RM03

EXTENDED DRIVE TEST

MD-11-DZRMF-A

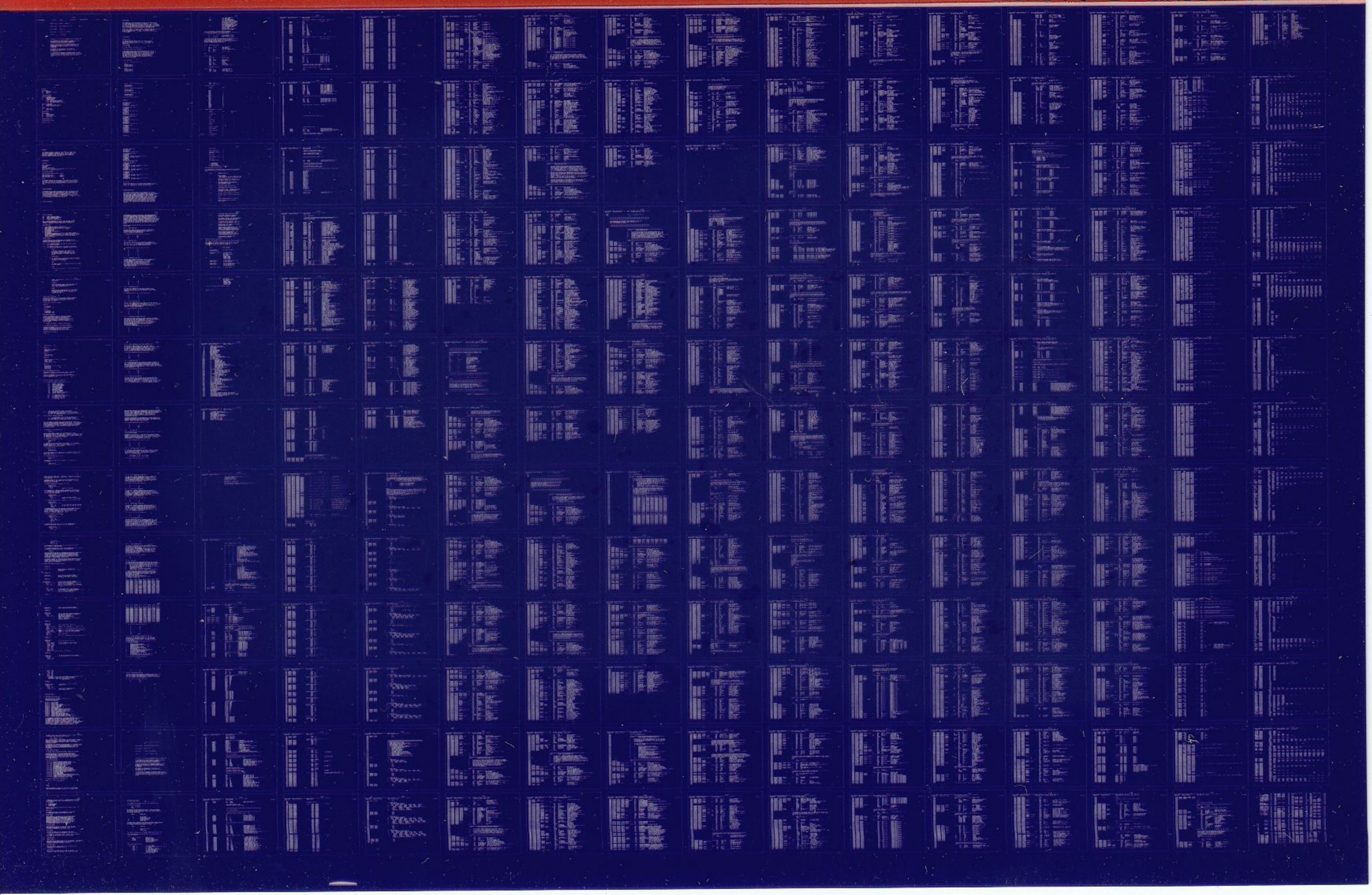
EP-DZRMF-A-DL-A

FICHE 1 OF 2

OCT 1977

digital

MADE IN USA



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MADE IN USA

PRODUCT CODE: MAINDEC-11-DZRMF-A-D

PRODUCT NAME: RM03 EXTENDED DRIVE TEST

DATE CREATED: AUGUST 1977

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: H. BLACKSTONE

CONTENTS

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 DISKLESS CONTROLLER TEST	DZRMJ-A
RM03 FUNCTIONAL TEST I	DZRMJC-A
RM03 FNCTIONAL TEST II	DZRMJD-A
RM03 FUNCTIONAL TEST III	DZRMJE-A

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.

SEQ 0005

<↑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'‹.›. SEQ 0008

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>                                          SEQ 0009
  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 (18 BIT) MODE
```

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

REFER TO 4.3.1 FOR C.SWR SELECTION

5. 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	-	8
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

PAT 8	PAT 9	PAT 10	PAT 11	PAT 12	PAT 13	PAT 14	PAT 15
133333	177777	000000	177777	177777	125252	170360	151322
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 8
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 0026

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

10.2 TO INITIALIZE THE DRIVER:

```
        JSR     PC,RMINIT
        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 OR FMT22, ECT, AND HCI
        .BYTE   0               ;(2) COMMAND
        .BYTE   0               ;(3) PSEL AND A17 AND A16
        .WORD   0               ;(4) WORD COUNT (MUST BE NEG.)
        .WORD   0               ;(6) BUFFER ADDRESS OR
                                ;REGISTER TABLE POINTER
        .BYTE   0               ;(10) SECTOR ADDRESS OR
                                ;FIRST REG. INDEX
```

```
                .BYTE   0               ;(11) TRACK ADDRESS OR
                                        ;LAST REG. INDEX
                .WORD   0               ;(12) CYLINDER ADDRESS
                .WORD   0               ;(14) ERROR TABLE POINTER
                                        ;POINTS TO THE FIRST OF TWENTY
                                        ;LOCATIONS OF WHERE THE DRIVER
                                        ;IS TO STORE THE rh70/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   ERRTB5          ;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,ERRTB5,0                                    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
RMHR	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
RECALIRATE	107	P
DRIVE CLEAR	111	N
RELEASE	113	N
OFFSET	115	P
RETURN TO CENTER	117	P
READIN PRESET	121	N
PACK ACKNOWLEDGE	123	N
SEARCH	131	P
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(1)	USER MADE A REQUEST FOR A FUNCTION TO BE PERFORMED ON A DRIVE THAT HAS AN UNLOAD REQUEST IN QUEUE.
12(2)	PERSISTENT UNSAFE CONDITION EXIST.
11(2)	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 (MCPE=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-A RM03 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-11-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      020634                      $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  004636                  JMP     @#START1
                                ;*204 = SELECT OPERATING PARAMETERS
000204  000137  004660                  JMP     @#START2
                                ;*210 = SELECT RH70/RM03 ADDRESSES
000210  000137  004626                  JMP     @#START3
                                ;*214 = COMBINATION OF 204 AND 210
000214  000137  004650                  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
```

```
                        
000240                  PR5=    240             ;;PRIORITY LEVEL 5
000300                  PR6=    300             ;;PRIORITY LEVEL 6
000340                  PR7=    340             ;;PRIORITY LEVEL 7
                        
                        ;*"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
```

```
                        DTO2=   4               ;DRIVE TYPE NUMBER BIT 3
                        DTO3=   10              ;DRIVE TYPE NUMBER BIT 4
                        DTO4=   20              ;DRIVE TYPE NUMBER BIT 5
                        DTO5=   40              ;DRIVE TYPE NUMBER BIT 6
                        DTO6=   100             ;DRIVE TYPE NUMBER BIT 7
                        DTO7=   200             ;DRIVE TYPE NUMBER BIT 8
                        DTO8=   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)

                        OFFDIR= 1               ;RM03 OFFSET DIRECTION
                        HCI=    2000            ;HEADER COMPARE INHIBIT (BIT #10)
                        ECI=    4000            ;ERROR CORRECTION CODE INHIBIT (BIT #11)
                        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
000143                  SETFORM=143
000145                  SELDRV=145

                        ;OTHER EQUATES

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

```
                                .SBTTL  COMMON TAGS

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

                        001100          .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000          $PASS:  .WORD   0               ;;CONTAINS PASS COUNT
001102  000             $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103  000             $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP 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
                                ;;**************************************************************
000015                  CR      =       15
```

```
                    000012                  LF      =       12
001220  000000                  C.SWR:  .WORD   0               ;CONTROL SWITCHES
001222  000000                  SAVCSW: .WORD   0               ;PREVIOUS CONTENTS OF 'C.SWR'
001224  000000                  CNTRLC: .WORD   0               ;CONTROL "C" FLAG
001226  000000                  BUSADR: .WORD   0               ;GET ADDRESSES FROM THE TTY FLAG (0=NO, -1=YES)
001230  000000                  LPTAVL: .WORD   0               ;LPT AVAILABLE STATUS (0=NO,1=YES)
001232  000000                  DRVSEL: .WORD   0               ;DRIVES SELECTED FOR TESTING
001234  176777  000003          TSTNMS: .WORD   176777,3        ;DEFAULT IS RUN TESTS 0-10 & 12-21
001240  000000  000000          OPNFLG: .WORD   0,0             ;MODIFY TEST PARAMETER FLAGS
001244  000000                  CLKSTA: .WORD   0               ;CLOCK STATUS (0=NO CLOCK,+1=KW11-P,
                                                                ;AND -1=KW11-L)
001246  000020                  TICKMS: .WORD   16.             ;16 MILLISECONDS PER CLOCK TICK
001250  040432                  TICKUS: .WORD   16666.          ;16666 MIRCOSECONDS PER CLOCK TICK
001252  000000                  BYPASS: .WORD   0
001254  000000                  CHKDRV: .WORD   0               ;DRIVE UNDER TEST
001256  000000                  DRVMSK: .WORD   0               ;DRIVE MASK BIT
001260  000000                  SVSTAT: .WORD   0               ;STATUS/ERROR INDICATOR IS
                                                                ;SAVED HERE ON AN ERROR
001262  000000                  CYL.RD: .WORD   0               ;CYLINDER READ
001264  000000                  TRK.RD: .WORD   0               ;TRACK READ
001266  000000                  SEC.RD: .WORD   0               ;SECTOR READ
001270  000000                  CYL.DS: .WORD   0               ;CYLINDER DESIRED
001272  000000                  SEC.DS: .WORD   0               ;SECTOR DESIRED
001274  000000                  TRK.DS: .WORD   0               ;TRACK DESIRED
001276  000000                  TIM.UP: .WORD   0               ;MINIMUM TIME
001300  000000                          .WORD   0               ;NUMBER OF COUNTS BELOW MIN. LIMIT
001302  000000                          .WORD   0               ;MAXIMUM TIME
001304  000000                          .WORD   0               ;NUMBER OF COUNTS ABOVE MAX. LIMIT
001306  000000  000000                  .WORD   0,0             ;TOTAL TIME OF ALL SEEKS
001312  000000                          .WORD   0               ;NUMBER OF SEEKS PERFORMED
001314  000000                  TIM.DN: .WORD   0               ;MINIMUM TIME
001316  000000                          .WORD   0               ;NUMBER OF COUNTS BELOW MIN. LIMIT
001320  000000                          .WORD   0               ;MAXIMUM TIME
001322  000000                          .WORD   0               ;NUMBER OF COUNTS ABOVE MAX. LIMIT
001324  000000  000000                  .WORD   0,0             ;TOTAL TIME OF ALL SEEKS
001330  000000                          .WORD   0               ;NUMBER OF SEEKS PERFORMED
001332  000000                  TIM.PT: .WORD   0               ;POINTS TO TABLE OF TIMES
001334  000000                  WCEFLG: .WORD   0               ;FATAL WRITE CHECK ERROR FLAG (TEST 20)
001336  000000                  STALLO: .WORD   0               ;VARIABLE STALL (TEST 4)
001340  000000  000000          SVADR:  .WORD   0,0             ;SAVE DISK ADDRESS (TEST 22)
001344  000000                  SEKTMR: .WORD   0               ;SEEK TIMER  (TEST 10)
001346  000000                  SEKCNT: .WORD   0               ;SEEK COUNTER
001350  000000                  DELTA:  .WORD   0               ;TESTING RANGE FOR SERVO SETTLE DOWN TEST
001352  160000                  TRCKWC: .WORD   -<256.*32.>     ;WORD COUNT FOR A FULL TRACK IN 16 BIT MODE
001354  000012                  STALL1: .WORD   10.             ;10 MILLISECONDS STALL (TEST 0-11)
001356  000012                  STALL2: .WORD   10.             ;10 MILLISECONDS STALL (TEST 16-21)
001360  011610                  STALL3: .WORD   5000.           ;5 SEC STALL (TEST 22)
001362  000031                  MXSTAL: .WORD   25.             ;MAX. INCREMENTING STALL ALLOWED IN TEST 4
001364     144                  ERR.CT: .BYTE   100.            ;NUMBER OF ERRORS ALLOWED IN TESTS 16 - 21
                                                                ;BEFORE GOING TO THE NEXT TEST
001365     000                          .BYTE   0               ;RESERVED

                                ;ADDRESSES AND VECTORS
001366  176700                  RH.ADR: .WORD   176700          ;RH70 UNIBUS ADDRESS
001370  000254  000240          RHVEC:  .WORD   254,5*32.       ;RH70 VECTOR ADDRESS AND PRIORITY
001374  000104  000106          PKV:    .WORD   104,106         ;KW11-P VECTOR ADDRESS
```

