  026162  022626                  1$:     CMP     (SP)+,(SP)+     ;CLEAN UP THE STACK
5125  026164  012711  026210                  MOV     #2$,(R1)        ;IF TIMEOUT GO TO 2$
5126  026170  005777  153300                  TST     @LKS            ;IS THERE A KW11-L?
5127  026174  012737  177777  001324          MOV     #-1,CLKSTA      ;YES-- SET STATUS TO KW11-L
5128  026202  004737  026326                  JSR     PC,ST.LCLK      ;START THE KW11-L
5129  026206  000401                          BR      3$              ;EXIT
5130  026210  022626                  2$:     CMP     (SP)+,(SP)+     ;CLEAN UP THE STACK
5131  026212  012621                  3$:     MOV     (SP)+,(R1)+     ;RESTORE THE TIMEOUT VECTOR
5132  026214  012621                          MOV     (SP)+,(R1)+
5133  026216  012601                          MOV     (SP)+,R1        ;RESTORE R1
5134  026220  032737  000100  001300          BIT     #SW06,@#C.SWR   ;50HZ OR 60HZ?
5135  026226  001407                          BEQ     4$              ;BRANCH IF 50
5136  026230  012737  000020  001326          MOV     #20,@#TICKMS    ;SETUP TIME PER
5137  026236  012737  047040  001330          MOV     #20000.,@#TICKUS ;TICK FOR 50HZ
5138  026244  000406                          BR      5$
5139  026246  012737  000016  001326  4$:     MOV     #16,@#TICKMS    ;SETUP TIME PER
5140  026254  012737  040432  001330          MOV     #16666.,@#TICKUS ;TICK FOR 60HZ
5141  026262  000207                  5$:     RTS     PC              ;RETURN
5142
5143  026264                          ST.PCLK:
5144  026264  032737  000040  001300          BIT     #SW05,@#C.SWR   ;ALLOW SOFTWARE TIMEOUTS?
5145  026272  001014                          BNE     1$              ;NO--BRANCH
5146  026274  012777  026362  153154          MOV     #SRVCLK,@PKV    ;SETUP THE KW11-P VECTOR
5147  026302  012777  000300  153150          MOV     #300,@PKV+2
5148  026310  012777  000001  153146          MOV     #1,@PKB         ;COUNT ONE TICK
5149  026316  012777  000115  153136          MOV     #115,@PKCS      ;"INT.EN." COUNT DOWN", "MODE 1 (REPEAT)",
5150                                                                  ;"LINE FREQ", AND "RUN"
5151  026324  000207                  1$:     RTS     PC              ;RETURN
5152
5153  026326                          ST.LCLK:
5154  026326  032737  000040  001300          BIT     #SW05,@#C.SWR   ;ALLOW SOFTWARE TIMEOUTS?
5155  026334  001011                          BNE     1$              ;NO--BRANCH
5156  026336  012777  026362  153124          MOV     #SRVCLK,@LKV    ;SETUP THE KW11-L VECTOR
5157  026344  012777  000300  153120          MOV     #300,@LKV+2
5158  026352  012777  000100  153114          MOV     #100,@LKS       ;START THE KW11-L
5159  026360  000207                  1$:     RTS     PC              ;RETURN
5160
5161  026362  013746  001326          SRVCLK: MOV     @#TICKMS,-(SP)  ;TIME PER TICK IN MILLISECONDS
5162  026366  004737  043150                  JSR     PC,@#RPTMR      ;COUNT THE ELASPED TIME
5163  026372  000002                          RTI                     ;RETURN AFTER INTERRUPT
5164
5165                                  ;THIS ROUTINE SETS UP DEFAULT PARAMETER VALUES WHEN THE PROGRAM IS
5166                                  ;STARTED OR WHEN THE VALUE OF BIT00 IN 'C.SWR' IS CHANGED.
5167                                  ;CALL
5168                                  ;       JSR     PC,LODFLT
```

```
                                        ;       RETURN
                                        LODFLT:
026374 010046                                   MOV     R0,-(SP)        ;;PUSH R0 ON STACK
026376 010146                                   MOV     R1,-(SP)        ;;PUSH R1 ON STACK
026400 010246                                   MOV     R2,-(SP)        ;;PUSH R2 ON STACK
026402 010346                                   MOV     R3,-(SP)        ;;PUSH R3 ON STACK
026404 012737 176777 001314                     MOV     #176777,TSTNMS  ;SELECT TESTS 0-10, 12-17
026412 012737 000003 001316                     MOV     #3,TSTNMS+2     ;SELECT TESTS 20 & 21
026420 012700 001746                            MOV     #DFLT,R0        ;DEFAULT PARAMETERS POINTER
026424 012701 002412                            MOV     #PRM0,R1        ;TABLE POINTER
026430 010102                                   MOV     R1,R2           ;STOP ADDRESS
026432 012021                           1$:     MOV     (R0)+,(R1)+     ;MOVE DEFAULT PARAMETERS INTO
026434 020002                                   CMP     R0,R2           ;RUN TIME TABLES ** DONE?
026436 103775                                   BLO     1$              ;NO--BRANCH
026440 012700 003606                            MOV     #PAT8,R0        ;PAT0 DEFAULTS TO PATTERN 8
026444 012701 003206                            MOV     #PAT0,R1
026450 012021                           2$:     MOV     (R0)+,(R1)+
026452 020027 003646                            CMP     R0,#PAT9
026456 103774                                   BLO     2$
026460 032737 000001 001300                     BIT     #BIT00,C.SWR    ;16 BIT MODE ?
026466 001012                                   BNE     3$              ;BR IF 18 BIT MODE
026470 012737 000037 001712                     MOV     #31.,PRMLMT+22  ;SET 'FS' LIMIT TO 31.
026476 012737 000037 001714                     MOV     #31.,PRMLMT+24  ;SET 'LS' LIMIT TO 31.
026504 012737 160000 001432                     MOV     #-<256.*32.>,TRCKWC  ;WORD COUNT FOR A 16 BIT TRACK
026512 000411                                   BR      4$              ;CONTINUE
026514 012737 000035 001712             3$:     MOV     #29.,PRMLMT+22  ;SET 'FS' LIMIT TO 29.
026522 012737 000035 001714                     MOV     #29.,PRMLMT+24  ;SET 'LS' LIMIT TO 29.
026530 012737 161000 001432                     MOV     #-<256.*30.>,TRCKWC  ;WORD COUNT FOR AN 18 BIT TRACK
026536 012701 001620                    4$:     MOV     #PRMPT,R1       ;ADDRESS OF PARAMETER POINTER TABLE
026542 005711                           5$:     TST     (R1)            ;END OF THE TABLE ?
026544 001425                                   BEQ     3$              ;BR IF END
026546 032731 002000                            BIT     #BIT10,2(R1)+   ;'LS' SELECTED ?
026552 001773                                   BEQ     5$              ;BR IF NOT
026554 016102 177776                            MOV     -2(R1),R2       ;PARAMETER TABLE ADDRESS
026560 011246                                   MOV     (R2),-(SP)      ;PARAMETER ALLOCATION BITS
026562 012703 000013                            MOV     #11.,R3         ;NUMBER OF PARAMETERS (MAXIMUM) BEFORE 'LS'
026566 006216                           6$:     ASR     (SP)            ;COUNT THE PARAMETER
026570 103002                                   BCC     7$              ;BR IF NOT USED
026572 062702 000002                            ADD     #2,R2           ;INCREMENT THE PARAMETER TABLE ADDRESS
026576 005303                           7$:     DEC     R3              ;COUNT THE PARAMETER
026600 001372                                   BNE     6$              ;BR IF NOT THERE YET
026602 005726                                   TST     (SP)+           ;CORRECT THE STACK POINTER
026604 021237 001712                            CMP     (R2),PRMLMT+22  ;IS 'LS' TOO LARGE FOR THE MODE SELECTED ?
026610 101754                                   BLOS    5$              ;BR IF NOT
026612 013712 001712                            MOV     PRMLMT+22,(R2)  ;RESET VALUE FOR MODE USED
026616 000751                                   BR      5$              ;CONTINUE
026620                                  8$:
026620 012603                                   MOV     (SP)+,R3        ;;POP STACK INTO R3
026622 012602                                   MOV     (SP)+,R2        ;;POP STACK INTO R2
026624 012601                                   MOV     (SP)+,R1        ;;POP STACK INTO R1
026626 012600                                   MOV     (SP)+,R0        ;;POP STACK INTO R0
026630 000207                                   RTS     PC              ;RETURN

                                        ;THIS ROUTINE FILLS THE PARAMETER TABLE THE CURRENT TEST.
                                        ;CALL
```

```
5225                                    ;       MOV     #TESTNUM,$TSTNM  ;LOAD THE TEST NUMBER
5226                                    ;       JSR     PC,LODPRM
5227                                    ;       RETURN
5228
5229  026632                            LODPRM:
5230  026632  010146                            MOV     R1,-(SP)         ;;PUSH R1 ON STACK
5231  026634  010246                            MOV     R2,-(SP)         ;;PUSH R2 ON STACK
5232  026636  010346                            MOV     R3,-(SP)         ;;PUSH R3 ON STACK
5233  026640  010446                            MOV     R4,-(SP)         ;;PUSH R4 ON STACK
5234  026642  005004                            CLR     R4               ;CLEAR R4
5235  026644  113704  001102                    MOVB    $TSTNM,R4        ;GET THE TEST NUMBER
5236  026650  006304                            ASL     R4               ;SETUP TO ADDRESS WORDS
5237  026652  016401  001620                    MOV     PRMPT(R4),R1     ;GET THE TEST'S PARAMETER TABLE ADDRESS
5238  026656  012702  001566                    MOV     #PRM,R2          ;PARAMETER EXECUTION TABLE
5239  026662  005003                            CLR     R3               ;R3 IS USED AS A COUNTER
5240  026664  013704  001334                    MOV     CHKDRV,R4        ;DRIVE'S ADDRESS
5241  026670  012122                            MOV     (R1)+,(R2)+      ;PARAMETER SPECIFIER
5242  026672  006237  001566            1$:     ASR     PRM              ;THIS PARAMETER USED IN THE TEST ?
5243  026676  103002                            BCC     2$               ;BR IF NOT
5244  026700  012122                            MOV     (R1)+,(R2)+      ;LOAD THE VALUE
5245  026702  000401                            BR      3$               ;CONTINUE
5246  026704  005022                    2$:     CLR     (R2)+            ;CLEAR THE UNUSED PARAMETER LOCATION
5247  026706  005203                    3$:     INC     R3               ;COUNT THE POSITION IN THE OUTPUT TABLE
5248  026710  020327  000014                    CMP     R3,#12.          ;FINISHED ?
5249  026714  001430                            BEQ     6$               ;BR IF YES
5250  026716  020327  000003                    CMP     R3,#3            ;DOING THE CYLINDER ADDRESSES ?
5251  026722  001363                            BNE     1$               ;BR IF NOT
5252  026724  132764  000004  036620           BITB    #BIT02,DRVTYP(R4)  ;RM03 ?
5253  026732  001016                            BNE     5$               ;IF IT IS, OVERLAY FC & LC WITH FC' & LC'
5254  026734  062703  000002                    ADD     #2,R3            ;COUNT THE BYPASSED PARAMETERS (FC' & LC')
5255  026740  006237  001566                    ASR     PRM              ;SHIFT THE COUNTER
5256  026744  103002                            BCC     4$               ;BR IF FC' IS NOT USED
5257  026746  062701  000002                    ADD     #2,R1            ;MOVE THE INPUT POINTER
5258  026752  006237  001566            4$:     ASR     PRM              ;COUNT THE PARAMETER
5259  026756  103345                            BCC     1$               ;BR IF LC' NOT USED
5260  026760  062701  000002                    ADD     #2,R1            ;MOVE THE INPUT PINTER
5261  026764  000742                            BR      1$               ;KEEP GOING
5262  026766  000741                            BR      1$               ;KEEP GOING
5263  026770  162702  000004            5$:     SUB     #4,R2            ;BACKUP THE OUTPUT POINTER
5264  026774  000736                            BR      1$               ;KEEP GOING
5265  026776                            6$:
5266  026776  012604                            MOV     (SP)+,R4         ;;POP STACK INTO R4
5267  027000  012603                            MOV     (SP)+,R3         ;;POP STACK INTO R3
5268  027002  012602                            MOV     (SP)+,R2         ;;POP STACK INTO R2
5269  027004  012601                            MOV     (SP)+,R1         ;;POP STACK INTO R1
5270  027006  000207                            RTS     PC               ;RETURN
5271
5272                                    ;THIS ROUTINE LOADS A READ HEADER AND DATA COMMAND OR A SEEK COMMAND
5273                                    ;INTO DPB.B+2 AND DPB.C+2, DEPENDING ON THE STATE OF "CONTROL SWITCH"
5274                                    ;BIT07.
5275                                    ;CALL
5276                                    ;       JSR     PC,@#LDCMD
5277                                    ;       RETURN
5278
5279  027010  032737  000200  001300  LDCMD:  BIT     #SW07,@#C.SWR    ;DO EXPLICIT SEEKS^
5280  027016  001007                            BNE     1$               ;YES--BRANCH
```

```
5281  027020  012737  000173  004230          MOV     #READHD,@#DPB.B+2 ;NO--SET UP FOR READ HEADER AND
5282  027026  012737  000173  004250          MOV     #READHD,@#DPB.C+2 ;DATA COMMAND
5283  027034  000406                          BR      2$
5284  027036  012737  000105  004230  1$:     MOV     #SEEK,@#DPB.B+2 ;SETUP FOR SEEK COMMAND
5285  027044  012737  000105  004250          MOV     #SEEK,@#DPB.C+2
5286  027052  000207                  2$:     RTS     PC
5287
5288                                  ;THIS ROUTINE WILL CALL THE RM03 DRIVER AND THEN WAIT ON THE FUNCTION
5289                                  ;TO COMPLETE. IF AN ERROR OCCURS IT IS REPORTED.
5290                                  ;CALL
5291                                  ;       FILL "DPB" WITH COMMAND INFORMATION
5292                                  ;       JSR     R0,@#CALL.A
5293                                  ;       RETURN
5294
5295  027054  005037  001206          CALL.A: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5296  027060  004037  037502                  JSR     R0,@#RM03       ;CALL RM03 DRIVER
5297  027064  004206                          DPB.A
5298  027066  000772                          BR      CALL.A
5299  027070  005737  004224          1$:     TST     @#DPB.A+16      ;DONE?
5300  027074  001775                          BEQ     1$              ;NO--LOOP
5301  027076  100042                          BPL     4$              ;BRANCH IF NO ERROR
5302  027100  012737  027174  001206          MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
5303  027106  013737  004220  001350          MOV     @#DPB.A+12,@#CYL.DS ;CYLINDER
5304  027114  113737  004217  001354          MOVB    @#DPB.A+11,@#TRK.DS ;TRACK
5305  027122  113737  004216  001352          MOVB    @#DPB.A+10,@#SEC.DS ;SECTOR
5306  027130  012746  004224                  MOV     #DPB.A+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5307  027134  004737  030450                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5308  027140  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5309  027142  104041                          ERROR   41              ;
5310  027144  104042                          ERROR   42              ;PARITY ERROR
5311  027146  104043                          ERROR   43              ;UNSAFE ERROR
5312  027150  104044                          ERROR   44              ;NON-I/O ERROR
5313  027152  000240                          NOP                     ;TO SYNC THE CALLING SEQ OF ERINDX
5314  027154  005737  004322                  TST     RM.REG+RMER1            ;ANY DRIVE ERROR
5315  027160  001004                          BNE     2$              ;BRANCH IF SO
5316  027162  032737  100000  004350          BIT     #BIT15,RM.REG+RMER2     ;BAD SPOT ERROR
5317  027170  001005                          BNE     4$              ;BRANCH IF SO
5318  027172  104045                  2$:     ERROR   45              ;I/O ERROR
5319  027174  013746  004224          3$:     MOV     DPB.A+16,-(SP)  ;STATUS WORD
5320  027200  004737  030410                  JSR     PC,LOP.CK       ;SEE IF LOOP, ABORT, OR CONTINUE
5321  027204  000200                  4$:     RTS     R0              ;RETURN
5322
5323                                  ;THIS ROUTINE IS THE SAME AS "CALL.A" EXCEPT FOR THE DPB USED AND IF
5324                                  ;THE COMMAND IS A READ HEADER AND DATA THE HEADER (CYLINDER, TRACK,
5325                                  ;AND SECTOR) READ IS CHECKED FOR VALIDITY.
5326                                  ;CALL
5327                                  ;       FILL DPB
5328                                  ;       JSR     R0,@#CALL.B
5329                                  ;       RETURN
5330
5331  027206  005037  001206          CALL.B: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5332  027212  004037  037502                  JSR     R0,@#RM03       ;CALL RM03 DRIVER
5333  027216  004226                          DPB.B
5334  027220  000772                          BR      CALL.B
5335  027222  005737  004244          1$:     TST     DPB.B+16        ;DONE?
5336  027226  001775                          BEQ     1$              ;NO--BRANCH
```

```
5337  027230  100047                        BPL     4$                      ;BRANCH IF NO ERROR
5338  027232  012737  027336  001206        MOV     #3$,$ESCAPE             ;;ESCAPE TO 3$ ON ERROR
5339  027240  013737  004240  001350        MOV     @#DPB.B+12,@#CYL.DS ;CYLINDER
5340  027246  113737  004237  001354        MOVB    @#DPB.B+11,@#TRK.DS ;TRACK
5341  027254  113737  004236  001352        MOVB    @#DPB.B+10,@#SEC.DS ;SECTOR
5342  027262  012746  004244                MOV     #DPB.B+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5343  027266  004737  030450                JSR     PC,@#ERINDX             ;FORM DISPATCH INDEX
5344  027272  062607                        ADD     (SP)+,PC                ;REPORT PROPER ERROR
5345  027274  104041                        ERROR   41                      ;
5346  027276  104042                        ERROR   42                      ;PARITY ERROR
5347  027300  104043                        ERROR   43                      ;UNSAFE ERROR
5348  027302  104044                        ERROR   44                      ;NON-I/O ERROR
5349  027304  000240                        NOP                             ;TO SYNC THE CALLING SEQ OF ERINDX: RT.
5350  027306  005737  004322                TST     RM.REG+RMER1            ;DRIVE ERROR ?
5351  027312  001404                        BEQ     2$                      ;BR IF NOT
5352  027314  032737  177677  004322        BIT     #^C100,RM.REG+RMER1     ;SEE IF ONLY 'HCE' SET
5353  027322  001412                        BEQ     4$                      ;BR IF IT IS
5354  027324                          2$:
5355  027324  032737  100000  004350        BIT     #BIT15,RM.REG+RMER2     ;BSE ERROR
5356  027332  001025                        BNE     6$                      ;BRANCH IF SO
5357  027334  104045                        ERROR   45                      ;I/O ERROR
5358  027336  013746  004244          3$:   MOV     DPB.B+16,-(SP)  ;STATUS WORD
5359  027342  004737  030410                JSR     PC,LOP.CK               ;SEE IF LOOP, ABORT, OR CONTINUE
5360  027346  000410                        BR      5$                      ;CHECK FOR STALL
5361  027350  123727  004230  000173  4$:   CMPB    @#DPB.B+2,#READHD ;DOING IMPLIED SEEKS?
5362  027356  001004                        BNE     5$                      ;NO--BRANCH
5363  027360  004037  030750                JSR     R0,@#VERIFY             ;YES--GO CHECK THE DATA
5364  027364  004236                        DPB.B+10
5365  027366  000407                        BR      6$                      ;ERROR DURING VERIFY
5366  027370  032737  040000  001300  5$:   BIT     #SW14,@#C.SWR   ;STALL?
5367  027376  001403                        BEQ     6$                      ;NO--BRANCH
5368  027400  004037  030606                JSR     R0,@#STALL              ;YES--CALL STALL ROUTINE
5369  027404  001434                        .WORD   STALL1                  ;STALL TIME POINTER
5370  027406  000200                  6$:   RTS     R0                      ;RETURN
5371
5372                                  ;THIS ROUTINE IS THE SAME AS "CALL.B" EXCEPT FOR THE DPB USED.
5373                                  ;CALL
5374                                  ;       FILL DPB
5375                                  ;       JSR     R0,@#CALL.C
5376                                  ;       RETURN
5377
5378  027410  005037  001206          CALL.C: CLR     @#$ESCAPE               ;NO ESCAPE ADDRESS
5379  027414  004037  037502                  JSR     R0,@#RM03               ;CALL RM03 DRIVER
5380  027420  004246                          DPB.C
5381  027422  000772                          BR      CALL.C
5382  027424  005737  004264          1$:     TST     @#DPB.C+16              ;DONE?
5383  027430  001775                          BEQ     1$                      ;NO--LOOP
5384  027432  100047                          BPL     4$                      ;YES--BRANCH IF NO ERROR
5385  027434  012737  027540  001206          MOV     #3$,$ESCAPE             ;;ESCAPE TO 3$ ON ERROR
5386  027442  013737  004260  001350          MOV     @#DPB.C+12,@#CYL.DS ;CYLINDER
5387  027450  113737  004257  001354          MOVB    @#DPB.C+11,@#TRK.DS ;TRACK
5388  027456  113737  004256  001352          MOVB    @#DPB.C+10,@#SEC.DS ;SECTOR
5389  027464  012746  004264                  MOV     #DPB.C+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5390  027470  004737  030450                  JSR     PC,@#ERINDX             ;FORM DISPATCH INDEX
5391  027474  062607                          ADD     (SP)+,PC                ;REPORT PROPER ERROR
5392  027476  104041                          ERROR   41                      ;
```

```
                                        ERROR   42              ;PARITY ERROR
                                        ERROR   43              ;UNSAFE ERROR
                                        ERROR   44              ;NON-I/O ERROR
                                        NOP                     ;TO SYNC THE CALLING SEQ OF ERINDX: RT.
                                        TST     RM.REG+RMER1    ;DRIVE ERROR ?
                                        BEQ     2$              ;BR IF NOT
                                        BIT     #^C100,RM.REG+RMER1  ;SEE IF ONLY 'HCE' SET
                                        BEQ     4$              ;BR IF IT IS
                                2$:
                                        BIT     #BIT15,RM.REG+RMER2     ;BSE ERROR ONLY ?
                                        BNE     6$              ;BRANCH IF SO
                                        ERROR   45              ;I/O ERROR
                                3$:     MOV     DPB.C+16,-(SP)  ;STATUS WORD
                                        JSR     PC,LOP.CK       ;SEE IF LOOP, ABORT, OR CONTINUE
                                        BR      5$
                                4$:     CMPB    @#DPB.C+2,#READHD ;DOING IMPLIED SEEK?
                                        BNE     5$              ;NO--EXIT
                                        JSR     R0,@#VERIFY     ;YES--CHECK THE DATA
                                        DPB.C+10
                                        BR      6$              ;ERROR DURING VERIFY
                                5$:     BIT     #SW14,@#C.SWR   ;STALL?
                                        BEQ     6$              ;NO--BRANCH
                                        JSR     R0,@#STALL      ;YES--CALL STALL ROUTINE
                                        .WORD   STALL1          ;STALL TIME POINTER
                                6$:     RTS     R0


                                ;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 0
                                ;$ERFLG EXIT IS TO THE NEXT TEST.
                                ;CALL
                                ;       FILL DPB
                                ;       JSR     R0,@#DRVCAL
                                ;       RETURN

                                DRVCAL: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
                                        CLR     @#WCEFLG        ;CLEAR WRITE CHECK ERROR FLAG
                                        JSR     R0,@#RM03       ;CALL RM03 DRIVER
                                        DTADPB
                                        BR      DRVCAL
                                DRVCL1: TST     @#DTADPB+16     ;DONE
                                        BEQ     DRVCL1          ;NO--LOOP
                                        BMI     1$              ;BR IF ERRORS
                                        JMP     10$             ;NO ERRORS
                                1$:
                                        MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
                                        MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
                                        MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
                                        MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
                                        MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
                                        JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
                                        ADD     (SP)+,PC        ;REPORT PROPER ERROR
                                        ERROR   41              ;
                                        ERROR   42              ;PARITY ERROR
                                        ERROR   43              ;UNSAFE ERROR
                                        ERROR   44              ;NON-I/O ERROR
```

```
5449  027720  000240                          NOP                     ;TO SYN THE CALLING SEQ OF THE ERINDX:
5450  027722  005737  004322                  TST     RM.REG+RMER1    ;ANY DRIVE ERROR ?
5451  027726  001011                          BNE     22$             ;REPORT THE I/O ERROR IF SO
5452  027730  032737  100000  004350          BIT     #BIT15,RM.REG+RMER2     ;BAD SPOT ERROR ?
5453  027736  001405                          BEQ     22$             ;BRANCH IF NOT
5454  027740  012737  177777  001446          MOV     #-1,BASFLG      ;SET BAD SECTOR ENCOUNTER FLAG
5455  027746  000137  030370                  JMP     10$             ;OTHERWISE ,DON'T REPORT THE BSE
5456  027752  104045                  22$:    ERROR   45              ;EXIT
5457  027754  122737  000020  001102  2$:     CMPB    #20,@#$TSTNM    ;TEST 20?
5458  027762  001170                          BNE     8$              ;NO--BRANCH
5459  027764  013746  004304                  MOV     DTADPB+16,-(SP) ;STATUS WORD
5460  027770  004737  030410                  JSR     PC,LOP.CK       ;SEE IF LOOP, ABORT, OR CONTINUE
5461  027774  122737  000151  004270          CMPB    #WRCKD,@#DTADPB+2 ;DOING A WRITE CHECK?
5462  030002  001164                          BNE     12$             ;NO--BRANCH
5463  030004  032737  040000  004316          BIT     #BIT14,@#RM.REG+10 ;IS "WCE"=1?
5464  030012  001560                          BEQ     12$             ;NO--BRANCH
5465  030014  032777  000020  151116          BIT     #SW04,@SWR      ;INHIBIT WRITES?
5466  030022  001154                          BNE     12$             ;YES--BRANCH
5467  030024  112737  000161  004270          MOVB    #WRITE,@#DTADPB+2 ;SETUP FOR A WRITE
5468  030032  005037  001206                  CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5469  030036  004037  037502                  JSR     R0,@#RM03       ;DO THE WRITE
5470  030042  004266                          DTADPB
5471  030044  000240                          NOP
5472  030046  005737  004304          3$:     TST     @#DTADPB+16     ;DONE?
5473  030052  001775                          BEQ     3$              ;NO--LOOP
5474  030054  100043                          BPL     4$              ;YES--BRANCH IF NO ERROR
5475  030056  012737  030344  001206          MOV     #8$,$ESCAPE     ;ESCAPE TO 8$ ON ERROR
5476  030064  013737  004300  001350          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
5477  030072  113737  004277  001354          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
5478  030100  113737  004276  001352          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
5479  030106  012746  004304                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5480  030112  004737  030450                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5481  030116  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5482  030120  104041                          ERROR   41              ;
5483  030122  104042                          ERROR   42              ;PARITY ERROR
5484  030124  104043                          ERROR   43              ;UNSAFE ERROR
5485  030126  104044                          ERROR   44              ;NON-I/O ERROR
5486  030130  000240                          NOP                     ;TO SYN THE CALLING SEQ OF ERINDX
5487  030132  005737  004322                  TST     RM.REG+RMER1    ;ANY DRIVE ERROR ?
5488  030136  001011                          BNE     44$             ;BRANCH IF SO
5489  030140  032737  100000  004350          BIT     #BIT15,RM.REG+RMER2     ;BAD SOPT ERROR
5490  030146  001405                          BEQ     44$             ;BRANCH IF NOT
5491  030150  012737  177777  001446          MOV     #-1,BASFLG      ;SET BAD SECTOR ENCOUNTER FLAG
5492  030156  000137  030370                  JMP     10$             ;EXIT
5493  030162  104045                  44$:    ERROR   45              ;REPORT THE I/O ERROR
5494  030164  112737  000151  004270  4$:     MOVB    #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
5495  030172  004037  037502                  JSR     R0,@#RM03       ;DO THE WRITE CHECK
5496  030176  004266                          DTADPB
5497  030200  000240                          NOP
5498  030202  005737  004304          5$:     TST     @#DTADPB+16     ;DONE?
5499  030206  001775                          BEQ     5$              ;NO--LOOP
5500  030210  100410                          BMI     7$              ;YES--BRANCH IF ERROR
5501  030212  004037  037502                  JSR     R0,@#RM03       ;DO A 2ND WRITE CHECK
5502  030216  004266                          DTADPB
5503  030220  000240                          NOP
5504  030222  005737  004304          6$:     TST     @#DTADPB+16     ;DONE?
```

```
                                        BEQ     6$                      ;NO--LOOP
                                        BPL     10$                     ;YES--BRANCH IF NO ERROR
030232  012737  000001  001414  7$:     MOV     #1,@#WCEFLG             ;SET THE WRITE CHECK ERROR FLAG
030240  012737  030344  001206          MOV     #8$,$ESCAPE             ;;ESCAPE TO 8$ ON ERROR
030246  013737  004300  001350          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
030254  113737  004277  001354          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
030262  113737  004276  001352          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
030270  012746  004304                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
030274  004737  030450                  JSR     PC,@#ERINDX             ;FORM DISPATCH INDEX
030300  062607                          ADD     (SP)+,PC                ;REPORT PROPER ERROR
030302  104041                          ERROR   41                      ;
030304  104042                          ERROR   42                      ;PARITY ERROR
030306  104043                          ERROR   43                      ;UNSAFE ERROR
030310  104044                          ERROR   44                      ;NON-I/O ERROR
030312  000240                          NOP                             ;SO SYN THE CALLING SEQ OF ERINDX:
030314  005737  004322                  TST     RM.REG+RMER1            ;ANY DRIVE ERROR
030320  001010                          BNE     88$                     ;BRANCH IF SO
030322  032737  100000  004350          BIT     #BIT15,RM.REG+RMER2     ;BAD SOPT ERROR ?
030330  001404                          BEQ     88$                     ;BRANCH IF NOT
030332  012737  177777  001446          MOV     #-1,BASFLG              ;SET BAD SECTOR ENCOUNTER FLAG
030340  000413                          BR      10$                     ;OTHERWISE EXIT
030342  104046                  88$:    ERROR   46                      ;REPORT THE FATAL WRITE CHECK ERROR
030344  013746  004304          8$:     MOV     DTADPB+16,-(SP) ;STATUS WORD
030350  004737  030410                  JSR     PC,LOP.CK               ;SEE IF LOOP, ABORT, OR CONTINUE
030354  123737  001444  001103  12$:    CMPB    @#ERR.CT,@#ERFLG ;GO TO NEXT TEST?
030362  101002                          BHI     10$                     ;NO--BRANCH
030364  013700  001332          9$:     MOV     @#BYPASS,R0             ;YES--GET EXIT ADDRESS
030370  032737  040000  001300  10$:    BIT     #SW14,@#C.SWR           ;STALL?
030376  001403                          BEQ     11$                     ;NO--BRANCH
030400  004037  030606                  JSR     R0,@#STALL              ;YES--CALL STALL ROUTINE
030404  001436                          .WORD   STALL2                  ;STALL TIME POINTER
030406  000200                  11$:    RTS     R0

                                        ;THIS SUBROUTINE CHECK FOR LOOP, ABORT, OR CONTINUE SWITCHES AFTER
                                        ;ERRORS 41, 42, 43, 44, 45, AND 46.
                                        ;CALL
                                        ;       MOV     DTA+16,-(SP)    ;STATUS WORD FROM DPB IN USE
                                        ;       JSR     PC,LOP.CK
                                        ;       RETURN

030410  032777  001000  150522  LOP.CK: BIT     #SW9,@SWR               ;LOOP ON ERROR
030416  001402                          BEQ     1$                      ;BR IF NOT
030420  000177  150464                  JMP     @$LPERR                 ;START AT THE LOOP ADDRESS
030424  005037  001206          1$:     CLR     $ESCAPE                 ;CLEAR ERROR ESCAPE FLAG
030430  032766  072006  000002          BIT     #BIT14!BIT13!BIT12!BIT10!BIT02!BIT01,2(SP)  ;CHECK ERROR TYPE
030436  001402                          BEQ     2$                      ;BR IF DRIVE NOT OFFLINE, UNLOADED, OR
                                                                        ;PERSISTENT UNSAFE OR FATAL MASSBUS PARITY
030440  000137  021052                  JMP     $EOP                    ;TERMINATE DRIVE
030444  012616                  2$:     MOV     (SP)+,(SP)              ;ADJUST RETURN ADDRESS
030446  000207                          RTS     PC


                                        ;THIS ROUTINE FORMS AN INDEX THAT WILL BE USED TO DISPATCH
                                        ;TO THE PROPER ERROR CALL.  THE INDEX IS FORMED BY EXAMINING
                                        ;THE STATUS/ERROR INDICATOR OF THE APPLICABLE DPB.
                                        ;INDEX          STATUS/ERROR
                                        ;-----          ------------
```

```
                                        ;      0 BIT14!BIT13:BIT08!BIT01
                                        ;      2 BIT11!BIT10!BIT02
                                        ;      4 BIT12!BIT04
                                        ;      6 BIT05!BIT03!<BIT09 & COMMAND=NON-I/O>
                                        ;     10 BIT06!<BIT09 & COMMAND=I/O>
                                        ;CALL
                                        ;       JSR     #DPB+16,-(SP)   ;ADDRESS OF STATUS/ERROR INDICATOR
                                        ;       JSR     PC,@#ERINDX     ;FORM INDEX
                                        ;       RETURN                  ;INDEX IS ON THE STACK

030450  010046                  ERINDX: MOV     R0,-(SP)        ;SAVE R0
030452  010146                          MOV     R1,-(SP)        ;SAVE R1
030454  016600  000006                  MOV     6(SP),R0        ;GET STATUS/ERROR INDICATOR POINTER
030460  011037  001340                  MOV     (R0),@#SVSTAT   ;SAVE THE STATUS/ERROR INDICATOR
030464  005001                          CLR     R1              ;START INDEX AT ZERO
030466  032710                          BIT     (PC)+,(R0)      ;FORM INDEX OF 0?
030470  020402                          .WORD   BIT13!BIT08!BIT01
030472  001037                          BNE     5$              ;YES--BRANCH
030474  032710                          BIT     (PC)+,(R0)      ;FORM PARITY ERROR OR PORT REQUEST INDEX (2 ?
030476  006004                          .WORD   BIT11!BIT10!BIT02
030500  001033                          BNE     4$              ;YES--BRANCH
030502  032710                          BIT     (PC)+,(R0)      ;FORM UNSAFE INDEX (4)?
030504  050020                          .WORD   BIT14!BIT12!BIT04
030506  001027                          BNE     3$              ;YES--BRANCH
030510  032710                          BIT     (PC)+,(R0)      ;FORM NON-I/O ERROR INDEX (6)?
030512  000050                          .WORD   BIT05!BIT03
030514  001023                          BNE     2$              ;YES--BRANCH
030516  032710                          BIT     (PC)+,(R0)      ;FORM I/O ERROR INDEX (10)?
030520  000100                          .WORD   BIT06
030522  001017                          BNE     1$              ;YES--BRANCH
030524  032710                          BIT     (PC)+,(R0)      ;SOFTWARE TIMEOUT?
030526  001000                          .WORD   BIT09
030530  001420                          BEQ     5$              ;NO--FORM INDEX OF 0
030532  122760  000150  177762          CMPB    #150,-16(R0)    ;YES--I/O?
030540  003011                          BGT     2$              ;NO--BRANCH
030542  005737  004322                  TST     RM.REG+RMER1    ;ANY DRIVE ERROR ?
030546  001005                          BNE     1$              ;BRANCH IF SO
030550  032737  100000  004350          BIT     #BIT15,RM.REG+RMER2     ;BSE ERROR
030556  001401                          BEQ     1$              ;BRANCH IF NOT
030560  005201                          INC     R1              ;SKIP , NOT REPORT BSE ERROR
030562  005201                  1$:     INC     R1              ;INDEX=10---ERROR=45 OR 46
030564  005201                  2$:     INC     R1              ;INDEX=6---ERROR=44
030566  005201                  3$:     INC     R1              ;INDEX=4---ERROR=43
030570  005201                  4$:     INC     R1              ;INDEX=2---ERROR=42
030572  006301                  5$:     ASL     R1              ;INDEX=0---ERROR=41
030574  010166  000006                  MOV     R1,6(SP)        ;RETURN INDEX TO USER
030600  012601                          MOV     (SP)+,R1        ;RESTORE R1
030602  012600                          MOV     (SP)+,R0        ;RESTORE R0
030604  000207                          RTS     PC              ;RETURN FROM CALL

                                        ;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 - 7, AND STALL2
                                        ;CONTAINS THE TIME FOR TESTS 16-21.
                                        ;CALL
```

```
                                        ;       JSR     R0,@#STALL
                                        ;       TIME POINTER            ;WHERE TO FIND THE STALL TIME
                                        STALL:  MOV     @(R0)+,-(SP)    ;PICKUP STALL TIME
030610  032737  020000  001300                  BIT     #SW13,@#C.SWR   ;USE A RANDOM TIME?
030616  001406                                  BEQ     1$              ;NO--BRANCH
030620  004737  025532                          JSR     PC,@#$RAND      ;YES--FORM RANDOM NUMBER
030624  013716  025632                          MOV     @#$LONUM,(SP)   ;AND USE IT FOR THE STALL TIME
030630  042716  177700                          BIC     #^C77,(SP)      ;BUT NEVER > 64 MILLISECONDS
030634  005046                          1$:     CLR     -(SP)           ;CLEAR TEMP. LOCATION
030636  162766  000001  000002          2$:     SUB     #1,2(SP)        ;MORE STALL REQUIRED?
030644  103407                                  BLO     4$              ;NO--BRANCH
030646  012716  000144                          MOV     #100.,(SP)      ;STALL FOR ABOUT 1 MILLISECOND
030652  005700                          3$:     TST     R0              ;NOP TO KILL TIME
030654  005366  000000                          DEC     0(SP)           ;COUNT
030660  001374                                  BNE     3$              ;LOOP IF MORE COUNTS NEEDED
030662  000765                                  BR      2$
030664  022626                          4$:     CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
030666  000200                                  RTS     R0              ;EXIT


                                        ;ROUTINE TO PROVIDE A 2 MS STALL AFTER A SEEK OPERATION IN THE SEEK TIMING
                                        ;TESTS.  THIS STALL IS REQUIRED TO COMPENSATE FOR THE 'ACCESS READY' DELAY
                                        ;IN THE RM03.  THIS STALL TIME IS NOT INCLUDED IN THE CALCULATED SEEK TIMES.
                                        ;CALL
                                        ;       JSR     PC,@#TWOMS
                                        ;       RETURN

030670  013746  177776                  TWOMS:  MOV     @#PS,-(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
030674  012737  000240  177776                  MOV     #(5*32.),@#PS   ;SET THE PROCESSOR PRIORITY TO 5
030702  017746  150550                          MOV     @PKV,-(SP)      ;SAVE THE OLD CLOCK VECTOR ADDRESS
030706  012777  030732  150542                  MOV     #1$,@PKV        ;SETUP NEW VECTOR ADDRESS
030714  012777  000310  150542                  MOV     #200.,@PKB      ;LOAD THE CLOCK BUFFER
030722  012777  000101  150532                  MOV     #101,@PKCS      ;START THE CLOCK
030730  000001                                  WAIT                    ;WAIT FOR 2 MS
030732  062706  000004                  1$:     ADD     #4,SP           ;INCREMENT STACK FOR RETURN
030736  012677  150514                          MOV     (SP)+,@PKV      ;RESTORE OLD CLOCK VECTOR
030742  012637  177776                          MOV     (SP)+,@#PS      ;RESTORE THE OLD PROCESSOR STATUS
030746  000207                                  RTS     PC              ;RETURN


                                        ;ROUTINE TO SOFTWARE COMPARE HEADER ON IMPLIED SEEKS
                                        ;CALL
                                        ;       JSR     R0,@#VERIFY
                                        ;       ADR POINTER             ;ADDRESS OF DPB+10 (SECTOR NUMBER)
                                        ;       RETURN

030750  010146                  VERIFY: MOV     R1,-(SP)        ;SAVE R1
030752  012001                          MOV     (R0)+,R1        ;GET ADDRESS OF DPB+10
030754  042737  150000  051776          BIC     #150000,@#BUFFER ;STRIP FORMAT AND BAD SECTOR BITS FROM CYLINDER NUMBER
030762  023761  051776  000002          CMP     @#BUFFER,2(R1)  ;CYLINDER NUMBER OK?
030770  001003                          BNE     1$              ;NO--BRANCH
030772  023711  052000                  CMP     @#BUFFER+2,(R1) ;YES--HOW ABOUT TRACK SECTOR?
030776  001441                          BEQ     3$              ;BRANCH IF GOOD
031000  013737  051776  001342  1$:     MOV     @#BUFFER,@#CYL.R0 ;SAVE THE EXPECTED AND THE
031006  113737  052001  001344          MOVB    @#BUFFER+3,@#TRK.R0 ;RECIEVED CYLINDER, TRACK,
031014  113737  052000  001346          MOVB    @#BUFFER+2,@#SEC.R0 ;AND SECTOR
```