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                                PKCS:   .WORD   172540          ;KW11-P CONTROL AND STATUS REG.
                                PKB:    .WORD   172542          ;KW11-P COUNT SET BUFFER
                                PKC:    .WORD   172544          ;KW11-P COUNTER
                                LKV:    .WORD   100,102         ;KW11-L VECTOR ADDRESS
                                LKS:    .WORD   177546          ;KW11-L STATUS REGISTER
                                TPS:    .WORD   177564          ;TTY PRINTER STATUS
                                TPB:    .WORD   177566          ;TTY PRINTER BUFFER
                                LPS:    .WORD   177514          ;LINE PRINTER STATUS
                                LPB:    .WORD   177516          ;LINE PRINTER BUFFER

                                ;BIT TABLE
                                BITS:   .WORD   BIT00
                                        .WORD   BIT01
                                        .WORD   BIT02
                                        .WORD   BIT03
                                        .WORD   BIT04
                                        .WORD   BIT05
                                        .WORD   BIT06
                                        .WORD   BIT07
                                        .WORD   BIT08
                                        .WORD   BIT09
                                        .WORD   BIT10
                                        .WORD   BIT11
                                        .WORD   BIT12
                                        .WORD   BIT13
                                        .WORD   BIT14
                                        .WORD   BIT15
                                        .WORD   BIT00
                                        .WORD   BIT01
                                        .WORD   BIT02
                                        .WORD   BIT03
                                        .WORD   BIT04
                                        .WORD   BIT05
                                        .WORD   BIT06
                                        .WORD   BIT07


                                ;COMMON STORAGE FOR TEST PARAMETER
001504  000000                  PRM:    .WORD   0               ;THIS WORD TELLS WHICH OF THE
                                                                ;FOLLOWING PARAMETERS ARE TO BE USED
001506  000000                  RPT:    .WORD   0               ;REPEAT COUNTS FOR ALL TESTS
001510  000000                  FC:     .WORD   0               ;FIRST CYLINDER
001512  000000                  LC:     .WORD   0               ;LAST CYLINDER
001514  000000                  IC:     .WORD   0               ;INCREMENT CYLINDER
001516  000000                  FT:     .WORD   0               ;FIRST TRACK
001520  000000                  LT:     .WORD   0               ;LAST TRACK
001522  000000                  IT:     .WORD   0               ;INCREMENT TRACK
001524  000000                  FS:     .WORD   0               ;FIRST SECTOR
001526  000000                  LS:     .WORD   0               ;LAST SECTOR
001530  000000                  PAT:    .WORD   0               ;PATTERN CODE
001532  000000                  NC1:    .WORD   0               ;NEW CYLINDER ADDRESS
001534  000000                  NC2:    .WORD   0               ;NEW CYLINDER ADDRESS

                                ;TABLE OF PARAMETER POINTERS
001536  002330                  PRMPT:  .WORD   PRM0
001540  002344                          .WORD   PRM1
```

```
001542  002372                          .WORD   PRM2
001544  002414                          .WORD   PRM3
001546  002436                          .WORD   PRM4
001550  002460                          .WORD   PRM5
001552  002502                          .WORD   PRM6
001554  002524                          .WORD   PRM7
001556  002544                          .WORD   PRM10
001560  002564                          .WORD   PRM11
001562  002606                          .WORD   PRM12
001564  002622                          .WORD   PRM13
001566  002636                          .WORD   PRM14
001570  002652                          .WORD   PRM15
001572  002666                          .WORD   PRM16
001574  002700                          .WORD   PRM17
001576  002712                          .WORD   PRM20
001600  002744                          .WORD   PRM21
001602  002760                          .WORD   PRM22
001604  000000                          .WORD   0                       ;TERMINATOR

                                ;TABLE OF PARAMETER UPPER LIMITS
001606  032767                  PRMLMT: .WORD   32767                   ;"R"
001610  001466                          .WORD   822.                    ;"FC"
001612  001466                          .WORD   822.                    ;"LC"
001614  001466                          .WORD   822.                    ;"FC'"
001616  001466                          .WORD   822.                    ;"LC'"
001620  001466                          .WORD   822.                    ;"IC"
001622  000004                          .WORD   4                       ;"FT"
001624  000004                          .WORD   4                       ;"LT"
001626  000004                          .WORD   4                       ;"IT"
001630  000037                          .WORD   31.                     ;"FS"
001632  000037                          .WORD   31.                     ;"LS"
001634  177777                          .WORD   177777                  ;"PAT"

                                ;TABLE OF MESSAGE POINTERS
001636  043634                  PRMMSG: .WORD   MSG.R
001640  043636                          .WORD   MSG.FC
001642  043641                          .WORD   MSG.LC
001644  043644                          .WORD   MSGFCP
001646  043650                          .WORD   MSGLCP
001650  043654                          .WORD   MSG.IC
001652  043657                          .WORD   MSG.FT
001654  043662                          .WORD   MSG.LT
001656  043665                          .WORD   MSG.IT
001660  043670                          .WORD   MSG.FS
001662  043673                          .WORD   MSG.LS


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

001664  001125  000310  000632  DFLT:   .WORD   1125,200.,410.,822.,0,0        ;RECAL/SEEK (T0)
001672  001466  000000  000000
001700  003377  000144  000000          .WORD   3377,100.,0,128.,0,256.,0,0,0,0,0 ;SEEK/SEEK (T1)
001706  000200  000000  000400
001714  000000  000000  000000
```

```
677  001722  000000  000000
678  001726  001177  000001  000000          .WORD   1177,1,0,410.,0,822.,1,0,0       ;INCREMENT SEEK (T2)
679  001734  000632  000000  001466
680  001742  000001  000000  000000
681  001750  001177  000010  000000          .WORD   1177,10,0,256.,0,512.,1,0,0     ;STEPPING SEEK (T3)
682  001756  000400  000000  001000
683  001764  000001  000000  000000
684  001772  001177  000001  000000          .WORD   1177,1,0,410.,0,822.,1,0,0      ;OSCILLATING SEEK (T4)
685  002000  000632  000000  001466
686  002006  000001  000000  000000
687  002014  001177  000001  000000          .WORD   1177,1,0,410.,0,822.,1,0,0      ;CONVERGING/DIVERGING SEEK (T5)
688  002022  000632  000000  001466
689  002030  000001  000000  000000
690  002036  001177  000001  000000          .WORD   1177,1,0,410.,0,822.,1,0,0      ;SERVO ADDRESSING LOGIC NOISE (T6)
691  002044  000632  000000  001466
692  002052  000001  000000  000000
693  002060  000337  011610  000000          .WORD   337,5000.,0,410.,0,822.,0,4     ;RANDOM SEEK TEST (T7)
694  002066  000632  000000  001466
695  002074  000000  000004
696  002100  000177  000001  000000          .WORD   177,1,0,410.,0,822.,100.,0      ;SERVO SETTLE DOWN TEST (T10)
697  002106  000632  000000  001466
698  002114  000144  000000
699  002120  001177  000001  000000          .WORD   1177,1,0,410.,0,822.,1,0,0      ;ALL SEEKS TEST (T11)
700  002126  000632  000000  001466
701  002134  000001  000000  000000
702  002142  001113  000001  000000          .WORD   1113,1,0,0,0,0                  ;ROTATIONAL SPEED TIMING TEST (T12)
703  002150  000000  000000  000000
704  002156  000037  000001  000000          .WORD   37,1,0,410.,0,822.              ;ONE CYLINDER SEEK TIMING TEST (T13)
705  002164  000632  000000  001466
706  002172  000037  000001  000000          .WORD   37,1,0,136.,0,255.              ;ACCESS TIME MEASUREMENT TEST (T14)
707  002200  000210  000000  000377
708  002206  000037  000001  000000          .WORD   37,1,0,410.,0,822.              ;MAXIMUM SEEK TIMING TEST (T15)
709  002214  000632  000000  001466
710  002222  000113  000001  000000          .WORD   113,1,0,0,0                     ;SECTOR ADDRESSING TEST (T16)
711  002230  000000  000000
712  002234  001013  000001  000000          .WORD   1013,1,0,0,0                    ;TRACK ADDRESSING TEST (T17)
713  002242  000000  000000
714  002246  007777  000001  000000          .WORD   7777,1,0,410.,0,821.,64.,0,4,1,1,0,177777 ;DATA TEST (T20)
715  002254  000632  000000  001465
716  002262  000100  000000  000004
717  002270  000001  000001  000000
718  002276  177777
719  002300  000037  001750  000000          .WORD   37,1000.,0,410.,0,821.          ;EXERCISER (T21)
720  002306  000632  000000  001465
721  002314  000037  011610  000000          .WORD   37,5000.,0,136.,0,255.          ;RM03 ACCESS TIME ADJUSTMENT TEST (T22)
722  002322  000210  000000  000377
723
724
725
726                                     ;PARAMETER TABLES
727
728                                     ;RECAL/SEEK (T0)
729  002330  001125                     PRM0:   .WORD   1125
730  002332  000310                             .WORD   200.
731  002334  000632                             .WORD   410.
732  002336  001466                             .WORD   822.
```

```
                                        .WORD   0
                                        .WORD   0

                                ;SEEK/SEEK (T1)
002344  003377                  PRM1:   .WORD   3377
002346  000144                          .WORD   100.
002350  000000                          .WORD   0
002352  000200                          .WORD   128.
002354  000000                          .WORD   0
002356  000400                          .WORD   256.
002360  000000                          .WORD   0
002362  000000                          .WORD   0
002364  000000                          .WORD   0
002366  000000                          .WORD   0
002370  000000                          .WORD   0

                                ;INCREMENT SEEK (T2)
002372  001177                  PRM2:   .WORD   1177
002374  000001                          .WORD   1
002376  000000                          .WORD   0
002400  000632                          .WORD   410.
002402  000000                          .WORD   0
002404  001466                          .WORD   822.
002406  000001                          .WORD   1
002410  000000                          .WORD   0
002412  000000                          .WORD   0

                                ;STEPPING SEEK (T3)
002414  001177                  PRM3:   .WORD   1177
002416  000001                          .WORD   1
002420  000000                          .WORD   0
002422  000400                          .WORD   256.
002424  000000                          .WORD   0
002426  001000                          .WORD   512.
002430  000001                          .WORD   1
002432  000000                          .WORD   0
002434  000000                          .WORD   0

                                ;OSCILLATING SEEK (T4)
002436  001177                  PRM4:   .WORD   1177
002440  000001                          .WORD   1
002442  000000                          .WORD   0
002444  000632                          .WORD   410.
002446  000000                          .WORD   0
002450  001466                          .WORD   822.
002452  000001                          .WORD   1
002454  000000                          .WORD   0
002456  000000                          .WORD   0

                                ;CONVERGING/DIVERGING SEEK (T5)
002460  001177                  PRM5:   .WORD   1177
002462  000001                          .WORD   1
002464  000000                          .WORD   0
002466  000632                          .WORD   410.
002470  000000                          .WORD   0
002472  001466                          .WORD   822.
```

K04


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  789  002474  000001                    .WORD   1
  790  002476  000000                    .WORD   0
  791  002500  000000                    .WORD   0
  792
  793                                    ;SERVO ADDRESSING LOGIC NOISE GENERATOR (T6)
  794  002502  001177                    PRM6:   .WORD   1177
  795  002504  000001                            .WORD   1
  796  002506  000000                            .WORD   0
  797  002510  000632                            .WORD   410.
  798  002512  000000                            .WORD   0
  799  002514  001466                            .WORD   822.
  800  002516  000001                            .WORD   1
  801  002520  000000                            .WORD   0
  802  002522  000000                            .WORD   0
  803
  804                                    ;RANDOM SEEK TEST (T7)
  805  002524  000337                    PRM7:   .WORD   337
  806  002526  011610                            .WORD   5000.
  807  002530  000000                            .WORD   0
  808  002532  000632                            .WORD   410.
  809  002534  000000                            .WORD   0
  810  002536  001466                            .WORD   822.
  811  002540  000000                            .WORD   0
  812  002542  000004                            .WORD   4
  813
  814                                    ;SERVO SETTLE DOWN TEST (T10)
  815  002544  000177                    PRM10:  .WORD   177
  816  002546  000001                            .WORD   1
  817  002550  000000                            .WORD   0
  818  002552  000632                            .WORD   410.
  819  002554  000000                            .WORD   0
  820  002556  001466                            .WORD   822.
  821  002560  000144                            .WORD   100.
  822  002562  000000                            .WORD   0
  823
  824                                    ;ALL SEEKS TEST (T11)
  825  002564  001177                    PRM11:  .WORD   1177
  826  002566  000001                            .WORD   1
  827  002570  000000                            .WORD   0
  828  002572  000632                            .WORD   410.
  829  002574  000000                            .WORD   0
  830  002576  001466                            .WORD   822.
  831  002600  000001                            .WORD   1
  832  002602  000000                            .WORD   0
  833  002604  000000                            .WORD   0
  834
  835                                    ;ROTATIONAL SPEED TIMING TEST (T12)
  836  002606  001113                    PRM12:  .WORD   1113
  837  002610  000001                            .WORD   1
  838  002612  000000                            .WORD   0
  839  002614  000000                            .WORD   0
  840  002616  000000                            .WORD   0
  841  002620  000000                            .WORD   0
  842
  843                                    ;ONE CYLINDER SEEK TIMING TEST (T13)
  844  002622  000037                    PRM13:  .WORD   37
```

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

```
  901  002754  000000                    .WORD   0
  902  002756  001465                    .WORD   821.
  903
  904                              ;RM03 ACCESS TIME ADJUSTMENT TEST (T22)
  905  002760  000037              PRM22:  .WORD   37
  906  002762  011610                      .WORD   5000.
  907  002764  000000                      .WORD   0
  908  002766  000210                      .WORD   136.
  909  002770  000000                      .WORD   0
  910  002772  000377                      .WORD   255.
  911
  912
  913
  914                              ;TIMING LIMITS
  915
  916  002774  044236              T7A:    .WORD   MSG7
  917  002776  000000                      .WORD   0
  918  003000  003142                      .WORD   1634.           ;(16.67-2%)**2
  919  003002  003244                      .WORD   1700.           ;(16.67+2%)**2
  920
  921  003004  044236              T7B:    .WORD   MSG7
  922  003006  000000                      .WORD   0
  923  003010  003131                      .WORD   1625.           ;(16.67-2.5%)**2
  924  003012  003255                      .WORD   1709.           ;(16.67+2.5%)**2
  925
  926  003014  044270              T10:    .WORD   MSG10A
  927  003016  044337                      .WORD   MSG10B
  928  003020  000000                      .WORD   0               ;NO LOWER LIMIT
  929  003022  001274                      .WORD   700.            ;(7)**2
  930
  931  003024  044354              T11:    .WORD   MSG11A
  932  003026  044423                      .WORD   MSG11B
  933  003030  000000                      .WORD   0               ;NO LOWER LIMIT
  934  003032  006200                      .WORD   3200.           ;(32)**2
  935
  936  003034  044440              T12:    .WORD   MSG12A
  937  003036  044502                      .WORD   MSG12B
  938  003040  000000                      .WORD   0               ;NO LOWER LIMIT
  939  003042  012574                      .WORD   5500.           ;(55)**2
  940
  941  003044  003104              PAT.PT: .WORD   PAT0            ;TABLE OF POINTERS WHICH POINT TO THE
  942  003046  003144                      .WORD   PAT1            ;PATTERNS USED BY THE DATA TEST
  943  003050  003204                      .WORD   PAT2
  944  003052  003244                      .WORD   PAT3
  945  003054  003304                      .WORD   PAT4
  946  003056  003344                      .WORD   PAT5
  947  003060  003404                      .WORD   PAT6
  948  003062  003444                      .WORD   PAT7
  949  003064  003504                      .WORD   PAT8
  950  003066  003544                      .WORD   PAT9
  951  003070  003604                      .WORD   PAT10
  952  003072  003644                      .WORD   PAT11
  953  003074  003704                      .WORD   PAT12
  954  003076  003744                      .WORD   PAT13
  955  003100  004004                      .WORD   PAT14
  956  003102  004044                      .WORD   PAT15
```

```
                                ;PATTERNS 0 THRU 15

003104  066666  PAT0:    .WORD   066666          ;PATTERN 0
003106  066666            .WORD   066666
003110  066666            .WORD   066666
003112  066666            .WORD   066666
003114  066666            .WORD   066666
003116  066666            .WORD   066666
003120  066666            .WORD   066666
003122  066666            .WORD   066666
003124  066666            .WORD   066666
003126  066666            .WORD   066666
003130  066666            .WORD   066666
003132  066666            .WORD   066666
003134  066666            .WORD   066666
003136  066666            .WORD   066666
003140  066666            .WORD   066666
003142  066666            .WORD   066666

003144  000001  PAT1:    .WORD   000001          ;PATTERN 1
003146  000003            .WORD   000003
003150  000007            .WORD   000007
003152  000017            .WORD   000017
003154  000037            .WORD   000037
003156  000077            .WORD   000077
003160  000177            .WORD   000177
003162  000377            .WORD   000377
003164  000777            .WORD   000777
003166  001777            .WORD   001777
003170  003777            .WORD   003777
003172  007777            .WORD   007777
003174  017777            .WORD   017777
003176  037777            .WORD   037777
003200  077777            .WORD   077777
003202  177777            .WORD   177777

003204  177776  PAT2:    .WORD   177776          ;PATTERN 2
003206  177774            .WORD   177774
003210  177770            .WORD   177770
003212  177760            .WORD   177760
003214  177740            .WORD   177740
003216  177700            .WORD   177700
003220  177600            .WORD   177600
003222  177400            .WORD   177400
003224  177000            .WORD   177000
003226  176000            .WORD   176000
003230  174000            .WORD   174000
003232  170000            .WORD   170000
003234  160000            .WORD   160000
003236  140000            .WORD   140000
003240  100000            .WORD   100000
003242  000000            .WORD   000000

003244  000000  PAT3:    .WORD   000000          ;PATTERN 3
003246  000000            .WORD   000000
```