```
5673  031022  112137  001352                  MOVB    (R1)+,@#SEC.DS
5674  031026  112137  001354                  MOVB    (R1)+,@#TRK.DS
5675  031032  011137  001350                  MOV     (R1),@#CYL.DS
5676  031036  012737  031050  001206          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
5677  031044  005740                          TST     -(R0)           ;MAKE IT TEST PC+4
5678  031046  104012                          ERROR   12              ;REPORT THE ERROR
5679  031050  012737  000107  004210  2$:     MOV     #RECAL,DPB.A+2  ;LOAD RECALIBRATE ORDER CODE
5680  031056  004037  027054                  JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
5681  031062  005037  001206                  CLR     $ESCAPE         ;CLEAR ERROR ESCAPE FLAG
5682  031066  032777  001000  150044          BIT     #SW9,@SWR       ;LOOP ON ERROR ?
5683  031074  001404                          BEQ     4$              ;BR IF NOT
5684  031076  000177  150006                  JMP     @$LPERR         ;RETURN TO ERROR LOOP ADDRESS
5685  031102  062700  000002          3$:     ADD     #2,R0           ;INCREMENT RETURN ADDRESS
5686  031106  012601                  4$:     MOV     (SP)+,R1        ;RESTORE R1
5687  031110  000200                          RTS     R0              ;EXIT
5688
5689                                  ;THIS ROUTINE WILL PERFORM A "MASSBUS" INIT. FOLLOWED BY
5690                                  ;A "RECALIBRATE" ON THE DRIVE UNDER TEST.
5691                                  ;NOTE: THIS ROUTINE DESTROYS R1 AND R4
5692                                  ;CALL
5693                                  ;       JSR     R0,SRCH00       ;DO A MASSBUS INIT. AND RECAL
5694                                  ;       RETURN1                 ;RETURN HERE IF NO ERROR
5695                                  ;       RETURN2                 ;RETURN HERE ON ERROR
5696
5697  031112  005001                  SRCH00: CLR     R1              ;INCASE OF ERROR (TYPTIM)
5698  031114  005037  177776                  CLR     @#PS
5699  031120  012777  041566  005612          MOV     #ISR,@RMVEC     ;SETUP INTERRUPT VECTOR
5700  031126  013704  036736                  MOV     @#RMADR,R4      ;PICKUP ADDRESS OF RMCS1
5701  031132  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;MASSBUS INIT.
5702  031140  005037  004276                  CLR     @#DTADPB+10     ;TRACK=0; SECTOR=0
5703  031144  005037  004300                  CLR     @#DTADPB+12     ;CYLINDER =0
5704  031150  012737  000107  004270          MOV     #RECAL,@#DTADPB+2 ;COMMAND = RECALIBRATE
5705  031156  005037  001206                  CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5706  031162  004037  037502                  JSR     R0,@#RM03       ;CALL THE DRIVER
5707  031166  004266                          DTADPB                  ;DPB POINTER
5708  031170  000440                          BR      4$              ;QUEUE IS FULL
5709  031172  005737  004304          1$:     TST     DTADPB+16       ;WAIT ON DONE
5710  031176  001775                          BEQ     1$
5711  031200  100030                          BPL     3$              ;TAKE NORMAL EXIT IF NO ERROR
5712  031202  012737  031256  001206          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
5713  031210  013737  004300  001350          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
5714  031216  113737  004277  001354          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
5715  031224  113737  004276  001352          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
5716  031232  012746  004304                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5717  031236  004737  030450                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5718  031242  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5719  031244  104041                          ERROR   41              ;
5720  031246  104042                          ERROR   42              ;PARITY ERROR
5721  031250  104043                          ERROR   43              ;UNSAFE ERROR
5722  031252  104044                          ERROR   44              ;NON-I/O ERROR
5723  031254  104045                          ERROR   45              ;I/O ERROR
5724  031256  005720                  2$:     TST     (R0)+           ;ADJUST FOR ERROR EXIT
5725  031260  000404                          BR      4$              ;GO TO THE EXIT
5726  031262  005064  000006          3$:     CLR     RMDA(R4)        ;TRACK AND SECTOR = 0
5727  031266  005064  000034                  CLR     RMDC(R4)        ;CYLINDER = 0
5728  031272  000200                  4$:     RTS     R0              ;RETURN
```

```
                                        ;THIS IS AN RTI WHICH IS USED BY THE TIMING TESTS & THE SERVO SETTLE DOWN TEST
                                        ;
031274  000002                  DORTI:  RTI                     ;RETURN FROM INTERRUPT
                                        ;
                                        ;THIS ROUTINE WILL INITIALIZE THE TIMERS USED BY THE "TIMING ROUTI ES
                                        ;CALL
                                        ;       JSR     PC,@#STRTMR
                                        ;       RETURN
                                        ;
031276  104412                  STRTMR: SAVREG                  ;SAVE R0-R5
031300  012700  001356                  MOV     #TIM.UP,R0      ;START AT TIM.UP (MINIMUM)
031304  012701  001412                  MOV     #TIM.PT,R1      ;STOP AT TIM.PT
031310  005020                  1$:     CLR     (R0)+           ;CLEAR
031312  020001                          CMP     R0,R1           ;DONE?
031314  103775                          BLO     1$              ;NO--BRANCH
031316  012710  051776                  MOV     #BUFFER,(R0)    ;SETUP POINTER
031322  012737  077777  001356          MOV     #^CBIT15,@#TIM.UP ;SET MINIMUM TIME TO MAXIMUM
031330  012737  077777  001374          MOV     #^CBIT15,@#TIM.DN ;POSITIVE NUMBER
031336  104413                          RESREG                  ;RESTORE R0-R5
031340  000207                          RTS     PC              ;RETURN
                                        ;
                                        ;THIS ROUTINE WILL ADD THE ELAPSED TIME TO THE AVERAGE COUNTER AND
                                        ;MAINTAIN THE MINIMUM AND MAXIMUM TIMES.
                                        ;NOTE: THIS ROUTINE DESTROYS R2
                                        ;CALL
                                        ;       MOV     #TP,R3          ;PARAMETER POINTER
                                        ;       MOV     FLAG,R5         ;FLAG=0=COUNT UP
                                        ;                               ;FLAG=-1=COUNT DOWN
                                        ;       JSR     PC,@#COUNT
                                        ;       RETURN
                                        ;
031342  012702  001356          COUNT:  MOV     #TIM.UP,R2      ;PICKUP THE "UP" POINTER
031346  005705                          TST     R5              ;USE IT?
031350  001402                          BEQ     1$              ;YES--BRANCH
031352  012702  001374                  MOV     #TIM.DN,R2      ;NO--PICKUP "DOWN" POINTER
031356  027722  150104          1$:     CMP     @PKC,(R2)+      ;LESS THAN PREVIOUS LOW?
031362  002003                          BGE     2$              ;NO--BRANCH
031364  017762  150076  177776          MOV     @PKC,-2(R2)     ;YES--SAVE IT
031372  027763  150070  000004  2$:     CMP     @PKC,4(R3)      ;LESS THAN THE LOW LIMIT?
031400  002001                          BGE     3$              ;NO--BRANCH
031402  005212                          INC     (R2)            ;YES--COUNT IT
031404  005722                  3$:     TST     (R2)+           ;ADVANCE THE POINTER
031406  027722  150054                  CMP     @PKC,(R2)+      ;GREATER THAN PREVIOUS HIGH?
031412  003403                          BLE     4$              ;NO--BRANCH
031414  017762  150046  177776          MOV     @PKC,-2(R2)     ;YES--SAVE IT
031422  027763  150040  000006  4$:     CMP     @PKC,6(R3)      ;GREATER THAN THE HIGH LIMIT?
031430  003401                          BLE     5$              ;NO--BRANCH
031432  005212                          INC     (R2)            ;YES--COUNT IT
031434  005722                  5$:     TST     (R2)+           ;ADVANCE THE POINTER
031436  067722  150024                  ADD     @PKC,(R2)+      ;ADD THIS COUNT TO THE TOTAL
031442  005522                          ADC     (R2)+
031444  005212                          INC     (R2)            ;COUNT THIS READING
031446  022737  060266  001412          CMP     #BUFFER+<4*814.>,@#TIM.PT ;SAVE THIS COUNT?
031454  101406                          BLOS    6$              ;NO--BRANCH
031456  017777  150004  147726          MOV     @PKC,@TIM.PT    ;YES--WELL SAVE IT THEN
```

```
5785  031464  062737  000002  001412          ADD     #2,@#TIM.PT     ;ADVANCE THE POINTER
5786  031472  000207                  6$:     RTS     PC              ;RETURN
5787
5788                                          ;THIS ROUTINE IS USED TO TYPE THE MINIMUM,
5789                                          ;MAXIMUM, AND AVERAGE TIMES FOR THE TIMING TESTS
5790                                          ;IT WILL ALSO CHECK THE TIMES TO ENSURE
5791                                          ;THEY ARE WITHIN TOLERANCE AND IF NOT FLAG THE BAD TIMES.
5792                                          ;NOTE: THIS ROUTINE DESTROYS R2-R5
5793                                          ;CALL
5794                                          ;       JSR     R0,@#TYPTIM     ;GO REPORT THE TIMES
5795                                          ;       TABLE                   ;POINT TO THE PROPER TABLE
5796                                          ;       RETURN
5797                                          ;
5798                                          ;TABLE:MSGADR1                  ;ADDRESS OF ASCIZ MESSAGE NUMBER 1
5799                                          ;       MSGADR2                 ;ADDRESS OF ASCIZ MESSAGE NUMBER 2
5800                                          ;       MIN.ALLOWED             ;MINIMUM TIME ALLOWED
5801                                          ;       MAX.ALLOWED             ;MAXIMUM TIME ALLOWED
5802
5803  031474  012002                  TYPTIM: MOV     (R0)+,R2        ;PICKUP THE TABLE POINTER
5804  031476  032777  000100  147434          BIT     #SW06,@SWR      ;INHIBIT TIME REPORTS?
5805  031504  001145                          BNE     7$              ;YES--BRANCH
5806  031506  012237  031526                  MOV     (R2)+,2$        ;ADDRESS OF MESSAGE NUMBER 1
5807  031512  012205                          MOV     (R2)+,R5        ;ADDRESS OF MESSAGE NUMBER 2
5808  031514  012203                          MOV     (R2)+,R3        ;PICKUP THE LOW LIMIT
5809  031516  011202                          MOV     (R2),R2         ;AND THE HIGH LIMIT
5810  031520  012704  001356                  MOV     #TIM.UP,R4      ;PARAMETER POINTER
5811  031524  104401                  1$:     TYPE                    ;TYPE THE MESSAGE
5812  031526  000000                  2$:     .WORD   0               ;ASCIZ MESSAGE POINTER GOES HERE
5813  031530  005764  000014                  TST     14(R4)          ;DID ANY COUNTS OCCUR?
5814  031534  001527                          BEQ     6$              ;NO--BRANCH
5815  031536  104401  046001                  TYPE    ,MSGMIN         ;"MIN="
5816  031542  012446                          MOV     (R4)+,-(SP)             ;PUT (R4)+ ON THE STACK
5817  031544  004737  025242                  JSR     PC,@#$SB2D      ;CHANGE (R4)+ TO DECIMAL ASCIZ
5818  031550  004737  025472                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
5819  031554  104401  046026                  TYPE    ,MSGOUS         ;"0 US"
5820  031560  005724                          TST     (R4)+           ;ANY SEEKS BELOW THE LOW LIMIT
5821  031562  001421                          BEQ     3$              ;NO--BRANCH
5822  031564  104401  046141                  TYPE    ,MSG.SP         ;" "
5823  031570  016446  177776                  MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
5824  031574  004737  025242                  JSR     PC,@#$SB2D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
5825  031600  004737  025472                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
5826  031604  104401  046033                  TYPE    ,MBELOW         ;"BELOW THE MINIMUM OF"
5827  031610  010346                          MOV     R3,-(SP)                ;PUT R3 ON THE STACK
5828  031612  004737  025242                  JSR     PC,@#$SB2D      ;CHANGE R3 TO DECIMAL ASCIZ
5829  031616  004737  025472                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
5830  031622  104401  046026                  TYPE    ,MSGOUS
5831  031626  104401  046010          3$:     TYPE    ,MSGMAX         ;"MAX="
5832  031632  012446                          MOV     (R4)+,-(SP)             ;PUT (R4)+ ON THE STACK
5833  031634  004737  025242                  JSR     PC,@#$SB2D      ;CHANGE (R4)+ TO DECIMAL ASCIZ
5834  031640  004737  025472                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
5835  031644  104401  046026                  TYPE    ,MSGOUS
5836  031650  005724                          TST     (R4)+           ;ANY SEEKS ABOVE THE HIGH LIMIT
5837  031652  000421                          BR      4$              ;NO--BRANCH
5838  031654  104401  046141                  TYPE    ,MSG.SP         ;YES--REPORT HOW MANY
5839  031660  016446  177776                  MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
5840  031664  004737  025242                  JSR     PC,@#$SB2D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
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 5841  031670  004737  025472            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
 5842  031674  104401  046062            TYPE    ,MABOVE         ;"ABOVE THE MAXIMUM OF"
 5843  031700  010246                    MOV     R2,-(SP)                ;PUT R2 ON THE STACK
 5844  031702  004737  025242            JSR     PC,@#$SB2D      ;CHANGE R2 TO DECIMAL ASCIZ
 5845  031706  004737  025472            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
 5846  031712  104401  046026            TYPE    ,MSGOUS
 5847  031716  104401  046017    4$:     TYPE    ,MSGAVG         ;"AVG="
 5848  031722  012446                    MOV     (R4)+,-(SP)     ;FORM THE AVERAGE
 5849  031724  012446                    MOV     (R4)+,-(SP)
 5850  031726  012446                    MOV     (R4)+,-(SP)
 5851  031730  004737  025634            JSR     PC,@#$DIV
 5852  031734  006126                    ROL     (SP)+           ;IS THE REMAINDER OVER HALF?
 5853  031736  100001                    BPL     5$              ;NO--BRANCH
 5854  031740  005216                    INC     (SP)            ;YES--ROUND UP
 5855  031742                    5$:
 5856  031742  004737  025242            JSR     PC,@#$SB2D      ;CHANGE  TO DECIMAL ASCIZ
 5857  031746  004737  025472            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
 5858  031752  104401  046026            TYPE    ,MSGOUS
 5859  031756  104401  046141            TYPE    ,MSG.SP
 5860  031762  016446  177776            MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
 5861  031766  004737  025242            JSR     PC,@#$SB2D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
 5862  031772  004737  025472            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
 5863  031776  104401  046111            TYPE    ,MSGNUM         ;"SEEKS TIMED"
 5864  032002  010537  031526            MOV     R5,2$           ;NEXT MESSAGE POINTER
 5865  032006  001404                    BEQ     7$              ;IF NONE EXIT
 5866  032010  005005                    CLR     R5              ;NO MORE THAN 2
 5867  032012  000644                    BR      1$
 5868  032014  104401  046126    6$:     TYPE    ,MSGNON
 5869  032020  000200    7$:     RTS     R0                      ;EXIT
 5870
 5871                              ;THIS SUBROUTINE WILL INCREMENT THE TRACK
 5872                              ;NUMBER (R2) BY THE AMOUNT SPECIFIED BY 'IT'.
 5873                              ;CALL
 5874                              ;       JSR     R0,@#INCTRK
 5875                              ;       RETURN1                 ;TRACK NUMBER GREATER THAN LT15
 5876                              ;       RETURN2                 ;TRACK NUMBER INCREMENTED
 5877
 5878  032022  020237  001602    INCTRK: CMP     R2,@#LT         ;LAST TRACK COMPLETED?
 5879  032026  001410                    BEQ     2$              ;YES--EXIT
 5880  032030  063702  001604            ADD     @#IT,R2         ;NO--UPDATE TRACK
 5881  032034  020237  001602            CMP     R2,@#LT         ;TRACK TO BIG?
 5882  032040  003402                    BLE     1$              ;NO--EXIT
 5883  032042  013702  001602            MOV     @#LT,R2         ;YES--SET TRACK TO LAST TRACK
 5884  032046  005720            1$:     TST     (R0)+           ;ADJUST FOR RETURN 2
 5885  032050  000200            2$:     RTS     R0              ;RETURN
 5886
 5887
 5888                              ;THIS SUBROUTINE WILL INCREMENT THE CYLINDER
 5889                              ;NUMBER (R1) BY THE AMOUNT SPECIFIED BY 'IC'.
 5890                              ;CALL
 5891                              ;       JSR     R0,@#INCCYL
 5892                              ;       RETURN1                 ;CYLINDER NUMBER GREATER THAN LC15
 5893                              ;       RETURN2                 ;CYLINDER NUMBER INCREMENTED
 5894
 5895  032052  020137  001574    INCCYL: CMP     R1,@#LC         ;LAST CYLINDER COMPLETED?
 5896  032056  001410                    BEQ     2$              ;YES--EXIT
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5897  032060  063701  001576            ADD     @#IC,R1         ;NO--UPDATE CYLINDER
5898  032064  020137  001574            CMP     R1,@#LC         ;CYLINDER TO BIG?
5899  032070  003402                    BLE     1$              ;NO--EXIT
5900  032072  013701  001574            MOV     @#LC,R1         ;YES--SET CYLINDER TO LAST CYLINDER
5901  032076  005720            1$:     TST     (R0)+           ;ADJUST FOR RETURN 2
5902  032100  000200            2$:     RTS     R0              ;RETURN
5903
5904                              ;THIS ROUTINE DECREMENTS THE SECTOR ADDRESS.
5905                              ;CALL
5906                              ;       CLR     -(SP)           ;CLEAR THE STACK
5907                              ;       JSR     PC,DECSEC       ;SUBROUTINE ENTRY
5908                              ;       RETURN
5909
5910  032102  113766  004314  000002  DECSEC: MOVB    RM.REG+RMDA,2(SP)  ;PUT THE SECTOR ADDRESS ON THE STACK
5911  032110  005366  000002            DEC     2(SP)           ;DECREMENT THE ADDRESS
5912  032114  100003                    BPL     1$              ;BR IF NOT CORRECTION NEEDED
5913  032116  013766  001716  000002    MOV     PRMLMT+22.,2(SP)  ;OVERFLOW OCCURED. FORCE TO MAXIMUM ADDRESS
5914  032124  000207            1$:     RTS     PC              ;RETURN
5915
5916                              ;THIS SUBROUTINE IS USED TO FILL THE DATA BUFFER
5917                              ;WITH ADDRESSES FROM 0 TO 21 WITH EACH ADDRESS
5918                              ;BEING STORED IN 256 CONSECUTIVE LOCATIONS
5919                              ;CALL
5920                              ;       JSR     PC,@#FILBUF
5921                              ;       RETURN
5922
5923  032126  104412            FILBUF: SAVREG                  ;SAVE R0 - R5
5924  032130  005000                    CLR     R0              ;FIRST DISK ADDRESS
5925  032132  012701  051776            MOV     #BUFFER,R1      ;START FILLING HERE
5926  032136  012702  000400    1$:     MOV     #256.,R2        ;DO 256 WORDS
5927  032142  010021            2$:     MOV     R0,(R1)+        ;STORE
5928  032144  005302                    DEC     R2              ;MORE?
5929  032146  003375                    BGT     2$              ;YES--BRANCH
5930  032150  005200                    INC     R0              ;NO--UPDATE DISK ADDRESS
5931  032152  023700  001712            CMP     PRMLMT+22,R0    ;DONE?
5932  032156  103367                    BHIS    1$              ;NO--BRANCH
5933  032160  104413                    RESREG                  ;RESTORE R0 - R5
5934  032162  000207                    RTS     PC              ;RETURN
5935
5936                              ;THIS ROUTINE WILL CLEAR THE BUFFER BY
5937                              ;SETTING EACH WORD TO "177400".
5938                              ;CALL
5939                              ;       JSR     R0,@#CLRBUF
5940                              ;       RETURN
5941
5942  032164  104412            CLRBUF: SAVREG                  ;SAVE R0 - R5
5943  032166  012701  177400            MOV     #177400,R1      ;WORD TO FILL BUFFER WITH
5944  032172  012702  051776            MOV     #BUFFER,R2      ;FIRST ADDRESS OF BUFFER
5945  032176  012703  077776            MOV     #BUFFER+<512.*22.>,R3 ;LAST ADDRESS+2 OF BUFFER
5946  032202  010122            1$:     MOV     R1,(R2)+        ;FILL WORDS 1, 9,...249,...5625
5947  032204  010122                    MOV     R1,(R2)+        ;FILL WORDS 2,10,...250,...5626
5948  032206  010122                    MOV     R1,(R2)+        ;FILL WORDS 3,11,...251,...5627
5949  032210  010122                    MOV     R1,(R2)+        ;FILL WORDS 4,12,...252,...5628
5950  032212  010122                    MOV     R1,(R2)+        ;FILL WORDS 5,13,...253,...5629
5951  032214  010122                    MOV     R1,(R2)+        ;FILL WORDS 6,14,...254,...5630
5952  032216  010122                    MOV     R1,(R2)+        ;FILL WORDS 7,15,...255,...5631
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                                        MOV     R1,(R2)+        ;FILL WORDS 8,16,...256,...5632
                                        CMP     R2,R3           ;DONE?
                                        BLO     1$              ;NO--BRANCH
                                        RESREG                  ;RESTORE R0 - R5
                                        RTS     R0              ;RETURN FROM CALL

                                ;THIS ROUTINE IS USED TO CHECK THE DATA BUFFER
                                ;FOR ADDRESSES 0 THROUGH 21 WITH EACH ADDRESS
                                ;BEING STORED IN 256 CONSECUTIVE LOCATIONS
                                ;CALL
                                ;       JSR     R0,@#CKSCTR
                                ;       RETURN
                                
032232  104412          CKSCTR: SAVREG                  ;SAVE R0 - R5
032234  162706  000004          SUB     #4,SP           ;RESERVE TEMP. STORAGE AREA
032240  005001                  CLR     R1              ;FIRST SECTOR
032242  012716  051776          MOV     #BUFFER,(SP)    ;FIRST ADDRESS OF DATA BUFFER
032246  005066  000002          CLR     2(SP)           ;NO ERRORS
032252  012702  000020  1$:     MOV     #16.,R2 ;LOOP COUNT (16*16=256)
032256  011603                  MOV     (SP),R3         ;GET 1ST ADDRESS OF THIS SECTORS DATA
032260                  2$:
032260  020123                  CMP     R1,(R3)+        ;WORD 1
032262  001063                  BNE     7$              ;BRANCH IF BAD
032264  020123                  CMP     R1,(R3)+        ;WORD 2
032266  001061                  BNE     7$              ;BRANCH IF BAD
032270  020123                  CMP     R1,(R3)+        ;WORD 3
032272  001057                  BNE     7$              ;BRANCH IF BAD
032274  020123                  CMP     R1,(R3)+        ;WORD 4
032276  001055                  BNE     7$              ;BRANCH IF BAD
032300  020123                  CMP     R1,(R3)+        ;WORD 5
032302  001053                  BNE     7$              ;BRANCH IF BAD
032304  020123                  CMP     R1,(R3)+        ;WORD 6
032306  001051                  BNE     7$              ;BRANCH IF BAD
032310  020123                  CMP     R1,(R3)+        ;WORD 7
032312  001047                  BNE     7$              ;BRANCH IF BAD
032314  020123                  CMP     R1,(R3)+        ;WORD 8
032316  001045                  BNE     7$              ;BRANCH IF BAD
032320  020123                  CMP     R1,(R3)+        ;WORD 9
032322  001043                  BNE     7$              ;BRANCH IF BAD
032324  020123                  CMP     R1,(R3)+        ;WORD 10
032326  001041                  BNE     7$              ;BRANCH IF BAD
032330  020123                  CMP     R1,(R3)+        ;WORD 11
032332  001037                  BNE     7$              ;BRANCH IF BAD
032334  020123                  CMP     R1,(R3)+        ;WORD 12
032336  001035                  BNE     7$              ;BRANCH IF BAD
032340  020123                  CMP     R1,(R3)+        ;WORD 13
032342  001033                  BNE     7$              ;BRANCH IF BAD
032344  020123                  CMP     R1,(R3)+        ;WORD 14
032346  001031                  BNE     7$              ;BRANCH IF BAD
032350  020123                  CMP     R1,(R3)+        ;WORD 15
032352  001027                  BNE     7$              ;BRANCH IF BAD
032354  020123                  CMP     R1,(R3)+        ;WORD 16
032356  001025                  BNE     7$              ;BRANCH IF BAD
032360  005302                  DEC     R2              ;FINISHED WITH THIS SECTORS DATA?
032362  001336                  BNE     2$              ;NO--BRANCH
032364  062716  001000  3$:     ADD     #512.,(SP)      ;YES--FIRST ADDRESS OF NEXT SECTOR
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6009  032370  005201                          INC     R1              ;MOVE TO NEXT SECTOR
6010  032372  023701  001712                  CMP     PRMLMT+22,R1    ;DONE?
6011  032376  103325                          BHIS    1$              ;NO--BRANCH
6012  032400  005766  000002          4$:     TST     2(SP)           ;ERROR OCCUR?
6013  032404  001406                          BEQ     5$              ;NO--BRANCH
6014  032406  123737  001444  001103          CMPB    @#ERR.CT,@#SERFLG ;MAX. ERROR OCCURRED?
6015  032414  101002                          BHI     6$              ;NO--BRANCH
6016  032416  013700  001332          5$:     MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
6017  032422  062706  000004          6$:     ADD     #4,SP           ;FREE TEMP. AREA
6018  032426  104413                          RESREG                  ;RESTORE R0 - R5
6019  032430  000200                          RTS     R0              ;RETURN FROM CALL
6020  032432  010304          7$:     MOV     R3,R4           ;FORM WORD NUMBER AND
6021  032434  161604                          SUB     (SP),R4         ;ADDRESS TO CONTINUE FROM
6022  032436  010405                          MOV     R4,R5
6023  032440  006204                          ASR     R4              ;WORD NUMBER
6024  032442  042705  177740                  BIC     #^C37,R5
6025  032446  001002                          BNE     8$              ;BRANCH IF NOT A MULTIPLE OF 16
6026  032450  012705  000040                  MOV     #40,R5          ;SET TO WORD 16
6027  032454  006305          8$:     ASL     R5
6028  032456  062705  032260                  ADD     #2$,R5          ;ADDRESS
6029  032462  016337  177776  001126          MOV     -2(R3),@#$BDDAT ;SAVE BAD DATA
6030  032470  005766  000002                  TST     2(SP)           ;FIRST ERROR?
6031  032474  001015                          BNE     10$             ;NO--BRANCH
6032  032476  013737  004300  001350          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER NUMBER
6033  032504  113737  004277  001354          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK NUMBER
6034  032512  012737  032522  001206          MOV     #9$,$ESCAPE     ;;ESCAPE TO 9$ ON ERROR
6035  032520  104021                          ERROR   21              ;REPORT THE ERROR
6036  032522  105166  000002          9$:     COMB    2(SP)           ;SET ERROR SWITCH
6037  032526  000404                          BR      11$
6038  032530                          10$:
6039  032530  012737  032540  001206          MOV     #11$,$ESCAPE    ;;ESCAPE TO 11$ ON ERROR
6040  032536  104022                          ERROR   22              ;REPORT THE ERROR
6041  032540  032777  001000  146372  11$:    BIT     #SW09,@SWR      ;LOOP ON ERROR?
6042  032546  001323                          BNE     5$              ;YES
6043  032550  032777  000002  146362          BIT     #SW01,@SWR      ;STOP DATA COMPARE?
6044  032556  001310                          BNE     4$              ;YES--BRANCH
6045  032560  123737  001444  001103          CMPB    @#ERR.CT,@#SERFLG ;MAX. ERRORS?
6046  032566  101713                          BLOS    5$              ;YES--BRANCH
6047  032570  032777  000040  146342          BIT     #SW05,@SWR      ;REPORT ONLY 1ST ERROR PER SECTOR?
6048  032576  001272                          BNE     3$              ;YES--BRANCH
6049  032600  000115                          JMP     (R5)
6050
6051                                  ;THIS ROUTINE WILL MOVE THE 16 WORDS OF THE
6052                                  ;DESIRED PATTERN INTO THE DATA BUFFER.
6053                                  ;CALL
6054                                  ;       MOV     #NX,R0          ;PATTERN NUMBER INDEX TO R0
6055                                  ;       JSR     PC,@#SETBUF
6056
6057  032602  104412                  SETBUF: SAVREG                  ;SAVE R0 - R5
6058  032604  012701  051776                  MOV     #BUFFER,R1      ;FIRST ADDRESS
6059  032610  013702  004272                  MOV     @#DTADPB+4,R2   ;WORD COUNT
6060  032614  016003  003146          1$:     MOV     PAT.PT(R0),R3   ;PICKUP PATTERN POINTER
6061  032620  012321                          MOV     (R3)+,(R1)+     ;MOVE WORD 1 INTO DATA BUFFER
6062  032622  012321                          MOV     (R3)+,(R1)+     ;MOVE WORD 2 INTO DATA BUFFER
6063  032624  012321                          MOV     (R3)+,(R1)+     ;MOVE WORD 3 INTO DATA BUFFER
6064  032626  012321                          MOV      R3)+,(R1)+     ;MOVE WORD 4 INTO DATA BUFFER
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 6065  032630  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 5 INTO DATA BUFFER
 6066  032632  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 6 INTO DATA BUFFER
 6067  032634  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 7 INTO DATA BUFFER
 6068  032636  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 8 INTO DATA BUFFER
 6069  032640  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 9 INTO DATA BUFFER
 6070  032642  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 10 INTO DATA BUFFER
 6071  032644  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 11 INTO DATA BUFFER
 6072  032646  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 12 INTO DATA BUFFER
 6073  032650  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 13 INTO DATA BUFFER
 6074  032652  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 14 INTO DATA BUFFER
 6075  032654  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 15 INTO DATA BUFFER
 6076  032656  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 16 INTO DATA BUFFER
 6077  032660  062702  000020            ADD     #16.,R2 ;DONE?
 6078  032664  001353                    BNE     1$              ;NO--BRANCH
 6079  032666  104413                    RESREG                  ;RESTORE R0 - R5
 6080  032670  000207                    RTS     PC              ;RETURN
 6081
 6082                                ;THIS ROUTINE COMPARES A 16 WORD DATA PATTERN
 6083                                ;AGAINST THE DATA BUFFER
 6084                                ;CALL
 6085                                ;       MOV     #NX,R0          ;PATTERN NUMBER INDEX TO R0
 6086                                ;       JSR     PC,@#DATCMP
 6087                                ;       RETURN
 6088
 6089  032672  104412                DATCMP: SAVREG                  ;SAVE R0 - R5
 6090  032674  012701  051776                MOV     #BUFFER,R1      ;FIRST ADDRESS OF BUFFER
 6091  032700  013702  004272                MOV     @#DTADPB+4,R2   ;WORD COUNT
 6092  032704  005046                        CLR     -(SP)           ;NO ERROR
 6093  032706  016003  003146        1$:     MOV     PAT.PT(R0),R3   ;PATTERN POINTER
 6094  032712                        2$:
 6095  032712  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 1
 6096  032714  001044                        BNE     4$              ;BRANCH IF DIFFERENT
 6097  032716  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 2
 6098  032720  001042                        BNE     4$              ;BRANCH IF DIFFERENT
 6099  032722  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 3
 6100  032724  001040                        BNE     4$              ;BRANCH IF DIFFERENT
 6101  032726  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 4
 6102  032730  001036                        BNE     4$              ;BRANCH IF DIFFERENT
 6103  032732  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 5
 6104  032734  001034                        BNE     4$              ;BRANCH IF DIFFERENT
 6105  032736  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 6
 6106  032740  001032                        BNE     4$              ;BRANCH IF DIFFERENT
 6107  032742  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 7
 6108  032744  001030                        BNE     4$              ;BRANCH IF DIFFERENT
 6109  032746  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 8
 6110  032750  001026                        BNE     4$              ;BRANCH IF DIFFERENT
 6111  032752  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 9
 6112  032754  001024                        BNE     4$              ;BRANCH IF DIFFERENT
 6113  032756  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 10
 6114  032760  001022                        BNE     4$              ;BRANCH IF DIFFERENT
 6115  032762  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 11
 6116  032764  001020                        BNE     4$              ;BRANCH IF DIFFERENT
 6117  032766  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 12
 6118  032770  001016                        BNE     4$              ;BRANCH IF DIFFERENT
 6119  032772  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 13
 6120  032774  001014                        BNE     4$              ;BRANCH IF DIFFERENT
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6121  032776  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 14
6122  033000  001012                        BNE     4$              ;BRANCH IF DIFFERENT
6123  033002  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 15
6124  033004  001010                        BNE     4$              ;BRANCH IF DIFFERENT
6125  033006  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 16
6126  033010  001006                        BNE     4$              ;BRANCH IF DIFFERENT
6127  033012  062702  000020                ADD     #16.,R2         ;DONE ?
6128  033016  001333                        BNE     1$              ;NO--BRANCH
6129  033020  005726                3$:     TST     (SP)+           ;YES -- CLEAN UP STACK
6130  033022  104413                        RESREG                  ;RESTORE R0 - R5
6131  033024  000207                        RTS     PC
6132  033026  010104                4$:     MOV     R1,R4           ;FORM THE WORD NUMBER
6133  033030  162704  051776                SUB     #BUFFER,R4
6134  033034  006204                        ASR     R4              ;WORD NUMBER
6135  033036  010305                        MOV     R3,R5           ;FORM ADDRESS TO CONTINUE FROM
6136  033040  166005  003146                SUB     PAT.PT(R0),R5
6137  033044  006305                        ASL     R5
6138  033046  062705  032712                ADD     #2$,R5          ;ADDRESS
6139  033052  064341                        ADD     -(R3),-(R1)     ;RECONSTRUCT THE BAD WORD
6140  033054  010137  001122                MOV     R1,@#$BDADR     ;SAVE THE ERROR INFORMATION
6141  033060  010337  001120                MOV     R3,@#$GDADR     ;
6142  033064  012137  001126                MOV     (R1)+,@#$BDDAT  ;
6143  033070  012337  001124                MOV     (R3)+,@#$GDDAT  ;
6144  033074  005716                        TST     (SP)            ;1ST DATA COMPARE ERROR?
6145  033076  001023                        BNE     6$              ;NO--BRANCH
6146  033100  013737  004300  001350        MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
6147  033106  113737  004277  001354        MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
6148  033114  113737  004276  001352        MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
6149  033122  016600  000016                MOV     16(SP),R0       ;GET TEST PC+4
6150  033126  012737  033136  001206        MOV     #5$,$ESCAPE     ;;ESCAPE TO 5$ ON ERROR
6151  033134  104013                        ERROR   13              ;REPORT THE ERROR
6152  033136  016600  000014        5$:     MOV     14(SP),R0       ;PATTERN NUMBER INDEX
6153  033142  105116                        COMB    (SP)            ;SET THE ERROR SWITCH
6154  033144  000404                        BR      7$
6155  033146                        6$:
6156  033146  012737  033156  001206        MOV     #7$,$ESCAPE     ;;ESCAPE TO 7$ ON ERROR
6157  033154  104014                        ERROR   14              ;REPORT THE ERROR
6158  033156  032777  000002  145754  7$:   BIT     #$SW01,@SWR     ;STOP DATA COMPARE?
6159  033164  001315                        BNE     3$              ;YES--EXIT
6160  033166  123737  001444  001103        CMPB    @#ERR.CT,@#$ERFLG ;MAX. ERRORS?
6161  033174  101004                        BHI     8$              ;NO--BRANCH
6162  033176  013766  001332  000016        MOV     @#BYPASS,16(SP) ;YES--ERROR EXIT
6163  033204  000705                        BR      3$
6164  033206  000115                8$:     JMP     (R5)            ;NO--CONTINUE AT NEXT WORD
6165
6166                                ;THIS ROUTINE WILL FILL THE DATA BUFFER (256*22 WORDS) WITH
6167                                ;A RANDOM PATTERN.  THE FIRST TWO WORDS OF EVERY 256 WILL
6168                                ;BE THE BASE OF THE RANDOM NUMBER GENERATOR FOR THE
6169                                ;NEXT 254 WORDS.
6170                                ;NOTE: THIS ROUTINE DESTROYS R1 AND R2
6171                                ;CALL
6172                                ;       JSR     R0,@#FILRAN
6173                                ;       RETURN
6174
6175  033210  012701  051776        FILRAN: MOV     #BUFFER,R1
6176  033214  013702  001712                MOV     PRMLMT+22.,R2   ;MAXIMUM NUMBER OF SECTORS
```

```
6177  033220  004037  033430          1$:     JSR     R0,@#RANPAT
6178  033224  005302                          DEC     R2
6179  033226  100374                          BPL     1$
6180  033230  000200                          RTS     R0
6181
6182                                  ;THIS ROUTINE USES THE FIRST TWO WORDS OF THE
6183                                  ;READ BUFFER TO GENERATED A RANDOM PATTERN.  THEN
6184                                  ;THE READ BUFFER IS COMPARED TO THE PATTERN GENERATED.
6185                                  ;NOTE: THIS ROUTINE DESTROYS R1-R4
6186                                  ;CALL
6187                                  ;       JSR     R0,@#RANCK
6188                                  ;       RETURN
6189
6190  033232  013746  025630          RANCK:  MOV     @#$HINUM,-(SP)  ;SAVE THE PRESENT RANDOM NUMBER
6191  033236  013746  025632                  MOV     @#$LONUM,-(SP)
6192  033242  012702  052776                  MOV     #BUFFER+512.,R2 ;READ BUFFER ADDRESS
6193  033246  012701  053776                  MOV     #BUFFER+1024.,R1 ;RANDOM PATTERN ADDRESS
6194  033252  010103                          MOV     R1,R3           ;COPY IT INTO R3 FOR LATER USE
6195  033254  011237  025632                  MOV     (R2),@#$LONUM   ;PRIME THE RANDOM NUMBER GENERATOR
6196  033260  016237  000002  025630          MOV     2(R2),@#$HINUM
6197  033266  004037  033430                  JSR     R0,@#RANPAT     ;GENERATE A RANDOM PATTERN
6198  033272  012637  025632                  MOV     (SP)+,@#$LONUM  ;RESTORE PRESENT RANDOM NUMBER
6199  033276  012637  025630                  MOV     (SP)+,@#$HINUM
6200  033302  005046                          CLR     -(SP)           ;NO ERRORS
6201  033304  162322                  1$:     SUB     (R3)+,(R2)+     ;ARE THESE TWO WORDS DIFFERENT?
6202  033306  001441                          BEQ     4$              ;NO--BRANCH
6203  033310  012737  033362  001206          MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
6204  033316  064342                          ADD     -(R3),-(R2)     ;RECREATE THE BAD WORD
6205  033320  010237  001122                  MOV     R2,@#$BDADR     ;ADDRESS OF BAD DATA
6206  033324  010337  001120                  MOV     R3,@#$GDADR     ;ADDRESS OF GOOD DATA
6207  033330  012237  001126                  MOV     (R2)+,@#$BDDAT  ;BAD DATA
6208  033334  012337  001124                  MOV     (R3)+,@#$GDDAT  ;GOOD DATA
6209  033340  010204                          MOV     R2,R4           ;FORM WORD NUMBER (1 TO 256
6210  033342  162704  052776                  SUB     #BUFFER+512.,R4
6211  033346  006204                          ASR     R4
6212  033350  005716                          TST     (SP)            ;FIRST ERROR
6213  033352  001002                          BNE     2$              ;NO--BRANCH
6214  033354  105116                          COMB    (SP)            ;YES--SET ERROR SWITCH
6215  033356  104015                          ERROR   15              ;REPORT THE ERROR
6216  033360  104016                  2$:     ERROR   16              ;REPORT THE ERROR
6217  033362  032777  001000  145550  3$:     BIT     #SW09,@SWR      ;LOOP ON ERROR?
6218  033370  001012                          BNE     5$              ;YES--BRANCH
6219  033372  123737  001444  001103          CMPB    @#ERR.CT,@#$ERFLG ;MAX. ERRORS OCCURRED?
6220  033400  101406                          BLOS    5$              ;YES--BRANCH
6221  033402  032777  000002  145530          BIT     #SW01,@SWR      ;STOP COMPARING?
6222  033410  001002                          BNE     5$              ;YES--BRANCH
6223  033412  020103                  4$:     CMP     R1,R3           ;ALL DATA BEEN COMPARED?
6224  033414  101333                          BHI     1$              ;NO--BRANCH
6225  033416  005726                  5$:     TST     (SP)+           ;ERROR OCCUR?
6226  033420  001402                          BEQ     6$              ;NO--BRANCH
6227  033422  013700  001332                  MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
6228  033426  000200                  6$:     RTS     R0              ;EXIT
6229
6230                                  ;THIS ROUTINE FILLS A 256 WORD BUFFER WITH A RANDOM
6231                                  ;PATTERN OF WHICH THE FIRST TWO WORDS ARE THE BASE
6232                                  ;OF THE PATTERN.
```

```
                                        ;CALL
                                        ;       MOV     #ADR,R1         ;ADDRESS OF THE BUFFER
                                        ;       JSR     R0,@#RANPAT
                                        ;       RETURN
                                        RANPAT: MOV     R2,-(SP)        ;SAVE R2
033432  012702  000200                          MOV     #256./2.,R2     ;GENERATE 256 WORDS
033436  000402                          1$:     BR      2$
033440  004737  025532                  2$:     JSR     PC,@#$RAND      ;GENERATE A RANDOM NUMBER
033444  013721  025632                          MOV     @#$LONUM,(R1)+  ;PUT LOW WORD IN BUFFER
033450  013721  025630                          MOV     @#$HINUM,(R1)+  ;PUT HIGH WORD IN BUFFER
033454  005302                              DEC     R2              ;DONE?
033456  003370                              BGT     1$              ;NO--BRANCH
033460  012602                              MOV     (SP)+,R2        ;RESTORE R2
033462  000200                              RTS     R0              ;EXIT