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1013  003250  000000                    .WORD   000000
1014  003252  177777                    .WORD   177777
1015  003254  177777                    .WORD   177777
1016  003256  177777                    .WORD   177777
1017  003260  000000                    .WORD   000000
1018  003262  000000                    .WORD   000000
1019  003264  177777                    .WORD   177777
1020  003266  177777                    .WORD   177777
1021  003270  000000                    .WORD   000000
1022  003272  177777                    .WORD   177777
1023  003274  000000                    .WORD   000000
1024  003276  177777                    .WORD   177777
1025  003300  000000                    .WORD   000000
1026  003302  177777                    .WORD   177777
1027
1028  003304  000000            PAT4:   .WORD   000000          ;PATTERN 4
1029  003306  010421                    .WORD   010421
1030  003310  021042                    .WORD   021042
1031  003312  031463                    .WORD   031463
1032  003314  042104                    .WORD   042104
1033  003316  052525                    .WORD   052525
1034  003320  063146                    .WORD   063146
1035  003322  073567                    .WORD   073567
1036  003324  104210                    .WORD   104210
1037  003326  114631                    .WORD   114631
1038  003330  125252                    .WORD   125252
1039  003332  135673                    .WORD   135673
1040  003334  146314                    .WORD   146314
1041  003336  156735                    .WORD   156735
1042  003340  167356                    .WORD   167356
1043  003342  177777                    .WORD   177777
1044
1045  003344  052525            PAT5:   .WORD   052525          ;PATTERN 5
1046  003346  052525                    .WORD   052525
1047  003350  052525                    .WORD   052525
1048  003352  125252                    .WORD   125252
1049  003354  125252                    .WORD   125252
1050  003356  125252                    .WORD   125252
1051  003360  052525                    .WORD   052525
1052  003362  052525                    .WORD   052525
1053  003364  125252                    .WORD   125252
1054  003366  125252                    .WORD   125252
1055  003370  052525                    .WORD   052525
1056  003372  125252                    .WORD   125252
1057  003374  052525                    .WORD   052525
1058  003376  125252                    .WORD   125252
1059  003400  052525                    .WORD   052525
1060  003402  125252                    .WORD   125252
1061
1062  003404  007417            PAT6:   .WORD   007417          ;PATTERN 6
1063  003406  007417                    .WORD   007417
1064  003410  007417                    .WORD   007417
1065  003412  170360                    .WORD   170360
1066  003414  170360                    .WORD   170360
1067  003416  170360                    .WORD   170360
1068  003420  007417                    .WORD   007417
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1069  003422  007417                    .WORD   007417
1070  003424  170360                    .WORD   170360
1071  003426  170360                    .WORD   170360
1072  003430  007417                    .WORD   007417
1073  003432  170360                    .WORD   170360
1074  003434  007417                    .WORD   007417
1075  003436  170360                    .WORD   170360
1076  003440  007417                    .WORD   007417
1077  003442  170360                    .WORD   170360
1078
1079  003444  026455            PAT7:   .WORD   026455          ;PATTERN 7
1080  003446  026455                    .WORD   026455
1081  003450  026455                    .WORD   026455
1082  003452  151322                    .WORD   151322
1083  003454  151322                    .WORD   151322
1084  003456  151322                    .WORD   151322
1085  003460  026455                    .WORD   026455
1086  003462  026455                    .WORD   026455
1087  003464  151322                    .WORD   151322
1088  003466  151322                    .WORD   151322
1089  003470  026455                    .WORD   026455
1090  003472  151322                    .WORD   151322
1091  003474  026455                    .WORD   026455
1092  003476  151322                    .WORD   151322
1093  003500  026455                    .WORD   026455
1094  003502  151322                    .WORD   151322
1095
1096  003504  165555            PAT8:   .WORD   165555          ;PATTERN 8
1097  003506  133333                    .WORD   133333
1098  003510  165555                    .WORD   165555
1099  003512  133333                    .WORD   133333
1100  003514  165555                    .WORD   165555
1101  003516  133333                    .WORD   133333
1102  003520  165555                    .WORD   165555
1103  003522  133333                    .WORD   133333
1104  003524  165555                    .WORD   165555
1105  003526  133333                    .WORD   133333
1106  003530  165555                    .WORD   165555
1107  003532  133333                    .WORD   133333
1108  003534  165555                    .WORD   165555
1109  003536  133333                    .WORD   133333
1110  003540  165555                    .WORD   165555
1111  003542  133333                    .WORD   133333
1112
1113  003544  000001            PAT9:   .WORD   000001          ;PATTERN 9
1114  003546  000002                    .WORD   000002
1115  003550  000004                    .WORD   000004
1116  003552  000010                    .WORD   000010
1117  003554  000020                    .WORD   000020
1118  003556  000040                    .WORD   000040
1119  003560  000100                    .WORD   000100
1120  003562  000200                    .WORD   000200
1121  003564  000400                    .WORD   000400
1122  003566  001000                    .WORD   001000
1123  003570  002000                    .WORD   002000
1124  003572  004000                    .WORD   004000
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1125  003574  010000                    .WORD   010000
1126  003576  020000                    .WORD   020000
1127  003600  040000                    .WORD   040000
1128  003602  100000                    .WORD   100000
1129
1130  003604  177776          PAT10:    .WORD   177776          ;PATTERN 10
1131  003606  177775                    .WORD   177775
1132  003610  177773                    .WORD   177773
1133  003612  177767                    .WORD   177767
1134  003614  177757                    .WORD   177757
1135  003616  177737                    .WORD   177737
1136  003620  177677                    .WORD   177677
1137  003622  177577                    .WORD   177577
1138  003624  177377                    .WORD   177377
1139  003626  176777                    .WORD   176777
1140  003630  175777                    .WORD   175777
1141  003632  173777                    .WORD   173777
1142  003634  167777                    .WORD   167777
1143  003636  157777                    .WORD   157777
1144  003640  137777                    .WORD   137777
1145  003642  077777                    .WORD   077777
1146
1147  003644  172666          PAT11:    .WORD   172666          ;PATTERN 11
1148  003646  155555                    .WORD   155555
1149  003650  172666                    .WORD   172666
1150  003652  155555                    .WORD   155555
1151  003654  172666                    .WORD   172666
1152  003656  155555                    .WORD   155555
1153  003660  172666                    .WORD   172666
1154  003662  155555                    .WORD   155555
1155  003664  172666                    .WORD   172666
1156  003666  155555                    .WORD   155555
1157  003670  172666                    .WORD   172666
1158  003672  155555                    .WORD   155555
1159  003674  172666                    .WORD   172666
1160  003676  155555                    .WORD   155555
1161  003700  172666                    .WORD   172666
1162  003702  155555                    .WORD   155555
1163
1164  003704  077777          PAT12:    .WORD   077777          ;PATTERN 12
1165  003706  137777                    .WORD   137777
1166  003710  157777                    .WORD   157777
1167  003712  167777                    .WORD   167777
1168  003714  173777                    .WORD   173777
1169  003716  175777                    .WORD   175777
1170  003720  176777                    .WORD   176777
1171  003722  177377                    .WORD   177377
1172  003724  177577                    .WORD   177577
1173  003726  177677                    .WORD   177677
1174  003730  177737                    .WORD   177737
1175  003732  177757                    .WORD   177757
1176  003734  177767                    .WORD   177767
1177  003736  177773                    .WORD   177773
1178  003740  177775                    .WORD   177775
1179  003742  177776                    .WORD   177776
1180
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1181  003744  153333          PAT13:  .WORD   153333          ;PATTERN 13
1182  003746  066667                  .WORD   066667
1183  003750  153333                  .WORD   153333
1184  003752  066667                  .WORD   066667
1185  003754  153333                  .WORD   153333
1186  003756  066667                  .WORD   066667
1187  003760  153333                  .WORD   153333
1188  003762  066667                  .WORD   066667
1189  003764  153333                  .WORD   153333
1190  003766  066667                  .WORD   066667
1191  003770  153333                  .WORD   153333
1192  003772  066667                  .WORD   066667
1193  003774  153333                  .WORD   153333
1194  003776  066667                  .WORD   066667
1195  004000  153333                  .WORD   153333
1196  004002  066667                  .WORD   066667
1197
1198  004004  000000          PAT14:  .WORD   000000          ;PATTERN 14
1199  004006  177777                  .WORD   177777
1200  004010  177777                  .WORD   177777
1201  004012  177777                  .WORD   177777
1202  004014  177777                  .WORD   177777
1203  004016  177777                  .WORD   177777
1204  004020  177777                  .WORD   177777
1205  004022  177777                  .WORD   177777
1206  004024  177777                  .WORD   177777
1207  004026  177777                  .WORD   177777
1208  004030  177777                  .WORD   177777
1209  004032  177777                  .WORD   177777
1210  004034  177777                  .WORD   177777
1211  004036  177777                  .WORD   177777
1212  004040  177777                  .WORD   177777
1213  004042  177777                  .WORD   177777
1214
1215  004044  177777          PAT15:  .WORD   177777          ;PATTERN 15
1216  004046  000000                  .WORD   000000
1217  004050  000000                  .WORD   000000
1218  004052  000000                  .WORD   000000
1219  004054  000000                  .WORD   000000
1220  004056  000000                  .WORD   000000
1221  004060  000000                  .WORD   000000
1222  004062  000000                  .WORD   000000
1223  004064  000000                  .WORD   000000
1224  004066  000000                  .WORD   000000
1225  004070  000000                  .WORD   000000
1226  004072  000000                  .WORD   000000
1227  004074  000000                  .WORD   000000
1228  004076  000000                  .WORD   000000
1229  004100  000000                  .WORD   000000
1230  004102  000000                  .WORD   000000
1231
1232                          ;DPB (DATA PARAMETER BLOCK)
1233
1234  004104     000          DPB.A:  .BYTE   0               ;(0) DRIVE NUMBER
1235  004105     000                  .BYTE   0               ;(1) OFFSET VALUE OR FMT22, ECI, AND HCI
1236  004106     000                  .BYTE   0               ;(2) COMMAND
```

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1237  004107  000                    .BYTE   0          ;(3) PSEL AND A17 AND A16
1238  004110  000000                 .WORD   0          ;(4) WORD COUNT (MUST BE NEG.)
1239  004112  050514                 .WORD   BUFFER     ;(6) BUFFER ADDRESS OR
1240                                                    ;REGISTER TABLE POINTER
1241  004114  000                    .BYTE   0          ;(10) SECTOR ADDRESS OR
1242                                                    ;FIRST REG. INDEX
1243  004115  000                    .BYTE   0          ;(11) TRACK ADDRESS OR
1244                                                    ;LAST REG. INDEX
1245  004116  000000                 .WORD   0          ;(12) CYLINDER ADDRESS
1246  004120  004204                 .WORD   RM.REG     ;(14) ERROR TABLE POINTER
1247                                                    ;POINTS TO THE FIRST OF TWENTY
1248                                                    ;LOCATIONS OF WHERE THE DRIVER
1249                                                    ;IS TO STORE THE RH70/RM03
1250                                                    ;REGISTERS ON AN ERROR. IF LEFT
1251                                                    ;ZERO REGISTERS ARE NOT SAVED.
1252  004122  000000                 .WORD   0          ;(16) STATUS/ERROR INDICATOR
1253                                                    ;BIT15=1=>ERROR OCCURRED
1254                                                    ;BIT07=1=>DONE
1255                                                    ;BIT14-BIT09 AND BIT06-BIT03
1256                                                    ;INDICATE TYPE OF ERROR
1257
1258  004124  000            DPB.B:  .BYTE   0          ;(0) DRIVE NUMBER
1259  004125  000                    .BYTE   0          ;(1) OFFSET VALUE OR FMT22, ECI, AND HCI
1260  004126  000                    .BYTE   0          ;(2) COMMAND
1261  004127  000                    .BYTE   0          ;(3) PSEL AND A17 AND A16
1262  004130  177776                 .WORD   -2         ;(4) WORD COUNT (MUST BE NEG.)
1263  004132  050514                 .WORD   BUFFER     ;(6) BUFFER ADDRESS OR
1264                                                    ;REGISTER TABLE POINTER
1265  004134  000                    .BYTE   0          ;(10) SECTOR ADDRESS OR
1266                                                    ;FIRST REG. INDEX
1267  004135  000                    .BYTE   0          ;(11) TRACK ADDRESS OR
1268                                                    ;LAST REG. INDEX
1269  004136  000000                 .WORD   0          ;(12) CYLINDER ADDRESS
1270  004140  004204                 .WORD   RM.REG     ;(14) ERROR TABLE POINTER
1271                                                    ;POINTS TO THE FIRST OF TWENTY
1272                                                    ;LOCATIONS OF WHERE THE DRIVER
1273                                                    ;IS TO STORE THE RH70/RM03
1274                                                    ;REGISTERS ON AN ERROR. IF LEFT
1275                                                    ;ZERO REGISTERS ARE NOT SAVED.
1276  004142  000000                 .WORD   0          ;(16) STATUS/ERROR INDICATOR
1277                                                    ;BIT15=1=>ERROR OCCURRED
1278                                                    ;BIT07=1=>DONE
1279                                                    ;BIT14-BIT09 AND BIT06-BIT03
1280                                                    ;INDICATE TYPE OF ERROR
1281
1282  004144  000            DPB.C:  .BYTE   0          ;(0) DRIVE NUMBER
1283  004145  000                    .BYTE   0          ;(1) OFFSET VALUE OR FMT22, ECI, AND HCI
1284  004146  000                    .BYTE   0          ;(2) COMMAND
1285  004147  000                    .BYTE   0          ;(3) PSEL AND A17 AND A16
1286  004150  177776                 .WORD   -2         ;(4) WORD COUNT (MUST BE NEG.)
1287  004152  050514                 .WORD   BUFFER     ;(6) BUFFER ADDRESS OR
1288                                                    ;REGISTER TABLE POINTER
1289  004154  000                    .BYTE   0          ;(10) SECTOR ADDRESS OR
1290                                                    ;FIRST REG. INDEX
1291  004155  000                    .BYTE   0          ;(11) TRACK ADDRESS OR
1292                                                    ;LAST REG. INDEX
```

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1293  004156  000000                    .WORD   0           ;(12) CYLINDER ADDRESS
1294  004160  004204                    .WORD   RM.REG      ;(14) ERROR TABLE POINTER
1295                                                      ;POINTS TO THE FIRST OF TWENTY
1296                                                      ;LOCATIONS OF WHERE THE DRIVER
1297                                                      ;IS TO STORE THE RH70/RM03
1298                                                      ;REGISTERS ON AN ERROR. IF LEFT
1299                                                      ;ZERO REGISTERS ARE NOT SAVED.
1300  004162  000000                    .WORD   0           ;(16) STATUS/ERROR INDICATOR
1301                                                      ;BIT15=1=>ERROR OCCURRED
1302                                                      ;BIT07=1=>DONE
1303                                                      ;BIT14-BIT09 AND BIT06-BIT03
1304                                                      ;INDICATE TYPE OF ERROR
1305
1306  004164     000          DTADPB: .BYTE   0           ;(0) DRIVE NUMBER
1307  004165     000                  .BYTE   0           ;(1) OFFSET VALUE OR FMT22, ECT, AND HCI
1308  004166     000                  .BYTE   0           ;(2) COMMAND
1309  004167     000                  .BYTE   0           ;(3) PSEL AND A17 AND A16
1310  004170  000000                  .WORD   0           ;(4) WORD COUNT (MUST BE NEG.)
1311  004172  050514                  .WORD   BUFFER      ;(6) BUFFER ADDRESS OR
1312                                                      ;REGISTER TABLE POINTER
1313  004174     000                  .BYTE   0           ;(10) SECTOR ADDRESS OR
1314                                                      ;FIRST REG. INDEX
1315  004175     000                  .BYTE   0           ;(11) TRACK ADDRESS OR
1316                                                      ;LAST REG. INDEX
1317  004176  000000                  .WORD   0           ;(12) CYLINDER ADDRESS
1318  004200  004204                  .WORD   RM.REG      ;(14) ERROR TABLE POINTER
1319                                                      ;POINTS TO THE FIRST OF TWENTY
1320                                                      ;LOCATIONS OF WHERE THE DRIVER
1321                                                      ;IS TO STORE THE RH70/RM03
1322                                                      ;REGISTERS ON AN ERROR. IF LEFT
1323                                                      ;ZERO REGISTERS ARE NOT SAVED.
1324  004202  000000                    .WORD   0           ;(16) STATUS/ERROR INDICATOR
1325                                                      ;BIT15=1=>ERROR OCCURRED
1326                                                      ;BIT07=1=>DONE
1327                                                      ;BIT14-BIT09 AND BIT06-BIT03
1328                                                      ;INDICATE TYPE OF ERROR
1329
1330
1331
1332                                ;SAVE RH70/RM03 REGISTERS HERE ON ERROR
1333
1334  004204  000000                RM.REG: .WORD   0           ;RMCS1 (776700) CONTROL & STATUS #1
1335  004206  000000                        .WORD   0           ;RMWC (776702) WORD COUNT
1336  004210  000000                        .WORD   0           ;RMBA (776704) BUS ADDRESS
1337  004212  000000                        .WORD   0           ;RMDA (776706) DESIRED SECTOR/TRACK
1338  004214  000000                        .WORD   0           ;RMCS2 (776710) CONTROL & STATUS #2
1339  004216  000000                        .WORD   0           ;RMDS (776712) DISK STATUS
1340  004220  000000                        .WORD   0           ;RMER1 (776714) ERROR REG. #1
1341  004222  000000                        .WORD   0           ;RMAS (776716) ATTENTION SUMMARY
1342  004224  000000                        .WORD   0           ;RMLA (776720) LOOK AHEAD
1343  004226  000000                        .WORD   0           ;RMDB (776722) DATA BUFFER
1344  004230  000000                        .WORD   0           ;RMMR1 (776724) MAINTAINABILITY
1345  004232  000000                        .WORD   0           ;RMDT (776726) DRIVE TYPE
1346  004234  000000                        .WORD   0           ;RMSN (776730) SERIAL NUMBER
1347  004236  000000                        .WORD   0           ;RMOF (776732) OFFSET
1348  004240  000000                        .WORD   0           ;RMDC (776734) DESIRED CYLINDER
```

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1349  004242  000000                .WORD   0               ;RMHR (776736) CURRENT CYLINDER
1350  004244  000000                .WORD   0               ;RMMR2 (776740) ERROR REG #2
1351  004246  000000                .WORD   0               ;RMER2 (776742) ERROR REG #3
1352  004250  000000                .WORD   0               ;RMEC1 (776744) ECC POSITION
1353  004252  000000                .WORD   0               ;RMEC2 (776746) ECC PATTERN
1354
1355                          ;STATUS/ERROR MESSAGE POINTER TABLE
1356  004254  045531          STATBL: .WORD   MSGB14          ;OFFLINE OR UNSAFE DRIVE REQUESTED
1357  004256  045573                  .WORD   MSGB13          ;UNLOAD DRIVE REQUESTED
1358  004260  045624                  .WORD   MSGB12          ;PERSISTENT UNSAFE
1359  004262  045646                  .WORD   MSGB11          ;PARITY ERROR OCCURRED
1360  004264  045674                  .WORD   MSGB10          ;FATAL PARITY ERROR
1361  004266  045717                  .WORD   MSGB09          ;SOFTWARE TIMEOUT ON THIS DRIVE
1362  004270  045756                  .WORD   MSGB08          ;SOFTWARE TIMEOUT ON ANOTHER DRIVE
1363  004272  046020                  .WORD   MSGB06          ;ERROR OCCURRED DURING I/O OPERATION
1364  004274  046064                  .WORD   MSGB05          ;ERROR OCCURRED DURING NON-I/O OPERATION
1365  004276  046134                  .WORD   MSGB04          ;UNSAFE OCCURRED
1366  004300  046154                  .WORD   MSGB03          ;AUTOMATIC RECALIBRATE SEQUENCE OCCURRED
1367  004302  046224                  .WORD   MSGB02          ;DRIVE HAS NOT RESPONDED TO PORT REQUEST
1368  004304  046274                  .WORD   MSGB01          ;DRIVE HAS BECOME NONEXISTENT
```