                                        ;THIS ROUTINE GENERATES RANDOM CYLINDER, TRACK, AND SECTOR
                                        ;ADDRESSES AND SAVES THEN IN THE DPB (DTADPB+10, 11 & DTADPB+12).
                                        ;NOTE: THIS ROUTINE DESTROYS R1-R3
                                        ;CALL
                                        ;       JSR     R0,@#RANADR
                                        ;       RETURN
033464  004737  025532                  RANADR: JSR     PC,@#$RAND      ;GENERATE A RANDOM NUMBER
033470  113701  025632                          MOVB    @#$LONUM,R1     ;FORM SECTOR IN R1
033474  113702  025633                          MOVB    @#$LONUM+1,R2   ;FORM TRACK IN R2
033500  013703  025630                          MOV     @#$HINUM,R3     ;FORM CYLINDER IN R3
033504  105701                              TSTB    R1              ;ENSURE THE SECTOR IS BETWEEN 0 AND 31
033506  002403                              BLT     2$
033510  123701  001712                  1$:     CMPB    PRMLMT+22,R1    ;CHECK MAXIMUM SECTOR ADDRESS
033514  103003                              BHIS    3$
033516  000241                          2$:     CLC
033520  106001                              RORB    R1
033522  000772                              BR      1$
033524  105702                          3$:     TSTB    R2              ;ENSURE THE TRACK IS BETWEEN 0 AND 4
033526  002403                              BLT     5$
033530  122702  000005                  4$:     CMPB    #5,R2
033534  003003                              BGT     6$
033536  000241                          5$:     CLC
033540  106002                              RORB    R2
033542  000772                              BR      4$
033544  023703  001572                  6$:     CMP     @#FC,R3         ;ENSURE THE CYLINDER IS BETWEEN FC AND LC
033550  003413                              BLE     7$
033552  000241                              CLC
033554  006003                              ROR     R3
033556  005503                              ADC     R3
033560  001371                              BNE     6$
033562  010103                              MOV     R1,R3
033564  000303                              SWAB    R3
033566  060203                              ADD     R2,R3
033570  005203                              INC     R3
033572  003364                              BGT     6$
033574  005403                              NEG     R3
033576  000762                              BR      6$
033600  023703  001574                  7$:     CMP     @#LC,R3
033604  002003                              BGE     8$
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6289  033606  000241                          CLC
6290  033610  006003                          ROR     R3
6291  033612  000772                          BR      7$
6292  033614  023703  001572          8$:     CMP     @#FC,R3
6293  033620  003403                          BLE     9$
6294  033622  005203                          INC     R3
6295  033624  000303                          SWAB    R3
6296  033626  000764                          BR      7$
6297  033630  110137  004276          9$:     MOVB    R1,@#DTADPB+10  ;SAVE SECTOR ADDRESS
6298  033634  110237  004277                  MOVB    R2,@#DTADPB+11  ;SAVE TRACK ADDRESS
6299  033640  010337  004300                  MOV     R3,@#DTADPB+12  ;SAVE CYLINDER ADDRESS
6300  033644  000200                          RTS     R0              ;RETURN
6301
6302                                  ;THIS ROUTINE IS USED TO INPUT THE "CONTROL SWITCHES".
6303                                  ;IF SWR<07>=1 THE PRESENT SETTING WILL BE TYPED AND THE NEW
6304                                  ;SETTING IS READ AND STORED.
6305                                  ;NOTE: THIS ROUTINE DESTROYS R3 AND R4
6306                                  ;CALL
6307                                  ;       JSR     PC,@#GETSWR
6308                                  ;       RETURN                  ;(C.SWR)=DESIRED CONTROL SWITCHES
6309
6310  033646  032777  000200  145264  GETSWR: BIT     #SW07,@SWR      ;READ CONTROL SWITCHES?
6311  033654  001430                          BEQ     2$              ;NO--BRANCH
6312  033656  104401  033664                  TYPE    ,65$            ;;TYPE ASCIZ STRING
6313  033662  000410                          BR      64$             ;;GET OVER THE ASCIZ
6314                                  ;;65$:  .ASCIZ  <CR><LF>/SET SWR<07>=0/
6315  033704                          64$:
6316  033704  012703  045154          1$:     MOV     #MSG.CS,R3       "CONTROL SWITCHES="
6317  033710  013704  001300                  MOV     @#C.SWR,R4      ;PRESENT CONTROL SWITCH SETTINGS
6318  033714  004037  033740                  JSR     R0,@#GETNUM     ;GET THE NEW SWITCH SETTINGS
6319  033720  000771                          BR      1$              ; COMMA
6320  033722  000240                          NOP                     ;PERIOD
6321  033724  013737  001300  001302          MOV     C.SWR,SAVCSW    ;SAVE PREVIOUS VALUE
6322  033732  010437  001300                  MOV     R4,@#C.SWR      ; DOUBLE PERIOD-SAVE NEW SWITCH SETTING
6323  033736  000207                  2$:     RTS     PC              ;RETURN FROM CALL
6324
6325                                  ;THIS ROUTINE WILL TYPE AN ASCIZ MESSAGE AND THEN
6326                                  ;INPUT AN ASCIZ STRING AND CHANGE THE STRING TO OCTAL
6327                                  ;IF REQUIRED.
6328                                  ;NOTE: THIS ROUTINE DESTROYS R1
6329                                  ;CALL
6330                                  ;       MOV     #ADR,R3         ;ADDRESS OF ASCIZ MESSAGE
6331                                  ;       MOV     #NUM,R4         ;OCTAL NUMBER
6332                                  ;       JSR     R0,@#GETNUM
6333                                  ;       RETURN1                 ;INPUT TERMINATED WITH A COMMA
6334                                  ;       RETURN2                 ;WITH A PERIOD
6335                                  ;       RETURN3                 ;WITH A DOUBLE PERIOD
6336                                  ;                               ;R4=INPUT NUMBER AND
6337                                  ;                               ;R2=R4*32 FOR ALL
6338                                  ;                               ;THREE RETURNS
6339
6340  033740  010337  033746          GETNUM: MOV     R3,2$           ;SAVE MESSAGE POINTER
6341  033744  104401                  1$:     TYPE                    ;TYPE THE MESSAGE
6342  033746  000000                  2$:     .WORD   0               ;MESSAGE POINTER GOES HERE
6343  033750  010446                          MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
6344  033752  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII ALL DIGITS
```

```
6345  033754  104401  045200          TYPE    ,SLASH          ;' / '
6346  033760  104411                  RDLIN                   ;READ AN ASCIZ STRING
6347  033762  012601                  MOV     (SP)+,R1        ;ADDRESS OF FIRST CHARACTER
6348  033764  004037  036210          JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6349  033770  033744                  1$                      ;ILLEGAL CHARACTER
6350  033772  033744                  1$                      ;CARRIAGE RETURN
6351  033774  034006                  3$                      ;"/"
6352  033776  034032                  7$                      ;","
6353  034000  034040                  8$                      ;"."
6354  034002  034004                  11$                     ;DIGIT 0-9
6355  034004  005301          11$:    DEC     R1              ;DECREMENT THE INPUT POINTER
6356  034006                  3$:
6357  034006  004037  036450          JSR     R0,@#CK.NUM     ;CHECK THE NUMBER
6358  034012  033744                  1$                      ;ILLEGAL INPUT
6359  034014  034026                  6$                      ;TERMINATED WITH A "," OR "CR"
6360  034016  034024                  5$                      ;TERMINATED WITH A "."
6361  034020  034022                  4$                      ;TERMINATED WITH A ".."
6362  034022  005720          4$:     TST     (R0)+           ;DOUBLE PERIOD
6363  034024  005720          5$:     TST     (R0)+           ;SINGLE PERIOD
6364  034026  010204          6$:     MOV     R2,R4           ;COMMA--SAVE INPUT NUMBER
6365  034030  000414                  BR      10$             ;GO TO EXIT
6366  034032  105711          7$:     TSTB    (R1)            ;TERMINATOR AFTER A COMMA?
6367  034034  001343                  BNE     1$              ;NO--LOOP
6368  034036  000411                  BR      10$             ;YES--EXIT
6369  034040  105711          8$:     TSTB    (R1)            ;TERMINATOR AFTER A PERIOD?
6370  034042  001406                  BEQ     9$              ;YES--EXIT
6371  034044  122721  000056          CMPB    #'.,(R1)+       ;NO--DOUBLE PERIOD?
6372  034050  001335                  BNE     1$              ;NO--LOOP
6373  034052  105711                  TSTB    (R1)            ;YES--TERMINATOR?
6374  034054  001333                  BNE     1$              ;NO--LOOP
6375  034056  005720                  TST     (R0)+           ;DOUBLE PERIOD
6376  034060  005720          9$:     TST     (R0)+           ;PERIOD
6377  034062  010402          10$:    MOV     R4,R2           ;COMMA--POSITION THE
6378  034064  000302                  SWAB    R2              ;NUMBER IN CASE IT
6379  034066  006202                  ASR     R2              ;IS THE PRIORITY LEVEL
6380  034070  006202                  ASR     R2
6381  034072  006202                  ASR     R2
6382  034074  000200                  RTS     R0              ;EXIT
6383
6384
6385                  ;THIS ROUTINE IS USED TO CHANGE OR MODIFY
6386                  ;THE TEST PARAMETERS.  IT GIVES THE OPERATOR
6387                  ;THE CAPABILITY OF SPECIFYING WHICH DRIVES TO TEST, WHICH
6388                  ;TESTS TO RUN AND HOW MANY TIMES TO
6389                  ;REPEAT EACH TEST
6390  034076  104412  GT.PRM:  SAVREG                   ;SAVE R0 - R5
6391  034100  005037  001312  GT.PR1:  CLR     DRVSEL          ;NO DRIVE SELECTED
6392  034104  104401  034112          TYPE    ,65$             ;;TYPE ASCIZ STRING
6393  034110  000406                  BR      64$             ;;GET OVER THE ASCIZ
6394
6395  034126          ;;65$:  .ASCIZ  <CR><LF>/DRIVE(S)=/
6396  034126  104411  64$:            RDLIN                   ;READ TTY
6397  034130  012601                  MOV     (SP)+,R1        ;ADDRESS OF ASCIZ STRING
6398  034132  004037  036210          JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6399  034136  034100                  GT.PR1                  ;ILLEGAL CHARACTER
6400  034140  034100                  GT.PR1                  ;CARRIAGE RETURN
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```
6401  034142  034100                        GT.PR1                  ;"/"
6402  034144  034100                        GT.PR1                  ;":"
6403  034146  034100                        GT.PR1                  ;","
6404  034150  034152                        1$                      ;DIGIT 0-9
6405  034152  005301                  1$:   DEC     R1
6406  034154                        2$:
6407  034154  012702  000007              MOV     #7.R2   ;UPPER LIMIT OF INPUT
6408  034160  004037  036264              JSR     R0,@#CK.DIG     ;CHECK THE DIGIT(S)
6409  034164  034100                        GT.PR1                  ;ILLEGAL INPUT
6410  034166  034100                        GT.PR1                  ;INPUT TO LARGE
6411  034170  034176                        3$                      ;TERMINATED WITH A "," OR "CR"
6412  034172  034222                        4$                      ;TERMINATED WITH A ":"
6413  034174  034222                        4$                      ;TERMINATED WITH A "."
6414  034176  156237  036724  001312  3$:   BISB    ATABIT(R2),DRVSEL ;SET THE DRIVE SELECTED BIT
6415  034204  105741                        TSTB    -(R1)           ;WAS THE LINE TERMINATED?
6416  034206  001362                        BNE     2$              ;NO-GET THE NEXT DRIVE
6417  034210  005037  001314              CLR     @#TSTNMS        ;DESELECT ALL TESTS
6418  034214  005037  001316              CLR     TSTNMS+2
6419  034220  000405                        BR      GTTST1          ;YES--SELECT TEST
6420  034222  156237  036724  001312  4$:   BISB    ATABIT(R2),DRVSEL ;SET THE SELECTED DRIVE BITS
6421  034230  104413                  GT.PR2: RESREG                  ;RESTORE R0 - R5
6422  034232  000207                        RTS     PC              ;EXIT
6423
6424  034234                        GTTST1:
6425  034234  104401  034242              TYPE    ,65$            ;;TYPE ASCIZ STRING
6426  034240  000403                        BR      64$             ;;GET OVER THE ASCIZ
6427                                ;;65$:  .ASCIZ  /TEST=/
6428  034250                        64$:
6429  034250  104411                        RDLIN                   ;READ AN ASCIZ STRING
6430  034252  012601                        MOV     (SP)+,R1        ;POINTER TO R1
6431  034254  122711  000056              CMPB    #'.,(R1)        ;DOUBLE PERIOD?
6432  034260  001007                        BNE     1$              ;NO--BRANCH
6433  034262  122761  000056  000001        CMPB    #'.,1(R1)
6434  034270  001003                        BNE     1$
6435  034272  105761  000002                TSTB    2(R1)           ;"CR"?
6436  034276  001754                        BEQ     GT.PR2          ;YES--EXIT
6437  034300  005037  001314          1$:   CLR     TSTNMS          ;NO TEST SELECTED
6438  034304  005037  001316              CLR     TSTNMS+2
6439  034310  005037  001320              CLR     OPNFLG          ;NO TESTS TO BE OPENED
6440  034314  005037  001322              CLR     OPNFLG+2
6441  034320  121127  000123        GTTST2: CMPB    (R1),#'S        ;ALL SEEK TESTS?
6442  034324  001004                        BNE     1$              ;NO--BRANCH
6443  034326  052737  000777  001314        BIS     #777,TSTNMS     ;YES--SELECT TESTS 0-10
6444  034334  000552                        BR      GTTST3
6445  034336  121127  000124          1$:   CMPB    (R1),#'T        ;ALL TIMING TESTS?
6446  034342  001004                        BNE     2$              ;NO--BRANCH
6447  034344  052737  036000  001314        BIS     #36000,TSTNMS   ;YES--SELECT TESTS 12-15
6448  034352  000543                        BR      GTTST3
6449  034354  121127  000101          2$:   CMPB    (R1),#'A        ;ALL ADDRESSING TESTS?
6450  034360  001004                        BNE     3$              ;NO--BRANCH
6451  034362  052737  140000  001314        BIS     #140000,TSTNMS  ;YES--SELECT TESTS 16 & 17
6452  034370  000534                        BR      GTTST3
6453  034372  121127  000104          3$:   CMPB    (R1),#'D        ;DATA TEST?
6454  034376  001004                        BNE     4$              ;NO--BRANCH
6455  034400  052737  000001  001316        BIS     #1,TSTNMS+2     ;YES--SELECT TEST 20
6456  034406  000525                        BR      GTTST3
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6457  034410  121127  000105          4$:   CMPB    (R1),#'E          ;EXERCISER TEST?
6458  034414  001004                        BNE     5$                ;NO--BRANCH
6459  034416  052737  000002  001316        BIS     #2,TSTNMS+2       ;YES--SELECT TEST 21
6460  034424  000516                        BR      GT1ST3
6461  034426  004037  036134          5$:   JSR     R0,@#CK.OCT       ;OCTAL DIGIT?
6462  034432  000514                        BR      GT1ST4            ;NO--BRANCH
6463  034434  010205                        MOV     R2,R5             ;YES--SAVE IT
6464  034436  005201                        INC     R1                ;MOVE TO NEXT CHARACTER
6465  034440  004037  036134                JSR     R0,@#CK.OCT       ;OCTAL DIGIT
6466  034444  000405                        BR      6$                ;NO--BRANCH
6467  034446  005201                        INC     R1                ;MOVE TO NEXT CHARACTER
6468  034450  006305                        ASL     R5                ;SCALE HIGH DIGIT
6469  034452  006305                        ASL     R5
6470  034454  006305                        ASL     R5
6471  034456  060502                        ADD     R5,R2             ;COMBINE HIGH & LOW DIGITS
6472  034460  020227  000022          6$:   CMP     R2,#$TN-1         ;VALID TEST NUMBER?
6473  034464  003263                        BGT     GT1ST1            ;NO--BRANCH
6474  034466  010237  034660                MOV     R2,9$             ;SAVE THE TEST NUMBER
6475  034472  010204                        MOV     R2,R4             ;CONVERT TEST NUMBER INTO AN INDEX
6476  034474  042704  000017                BIC     #17,R4            ;CLEAR UNWANTED BITS
6477  034500  006204                        ASR     R4                ;SHIFT THE BITS
6478  034502  006204                        ASR     R4                ;SHIFT THE BITS
6479  034504  006204                        ASR     R4                ;SHIFT THE BITS
6480  034506  006302                        ASL     R2
6481  034510  056264  001506  001314        BIS     BITS(R2),TSTNMS(R4)   ;SELECT TEST
6482  034516  121127  000055                CMPB    (R1),#'-          ;TEST STRING?
6483  034522  001060                        BNE     GT1ST4            ;NO--BRANCH
6484  034524  005201                        INC     R1                ;YES--MOVE TO NEXT CHARACTER
6485  034526  004037  036134                JSR     R0,@#CK.OCT       ;OCTAL DIGIT?
6486  034532  000640                        BR      GT1ST1            ;NO--BRANCH
6487  034534  010205                        MOV     R2,R5             ;YES--SAVE IT
6488  034536  005201                        INC     R1                ;MOVE TO NEXT CHARACTER
6489  034540  004037  036134                JSR     R0,@#CK.OCT       ;OCTAL DIGIT?
6490  034544  000405                        BR      7$                ;NO--BRANCH
6491  034546  005201                        INC     R1                ;YES--MOVE TO NEXT CHARACTER
6492  034550  006305                        ASL     R5                ;SCALE HIGH DIGIT
6493  034552  006305                        ASL     R5
6494  034554  006305                        ASL     R5
6495  034556  060502                        ADD     R5,R2             ;COMBINE HIGH & LOW DIGIT
6496  034560  020227  000022          7$:   CMP     R2,#$TN-1         ;VALID TEST NUMBER?
6497  034564  003223                        BGT     GT1ST1            ;NO--BRANCH
6498  034566  023702  034660                CMP     9$,R2             ;IS THE FIRST NUMBER OF THE
6499                                                                  ;STRING SMALLER THAN THE LAST?
6500  034572  002220                        BGE     GT1ST1            ;NO--BRANCH
6501  034574  010246                        MOV     R2,-(SP)          ;SAVE ENDING TEST NUMBER
6502  034576  013702  034660                MOV     9$,R2             ;GET STARTING TEST NUMBER
6503  034602  012637  034660                MOV     (SP)+,9$          ;STORE ENDING TEST NUMBER
6504  034606  006337  034660                ASL     9$                ;SHIFT ENDING TEST NUMBER
6505  034612  006302                        ASL     R2                ;SHIFT TEST NUMBER
6506  034614  010204                  8$:   MOV     R2,R4             ;COPY TEST NUMBER INTO R4
6507  034616  042704  000037                BIC     #37,R4            ;CLEAR LOWER BITS
6508  034622  006204                        ASR     R4                ;SHIFT THE TEST NUMBER
6509  034624  006204                        ASR     R4                ;SHIFT THE TEST NUMBER
6510  034626  006204                        ASR     R4                ;SHIFT THE TEST NUMBER
6511  034630  006204                        ASR     R4                ;SHIFT THE TEST NUMBER
6512  034632  056264  001506  001314        BIS     BITS(R2),TSTNMS(R4)   ;SELECT THE TEST
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6513  034640  062702  000002            ADD     #2,R2           ;INECREMENT THE TEST NUMBER
6514  034644  020237  034660            CMP     R2,9$           ;SEE IF FINISHED
6515  034650  101761                    BLOS    8$              ;BR IF NOT
6516  034652  162702  000002            SUB     #2,R2           ;CORRECT TEST NUMBER
6517  034656  000402                    BR      GTTST4          ;CONTINUE
6518  034660  000000            9$:     .WORD   0               ;STORE TEST NUMBER HERE
6519  034662  005201            GTTST3: INC     R1              ;MOVE TO NEXT CHARACTER
6520  034664  121127  000056    GTTST4: CMPB    (R1),#'.        ;"PERIOD"?
6521  034670  001441                    BEQ     GTTST5          ;YES--BRANCH
6522  034672  005737  001314            TST     TSTNMS          ;ANY TEST SELECTED THIS CYCLE?
6523  034676  001005                    BNE     1$              ;BR IF YES
6524  034700  005737  001316            TST     TSTNMS+2        ;ANY TEST SELECTED THIS CYCLE ?
6525  034704  001002                    BNE     1$              ;BR IF YES
6526  034706  000137  034234            JMP     GTTST1          ;NO
6527  034712  121127  000057    1$:     CMPB    (R1),#'/        ;"OPEN"?
6528  034716  001004                    BNE     2$              ;NO--BRANCH
6529  034720  056264  001506  001320    BIS     BITS(R2), OPNFLG(R4)  ;YES--SET BITS FOR TEST TO OPEN
6530  034726  000405                    BR      3$
6531  034730  121127  000054    2$:     CMPB    (R1),#',        ;"COMMA"?
6532  034734  001402                    BEQ     3$              ;BR IF YES
6533  034736  000137  034234            JMP     GTTST1          ;NO
6534  034742  005201            3$:     INC     R1              ;MOVE TO NEXT CHARACTER
6535  034744  105711                    TSTB    (R1)            ;"CR"?
6536  034746  001402                    BEQ     4$              ;BR IF 'CR'
6537  034750  000137  034320            JMP     GTTST2          ;NO--GO GET NEXT CHARACTER
6538  034754  005737  001320    4$:     TST     OPNFLG          ;ANY TESTS TO OPEN ?
6539  034760  001042                    BNE     OPNTST          ;BR IF YES
6540  034762  005737  001322            TST     OPNFLG+2        ;ANY TESTS TO OPEN ?
6541  034766  001037                    BNE     OPNTST          ;BR IF YES
6542  034770  000137  034234            JMP     GTTST1          ;NO--START AGAIN
6543  034774  005201            GTTST5: INC     R1              ;MOVE TO NEXT CHARACTER
6544  034776  121127  000056            CMPB    (R1),#'.        ;"PERIOD"?
6545  035002  001414                    BEQ     GTTST6          ;YES--BRANCH
6546  035004  105711                    TSTB    (R1)            ;"CR"?
6547  035006  001402                    BEQ     1$              ;YES--BRANCH
6548  035010  000137  034234            JMP     GTTST1
6549  035014  005737  001320    1$:     TST     OPNFLG          ;ANY TESTS TO OPEN ?
6550  035020  001022                    BNE     OPNTST          ;BR IF YES
6551  035022  005737  001322            TST     OPNFLG+2        ;ANY TESTS TO OPEN ?
6552  035026  001017                    BNE     OPNTST          ;BR IF YES
6553  035030  000137  034230            JMP     GT.PR2          ;NO--GO START TESTING
6554  035034  005201            GTTST6: INC     R1              ;MOVE TO NEXT CHARACTER
6555  035036  105711                    TSTB    (R1)            ;"CR"?
6556  035040  001402                    BEQ     1$              ;YES--BRANCH
6557  035042  000137  034234            JMP     GTTST1          ;NO--GO ASK FOR TEST
6558  035046  005737  001320    1$:     TST     OPNFLG          ;ANY TESTS TO OPEN ?
6559  035052  001005                    BNE     OPNTST          ;BR IF YES
6560  035054  005737  001322            TST     OPNFLG+2        ;ANY TESTS TO OPEN ?
6561  035060  001002                    BNE     OPNTST          ;BR IF YES
6562  035062  000137  034230            JMP     GT.PR2          ;NO--GO START TESTING
6563
6564                                    ;OPEN THE SELECTED TEST FOR CHANGES
6565
6566  035066  104412            OPNTST: SAVREG                  ;SAVE R0 - R5
6567  035070  005027                    CLR     (PC)+           ;START WITH TEST 0
6568  035072  000000            OPN.CT: .WORD   0               ;COUNT STORED HERE
```

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  6569  035074  000411                        BR      OPN.2           ;SKIP THE INCREMENT
  6570  035076  005237  035072        OPN.1:  INC     OPN.CT          ;MOVE TO THE NEXT TEST
  6571  035102  022737  000022  035072        CMP     #$TN-1,OPN.CT   ;TEST NUMBER TOO BIG?
  6572  035110  002003                        BGE     OPN.2           ;NO--OPEN THE NEXT TEST
  6573  035112  104413                        RESREG                  ;RESTORE R0 - R5
  6574  035114  000137  034234                JMP     GTTST1          ;YES--GO ASK FOR MORE TESTS
  6575  035120  013705  035072        OPN.2:  MOV     OPN.CT,R5       ;SETUP TO USE THE
  6576  035124  006305                        ASL     R5              ;TEST NUMBER AS AN INDEX
  6577  035126  013703  035072                MOV     OPN.CT,R3       ;GET INDEX
  6578  035132  042703  000017                BIC     #17,R3          ;CLEAR LOWER TEST BITS
  6579  035136  006203                        ASR     R3              ;SHIFT TEST NUMBER
  6580  035140  006203                        ASR     R3              ;SHIFT TEST NUMBER
  6581  035142  006203                        ASR     R3              ;SHIFT TEST NUMBER
  6582  035144  036563  001506  001320        BIT     BITS(R5),OPNFLG(R3)  ;OPEN THIS TEST?
  6583  035152  001751                        BEQ     OPN.1           ;NO--MOVE TO NEXT TEST
  6584  035154  104401  035162                TYPE    ,65$            ;;TYPE ASCIZ STRING
  6585  035160  000404                        BR      64$             ;;GET OVER THE ASCIZ
  6586                            ;;65$:  .ASCIZ  / TEST /
  6587  035172                    64$:
  6588  035172  013746  035072                MOV     OPN.CT,-(SP)    ;;SAVE OPN.CT FOR TYPEOUT
  6589                                                                  ;;TEST NUMBER
  6590  035176  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
  6591  035200     002                        .BYTE   2               ;;TYPE 2 DIGIT(S)
  6592  035201     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
  6593  035202  104401  001215                TYPE    $CRLF           ;TYPE "CR" & "LF"
  6594  035206  016500  001620                MOV     PRMPT(R5),R0    ;PICKUP PARAMETER POINTER
  6595  035212  011046                        MOV     (R0),-(SP)      ;SAVE THE VARIABLE INDICATOR
  6596  035214  012702  001566                MOV     #PRM,R2         ;FIRST ADDRESS OF TABLE
  6597  035220  000405                        BR      2$
  6598  035222  006216                1$:     ASR     (SP)            ;CHECK FOR A VARIABLE
  6599  035224  103403                        BCS     2$              ;GO MOVE THIS ONE
  6600  035226  001404                        BEQ     OPNPRM          ;DONE
  6601  035230  005722                        TST     (R2)+           ;BUMP THE POINTER
  6602  035232  000773                        BR      1$
  6603  035234  012022                2$:     MOV     (R0)+,(R2)+     ;MOVE THIS VARIABLE INTO THE
  6604  035236  000771                        BR      1$              ;COMMON AREA
  6605  035240  013716  001566        OPNPRM: MOV     @#PRM,(SP)      ;GET THE VARIABLE INDICATOR
  6606  035244  005004                        CLR     R4              ;ZERO THE INDEX
  6607  035246  006216                1$:     ASR     (SP)            ;CHECK FOR A VARIABLE
  6608  035250  103403                        BCS     3$              ;GO GET IT
  6609  035252  001772                        BEQ     OPNPRM          ;OUT OF VARIABLES
  6610  035254  005724                2$:     TST     (R4)+           ;UPDATE THE INDEX
  6611  035256  000773                        BR      1$
  6612  035260  005764  001670        3$:     TST     PRMLMT(R4)      ;IS THE MAX. MAGNITUDE NEG?
  6613  035264  100466                        BMI     OPNPAT          ;YES--THEN IT IS THE PATTERN
  6614  035266  104401  046141                TYPE    ,MSG.SP         ;TYPE SPACES
  6615  035272  016437  001720  035302        MOV     PRMMSG(R4),4$   ;TYPE THE NAME OF THIS VARIABLE
  6616  035300  104401                        TYPE
  6617  035302  000000                4$:     .WORD   0
  6618  035304  104401  045152                TYPE    ,MSG.EQ         ;TYPE "="
  6619  035310  016446  001570                MOV     RPT(R4),-(SP)           ;PUT RPT(R4) ON THE STACK
  6620  035314  004737  025242                JSR     PC,@#$$B2D      ;CHANGE RPT(R4) TO DECIMAL ASCIZ
  6621  035320  004737  025472                JSR     PC,@#$$UPRS     ;TYPE WITHOUT LEADING ZEROS
  6622  035324  104401  045200                TYPE    .SLASH          ;'/'
  6623  035330  104411                        RDLIN
  6624  035332  012601                        MOV     (SP)+,R1        ;READ AN ASCIZ STRING
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6625  035334  004037  036210          JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6626  035340  035260                  3$                      ;ILLEGAL CHARACTER
6627  035342  035254                  2$                      ;CARRIAGE RETURN
6628  035344  035412                  8$                      ;"/"
6629  035346  035354                  5$                      ;"."
6630  035350  035362                  6$                      ;"'"
6631  035352  035410                  7$                      ;DIGIT 0-9
6632  035354  105711          5$:     TSTB    (R1)            ;"CR"?
6633  035356  001340                  BNE     3$              ;NO--STAY ON THIS VARIABLE
6634  035360  000735                  BR      2$              ;YES--MOVE TO NEXT VARIABLE
6635  035362  105711          6$:     TSTB    (R1)            ;IS THERE A "CR" AFTER THE PERIOD?
6636  035364  001002                  BNE     64$             ;NO
6637  035366  000137  036002          JMP     OPN.N2          ;YES--GO CLOSE THIS TEST
6638  035372  122721  000056  64$:    CMPB    #'.,(R1)+       ;DOUBLE PERIOD?
6639  035376  001330                  BNE     3$              ;NO--GO ASK FOR THIS VARIABLE
6640  035400  105711                  TSTB    (R1)            ;YES--IS A "CR" AFTER THE DOUBLE PERIOD?
6641  035402  001326                  BNE     3$              ;NO--ASK FOR THIS VARIABLE AGAIN
6642  035404  000137  036020          JMP     OPN.X2          ;YES--CLOSE ALL TEST
6643  035410  005301          7$:     DEC     R1              ;BACK THE POINTER UP BY ONE
6644  035412                  8$:
6645  035412  016402  001670          MOV     PRMLMT(R4),R2   ;UPPER LIMIT OF INPUT
6646  035416  004037  036264          JSR     R0,@#CK.DIG     ;CHECK THE DIGIT(S)
6647  035422  035260                  3$                      ;ILLEGAL INPUT
6648  035424  035260                  3$                      ;INPUT TO LARGE
6649  035426  035434                  9$                      ;TERMINATED WITH A "," OR "CR"
6650  035430  035776                  OPN.N1                  ;TERMINATED WITH A ":"
6651  035432  036014                  OPN.X1                  ;TERMINATED WITH A ".."
6652  035434  010264  001570  9$:     MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
6653  035440  000705                  BR      2$              ;MOVE TO NEXT VARIABLE
6654  035442  104401  046141  OPNPAT: TYPE    ,MSG.SP         ;TYPE SPACES
6655  035446  104401  045146          TYPE    ,MSG.PAT        ;TYPE "PAT"
6656  035452  104401  045152          TYPE    ,MSG.EQ         ;TYPE "="
6657  035456  016446  001570          MOV     RPT(R4),-(SP)   ;;SAVE RPT(R4) FOR TYPEOUT
6658  035462  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
6659  035464  104401  046142          TYPE    ,MSG.SP+1       ;TYPE ONE SPACE
6660  035470  104411                  RDLIN                   ;READ ASCIZ STRING
6661  035472  012601                  MOV     (SP)+,R1        ;PICKUP POINTER
6662  035474  004037  036210          JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6663  035500  035442                  OPNPAT                  ;ILLEGAL CHARACTER
6664  035502  035240                  OPNPRM                  ;CARRIAGE RETURN
6665  035504  035536                  3$                      ;"/"
6666  035506  035240                  OPNPRM                  ;"."
6667  035510  035514                  1$                      ;"'"
6668  035512  035534                  2$                      ;DIGIT 0-9
6669  035514  105711          1$:     TSTB    (R1)            ;"CR" AFTER THE PERIOD?
6670  035516  001531                  BEQ     OPN.N2          ;YES--GO CLOSE THIS TEST
6671  035520  122721  000056          CMPB    #'.,(R1)+       ;NO--PERIOD?
6672  035524  001346                  BNE     OPNPAT          ;NO--LOOP
6673  035526  105711                  TSTB    (R1)            ;"CR" AFTER A DOUBLE PERIOD?
6674  035530  001533                  BEQ     OPN.X2          ;YES--GO START TESTING
6675  035532  000743                  BR      OPNPAT          ;NO--LOOP
6676  035534  005301          2$:     DEC     R1              ;BACKUP THE ASCII POINTER
6677  035536                  3$:
6678  035536  004037  036450          JSR     R0,@#CK.NUM     ;CHECK THE NUMBER
6679  035542  035442                  OPNPAT                  ;ILLEGAL INPUT
6680  035544  035552                  4$                      ;TERMINATED WITH A "," OR "CR"
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6681  035546  035776                        OPN.N1                  ;TERMINATED WITH A "."
6682  035550  036014                        OPN.X1                  ;TERMINATED WITH A ".."
6683  035552  010264  001570          4$:   MOV     R2,RPT(R4)      ;SAVE THE INPUT NUMBER
6684  035556  006002                        ROR     R2              ;OPEN PATTERN 0?
6685  035560  103227                        BCC     OPNPRM          ;NO--START AT BEGINNING OF PARAMETER TABLE
6686  035562  104412                        SAVREG                  ;SAVE R0 - R5
6687  035564  005000          OPNWDS: CLR     R0                      ;START WITH WORD 0
6688  035566  012704  003206                MOV     #PAT0,R4
6689  035572                    1$:
6690  035572  104401  035600                TYPE    ,65$            ;;TYPE ASCIZ STRING
6691  035576  000403                        BR      64$             ;;GET OVER THE ASCIZ
6692                            ;;65$:  .ASCIZ  /   WD/
6693  035606                    64$:
6694  035606  010046                        MOV     R0,-(SP)                ;PUT R0 ON THE STACK
6695  035610  004737  025242                JSR     PC,@#$SB2D      ;CHANGE R0 TO DECIMAL ASCIZ
6696  035614  004737  025472                JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6697  035620  104401  045152                TYPE    ,MSG.EQ         ;TYPE "="
6698  035624  011446                        MOV     (R4),-(SP)      ;;SAVE (R4) FOR TYPEOUT
6699  035626  104402                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
6700  035630  104411                        RDLIN                   ;READ ASCIZ STRING
6701  035632  012601                        MOV     (SP)+,R1        ;PICKUP THE POINTER
6702  035634  004037  036210                JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6703  035640  035572                        1$                      ;ILLEGAL CHARACTER
6704  035642  035674                        4$                      ;CARRIAGE RETURN
6705  035644  035656                        2$                      ;"/"
6706  035646  035674                        4$                      ;","
6707  035650  035710                        5$                      ;"'"
6708  035652  035654                        10$                     ;DIGIT 0-9
6709  035654  005301          10$:  DEC     R1                      ;BACKUP THE ASCII POINTER
6710  035656                    2$:
6711  035656  004037  036450                JSR     R0,@#CK.NUM     ;CHECK THE NUMBER
6712  035662  035572                        1$                      ;ILLEGAL INPUT
6713  035664  035672                        3$                      ;TERMINATED WITH A "." OR "CR"
6714  035666  035730                        6$                      ;TERMINATED WITH A ","
6715  035670  035742                        8$                      ;TERMINATED WITH A ".."
6716  035672  010214          3$:   MOV     R2,(R4)         ;SAVE THE INPUT
6717  035674  005724          4$:   TST     (R4)+           ;MOVE TO NEXT WORD
6718  035676  005200                INC     R0              ;INCREMENT THE COUNT
6719  035700  022700  000020        CMP     #16.,R0         ;COUNT TO LARGE?
6720  035704  003332                BGT     1$              ;NO--BRANCH
6721  035706  000726                BR      OPNWDS          ;YES--BRANCH
6722  035710  105711          5$:   TSTB    (R1)            ;"CR" AFTER THE PERIOD?
6723  035712  001407                BEQ     7$              ;YES--GO CLOSE THIS TEST
6724  035714  122721  000056        CMPB    #'.,(R1)+       ;NO--PERIOD?
6725  035720  001324                BNE     1$              ;NO--BRANCH ILLEGAL INPUT STRING
6726  035722  105711                TSTB    (R1)            ;"CR" AFTER THE "PERIOD-PERIOD"?
6727  035724  001407                BEQ     9$              ;YES--GO START TESTING
6728  035726  000721                BR      1$              ;NO--LOOP
6729  035730  010224          6$:   MOV     R2,(R4)+        ;SAVE THE INPUT
6730  035732  004737  035754  7$:   JSR     PC,@#CLSWDS     ;CLOSE THE DATA PATTERN
6731  035736  104413                RESREG                  ;RESTORE R0 - R5
6732  035740  000420                BR      OPN.N2          ;MOVE TO NEXT TEST
6733  035742  010224          8$:   MOV     R2,(R4)+        ;SAVE THE INPUT
6734  035744  004737  035754  9$:   JSR     PC,@#CLSWDS     ;CLOSE THE DATA PATTERN
6735  035750  104413                RESREG                  ;RESTORE R0 - R5
6736  035752  000422                BR      OPN.X2          ;START TESTING
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6737  035754  012701  003206          CLSWDS: MOV     #PATO,R1        ;FIRST ADDRESS OF DATA PATTERN
6738  035760  005200                  1$:     INC     R0              ;COUNT THE LAST WORD THAT WAS STORED
6739  035762  022700  000017                  CMP     #15.,R0         ;END OF TABLE
6740  035766  002402                          BLT     2$              ;YES--EXIT
6741  035770  012124                          MOV     (R1)+,-(R4)     ;COPY
6742  035772  000772                          BR      1$              ;LOOP
6743  035774  000207                  2$:     RTS     PC              ;RETURN
6744  035776  010264  001570          OPN.N1: MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
6745  036002  005726                  OPN.N2: TST     (SP)+           ;CLEAN OFF THE STACK
6746  036004  004737  036054                  JSR     PC,CLOSE        ;CLOSE THIS TEST
6747  036010  000137  035076                  JMP     OPN.1           ;GO OPEN THE NEXT TEST
6748  036014  010264  001570          OPN.X1: MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
6749  036020  005726                  OPN.X2: TST     (SP)+           ;CLEAN OFF THE STACK
6750  036022  004737  036054          1$:     JSR     PC,CLOSE        ;CLOSE THIS TEST
6751  036026  005725                  2$:     TST     (R5)+           ;UPDATE THE INDEX
6752  036030  020527  000034                  CMP     R5,#16*2        ;INDEX TO BIG?
6753  036034  002403                          BLT     3$              ;NO--BRANCH
6754  036036  104413                          RESREG                  ;RESTORE R0 - R5
6755  036040  000137  034230                  JMP     GT.PR2          ;GO TO EXIT
6756  036044  036503  001506          3$:     BIT     BITS(R5),R3     ;IS THIS TEST OPEN FOR CHANGE?
6757  036050  001364                          BNE     1$              ;YES--GO CLOSE IT
6758  036052  000765                          BR      2$              ;NO--MOVE TO NEXT TEST
6759  036054  104412                  CLOSE:  SAVREG                  ;SAVE R0 - R5
6760  036056  012700  001566                  MOV     #PRM,R0         ;"FROM" ADDRESS
6761  036062  016501  001620                  MOV     PRMPT(R5),R1    ;"TO" ADDRESS
6762  036066  012002                          MOV     (R0)+,R2        ;"FROM" INDICATOR
6763  036070  012103                          MOV     (R1)+,R3        ;"TO" INDICATOR
6764  036072  012704  000001                  MOV     #1,R4           ;TEST BIT START A "RPT"
6765  036076  030402                  1$:     BIT     R4,R2           ;PARAMETER TO BE MOVED?
6766  036100  001403                          BEQ     2$              ;NO--BRANCH
6767  036102  030403                          BIT     R4,R3           ;A PLACE TO PUT IT?
6768  036104  001404                          BEQ     3$              ;NO--BRANCH
6769  036106  011011                          MOV     (R0),(R1)       ;YES--MOVE "FROM" TO "TO"
6770  036110  030403                  2$:     BIT     R4,R3           ;"TO" PARAMETER?
6771  036112  001401                          BEQ     3$              ;NO--BRANCH
6772  036114  005721                          TST     (R1)+           ;YES--UPDATE THE POINTER
6773  036116  005720                  3$:     TST     (R0)+           ;UPDATE FROM POINTER
6774  036120  006304                          ASL     R4              ;POSITION THE TEST BIT
6775  036122  032704  002000                  BIT     #BIT10,R4       ;DONE?
6776  036126  001763                          BEQ     1$              ;NO--BRANCH
6777  036130  104413                          RESREG                  ;RESTORE R0 - R5
6778  036132  000207                          RTS     PC              ;RETURN
6779                                  ;THIS ROUTINE IS USED TO CHECK IF AN
6780                                  ;ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
6781                                  ;CALL
6782                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
6783                                  ;       JSR     R0,@#CK.OCT     ;CHECK THE CHARACTER
6784                                  ;       RETURN1                 ;CHARACTER IS NOT BETWEEN 0-7
6785                                  ;       RETURN2                 ;CHARACTER IS IN R2 AS A
6786                                  ;                               ;OCTAL DIGIT
6787
6788  036134  121127  000060          CK.OCT: CMPB    (R1),#'0        ;LESS THAN ZERO?
6789  036140  103407                          BLO     1$              ;YES -- BRANCH
6790  036142  121127  000067                  CMPB    (R1),#'7        ;GREATER THAN SEVEN?
6791  036146  101004                          BHI     1$              ;YES -- BRANCH
6792  036150  111102                          MOVB    (R1),R2         ;GET THE CHARACTER
```

```
036152  042702  177770          BIC     #^C7,R2         ;STRIP AWAY THE ASCII
036156  005720                  TST     (R0)+           ;ADJUST FOR RETURN
036160  000200          1$:     RTS     R0              ;RETURN

                        ;THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
                        ;AND DETERMINE IF IT IS A DIGIT BETWEEN 0 AND 9.
                        ;CALL
                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
                        ;       JSR     R0,@#CK.DEC     ;CHECK THE CHARACTER
                        ;       RETURN1                 ;NOT BETWEEN 0 AND 9
                        ;       RETURN2                 ;BETWEEN 0 AND 9
                        ;                               ;R2 = DIGIT

036162  121127  000060  CK.DEC: CMPB     (R1),#'0        ;LESS THAN ZERO?
036166  103407                  BLO     1$              ;YES -- BRANCH
036170  121127  000071          CMPB    (R1),#'9        ;GREATER THAN NINE?
036174  101004                  BHI     1$              ;YES -- BRANCH
036176  111102                  MOVB    (R1),R2         ;GET THE CHARACTER
036200  042702  000060          BIC     #'0,R2          ;STRIP AWAY THE ASCII
036204  005720                  TST     (R0)+           ;ADJUST FOR RETURN
036206  000200          1$:     RTS     R0              ;RETURN

                        ;THIS ROUTINE WILL CHECK AN ASCII CHARACTER TO
                        ;DETERMINE WHAT IT IS.
                        ;CALL
                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
                        ;       JSR     R0,@#CK.CHR     ;CHECK CHARACTER
                        ;       RETURN  ADR1            ;UNKNOWN CHARACTER
                        ;       RETURN  ADR2            ;CARRIAGE RETURN * (R1)=ADR+1
                        ;       RETURN  ADR3            ;SLASH * (R1)=ADR+1
                        ;       RETURN  ADR4            ;COMMA * (R1)=ADR+1
                        ;       RETURN  ADR5            ;PERIOD * (R1)=ADR+1
                        ;       RETURN  ADR6            ;DIGIT BETWEEN 0 AND 9.
                        ;                               ;R2 = DIGIT * (R1)=ADR+1

036210  105711          CK.CHR: TSTB    (R1)            ;"CARRIAGE RETURN"?
036212  001420                  BEQ     4$              ;YES -- BRANCH
036214  121127  000057          CMPB    (R1),#'/        ;"SLASH"?
036220  001414                  BEQ     3$              ;YES -- BRANCH
036222  121127  000054          CMPB    (R1),#',        ;"COMMA"?
036226  001410                  BEQ     2$              ;YES -- BRANCH
036230  121127  000056          CMPB    (R1),#'.        ;"PERIOD"?
036234  001404                  BEQ     1$              ;YES -- BRANCH
036236  004037  036162          JSR     R0,@#CK.DEC     ;"DIGIT"?
036242  000406                  BR      5$              ;NO -- BRANCH
036244  005720                  TST     (R0)+           ;DIGIT BETWEEN 0-9
036246  005720          1$:     TST     (R0)+           ;PERIOD
036250  005720          2$:     TST     (R0)+           ;COMMA
036252  005720          3$:     TST     (R0)+           ;SLASH
036254  005720          4$:     TST     (R0)+           ;CARRIAGE RETURN
036256  005201                  INC     R1              ;MOVE POINTER TO NEXT CHARACTER
036260  011000          5$:     MOV     (R0),R0         ;UNKNOWN CHARACTER
036262  000200                  RTS     R0              ;RETURN

                        ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
                        ;CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
```

```
6849                                    ;CALL
6850                                    ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
6851                                    ;       MOV     #NUM,R2         ;MAX. MAGNITUDE OF INPUT NUMBER
6852                                    ;       JSR     R0,@#CK.DIG     ;CHECK DIGITS
6853                                    ;       RETURN  ADR1            ;ILLEGAL CHARACTER -- R2=?
6854                                    ;       RETURN  ADR2            ;INPUT NUMBER TO LARGE -- R2=?
6855                                    ;       RETURN  ADR3            ;"COMMA" -- R2 = NUMBER
6856                                    ;       RETURN  ADR4            ;"PERIOD" -- R2 = NUMBER
6857                                    ;       RETURN  ADR5            ;"PERIOD-PERIOD" -- R2 = NUMBER
6858
6859   036264  010446                   CK.DIG: MOV     R4,-(SP)        ;SAVE R4
6860   036266  010346                           MOV     R3,-(SP)        ;SAVE R3
6861   036270  010246                           MOV     R2,-(SP)        ;SAVE THE MAX. SIZE ON THE STACK
6862   036272  005002                           CLR     R2              ;START WITH 0
6863   036274  005003                           CLR     R3
6864   036276  005004                           CLR     R4
6865   036300  004037  036210                   JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6866   036304  036434                           8$                      ;ILLEGAL CHARACTER
6867   036306  036434                           8$                      ;CARRIAGE RETURN
6868   036310  036434                           8$                      ;"/"
6869   036312  036434                           8$                      ;","
6870   036314  036434                           8$                      ;"."
6871   036316  036320                           1$                      ;DIGIT 0-9
6872   036320  006303                   1$:     ASL     R3              ;2
6873   036322  010346                           MOV     R3,-(SP)        ;SAVE *2
6874   036324  006303                           ASL     R3              ;4
6875   036326  006303                           ASL     R3              ;8
6876   036330  062603                           ADD     (SP)+,R3        ;(*8)+(*2)=*10.
6877   036332  060203                           ADD     R2,R3           ;UPDATE THE INPUT NUMBER
6878   036334  004037  036210                   JSR     R0,@#Ck.CHR     ;CHECK ONE CHARACTER
6879   036340  036434                           8$                      ;ILLEGAL CHARACTER
6880   036342  036354                           9$                      ;CARRIAGE RETURN
6881   036344  036434                           8$                      ;"/"
6882   036346  036362                           3$                      ;","
6883   036350  036360                           2$                      ;"."
6884   036352  036320                           1$                      ;DIGIT 0-9
6885   036354  005301                   9$:     DEC     R1              ;BACKUP THE CHARACTER POINTER
6886   036356  000401                           BR      3$              ;CONTINE
6887   036360  005724                   2$:     TST     (R4)+           ;"PERIOD"
6888   036362  005724                   3$:     TST     (R4)+           ;"COMMA" OR "CR"
6889   036364  004037  036210                   JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6890   036370  036434                           8$                      ;ILLEGAL CHARACTER
6891   036372  036424                           6$                      ;CARRIAGE RETURN
6892   036374  036434                           8$                      ;"/"
6893   036376  036434                           8$                      ;","
6894   036400  036404                           4$                      ;"."
6895   036402  036414                           5$                      ;DIGIT 0-9
6896   036404  005724                   4$:     TST     (R4)+           ;"PERIOD-PERIOD"
6897   036406  105711                           TSTB    (R1)            ;"CR"?
6898   036410  001405                           BEQ     6$              ;YES--BRANCH
6899   036412  000410                           BR      8$
6900   036414  126127  177776  000054   5$:     CMPB    -2(R1),#',      ;WAS CHARACTER BEFORE THE DIGIT A COMMA?
6901   036422  001004                           BNE     8$              ;NO--EXIT
6902   036424  020316                   6$:     CMP     R3,(SP)         ;INPUT TO LARGE?
6903   036426  101001                           BHI     7$              ;YES -- BRANCH
6904   036430  060400                           ADD     R4,R0           ;ADJUST RETURN ADDRESS
```

```
                                7$:     TST     (R0)+
                                8$:     MOV     R3,R2           ;NUMBER TO R2
                                        TST     (SP)+           ;CLEAN MAX. SIZE OFF OF STACK
                                        MOV     (SP)+,R3        ;RESTORE R3
                                        MOV     (SP)+,R4        ;RESTORE R4
                                        MOV     (R0),R0         ;GET RETURN ADDRESS
                                        RTS     R0              ;RETURN

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

                                CK.NUM: MOV     R3,-(SP)        ;SAVE R3
                                        CLR     R3              ;START NUMBER AT ZERO
036454  004037  036134                  JSR     R0,@#CK.OCT     ;OCTAL DIGIT?
036460  000440                          BR      6$              ;NO--BRANCH
036462  005201                  1$:     INC     R1              ;MOVE TO NEXT CHARACTER
036464  006303                          ASL     R3              ;FOR THE OCTAL NUMBER IN R3
036466  103435                          BCS     6$              ;DON'T LET IT GET TO BIG
036470  006303                          ASL     R3
036472  103433                          BCS     6$
036474  006303                          ASL     R3
036476  103431                          BCS     6$
036500  060203                          ADD     R2,R3
036502  004037  036134                  JSR     R0,@#CK.OCT     ;IS THIS AN OCTAL DIGIT?
036506  000401                          BR      2$              ;NO--FIND OUT WHAT IT IS
036510  000764                          BR      1$              ;YES--MAKE IT PART OF THE NUMBER
036512  010302                  2$:     MOV     R3,R2           ;SAVE THE OCTAL NUMBER
036514  005003                          CLR     R3              ;START WITH ZERO INDEX
036516  004037  036210                  JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
036522  036562                          6$                      ;ILLEGAL CHARACTER
036524  036552                          5$                      ;CARRIAGE RETURN
036526  036562                          6$                      ;"/"
036530  036552                          5$                      ;","
036532  036536                          3$                      ;"."
036534  036562                          6$                      ;DIGIT 0-9
036536  005723                  3$:     TST     (R3)+           ;"PERIOD"
036540  121127  000056                  CMPB    (R1),#'.        ;"PERIOD-PERIOD"?
036544  001002                          BNE     5$              ;NO--BRANCH
036546  005201                          INC     R1              ;YES--ADVANCE THE POINTER
036550  005723                  4$:     TST     (R3)+           ;"PERIOD-PERIOD"
036552  005723                  5$:     TST     (R3)+           ;"COMMA"
036554  105711                          TSTB    (R1)            ;"CR"?
036556  001001                          BNE     6$              ;NO--BRANCH
036560  060300                          ADD     R3,R0           ;YES--SAVE THE OCTAL NUMBER
036562  012603                  6$:     MOV     (SP)+,R3        ;RESTORE R3
036564  011000                          MOV     (R0),R0         ;PICKUP EXIT ADDRESS
036566  000200                          RTS     R0              ;RETURN
```