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                                .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

004306                          $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

004306  044662                          EM1
004310  046332                          DH1
004312  047706                          DT1
004314  050340                          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

004316  044725                          EM2
004320  046347                          DH2
004322  047712                          DT2
004324  050344                          DF2

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

004326  044763                          EM3
004330  046434                          DH3
004332  047730                          DT3
004334  050350                          DF3

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

```
                                ;*    $TMPO   $ERRPC  WRT.ADR WRT.WD  RD.WRD
                                
004336  045020                        EM4
004340  046471                        DH4
004342  047740                        DT4
004344  050354                        DF4
                                
                                ;*  ERROR ITEM 5
                                ;*    ADDRESS PLUG CHANGE BIT SET
                                ;*    ERR PC  DRIVE   RMAS    RMDS    RMER1     RMMR2     RMER2
                                ;*    $ERRPC  $REG1   $REG3   RMERRS  RMERRS+2  RMERRS+4 RMERRS+6
                                
004346  045054                        EM5
004350  046347                        DH2
004352  047712                        DT2
004354  050344                        DF2
                                
                                ;*  ERROR ITEM 6 -- NOT USED
                                
004356  000000                        0
004360  000000                        0
004362  000000                        0
004364  000000                        0
                                
                                ;*  ERROR ITEM 7 -- NOT USED
                                
004366  000000                        0
004370  000000                        0
004372  000000                        0
004374  000000                        0
                                
                                ;*  ERROR ITEM 10
                                ;*    RH70/RM03 FAILED TO RESPOND TO ADDRESSING
                                ;*    RMCS1   ERR PC
                                ;*    RH.ADR  $ERRPC
                                
004376  045110                        EM10
004400  046540                        DH10
004402  047772                        DT10
004404  050360                        DF10
                                
                                ;*  ERROR ITEM 11
                                ;*    DRIVE SELECTED IS NOT ONLINE
                                ;*    DRIVE   ERR PC
                                ;*    $REG2   $ERRPC
                                
004406  045162                        EM11
004410  046557                        DH11
004412  047776                        DT11
004414  050364                        DF11
                                
                                ;*  ERROR ITEM 12
                                ;*    IMPROPER HEADER DATA
                                ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
                                ;*    $TMPO   $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS  SEC.DS
                                ;*        GDCYL   GDTRK   GDSCTR  BDCYL   BDTRK   BDSCTR
```

```
                                ;*          CYL.DS  TRK.DS  SEC.DS  CYL.RD  TRK.RD  SEC.RD
                                ;*     CYLNDR, TRACK, AND SECTOR ARE DECIMAL

004416  045217                          EM12
004420  046576                          DH12
004422  050002                          DT12
004424  050370                          DF12

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

004426  045244                          EM13
004430  046576                          DH12
004432  050034                          DT13
004434  050400                          DF13

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

004436  000000                          0
004440  000000                          0
004442  050052                          DT13A
004444  050410                          DF14

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

004446  045244                          EM13
004450  046576                          DH12
004452  050034                          DT13
004454  050400                          DF13

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

004456  000000                          0
004460  000000                          0
004462  050052                          DT13A
004464  050410                          DF14

                                ;*  ERROR ITEM 17
                                ;*    DISK ERROR IN TIMING TEST
                                ;*    TEST    ERR PC  DRIVE   RMCS1   RMDS     RMER1     RMMR2     RMER2
                                ;*    $TMPO   $ERRPC  CHKDRV  RM.REG  RM.REG+12 RM.REG+14 RM.REG+40 RM.REG+42

004466  045271                          EM17
```

```
 1537  004470  047012                          DH17
 1538  004472  050064                          DT17
 1539  004474  050414                          DF17
 1540
 1541                                  ;*  ERROR ITEM 20
 1542                                  ;*    CLOCK (KW11-P) OVERFLOW IN TIMING TEST
 1543                                  ;*    TEST    ERR PC  DRIVE   RMCS1   RMDS     RMER1     RMMR2     RMER2
 1544                                  ;*    $TMPO   $ERRPC  CHKDRV  RM.REG  RM.REG+12 RM.REG+14 RM.REG+40 RM.REG+42
 1545
 1546  004476  045323                          EM20
 1547  004500  047012                          DH17
 1548  004502  050064                          DT17
 1549  004504  050414                          DF17
 1550
 1551                                  ;*  ERROR ITEM 21
 1552                                  ;*    DATA COMPARE FAILURE
 1553                                  ;*    TEST      ERR PC  TST PC  DRIVE   CYLNDR  TRACK
 1554                                  ;*    $TMPO     $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS
 1555                                  ;*        GDDAT   BDDAT   WRDCNT  SECTOR
 1556                                  ;*        $REG1   $BDDAT  $REG4   $REG1
 1557                                  ;*        CYLINDR, TRACK, WRDCNT, AND SECTOR ARE DECIMAL
 1558
 1559  004506  045244                          EM13
 1560  004510  047107                          DH21
 1561  004512  050104                          DT21
 1562  004514  050420                          DF21
 1563
 1564                                  ;*  ERROR ITEM 22--FOLLOWS #21
 1565                                  ;*        $REG1   $BDDAT   $REG4   $REG1
 1566
 1567  004516  000000                          0
 1568  004520  000000                          0
 1569  004522  050120                          DT21A
 1570  004524  050430                          DF22
 1571
 1572                                  ;*  ERROR ITEM 23
 1573                                  ;*      DISK ERROR DURING SEEK
 1574                                  ;*      TEST    ERR PC  DRIVE   CYLNDR  RMCS1   RMCS2     RMDS
 1575                                  ;*      $TMPO   $ERRPC  CHKDRV  CYL.DS  RM.REG RM.REG+10 RM.REG+12
 1576                                  ;*          RMER1     RMMR2     RMER2     RMDC      RMHR
 1577                                  ;*          RM.REG+14 RM.REG+40 RM.REG+42 RM.REG+34 RM.REG+36
 1578
 1579  004526  045372                          EM23
 1580  004530  047224                          DH23
 1581  004532  050130                          DT23
 1582  004534  050434                          DF23
 1583
 1584                                  ;*  ERROR ITEM 24
 1585                                  ;*      SEEK NOT COMPLETE WITHIN 120 MS
 1586                                  ;*      TEST    ERR PC  DRIVE   CYLNDR  RMCS1   RMCS2     RMDS
 1587                                  ;*      $TMPO   $ERRPC  CHKDRV  CYL.DS  RM.REG RM.REG+10 RM.REG+12
 1588                                  ;*          RMER1     RMMR2     RMER2     RMDC      RMHR
 1589                                  ;*          RM.REG+14 RM.REG+40 RM.REG+42 RM.REG+34 RM.REG+36
 1590
 1591  004536  045421                          EM24
 1592  004540  047224                          DH23
```

```
1593  004542  050130                        DT23
1594  004544  050434                        DF23
1595
1596
1597
1598                                ;;*****************************************************************
1599                                ;;*****************************************************************
1600                                ;*  ERROR ITEMS 23-40 NOT USED
1601                                ;*  ERROR ITEMS 41-46 WILL HAVE AN EM THAT
1602                                ;*  VARIES DEPENDING ON THE ERROR, IT WILL BE IN THE FORM:
1603                                ;*  RH70/RM03 ERROR (MESSAGE)
1604                                ;*  WHERE MESSAGE WILL BE ONE OR MORE OF THE FOLLOWING:
1605                                ;*  1)  OFFLINE OR UNSAFE DRIVE REQUESTED
1606                                ;*  2)  UNLOADED DRIVE REQUESTED
1607                                ;*  3)  PERSISTENT UNSAFE
1608                                ;*  4)  PARITY ERROR OCCURRED
1609                                ;*  5)  FATAL PARITY ERROR
1610                                ;*  6)  SOFTWARE TIMEOUT ON THIS DRIVE
1611                                ;*  7)  SOFTWARE TIMEOUT ON ANOTHER DRIVE
1612                                ;*  8)  ERROR OCCURRED DURING I/O OPERATION
1613                                ;*  9)  ERROR OCCURRED DURING NON-I/O OPERATION
1614                                ;*  10) UNSAFE OCCURRED
1615                                ;*  11) AUTOMATIC RECALIBRATE SEQUENCE OCCURRED
1616
1617  004546                        ITEM41:
1618
1619                                ;*  ERROR ITEM 41
1620                                ;*    RH70/RM03 ERROR (MESSAGE)
1621                                ;*    TEST    ERR PC  TST PC  DRIVE
1622                                ;*    $TMP0   $ERRPC  $REG0   CHKDRV
1623
1624  004546  045461                    EM41
1625  004550  047356                    DH41
1626  004552  050160                    DT41
1627  004554  050444                    DF41
1628
1629                                ;*  ERROR ITEM 42
1630                                ;*    RH70/RM03 ERROR (MESSAGE)
1631                                ;*    TEST    ERR PC  TST PC  DRIVE   RMCS1   RMCS2   RMDS
1632                                ;*    $TMP0   $ERRPC  $REG0   CHKDRV  RM.REG  RM.REG+10 RM.REG+12
1633
1634  004556  045461                    EM41
1635  004560  047414                    DH42
1636  004562  050170                    DT42
1637  004564  050450                    DF42
1638
1639                                ;*  ERROR ITEM 43
1640                                ;*    RH70/RM03 ERROR (MESSAGE)
1641                                ;*    TEST    ERR PC  TST PC  DRIVE   RMCS1   RMCS2   RMDS
1642                                ;*    $TMP0   $ERRPC  $REG0   CHKDRV  RM.REG  RM.REG+10 RM.REG+12
1643                                ;*        RMER1     RMMR2     RMER2
1644                                ;*        RM.REG+14 RM.REG+40 RM.REG+42
1645
1646  004566  045461                    EM41
1647  004570  047414                    DH42
1648  004572  050206                    DT43
```