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

                                        .SBTTL  SINGLE/DUAL PORT RH70/RM03 DRIVER (REV 5.1)-24-AUG-77
                                        ;NEW DRIVE TYPE ID FOR RM02 **********
                                        ;  10-AUG-77 ***********

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                                        ;MAYNARD, MA 01754
                                        ;AUTHOR(S): JIM LACEY/CHUCK HESS/C. CHEN

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

                                        ;STORAGE FOR RMDS, RMER1, RMER2, AND RMMR2 ON AN ERROR "2"
                                                ;RMERRS   = RMDS
                                                ;RMERRS+2 = RMER1
                                                ;RMERRS+4 = RMER2
                                                ;RMERRS+6 = RMMR2

036570  000000  000000  000000  RMERRS: .WORD   0,0,0,0
036576  000000

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

036600      000                 DRVACT: .BYTE   0               ;DRIVE 0
036601      000                         .BYTE   0               ;DRIVE 1
036602      000                         .BYTE   0               ;DRIVE 2
036603      000                         .BYTE   0               ;DRIVE 3
036604      000                         .BYTE   0               ;DRIVE 4
036605      000                         .BYTE   0               ;DRIVE 5
036606      000                         .BYTE   0               ;DRIVE 6
036607      000                         .BYTE   0               ;DRIVE 7

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

036610      000                 DRVSTA: .BYTE   0               ;DRIVE 0
036611      000                         .BYTE   0               ;DRIVE 1
036612      000                         .BYTE   0               ;DRIVE 2
036613      000                         .BYTE   0               ;DRIVE 3
036614      000                         .BYTE   0               ;DRIVE 4
036615      000                         .BYTE   0               ;DRIVE 5
036616      000                         .BYTE   0               ;DRIVE 6
036617      000                         .BYTE   0               ;DRIVE 7

                                        ;TABLE OF DRIVE TYPES (DRVTYP=8 BYTES)
                                                ;DRVTYP=0 IF DRIVE IS NONEXISTENT (DRVSTA=0, ALS
                                                ;DRVTYP=5 IF DRIVE IS RM02 ******
                                                ;DRVTYP=4 IF DRIVE IS RM03
                                                ;DRVTYP=-1 IF NOT RM03
```

```
7015
7016  036620  000                DRVTYP: .BYTE   0               ;DRIVE 0
7017  036621  000                        .BYTE   0               ;DRIVE 1
7018  036622  000                        .BYTE   0               ;DRIVE 2
7019  036623  000                        .BYTE   0               ;DRIVE 3
7020  036624  000                        .BYTE   0               ;DRIVE 4
7021  036625  000                        .BYTE   0               ;DRIVE 5
7022  036626  000                        .BYTE   0               ;DRIVE 6
7023  036627  000                        .BYTE   0               ;DRIVE 7
7024
7025                             ;TABLE OF DUAL PORT INITIALIZATION INDICATORS
7026                                     ;DPINT=0 IF INITIALIZATION IS NOT ACTIVE ON THE DRIVE
7027                                     ;DPINT<0 IF INITIALIZATION IS IN PROGRESS
7028
7029  036630  000                DPINT:  .BYTE   0               ;DRIVE 0
7030  036631  000                        .BYTE   0               ;DRIVE 1
7031  036632  000                        .BYTE   0               ;DRIVE 2
7032  036633  000                        .BYTE   0               ;DRIVE 3
7033  036634  000                        .BYTE   0               ;DRIVE 4
7034  036635  000                        .BYTE   0               ;DRIVE 5
7035  036636  000                        .BYTE   0               ;DRIVE 6
7036  036637  000                        .BYTE   0               ;DRIVE 7
7037
7038                             ;TABLE OF PENDING DUAL PORT REQUESTS
7039                                     ;DPRQS=0 IF THAT A DUAL PORT REQUEST IS NOT PENDING FOR THAT DRIVE
7040                                     ;DPRQS<0 IF THAT A DUAL PORT REQUEST IS PENDING FOR THAT DRIVE
7041
7042  036640  000                DPRQS:  .BYTE   0               ;DRIVE 0
7043  036641  000                        .BYTE   0               ;DRIVE 1
7044  036642  000                        .BYTE   0               ;DRIVE 2
7045  036643  000                        .BYTE   0               ;DRIVE 3
7046  036644  000                        .BYTE   0               ;DRIVE 4
7047  036645  000                        .BYTE   0               ;DRIVE 5
7048  036646  000                        .BYTE   0               ;DRIVE 6
7049  036647  000                        .BYTE   0               ;DRIVE 7
7050
7051                             ;TRANSFER WAIT FLAG (TRNSWT=1 WORD)
7052                                     ;THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
7053                                     ;"DPB" OF THE I/O OPERATION.
7054
7055  036650  000000             TRNSWT: .WORD   0
7056
7057                             ;SEARCH WAIT KEYS (SRCHWT=1 WORD)
7058                                     ;THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
7059                                     ;THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
7060                                     ;REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
7061                                     ;EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
7062
7063  036652  000000             SRCHWT: .WORD   0
7064
7065                             ;RM03 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
7066                                     ;ACTDRV=0 IF DRIVER IS INACTIVE
7067                                     ;ACTDRV>0 IF DRIVER IS ACTIVE
7068
7069  036654  000                ACTDRV: .BYTE   0
7070
```

```
                                ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
                                        ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
                                        ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE
036655  000                   ACTSTR: .BYTE   0

                                ;UNLOAD FLAG (ULDFLG=8 BYTES)
                                        ;ULDFLG=0 IF NO UNLOAD COMMAND
                                        ;ULDFLG>0 IF UNLOAD COMMAND IN PROGRESS
                                        ;ULDFLG<0 IF UNLOAD COMMAND IN WAIT QUEUE

036656  000                   ULDFLG: .BYTE   0               ;DRIVE 0
036657  000                           .BYTE   0               ;DRIVE 1
036660  000                           .BYTE   0               ;DRIVE 2
036661  000                           .BYTE   0               ;DRIVE 3
036662  000                           .BYTE   0               ;DRIVE 4
036663  000                           .BYTE   0               ;DRIVE 5
036664  000                           .BYTE   0               ;DRIVE 6
036665  000                           .BYTE   0               ;DRIVE 7

                                ;LOOK AHEAD COUNT (LACNT=8 BYTES)
                                        ;LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED

036666  000                   LACNT:  .BYTE   0               ;DRIVE 0
036667  000                           .BYTE   0               ;DRIVE 1
036670  000                           .BYTE   0               ;DRIVE 2
036671  000                           .BYTE   0               ;DRIVE 3
036672  000                           .BYTE   0               ;DRIVE 4
036673  000                           .BYTE   0               ;DRIVE 5
036674  000                           .BYTE   0               ;DRIVE 6
036675  000                           .BYTE   0               ;DRIVE 7

                                ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
                                        ;SAVEFG <0 IF SAVE THE RH70/RM03 REGISTERS WHEN THE
                                        ;OPERATION IS COMPLETED AS PER (DPB+14).
                                        ;SAVEFG=0 IF SAVE THE RH70/RM03 REGISTERS, AS PER
                                        ;(DPB+14), AFTER AN ERROR.

036676  000000                SAVEFG: .WORD   0

                                ;SEEK FLAG (SEEKFG=1 WORD)
                                        ;SEEKFG=0 IF WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
                                        ;FOR A DATA TRANSFER START A SEARCH COMMAND
                                        ;SEEKFG<0 IF DATA TRANSFER WILL DO IMPLIED SEEKS.
                                        ;DISREGARD THE WINDOW

036700  177777                SEEKFG: .WORD   -1

                                ;TIMEOUT TABLE (TIMER=8 WORDS)
                                        ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION

036702  177777                TIMER:  .WORD   -1       ;DRIVE 0
036704  177777                        .WORD   -1       ;DRIVE 1
036706  177777                        .WORD   -1       ;DRIVE 2
036710  177777                        .WORD   -1       ;DRIVE 3
036712  177777                        .WORD   -1       ;DRIVE 4
```

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7127  036714  177777                  .WORD   -1      ;DRIVE 5
7128  036716  177777                  .WORD   -1      ;DRIVE 6
7129  036720  177777                  .WORD   -1      ;DRIVE 7
7130
7131                                  ;DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
7132                                          ;DTUW<0 IF NO DATA TRANSFER UNDERWAY
7133                                          ;DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N
7134
7135  036722  177777                  DTUW:   .WORD   -1
7136
7137                                  ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
7138                                          ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
7139                                          ;ATTENTION BIT
7140
7141  036724     001                  ATABIT: .BYTE   1       ;DRIVE 0
7142  036725     002                          .BYTE   2       ;DRIVE 1
7143  036726     004                          .BYTE   4       ;DRIVE 2
7144  036727     010                          .BYTE   10      ;DRIVE 3
7145  036730     020                          .BYTE   20      ;DRIVE 4
7146  036731     040                          .BYTE   40      ;DRIVE 5
7147  036732     100                          .BYTE   100     ;DRIVE 6
7148  036733     200                          .BYTE   200     ;DRIVE 7
7149
7150                                  ;FSRM03 TO RH70 "MASSBUS CONTROL BUS PARITY ERRORS" (MCPE) ALLOWED BEFORE
7151                                  ;CALLING IT FATAL (MCPEMX=1 WORD)
7152
7153  036734  000003                  MCPEMX: .WORD   3
7154
7155                                  ;STORAGE FOR RMADR (THE FIRST ADDRESS (776700) OF THE RH70/RM03),
7156                                  ;RMVEC (THE VECTOR ADDRESS (254)), AND RMVEC+2 (THE BR LEVEL (5)).
7157
7158  036736  176700                  RMADR:  .WORD   176700
7159  036740  000254  000240          RMVEC:  .WORD   254,5*32.
7160
7161                                  ;MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)
7162
7163  036744  000004                  MXLACT: .WORD   4
7164                                  ;MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)
7165
7166  036746  001000                  MXDLTA: .WORD   8.*64.
7167                                  ;MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)
7168
7169  036750  000200                  MNDLTA: .WORD   2*64.
7170                                  ;MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)
7171
7172  036752  000005                  MXWNDW: .WORD   5
7173
7174                                  ;DEFINITIONS OF THE RH70/RM03 ADDRESS INDEXES
7175
7176          000000                  RMCS1=0                 ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
7177          000002                  RMWC=2                  ;WORD COUNT REGISTER (NOT A DRIVE REG)
7178          000004                  RMBA=4                  ;UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
7179          000006                  RMDA=6                  ;DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
7180          000010                  RMCS2=10                ;CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
7181          000012                  RMDS=12                 ;DRIVE STATUS REGISTER (DRIVE REG 01)
7182          000014                  RMER1=14                ;ERROR REGISTER #1 (DRIVE REG. 02)
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                    000016                  RMAS=16                         ;ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG. 04)
                    000020                  RMLA=20                         ;LOOK AHEAD REGISTER (DRIVE REG. 07)
                    000022                  RMDB=22                         ;DATA BUFFER REGISTER (NOT A DRIVE REG.)
                    000024                  RMMR1=24                        ;MAINTAINABILITY REGISTER (DRIVE REG. 03)
                    000026                  RMDT=26                         ;DRIVE TYPE REGISTER (DRIVE REG. 06)
                    000030                  RMSN=30                         ;SERIAL NUMBER REGISTER (DRIVE REG. 10)
                    000032                  RMOF=32                         ;OFFSET REGISTER (DRIVE REG. 11)
                    000034                  RMDC=34                         ;DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG. 12)
                    000036                  RMHR=36                         ;DUMMY  ADDRESS REGISTER (DRIVE REG. 13)
                    000040                  RMMR2=40                        ;MAINTENANCE REGISTER #2
                    000042                  RMER2=42                        ;ERROR REGISTER #2 (DRIVE REG. 15)
                    000044                  RMEC1=44                        ;ECC POSITION REGISTER (DRIVE REG. 16)
                    000046                  RMEC2=46                        ;ECC PATTERN REGISTER (DRIVE REG.  17)

                                            ;RH70/RM03 DRIVER INITIALIZATION CODE
                                                    ;THIS ROUTINE WILL DETERMINE WHICH RM03 DRIVES ARE
                                                    ;AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
                                                    ;TO THE PROPER STATE FOR EACH DRIVE.
                                                    ;NOTE: THIS ROUTINE CALLS DRVINT
                                            ;
                                            ;CALL
                                            ;
                                            ;       JSR     PC,RMINIT
                                            ;       RETURN
                                            ;
                                            ;NOTE: THE 'P' OR 'L' CLOCK MUST BE STARTED
                                            ;
036754  104412                  RMINIT:   SAVREG                          ;SAVE R0 - R5
036756  013746  177776                    MOV     @#PS,-(SP)              ;SAVE THE PRESENT PROCESSOR STATUS
036762  012737  000240  177776            MOV     #<5*32.>,@#PS           ;CHANGE THE PRIORITY TO 5
036770  004737  044616                    JSR     PC,CLRQUE               ;CLEAR ALL REQUEST QUEUES
036774  012701  036570                    MOV     #RMERRS,R1              ;FIRST ADDRESS TO BE CLEARED
037000  012702  036700                    MOV     #SEEKFG,R2              ;LAST ADDRESS TO BE CLEARED
037004  005021                  1$:       CLR     (R1)+                   ;CLEAR
037006  020102                            CMP     R1,R2                   ;ARE WE DONE?
037010  103775                            BLO     1$                      ;BRANCH IF NO
037012  012702  036722                    MOV     #DTUW,R2                ;LAST ADDRESS
037016  012721  177777            2$:     MOV     #-1,(R1)+               ;INITIALIZE
037022  020102                            CMP     R1,R2                   ;DONE?
037024  101774                            BLOS    2$                      ;LOOP IF NO
037026  005037  036610                    CLR     DRVSTA                  ;SET ALL DRIVES TO OFFLINE
037032  005037  036612                    CLR     DRVSTA+2
037036  005037  036614                    CLR     DRVSTA+4
037042  005037  036616                    CLR     DRVSTA+6
037046  013703  036740                    MOV     RMVEC,R3                ;SETUP THE RH70/RM03 VECTOR
037052  012723  041566                    MOV     #ISR,(R3)+
037056  013713  036742                    MOV     RMVEC+2,(R3)
037062  013704  036736                    MOV     RMADR,R4                ;FIRST ADDRESS OF RH70/RM03
037066  012764  000040  000010            MOV     #BIT05,RMCS2(R4)          ;MASSBUS INIT
037074  005001                            CLR     R1                      ;START WITH DRIVE 0
037076  004037  037166            3$:     JSR     R0,DRVINT               ;INIT THE DRIVE
037102  000401                            BR      4$                      ;'DVA' NOT SET OR PARITY ERROR
037104  000402                            BR      5$                      ;NORMAL RETURN
037106  105061  036610            4$:     CLRB    DRVSTA(R1)              ;SET DRIVE STATUS TO OFFLINE
037112  005201                    5$:     INC     R1                      ;GO TO NEXT DRIVE
037114  042701  177770                    BIC     #^C7,R1                 ;MASK OUT UNUSED BITS
```

```
7239  037120  001366                        BNE     3$                  ;BR IF MORE DRIVES TO GO
7240  037122  012701  000007                MOV     #7,R1               ;START WITH DRIVE 7
7241  037126  005037  177776                CLR     @#PS                ;CLEAR THE PROCESSOR STATUS
7242  037132  105761  036630        6$:     TSTB    DPINT(R1)           ;WAITING FOR DRIVE TO SWITCH PORTS ?
7243  037136  001405                        BEQ     8$                  ;BR NOT WAITING
7244  037140  004737  044252                JSR     PC,SET.IE           ;SET INTERRUPT
7245  037144  105761  036630        7$:     TSTB    DPINT(R1)           ;DRIVE SWITCHED PORTS ?
7246  037150  001375                        BNE     7$                  ;BR IF NOT
7247  037152  005301                8$:     DEC     R1                  ;GO TO THE NEXT DRIVE
7248  037154  100366                        BPL     6$                  ;CHECK NEXT DRIVE
7249  037156  012637  177776                MOV     (SP)+,@#PS          ;RESTORE THE PROCESSOR STATUS
7250  037162  104413                        RESREG                      ;RESTORE R0 - R5
7251  037164  000207                        RTS     PC                  ;BYE-BYE
7252
7253                                ;DRIVE INITILIZATION ROUTINE
7254                                 ;THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
7255                                 ;AN RM03. IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT22
7256                                 ;IS SET TO A "1". THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
7257                                 ;INSURE THEY ARE ALL ON A "1". AND DEPENDING ON THEIR STATE,
7258                                 ;DRVSTA IS SET TO THE PROPER CONDITION.
7259                                ;CALL
7260                                ;       MOV     #DRVNUM,R1          ;DRIVE NUMBER TO R1
7261                                ;       MOV     RMADR,R4            ;UNIBUS ADDRESS OF RH70/RM03 (RMCS1)
7262                                ;       JSR     R0,DRVINT           ;CALLED BY A JSR
7263                                ;       RETURN1                     ;ERROR OCCURRED (PARITY)
7264                                ;       RETURN2                     ;NORMAL RETURN
7265                                ;
7266
7267  037166  010546                DRVINT: MOV     R5,-(SP)            ;SAVE R5
7268  037170  105061  036610        DULP:   CLRB    DRVSTA(R1)          ;START DRIVE STATUS AS OFFLINE
7269  037174  105061  036620                CLRB    DRVTYP(R1)          ;CLEAR THE DRIVE TYPE INDICATOR
7270  037200  105061  036656                CLRB    ULDFLG(R1)          ;CLEAR THE UNLOAD FLAG
7271  037204  010164  000010                MOV     R1,RMCS2(R4)        ;SELECT A DRIVE
7272  037210  112764  000111  000000        MOVB    #111,RMCS1(R4)      ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
7273  037216  032764  010000  000010        BIT     #BIT12,RMCS2(R4)    ;NONEXISTENT DRIVE?
7274  037224  001403                        BEQ     1$                  ;NO---BRANCH
7275  037226  004737  044252                JSR     PC,SET.IE           ;GO SET "IE" WITHOUT A "TRE"
7276  037232  000507                        BR      6$                  ;LEAVE THIS ROUTINE
7277  037234  105061  036610        1$:     CLRB    DRVSTA(R1)          ;SET DRIVE STATUS TO OFFLINE
7278  037240  032764  004000  000000        BIT     #BIT11,RMCS1(R4)    ;SEE IF DRIVE AVAILABLE
7279  037246  001750                        BEQ     DULP                ;BR IF DRIVE NOT AVAILABLE
7280  037250  004037  043562                JSR     R0,RD.RM            ;READ THE DRIVE TYPE REG.
7281  037254  000026                        RMDT
7282  037256  037476                        8$                          ;ERROR RETURN ADDRESS
7283  037260  012605                        MOV     (SP)+,R5            ;PUT DRIVE TYPE IN R5
7284  037262  112761  000004  036620        MOVB    #4,DRVTYP(R1)       ;SET RM03 INDICATOR
7285  037270  022705  020024                CMP     #20024,R5           ;SINGLE PORT RM03 ?
7286  037274  001420                        BEQ     2$                  ;BR IF YES
7287  037276  022705  024024                CMP     #24024,R5           ;DUAL PORT RM03 ?
7288  037302  001415                        BEQ     2$                  ;BR IF YES
7289  037304  112761  000005  036620        MOVB    #5,DRVTYP(R1)       ;SET RM02 INDICATOR
7290  037312  022705  020025                CMP     #20025,R5           ;SINGLE PPRT RM02 ?
7291  037316  001407                        BEQ     2$                  ;BRANCH IF SO
7292  037320  022705  024025                CMP     #24025,R5           ;DUAL PORT RM02 ?
7293  037324  001404                        BEQ     2$                  ;BRANCH IF SO
7294  037326  112761  177777  036620        MOVB    #-1,DRVTYP(R1)      ;SET INDICATOR TO 'OTHER'
```

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7295  037334  000446                        BR      6$                      ;EXIT
7296  037336  012746  000121          2$:   MOV     #121,-(SP)              ;DO A "READ-IN PRESET"
7297  037342  004037  043742                JSR     R0,WRT.RM
7298  037346  000000                        RMCS1
7299  037350  037476                        8$
7300  037352  012746  010000                MOV     #BIT12,-(SP)            ;SET FMT22=1
7301  037356  004037  043742                JSR     R0,WRT.RM
7302  037362  000032                        RMOF
7303  037364  037476                        8$
7304  037366  004037  043562                JSR     R0,RD.RM                ;READ RMDS
7305  037372  000012                        RMDS
7306  037374  037476                        8$
7307  037376  012605                        MOV     (SP)+,R5                ;AND SAVE IT IN R5
7308  037400  100015                        BPL     4$                      ;BRANCH IF ATA=0
7309  037402  116164  036724  000016        MOVB    ATABIT(R1),RMAS(R4)     ;CLEAR ATTENTION BIT
7310  037410  004037  043562                JSR     R0,RD.RM                ;FIND OUT WHY ATA=1
7311  037414  000014                        RMER1
7312  037416  037476                        8$
7313  037420  006126                        ROL     (SP)+                   ;IS IT UNSAFE?
7314  037422  100004                        BPL     4$                      ;BR IF NOT
7315  037424  112761  177777  036610        MOVB    #-1,DRVSTA(R1)          ;SET UNSAFE INDICATOR
7316  037432  000407                        BR      6$                      ;EXIT
7317  037434  005105                4$:     COM     R5                      ;CHECK MOL, DPR, DRY, AND VV
7318  037436  042705  167077                BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
7319  037442  001003                        BNE     6$                      ;BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
7320  037444  112761  000001  036610        MOVB    #1,DRVSTA(R1)           ;SET DRIVE STATUS TO ONLINE
7321  037452  005720                6$:     TST     (R0)+                   ;STEP OVER THE ERROR RETURN
7322  037454  000410                        BR      8$                      ;EXIT
7323  037456  006301                7$:     ASL     R1                      ;CHANGE INDEX TO ADDRESS WORDS
7324  037460  012761  060000  036702        MOV     #60000,TIMER(R1)        ;START 2 SEC TIMER
7325  037466  006201                        ASR     R1                      ;RESTORE R1
7326  037470  112761  177777  036630        MOVB    #-1,DPINT(R1)           ;SET PORT INITIALIZE INIDICATOR
7327  037476  012605                8$:     MOV     (SP)+,R5                ;RESTORE R5
7328  037500  000200                        RTS     R0                      ;EXIT
7329
7330                                ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
7331                                ;
7332                                ;CALL
7333                                ;
7334                                ;       JSR     R0,@#RM03               ;CALL THE RM03 DRIVER
7335                                ;       PNTADR                          ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
7336                                ;       RETURN1                         ;RETURN HERE IF QUEUE IS FULL
7337                                ;       RETURN2                         ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
7338                                ;                                       ;IS AN ERROR CONDITION
7339
7340  037502  013746  177776  RM03:   MOV     @#PS,-(SP)              ;SAVE THE CALLING STATUS
7341  037506  013737  036742  177776  MOV     RMVEC+2,@#PS            ;DON'T ALLOW ANY RM03 INTERRUPTS
7342  037514  112737  000001  036654  MOVB    #1,ACTDRV               ;SET "ACTIVE DRIVER" FLAG
7343  037522  104412                SAVREG                          ;SAVE R0 - R5
7344  037524  011002                MOV     (R0),R2                 ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
7345  037526  005062  000016        CLR     16(R2)                  ;CLEAR THE STATUS/ERROR INDICATOR
7346  037532  111201                MOVB    (R2),R1                 ;PICKUP THE DRIVE NUMBER
7347  037534  013704  036736        MOV     RMADR,R4                ;UNIBUS ADDRESS OF RMCS1
7348  037540  105761  036610        TSTB    DRVSTA(R1)              ;CHECK DRIVES STATUS
7349  037544  003014                BGT     1$                      ;BRANCH IF ONLINE
7350  037546  105761  036656        TSTB    ULDFLG(R1)              ;UNLOAD COMMAND IN QUEUE?
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7351  037552  001036                        BNE     3$                ;BRANCH IF YES
7352  037554  105761  036630                TSTB    DPINT(R1)         ;TRYING TO INIT THE DRIVE
7353  037560  001042                        BNE     5$                ;BR IF YES
7354  037562  004037  037166                JSR     R0,DRVINT         ;GO INIT. THE DRIVE
7355  037566  000434                        BR      4$                ;ERROR RETURN
7356  037570  105761  036610                TSTB    DRVSTA(R1)        ;IS DRIVE STATUS ONLINE?
7357  037574  003445                        BLE     6$                ;BR IF NOT
7358  037576  105761  036640        1$:     TSTB    DPRQS(R1)         ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
7359  037602  001031                        BNE     5$                ;BR IF YES
7360  037604  010164  000010                MOV     R1,RMCS2(R4)      ;SELECT THE DRIVE
7361  037610  004037  044714                JSR     R0,DRVQUE         ;PUT THIS REQUEST IN QUEUE
7362  037614  000460                        BR      9$                ;QUEUE IS FULL
7363  037616  122762  000103  000002        CMPB    #103,2(R2)        ;IS THIS REQ. FOR AN UNLOAD?
7364  037624  001003                        BNE     2$                ;BR IF NO
7365  037626  112761  177777  036656        MOVB    #-1,ULDFLG(R1)    ;SET THE "UNLOAD IN QUEUE" FLAG
7366  037634  105761  036600        2$:     TSTB    DRVACT(R1)        ;IS THIS DRIVE ACTIVE?
7367  037640  001043                        BNE     8$                ;BR IF YES
7368  037642  004737  037774                JSR     PC,OPT            ;CALL THE OPTIMIZER
7369  037646  000440                        BR      8$
7370  037650  012762  120000  000016  3$:   MOV     #BIT15!BIT13,16(R2) ;SET THE "UNLOAD IN QUEUE" ERROR FLAG
7371  037656  000434                        BR      8$                ;EXIT
7372  037660  004737  041054        4$:     JSR     PC,CI7            ;GO HANDLE THE PARITY ERROR
7373  037664  000431                        BR      8$
7374  037666  004037  044714        5$:     JSR     R0,DRVQUE         ;PUT REQUEST IN QUEUE
7375  037672  000431                        BR      9$                ;QUEUE IS FULL
7376  037674  032714  000100                BIT     #BIT06,(R4)       ;IE BIT SET ?
7377  037700  001023                        BNE     8$                ;YES
7378  037702  004737  044252                JSR     PC,SET.IE         ;SET THE INTERRUPT
7379  037706  000420                        BR      8$                ;RETURN
7380  037710  105761  036610        6$:     TSTB    DRVSTA(R1)        ;SEE IF DRIVE OFFLINE OR UNSAFE
7381  037714  002412                        BLT     7$                ;BR IF UNSAFE
7382  037716  012762  140000  000016        MOV     #BIT15!BIT14,16(R2) ;SET OFFLINE ERROR INDICATOR
7383  037724  105761  036620                TSTB    DRVTYP(R1)        ;SEE IF OFFLINE OR NONEXISTENT
7384  037730  001007                        BNE     8$                ;BR IF OFFLINE
7385  037732  012762  100002  000016        MOV     #BIT15!BIT01,16(R2) ;REPORT DRIVE NONEXISTENT
7386  037740  000403                        BR      8$                ;GO TO EXIT
7387  037742  012762  110000  000016  7$:   MOV     #BIT15!BIT12,16(R2) ;DRIVE IS UNSAFE
7388  037750  104413                8$:     RESREG                    ;RESTORE R0 - R5
7389  037752  005720                        TST     (R0)+             ;SETUP FOR NORMAL RETURN
7390  037754  000401                        BR      10$               ;FINISH UP, THEN EXIT
7391  037756  104413                9$:     RESREG                    ;RESTORE R0 - R5
7392  037760  005720                10$:    TST     (R0)+             ;CORRECT THE RETURN ADDRESS
7393  037762  105037  036654                CLRB    ACTDRV            ;CLEAR "ACTIVE DRIVER" FLAG
7394  037766  012637  177776                MOV     (SP)+,@#PS        ;RETURN "PS" TO USER LEVEL
7395  037772  000200                        RTS     R0                ;RETURN TO CALLER
7396
7397                                ;OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
7398                                ;
7399                                ;CALL
7400                                ;       MOV     #DRVNUM,R1        ;DRIVE NUMBER TO R1
7401                                ;       JSR     PC,OPT            ;SETUP A COMMAND
7402                                ;
7403  037774  104412                OPT:    SAVREG                    ;SAVE R0 - R5
7404  037776  013746  177776                MOV     @#PS,-(SP)        ;SAVE PROC. STATUS
7405  040002  146137  036724  036652        BICB    ATABIT(R1),SRCHWT       ;CLEAR LA SEACH FLAG
7406  040010  105061  036640                CLRB    DPRQS(R1)         ;RESET THE PORT REQ FLAG ****
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7407  040014  004737  044770                  JSR     PC,GETREQ       ;GET "DPB" POINTER OF REQUEST
7408  040020  005702                          TST     R2              ;IS THERE A REQUEST IN QUEUE?
7409  040022  001472                          BEQ     7$              ;NO--BRANCH TO EXIT
7410  040024  010164  000010                  MOV     R1,RMCS2(R4)    ;LOAD THE DRIVE ADDRESS *******
7411  040030  012764  000111  000000          MOV     #111,RMCS1(R4)  ;CLEAR THE DRIVE
7412  040036  032764  004000  000000          BIT     #BIT11,RMCS1(R4)        ;DVA SET ?
7413  040044  001446                          BEQ     5$              ;TO PROT REQUEST ,IF NOT
7414  040046  105761  036610          10$:    TSTB    DRVSTA(R1)      ;IS DRIVE ONLINE?
7415  040052  003014                          BGT     1$              ;YES--BRANCH
7416  040054  004737  045012                  JSR     PC,POPQUE       ;NO--REMOVE REQUEST FROM QUEJE
7417  040060  012762  140000  000016          MOV     #BIT15!BIT14,16(R2)  ;SET OFFLINE STATUS/ERROR INDICATOR
7418  040066  105761  036610                  TSTB    DRVSTA(R1)      ;IS DRIVE UNSAFE ?
7419  040072  100053                          BPL     8$              ;BR TO EXIT IF NOT
7420  040074  012762  110000  000016          MOV     #BIT15!BIT12,16(R2)  ;SET UNSAFE STATUS/ERROR INDICATOR
7421  040102  000447                          BR      8$              ;BRANCH TO EXIT
7422  040104                          1$:
7423                                  ;       MOV     #111,-(SP)      ;LOAD COMMAND ONTO THE STACK
7424                                  ;       JSR     R0,WRT.RM       ;LOAD THE REGISTER
7425                                  ;       RMCS1                   ;REGISTER INCREMENT
7426                                  ;       6$                      ;ERROR RETURN ADDRESS
7427                                  ;       BIT     #BIT11,(R4)     ;DRIVE AVAILABLE ?
7428                                  ;       BEQ     9$              ;BR IF NOT
7429  040104  122762  000150  000002          CMPB    #150,2(R2)      ;IS THE REQUEST FOR I/O?
7430  040112  002403                          BLT     2$              ;YES--BRANCH
7431  040114  004737  040440                  JSR     PC,CI4          ;CALL THE COMMAND INITIATOR
7432  040120  000440                          BR      8$              ;BRANCH TO EXIT
7433  040122  005737  036722          2$:     TST     DTUW            ;DATA TRANSFER UNDERWAY?
7434  040126  002012                          BGE     4$              ;YES--GO START A SEARCH
7435  040130  005737  036700                  TST     SEEKFG          ;DO IMPLIED SEEKS?
7436  040134  100404                          BMI     3$              ;YES---BRANCH
7437  040136  004037  041412                  JSR     R0,LA           ;NO--DO LOOK AHEAD
7438  040142  000427                          BR      8$              ;RETURN HERE ON A PARITY ERROR
7439  040144  000403                          BR      4$              ;GO START A SEARCH
7440  040146  004737  040232          3$:     JSR     PC,CI1          ;START A DATA TRANSFER
7441  040152  000423                          BR      8$
7442  040154  004737  040340          4$:     JSR     PC,CI3          ;START A SEARCH
7443  040160  000420                          BR      8$              ;GO TO THE EXIT
7444  040162  112761  177777  036640  5$:     MOVB    #-1,DPRQS(R1)   ;SET PORT REQUEST INDICATOR
7445  040170  010103                          MOV     R1,R3           ;SET UP TO ADDRESS WORDS
7446  040172  006303                          ASL     R3              ;CONVERT TO WORD INDEX
7447  040174  012763  060000  036702          MOV     #60000,TIMER(R3)  ;START 10 SEC TIMER
7448  040202  000402                          BR      7$              ;EXIT
7449  040204  004737  041054          6$:     JSR     PC,CI7          ;PROCESS THE PARITY ERROR
7450  040210  032714  000100          7$:     BIT     #BIT06,(R4)     ;SEE IF 'IE' ALREADY SET
7451  040214  001002                          BNE     8$              ;BR IF SET
7452  040216  004737  044252                  JSR     PC,SET.IE       ;SET "IE" WITHOUT A "TRE"
7453  040222  012637  177776          8$:     MOV     (SP)+,@#PS      ;RESTORE PROC. STATUS
7454  040226  104413                          RESREG                  ;RESTORE R0 - R5
7455  040230  000207                          RTS     PC
7456
7457                                  ;COMMAND INITIATOR
7458
7459                                  ;CALL
7460                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
7461                                  ;       MOV     #DPB,R2         ;ADDRESS OF DPB
7462                                  ;       JSR     PC,CI?          ;CI? = CI1,CI3, OR CI4
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7463                                                    ;WHERE:
7464                                                    ;CI1=DATA TRANSFER
7465                                                    ;CI2=SEARCH REQUESTED BY DATA XFER
7466                                                    ;CI4=NOT DATA TRANSFER
7467
7468  040232  004737  045012        CI1:    JSR     PC,POPQUE       ;REMOVE REQUEST FROM "DRIVES WAIT" QUEUE
7469  040236  010237  036650              MOV     R2,TRNSWT       ;PUT REQ. IN TRANSFER WAIT QUEUE
7470  040242  010203                      MOV     R2,R3           ;UPB ADDRESS TO R3
7471  040244  013704  036736              MOV     RMADR,R4        ;RMCS1 ADDRESS
7472  040250  010164  000010              MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7473  040254  062703  000004              ADD     #4,R3           ;DESIRED WORD COUNT
7474  040260  062704  000002              ADD     #2,R4           ;RMWC ADDRESS
7475  040264  012324                      MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
7476  040266  012324                      MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
7477  040270  012346                      MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
7478  040272  004037  043742              JSR     R0,WRT.RM       ;CALL THE LOAD(WRITE) ROUTINE
7479  040276  000006                      RMDA                    ;INDEX OF REGISTER TO LOAD
7480  040300  041054                      CI7                     ;ERROR RETURN ADDRESS
7481  040302  012346                      MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
7482  040304  004037  043742              JSR     R0,WRT.RM
7483  040310  000034                      RMDC
7484  040312  041054                      CI7
7485  040314  016246  000002              MOV     2(R2),-(SP)     ;LOAD "COMMAND+GO", "A17&A16", AND "PSEL"
7486  040320  004037  043742              JSR     R0,WRT.RM
7487  040324  000000                      RMCS1
7488  040326  041054                      CI7
7489  040330  010137  036722              MOV     R1,DTUW         ;SET "DATA TRANSFER UNDERWAY"
7490  040334  000137  041016              JMP     CI5
7491  040340  013704  036736        CI3:  MOV     RMADR,R4        ;RMCS1 ADDRESS
7492  040344  010164  000010              MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7493  040350  016246  000012              MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
7494  040354  004037  043742              JSR     R0,WRT.RM
7495  040360  000034                      RMDC
7496  040362  041054                      CI7
7497  040364  116203  000010              MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
7498                                      SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
7499                                      BGE     1$
7500                                      ADD     #32.,R3
7501  040370  010346              1$:     MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
7502  040372  042716  177740              BIC     #177740,(SP)    ;CHOP OF ALL EXENTED BITS ,IF ANY
7503  040376  116266  000011  000001      MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
7504  040404  004037  043742              JSR     R0,WRT.RM       ;LOAD DESIRED TRACK & SECTOR
7505  040410  000006                      RMDA
7506  040412  041054                      CI7
7507  040414  012746  000131              MOV     #131,-(SP)      ;START A SEARCH
7508  040420  004037  043742              JSR     R0,WRT.RM
7509  040424  000000                      RMCS1
7510  040426  041054                      CI7
7511  040430  156137  036724  036652      BISB    ATABIT(R1),SRCHWT       ;SET "SEARCH WAIT" KEY
7512  040436  000567                      BR      CI5
7513  040440  013704  036736        CI4:  MOV     RMADR,R4        ;RMCS1 ADDRESS
7514  040444  010164  000010              MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7515  040450  116203  000002              MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
7516  040454  122703  000131              CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
7517  040460  001007                      BNE     1$              ;BRANCH IF NO
7518  040462  016246  000010              MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
```

```
7519  040466  004037  043742            JSR     R0,WRT.RM
7520  040472  000006                    RMDA
7521  040474  041054                    CI7
7522  040476  000403                    BR      2$                      ;GO LOAD CYLINDER
7523  040500  122703  000105    1$:     CMPB    #105,R3                 ;IS IT A SEEK COMMAND
7524  040504  001007                    BNE     3$                      ;BRANCH IF NO
7525  040506  016246  000012    2$:     MOV     12(R2),-(SP)            ;LOAD DESIRED CYLINDER
7526  040512  004037  043742            JSR     R0,WRT.RM
7527  040516  000034                    RMDC
7528  040520  041054                    CI7
7529  040522  000546                    BR      CI6
7530  040524  122703  000115    3$:     CMPB    #115,R3                 ;IS IT AN "OFFSET" COMMAND?
7531  040530  001013                    BNE     4$                      ;BR IF NO
7532  040532  004037  043562            JSR     R0,RD.RM                ;MERGE THE OFFSET VALUE INTO RMOF
7533  040536  000032                    RMOF                            ;BUT DON'T CHANGE THE UPPER
7534  040540  041054                    CI7
7535  040542  116216  000001            MOVB    1(R2),(SP)              ;BYTE WHEN LOADING THE
7536  040546  004037  043742            JSR     R0,WRT.RM               ;REGISTER (RMOF)
7537  040552  000032                    RMOF
7538  040554  041054                    CI7
7539  040556  000530                    BR      CI6                     ;GO START THE COMMAND
7540  040560  122703  000107    4$:     CMPB    #107,R3                 ;IS IT A "RECALIBRATE" COMMAND?
7541  040564  001525                    BEQ     CI6                     ;BRANCH IF YES
7542  040566  122703  000117            CMPB    #117,R3                 ;IS IT A RETURN TO CENTER?
7543  040572  001522                    BEQ     CI6                     ;BRANCH IF YES
7544  040574  122703  000103            CMPB    #103,R3                 ;IS IT AN "UNLOAD" COMMAND?
7545  040600  001016                    BNE     5$                      ;BRANCH IF NO
7546  040602  112761  000001  036600    MOVB    #1,DRVACT(R1)           ;SET THE DRIVE ACTIVE INDICATOR
7547  040610  105061  036610            CLRB    DRVSTA(R1)              ;PUT DRIVE STATUS TO OFFLINE
7548  040614  112761  000001  036656    MOVB    #1,ULDFLG(R1)           ;SET "UNLOAD IN PROGRESS" FLAG
7549  040622  010346                    MOV     R3,-(SP)                ;START THE "UNLOAD" COMMAND
7550  040624  004037  043742            JSR     R0,WRT.RM
7551  040630  000000                    RMCS1
7552  040632  041054                    CI7
7553  040634  000207                    RTS     PC                      ;RETURN TO USER
7554  040636  122703  000143    5$:     CMPB    #143,R3                 ;IS IT A "SET FORMAT" COMMAND?
7555  040642  001014                    BNE     6$                      ;BRANCH IF NO
7556  040644  004037  043562            JSR     R0,RD.RM                ;READ THE OFFSET REGISTER
7557  040650  000032                    RMOF
7558  040652  041054                    CI7
7559  040654  116266  000001  000001    MOVB    1(R2),1(SP)             ;COMBINE "FMT22","ECI", AND "HCI"
7560  040662  004037  043742            JSR     R0,WRT.RM               ;LOAD "FMT22", "ECI", AND/OR "HCI".
7561  040666  000032                    RMOF
7562  040670  041054                    CI7
7563  040672  000436                    BR      12$
7564  040674  122703  000141    6$:     CMPB    #141,R3                 ;IS IT A "GET REGISTER" COMMAND?
7565  040700  001023                    BNE     10$                     ;BRANCH IF NO
7566  040702  016203  000006    7$:     MOV     6(R2),R3                ;POINTS TO 1ST ADDRESS OF WHERE
7567                                                                    ;TO PUT THE REGISTER(S)
7568  040706  116237  000010  040724    MOVB    10(R2),9$               ;INIT. THE INDEX FOR THE FIRST REG.
7569  040714  116205  000011            MOVB    11(R2),R5               ;INDEX OF LAST REG. TO MOVE
7570  040720  004037  043562    8$:     JSR     R0,RD.RM                ;READ RH70/RM03 REGISTER
7571  040724  000000            9$:     RMCS1                           ;INDEX OF REG. TO READ
7572  040726  041054                    CI7
7573  040730  012623                    MOV     (SP)+,(R3)+             ;GET THE CONTENTS OF RH70  RM03 REG.
7574  040732  023705  040724            CMP     9$,R5                   ;LAST REG. BEEN READ?
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 7575  040736  001414                          BEQ     12$                     ;GET OUT IF YES
 7576  040740  062737  000002  040724          ADD     #2,9$                   ;INCREASE THE INDEX BY 2
 7577  040746  000764                          BR      8$                      ;LOOP--MORE TO READ
 7578  040750  122703  000145          10$:    CMPB    #145,R3                 ;IS IT A "SELECT DRIVE" COMMAND?
 7579  040754  001405                          BEQ     12$                     ;BRANCH IF YES
 7580  040756  010346                  11$:    MOV     R3,-(SP)                ;LOAD THE COMMAND
 7581  040760  004037  043742                  JSR     R0,WRT.RM
 7582  040764  000000                          RMCS1
 7583  040766  041054                          CI7
 7584  040770  004737  045012          12$:    JSR     PC,POPQUE               ;REMOVE REQ. FROM QUEUE
 7585  040774  052762  000200  000016          BIS     #BIT07,16(R2)           ;SET THE "DONE" BIT
 7586  041002  005737  036676                  TST     SAVEFG                  ;SAVE THE RH70/RM03 REGISTERS?
 7587  041006  100002                          BPL     13$                     ;BRANCH IF NO
 7588  041010  004737  044134                  JSR     PC,SVRH70               ;YES--GO SAVE THE REGISTERS
 7589  041014  000207                  13$:    RTS     PC                      ;RETURN TO USER
 7590  041016  006301                  CI5:    ASL     R1
 7591  041020  012761  060000  036702          MOV     #60000,TIMER(R1)        ;SET A ONE SECOND TIMER
 7592  041026  006201                          ASR     R1
 7593  041030  112761  000001  036600          MOVB    #1,DRVACT(R1)           ;SET THE DRIVE ACTIVE
 7594  041036  000207                          RTS     PC                      ;RETURN TO THE USER
 7595  041040  010346                  CI6:    MOV     R3,-(SP)                ;LOAD THE COMMAND
 7596  041042  004037  043742                  JSR     R0,WRT.RM
 7597  041046  000000                          RMCS1
 7598  041050  041054                          CI7
 7599  041052  000761                          BR      CI5
 7600  041054  032764  010000  000010  CI7:    BIT     #BIT12,RMCS2(R4)  ;DRIVE NON-EXISTENT ?
 7601                                  ;
 7602  041062  005702                  1$:     TST     R2                      ;ANYTHING IN QUEUE ?
 7603                                  ;       BEQ     CI7B                    ;BR IF NOT
 7604  041064  001001                          BNE     2$                      ;BRANCH IF QUEUE IS THERE
 7605  041066  000207                          RTS     PC                      ;OTHERWISE EXIT
 7606  041070  012762  104000  000016  2$:     MOV     #BIT15!BIT11,16(R2)     ;SET "PARITY" ERROR INDICATOR
 7607                                  ;
 7608  041076  012746  000111          CI7B:   MOV     #111,-(SP)              ;DO A "DRIVE CLEAR"
 7609  041102  004037  043742                  JSR     R0,WRT.RM
 7610  041106  000000                          RMCS1
 7611  041110  041154                          CI8
 7612  041112  004737  044674          2$:     JSR     PC,EMPTYQ               ;EMPTY THE QUEUE
 7613  041116  105061  036640                  CLRB    DPRQS(R1)               ;CLEAR THE PORT REQUEST FLAG
 7614  041122  105061  036656                  CLRB    ULDFLG(R1)              ;CLEAR THE UNLOAD IN QUEUE FLAG
 7615  041126  105061  036600                  CLRB    DRVACT(R1)              ;DRIVE IS IDLE
 7616  041132  020237  036650                  CMP     R2,TRNSWT               ;IF THIS DRIVE HAD AN I/O REQUEST
 7617                                  ;       CMP     R1,DTUW                 ;IF THIS DRIVE HAD AN I/O REQUEST
 7618  041136  001005                          BNE     1$                      ;IN PROGRESS CLEAR ALL OF THE FLAGS
 7619  041140  005037  036650                  CLR     TRNSWT
 7620  041144  012737  177777  036722          MOV     #-1,DTUW
 7621  041152  000207                  1$:     RTS     PC
 7622  041154  104412                  CI8:    SAVREG                          ;SAVE R0 - R5
 7623  041156  032764  010000  000010          BIT     #BIT12,RMCS2(R4)  ;IS 'NED' SET ?
 7624                                  ;       BNE     1$                      ;BR IF YES
 7625  041164  005001                          CLR     R1
 7626  041166  005003                          CLR     R3
 7627  041170  105761  036600          1$:     TSTB    DRVACT(R1)              ;DRIVE ACTIVE?
 7628                                  ;       BEQ     5$                      ;BRANCH IF NO
 7629  041174  001003                          BNE     22$                     ;BRANCH IF IN ACTIVE
 7630  041176  105761  036640                  TSTB    DPRQS(R1)               ;PORT REQUEST
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7631  041202  001443                        BEQ     5$                      ;BRANCH IF NOT
7632  041204  013702  036650        22$:    MOV     TRNSWT,R2               ;GET THE "TRANSFER WAIT" QUEUE
7633  041210  020137  036722                CMP     R1,DTUW                 ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
7634  041214  001402                        BEQ     2$                      ;BRANCH IF YES
7635  041216  004737  044770                JSR     PC,GETREQ               ;GET THE DPB POINTER
7636  041222  005702                2$:     TST     R2                      ;QUEUE ENTRY FOR DRIVE ?
7637  041224  001413                        BEQ     4$                      ;BR IF NOT
7638  041226  032764  010000  000010        BIT     #BIT12,RMCS2(R4)        ;'NED' SET ?
7639  041234  001404                        BEQ     3$                      ;BR IF NOT
7640  041236  012762  100002  000016        MOV     #BIT15!BIT01,16(R2)     ;SET 'DRIVE NON-EXISTENT' INDICATOR
7641  041244  000403                        BR      4$                      ;CONTINUE
7642  041246  012762  102000  000016  3$:    MOV     #BIT15!BIT10,16(R2)     ;SET "NON-CLEARABLE PARITY" ERROR INDICATOR
7643                                        ;
7644  041254  012763  177777  036702  4$:    MOV     #-1,TIMER(R3)           ;STOP THE TIMER
7645  041262  105061  036600                CLRB    DRVACT(R1)              ;SET "DRIVE ACTIVE" TO IDLE
7646  041266  105061  036640                CLRB    DPRQS(R1)               ;CLEAR PORT REQUEST FLAG
7647  041272  020137  036722                CMP     R1,DTUW                 ;IS THIS DRIVE SETUP FOR A TRANSFER
7648  041276  001005                        BNE     5$                      ;BR IF NOT
7649  041300  012737  177777  036722        MOV     #-1,DTUW                ;RESET THE INDICATOR
7650  041306  005037  036650                CLR     TRNSWT                  ;CLEAR THE TRANSFER QUEUE
7651  041312  105061  036656        5$:     CLRB    ULDFLG(R1)              ;CLEAR UNLOAD FLAG
7652  041316  032764  010000  000010        BIT     #BIT12,RMCS2(R4)        ;'NED' SET ?
7653                                        ;
7654  041324  005201                        BNE     6$                      ;BR IF YES
7655  041326  062703  000002                INC     R1                      ;MOVE TO THE NEXT DRIVE
7656  041332  042701  177770                ADD     #2,R3
7657  041336  001314                        BIC     #^C7,R1
7658  041340  012737  177777  036722        BNE     1$                      ;BRANCH IF MORE DRIVES
7659  041346  005037  036650                MOV     #-1,DTUW                ;NO DATA TRANSFERS UNDERWAY
7660  041352  004737  044616                CLR     TRNSWT                  ;CLEAR THE 'TRANSFER WAIT' QUEUE
7661  041356  012764  000040  000010        JSR     PC,CLRQUE               ;CLEAR ALL OF THE REQUEST QUEUES
7662  041364  000406                        MOV     #BIT05,RMCS2(R4)        ;DO A MASSBUS INIT.
7663  041366  004737  044674        6$:     BR      7$                      ;CONTINUE
7664  041372  105061  036610                JSR     PC,EMPTYQ               ;CLEAR THE DRIVE'S QUEUE
7665  041376  105061  036620                CLRB    DRVSTA(R1)              ;SET DRIVE TO OFFLINE
7666  041402  004737  044252        7$:     CLRB    DRVTYP(R1)              ;CLEAR THE DRIVE TYPE INDICATOR
7667  041406  104413                        JSR     PC,SET.IE               ;SET "IE" WITHOUT "TPE"
7668  041410  000207                        RESREG                          ;RESTORE R0 - R5
7669                                        RTS     PC                      ;RETURN
7670                                    ;LOOK AHEAD ROUTINE
7671                                    ;
7672                                    ;CALL
7673                                    ;       MOV     #DRVNUM,R1          ;DRIVE NUMBER
7674                                    ;       MOV     #DPB,R2             ;POINT TO DPB
7675                                    ;       JSR     R0,LA               ;GO CHECK THE WINDOW
7676                                    ;       RETURN1                     ;ERROR RETURN
7677                                    ;       RETURN2                     ;START A SEARCH
7678                                    ;       RETURN3                     ;START A DATA TRANSFER
7679
7680  041412  013704  036736        LA:     MOV     RMADR,R4                ;GET RMCS1'S ADDRESS
7681  041416  010164  000010                MOV     R1,RMCS2(R4)            ;SELECT DRIVE
7682  041422  004037  043562                JSR     R0,RD.RM                ;READ DRIVE STATUS
7683  041426  000012                        RMDS
7684  041430  041560                        4$                              ;ERROR RETURN ADDRESS
7685  041432  042716  157577                BIC     #^C020200,(SP)          ;ON CYLINDER ?
7686  041436  022726  000200                CMP     #200,(SP)+              ;PIP=0,DRY=1?
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7687  041442  001044                        BNE     3$              ;NO
7688  041444  105261  036666                INCB    LACNT(R1)       ;INCREMENT THE LOOK AHEAD COUNT
7689  041450  126137  036666  036744        CMPB    LACNT(R1),MXLACT ;EXCEED MAX?
7690  041456  003033                        BGT     2$              ;BRANCH IF YES
7691  041460  116203  000010                MOVB    10(R2),R3       ;GET DESIRED SECTOR ADDRESS AND
7692  041464  000303                        SWAB    R3              ;MULT. BY 64--ALIGN WITH
7693  041466  006203                        ASR     R3              ;LOOK AHEAD REGISTER
7694  041470  006203                        ASR     R3
7695  041472  012737  000340  177776        MOV     #340,@#PS       ;PRIORITY LEVEL "7"
7696  041500  004037  043562        6$:     JSR     R0,RD.RM        ;READ LOOK AHEAD REGISTER
7697  041504  000020                        RMLA
7698  041506  041560                        4$
7699  041510  021664  000020                CMP     (SP),RMLA(R4)   ;CORRECT LA NUMBER ?
7700  041514  001402                        BEQ     7$              ;YES
7701  041516  005726                        TST     (SP)+           ;NO,CLEAR STACK
7702  041520  000415                        BR      3$
7703  041522  162603                7$:     SUB     (SP)+,R3        ;CALCULATE THE DELTA
7704  041524  002002                        BGE     1$
7705  041526  062703  004000                ADD     #<32.*64.>,R3   ;MAKE THE DELTA POSITIVE
7706  041532  023703  036746        1$:     CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
7707  041536  002406                        BLT     3$              ;IF IT IS WITHIN THE
7708  041540  023703  036750                CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
7709  041544  002003                        BGE     3$              ;THE LOOK AHEAD COUNT
7710  041546  105061  036666        2$:     CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
7711  041552  005720                        TST     (R0)+
7712  041554  005720                3$:     TST     (R0)+           ;ADJUST THE RETURN ADDRESS
7713  041556  000402                        BR      5$              ;EXIT
7714  041560  004737  041054        4$:     JSR     PC,CI7          ;PROCESS THE ERROR
7715  041564  000200                5$:     RTS     R0              ;RETURN
7716
7717                                  ;INTERRUPT SERVICE ROUTINE
7718
7719  041566  112737  000001  036654  ISR:    MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
7720  041574  104412                        SAVREG                  ;SAVE R0 - R5
7721  041576  013704  036736                MOV     RMADR,R4        ;ADDRESS OF RHSCS1
7722  041602  013701  036722                MOV     DTUW,R1         ;GET "DATA TRANSFER UNDERWAY" INDICATOR
7723  041606  002403                        BLT     1$              ;BRANCH IF NO DATA TRANSFER UNDERWAY
7724  041610  004737  041632                JSR     PC,TD           ;CALL TRANSFER DONE
7725  041614  000402                        BR      2$              ;EXIT
7726  041616  004737  042002        1$:     JSR     PC,SC           ;CALL SPECIAL CONDITIONS
7727  041622  104413                2$:     RESREG                  ;RESTORE R0 - R5
7728  041624  105037  036654                CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
7729  041630  000002                        RTI                     ;RETURN
7730
7731                                  ;TRANSFER DONE ROUTINE
7732
7733  041632  105061  036600        TD:     CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
7734  041636  012737  177777  036722        MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
7735  041644  006301                        ASL     R1
7736  041646  012761  177777  036702        MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
7737  041654  006201                        ASR     R1
7738  041656  013702  036650                MOV     TRNSWT,R2       ;GET "DPB" ADDRESS FROM THE
7739  041662  005037  036650                CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
7740  041666  052762  000200  000016        BIS     #BIT07,16(R2)   ;SET DONE
7741  041674  010164  000010                MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
7742  041700  004037  043562                JSR     R0,RD.RM        ;TRANSFER ERROR(TRE=1 ?
```

```
                                        RMCS1
                                        CI7
                                        ROL     (SP)+
                                        BMI     3$                      ;BR IF YES
                                        TST     SAVEFG                  ;SAVE THE RH70/RM03 REGISTERS?
                                        BPL     1$                      ;BRANCH IF NO
                                        JSR     PC,SVRH70               ;YES--SAVE THE REGISTERS
                                1$:
                                        JSR     PC,GETREQ               ;GET DPB POINTER
                                        TST     R2                      ;ENTRY FOR DRIVE ?
                                        BEQ     2$                      ;BR IF NOT
                                        JSR     PC,OPT                  ;CALL OPTIMIZER
                                        BR      SC                      ;CHECK OTHER DRIVES
                                ;THE RELEASE DRIVE COMMAND IS FORCED TO ENTER FOR DUAL PORT OPERATION
                                2$:     MOV     #113,(R4)               ;RELEASE THE DRIVE
                                        BR      SC                      ;CHECK FOR OTHER DRIVES
                                3$:     BIS     #BIT15!BIT06,16(R2)     ;SET DATA ERROR FLAG
                                        JSR     PC,EMPTYQ               ;EMPTY THE "DRIVE'S WAIT" QUELE
                                        JSR     PC,SVRH70               ;SAVE THE RH70/RM03 REGISTERS
                                        MOV     #40111,(R4)             ;ISSUE A "DRIVE CLEAR"
                                        MOV     #113,(R4)               ;ISSUE A RELEASE TO THE DRIVE
                                        BR      SC                      ;CHECK FOR OTHER DRIVES


                                ;SPECIAL CONDITION ROUTINE

                                SC:     MOVB    RMAS(R4),R3             ;READ "RMAS"
                                        BNE     2$                      ;BRANCH IF ANY 'ATA' BITS SET
                                        JSR     R0,RD.RM                ;READ CONTROL AND STATUS REGISTER
                                        RMCS1
                                ;       CI8
                                        1$                              ;EXIT IF FAIL TO READ
                                        ROLB    (SP)+                   ;IS "IE"=1?
                                        BMI     1$                      ;YES, NO DRIVES TO CHECK
                                        JSR     R0,ES.SAV               ;SAVE THE ADDRESS IN '$ESCAPE'
                                        ERROR   1                       ;REPORT AN ILLEGAL INTERRUPT
                                        JSR     PC,SET.IE               ;SET INTERRUPT ENABLE
                                1$:     RTS     PC                      ;RETURN
                                2$:     CLR     -(SP)                   ;PROCESS ALL DRIVES THAT HAVE
                                        MOVB    R3,(SP)                 ;AN "ATA"=1
                                        MOV     #1,R3
                                        CLR     R1
                                SC3:    BIT     R3,(SP)                 ;ATA=1?
                                        BNE     SC5                     ;YES--BRANCH
                                SC4:    INC     R1                      ;MOVE TO THE NEXT DRIVE
                                        ASLB    R3
                                        BNE     SC3                     ;BRANCH IF MORE TO CHECK
                                        TST     (SP)+                   ;CLEAN OFF THE STACK
                                        RTS     PC                      ;RETURN TO USER
                                SC5:    TSTB    DPINT(R1)               ;INITIALIZING THE DRIVE ?
                                        BEQ     1$                      ;BR IF NOT
                                        JMP     SC13                    ;PROCESS THE DRIVE
                                1$:     TSTB    DPRQS(R1)               ;PORT REQUEST OUTSTANDING ?
                                        BEQ     2$                      ;BR IF NOT
                                        JMP     SC13                    ;START THE OUTSTANDING COMMAND
```

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7799  042114  105761  036610          2$:     TSTB    DRVSTA(R1)          ;CHECK THE DRIVE STATUS
7800  042120  003025                          BGT     5$                  ;BRANCH IF ONLINE
7801  042122  105761  036656                  TSTB    ULDFLG(R1)          ;UNLOAD IN PROGRESS?
7802  042126  003422                          BLE     5$                  ;BRANCH IF NOT
7803  042130  004737  044770                  JSR     PC,GETREQ           ;GET DPB POINTER
7804  042134  004737  044134                  JSR     PC,SVRH70           ;SAVE THE RH70/RM03 REGISTERS
7805  042140  004737  042750                  JSR     PC,SC12             ;SAVE RMDS, RMER1, RMER2, AND RMMR2
7806                                                                      ;ALSO DO A DRIVE INIT (DRVINT)
7807  042144  105761  036610                  TSTB    DRVSTA(R1)          ;DID DRIVE COME ONLINE?
7808  042150  003416                          BLE     6$                  ;NO---BRANCH
7809  042152  032737  040000  036570          BIT     #BIT14,RMERRS       ;WAS THERE AN ERROR?
7810  042160  001002                          BNE     3$                  ;BR IF ERROR
7811  042162  000137  042640                  JMP     SC11                ;NO ERROR
7812  042166  013705  036572          3$:     MOV     RMERRS+2,R5         ;YES -- PICKUP RMER1 AND
7813  042172  000504                          BR      SC6A                ;GO PROCESS THE ERROR
7814  042174  105761  036600          5$:     TSTB    DRVACT(R1)          ;DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
7815  042200  001033                          BNE     SC6                 ;BR IF EITHER
7816  042202  004737  042750                  JSR     PC,SC12             ;SAVE RMDS, RMER1, RMER2, AND RMMR2
7817                                                                      ;ALSO DO A DRVINT
7818  042206  105761  036630          6$:     TSTB    DPINT(R1)           ;TRYING TO INIT THE DRIVE ?
7819  042212  001321                          BNE     SC4                 ;BR IF YES, CHECK ON MORE DRIVES
7820  042214  105761  036610                  TSTB    DRVSTA(R1)          ;CHECK ON DRIVE'S STATUS
7821  042220  100412                          BMI     7$                  ;BR IF UNSAFE
7822  042222  032737  020000  036574          BIT     #BIT13,RMERRS+4     ;ADDRESS PLUG CHANGED ?
7823  042230  001013                          BNE     8$                  ;BR IF YES
7824                                  :       MOV     #113,-(SP)          ;RELEASE COMMAND
7825  042232  012746  000111                  MOV     #111,-(SP)          ;DRIVE CLEAR
7826  042236  004037  043742                  JSR     R0,WRT.RM           ;WRITE THE COMMAND INTO RMCS1
7827  042242  000000                          RMCS1                       ;REGISTER INDEX
7828  042244  042610                          SC8                         ;PARITY EXIT ADDRESS
7829  042246  011605          7$:     MOV     (SP),R5             ;PICKUP (RMAS) BEFORE THE ERROR CALL
7830  042250  004037  045060                  JSR     R0,ES.SAV           ;SAVE THE ADDRESS IN '$ESCAPE'
7831  042254  104002                          ERROR   2                   ;REPORT THE UNEXPECTED ATTENTION
7832  042256  000677                          BR      SC4                 ;GO CHECK FOR MORE ATA'S
7833  042260                          8$:
7834  042260  004037  045060                  JSR     R0,ES.SAV           ;SAVE THE ADDRESS IN '$ESCAPE'
7835  042264  104005                          ERROR   5                   ;REPORT THE ADDRESS PLUG CHANGE
7836  042266  000673                          BR      SC4                 ;CHECK FOR MORE DRIVES
7837  042270  006301                  SC6:    ASL     R1                  ;SETUP TO ADDRESS WORDS
7838  042272  012761  177777  036702          MOV     #-1,TIMER(R1)       ;STOP THE TIMER
7839  042300  006201                          ASR     R1                  ;RESTORE THE DRIVE ADDRESS
7840  042302  004737  044770                  JSR     PC,GETREQ           ;GET THE DPB POINTER FROM THE QUEUE
7841  042306  010164  000010                  MOV     R1,RMCS2(R4)        ;SELECT DRIVE
7842  042312  000137  042640                  JMP     SC11                ;PROCESS THE SEARCH
7843  042316  004037  043562                  JSR     R0,RD.RM            ;READ THE RM03'S STATUS REG.
7844  042322  000012                          RMDS
7845  042324  042610                          SC8
7846  042326  011605                          MOV     (SP),R5             ;AND PUT IT IN R5
7847  042330  006126                          ROL     (SP)+               ;WAS THERE AN ERROR?
7848  042332  100407                          BMI     1$                  ;BR IF ERROR
7849  042334  105761  036600                  TSTB    DRVACT(R1)          ;CHECK DRIVE'S STATE
7850  042340  003137                          BGT     SC11                ;BR IF DRIVE ACTIVE WITH ORDER
7851  042342  052762  100210  000016          BIS     #BIT15!BIT07!BIT03,16(R2)  ;INFORM USER OF ERROR RECOVER COMPLETION
7852  042350  000470                          BR      SC7
7853  042352  004037  043562          1$:     JSR     R0,RD.RM            ;READ ERROR REGISTER #1
7854  042356  000014                          RMER1
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                                                SC8
                                                MOV     (SP)+,R5        ;AND SAVE IT IN R5
                                                JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
                                                MOV     #111,-(SP)      ;ISSUE A DRIVE CLEAR
                                                JSR     R0,WRT.RM
                                                RMCS1
                                                SC8
                                        SC6A:   ROL     R5              ;WAS "UNSAFE" CONDITION =1?
                                                BMI     1$              ;BRANCH IF YES
                                                TST     R2              ;ANYTHING IN QUEUE ?
                                                BEQ     SC7             ;BR IF NOT
                                                BIS     #BIT15!BIT07!BIT05,16(R2)       ;INFORM USER OF ERROR
                                                BR      SC7
                                        1$:     JSR     R0,RD.RM        ;READ DRIVE STATUS REG. #1
                                                RMDS
                                                SC8
                                                MOV     (SP),R5         ;SAVE RMDS IN R5
                                                ROL     (SP)+           ;"ERR"=1?
                                                BPL     2$              ;BR IF NO--UNSAFE CLEARED
                                                MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
                                                JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
                                                BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
                                                BR      SC7
                                        2$:     BIT     #BIT12,R5       ;"MOL" = 1 ?
                                                BNE     3$              ;BR IF YES
                                                MOVB    #-1,DRVACT(R1)  ;ACTIVE ERROR RECOVER
                                                MOVB    #1,DRVSTA(R1)   ;ONLINE
                                                ASL     R1
                                                MOV     #30000..TIMER(R1) ;START 30 SECOND TIMER
                                                ASR     R1
                                                JMP     SC4
                                        3$:     BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
                                        SC7:    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
                                                JSR     PC,EMPTYQ       ;DUMP THE QUEUE
                                                JSR     PC,POPQUE       ;REMOVE THE QUEUE
                                                TSTB    ULDFLG(R1)      ;UNLOAD IN RMOGRESS OR QUEUE?
                                                BGT     1$              ;BR IF NOT
                                                CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
                                        1$:     MOVB    ATABIT(R1),RMAS(R4)  ;CLEAR ATTENTION BIT
                                                TSTB    DRVSTA(R1)      ;IS THE DRIVE UNSAFE ?
                                                BMI     2$              ;BR IF IT IS
                                                MOV     #113,-(SP)      ;RELEASE COMMAND
                                                MOV     #111,-(SP)      ;DRIVE CLEAR COMMAND
                                                JSR     R0,WRT.RM       ;WRITE THE COMMAND INTO RPCS1
                                                RMCS1                   ;REGISTER INDEX
                                                SC8                     ;PARITY EXIT ADDRESS
                                        2$:     JMP     SC4             ;CHECK FOR MORE DRIVES
                                        SC8:    TSTB    DRVACT(R1)      ;IS DRIVE IDLE?
                                                BEQ     1$              ;YES--BRANCH
                                                JSR     PC,GETREQ       ;GET DPB POINTER
                                                JSR     PC,CI7          ;PROCESS THE PARITY ERROR
                                                BR      2$              ;CONTINUE
                                        1$:
                                                JSR     PC,CI7          ;PROCESS THE PARITY ERROR
                                                JSR     PC,CI7B         ;PROCESS THE UNCORRECTABLE PARITY ERROR
                                        2$:     JMP     SC4             ;CHECK MORE DRIVES
```