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1649  004574  050454                        DF43
1650
1651                                ;*  ERROR ITEM 44
1652                                ;*    RH70/RM03 ERROR (MESSAGE)
1653                                ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
1654                                ;*    $TMPO   $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS    SEC.DS
1655                                ;*       RMCS1     RMCS2     RMDS      RMHR      RMDC      RMDA
1656                                ;*       RM.REG    RM.REG+10 RM.REG+12 RM.REG+36 RM.REG+34 RM.REG+06
1657                                ;*      RMER1       RMMR2       RMER2
1658                                ;*      RM.REG+14   RM.REG+40   RM.REG+42
1659                                ;*      CYLNDR,TRACK, AND SECTOR ARE DECIMAL
1660
1661  004576  045461                        EM41
1662  004600  046576                        DH12
1663  004602  050232                        DT44
1664  004604  050464                        DF44
1665
1666                                ;*  ERROR ITEM 45
1667                                ;*    RH70/RM03 ERROR (MESSAGE)
1668                                ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
1669                                ;*    $TMPO   $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS    SEC.DS
1670                                ;*       RMCS1     RMCS2     RMDS      RMHR      RMDC      RMDA
1671                                ;*       RM.REG    RM.REG+10 RM.REG+12 RM.REG+36 RM.REG+34 RM.REG+06
1672                                ;*      RMER1       RMMR2       RMER2       RMWC       RMBA      RMDB
1673                                ;*      RM.REG+14   RM.REG+40   RM.REG+42   RM.REG+2   RM.REG+4 RM.REG+22
1674                                ;*      CYLNDR,TRACK, AND SECTOR ARE DECIMAL
1675
1676  004606  045461                        EM41
1677  004610  046576                        DH12
1678  004612  050272                        DT45
1679  004614  050500                        DF45
1680
1681                                ;*  ERROR ITEM 46
1682                                ;*    FATAL WRITE CHECK ERROR (MESSAGE)
1683                                ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
1684                                ;*    $TMPO   $ERRPC  $REG0   CHKDRV  CYL.DS  TRK.DS    SEC.DS
1685                                ;*       RMCS1     RMCS2     RMDS      RMHR      RMDC      RMDA
1686                                ;*       RM.REG    RM.REG+10 RM.REG+12 RM.REG+36 RM.REG+34 RM.REG+06
1687                                ;*      RMER1       RMMR2       RMER2       RMWC       RMBA      RMDB
1688                                ;*      RM.REG+14   RM.REG+40   RM.REG+42   RM.REG+2   RM.REG+4 RM.REG+22
1689                                ;*      CYLNDR,TRACK, AND SECTOR ARE DECIMAL
1690
1691  004616  045501                        EM46
1692  004620  046576                        DH12
1693  004622  050272                        DT45
1694  004624  050500                        DF45
1695
```

```
1696
1697                                    .SBTTL  START OF PROGRAM
1698
1699
1700  004626  012737  177777  001226  START3: MOV     #-1,@#BUSADR    ;GET BUSADR FLAG
1701  004634  000402                  BR      STRT1A
1702  004636  005037  001226          START1: CLR     @#BUSADR        ;CLR BUSADR FLAG
1703  004642  005037  001224          STRT1A: CLR     @#CNTRLC        ;NO CONTROL "C"
1704  004646  000411                  BR      START
1705  004650  012737  177777  001226  START4: MOV     #-1,@#BUSADR    ;SET BUSADR FLAG
1706  004656  000402                  BR      STRT2A
1707  004660  005037  001226          START2: CLR     @#BUSADR        ;CLR BUSADR FLAG
1708  004664  012737  177777  001224  STRT2A: MOV     #-1,@#CNTRLC    ;SET CONTROL "C" FLAG
1709  004672  000005                  START:  RESET
1710                                    .SBTTL  INITIALIZE THE COMMON TAGS
1711                                    ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
1712  004674  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
1713  004700  005026                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
1714  004702  022706  001140                  CMP     #SWR,R6 ;;DONE?
1715  004706  001374                  BNE     .-6             ;;LOOP BACK IF NO
1716  004710  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
1717                                    ;;INITIALIZE A FEW VECTORS
1718  004714  012737  023614  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
1719  004722  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
1720  004730  012737  020654  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
1721  004736  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
1722  004744  012737  024134  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
1723  004752  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
1724  004760  012737  176543  024606          MOV     #176543,$HINUM  ;;PRIME THE RANDOM NUMBER GENERATOR
1725  004766  012737  123456  024610          MOV     #123456,$LONUM  ;;BOTH HIGH AND LOW WORDS
1726  004774  005037  001204                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
1727  005000  005037  001206                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
1728  005004  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
1729  005012  012737  005012  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
1730  005020  012737  005020  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
1731                                    ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
1732                                    ;;EQUAL TO A "-1"  SETUP FOR A SOFTWARE SWITCH REGISTER.
1733  005026  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
1734  005032  012737  005066  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
1735  005040  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
1736  005046  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
1737  005054  022777  177777  174056          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
1738  005062  001012                  BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
1739                                                          ;;AND  THE HARDWARE SWR IS NOT = -1
1740  005064  000403                  BR      65$             ;;BRANCH IF NO TIMEOUT
1741  005066  012716  005074  64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
1742  005072  000002                  RTI
1743  005074  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
1744  005102  012737  000174  001142          MOV     #DISPREG,DISPLAY
1745  005110  012637  000004  66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
1746
1747  005114  012700  001160                  MOV     #$REGAD,R0      ;FIRST ADDRESS
1748  005120  005020          1$:     CLR     (R0)+           ;CLEAR VARIABLE STORAGE
1749  005122  022700  001210                  CMP     #$BELL,R0       ;DONE?
1750  005126  001374                  BNE     1$              ;NO--BRANCH
1751  005130  013737  001414  001150          MOV     @#TPS,@#$TPS    ;SETUP THE STATUS AND BUFFER REG'S
```

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 1752  005136  013737  001416  001152          MOV     @#TPB,@#STPB    ;FOR THE TYPE ROUTINE
 1753  005144  005227  177777                  INC     #-1             ;FIRST START ?
 1754  005150  001026                          BNE     3$              ;BR IF NOT
 1755  005152  104401  050514                  TYPE    ,TITLE          ;TYPE THE PROGRAM'S TITLE
 1756  005156  005737  000042                  TST     42              ;AUTO ACCEPT OR CHAIN MODE ?
 1757  005162  001006                          BNE     2$              ;BR IF EITHER
 1758  005164  122737  000011  000041          CMPB    #11,41          ;LOADED FROM AN RM03 ?
 1759  005172  001002                          BNE     2$              ;BR IF NOT
 1760  005174  104401  050612                  TYPE    ,LOADRV         ;INSTRUCT THE OPERATOR TO REMOVE THE PACK
 1761                                                                  ;ON DRIVE 0 IF DRIVE 0 IS TO BE TESTED
 1762  005200  105737  000041          2$:     TSTB    @#41            ;LOADED FROM PAPER TAPE ?
 1763  005204  001410                          BEQ     3$              ;BR IF NOT
 1764  005206  004737  051106                  JSR     PC,$SIZE        ;SIZE THE MEMORY
 1765  005212  023727  051202  100000          CMP     $LSTAD,#100000  ;16K OR MORE ON THE SYSTEM ?
 1766  005220  103002                          BHIS    3$              ;BR IF YES
 1767  005222  104401  051010                  TYPE    ,NOLOAD         ;INFORM THE OPEATOR THAT THE 'XXDP' LOADER
 1768                                                                  ;WILL BE OVERWRITTEN
 1769  005226  004737  022352          3$:     JSR     PC,$TKINT       ;TURN ON THE TTY KEYBOARD INTERRUPT
 1770                                  .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
 1771  005232  005737  000042                  TST     @#42            ;;ARE WE RUNNING UNDER XXDP/^CT?
 1772  005236  001006                          BNE     67$             ;;BRANCH IF YES
 1773  005240  023727  001140  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
 1774  005246  001005                          BNE     68$             ;;BRANCH IF NO
 1775  005250  104406                          GTSWR                   ;;GET SOFT-SWR SETTINGS
 1776  005252  000403                          BR      68$
 1777  005254  112737  000001  001134  67$:     MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
 1778  005262                          68$:
 1779  005262  005227  177777                  INC     #-1             ;SEE IF FIRST START
 1780  005266  001002                          BNE     SRTINT          ;BR IF NOT
 1781  005270  004737  051204                  JSR     PC,GETADR       ;GET OR CHECK THE RH70 ADDRESS
 1782  005274  104401  001215          SRTINT: TYPE    ,$CRLF          ;CR-LF
 1783  005300  004737  025032                  JSR     PC,@#LP.AVL     ;CHECK FOR A LINE PRINTER
 1784  005304  005037  177776                  CLR     @#PS            ;ENSURE THE PRIORITY = 0
 1785  005310  012737  000001  001104          MOV     #1,$ICNT        ;SET ITERATION COUNT TO 1
 1786  005316  004737  032424                  JSR     PC,@#GETSWR     ;GO CHECK FOR CONTROL SWITCHES
 1787  005322  004737  025074                  JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
 1788  005326  004737  035532          SETVEC: JSR     PC,RMINIT       ;CHECK THE DRIVE STATUS
 1789  005332  012737  177777  035454          MOV     #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
 1790  005340  062727  177777  000000          ADD     #-1,#0          ;FIRST START ?
 1791  005346  103003                          BCC     11$             ;BR IF YES
 1792  005350  005737  001224                  TST     CNTRLC          ;CONTROL 'C' SWITCH SET ?
 1793  005354  001072                          BNE     SRTDRV          ;CONTINUE IF YES
 1794  005356  012737  000340  177776  11$:     MOV     #PR7,PS         ;SET PRIORITY TO 7
 1795  005364  005004                          CLR     R4              ;DRIVE TABLE POINTER
 1796  005366  104401  001215                  TYPE    ,$CRLF          ;CR-LF
 1797  005372  104401  043734                  TYPE    ,SYSTAT         ;TYPE STATUS HEADING
 1798  005376                          1$:
 1799  005376  010446                          MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
 1800                                                                  ;;TYPE DRIVE NUMBER
 1801  005400  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
 1802  005402     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
 1803  005403     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
 1804  005404  104401  044657                  TYPE    ,MSG.SP         ;SPACES
 1805  005410  104401  044657                  TYPE    ,MSG.SP         ;SPACES
 1806  005414  105764  035366                  TSTB    DRVSTA(R4)      ;CHECK DRIVE'S STATUS
 1807  005420  100416                          BMI     4$              ;BR IF UNSAFE
```