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7911  042640  105761  036656          SC11:   TSTB    ULDFLG(R1)          ;"UNLOAD IN PROGRESS"?
7912  042644  003402                          BLE     1$                  ;BRANCH IF NO
7913  042646  105061  036656                  CLRB    ULDFLG(R1)          ;CLEAR UNLOAD FLAG
7914  042652  105061  036600          1$:     CLRB    DRVACT(R1)          ;SET DRIVE IDLE
7915  042656  136137  036724  036652          BITB    ATABIT(R1),SRCHWT   ;DOING A SEARCH OPERATION FOR
7916                                                                      ;AN I/O COMMAND?
7917  042664  001012                          BNE     2$                  ;BRANCH IF YES
7918  042666  004737  045012                  JSR     PC,POPQUE           ;REMOVE REQUEST FROM QUEUE
7919  042672  052762  000200  000016          BIS     #BIT07,16(R2)       ;SET "DONE" BIT
7920  042700  005737  036676                  TST     SAVEFG              ;SAVE THE REGISTERS?
7921  042704  100002                          BPL     2$                  ;BRANCH IF NO
7922  042706  004737  044134                  JSR     PC,SVRH70           ;YES--SAVE ALL OF THE RH70/RM03 REG'S
7923  042712  116164  036724  000016  2$:     MOVB    ATABIT(R1),RMAS(R4)  ;CLEAR ATTENTION BIT
7924  042720  146137  036724  036652          BICB    ATABIT(R1),SRCHWT       ;CLEAR IMPLIED SEEK SET
7925  042726  006301                          ASL     R1                  ;WORD INDEX
7926  042730  012761  177777  036702          MOV     #-1,TIMER(R1)       ;STOP CLOCK
7927  042736  006201                          ASR     R1                  ;RESTORE R1
7928  042740  004737  037774                  JSR     PC,OPT              ;START A REQUEST
7929  042744  000137  042056                  JMP     SC4                 ;CHECK FOR MORE DRIVES
7930  042750  010164  000010          SC12:   MOV     R1,RMCS2(R4)        ;SELECT DRIVE
7931  042754  016437  000012  036570          MOV     RMDS(R4),RMERRS     ;SAVE THE FOUR REGISTERS THAT
7932  042762  016437  000014  036572          MOV     RMER1(R4),RMERRS+2      ;WILL TELL US SOMETHING
7933  042770  016437  000042  036574          MOV     RMER2(R4),RMERRS+4
7934  042776  016437  000040  036576          MOV     RMMR2(R4),RMERRS+6
7935                                  ;       JSR     R0,DRVINT           ;INIT. THE STATE OF THE DRIVE
7936                                  ;       BR      1$                  ;TAKE ERROR EXIT
7937  043004  000207                          RTS     PC                  ;RETURN
7938  043006  005726                  1$:     TST     (SP)+               ;POP PC OFF OF THE STACK
7939  043010  000677                          BR      SC8                 ;PROCESS THE PARITY ERROR
7940  043012  006301                  SC13:   ASL     R1                  ;SETUP TO ADDRESS WORDS
7941  043014  012761  177777  036702          MOV     #-1,TIMER(R1)       ;STOP THE TIMER
7942  043022  006201                          ASR     R1                  ;
7943  043024  010164  000010                  MOV     R1,RMCS2(R4)        ;SELECT THE DRIVE
7944  043030  116164  036724  000016          MOVB    ATABIT(R1),RMAS(R4)  ;CLEAR THE ATTENTION BIT
7945  043036  105761  036630          1$:     TSTB    DPINT(R1)           ;INITIALIZING THE DRIVE ?
7946  043042  001424                          BEQ     2$                  ;BR IF NOT
7947  043044  105061  036630                  CLRB    DPINT(R1)           ;CLEAR THE INIT INDICATOR
7948  043050  004037  037166                  JSR     R0,DRVINT           ;GO INIT THE DRIVE
7949  043054  000240                          NOP                         ;DUMMY PARITY ERROR RETURN
7950  043056  105761  036610                  TSTB    DRVSTA(R1)          ;DRIVE ONLINE ?
7951  043062  003014                          BGT     2$                  ;BR IF YES -- START ORDER
7952  043064  005702                          TST     R2                  ;QUEUE ENTRY FOR THE DRIVE
7953  043066  001426                          BEQ     3$                  ;BR IF NOT
7954  043070  004737  044770                  JSR     PC,GETREQ           ;GET DPB ADDRESS
7955  043074  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)  ;INFORM USER THAT DRIVE OFFLINE
7956  043102  004737  044134                  JSR     PC,SVRH70           ;SAVE THE REGISTERS
7957                                  ;       JSR     PC,EMPTYQ           ;EMPTY THE REQUEST QUEUE
7958  043106  004737  045012                  JSR     PC,POPQUE           ;REMOVE THE QUEUE
7959  043112  000414                          BR      3$
7960  043114  032764  004000  000000  2$:     BIT     #BIT11,RMCS1(R4)        ;DVA SET ?
7961  043122  001006                          BNE     4$                  ;SET THEN CALL OPT
7962  043124  006301                          ASL     R1
7963  043126  012761  060000  036702          MOV     #60000.,TIMER(R1)
7964  043134  006201                          ASR     R1
7965  043136  000402                          BR      3$
7966  043140  004737  037774          4$:     JSR     PC,OPT              ;START THE PENDING REQUEST
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7967  043144  000137  042056          3$:     JMP     SC4             ;PROCESS OTHER DRIVES
7968
7969                                  ;/RM03 TIMER ROUTINE
7970                                  ;CALL
7971                                  ;       MOV     #TIME,-(SP)     ;ELASPED TIME IN MILLISECONDS ON THE STACK
7972                                  ;       JSR     PC,RPTMR        ;CALL RM03 TIME ROUTINE
7973
7974  043150  005737  036654          RPTMR:  TST     ACTDRV          ;CHECK "ACTDRV & ACTSTR"
7975  043154  001027                  BNE     4$              ;IF NON ZERO EXIT
7976  043156  112737  000001  036655          MOVB    #1,ACTSTR       ;SET "ACTSTR"
7977  043164  104412                  SAVREG                  ;SAVE R0 - R5
7978  043166  005001                  CLR     R1              ;START WITH DRIVE 0
7979  043170  005003                  CLR     R3
7980  043172  005763  036702          1$:     TST     TIMER(R3)       ;IS THE TIMER RUNNING?
7981  043176  002406                  BLT     2$              ;BRANCH IF NO
7982  043200  166663  000002  036702          SUB     2(SP),TIMER(R3) ;COUNT THE INTERVAL
7983  043206  003002                  BGT     2$              ;BR IF NO SOFTWARE TIMEOUT
7984  043210  004737  043240          JSR     PC,STO          ;CALL SOFTWARE TIMEOUT ROUTINE
7985  043214  005201                  2$:     INC     R1              ;MOVE TO NEXT DRIVE
7986  043216  005723                  TST     (R3)+
7987  043220  022701  000010          CMP     #8.,R1          ;OUT OF DRIVES?
7988  043224  003362                  BGT     1$              ;BRANCH IF NO
7989  043226  104413                  3$:     RESREG                  ;RESTORE R0 - R5
7990  043230  105037  036655          CLRB    ACTSTR          ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
7991  043234  012616                  4$:     MOV     (SP)+,(SP)      ;ADJUST THE STACK
7992  043236  000207                  RTS     PC              ;RETURN
7993
7994                                  ;SOFTWARE TIMEOUT ROUTINE
7995                                  ;
7996                                  ;NOTE: THIS ROUTINE MUST BE ENTERED AT PRIORITY 6
7997                                  ;       OR GREATER
7998                                  ;
7999                                  ;CALL:  STO
8000                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
8001                                  ;       JSR     PC,STO          ;CALL
8002                                  ;       RETURN
8003
8004  043240  010146                  STO:    MOV     R1,-(SP)        ;SAVE R1
8005  043242  010246                  MOV     R2,-(SP)        ;SAVE R2
8006  043244  010346                  MOV     R3,-(SP)        ;SAVE R3
8007  043246  010446                  MOV     R4,-(SP)        ;SAVE R4
8008  043250  013704  036736          MOV     RMADR,R4        ;GET ADDRESS OF "RMCS1"
8009  043254  010164  000010          MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
8010  043260  004037  043562          JSR     R0,RD RM        ;READ "DRIVE STATUS REG"
8011  043264  000012                  RMDS
8012                                  ;       STO5
8013  043266  043550                  STO9
8014  043270  105726                  TSTB    (SP)+           ;IS "DRY"=1?
8015  043272  100436                  BMI     STO2            ;BR IF YES
8016  043274  105761  036630          STO1:   TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
8017  043300  001033                  BNE     STO2            ;BR IF YES
8018  043302  105761  036640          TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
8019  043306  001030                  BNE     STO2            ;BR IF YES
8020  043310  013702  036650          MOV     TRNSWT,R2       ;PICKUP TRANSFER WAIT QUEUE
8021  043314  020137  036722          CMP     R1,DTUW         ;TRANSFER UNDERWAY ON THIS DRIVE?
8022  043320  001404                  BEQ     1$              ;BRANCH IF YES
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8023  043322  000137  043550                    JMP     ST09            ;IF NOT DON'T BOTHER DRIVES
8024  043326  004737  044770                    JSR     PC,GETREQ       ;GET DPB ADDRESS
8025  043332  052762  101000  000016  1$:       BIS     #BIT15!BIT09,16(R2) ;SET THE ERROR FLAGS
8026  043340  004737  044134                    JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
8027                                    ;       MOV     #BIT05,RMCS2(R4) ;"INIT" THE MASS BUS
8028  043344  105061  036600                    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
8029  043350  105061  036656                    CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
8030  043354  005037  036650                    CLR     TRNSWT          ;CLEAR DPB ADDRESS
8031  043360  012737  177777  036722            MOV     #-1,DTUW        ;CLEAR THE TRANSFER DRIVE #
8032  043366  000470                    BR      ST09            ;DON'T BOTHER OTHER DRIVES
8033  043370  116405  000016            ST02:   MOVB    RMAS(R4),R5     ;READ ATTENTION REG
8034  043374  136105  036724                    BITB    ATABIT(R1),R5   ;IS ATTENTION FOR THIS DRIVE UP ?
8035  043400  001007                    BNE     ST03            ;YES--BRANCH
8036  043402  105761  036630                    TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
8037  043406  001021                    BNE     ST06            ;BR IF YES - DRIVE NOT ONLINE
8038  043410  105761  036640                    TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
8039  043414  001035                    BNE     ST07            ;BR IF YES - NO RESPONSE TO REQUEST
8040  043416  000454                    BR      ST09            ;OTHER WISE EXIT
8041  043420  105761  036630            ST03:   TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
8042  043424  001003                    BNE     1$              ;BR IF INIT PENDING
8043  043426  105761  036640                    TSTB    DPRQS(R1)       ;PORT REQUEST PENDING ?
8044  043432  001446                    BEQ     ST09            ;BR IF NOT
8045  043434  012763  177777  036702  1$:       MOV     #-1,TIMER(R3)   ;STOP THE TIMER
8046  043442  000442                    BR      ST09            ;EXIT
8047  043444  004737  041154            ST05:   JSR     PC,CI8          ;GO HANDLE THE PARITY ERROR
8048  043450  000437                    BR      ST09
8049  043452  105061  036630            ST06:   CLRB    DPINT(R1)       ;CLEAR THE INITIALIZE INDICATOR
8050  043456  105061  036610                    CLRB    DRVSTA(R1)      ;SET UNIT OFFLINE
8051  043462  012763  177777  036702            MOV     #-1,TIMER(R3)   ;STOP THE TIMER
8052  043470  004737  044770                    JSR     PC,GETREQ       ;GET THE DPB ADDRESS
8053  043474  005702                    TST     R2              ;REQUEST IN QUEUE ?
8054  043476  001424                    BEQ     ST09            ;BR IF NOT
8055  043500  052762  140000  000016            BIS     #BIT15!BIT14,16(R2) ;INFORM THE USER DRIVE NOT AVAILABLE
8056  043506  000414                    BR      ST08            ;FINISH
8057  043510  012763  177777  036702  ST07:   MOV     #-1,TIMER(R3)   ;STOP THE TIMER
8058  043516  105061  036640                    CLRB    DPRQS(R1)       ;CLEAR PORT REQUEST INDICATOR
8059  043522  004737  044770                    JSR     PC,GETREQ       ;GET DPB ADDRESS
8060  043526  005702                    TST     R2              ;QUEUE ENTRY FOR DRIVE ?
8061  043530  001407                    BEQ     ST09            ;BR IF NONE
8062  043532  012762  100004  000016            MOV     #BIT15!BIT2,16(R2) ;INFORM USER OF PORT REQUEST ERROR
8063  043540  004737  044674            ST08:   JSR     PC,EMPTYQ       ;CLEAR THE QUEUE FOR THE DRIVE
8064  043544  004737  044134                    JSR     PC,SVRH70       ;SAVE THE REGISTERS
8065  043550  012604                    ST09:   MOV     (SP)+,R4        ;RESTORE R4
8066  043552  012603                    MOV     (SP)+,R3        ;RESTORE R3
8067  043554  012602                    MOV     (SP)+,R2        ;RESTORE R2
8068  043556  012601                    MOV     (SP)+,R1        ;RESTORE R1
8069  043560  000207                    RTS     PC              ;RETURN
8070
8071                                    ;ROUTINE TO READ A RH70/RM03 REGISTER
8072                                    ;
8073                                    ;CALL
8074                                    ;       JSR     R0,RD.RM        ;GO READ A REGISTER
8075                                    ;       INDEX                   ;REG. INDEX FROM BASE
8076                                    ;       ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
8077                                    ;                               ;AT THIS ADDRESS
8078                                    ;       RETURN                  ;CONTENTS OF REG. IS ON THE STACK
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8079
8080  043562  013737  036734  043730  RD.RM:  MOV     MCPEMX,RD.RM2   ;MAX. RETRYS ALLOWED
8081  043570  011646                  MOV     (SP),-(SP)      ;SAVE R0 FOR RETURN
8082  043572  013737  036736  043606          MOV     RMADR,RD.ADR    ;FORM THE DESIRED ADDRESS
8083  043600  062037  043606          ADD     (R0)+,RD.ADR    ;USING THE BASE AND THE INDEX
8084  043604  013727                  RD.RM1: MOV     @(PC)+,(PC)+    ;READ THE DESIRED REGISTER OF THE RM03
8085  043606  000000                  RD.ADR: .WORD   0               ;ADDRESS IS FORMED HERE
8086  043610  000000                  RD.WRD: .WORD   0               ;REG. CONTENTS PUT HERE
8087  043612  013766  043610  000002          MOV     RD.WRD,2(SP)    ;RETURN IT TO THE USER
8088  043620  013746  036736          MOV     RMADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
8089  043624  062716  000010          ADD     #RMCS2,(SP)     ;FORM THE ADDRESS OF RMCS2
8090  043630  032736  010000          BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
8091  043634  001037                  BNE     RD.RM3          ;BR IF DRIVE NON-EXISTENT
8092  043636  017746  173074          MOV     @RMADR,-(SP)    ;READ RMCS1
8093  043642  032716  020000          BIT     #BIT13,(SP)     ;DID MCPE SET?
8094  043646  001002                  BNE     1$              ;BRANCH IF YES
8095  043650  022620                  CMP     (SP)+,(R0)+     ;ADJUST FOR RETURN
8096  043652  000432                  BR      RD.RM4          ;EXIT
8097  043654                  1$:
8098  043654  004037  045060          JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
8099  043660  104003                  ERROR   3               ;REPORT "MCPE" ERROR
8100  043662  005737  036722          TST     DTUW            ;DATA TRANSFER UNDERWAY?
8101  043666  100405                  BMI     2$              ;NO--BRANCH
8102  043670  032716  040000          BIT     #BIT14,(SP)     ;NO--"TRE"=1?
8103  043674  001402                  BEQ     2$              ;NO--BRANCH
8104  043676  005726                  TST     (SP)+           ;YES--CLEAN OFF THE STACK AND
8105  043700  000415                  BR      RD.RM3          ;TAKE THE FATAL ERROR EXIT
8106  043702  052716  040000          2$:     BIS     #BIT14,(SP)     ;CLEAR "MCPE" BY SENDING A "1" TO "TRE"
8107  043706  000316                  SWAB    (SP)            ;POSITION BEFORE WRITING
8108  043710  013737  036736  043724          MOV     RMADR,3$        ;FORM ADDRESS OF HIGH BYTE
8109  043716  005237  043724          INC     3$
8110  043722  112637                  MOVB    (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RMCS1
8111  043724  000000                  3$:     .WORD   0               ;ADDRESS STORAGE
8112  043726  005327                  DEC     (PC)+           ;EXCEEDED MAX. RETRYS
8113  043730  000003                  RD.RM2: .WORD   3
8114  043732  002324                  BGE     RD.RM1          ;BRANCH IF NO
8115  043734  011000                  RD.RM3: MOV     (R0),R0         ;FATAL ERROR EXIT
8116  043736  012616                  MOV     (SP)+,(SP)
8117  043740  000200                  RD.RM4: RTS     R0
8118
8119                                  ;ROUTINE TO WRITE A REGISTER
8120                                  ;
8121                                  ;CALL
8122                                  ;       MOV     DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
8123                                  ;       JSR     R0,WRT.RM       ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
8124                                  ;       INDEX                   ;INDEX OF THE REGISTER TO BE LOADED
8125                                  ;       ERRADR                  ;ADDRESS TO RETURN TO ON AN ERROR
8126                                  ;       RETURN                  ;ERROR FREE RETURN
8127
8128  043742  013737  036734  044120  WRT.RM: MOV     MCPEMX,WRT.R2   ;MAX RETRYS ALLOWED
8129  043750  016637  000002  044030          MOV     2(SP),WRT.WD    ;SAVE THE WORD TO WRITE
8130  043756  012616                  MOV     (SP)+,(SP)      ;ADJUST THE STACK
8131  043760  012037  044032          MOV     (R0)+,WRT.AD    ;GET INDEX OF REGISTER TO BE WRITTEN
8132  043764  001015                  BNE     1$              ;BRANCH IF NOT RMCS1
8133  043766  122737  000150  044030          CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
8134  043774  002411                  BLT     1$              ;YES--DON'T GET THE OLD A16 & A17, & PSE
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8135  043776  004037  043562                  JSR     R0,RD.RM        ;NO---COMBINE A16&A17, & PSEL WITH
8136  044002  000000                          RMCS1                   ;THE COMMAND BEFORE SENDING IT TO
8137  044004  044124                          WRT.R3                  ;THE RH70/RM03
8138  044006  000316                          SWAB    (SP)
8139  044010  042716  177770                  BIC     #^C7,(SP)
8140  044014  112637  044031                  MOVB    (SP)+,WRT.WD+1
8141  044020  063737  036736  044032  1$:     ADD     RMADR,WRT.AD    ;FORM THE ADDRESS OF THE DISK REG.
8142  044026  012737                  WRT.R1: MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
8143  044030  000000                  WRT.WD: .WORD   0               ;WORD TO WRITE GOES HERE
8144  044032  000000                  WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
8145  044034  013746  036736                  MOV     RMADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
8146  044040  062716  000010                  ADD     #RMCS2,(SP)     ;FORM THE ADDRESS OF RMCS2
8147  044044  032736  010000                  BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
8148  044050  001025                          BNE     WRT.R3          ;BR IF DRIVE NON-EXISTENT
8149  044052  004037  043562                  JSR     R0,RD.RM        ;CHECK FOR PARITY ERROR ON WRITE
8150  044056  000014                          RMER1
8151  044060  044124                          WRT.R3
8152  044062  032726  000010                  BIT     #BIT03,(SP)+
8153  044066  001420                          BEQ     WRT.R4          ;BRANCH IF "PAR=0"
8154  044070  016037  177776  044102          MOV     -2(R0),1$       ;PICKUP THE INDEX
8155  044076  004037  043562                  JSR     R0,RD.RM        ;READ THE REG.
8156  044102  000000                  1$:     .WORD   0               ;REG. INDEX
8157  044104  044124                          WRT.R3                  ;RETURN TO THIS ADDRESS ON ERROR
8158  044106  004037  045060                  JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
8159  044112  104004                          ERROR   4               ;REPORT THE PARITY ON WRITE ERROR
8160  044114  005726                          TST     (SP)+           ;CLEAR OFF THE STACK
8161  044116  005327                          DEC     (PC)+           ;DECREMENT THE ERROR COUNT
8162  044120  000003                  WRT.R2: .WORD   3               ;RETRY COUNTER
8163  044122  002341                          BGE     WRT.R1          ;TRY AGAIN IF NOT FINISHED
8164  044124  011000                  WRT.R3: MOV     (R0),R0         ;TAKE THE "PARITY ON WRITE" ERROR EXIT
8165  044126  000401                          BR      WRT.R5          ;EXIT
8166  044130  005720                  WRT.R4: TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
8167  044132  000200                  WRT.R5: RTS     R0
8168
8169                                  ;ROUTINE TO SAVE THE RH70/RP04/5/RM03 REGISTERS AS PER DPB+14
8170                                  ;
8171                                  ;CALL
8172                                  ;       MOV     #DPBNUM,R2      ;DPB POINTER TO R2
8173                                  ;       JSR     PC,SVRH70       ;SAVE THE DRIVES REG'S
8174
8175  044134  104412                  SVRH70: SAVREG                  ;SAVE R0 - R5
8176  044136  005702                          TST     R2              ;QUEUE ENTRY FOR THE DRIVE ?
8177  044140  001442                          BEQ     6$              ;BR IF NONE
8178  044142  013704  036736                  MOV     RMADR,R4
8179  044146  111264  000010                  MOVB    (R2),RMCS2(R4)  ;SELECT DRIVE
8180  044152  016203  000014                  MOV     14(R2),R3       ;GET THE ERROR TABLE POINTER
8181  044156  001433                          BEQ     6$              ;EXIT IF NO ADDRESS
8182  044160  005037  044214                  CLR     3$              ;COUNTER & POINTER
8183  044164  023727  044214  000022  1$:     CMP     3$,#RMDB        ;REACHED THE BUFFER REGISTER ?
8184  044172  001006                          BNE     2$              ;BR IF NOT
8185  044174  032764  000200  000010          BIT     #BIT07,RMCS2(R4)  ;'OR' SET ?
8186  044202  001002                          BNE     2$              ;BR IF SET
8187  044204  005023                          CLR     (R3)+           ;STORE RMDB AS ZEROES
8188  044206  000405                          BR      4$              ;CONTINUE
8189  044210  004037  043562          2$:     JSR     R0,RD.RM        ;READ THE SELECTED REGISTER
8190  044214  000000                  3$:     .WORD   0               ;REGISTER INDEX
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 8191  044216  044242                        5$                      ;ERROR RETURN ADDRESS
 8192  044220  012623                        MOV     SP,+,(R3)+      ;STORE THE REGISTER CONTENTS
 8193  044222  023727  044214  000046  4$:   CMP     3$,#RMEC2       ;REACHED THE END ?
 8194  044230  001406                        BEQ     6$              ;BR IF YES
 8195  044232  062737  000002  044214        ADD     #2,3$           ;INCREMENT THE REGISTER INDEX
 8196  044240  000751                        BR      1$              ;CONTINUE READING THE REGISTERS
 8197  044242  004737  041354          5$    JSR     PC,CI7          ;PROCESS THE UNCORRECTABLE PARITY ERROR
 8198  044246  104413                  6$:   RESREG                  ;RESTORE R0 - R5
 8199  044250  000207                        RTS     PC              ;RETURN
 8200
 8201                                  ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A "TRE"
 8202                                  ;CALL
 8203                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
 8204                                  ;       JSR     PC,SET.IE       ;SET "IE"
 8205                                  ;       RETURN
 8206
 8207  044252  010446                  SET.IE: MOV     R4,-(SP)        ;SAVE R4
 8208  044254  013704  036736                  MOV     RMADR,R4        ;PICKUP ADDRESS OF RMCS1
 8209  044260  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
 8210  044264  011446                          MOV     (R4),-(SP)      ;READ RMCS1
 8211  044266  052716  040000                  BIS     #BIT14,(SP)     ;SET THE "TRE" BIT OF THE WORD READ
 8212  044272  000316                          SWAB    (SP)            ;ADJUST FOR DATO
 8213  044274  112714  000100                  MOVB    #BIT06,(R4)     ;SET "IE"
 8214  044300  032764  010000  000010          BIT     #BIT12,RMCS2(R4) ;IS "NED"=1?
 8215  044306  001002                          BNE     1$              ;YES--CLEAR "TRE"
 8216  044310  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
 8217  044312  000402                          BR      2$
 8218  044314  112664  000001          1$:     MOVB    (SP)+,1(R4)     ;CLEAR "TRE"
 8219  044320  012604                  2$:     MOV     (SP)+,R4        ;RESTORE R4
 8220  044322  000207                          RTS     PC              ;RETURN TO CALLER
 8221
 8222                                  ;QUEUE COUNT
 8223  044324      000                 QCNT:   .BYTE   0               ;DRIVE 0
 8224  044325      000                         .BYTE   0               ;DRIVE 1
 8225  044326      000                         .BYTE   0               ;DRIVE 2
 8226  044327      000                         .BYTE   0               ;DRIVE 3
 8227  044330      000                         .BYTE   0               ;DRIVE 4
 8228  044331      000                         .BYTE   0               ;DRIVE 5
 8229  044332      000                         .BYTE   0               ;DRIVE 6
 8230  044333      000                         .BYTE   0               ;DRIVE 7
 8231
 8232                                  ;QUEUE INPUT POINTERS
 8233
 8234  044334  044416                  QINPT:  .WORD   QDRV0            ;DRIVE 0
 8235  044336  044436                          .WORD   QDRV1           ;DRIVE 1
 8236  044340  044456                          .WORD   QDRV2           ;DRIVE 2
 8237  044342  044476                          .WORD   QDRV3           ;DRIVE 3
 8238  044344  044516                          .WORD   QDRV4           ;DRIVE 4
 8239  044346  044536                          .WORD   QDRV5           ;DRIVE 5
 8240  044350  044556                          .WORD   QDRV6           ;DRIVE 6
 8241  044352  044576                          .WORD   QDRV7           ;DRIVE 7
 8242
 8243                                  ;QUEUE OUTPUT POINTERS
 8244
 8245  044354  044416                  QOUTPT: .WORD   QDRV0            ;DRIVE 0
 8246  044356  044436                          .WORD   QDRV1           ;DRIVE 1
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8247  044360  044456                  .WORD   QDRV2           ;DRIVE 2
8248  044362  044476                  .WORD   QDRV3           ;DRIVE 3
8249  044364  044516                  .WORD   QDRV4           ;DRIVE 4
8250  044366  044536                  .WORD   QDRV5           ;DRIVE 5
8251  044370  044556                  .WORD   QDRV6           ;DRIVE 6
8252  044372  044576                  .WORD   QDRV7           ;DRIVE 7
8253
8254  044374  044416          QSTART: .WORD   QDRV0           ;DRIVE 0 START ADDRESS
8255  044376  044436          QSTOP:  .WORD   QDRV1           ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
8256  044400  044456                  .WORD   QDRV2           ;STOP DRIVE 1--START DRIVE 2
8257  044402  044476                  .WORD   QDRV3           ;STOP DRIVE 2--START DRIVE 3
8258  044404  044516                  .WORD   QDRV4           ;STOP DRIVE 3--START DRIVE 4
8259  044406  044536                  .WORD   QDRV5           ;STOP DRIVE 4--START DRIVE 5
8260  044410  044556                  .WORD   QDRV6           ;STOP DRIVE 5--START DRIVE 6
8261  044412  044576                  .WORD   QDRV7           ;STOP DRIVE 6--START DRIVE 7
8262  044414  044616                  .WORD   QTERM           ;STOP DRIVE 7
8263
8264                          ;DRIVE REQUEST QUEUES
8265
8266  044416  000010          QDRV0:  .BLKW   10
8267  044436  000010          QDRV1:  .BLKW   10
8268  044456  000010          QDRV2:  .BLKW   10
8269  044476  000010          QDRV3:  .BLKW   10
8270  044516  000010          QDRV4:  .BLKW   10
8271  044536  000010          QDRV5:  .BLKW   10
8272  044556  000010          QDRV6:  .BLKW   10
8273  044576  000010          QDRV7:  .BLKW   10
8274          044616          QTERM=.
8275
8276                          ;ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
8277                          ;
8278                          ;CALL
8279                          ;       JSR     PC,CLRQUE
8280
8281  044616  104412          CLRQUE: SAVREG                  ;SAVE R0 - R5
8282  044620  012702  044324          MOV     #QCNT,R2        ;ZERO THE QUEUE COUNTS
8283  044624  005022                  CLR     (R2)+           ;DRIVES 0 & 1
8284  044626  005022                  CLR     (R2)+           ;DRIVES 2 & 3
8285  044630  005022                  CLR     (R2)+           ;DRIVES 4 & 5
8286  044632  005022                  CLR     (R2)+           ;DRIVES 6 & 7
8287  044634  012703  000010          MOV     #8.,R3          ;MOVE THE STARTING
8288  044640  012701  044374          MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
8289  044644  012122          1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
8290  044646  005303                  DEC     R3
8291  044650  001375                  BNE     1$
8292  044652  012703  000010          MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
8293  044656  012701  044374          MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
8294  044662  012122          2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
8295  044664  005303                  DEC     R3
8296  044666  001375                  BNE     2$
8297  044670  104413                  RESREG                  ;RESTORE R0 - R5
8298  044672  000207                  RTS     PC
8299
8300                          ;EMPTY THE QUEUE SPECIFIED BY R1
8301                          ;
8302                          ;CALL
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                                        ;       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$:     ASL     R1
                                                MOV     @QOUTPT(R1),R2  ;PICKUP "DPB" POINTER FOR THIS DRIVE
                                                ASR     R1
                                        2$:     RTS     PC              ;RETURN TO USER

                                        ;ROUTINE TO "POP" THE REQUEST FROM QUEUE
                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
                                        ;       JSR     PC,POPQUE       ;CALL TO REMOVE REQUEST
                                        ;       RETURN                  ;R2=ADDRESS OF DPB REMOVED

                                        POPQUE. DECB    QCNT(R1)        ;DECREMENT QUEUE COUNT
                                                ASL     R1
```

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8359  045020  017102  044354                  MOV     @QOUTPT(R1),R2  ;GET THE "DPB" POINTER
8360  045024  005071  044354                  CLR     @QOUTPT(R1)     ;REMOVE DPB ADDRESS FROM THE QUEUE
8361  045030  062761  000002  044354          ADD     #2,QOUTPT(R1)   ;UPDATE THE QUEUE POINTER
8362  045036  026161  044354  044376          CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
8363  045044  001003                          BNE     1$              ;NO--BRANCH TO EXIT
8364  045046  016161  044374  044354          MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
8365  045054  006201                  1$:     ASR     R1
8366  045056  000207                          RTS     PC              ;RETURN TO USER
8367
8368                                  ;ROUTINE TO SAVE THE CONTENTS OF '$ESCAPE' WHEN THE DRIVER
8369                                  ;REPORTS AN ERROR DIRECTLY.
8370                                  ;
8371                                  ;CALL
8372                                  ;       JSR     R0,ES.SAV
8373                                  ;       ERROR   N               ;;THE ERROR CALL
8374                                  ;       RETURN                  ;THE RETURN IS PAST THE ERROR CALL
8375
8376  045060  012037  045074          ES.SAV: MOV     (R0)+,1$        ;GET THE ERROR CALL
8377  045064  013746  001206                  MOV     $ESCAPE,-(SP)   ;SAVE THE ADDRESS IN '$ESCAPE'
8378  045070  005037  001206                  CLR     $ESCAPE         ;CLEAR THE ESCAPE RETURN
8379  045074  000000                  1$:     .WORD   0               ;THE ERROR CALL IS MOVED HERE
8380  045076  012637  001206                  MOV     (SP)+,$ESCAPE   ;RESTORE THE ESCAPE ADDRESS
8381  045102  000200                          RTS     R0              ;RETURN
8382
8383
8384                                  .SBTTL  ASCIZ MESSAGES
8385
8386  045104  000122                  MSG.R:  .ASCIZ  /R/
8387  045106  041506     000          MSG.FC: .ASCIZ  /FC/
8388  045111     114  000103          MSG.LC: .ASCIZ  /LC/
8389  045114  041506  000047          MSGFCP: .ASCIZ  /FC'/
8390  045120  041514  000047          MSGLCP: .ASCIZ  /LC'/
8391  045124  041511     000          MSG.IC: .ASCIZ  /IC/
8392  045127     106  000124          MSG.FT: .ASCIZ  /FT/
8393  045132  052114     000          MSG.LT: .ASCIZ  /LT/
8394  045135     111  000124          MSG.IT: .ASCIZ  /IT/
8395  045140  051506     000          MSG.FS: .ASCIZ  /FS/
8396  045143     114  000123          MSG.LS: .ASCIZ  /LS/
8397  045146  040520  000124          MSG.PAT:        .ASCIZ  /PAT
8398  045152  000075                  MSG.EQ: .ASCIZ  /=/
8399  045154  005015  047503  052116  MSG.CS: .ASCIZ  /<CR><LF>CONTROL SWITCHES=/
8400  045162  047522  020114  053523
8401  045170  052111  044103  051505
8402  045176  000075
8403
8404  045200  027440  000040          SLASH:  .ASCIZ  @ / @
8405  045204  047125  052111  051440  SYSTAT: .ASCIZ  /UNIT STATUS:/<CR><LF><LF>
8406  045212  040524  052524  035123
8407  045220  005015  000012
8408  045224  051104  053111  000105  UNTMSG: .ASCIZ  /DRIVE/
8409  045232  047440  043106  044514  UNTOFF: .ASCIZ  / OFFLINE/
8410  045240  042516     000
8411  045243     040  047117  044514  UNTON:  .ASCIZ  / ONLINE/
8412  045250  042516     000
8413  045253     040  047516  020124  NOTPRS: .ASCIZ  / NOT PRESENT
8414  045260  051120  051505  047105
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8415  045266  000124
8416  045270  052440  051516  043101  NOTSAF: .ASCIZ  / UNSAFE/
8417  045276  000105
8418  045300  047040  052117  051040  NOTRM:  .ASCIZ  @ NOT RM03/RM02@
8419  045306  030115  027463  046522
8420  045314  031060     000
8421  045317     122  030115  000062  ISRM02: .ASCIZ  /RM02/
8422  045324  046522  031460     000  ISRM03: .ASCIZ  /RM03/
8423  045331     015  042012  044522  DRIVES: .ASCIZ  <CR><LF>/DRIVE(S) TO BE TESTED /
8424  045336  042526  051450  020051
8425  045344  047524  041040  020105
8426  045352  042524  052123  042105
8427  045360  000040
8428  045362  047516  042516     000  NONE:   .ASCIZ  /NONE/
8429  045367     054     000          COMMA:  .ASCIZ  /,/
8430  045371     015  047012  020117  NOCLOK: .ASCIZ  <CR><LF>/NO KW11-P CLOCK, TIMING TESTS WILL NOT BE PERFORMED/
8431  045376  053513  030461  050055
8432  045404  041440  047514  045503
8433  045412  020054  044524  044515
8434  045420  043516  052040  051505
8435  045426  051524  053440  046111
8436  045434  020114  047516  020124
8437  045442  042502  050040  051105
8438  045450  047506  046522  042105
8439  045456     000
8440  045457     015  005012  042524  TESTNG: .ASCIZ  <CR><LF><LF>/TESTING DRIVE /
8441  045464  052123  047111  020107
8442  045472  051104  053111  020105
8443  045500     000
8444  045501     123  051105  040511  SERIAL: .ASCIZ  /SERIAL NUMBER /
8445  045506  020114  052516  041115
8446  045514  051105  000040
8447
8448  045520  005015  051012  052117  MSG7:   .ASCIZ  <CR><LF><LF>/ROTATIONAL SPEED TIMES/
8449  045526  052101  047511  040516
8450  045534  020114  050123  042505
8451  045542  020104  044524  042515
8452  045550  000123
8453  045552  005015  047412  042516  MSG10A: .ASCIZ  <CR><LF><LF>/ONE CYLINDER SEEK TIMES/<CR><LF>/ * FORWARD/
8454  045560  041440  046131  047111
8455  045566  042504  020122  042523
8456  045574  045505  052040  046511
8457  045602  051505  005015  025040
8458  045610  043040  051117  040527
8459  045616  042122     000
8460  045621     015  020012  020052  MSG10B: .ASCIZ  <CR><LF>/ * REVERSE/
8461  045626  042522  042526  051522
8462  045634  000105
8463  045636  005015  040412  041503  MSG11A: .ASCIZ  <CR><LF><LF>/ACCESS TIME MEASUREMENT/<CR><LF>/ * FORWARD.
8464  045644  051505  020123  044524
8465  045652  042515  046440  040505
8466  045660  052523  042522  042515
8467  045666  052116  005015  025040
8468  045674  043040  051117  040527
8469  045702  042122     000
8470  045705     015  020012  020052  MSG11B: .ASCIZ  <CR><LF>/ * REVERSE/
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8471  045712  042522  042526  051522
8472  045720  000105
8473  045722  005015  046412  054101  MSG12A: .ASCIZ  <CR><LF><LF>/MAXIMUM SEEK TIMES/<CR><LF>/ * FORWARD/
8474  045730  046511  046525  051440
8475  045736  042505  020113  044524
8476  045744  042515  006523  020012
8477  045752  020052  047506  053522
8478  045760  051101  000104
8479  045764  005015  025040  051040  MSG12B: .ASCIZ  <CR><LF>/ * REVERSE/
8480  045772  053105  051105  042523
8481  046000     000
8482
8483  046001     015  046412  047111  MSGMIN: .ASCIZ  <CR><LF>/MIN=/
8484  046006  000075
8485  046010  005015  040515  036530  MSGMAX: .ASCIZ  <CR><LF>/MAX=/
8486  046016     000
8487  046017     015  040412  043526  MSGAVG: .ASCIZ  <CR><LF>/AVG=/
8488  046024  000075
8489  046026  020060  051525     000  MSGOUS: .ASCIZ  /0 US/
8490  046033     040  042502  047514  MBELOW: .ASCIZ  / BELOW THE MINIMUM OF /
8491  046040  020127  044124  020105
8492  046046  044515  044516  052515
8493  046054  020115  043117  000040
8494  046062  040440  047502  042526  MABOVE: .ASCIZ  / ABOVE THE MAXIMUM OF /
8495  046070  052040  042510  046440
8496  046076  054101  046511  046525
8497  046104  047440  020106     000
8498  046111     040  042523  045505  MSGNUM: .ASCIZ  / SEEKS TIMED/
8499  046116  020123  044524  042515
8500  046124  000104
8501  046126  047040  052117  052040  MSGNON: .ASCIZ  / NOT TIMED/
8502  046134  046511  042105     000
8503  046141     040  000040          MSG.SP: .ASCIZ  /  /            ;TWO (2) SPACES
8504
8505                                  .SBTTL  ERROR HEADER (EM) MESSAGES
8506
8507  046144  044122  030067  044440  EM1:    .ASCIZ  /RH70 INTERRUPT OCCURRED (RMAS = 0)/
8508  046152  052116  051105  052522
8509  046160  052120  047440  041503
8510  046166  051125  042522  020104
8511  046174  051050  040515  020123
8512  046202  020075  024460     000
8513  046207     125  042516  050130  EM2:    .ASCIZ  /UNEXPECTED ATTENTION OCCURRED/
8514  046214  041505  042524  020104
8515  046222  052101  042524  052116
8516  046230  047511  020116  041517
8517  046236  052503  051122  042105
8518  046244     000
8519  046245     115  051501  041123  EM3:    .ASCIZ  /MASSBUS PARITY ERROR(MCPE=1)/
8520  046252  051525  050040  051101
8521  046260  052111  020131  051105
8522  046266  047522  024122  041515
8523  046274  042520  030475  000051
8524  046302  040515  051523  052502  EM4:    .ASCIZ  /MASSBUS PARITY ERROR(PAR=1)/
8525  046310  020123  040520  044522
8526  046316  054524  042440  051122
```