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1808  005422  001020                        BNE     5$              ;BR IF ONLINE
1809  005424  105764  035376                TSTB    DRVTYP(R4)      ;SEE IF OFFLINE OR NONEXISTENT
1810  005430  001404                        BEQ     2$              ;BR IF NONEXISTENT
1811  005432  100006                        BPL     3$              ;BR IF OFFLINE
1812  005434  104401  044030                TYPE    ,NOTRM          ;DRIVE NOT AN RM03
1813  005440  000430                        BR      9$              ;CHECK NEXT DRIVE
1814  005442  104401  044003        2$:     TYPE    ,NOTPRS         ;DRIVE NOT PRESENT
1815  005446  000425                        BR      9$              ;CHECK NEXT DRIVE
1816  005450  104401  043762        3$:     TYPE    ,UNTOFF         ;DRIVE OFFLINE
1817  005454  000405                        BR      6$              ;PRINT DRIVE TYPE
1818  005456  104401  044020        4$:     TYPE    ,NOTSAF         ;DRIVE UNSAFE
1819  005462  000402                        BR      6$              ;PRINT DRIVE TYPE
1820  005464  104401  043773        5$:     TYPE    ,UNTON          ;DRIVE ONLINE
1821  005470  104401  044657        6$:     TYPE    ,MSG.SP         ;SPACES
1822  005474  012737  044042  005520        MOV     #ISRM03,8$      ;ADDRESS OF RM03 MESSAGE
1823  005502  132764  000004  035376        BITB    #BIT02,DRVTYP(R4)  ;RM03 ?
1824  005510  001002                        BNE     7$              ;TYPE IT IF YES
1825  005512  104401  044030                TYPE    ,NOTRM          ;TYPE DRIVE NOT AN RM03 IF NOT
1826  005516  104401                7$:     TYPE                    ;TYPE THE DRIVE TYPE MESSAGE
1827  005520  000000                8$:     .WORD   0               ;MESSAGE ADDRESS HERE
1828  005522  104401  001215        9$:     TYPE    ,$CRLF          ;CR-LF
1829  005526  005204                        INC     R4              ;INCREMENT DRIVE NUMBER/TABLE POINTER
1830  005530  020427  000010                CMP     R4,#8.          ;FINISHED ?
1831  005534  001320                        BNE     1$              ;BR IF NOT
1832  005536  005037  177776                CLR     PS              ;SET PRIORITY BACK TO '0'
1833  005542  005737  001224        SRTDRV: TST     @#CNTRLC        ;CONTROL "C" START/RESTART?
1834  005546  001417                        BEQ     1$              ;NO--BRANCH
1835  005550  013746  001222                MOV     SAVCSW,-(SP)    ;GET THE PREVIOUS 'C.SWR' CONTENTS
1836  005554  063716  001220                ADD     C.SWR,(SP)      ;SET UP TO SEE IF 'BIT00' IS DIFFERENT
1837  005560  032726  000001                BIT     #BIT00,(SP)+    ;IS 'BIT00' DIFFERENT ?
1838  005564  001405                        BEQ     9$              ;BR IF NOT
1839  005566  013737  001220  001222        MOV     C.SWR,SAVCSW    ;STORE PRESENT 'C.SWR' VALUE
1840  005574  004737  025352                JSR     PC,LODFLT       ;RESET PARAMETERS TO THEIR DEFAULT VALUES
1841  005600  004737  032654        9$:     JSR     PC,@#GT.PRM     ;GET PARAMETERS
1842  005604  000420                        BR      4$
1843  005606  004737  025352        1$:     JSR     PC,LODFLT       ;SETUP DEFAULT PARAMETERS
1844  005612  005037  001232                CLR     DRVSEL          ;NO DRIVES SELECTED
1845  005616  005000                        CLR     R0              ;DETERMINE THE DRIVES THAT
1846  005620  012701  000001                MOV     #1,R1           ;ARE AVAILABLE FOR TESTING
1847  005624  105760  035366        2$:     TSTB    DRVSTA(R0)
1848  005630  003403                        BLE     3$
1849  005632  156037  035502  001232        BISB    ATABIT(R0),@#DRVSEL
1850  005640  005200                3$:     INC     R0
1851  005642  106301                        ASLB    R1
1852  005644  001367                        BNE     2$
1853  005646  005037  035456        4$:     CLR     @#SEEKFG        ;CLEAR SEEK FLAG
1854  005652  032737  000400  001220        BIT     #SW08,@#C.SWR   ;DO SEEK BEFORE DATA TRANSFER?
1855  005660  001002                        BNE     5$              ;YES--BRANCH
1856  005662  005137  035456                COM     @#SEEKFG        ;NO
1857  005666  122737  000011  000041  5$:   CMPB    #11,41  ;LOADED FROM AN RM03 ?
1858  005674  001003                        BNE     10$             ;BR IF NOT
1859  005676  042737  000001  001232        BIC     #BIT00,DRVSEL   ;CLEAR THE DRIVE 0 SELECTION BIT
1860  005704  104401  044047        10$:    TYPE    ,DRIVES         ;'DRIVES(S) TO BE TESTED'
1861  005710  005037  020570                CLR     @#SENDCT        ;DETERMINE PASSES TO MAKE AND
1862  005714  005000                        CLR     R0              ;THE DRIVES TO BE TESTED
1863  005716  013701  001232                MOV     @#DRVSEL,R1     ;ANY DRIVES SELECTED?
```

```
1864  005722  001004                        BNE     6$              ;YES--BRANCH
1865  005724  104401  044100                TYPE    ,NONE           ;'NONE'
1866
1867  005730  000137  020406                JMP     @#$EOP          ;GO TO END OF PROGRAM
1868  005734  006201                6$:     ASR     R1              ;REPORT THE DRIVES TO BE TESTED
1869  005736  103011                        BCC     7$
1870  005740  005237  020570                INC     @#$ENDCT        ;GIVE THIS DRIVE A PASS
1871  005744  010046                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
1872  005746  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
1873  005750     001                        .BYTE   1               ;;TYPE 1 DIGIT(S)
1874  005751     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
1875  005752  005701                        TST     R1              ;MORE DRIVES?
1876  005754  001404                        BEQ     8$              ;NO--BRANCH
1877  005756  104401  044105                TYPE    ,COMMA          ;','
1878  005762  005200                7$:     INC     R0              ;FORM DRIVE NUMBER
1879  005764  000763                        BR      6$
1880  005766  013737  020570  020562  8$:   MOV     @#$ENDCT,@#$EOPCT
1881  005774  005737  001244                TST     @#CLKSTA        ;KW11-P AVAILABLE
1882  006000  003006                        BGT     RSTRT1          ;YES--BRANCH
1883  006002  032737  036000  001234        BIT     #36000,@#TSTNMS ;NO--ANY TIMING TESTS TO BE PERFORMED?
1884  006010  001402                        BEQ     RSTRT1          ;NO--BRANCH
1885  006012  104401  044107                TYPE    ,NOCLOK         ;'NO KW11-P CLOCK, TIMING TESTS WILL NOT BE PERFORMED'
1886  006016  005737  001232        RSTRT1: TST     DRVSEL          ;ANY DRIVES SELECTED ?
1887  006022  001002                        BNE     1$              ;BR IF YES
1888  006024  000137  004660                JMP     START2          ;GET DRIVE SELECTION ENTRY
1889                                                                ;& RESTART AT BEGINNING ---------->
1890
1891  006030  005037  001254        1$:     CLR     CHKDRV          ;INIT. THE CHECK DRIVE KEY
1892  006034  012737  000001  001256        MOV     #1,DRVMSK       ;START TO CHECK DESIRED DRIVES
1893  006042  033737  001256  001232  RSTRT2: BIT     DRVMSK,DRVSEL   ;IS THIS DRIVE SELECTED?
1894  006050  001010                        BNE     DRVOK           ;YES--GO CHECK IF DRIVE IS READY FOR TESTING
1895  006052  012706  001100        RESTART: MOV    #STACK,SP       ;SETUP THE STACK POINTER
1896  006056  005237  001254                INC     CHKDRV          ;MOVE  TO NEXT DRIVE NUMBER
1897  006062  106337  001256                ASLB    DRVMSK          ;POSITION THE MASK
1898  006066  103753                        BCS     RSTRT1          ;BRANCH IF THE DRIVE NUMBER NEEDS INITIALIZED
1899  006070  000764                        BR      RSTRT2
1900
1901  006072  013702  001254        DRVOK:  MOV     CHKDRV,R2       ;PICKUP THE DRIVE NUMBER
1902  006076  105762  035366                TSTB    DRVSTA(R2)      ;IS DESIRED DRIVE ON-LINE?
1903  006102  003005                        BGT     1$              ;YES, BRANCH
1904  006104  104011                        ERROR   11              ;DRIVE SELECTED IS NOT ONLINE
1905  006106  043737  001256  001232        BIC     DRVMSK,DRVSEL   ;CLEAR DRIVE'S SELECTION BIT
1906  006114  000756                        BR      RESTART         ;RETURN
1907  006116  010237  004104        1$:     MOV     R2,@#DPB.A      ;SET THE DRIVE NUMBER INTO THE DPB'S
1908  006122  010237  004124                MOV     R2,@#DPB.B
1909  006126  010237  004144                MOV     R2,@#DPB.C
1910  006132  010237  004164                MOV     R2,@#DTADPB
1911  006136  004737  025766                JSR     PC,@#LDCMD      ;LOAD COMMAND INTO DPB.B AND DPB.C
1912  006142  012737  020406  001252        MOV     #$EOP,@#BYPASS  ;IF ERROR GO TO END OF PROGRAM
1913  006150  112737  000020  004105        MOVB    #FMT22/256.,DPB.A+1  ;ASSUME 16 BIT FORMAT
1914  006156  032737  000001  001220        BIT     #BIT00,C.SWR    ;16 BIT FORMAT REQUESTED ?
1915  006164  001402                        BEQ     2$              ;BR IF YES
1916  006166  105037  004105                CLRB    DPB.A+1         ;CLEAR THE 'FMT22' BIT
1917  006172  112737  000143  004106  2$:   MOVB    #SETFORM,DPB.A+2  ;SET THE FORMAT BIT PER DPB.A+1
1918  006200  004037  026032                JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
1919  006204  112737  000107  004106        MOVB    #RECAL,@#DPB.A+2        ;RECAL=COMMAND
```

```
 1920  006212  004037  026032                  JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
 1921  006216  104401  044175                  TYPE    ,TESTNG         ;'TESTING DRIVE '
 1922  006222  010246                          MOV     R2,-(SP)        ;;SAVE R2 FOR TYPEOUT
 1923  006224  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
 1924  006226     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
 1925  006227     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
 1926  006230  104401  044657                  TYPE    ,MSG.SP         ;TYPE SPACES
 1927  006234  104401  044217                  TYPE    ,SERIAL         ;'SERIAL NUMBER '
 1928  006240  012700  000004                  MOV     #4,R0           ;FOUR DIGITS TO TYPE
 1929  006244  013701  004234                  MOV     RM.REG+30,R1    ;SERIAL NUMBER
 1930  006250  005002                  3$:     CLR     R2              ;ZERO
 1931  006252  006101                          ROL     R1              ;PUT THE NEXT DIGIT
 1932  006254  006102                          ROL     R2              ;INTO R2
 1933  006256  006101                          ROL     R1
 1934  006260  006102                          ROL     R2
 1935  006262  006101                          ROL     R1
 1936  006264  006102                          ROL     R2
 1937  006266  006101                          ROL     R1
 1938  006270  006102                          ROL     R2
 1939  006272  062702  000060                  ADD     #'0,R2          ;MAKE IT ASCII
 1940  006276  010227                          MOV     R2,(PC)+        ;SAVE IT
 1941  006300  000000                  4$:     .WORD   0
 1942  006302  104401  006300                  TYPE    ,4$             ;TYPE
 1943  006306  005300                          DEC     R0              ;ALL DIGITS TYPED?
 1944  006310  003357                          BGT     3$              ;NO -- BRANCH
 1945  006312  104401  001215                  TYPE    ,$CRLF
 1946  006316  113737  001364  001115          MOVB    ERR.CT,$ERMAX   ;SETUP MAX ERROR COUNT
```

```
1947
1948                                    .SBTTL  #### TESTS ####
1949

        ;/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:/*\:
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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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1982
1983                                    .SBTTL  *** SEEK TESTS ***
1984

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

        ;/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*
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2000
2001                                    ;;*****************************************************************
2002                                    ;*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.
                                ;;*****************************************************************
006324                          TST0:
006324  000240                          NOP
006326  033737  001424  001234          BIT     @#BITS+<0*2>,TSTNMS ;DO THIS TEST?
006334  001002                          BNE     64$                 ;YES--BRANCH
006336  000137  006524                  JMP     TST1                ;NO--GO TO THE NEXT TEST
006342  012737  000000  001102  64$:    MOV     #0,@#STSTNM         ;SET UP TEST NUMBER AND
                                                                    ;CLEAR THE ERROR FLAG (SERFLG)
006350  004737  025610                  JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
006354  012737  006506  001110          MOV     #TEST0,@#SLPERR     ;SETUP THE LOOP ON ERROR ADDRESS
006362  013777  001102  172552          MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
006370  013737  001506  001204          MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
006376  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
006404  032777  010000  172526          BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
006412  001413                          BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
006414  013700  001102                  MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
006420  042700  177000                  BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
006424  104401  001215                  TYPE    ,$CRLF
006430  010046                          MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
                                                                    ;;TEST NUMBER
006432  104403                          TYPOS                       ;;GO TYPE--OCTAL ASCII
006434     002                          .BYTE   2                   ;;TYPE 2 DIGIT(S)
006435     000                          .BYTE   0                   ;;SUPPRESS LEADING ZEROS
006436  104401  001215                  TYPE    ,$CRLF
006442                          20$:

006442  112737  000107  004106          MOVB    #RECAL,@#DPB.A+2        ;RECAL=COMMAND
006450  113737  001524  004134          MOVB    @#FS,@#DPB.B+10 ;FS
006456  113737  001516  004135          MOVB    @#FT,@#DPB.B+11 ;FT
006464  013737  001512  004136          MOV     @#LC,@#DPB.B+12 ;LC
006472  012737  006522  001252          MOV     #EXIT0,@#BYPASS ;GO TO EXIT0 ON ERROR
006500  012737  006506  001106          MOV     #TEST0,$LPADR   ;SETUP LOOP ADDRESS
006506  012706  001100          TEST0:  MOV     #STACK,SP       ;SET UP STACK POINTER
006512  004037  026032                  JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
006516  004037  026144                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
006522  000004                  EXIT0:  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