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8527  046324  051117  050050  051101
8528  046332  030475  000051
8529  046336  042101  051104  051505  EM5:    .ASCIZ  /ADDRESS PLUG CHANGE BIT SET/
8530  046344  020123  046120  043525
8531  046352  041440  040510  043516
8532  046360  020105  044502  020124
8533  046366  042523  000124
8534  046372  044122  030067  051057  EM10.   .ASCIZ  "RH70/RM03 FAILED TO RESPOND TO ADDRESSING"
8535  046400  030115  020063  040506
8536  046406  046111  042105  052040
8537  046414  020117  042522  050123
8538  046422  047117  020104  047524
8539  046430  040440  042104  042522
8540  046436  051523  047111  000107
8541  046444  051104  053111  020105  EM11:   .ASCIZ  /DRIVE SELECTED IS NOT ONLINE/
8542  046452  042523  042514  052103
8543  046460  042105  044440  020123
8544  046466  047516  020124  047117
8545  046474  044514  042516     000
8546  046501     111  050115  047522  EM12:   .ASCIZ  /IMPROPER HEADER DATA/
8547  046506  042520  020122  042510
8548  046514  042101  051105  042040
8549  046522  052101  000101
8550  046526  040504  040524  041440  EM13:   .ASCIZ  /DATA COMPARE FAILURE/
8551  046534  046517  040520  042522
8552  046542  043040  044501  052514
8553  046550  042522     000
8554  046553     104  051511  020113  EM17:   .ASCIZ  /DISK ERROR IN TIMING TEST/
8555  046560  051105  047522  020122
8556  046566  047111  052040  046511
8557  046574  047111  020107  042524
8558  046602  052123     000
8559  046605     103  047514  045503  EM20:   .ASCIZ  /CLOCK (KW11-P) OVERFLOW IN TIMING TEST/
8560  046612  024040  053513  030461
8561  046620  050055  020051  053117
8562  046626  051105  046106  053517
8563  046634  044440  020116  044524
8564  046642  044515  043516  052040
8565  046650  051505  000124
8566  046654  044504  045523  042440  EM23:   .ASCIZ  /DISK ERROR DURING SEEK/
8567  046662  051122  051117  042040
8568  046670  051125  047111  020107
8569  046676  042523  045505     000
8570  046703     123  042505  020113  EM24:   .ASCIZ  /SEEK NOT COMPLETE WITHIN 120 MS/
8571  046710  047516  020124  047503
8572  046716  050115  042514  042524
8573  046724  053440  052111  044510
8574  046732  020116  031061  020060
8575  046740  051515     000
8576  046743     122  033510  027460  EM41:   .ASCIZ  "RH70/RM03 ERROR"
8577  046750  046522  031460  042440
8578  046756  051122  051117     000
8579  046763     106  052101  046101  EM46:   .ASCIZ  /FATAL WRITE CHECK ERROR/
8580  046770  053440  044522  042524
8581  046776  041440  042510  045503
8582  047004  042440  051122  051117
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8583  047012     000
8584
8585                                        .SBTTL  STATUS/ERROR INDICATOR MESSAGES
8586
8587  047013     117  043106  044514  MSGB14: .ASCIZ  /OFFLINE OR UNSAFE DRIVE REQUESTED/
8588  047020  042516  047440  020122
8589  047026  047125  040523  042506
8590  047034  042040  044522  042526
8591  047042  051040  050505  042525
8592  047050  052123  042105     000
8593  047055     125  046116  040517  MSGB13: .ASCIZ  /UNLOADED DRIVE REQUESTED/
8594  047062  042504  020104  051104
8595  047070  053111  020105  042522
8596  047076  052521  051505  042524
8597  047104  000104
8598  047106  042520  051522  051511  MSGB12: .ASCIZ  /PERSISTENT UNSAFE/
8599  047114  042524  052116  052440
8600  047122  051516  043101  000105
8601  047130  040520  044522  054524  MSGB11: .ASCIZ  /PARITY ERROR OCCURRED/
8602  047136  042440  051122  051117
8603  047144  047440  041503  051125
8604  047152  042522  000104
8605  047156  040506  040524  020114  MSGB10: .ASCIZ  /FATAL PARITY ERROR/
8606  047164  040520  044522  054524
8607  047172  042440  051122  051117
8608  047200     000
8609  047201     123  043117  053524  MSGB09: .ASCIZ  /SOFTWARE TIMEOUT ON THIS DRIVE/
8610  047206  051101  020105  044524
8611  047214  042515  052517  020124
8612  047222  047117  052040  044510
8613  047230  020123  051104  053111
8614  047236  000105
8615  047240  047523  052106  040527  MSGB08: .ASCIZ  /SOFTWARE TIMEOUT ON ANOTHER DRIVE/
8616  047246  042522  052040  046511
8617  047254  047505  052125  047440
8618  047262  020116  047101  052117
8619  047270  042510  020122  051104
8620  047276  053111  000105
8621  047302  051105  047522  020122  MSGB06: .ASCIZ  "ERROR OCCURRED DURING I/O OPERATION"
8622  047310  041517  052503  051122
8623  047316  042105  042040  051125
8624  047324  047111  020107  027511
8625  047332  020117  050117  051105
8626  047340  052101  047511  000116
8627  047346  051105  047522  020122  MSGB05: .ASCIZ  "ERROR OCCURRED DURING NON-I/O OPERATION"
8628  047354  041517  052503  051122
8629  047362  042105  042040  051125
8630  047370  047111  020107  047516
8631  047376  026516  027511  020117
8632  047404  050117  051105  052101
8633  047412  047511  000116
8634  047416  047125  040523  042506  MSGB04: .ASCIZ  /UNSAFE OCCURRED/
8635  047424  047440  041503  051125
8636  047432  042522  000104
8637  047436  052501  047524  040515  MSGB03: .ASCIZ   AUTOMATIC RECALIBRATE SEQUENCE OCCURRED
8638  047444  044524  020103  042522
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8639  047452  040503  044514  051102
8640  047460  052101  020105  042523
8641  047466  052521  047105  042503
8642  047474  047440  041503  051125
8643  047502  042522  000104
8644  047506  051104  053111  020105  MSGB02: .ASCIZ  /DRIVE HAS NOT RESPONDED TO PORT REQUEST/
8645  047514  040510  020123  047516
8646  047522  020124  042522  050123
8647  047530  047117  042504  020104
8648  047536  047524  050040  051117
8649  047544  020124  042522  052521
8650  047552  051505  000124
8651  047556  051104  053111  020105  MSGB01: .ASCIZ  /DRIVE HAS BECOME NON-EXISTENT/
8652  047564  040510  020123  042502
8653  047572  047503  042515  047040
8654  047600  047117  042455  044530
8655  047606  052123  047105  000124
8656
8657                                  .SBTTL  DATA HEADER (DT) MESSAGES
8658
8659  047614  051105  020122  041520  DH1:    .ASCIZ  /ERR PC  RMAS/
8660  047622  020040  046522  051501
8661  047630     000
8662  047631     105  051122  050040  DH2:    .ASCIZ  /ERR PC  DRIVE   RMAS    RMDS    RMER1   RMMR2   RMER2/
8663  047636  020103  042040  044522
8664  047644  042526  020040  051040
8665  047652  040515  020123  020040
8666  047660  051040  042115  020123
8667  047666  020040  046522  051105
8668  047674  020061  020040  046522
8669  047702  051115  020062  020040
8670  047710  046522  051105  000062
8671  047716  042524  052123  020040  DH3:    .ASCIZ  /TEST    ERR PC  ADDRESS DATA/
8672  047724  020040  051105  020122
8673  047732  041520  020040  042101
8674  047740  051104  051505  020123
8675  047746  040504  040524     000
8676  047753     124  051505  020124  DH4:    .ASCIZ  /TEST    ERR PC  ADDRESS GDDATA  BDDATA/
8677  047760  020040  042440  051122
8678  047766  050040  020103  040440
8679  047774  042104  042522  051523
8680  050002  043440  042104  052101
8681  050010  020101  041040  042104
8682  050016  052101  000101
8683  050022  046522  051503  020061  DH10:   .ASCIZ  /RMCS1   ERR PC/
8684  050030  020040  051105  020122
8685  050036  041520     000
8686  050041     104  044522  042526  DH11:   .ASCIZ  /DRIVE   ERR PC/
8687  050046  020040  042440  051122
8688  050054  050040  000103
8689  050060  042524  052123  020040  DH12:   .ASCIZ  /TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
8690  050066  020040  051105  020122
8691  050074  041520  020040  051524
8692  050102  020124  041520  020040
8693  050110  051104  053111  020105
8694  050116  020040  054503  047114
```

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8695  050124  051104  020040  051124
8696  050132  041501  020113  020040
8697  050140  042523  052103  051117
8698  050146     000
8699  050147     107  041504  046131  DH12A:  .ASCIZ  /GDCYL   GDTRK   GDSCTR  BDCYL   BDTRK   BDSCTR/
8700  050154  020040  043440  052104
8701  050162  045522  020040  043440
8702  050170  051504  052103  020122
8703  050176  041040  041504  046131
8704  050204  020040  041040  052104
8705  050212  045522  020040  041040
8706  050220  051504  052103  000122
8707  050226  042107  040504  020124  DH13A:  .ASCIZ  /GDDAT   BDDAT   WRDCNT  GDADR   BDADR/
8708  050234  020040  042102  040504
8709  050242  020124  020040  051127
8710  050250  041504  052116  020040
8711  050256  042107  042101  020122
8712  050264  020040  042102  042101
8713  050272  000122
8714  050274  042524  052123  020040  DH17:   .ASCIZ  /TEST    ERR PC  DRIVE   RMCS1   RMDS    RMER1   RMMR2   RMER2/
8715  050302  020040  051105  020122
8716  050310  041520  020040  051104
8717  050316  053111  020105  020040
8718  050324  046522  051503  020061
8719  050332  020040  046522  051504
8720  050340  020040  051040  042515
8721  050346  030522  020040  051040
8722  050354  046515  031122  020040
8723  050362  051040  042515  031122
8724  050370     000
8725  050371     124  051505  020124  DH21:   .ASCIZ  /TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK/
8726  050376  020040  042440  051122
8727  050404  050040  020103  052040
8728  050412  052123  050040  020103
8729  050420  042040  044522  042526
8730  050426  020040  041440  046131
8731  050434  042116  020122  052040
8732  050442  040522  045503     000
8733  050447     107  042104  052101  DH21A:  .ASCIZ  /GDDAT   BDDAT   WRDCNT  SECTOR/
8734  050454  020040  041040  042104
8735  050462  052101  020040  053440
8736  050470  042122  047103  020124
8737  050476  051440  041505  047524
8738  050504  000122
8739  050506  042524  052123  020040  DH23:   .ASCIZ  /TEST    ERR PC  DRIVE   CYLNDR  RMCS1   RMCS2   RMDS
8740  050514  020040  051105  020122
8741  050522  041520  020040  051104
8742  050530  053111  020105  020040
8743  050536  054503  047114  051104
8744  050544  020040  046522  051503
8745  050552  020061  020040  046522
8746  050560  051503  020062  020040
8747  050566  046522  051504     000
8748  050573     122  042515  030522  DH23A:  .ASCIZ  /RMER1   RMMR2   RMER2   RMDC    RMHR
8749  050600  020040  051040  046515
8750  050606  031122  020040  051040
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 8751  050614  042515  031122  020040
 8752  050622  051040  042115  020103
 8753  050630  020040  051040  044115
 8754  050636  000122
 8755  050640  042524  052123  020040  DH41:   .ASCIZ  /TEST    ERR PC  TST PC  DRIVE/
 8756  050646  020040  051105  020122
 8757  050654  041520  020040  051524
 8758  050662  020124  041520  020040
 8759  050670  051104  053111  000105
 8760  050676  042524  052123  020040  DH42:   .ASCIZ  /TEST    ERR PC  TST PC  DRIVE   RMCS1   RMCS2   RMDS/
 8761  050704  020040  051105  020122
 8762  050712  041520  020040  051524
 8763  050720  020124  041520  020040
 8764  050726  051104  053111  020105
 8765  050734  020040  046522  05.503
 8766  050742  020061  020040  046522
 8767  050750  051503  020062  020040
 8768  050756  046522  051504     000
 8769  050763     122  042515  030522  DH43A:  .ASCIZ  /RMER1   RMMR2   RMER2/
 8770  050770  020040  051040  046515
 8771  050776  031122  020040  051040
 8772  051004  042515  031122     000
 8773  051011     122  041515  030523  DH44A:  .ASCIZ  /RMCS1   RMCS2   RMDS    RMHR    RMDC    RMDA/
 8774  051016  020040  051040  041515
 8775  051024  031123  020040  051040
 8776  051032  042115  020123  020040
 8777  051040  046522  051110  020040
 8778  051046  020040  046522  041504
 8779  051054  020040  020040  046522
 8780  051062  040504     000
 8781  051065     122  042515  030522  DH44B:  .ASCIZ  /RMER1   RMMR2   RMER2/
 8782  051072  020040  051040  046515
 8783  051100  031122  020040  051040
 8784  051106  042515  031122     000
 8785  051113     122  042515  030522  DH45A:  .ASCIZ  /RMER1   RMMR2   RMER2   RMWC    RMBA    RMDB/
 8786  051120  020040  051040  046515
 8787  051126  031122  020040  051040
 8788  051134  042515  031122  020040
 8789  051142  051040  053515  020103
 8790  051150  020040  051040  041115
 8791  051156  020101  020040  051040
 8792  051164  042115  000102
 8793
 8794
 8795                                  .EVEN
 8796
 8797                                  .SBTTL  DATA TABLE (DT)
 8798
 8799  051170  001116  001170        DT1:    .WORD   $ERRPC,$REG3
 8800  051174  001116  001164  001170  DT2:    .WORD   $ERRPC,$REG1,$REG3,RMERRS,RMERRS+2,RMERRS+4,RMERRS+6
 8801  051202  036570  036572  036574
 8802  051210  036576
 8803  051212  001176  001116  043606  DT3:    .WORD   $TMP0,$ERRPC,RD.ADR,RD.WRD
 8804  051220  043610
 8805  051222  001176  001116  044032  DT4:    .WORD   $TMP0,$ERRPC,WRT.ADR,WRT.WD,RD.WRD
 8806  051230  044030  043610
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8807  051234  001176  001116  001164  DT5:    .WORD   $TMPO,$ERRPC,$REG1,$REG5,RMERRS,RMERRS+2,RMERRS+4,RMERRS+6
8808  051242  001174  036570  036572
8809  051250  036574  036576
8810  051254  001450  001116          DT10:   .WORD   RH.ADR,$ERRPC
8811  051260  001166  001116          DT11:   .WORD   $REG2,$ERRPC
8812  051264  001176  001116  001162  DT12:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS,SEC.DS
8813  051272  001334  001350  001354
8814  051300  001352
8815  051302  001350  001354  001352  DT12A:  .WORD   CYL.DS,TRK.DS,SEC.DS,CYL.RD,TRK.RD,SEC.RD
8816  051310  001342  001344  001346
8817  051316  001176  001116  001162  DT13:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS,SEC.DS
8818  051324  001334  001350  001354
8819  051332  001352
8820  051334  001124  001126  001172  DT13A:  .WORD   $GDDAT,$BDDAT,$REG4,$GDADR,$BDADR
8821  051342  001120  001122
8822  051346  001176  001116  001334  DT17:   .WORD   $TMPO,$ERRPC,CHKDRV,RM.REG,RM.REG+12,RM.REG+14,RM.REG+40,RM.REG+42
8823  051354  004306  004320  004322
8824  051362  004346  004350
8825  051366  001176  001116  001162  DT21:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS
8826  051374  001334  001350  001354
8827  051402  001164  001126  001172  DT21A:  .WORD   $REG1,$BDDAT,$REG4,$REG1
8828  051410  001164
8829  051412  001176  001116  001334  DT23:   .WORD   $TMPO,$ERRPC,CHKDRV,CYL.DS,RM.REG,RM.REG+10,RM.REG+12
8830  051420  001350  004306  004316
8831  051426  004320
8832  051430  004322  004346  004350  DT23A:  .WORD   RM.REG+14,RM.REG+40,RM.REG+42,RM.REG+34,RM.REG+36
8833  051436  004342  004344
8834  051442  001176  001116  001162  DT41:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV
8835  051450  001334
8836  051452  001176  001116  001162  DT42:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,RM.REG,RM.REG+10,RM.REG+12
8837  051460  001334  004306  004316
8838  051466  004320
8839  051470  001176  001116  001162  DT43:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,RM.REG,RM.REG+10,RM.REG+12
8840  051476  001334  004306  004316
8841  051504  004320
8842  051506  004322  004346  004350  DT43A:  .WORD   RM.REG+14,RM.REG+40,RM.REG+42
8843  051514  001176  001116  001162  DT44:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS,SEC.DS
8844  051522  001334  001350  001354
8845  051530  001352
8846  051532  004306  004316  004320  DT44A:  .WORD   RM.REG,RM.REG+10,RM.REG+12,RM.REG+36,RM.REG+34,RM.REG+06
8847  051540  004344  004342  004314
8848  051546  004322  004346  004350  DT44B:  .WORD   RM.REG+14,RM.REG+40,RM.REG+42
8849  051554  001176  001116  001162  DT45:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS,SEC.DS
8850  051562  001334  001350  001354
8851  051570  001352
8852  051572  004306  004316  004320  DT45A:  .WORD   RM.REG,RM.REG+10,RM.REG+12,RM.REG+36,RM.REG+34,RM.REG+06
8853  051600  004344  004342  004314
8854  051606  004322  004346  004350  DT45B:  .WORD   RM.REG+14,RM.REG+40,RM.REG+42,RM.REG+2,RM.REG+4,RM.REG+22
8855  051614  004310  004312  004330
8856
8857                                  .SBTTL  DATA FORMAT (DF) TABLE
8858
8859  051622  000001                  DF1:    .WORD   1               ;NUMBER OF DATA HEADERS
8860  051624     002                          .BYTE   2               ;NUMBER OF WORDS IN DATA TABLE
8861  051625     000                          .BYTE   0               ;ALL 3 NUMBERS ARE OCTAL
8862
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8863  051626  000001          DF2:    .WORD   1
8864  051630     007                  .BYTE   7
8865  051631     000                  .BYTE   0
8866
8867  051632  000001          DF3:    .WORD   1
8868  051634     004                  .BYTE   4
8869  051635     000                  .BYTE   0
8870
8871  051636  000001          DF4:    .WORD   1
8872  051640     005                  .BYTE   5
8873  051641     000                  .BYTE   0
8874
8875  051642  000001          DF10:   .WORD   1
8876  051644     002                  .BYTE   2
8877  051645     000                  .BYTE   0
8878
8879  051646  000001          DF11:   .WORD   1
8880  051650     002                  .BYTE   2
8881  051651     000                  .BYTE   0
8882
8883  051652  000002          DF12:   .WORD   2               ;2 DH'S TO BE TYPED
8884  051654     007                  .BYTE   7               ;7 DATA WORDS FOLLOW THE 1ST DH
8885  051655     160                  .BYTE   160             ;WORDS 1-4 ARE OCTAL 5-7 ARE DECIMAL
8886  051656  050147                  .WORD   DH12A           ;ADDRESS OF 2ND DH
8887  051660     006                  .BYTE   6               ;6 DATA WORDS FOLLOW THE 2ND DH
8888  051661     000                  .BYTE   0               ;ALL WORDS ARE OCTAL
8889
8890  051662  000002          DF13:   .WORD   2
8891  051664     007                  .BYTE   7
8892  051665     160                  .BYTE   160
8893  051666  050226                  .WORD   DH13A
8894  051670     005                  .BYTE   5
8895  051671     004                  .BYTE   4               ;WORD 3 IS DECIMAL
8896
8897  051672  000000          DF14:   .WORD   0
8898  051674     005                  .BYTE   5
8899  05[illegible]75     004         .BYTE   4               ;WORD 3 IS DECIMAL
8900
8901  051676  000001          DF17:   .WORD   1
8902  051700     010                  .BYTE   ↑D8
8903  051701     000                  .BYTE   0
8904
8905  051702  000002          DF21:   .WORD   2
8906  051704     006                  .BYTE   6
8907  051705     060                  .BYTE   60
8908  051706  050447                  .WORD   DH21A
8909  051710     004                  .BYTE   4
8910  051711     014                  .BYTE   14
8911
8912  051712  000000          DF22:   .WORD   0
8913  051714     004                  .BYTE   4
8914  051715     014                  .BYTE   14
8915
8916  051716  000002          DF23:   .WORD   2
8917  051720     007                  .BYTE   7
8918  051721     010                  .BYTE   10              ;WORD 4 IS DECIMAL
```

```
8919  051722  050523                        .WORD   DH23A
8920  051724     005                        .BYTE   5
8921  051725     000                        .BYTE   0
8922
8923
8924  051726  000001          DF41:         .WORD   1
8925  051730     004                        .BYTE   4
8926  051731     000                        .BYTE   0
8927
8928  051732  000001          DF42:         .WORD   1
8929  051734     007                        .BYTE   7
8930  051735     000                        .BYTE   0
8931
8932  051736  000002          DF43:         .WORD   2
8933  051740     007                        .BYTE   7
8934  051741     000                        .BYTE   0
8935  051742  050763                        .WORD   DH43A
8936  051744     003                        .BYTE   3
8937  051745     000                        .BYTE   0
8938
8939  051746  000003          DF44:         .WORD   3
8940  051750     007                        .BYTE   7
8941  051751     160                        .BYTE   160
8942  051752  051011                        .WORD   DH44A
8943  051754     006                        .BYTE   6
8944  051755     000                        .BYTE   0
8945  051756  051065                        .WORD   DH44B
8946  051760     003                        .BYTE   3
8947  051761     000                        .BYTE   0
8948
8949  051762  000003          DF45:         .WORD   3
8950  051764     007                        .BYTE   7
8951  051765     160                        .BYTE   160
8952  051766  051011                        .WORD   DH44A
8953  051770     006                        .BYTE   6
8954  051771     000                        .BYTE   0
8955  051772  051113                        .WORD   DH45A
8956  051774     006                        .BYTE   6
8957  051775     000                        .BYTE   0
8958
8959                          .EVEN
8960        051776            BUFFER=.
8961
8962  051776  005015  041412  051132  TITLE:  .ASCII  <CR><LF><LF>/CZRMFB0/<CR><LF>
8963  052004  043115  030102  005015
8964  052012  046522  031460  051057          .ASCIZ  @RM03/RM02 EXTENDED DRIVE TEST@<CR><LF>
8965  052020  030115  020062  054105
8966  052026  042524  042116  042105
8967  052034  042040  044522  042526
8968  052042  052040  051505  006524
8969  052050  000012
8970  052052  005015  047524  052040  LOADRV: .ASCII  <CR><LF>/TO TEST DRIVE 0 REPLACE THE 'XXDP' PACK ON DRIVE 0/<CR><LF>
8971  052060  051505  020124  051104
8972  052066  053111  020105  020060
8973  052074  042522  046120  041501
8974  052102  020105  044124  020105
```

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8975  052110  054047  042130  023520
8976  052116  050040  041501  020113
8977  052124  047117  042040  044522
8978  052132  042526  030040  005015
8979  052140  044527  044124  040440          .ASCII  /WITH ANOTHER PACK, CLEAR MEMORY LOCATION 40, AND RESTART/<CR><LF>
8980  052146  047516  044124  051105
8981  052154  050040  041501  026113
8982  052162  041440  042514  051101
8983  052170  046440  046505  051117
8984  052176  020131  047514  040503
8985  052204  044524  047117  032040
8986  052212  026060  040440  042116
8987  052220  051040  051505  040524
8988  052226  052122  005015
8989  052232  044124  020105  051120          .ASCIZ  /THE PROGRAM/<CR><LF>
8990  052240  043517  040522  006515
8991  052246  000012
8992  052250  005015  054523  052123  NOLOAD: .ASCIZ  <CR><LF>/SYSTEM HAS 16K MEMORY, 'XXDP' LOADER WILL BE OVERWRITTEN/<CR>
8993  052256  046505  044040  051501
8994  052264  030440  045466  046440
8995  052272  046505  051117  026131
8996  052300  023440  054130  050104
8997  052306  020047  047514  042101
8998  052314  051105  053440  046111
8999  052322  020114  042502  047440
9000  052330  042526  053522  044522
9001  052336  052124  047105  005015
9002  052344  000012
9003
9004                                  .EVEN
9005
9006                                  .SBTTL  ROUTINE TO SIZE MEMORY
9007
9008                                  ;;*************************************************************
9009                                  ;*CALL:
9010                                  ;*      JSR     PC,$SIZE
9011                                  ;*      RETURN
9012                                  ;*$LSTAD WILL CONTAIN THE LAST AVAILABLE MEMORY LOCATION
9013
9014  052346  010046                  $SIZE:  MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
9015  052350  010146                          MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
9016  052352  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE PRESENT ERROR VECTOR PS & PC
9017  052356  013746  000006                  MOV     @#ERRVEC+2,-(SP)
9018  052362  010600                          MOV     SP,R0           ;;SAVE THE STACK POINTER
9019                                  ;;SET THE ERRVEC PS TO THE PRESENT PS
9020  052364  104400                          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
9021  052366  012637  000006                  MOV     (SP)+,@#ERRVEC+2        ;;SAVE THE PSW IN @#ERRVEC+2
9022  052372  012737  052412  000004          MOV     #2$,@#ERRVEC    ;;SET FOR TIMEOUT
9023  052400  012701  020000                  MOV     #20000,R1       ;;FIRST ADDRESS
9024  052404  005711                  1$:     TST     (R1)            ;;TEST THIS ADDRESS
9025  052406  005721                          TST     (R1)+           ;;STEP TO NEXT ADDRESS
9026  052410  000775                          BR      1$              ;;TRY ANOTHER
9027  052412  162701  000002          2$:     SUB     #2,R1           ;;DROP BACK
9028  052416  010006                          MOV     R0,SP           ;;RESTORE THE STACK
9029  052420  012637  000006                  MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
9030  052424  012637  000004                  MOV     (SP)+,@#ERRVEC
```

```
9031  052430  010137  052442          MOV     R1,$LSTAD       ;;LAST ADDRESS
9032  052434  012601                  MOV     (SP)+,R1        ;;RESTORE R1
9033  052436  012600                  MOV     (SP)+,R0        ;;RESTORE R0
9034  052440  000207                  RTS     PC
9035  052442  000000          $LSTAD: .WORD   0               ;;CONTAINS THE LAST ADDRESS
9036
9037                          ;;*****************************************************************
9038                          ;.SBTTL  GETADR - GET BUS ADDRESS AND VECTOR ADDRESS
9039                          ;THIS ROUTINE IS USED TO ENSURE THE BUS ADDRESS
9040                          ;OF THE RH70/RM03 IS SETUP TO READ THE PROPER VALUE.
9041                          ;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
9042                          ;REQUIRED.
9043                          ;NOTE: THIS ROUTINE DESTROYS R0-R4
9044                          ;CALL
9045                          ;
9046                          ;       JSR     PC,@#GETADR
9047                          ;       RETURN
9048
9049  052444  005737  001306  GETADR: TST     @#BUSADR        ;INPUT FROM TTY REQUESTED?
9050  052450  001427                  BEQ     7$              ;NO--BRANCH
9051  052452  005037  001306          CLR     @#BUSADR        ;YES---CLEAR THE REQUEST FLAG
9052  052456  012700  001450  1$:     MOV     #RH.ADR,R0      ;FIRST ADDRESS
9053  052462  012703  052622          MOV     #MRMCS1,R3      ;"RMCS1="
9054  052466  011004                  MOV     (R0),R4         ;PRESENT RMCS1 ADDRESS
9055  052470  004037  033740          JSR     R0,@#GETNUM     ;GET NEW RMCS1
9056  052474  000402                  BR      2$              ;COMMA
9057  052476  000767                  BR      1$              ;PERIOD
9058  052500  000412                  BR      5$              ;DOUBLE PERIOD
9059  052502  010420          2$:     MOV     R4,(R0)+        ;SAVE NEW RMCS1
9060  052504  012703  052712          MOV     #MRHVEC,R3      ;"RHVEC="
9061  052510  011004                  MOV     (R0),R4         ;PRESENT RH70 VECTOR ADDRESS
9062  052512  004037  033740          JSR     R0,@#GETNUM     ;GET NEW RHVEC
9063  052516  000402                  BR      3$              ;COMMA
9064  052520  000756                  BR      1$              ;PERIOD
9065  052522  000401                  BR      5$              ;DOUBLE PERIOD
9066  052524  010420          3$:     MOV     R4,(R0)+        ;SAVE NEW RHVEC
9067  052526  010410          5$:     MOV     R4,(R0)         ;SAVE INPUT
9068  052530  013701  000004  7$:     MOV     @#ERRVEC,R1     ;SAVE THE ERROR VECTOR
9069  052534  012737  052570  000004  MOV     #8$,@#ERRVEC    ;SETUP FOR TRAP
9070  052542  005777  126702          TST     @RH.ADR         ;CHECK FOR RH70/RM03
9071  052546  010137  000004          MOV     R1,@#ERRVEC     ;RESTORE ERROR VECTOR
9072  052552  012700  001450          MOV     #RH.ADR,R0      ;FIRST ADDRESS OF NEW PARAMETERS
9073  052556  012701  036736          MOV     #RMADR,R1       ;FIRST ADDRESS OF WHERE TO PUT THEM
9074  052562  012021                  MOV     (R0)+,(R1)+     ;BUS ADDRESS
9075  052564  012021                  MOV     (R0)+,(R1)+     ;VECTOR ADDRESS
9076  052566  000207                  RTS     PC              ;RETURN
9077  052570  010137  000004  8$:     MOV     R1,@#ERRVEC     ;RESTORE ERROR VECTOR
9078  052574  022626                  CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
9079  052576  104010                  ERROR   10              ;REPORT THE ERROR
9080  052600  005737  000042          TST     @#42            ;IS THERE A MONITOR?
9081  052604  001724                  BEQ     1$              ;NO--GO ASK FOR ADDRESS
9082  052606  005037  001312          CLR     @#DRVSEL        ;YES--NO DRIVES SELECTED
9083  052612  005037  021226          CLR     @#$EOPCT        ;NO PASSES
9084  052616  000137  021052          JMP     @#$EOP          ;GO TO END OF PROGRAM
9085
9086  052622  005015  047105  042524  MRMCS1: .ASCII  <CR><LF><ENTER SIX OCTAL DIGITS,FOLLOWED BY . AND  CR
```

```
 9087  052630  020122  044523  020130
 9088  052636  041517  040524  020114
 9089  052644  044504  044507  051524
 9090  052652  043054  046117  047514
 9091  052660  042527  020104  054502
 9092  052666  026040  040440  042116
 9093  052674  036040  051103     076
 9094  052701     015  051012  041515          .ASCIZ  <CR><LF>/RMCS1=/
 9095  052706  030523  000075
 9096  052712  005015  044122  042526  MRHVEC: .ASCIZ  <CR><LF>/RHVEC=/
 9097  052720  036503     000
 9098          000001                  .END
```

```
ABASE  = 000000            533      574
ACDW1  = 000000            533
ACDW2  = 000000            533
ACPUOP= 000000             533      548
ACTDRV  036654            7069#    7342*    7393*    7719*    7728*    7974
ACTSTR  036655            7075#    7976*    7990*
ADDW0  = 000000            533
ADDW1  = 000000            533
ADDW10= 000000             533
ADDW11= 000000             533
ADDW12= 000000             533
ADDW13= 000000             533
ADDW14= 000000             533
ADDW15= 000000             533
ADDW2  = 000000            533
ADDW3  = 000000            533
ADDW4  = 000000            533
ADDW5  = 000000            533
ADDW6  = 000000            533
ADDW7  = 000000            533
ADDW8  = 000000            533
ADDW9  = 000000            533
ADEVCT= 000000             533      539
ADEVM  = 000000            533      575
AENV   = 000000            533      544
AENVM  = 000000            533      545
AFATAL= 000000             533      536
AMADR1= 000000             533      561
AMADR2= 000000             533      565
AMADR3= 000000             533      568
AMADR4= 000000             533      571
AMAMS1= 000000             533      555
AMAMS2= 000000             533      563
AMAMS3= 000000             533      566
AMAMS4= 000000             533      569
AMSGAD= 000000             533      541
AMSGLG= 000000             533      542
AMSGTY= 000000             533      535
AMTYP1= 000000             533      556
AMTYP2= 000000             533      564
AMTYP3= 000000             533      567
AMTYP4= 000000             533      570
AOE    = 001000            284#
APASS  = 000000            533      538
APRIOR= 000000             533
APTCSU= 000040            4052#    4251
APTENV= 000001            4008     4050#    4090     4244
APTSIZ= 000200            1831     4049#
APTSPO= 000100            4010     4051#    4246
ASWREG= 000000             533      546
ATA    = 100000            271#
ATABIT  036724            1943     6414     6420     7141#    7309     7405     7511     7893     7915     7923     7924     7944     8034
ATESTN= 000000             533      537
ATO    = 000001            332#
AT1    = 000002            333#
AT2    = 000004            334#
```

```
AT3     = 000010            335#
AT4     = 000020            336#
AT5     = 000040            337#
AT6     = 000100            338#
AT7     = 000200            339#
AUNIT   = 000000            533     540
AUSWR   = 000000            533     547
AVECT1= 000000              533     572
AVECT2= 000000              533     573
A16     = 000400            207#
A17     = 001000            208#
BAI     = 000010            225#
BASFLG  001446              630#  2182#  3865   3884   5454#  5491#  5524#
BITS    001506              647#  2106   2156   2211   2270   2326   2422   2481   2547   2652   2825   2907   3043
                           3155   3269   3399   3486   3631   3706   3792   3910   6481   6512   6529   6582   6756
BIT0    = 000001            182#
BIT00 = 000001              172#   182    647    663   1931   1953   2008   5189
BIT01 = 000002              171#   181    648    664   5549   5577   7385   7640
BIT02 = 000004              170#   180    649    665   5252   5549   5580
BIT03 = 000010              169#   179    650    666   5586   7851   8152
BIT04 = 000020              168#   178    651    667   5583   7886
BIT05 = 000040              167#   177    652    668   2711   2727   2803   2984   2998   3013   3018   3102   3126
                           3131   3206   3224   3241   3246   3320   3338   3355   3360   5586   5701   7231   7661
                           7866
BIT06 = 000100              166#   176    653    669   5589   7318   7376   7450   7759   8213
BIT07 = 000200              165#   175    654    670   7318   7585   7740   7851   7866   7886   7919   8185
BIT08 = 000400              164#   174    655   5577   7318
BIT09 = 001000              163#   173    656   4101   4736   5592   8025
BIT1    = 000002            181#
BIT10 = 002000              162#   657   4078   5201   5549   5580   6775   7642
BIT11 = 004000              161#   658   4743   5580   7278   7412   7606   7960
BIT12 = 010000              160#   659   5549   5583   7273   7300   7318   7387   7420   7600   7623   7638   7652
                           7876   7878   8090   8147   8214
BIT13 = 020000              159#   660   4085   5549   5577   7370   7822   8093
BIT14 = 040000              158#   661   2722   2979   2993   3097   3201   3219   3315   3333   4718   5463   5549
                           5583   7382   7417   7809   7955   8055   8102   8106   8211
BIT15 = 100000              157#   662   5316   5355   5402   5452   5489   5522   5598   5746   5747   7370   7382
                           7385   7387   7417   7420   7606   7640   7642   7759   7851   7866   7876   7886   7955
                           8025   8055   8062
BIT2    = 000004            180#   8062
BIT3    = 000010            179#
BIT4    = 000020            178#
BIT5    = 000040            177#
BIT6    = 000100            176#
BIT7    = 000200            175#
BIT8    = 000400            174#
BIT9    = 001000            173#
BPTVEC= 000014              189#
BUFFER= 051776             1321   1345   1369   1393   2688   3433   3448   3461   3520   3530   3544   3690   3824
                           3851   3861   3872   3880   3891   5665#  5666   5668   5670   5671   5672   5745   5782
                           5925   5944   5945   5969   6058   6090   6133   6175   6192   6193   6210   8960#
BUSADR  001306              583#  1782#  1784#  1787#  1789#  9049   9051#
BYPASS  001332              592#  2006#  2136#  2189#  2240#  2299#  2355#  2451#  2510#  2577#  2695#  2858#  3425#
                           3512#  3691#  3819#  5531   6016   6162   6227
.CALL.A 027054             2012   2014   2139   2596   3924   3929   5295#  5298   5680
.CALL.B 027206             2140   2193   2245   2253   2303   2308   2365   2371   2387   2393   2457   2459   2519
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                    2521    2523    2525    2527    2529    2618    2862    5331#   5334
CALL.C  027410      2192    2861    5378#   5381
CHKDRV  001334       593#   1985#   1990#   1995    3955    5240    8812    8817    8822    8825    8829    8834    8836
                    8839    8843    8849
CI1     040232      7440    7468#
CI3     040340      7442    7491#
CI4     040440      7431    7513#
CI5     041016      7490    7512    7590#   7599
CI6     041040      7529    7539    7541    7543    7595#
CI7     041054      7372    7449    7480    7484    7488    7496    7506    7510    7521    7528    7534    7538    7552
                    7558    7562    7572    7583    7598    7600#   7714    7744    7905    8197
CI7B    041076      7608#   7909
CI8     041154      7611    7622#   8047
CKSCTR  032232      3447    5966#
CKSWR = 104407      4068    4100    4717    4846#
CK.CHR  036210      6348    6398    6625    6662    6702    6828#   6865    6878    6889    6940
CK.DEC  036162      6806#   6836
CK.DIG  036264      6408    6646    6859#
CK.NUM  036450      6357    6678    6711    6923#
CK.OCT  036134      6461    6465    6485    6489    6788#   6925    6935
CLKSTA  001324       588#   1975    2700    2730    2932    3075    3181    3295    5119*   5121*   5127*
CLOSE   036054      6746    6750    6759#
CLR   = 000040       227#
CLRBUF  032164      3444    5942#
CLRQUE  044616      2694    7213    7660    8281#
CLSWDS  035754      6730    6734    6737#
CNTRLC  001304       582#   1785#   1790#   1883    1927
COMMA   045367      1971    8429
CONT  = 000100       300#
COUNT   031342      3002    3106    3211    3229    3325    3343    5761#
CR    = 000015        97#    578#   3948    3979    4290    4300    6315    6395    8399    8405    8423    8430    8440
                    8448    8453    8460    8463    8470    8473    8479    8483    8485    8487    8962    8964    8970
                    8979    8989    8992    9086    9094    9096
CRLF  = 000200        38#    4261    4300
CYL.DS  001350       600#   2714#   5303#   5339#   5386#   5439#   5476#   5509#   5675#   5713#   6032#   6146#   8812
                    8815    8817    8825    8829    8843    8849
CYL.RD  001342       597#   5670#   8815
C.SWR   001300       580#   1930    1933    1948    2008    2357    2952    3022    3826    5134    5144    5154    5189
                    5279    5366    5413    5532    5621    6317    6321    6322#
DATCMP  032672      3756    6089#
DCK   = 100000       290#
DDISP = 177570       104#    503    1819
DECSEC  032102      5910#
DECSK   007400      2252#   2256
DELTA   001430       621#   2686#   2776#   2777#   2778    2780#   2789
DFLT    001746       743#   5178
DF1     051622      1482    8859#
DF10    051642      1546    8875#
DF11    051646      1556    8879#
DF12    051652      1569    8883#
DF13    051662      1582    1603    8890#
DF14    051672      1590    1611    8897#
DF17    051676      1621    1631    8901#
DF2     051626      1492    1522    8863#
DF21    051702      1644    8905#
DF22    051712      1652    8912#
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DF23    051716          1664    1676    8916#
DF3     051632          1502    8867#
DF4     051636          1512    8871#
DF41    051726          1709    8924#
DF42    051732          1719    8928#
DF43    051736          1731    8932#
DF44    051746          1746    8939#
DF45    051762          1761    1776    8949#
DH1     047614          1480    8659#
DH10    050022          1544    8683#
DH11    050041          1554    8686#
DH12    050060          1567    1580    1601    1744    1759    1774    8689#
DH12A   050147          8699#   8886
DH13A   050226          8707#   8893
DH17    050274          1619    1629    8714#
DH2     047631          1490    1520    8662#
DH21    050371          1642    8725#
DH21A   050447          8733#   8908
DH23    050506          1662    1674    8739#
DH23A   050573          8748#   8919
DH3     047716          1500    8671#
DH4     047753          1510    8676#
DH41    050640          1707    8755#
DH42    050676          1717    1729    8760#
DH43A   050763          8769#   8935
DH44A   051011          8773#   8942    8952
DH44B   051065          8781#   8945
DH45A   051113          8785#   8955
DISPLA  001142           503#   1819#   1827#   2113#   2163#   2218#   2277#   2333#   2429#   2488#   2554#   2659#   2832
                        2914#   3056#   3162#   3276#   3406#   3493#   3638#   3799#   3917#   4077#   4156#
DISPRE  000174            62#   1827
DLT   = 100000           237#
DMD   = 000001           294#    313#
DORTI   031274          2709    2973    3090    3194    3308    5732#
DPB.A   004206          1316#   2001#   2007#   2010#   2011#   2013#   2132#   2574#   2592#   2599    2680#   2683#   2692
                        2713    2714    2724    2785#   2792#   2794    2796    2800    3922#   3923#   3927#   3928#   5297
                        5299    5303    5304    5305    5306    5319    5679#
DPB.B   004226          1340#   2002#   2133#   2134#   2135#   2183#   2185#   2187#   2238#   2239#   2241#   2246#   2247
                        2249#   2254#   2255    2297#   2298#   2300#   2307#   2353#   2354#   2364#   2370#   2386#   2392#
                        2449#   2450#   2456#   2458#   2508#   2509#   2518#   2520#   2522#   2524#   2526#   2528#   2573#
                        2575#   2580#   2590#   2592    2619#   2620    2622#   2852#   2854#   2856#   2867#   2868    5281#
                        5284#   5333    5335    5339    5340    5341    5342    5358    5361    5364
DPB.C   004246          1364#   2003#   2184#   2186#   2188#   2853#   2855#   2857#   2863#   2864    2866#   5282#   5285#
                        5380    5382    5386    5387    5388    5389    5405    5408    5411
DPINT   036630          7029#   7242    7245    7326#   7352    7793    7818    7945    7947#   8016    8036    8041    8049#
DPR   = 000400           264#
DPRQS   036640          7042#   7358    7406#   7444#   7613#   7630    7646#   7796    8018    8038    8043    8058#
DRIVES  045331          1954    8423#
DRG   = 004000           355#
DRVACT  036600          2763#   6987#   7366    7546#   7593#   7615#   7627    7645#   7733#   7814    7849    7880#   7887#
                        7902    7914#   8028#
DRVCAL  027612          3437    3441    3446    3456    3463    3525    3536    3552    3558    3737    3743    3753    3833
                        3857    3864    3876    3883    3894    5428#   5432
DRVCLR= 000111           431#   2756
DRVCL1  027632          2769    5433#   5434
DRVIN*  037166          7233    7267#   7354    7948
```

```
DRVMSK  001336   594*  1986*  1987  1991*  1999
DRVOK   006254  1988  1995*
DRVQUE  044714  7361  7374  8321*
DRVSEL  001312   585*  1938*  1943*  1953*  1957  1980  1987  1999*  3949  6391*  6414*  6420*  9082*
DRVSTA  036610  1897  1941  1996  7001*  7223*  7224*  7225*  7226*  7236*  7268*  7277*  7315*  7320*
                7348  7356  7380  7414  7418  7547*  7664*  7799  7807  7820  7874*  7881*  7894
                7950  8050*
DRVTYP  036620  1900  1914  1917  2956  2963  5252  7016*  7269*  7284*  7289*  7294*  7383  7665*
DRV     = 000200   263*
DSWR    = 177570   103*   502  1818
DTADPB  004266  1388*  2004*  2608*  2611  2614*  2616*  2681*  2682*  2684*  2687*  2688*  2746*  2749
                2752*  2754*  2755  2760*  2761  2767  2794  2796*  2951  2982  2985  2996  2999
                3011  3014  3019  3085*  3086*  3092  3100  3103  3110*  3111  3115*  3116  3124
                3127  3132  3204  3207  3222  3225  3239  3242  3247  3318  3321  3336  3339
                3353  3356  3361  3429*  3430*  3431*  3432*  3433*  3436*  3438*  3445*  3452*  3453*
                3454*  3455*  3459*  3460*  3461*  3462*  3516*  3517*  3518*  3519*  3520*  3524*  3526*
                3530*  3534*  3535*  3537*  3542*  3544*  3547*  3551*  3553*  3554*  3557*  3559  3689*
                3690*  3709*  3710*  3718*  3723*  3733*  3742*  3752*  3822*  3823*  3824*  3825*  3829*
                3834*  3835  3837*  3838  3842*  3848  3849  3850*  3852*  3860*  3861*  3869*  3870*
                3871*  3872*  3879*  3880*  3888*  3889*  3890*  3891*  5431  5433  5439  5440  5441
                5442  5459  5461  5467*  5470  5472  5476  5477  5478  5479  5494*  5496  5498
                5502  5504  5509  5510  5511  5512  5527  5702*  5703*  5704*  5707  5709  5713
                5714  5715  5716  6032  6033  6059  6091  6146  6147  6148  6297*  6298*  6299*
DTE     = 010000   287*
DTG     = 000020   317*
DTO     = 020000   326*
DTUW    036722  2762*  7135*  7219  7433  7489*  7620*  7633  7647  7649*  7658*  7722  7734*  8021
                8031*  8100
DT00    = 000001   346*
DT01    = 000002   347*
DT02    = 000004   348*
DT03    = 000010   349*
DT04    = 000020   350*
DT05    = 000040   351*
DT06    = 000100   352*
DT07    = 000200   353*
DT08    = 000400   354*
DT1     051170  1481  8799*
DT10    051254  1545  8810*
DT11    051260  1555  8811*
DT12    051264  1568  8812*
DT12A   051302  8815*
DT13    051316  1581  1602  8817*
DT13A   051334  1589  1610  8820*
DT17    051346  1620  1630  8822*
DT2     051174  1491  1521  8800*
DT21    051366  1643  8825*
DT21A   051402  1651  8827*
DT23    051412  1663  1675  8829*
DT23A   051430  8832*
DT3     051212  1501  8803*
DT4     051222  1511  8805*
DT41    051442  1708  8834*
DT42    051452  1718  8836*
DT43    051470  1730  8839*
DT43A   051506  8842*
```

```
DT44    051514          1745    8843#
DT44A   051532          8846#
DT44B   051546          8848#
DT45    051554          1760    1775    8849#
DT45A   051572          8852#
DT45B   051606          8854#
DT5     051234          8807#
DULP    037170          7268#   7279
DVA   = 004000           257#
EBL   = 020000           307#
ECH   = 000100           281#
ECI   = 004000           398#
ECRC  = 001000           303#
EECC  = 000020           298#
EMPTYQ  044674          7612    7663    7760    8063    8306#
EMTVEC= 000030           192#   1802*   1803*
EM1     046144          1479    8507#
EM10    046372          1543    8534#
EM11    046444          1553    8541#
EM12    046501          1566    8546#
EM13    046526          1579    1600    1641    8550#
EM17    046553          1616    8554#
EM2     046620          1489    8513#
EM20    046605          1628    8559#
EM23    046654          1661    8566#
EM24    046703          1673    8570#
EM3     046245          1499    8519#
EM4     046302          1509    8524#
EM41    046743          1706    1716    1728    1743    1758    8576#
EM46    046763          1773    8579#
EM5     046336          1519    8529#
ERINDX  030450          5307    5343    5390    5443    5480    5513    5571#   5717
ERR   = 040000           270#
ERRVEC= 000004           185#   1816    1817*   1828*   4723    4724*   4726*   4729*   5088*   5089*   5094*   5114    9016
                        9017    9021*   9022*   9029*   9030*   9068    9069*   9071*   9077*
ERR.CT  001444           627#   2040    3408    3495    3640    3801    5529    6014    6045    6160    6219
ESRC  = 004000           305#
ES.SAV  045060          7778    7830    7834    8098    8158    8376#
EXIT.A  014032          3027    3031#
EXIT0   006712          2136    2141#
EXIT1   007140          2189    2194#
EXIT10  012664          2695    2775    2806    2808#
EXIT11  013150          2858    2870#
EXIT12  014040          2938    2943    3030    3033#
EXIT13  014550          3081    3083    3137#
EXIT14  015332          3187    3189    3252#
EXIT15  016114          3301    3303    3366#
EXIT16  016556          3425    3468#
EXIT17  017242          3512    3564#
EXIT2   007422          2240    2257#
EXIT20  020042          3691    3701    3715    3760#
EXIT21  020700          3819    3895#
EXIT22  021050          3932#
EXIT3   007662          2299    2312#
EXIT4   010314          2355    2405#
EXIT5   010560          2451    2463    2466#
```

```
EXIT6   011070          2510    2517    2532#
EXIT7   011514          2577    2621    2623#
FC      001572           677#   2187    2241    2255    2300    2360    2370    2403    2452    2464    2511    2580    2581
                        2588    2683    2684    2685    2782    2856    2857    2866    2939    3085    3214    3328    3429
                        3517    3694    3822    3927    6274    6292
FER   = 000020           279#
FILBUF  032126          3428    3515    5923#
FILRAN  033210          3828    6175#
FMT22 = 010000           399#    451#   2007
FS      001606           683#   2133    2183    2238    2297    2353    2449    2508    2852    2853    2940    3518    3664
                        3681    3689
FT      001600           680#   2134    2185    2239    2298    2354    2450    2509    2573    2622    2682    2854    2855
                        2941    3430    3708
F1    = 000002           252#
F2    = 000004           253#
F3    = 000010           254#
F4    = 000020           255#
F5    = 000040           256#
GETADR  052444          1872    9049#
GETNUM  033740          6318    6340#   9055    9062
GETREG= 000141           444#
GETREQ  044770          7407    7635    7751    7803    7840    7904    7954    8024    8052    8059    8342#
GETSWR  033646          1877    6310#
GNS   = ****** U          61    3947    3953    3961    3978    4158    4175    4838    4839    4840    4841    4842    4844
                        4846    4847    4848    4849    4850    6314    6394    6427    6586    6692
GO    = 000001           251#
GTSWR = 104406          1866    4844#
GTTST1  034234          6419    6424#   6473    6486    6497    6500    6526    6533    6542    6548    6557    6574
GTTST2  034320          6441#   6537
GTTST3  034662          6444    6448    6452    6456    6460    6519#
GTTST4  034664          6462    6483    6517    6520#
GTTST5  034774          6521    6543#
GTTST6  035034          6545    6554#
GT.PRM  034076          1935    6390#
GT.PR1  034100          6391#   6399    6400    6401    6402    6403    6409    6410
GT.PR2  034230          6421#   6436    6553    6562    6755
HCE   = 000200           282#
HCI   = 002000           397#
HCRC  = 000400           283#
HT    = 000011            95#   4259    4300
IAE   = 002000           285#
IC      001576           679#   2246    2254    2304    2380    2402    2460    2461    2530    2686    2773    2778    2780
                        2863    2867    5897
IE    = 000100           205#
ILF   = 000001           275#
ILR   = 000002           276#
INCCYL  032052          3700    5895#
INCSK   007336          2244#   2248
INCTRK  032022          3757    5878#
IOTVEC= 000020           190#   1800#   1801#
IR    = 000100           228#
ISR     041566          2729    3021    3134    3249    3363    5699    7228    7719#
ISRM02  045317          1916    8421#
ISRM03  045324          1913    8422#
IT      00.604           682#   5880
ITEM41  004650          1699#   4142
```

```
KIPARD= ****** U          9012
LA      041412            7437    7680*
LACNT   036666            7094*   7688*   7689    7710*
LC      001574             678*   2135    2188    2247    2249    2310    2381    2383    2392    2453    2462    2512    2581
                          2586    2774    2776    2782    2864    2868    3111    3196    3310    3719    3838    3922    5895
                          5898    5900    6287
LDCMD   027010            2005    5279*
LF    = 000012              96*    579*   3948    3979    4294    4300    6315    6395    8399    8405    8423    8430    8440
                          8448    8453    8460    8463    8470    8473    8479    8483    8485    8487    8962    8964    8970
                          8979    8989    8992    9086    9094    9096
LKS     001474             640*   5126    5158*
LKV     001470             639*   2706    2707    5156*   5157*
LOADRV  052052            1848    8970*
LODFLT  026374            1934    1937    5171*
LODPRM  026632            2111    2161    2216    2275    2331    2427    2486    2552    2657    2830    2912    3054    3150
                          3274    3404    3491    3636    3797    3915    5229*
LOP.CK  030410            5320    5359    5406    5460    5528    5545*
LPB     001504             644*   4074
LPS     001502             643*   4073    5090
LPTAVL  001310             584*   4071    5087*   5091*
LP.AVL  026054            1874    5087*
LS      001610             684*   2184    3663
LSIT  = 000002             295*
LST   = 002000             266*
L       001602             681*   2186    2620    5878    5881    5883
MABOVE  046062            5842    8494*
MBELOW  046033            5826    8490*
MCLK  = 004000             324*
MCPE  = 020000             210*
MCPEMX  036734            7153*   8080    8128
MDF   = 000100             319*
MI    = 000004             315*
MNDLTA  036750            7169*   7708
MOC   = 000400             321*
MOH   = 020000             356*
MOL   = 010000             268*
MPE   = 000400             230*
MRD   = 002000             323*
MRHVEC  052712            9060    9096*
MRMCSI  052622            9053    9086*
MS    = 000040             318*
MSC   = 000002             314*
MSEN  = 010000             325*
MSER  = 000200             320*
MSGAVG  046017            5847    8487*
MSGB01  047556            1450    8651*
MSGB02  047506            1449    8644*
MSGB03  047436            1448    8637*
MSGB04  047416            1447    8634*
MSGB05  047346            1446    8627*
MSGB06  047302            1445    8621*
MSGB08  047240            1444    8615*
MSGB09  047201            1443    8609*
MSGB10  047156            1442    8605*
MSGB11  047130            1441    8601*
MSGB12  047106            1440    8598*
```

```
MSGB13  047055          1439    8593#
MSGB14  047013          1438    8587#
MSGFCP  045114           729    8389#
MSGLCP  045120           730    8390#
MSGMAX  046010          5831    8485#
MSGMIN  046001          5815    8483#
MSGNON  046126          5868    8501#
MSGNUM  046111          5863    8498#
MSG.DS  045154          6316    8399#
MSG.EQ  045152          6618    6656    6697    8398#
MSG.FC  045106           727    8387#
MSG.FS  045140           735    8395#
MSG.FT  045127           732    8392#
MSG.IC  045124           731    8391#
MSG.IT  045135           734    8394#
MSG.LC  045111           728    8388#
MSG.LS  045143           736    8396#
MSG.LT  045132           733    8393#
MSG.PA  045146          6655    8397#
MSG.R   045104           726    8386#
MSG.SP  046147          1895    1896    1912    2020    4170    4202    4209    4216    5822    5838    5859    6614    6654
                        6659    8503#
MSGOUS  046026          5819    5830    5835    5846    5859    8489#
MSG10A  045552          1008    8453#
MSG10B  045621          1009    8460#
MSG11A  045636          1013    8463#
MSG11B  045705          1014    8470#
MSG12A  045722          1018    8473#
MSG12B  045764          1019    8479#
MSG7    045520           987     992     998    1003    8448#
MUR   = 001000           322#
MWP   = 000010           316#
MXDLTA  036746          7166#   7706
MXF   = 001000           231#
MXLACT  036744          7163#   7689
MXSTAL  001442           626#   2377    2399
MXWNDW  036752          7172#
NBA   = 100000           358#
NC1     001614           686#   2685#   2773#   2774    2777    2785
NC2     001616           687#
NED   = 010000           234#
NEM   = 004000           233#
NOCLOK  045371          1979    8430#
NOLOAD  052250          1856    8992#
NONE    045362          1959    8428#
NOOP  = 000101           427#
NOTPRS  045253          1905    8413#
NOTRM   045300          1903    1919    8418#
NOTSAF  045270          1909    8416#
OBCK  = 100000           328#
OBEN  = 040000           327#
OCC   = 100000           309#
OFFDIR= 000001           396#
OFFSET= 000115           433#
OM    = 000001           261#
OPE   = 020000           415#
```

```
OPI     = 020000            288#
OPNFLG  001320            587#  6439#  6440#  6529#  6538   6540   6549   6551   6558   6560   6582
OPNPAT  035442           6613   6654#  6663   6672   6675   6679
OPNPRM  035240           6600   6605#  6609   6664   6666   6685
OPNTST  035066           6539   6541   6550   6552   6559   6561   6566#
OPNWDS  035564           6687#  6721
OPN.CT  035072           6568#  6570#  6571   6575   6577   6588
OPN.N1  035776           6650   6681   6744#
OPN.N2  036002           6637   6670   6732   6745#
OPN.X1  036014           6651   6682   6748#
OPN.X2  036020           6642   6674   6736   6749#
OPN.1   035076           6570#  6583   6747
OPN.2   035120           6569   6572   6575#
OPT     037774           7368   7403#  7754   7928   7966
OR      = 000200            229#
PACK    = 000123            436#
PAR     = 000010            278#
PAT     001612              685#  3706
PAT.PT  003146           1023#  6060   6093   6136
PAT0    003206           1023   1042#  5185   6688   6737
PAT1    003246           1024   1059#
PAT10   003706           1033   1212#
PAT11   003746           1034   1229#
PAT12   004006           1035   1246#
PAT13   004046           1036   1263#
PAT14   004106           1037   1280#
PAT15   004146           1038   1297#
PAT2    003306           1025   1076#
PAT3    003346           1026   1093#
PAT4    003406           1027   1110#
PAT5    003446           1028   1127#
PAT6    003506           1029   1144#
PAT7    003546           1030   1161#
PAT8    003606           1031   1178#  5184
PAT9    003646           1032   1195#  5187
PDA     = 000400            302#
PGE     = 002000            232#
PGM     = 001000            265#
PHA     = 000200            301#
PIP     = 020000            269#
PIRQ    = 177772            102#
PIRQVE= 000240              196#
PKB     001464              637#  2974#  2988#  3091#  3195#  3213#  3309#  3327#  5148#  5649#
PKC     001466              638#  5765   5767   5768   5772   5774   5775   5779   5784
PKCS    001462              636#  2975#  2978#  2990#  2992#  3006#  3094#  3096#  3119#  3198#  3200#  3216#  3218#
                           3234#  3312#  3314#  3330#  3332#  3348#  5120   5149#  5650#
PKV     001456              635#  2703   2704   2972#  3089#  3193#  3307#  5146#  5147#  5647   5648#  5653#
PLFS    = 002000            304#
POPQUE  045012           7416   7468   7584   7889   7918   7958   8357#
PRM     001566              674#  5238   5242#  5255#  5258#  6596   6605   6760
PRMLMT  001670              712#  2609   2747   3466   3667   3680   5191#  5192#  5195#  5196#  5212   5214   5913
                           5931   6010   6176   6262   6612   6645
PRMMSG  001720              726#  6615
PRMPT   001620              690#  5198   5237   6594   6761
PRM0    002412              690    800#  5179
PRM1    002426              691    808#
```

```
PRM10   002626            698     886#
PRM11   002646            699     896#
PRM12   002670            700     907#
PRM13   002704            701     915#
PRM14   002720            702     923#
PRM15   002734            703     931#
PRM16   002750            704     939#
PRM17   002762            705     946#
PRM2    002454            692     821#
PRM20   002774            706     953#
PRM21   003026            707     968#
PRM22   003042            708     976#
PRM3    002476            693     832#
PRM4    002520            694     843#
PRM5    002542            695     854#
PRM6    002564            696     865#
PRM7    002606            697     876#
PR0   = 000000            119#
PR1   = 000040            120#
PR2   = 000100            121#
PR3   = 000140            122#
PR4   = 000200            123#
PR5   = 000240            124#
PR6   = 000300            125#
PR7   = 000340            126#    1885    2699    2721
PS    = 177776             99#     100    1875#   1885#   1926#   2699#   2716#   2721#   2768#   3007#   3120#   3235#   3349#
                         5645    5646#   5654#   5698#   7211    7212#   7241#   7249#   7340    7341#   7394#   7404    7453#
                         7695#
PSEL  = 002000            209#
PSW   = 177776            100#
PTRN15  003024            965#
PWRVEC= 000024            191#
QCNT    044324           8223#   8282    8306#   8321    8323#   8343    8357#
QDRV0   044416           8234    8245    8254    8266#
QDRV1   044436           8235    8246    8255    8267#
QDRV2   044456           8236    8247    8256    8268#
QDRV3   044476           8237    8248    8257    8269#
QDRV4   044516           8238    8249    8258    8270#
QDRV5   044536           8239    8250    8259    8271#
QDRV6   044556           8240    8251    8260    8272#
QDRV7   044576           8241    8252    8261    8273#
QINPT   044334           8234#   8308    8325#   8326#   8327    8329#
QOUTPT  044354           8245#   8308#   8346    8359    8360#   8361#   8362    8364#
QSTART  044374           8254#   8288    8293    8329    8364
QSTOP   044376           8255#   8327    8362
QTERM = 044616           8262    8274#
RANADR  033464           3847    3859    3878    6256#
RANCK   033232           3867    3886    6190#
RANPAT  033430           3853    6177    6197    6238#
RDCHR = 104410           4647    4847#
RDLIN = 104411           4848#   6346    6396    6429    6623    6660    6700
RDY   = 000200            206#
RD.ADR  043606           8082#   8083#   8085#   8803
RD.RM   043562           7280    7304    7310    7532    7556    7570    7682    7696    7742    7772    7843    7853    7868
                         8010    8060#   8135    8149    8155    8189
RD.RM1  043604           8084#   8114
```

```
RD.RM2  043730  8080* 8113*
RD.RM3  043734  8091  8105  8115*
RD.RM4  043740  8096  8117*
RD.WRD  043610  8086* 8087  8803  8805
READ    = 000171  442* 3445  3752  3860  3879
READHD= 000173  443* 2575  5281  5282  5361  5408
READIN= 000121  435*
RECAL   = 000107  430* 2013  2132  5679  5704
RELEAS= 000113  432*
RESREG= 104413  2000  3000  3015  3104  3128  3208  3226  3243  3322  3340  3357  4218  4850*
                4910  5748  5933  5956  6018  6079  6130  6421  6573  6731  6735  6754  6777
                7250  7388  7391  7454  7667  7727  7989  8198  8297
RESTAR  006234  1989* 2000  3990
RESVEC= 000010  186*
REX     = 010000  306*
RHVEC   001452  634*
RH.ADR  001450  633*  8810  9052  9070  9072
RMADR   036736  2576  2693  5700  7158* 7230  7347  7471  7491  7513  7680  7721  8008  8082
                8088  8092  8108  8141  8145  8178  8208  9073
RMAS    = 000016  7183* 7309* 7770  7893* 7923* 7944* 8033
RMBA    = 000004  2758* 7178*
RMCS1   = 000000  2715* 2756* 2767* 3197* 3215* 3311* 3329* 7176* 7272* 7278  7298  7411* 7412
                7487  7509  7551  7571  7582  7597  7610  7743  7773  7827  7860  7899  7960
                8136
RMCS2   = 000010  2599* 2711* 2712* 2727* 2728* 2737* 2803* 2804* 2984* 2985* 2998* 2999* 3013*
                3014* 3018* 3019* 3102* 3103* 3126* 3127* 3131* 3132* 3206* 3207* 3224* 3225*
                3241* 3242* 3246* 3247* 3320* 3321* 3338* 3339* 3355* 3356* 3360* 3361* 5701*
                7180* 7231* 7271* 7273  7360* 7410* 7472* 7492* 7514* 7600  7623  7638  7652
                7661* 7681* 7741* 7841* 7930* 7943* 8009* 8089  8146  8179* 8185  8209* 8214
RMDA    = 000006  2759* 2942* 5726* 5910  7179* 7479  7505  7520
RMDB    = 000022  7185* 8183
RMDC    = 000034  2713* 2939* 3092* 3196* 3214* 3310* 3328* 5727* 7190* 7483  7495  7527
RMDS    = 000012  2717  2722  2979  2993  3097  3201  3219  3315  3333  7181* 7305  7683  7844
                7869  7931  8011
RMDT    = 000026  7187* 7281
RMEC1   = 000044  7194*
RMEC2   = 000046  7195* 8193
RMERRS  036570  6979* 7214  7809  7812  7822  7931* 7932* 7933* 7934* 8800  8807
RMER1   = 000014  5314  5350  5352  5397  5399  5450  5487  5520  5596  7182* 7311  7854  7932
                8150
RMER2   = 000042  5316  5355  5402  5452  5489  5522  5598  7193* 7933
RMHR    = 000036  7191*
RMINIT  036754  1879  7210*
RMLA    = 000020  2600  2738  7184* 7697  7699
RMMR1   = 000024  7186*
RMMR2   = 000040  7192*  7934
RMOF    = 000032  7189*  7302  7533  7537  7557  7561
RMR     = 000004  277*
RMSN    = 000030  7188*
RMVEC   036740  2709* 2729* 2973* 3021* 3090* 3134* 3194* 3249* 3308* 3363* 5699* 7159* 7227
                7229  7341
RMWC    = 000002  2757* 7177*
RM.REG  004306  1328  1352  1376  1400  1416* 2023  5314  5316  5350  5352  5355  5397  5399
                5402  5450  5452  5463  5487  5489  5520  5522  5596  5598  5910  8822  8829
                8832  8836  8839  8842  8846  8848  8852  8854
RM03    037502  5296  5332  5379  5430  5469  5495  5501  5706  7340*
```

```
RPT     001570   676*  2114  2164  2219  2278  2334  2430  2489  2555  2660  2833  2915  3057
                3163  3277  3407  3494  3639  3800  3918  6619  6652* 6657  6683* 6744* 6748*
RPTMR   043150  5162  7974*
RSTRT1  006200  1976  1978  1980*  1992
RSTRT2  006224  1987*  1993
RTC    = 000117   434*
SAVCSW  001302   581*  1929  1933*  6321*
SAVEFG  036676  1880*  7109*  7586  7747  7920
SAVREG= 104412  2981  2995  3010  3099  3123  3203  3221  3238  3317  3335  3352  4127  4849*
                4884  5739  5923  5942  5966  6057  6089  6390  6566  6686  6759  7210  7343
                7403  7622  7720  7977  8175  8281
SC      042002  7726  7755  7758  7764  7770*
SCTRWC= 177400   450*  3453  3519  3842
SC0    = 000100   363*
SC1    = 000200   364*
SC11    042640  7811  7842  7850  7911*
SC12    042750  7805  7816  7930*
SC13    043012  7795  7798  7940*
SC2    = 000400   365*
SC3     042052  7786*  7790
SC4     042056  7788*  7819  7832  7836  7885  7901  7910  7929  7967
SC5     042070  7787  7793*
SC6     042270  7815  7837*
SC6A    042404  7813  7862*
SC7     042532  7852  7865  7867  7877  7887*
SC8     042610  7828  7845  7855  7861  7870  7900  7902*  7939
SEARCH= 000131   437*  2976  2989
SEC.DS  001352   601*  5305*  5341*  5388*  5441*  5478*  5511*  5673*  5715*  6148*  8812  8815  8817
                8843  8849
SEC.RD  001346   599*  5672*  8815
SEEK   = 000105   429*  2574  2680  2715  3093  3197  3215  3311  3329  3923  3928  5284  5285
SEEKFG  036700  1947*  1950*  7117*  7215  7435
SEKCNT  001426   620*  2770  2772*  2781*
SEKTMR  001424   619*  2710*  2798*
SELDRV= 000145   446*
SERIAL  045501  2021  8444*
SETBUF  032602  2690  3728  6057*
SETFOR= 000143   445*  2011  2013  2132  2574  2680  3923  3928
SETVEC  005472  1879*
SET.IE  044252  7244  7275  7378  7452  7666  7780  8207*
SKI    = 040000   416*
SLASH   045200  6345  6622  8404*
SRCHWT  036652  7063*  7405*  7511*  7915  7924*
SRCHOO  031112  2936  3079  3185  3299  5697*
SRTDRV  005724  1884  1927*
SRTINT  005440  1871  1873*
SRVCLK  026362  5146  5156  5161*
STACK  = 001100    90*  1798  1989  2138  2191  2243  2251  2302  2306  2363  2385  2455  2515
                2579  2595  2598  2698  2736  2859  2969  3084  3190  3304  3427  3435  3440
                3443  3451  3458  3514  3523  3533  3550  3556  3692  3732  3741  3751  3831
                3845  3856  3863  3875  3882  3893  3921
STALL   030606  2368  2374  2390  2396  3925  3930  5368  5415  5534  5620*
STALLO  001416   617*  2361*  2369  2375  2376*  2377  2379*  2391  2397  2398*  2399  2401*
STALL1  001434   623*  5369  5416
STALL2  001436   624*  5535
STALL3  001440   625*  3926  3931
```

```
START   004774            1786    1791#
START1  004740              79    1784#
START2  004762              81    1789#  1982   4488   4571
START3  004730              83    1782#
START4  004752              85    1787#
STATBL  004356            1438#   4154
STKLMT= 177774             101#
ST0     043240            7984    8004#
ST01    043274            8016#
ST02    043370            8015    8017   8019   8033#
ST03    043420            8035    8041#
ST05    043444            8047#
ST06    043452            8037    8049#
ST07    043510            8039    8057#
ST08    043540            8056    8063#
ST09    043550            8013    8023   8032   8040   8044   8046   8048   8054   8061   8065#
STRTMR  031276            2971    3088   3192   3306   5739#
STRT1A  004744            1783    1785#
STRT2A  004766            1788    1790#
ST.CLK  026116            1878    3020   3133   3248   3362   5113#
ST.LCL  026326            5128    5153#
ST.PCL  026264            5122    5143#
SVADR   001420              '8#   3848#  3849#  3869   3870   3888   3889
SVRH7D  044134            2725    2801   2983   2997   3012   3101   3125   3205   3223   3240   3319   3337   3354
                          7588    7749   7761   7804   7857   7875   7922   7956   8026   8064   8175#
SVSTAT  001340             595#   4151   5574#
SWR     001140             502#   1796   1818#  1820   1826#  1833#  1864   2119   2169   2224   2283   2339   2435
                          2494    2560   2665   2838   2919   3062   3168   3282   3412   3499   3644   3724   3729
                          3738    3746   3748   3754   3805   4069   4078   4085   4097   4101   4491   4530   4585#
                          4718    4736   4743   5465   5545   5682   5804   6041   6043   6047   6158   6217   6221
                          6310
SWREG   000176              63#   1826   1864   4491   4530   4553
SW0     = 000001           154#
SW00    = 000001           144#    154   3746
SW01    = 000002           143#    153   3754   6043   6158   6221
SW02    = 000004           142#    152   3748
SW03    = 000010           141#    151   3726   3738
SW04    = 000020           140#    150   3726   3729   5465
SW05    = 000040           139#    149   5144   5154   6047
SW06    = 000100           138#    148   2952   3022   5134   5804
SW07    = 000200           137#    147   5279   6310
SW08    = 000400           136#    146   1948   4069
SW09    = 001000           135#    145   6041   6217
SW1     = 000002           153#
SW10    = 002000           134#
SW11    = 004000           133#
SW12    = 010000           132#   2119   2169   2224   2283   2339   2357   2435   2494   2560   2665   2838   2919
                          3062    3168   3282   3412   3499   3644   3805
SW13    = 020000           131#   5621
SW14    = 040000           130#   5366   5413   5532
SW15    = 100000           129#   3826
SW2     = 000004           152#
SW3     = 000010           151#
SW4     = 000020           150#
SW5     = 000040           149#
SW6     = 000100           148#
```

```
SW7    = 000200   147#
SW8    = 000400   146#
SW9    = 001000   145#  5545  5682
SYSTAT  045204  1888  8405#
TAP    = 040000   357#
TBITVE= 000014   187#
TD      041632  7724  7733#
TESTNG  045457  2015  8440#
TEST0   006676  2112  2137  2138#
TEST1   007124  2162  2190  2191#
TEST10  011770  2658  2696#  2784  2797
TEST11  013072  2831  2859#
TEST12  013472  2969#
TEST13  014232  3084#
TEST14  014742  3190#
TEST15  015524  3304#
TEST16  016256  3405  3426  3427#
TEST17  016720  3492  3513  3514#
TEST2   007316  2217  2241#
TEST20  017512  3637  3692#
TEST21  020360  3798  3843  3844  3845#
TEST22  020770  3916  3920  3921#
TEST3   007600  2276  2300#
TEST4   010054  2332  2358  2360#
TEST5   010472  2428  2452#
TEST6   010736  2487  2511#
TEST7   011260  2553  2578  2579#
TICKMS  001326   590#  5136#  5139#  5161
TICKUS  001330   591#  5137#  5140#
TIMER   036702  2765#  7122#  7324#  7447#  7591#  7644#  7736#  7838#  7883#  7926#  7941#  7963#  7980
                7982#  8045#  8051#  8057#
TIM.DN  001374   609#  5747#  5764
TIM.PT  001412   615#  5741  5782  5784#  5785#
TIM.UP  001356   603#  5740  5746#  5761  5810
TITLE   051776  1843  8962#
TKVEC  = 000060   194#  4468#  4469#
TPB     001500   642#  1840  4113
TPS     001476   641#  1839  4112
TPVEC  = 000064   195#
TPS0    014036  2955#  2959#  3032#
TP60    014026  2961#  2965#  3029#
TRAPVE= 000034   193#  1804#  1805#
TRCKWC  001432   622#  3432  3460  3823  5193#  5197#
TRE    = 040000   211#
TRK.DS  001354   602#  5304#  5340#  5387#  5440#  5477#  5510#  5674#  5714#  6033#  6147#  8812  8815
                8817  8825  8843  8849
TRK.RD  001344   598#  5671#  8815
TRNSWT  036650  2761#  7055#  7469#  7616  7619#  7632  7650#  7659#  7738  77?? 8020  8030#
TRTVEC= 000014   188#
TSTNMS  001314   586#  1977  2106  2156  2211  2270  2326  2422  2481  254?  2652  2825  2907
                3049  3155  3269  3399  3486  3631  3792  3910  5176#  51??#  6417#  6418#  6437#
                6438#  6443#  6447#  6451#  6455#  6459#  6481#  6512#  6522  6524
TST0    006506  2104#
TST1    006714  2108  2154#
TST10   011516  2549  2650#
TST10A  012226  2731  2734#
```

```
TST10B  012620          2708    2798#
TST11   012666          2654    2823#
TST12   013152          2827    2905#   2913
TST13   014042          2909    2934    3047#   3055
TST14   014552          3051    3077    3153#   3161
TST15   015334          3157    3183    3267#   3275
TST16   016116          3271    3297    3397#
TST17   016560          3401    3484#
TST2    007142          2158    2209#
TST20   017244          3488    3629#
TST21   020044          3633    3790#
TST22   020070          3794    3908#
TST3    007424          2213    2268#
TST4    007664          2272    2324#
TST5    010316          2328    2420#
TST6    010562          2424    2479#
TST7    011072          2483    2545#
TWOMS   030670          3107    3212    3230    3326    3344    5645#
TYPDS = 104405          4199    4842#
TYPE  = 104401          1843    1848    1856    1873    1887    1888    1895    1896    1903    1905    1907    1909    1911
                        1912    1919    1920    1922    1954    1959    1971    1979    2015    2020    2021    2036    2039
                        2123    2129    2173    2179    2228    2234    2287    2293    2343    2349    2439    2445    2498
                        2504    2564    2570    2669    2675    2842    2848    2923    2929    3066    3072    3172    3178
                        3286    3292    3416    3422    3503    3509    3648    3654    3809    3815    3945    3951    3959
                        3976    3980    4080    4088    4146    4147    4156    4165    4166    4170    4173    4179    4180
                        4189    4202    4206    4209    4211    4213    4216    4264    4361    4437    4485    4497    4551
                        4552    4555    4566    4576    4587    4606    4654    4660    4665    4669    4674    4675    4677
                        4680    4684    4838#   4952    5811    5815    5819    5822    5826    5830    5831    5835    5838
                        5842    5846    5847    5858    5859    5863    5868    6312    6341    6345    6392    6425    6584
                        6593    6614    6616    6618    6622    6654    6655    6656    6659    6690    6697
TYPERR  022034          4087    4126#
TYPOC = 104402          3964    4195    4554    4839#   6344    6658    6699
TYPON = 104404          4841#
TYPOS = 104403          1892    1966    2017    2126    2176    2231    2290    2346    2442    2501    2567    2672    2845
                        2926    3069    3175    3289    3419    3506    3651    3812    3956    4840#   6590
TYPTIM  031474          3028    3031    3135    3250    3364    5803#
T10     003116          1008#   3082    3136
T11     003126          1013#   3188    3251
T12     003136          1018#   3302    3365
T7A     003056           987#   2961    2962    3029
T7A1    003076           998#   2965    2966
T7B     003066           992#   2954    2955    3032
T7B1    003106          1003#   2958    2959
ULDFLG  036656          7082#   7270#   7350    7365#   7548#   7614#   7651#   7801    7890    7892#   7911    7913#   8029#
UNLOAD= 000103           428#
UNS   = 040000           289#
UNTMSG  045224          8408#
UNTOFF  045232          1907    8409#
UNTON   045243          1911    8411#
UPE   = 020000           235#
US1   = 000001           222#
US2   = 000002           223#
US4   = 000004           224#
VERIFY  030750          5363    5410    5663#
VV    = 000100           262#
WC    = 000040           299#
```

```
WCE    = 040000            236#
WCEFLG  001414             616#  3693#  3744   5429#  5507#
WCF    = 000040            280#
WD     = 000010            297#
WLE    = 004000            286#
WRCKD  = 000151            438#  3438   3459   3534   3557   3742   3871   3890   5461   5494
WRCKHD= 000153             439#
WRITE  = 000161            440#  2681   3436   3452   3516   3551   3733   3825   3850   5467
WRL    = 004000            267#
WRTHD  = 000163            441#
WRT.AD  044032            8131#  8141#  8144#  8805
WRT.RM  043742            7297   7301   7478   7482   7486   7494   7504   7508   7519   7526   7536   7550   7560
                          7581   7596   7609   7826   7859   7898   8128#
WRT.R1  044026            8142#  8163
WRT.R2  044120            8128#  8162#
WRT.R3  044124            8137   8148   8151   8157   8164#
WRT.R4  044130            8153   8166#
WRT.R5  044132            8165   8167#
WRT.WD  044030            8129#  8133   8140#  8143#  8805
$APTHD  000220             462    468#
$ASTAT= ****** U          4030   4045
$ATYC   021344            4001   4003#
$ATY1   021320            3999#
$ATY3   021326            4000#  4249
$ATY4   021336            4002#  4093
$AUTOB  001134             499#  1868#  4544   4701
$BASE   001274             574#
$BDADR  001122             494#  6140#  6205#  8820
$BDDAT  001126             496#  6029#  6142#  6207#  8820   8827
$BELL   001210             525#  1837   4080   4115   4497   4694
$CHARC  022700            4266#  4276#  4283   4292#  4297#
$CKSWR  023654            4530#  4846
$CMTAG  001100             482#  1793   1794   1802   1806   1809   1810
$CM1   = 000006            514#   515#   516#   517#   518#   519#   520#
$CM2   = 000014            514#   515#   516#   517#   518#   519#   520#
$CM3   = 000006            512#   514
$CM4   = 000003            520#   521#   522#   523#
$CNTLC  024566            4485   4566   4694#
$CNTLG  024600            4551   4696#
$CNTLU  024573            4576   4669   4695#
$CPUOP  001246             548#
$CRLF   001215             527#  1873   1887   1922   2039   2123   2129   2173   2179   2228   2234   2287   2293
                          2343   2349   2439   2445   2498   2504   2564   2570   2669   2675   2842   2848   2923
                          2929   3066   3072   3172   3178   3286   3292   3416   3422   3503   3509   3648   3654
                          3809   3815   4088   4115   4146   4165   4179   4189   4206   4213   4265   4300   4587
                          4674   4694   6593
$DBLK   023346            4403   4437   4445#
$DB2D   025276            4865   4884#
$DECYL  025456            4886   4932#
$DEVCT  001230             539#
$DEVM   001276             575#
$DIV    025634            2589   2791   5020#  5851
$DOAGN  021310            3972   3982   3988#
$DTBL   023336            4406   4441#
$ENDAD  021300              71   3984#  4108
$ENDCT  021234            1806   1955#  1964#  1974   3974#
```

```
$ENULL  021314          3980    3991#
$ENV    001240           544#   1862    4008    4032    4090    4244
$ENVM   001241           545#   1831    4010    4246    4251
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$EOPCT  021226          1806#   1974#   3971#   3975    9083#
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$ERRTB  004410          1465#   4142    4143
$ERTTL  001112           489#   3963    3965#   4081#   4115
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$ETEND  001300           474     576#
$FATAL  001222           536#   4036#
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$FILLS  001155           509#   4300
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$GTSWR  023744          4552#   4844
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$MADR1  001252           561#
$MADR2  001256           565#
$MADR3  001262           568#
$MADR4  001266           571#
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$MAMS3  001260           566#
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$MTYP2  001255             564#
$MTYP3  001261             567#
$MTYP4  001265             570#
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                          3254#   3256    3384#   3386    3470#   3472    3567#   3569    3763#   3765    3899#   3901
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$OMODE  023130            4328#   4332#   4337    4340#   4351#   4377#
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$PASTM  000226             472#
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$REG3   001170             517#   4132*   8799    8800
$REG4   001172             518#   4133*   8820    8827
$REG5   001174             519#   4134*   8807
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$RTNAD  021312            3990#
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                          2917    3059    3165    3279    3409    3496    3641    3802    3920    3941    3967    3983    3989
                          3991    4059    4060    4061    4062    4063    4078    4085    4097    4101    4115    4709    4710
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$TKQOU  023362         4453#  4467#  4629   4630#  4631   4633#
$TKQSR  023364         4454#  4466   4522   4633
$TKS    001144          504#  4450   4471#  4502#  4504   4510#  4532   4548#  4558   4570#  4590#
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                       2547   2556   2557#  2626   2650   2652   2661   2662#  2810   2823   2825   2834   2835#
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                       3164   3165#  3254   3267   3269   3278   3279#  3384   3397   3399   3408   3409#  3470
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$TYPEX  022702         4293   4295   4298#
$TYPOC  022730         4331#  4839
$TYPON  022744         4330   4333#  4841
$TYPOS  022704         4326#  4840
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N01


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                          2697    2735    3434    3439    3442    3450    3457    3522    3532    3549    3555    3660    3731
                          3740    3750    3818    3830    3855    3862    3866    3874    3881    3885    3892    3948#   3991
                          3992#   4048#   4115    4159#   4300    4445#   4450    4454#   4455    4456    4693#   4694    4701#
                          4759    4760    4932#   6587#   8266#   8267#   8268#   8269#   8270#   8271#   8272#   8273#   8274
                          8960
.$ASTA= ****** U          4000    4003
.$X    = 000220            458#    463
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CKDIG   1778#  6406   6644
CKNUM   1778#  6356   6677   6710
COMMEN   197#  2044   2079   2875   3370
COMND   1778#  2013   2132   2574   2679   3923   3928
DO      1778#  2012   2014   2139   2140   2192   2193   2245   2253   2303   2308   2365   2371   2387   2393
        2457   2459   2519   2521   2523   2525   2527   2529   2596   2617   2860   2862   3924   3929   5680
DODTA   1778#  3437   3441   3446   3456   3463   3525   3536   3552   3558   3737   3743   3753   3832   3857
        3864   3876   3883   3894
DRV.IN  1778#  3017   3130   3245   3359
ENDCOM   197#  2072   2090   2888   3379
ENDPAS  1778#  3976
ERRCAL  6960#  7778   7830   7833   8097   8158
ERREND  1778#  4112
ERROR     91#  1998   2726   2802   2987   3001   3016   3105   3129   3209   3227   3244   3323   3341   3358
        5309   5310   5311   5312   5318   5345   5346   5347   5348   5357   5392   5393   5394   5395   5404
        5445   5446   5447   5448   5456   5482   5483   5484   5485   5493   5515   5516   5517   5518   5526
        5678   5719   5720   5721   5722   5723   6035   6040   6151   6157   6215   6216   7779   7831   7835
        8099   8159   9079
ERRTYP  1778#  4069
ER.NDX  1778#  5303   5339   5386   5439   5476   5509   5713
ESCAPE   197#  2943   3083   3189   3303   5302   5338   5385   5437   5475   5508   5676   5712   6034   6038
        6150   6155   6203
GETPRI   197#  5020   9020
GETSWR     1#   197#  1859
LOOP    1778#  2242   2250   2301   2305   2362   2384   2454   2514   2593   2597   2696   2734   3434   3439
        3442   3450   3457   3522   3532   3549   3555   3731   3740   3750   3830   3855   3862   3874   3881
        3892
MORETA   453#   578
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        3397   3484   3629   3790   3908
MSG     2095#  2097   2143#  2145   2196#  2198   2259#  2261   2314#  2316   2407#  2409   2468#  2470   2534#
        2536   2625#  2628   2810#  2812   2892#  2895   3036#  3038   3140#  3142   3254#  3256   3384#  3386
        3470#  3472   3567#  3569   3763#  3765   3899#  3901
MULT     197#
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        3384   3470   3567   3763   3899
POP      197#  4042   4043   4432   4799   4988   5071   5216   5265
PUSH     197#  4003   4005   4026   4391   4779   4969   5023   5171   5229
REPORT   197#  1778#  3135   3250   3364
RM03.D     1#  6960
SAV.RH  1778#  2981   2995   3010   3099   3123   3203   3221   3238   3317   3335   3352
SCOPE     92#  2141   2194   2257   2312   2405   2466   2532   2623   2808   2870   3033   3137   3252   3366
        3468   3564   3760   3895   3932
SETPPI   197#  4622
SETTRA  4830#  4839   4840   4841   4842   4844   4846   4847   4848   4849   4850
SETUP    197#  1792
SET.TM  1778#  2105   2155   2210   2269   2325   2421   2480   2546   2651   2824   2906   3048   3154   3268
        3398   3485   3630   3791   3909
SKIP     197#
SLASH    197#
SPACE    197#
STAPS     67    197#   201    243    247    424    455    457    464    477    529    532   1680   2095   2103
        2143   2153   2196   2208   2259   2267   2314   2323   2407   2419   2468   2478   2534   2544   2626
        2649   2810   2822   2893   2904   3036   3046   3140   3152   3254   3266   3384   3396   3470   3483
        3567   3628   3763   3789   3899   3907   3938   3998   4055   4116   4223   4303   4381   4449   4525
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SWRSU        197#   1814#
TRMTRP      4830#
TSTTYP       12#    2117    2167    2222    2281    2337    2433    2492    2558    2663    2836    2917    3060    3166    3280
            34.0    3497    3642    3803
TYPBIN       197#
TYPB2D      1778#   5816    5823    5827    5832    5839    5843    5855    5860    6619    6694
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TYPEND      1778#   3945
TYPNAM       197#
TYPNUM       197#
TYPOCS       197#   1889    1965    2016    2124    2174    2229    2288    2344    2440    2499    2565    2670    2843    2924
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TYPOCT       197#   3963    4194    4553    6343    6657    6698
TYPTXT       197#   3945    3951    3959    3976    4156    4173    6312    6392    6424    6584    6689
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$$CMTM       475#    520     521     522
$$ESCA       197#
$$NEWT       197#   2095    2143    2196    2259    2314    2407    2468    2534    2626    2810    2893    3036    3140    3254
            3384    3470    3567    3763    3899
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$$SETM      1830#
$$SKIP       197#
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.HEADE         1#
.SETUP         1#   1782
.SWRHI         1#     36
.SWRLO        46#     47      48      49      50      51      52      53
 $ACTI         1#     65
.$APTB         1#    530#
.$APTH         1#    453
.$APTY         1#   3996
.$CATC         1#     55
.$CMTA         1#    475
.$DB2D         1#   4871
.$DIV          1#   4995
.$EOP          1#   3936
.$ERRO         1#   4053
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.$RDDE         1#
.$RDOC         1#
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.$SB2D         1#   4852
.$SCOP         1#   4703
.$SIZE         1#   9006
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.$TYPO         1#   4301

. ABS.   052723     000
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 ERRORS DETECTED:  0

 RM03:CZRMFB,RM03:CZRMFB.LST/NL:MD:MC:CND:TOC/SOL/CRF=RM03:RMDRV5.P11,RM03:CZRMFB.P11
 RUN-TIME:  33 27 2 SECONDS
 RUN-TIME RATIO:  558/64=8.6
 CORE USED:  47K  (93 PAGES)
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