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

```
                                TST1:
006524                          NOP
006524 000240
006526 033737 001426 001234     BIT     @#BITS+<1*2>,TSTNMS ;DO THIS TEST?
006534 001002                   BNE     64$                 ;YES--BRANCH
006536 000137 006740            JMP     TST2                ;NO--GO TO THE NEXT TEST
006542 012737 000001 001102 64$:MOV     #1,@#$TSTNM         ;SET UP TEST NUMBER AND
                                                            ;CLEAR THE ERROR FLAG (SERFLG)
006550 004737 025610            JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
006554 012737 006722 001110     MOV     #TEST1,@#$LPERR     ;SETUP THE LOOP ON ERROR ADDRESS
006562 013777 001102 172352     MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
006570 013737 001506 001204     MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
006576 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
006604 032777 010000 172326     BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
006612 001413                   BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
006614 013700 001102            MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
006620 042700 177000            BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
006624 104401 001215            TYPE    ,$CRLF
006630 010046                   MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
                                                            ;;TEST NUMBER
006632 104403                   TYPOS                       ;;GO TYPE--OCTAL ASCII
006634    002                   .BYTE   2                   ;;TYPE 2 DIGIT(S)
006635    000                   .BYTE   0                   ;;SUPPRESS LEADING ZEROS
006636 104401 001215            TYPE    ,$CRLF
006642                          20$:

006642 113737 001524 004134             MOVB    @#FS,@#DPB.B+10 ;FS
006650 113737 001526 004154             MOVB    @#LS,@#DPB.C+10 ;LS
006656 113737 001516 004135             MOVB    @#FT,@#DPB.B+11 ;FT
006664 113737 001520 004155             MOVB    @#LT,@#DPB.C+11 ;LT
006672 013737 001510 004136             MOV     @#FC,@#DPB.B+12 ;FC
006700 013737 001512 004156             MOV     @#LC,@#DPB.C+12 ;LC
006706 012737 006736 001252             MOV     #EXIT1,@#BYPASS ;GO TO EXIT1 ON ERROR
006714 012737 006722 001106             MOV     #TEST1,$LPADR   ;SETUP LOOP ADDRESS
006722 012706 001100            TEST1:  MOV     #STACK,SP       ;SET THE STACK POINTER
006726 004037 026334                    JSR     R0,@#CALL.C     ;GO EXECUTE THE COMMAND
006732 004037 026144                    JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
006736 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.

                                ;;*****************************************************************
006740                          TST2:
006740 000240                   NOP
006742 033737 001430 001234     BIT     @#BITS+<2*2>,TSTNMS ;DO THIS TEST?
```

```
2115  006750  001002                        BNE     64$             ;YES--BRANCH
2116  006752  000137  007214                JMP     TST3            ;NO--GO TO THE NEXT TEST
2117  006756  012737  000002  001102  64$:  MOV     #2,@#STSTNM     ;SET UP TEST NUMBER AND
2118                                                                ;CLEAR THE ERROR FLAG (SERFLG)
2119  006764  004737  025610                JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
2120  006770  012737  007106  001110        MOV     #TEST2,@#SLPERR  ;SETUP THE LOOP ON ERROR ADDRESS
2121  006776  013777  001102  172136        MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2122  007004  013737  001506  001204        MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
2123  007012  112737  000031  001115        MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
2124
2125                                        ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2126  007020  032777  010000  172112        BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
2127  007026  001413                        BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
2128  007030  013700  001102                MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
2129  007034  042700  177000                BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
2130  007040  104401  001215                TYPE    ,$CRLF
2131  007044  010046                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
2132                                                                ;;TEST NUMBER
2133  007046  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
2134  007050     002                        .BYTE   2               ;;TYPE 2 DIGIT(S)
2135  007051     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
2136  007052  104401  001215                TYPE    ,$CRLF
2137  007056                          20$:
2138
2139  007056  012737  007064  001106        MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
2140  007064  113737  001524  004134  1$:   MOVB    @#FS,@#DPB.B+10 ;FS
2141  007072  113737  001516  004135        MOVB    @#FT,@#DPB.B+11 ;FT
2142  007100  012737  007212  001252        MOV     #EXIT2,@#BYPASS ;GO TO EXIT2 ON ERROR
2143  007106  013737  001510  004136  TEST2: MOV     @#FC,@#DPB.B+12 ;FC
2144  007114  012737  007114  001110        MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2145  007122  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
2146  007126                          INCSK:
2147  007126  004037  026144                JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2148  007132  063737  001514  004136        ADD     @#IC,@#DPB.B+12 ;MOVE TO NEXT CYLINDER
2149  007140  023737  001512  004136        CMP     @#LC,@#DPB.B+12 ;OUT OF CYLINDERS?
2150  007146  002367                        BGE     INCSK           ;NO--BRANCH
2151  007150  013737  001512  004136        MOV     @#LC,@#DPB.B+12
2152  007156  012737  007156  001110        MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2153  007164  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
2154  007170                          DECSK:
2155  007170  004037  026144                JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2156  007174  163737  001514  004136        SUB     @#IC,@#DPB.B+12
2157  007202  023737  001510  004136        CMP     @#FC,@#DPB.B+12
2158  007210  003767                        BLE     DECSK
2159  007212  000004                  EXIT2: SCOPE                   ;LOOP
2160
2161                                        ;;*****************************************************************
2162                                        ;*TEST 3        STEPPING SEEK TEST
2163
2164                                        ;*      THIS TEST WILL COMMAND SEEK CYCLES TO CYLINDER 0,1,2,4,
2165                                        ;*      8,16,32,64,128, AND 256.  AT THE COMPLETION OF EACH SEEK
2166                                        ;*      COMMAND THE PROPER INDICATORS ARE EXAMINED TO ENSURE PROPER
2167                                        ;*      OPERATION.
2168
2169                                        ;;*****************************************************************
2170  007214                          TST3:
```

```
2171  007214  000240                      NOP
2172  007216  033737  001432  001234      BIT     @#BITS+<3*2>,TSTNMS ;DO THIS TEST?
2173  007224  001002                      BNE     64$             ;YES--BRANCH
2174  007226  000137  007446              JMP     TST4            ;NO--GO TO THE NEXT TEST
2175  007232  012737  000003  001102  64$:MOV     #3,@#STSTNM     ;SET UP TEST NUMBER AND
2176                                              ;CLEAR THE ERROR FLAG (SERFLG)
2177  007240  004737  025610              JSR     PC,LOOPRM       ;LOAD THE PARMETERS FOR THE TEST
2178  007244  012737  007362  001110      MOV     #TEST3,@#SLPERR ;SETUP THE LOOP ON ERROR ADDRESS
2179  007252  013777  001102  171662      MOV     $TSTNM,@DISPLAY ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2180  007260  013737  001506  001204      MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
2181  007266  112737  000031  001115      MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
2182
2183                                      ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2184  007274  032777  010000  171636      BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
2185  007302  001413                      BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
2186  007304  013700  001102              MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
2187  007310  042700  177000              BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
2188  007314  104401  001215              TYPE    ,$CRLF
2189  007320  010046                      MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
2190                                              ;;TEST NUMBER
2191  007322  104403                      TYPOS                   ;;GO TYPE--OCTAL ASCII
2192  007324     002                      .BYTE   2               ;;TYPE 2 DIGIT(S)
2193  007325     000                      .BYTE   0               ;;SUPPRESS LEADING ZEROS
2194  007326  104401  001215              TYPE    ,$CRLF
2195  007332                          20$:
2196
2197  007332  012737  007340  001106              MOV     #1$,$LPADR      ;SETUP TEST LOOP ADDRESS
2198  007340  113737  001524  004134  1$:         MOVB    @#FS,@#DPB.B+10 ;FS
2199  007346  113737  001516  004135              MOVB    @#FT,@#DPB.B+11 ;FT
2200  007354  012737  007444  001252              MOV     #EXIT3,@#BYPASS ;GO TO BYPASS ON ERROR
2201  007362  013737  001510  004136  TEST3:     MOV     @#FC,@#DPB.B+12 ;FC
2202  007370  012737  007370  001110              MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2203  007376  012706  001100                      MOV     #STACK,SP       ;LOAD THE STACK POINTER
2204  007402  004037  026144                      JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2205  007406  013701  001514                      MOV     IC,R1           ;CYLINDER 1
2206  007412  012737  007412  001110              MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2207  007420  012706  001100                      MOV     #STACK,SP       ;LOAD THE STACK POINTER
2208  007424  010137  004136          1$:         MOV     R1,@#DPB.B+12   ;DESIRED CYLINDER
2209  007430  004037  026144                      JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2210  007434  006301                              ASL     R1              ;MOVE TO NEXT CYLINDER
2211  007436  020137  001512                      CMP     R1,@#LC         ;DONE?
2212  007442  003770                              BLE     1$              ;NO--LOOP
2213  007444  000004                  EXIT3:      SCOPE
2214
2215                                      ;;*****************************************************************
2216                                      ;*TEST 4         OSCILLATING SEEK TEST
2217
2218                                      ;*      THIS TEST WILL COMMAND SEEK CYCLES FROM "FC" TO "NC" AND BACK
2219                                      ;*      TO "FC".  "NC" STARTS AT "FC" AND INCREMENTS BY "IC" UP TO CYLINDER
2220                                      ;*      "LC", THEN IS DECREMENTED BY "IC" BACK TO CYLINDER "FC".  AT THE
2221                                      ;*      COMPLETION OF EVERY SEEK COMMAND THE PROPER INDICATORS ARE
2222                                      ;*      EXAMINED TO ENSURE PROPER OPERATION.
2223
2224                                      ;;*****************************************************************
2225  007446                          TST4:
2226  007446  000240                              NOP
```

```
                                                BIT     @#BITS+<4*2>,TSTNMS ;DO THIS TEST?
                                                BNE     64$                 ;YES--BRANCH
                                                JMP     TST5                ;NO--GO TO THE NEXT TEST
007464  012737  000004  001102  64$:           MOV     #4,@#$TSTNM         ;SET UP TEST NUMBER AND
                                                                            ;CLEAR THE ERROR FLAG (SERFLG)
007472  004737  025610                          JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
007476  012737  007630  001110                  MOV     #TEST4,@#$LPERR     ;SETUP THE LOOP ON ERROR ADDRESS
007504  013777  001102  171430                  MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
007512  013737  001506  001204                  MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
007520  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
007526  032777  010000  171404                  BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
007534  001413                                  BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
007536  013700  001102                          MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
007542  042700  177000                          BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
007546  104401  001215                          TYPE    ,$CRLF
007552  010046                                  MOV     R0,-(SP)            ;;SAVE R0 FOR TYPEOUT
                                                                            ;;TEST NUMBER
007554  104403                                  TYPOS                       ;;GO TYPE--OCTAL ASCII
007556     002                                  .BYTE   2                   ;;TYPE 2 DIGIT(S)
007557     000                                  .BYTE   0                   ;;SUPPRESS LEADING ZEROS
007560  104401  001215                          TYPE    ,$CRLF
007564                          20$:
007564  012737  007572  001106                  MOV     #1$,$LPADR          ;SETUP LOOP ADDRESS
007572  113737  001524  004134  1$:             MOVB    @#FS,@#DPB.B+10     ;FS
007600  113737  001516  004135                  MOVB    @#FT,@#DPB.B+11     ;FT
007606  012737  010070  001252                  MOV     #EXIT4,@#BYPASS     ;GO TO EXIT4 ON ERROR
007614  005002                                  CLR     R2                  ;CLEAR STALL SWITCH (NO STALL)
007616  032737  010000  001220                  BIT     #SW12,@#C.SWR       ;STALL REQUIRED?
007624  001401                                  BEQ     TEST4               ;NO--BRANCH
007626  005102                                  COM     R2                  ;YES--SET SWITCH
007630  013701  001510          TEST4:          MOV     @#FC,R1             ;SET NC TO FC
007634  005037  001336                          CLR     @#STALLO            ;START AT ZERO IF STALLS REQUIRED
007640  012737  007640  001110                  MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
007646  012706  001100                          MOV     #STACK,SP           ;LOAD THE STACK POINTER
007652  010137  004136          1$:             MOV     R1,@#DPB.B+12       ;NC
007656  004037  026144                          JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
007662  005702                                  TST     R2                  ;STALL?
007664  001403                                  BEQ     2$                  ;NO--BRANCH
007666  004037  027364                          JSR     R0,@#STALL          ;YES-GO TO STALL ROUTINE
007672  001336                                  .WORD   STALLO              ;TIME POINTER
007674  013737  001510  004136  2$:             MOV     FC,@#DPB.B+12       ;FC
007702  004037  026144                          JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
007706  005702                                  TST     R2                  ;STALL?
007710  001413                                  BEQ     3$                  ;NO--BRANCH
007712  004037  027364                          JSR     R0,@#STALL          ;YES--GO TO STALL ROUTINE
007716  001336                                  .WORD   STALLO              ;TIME POINTER
007720  005237  001336                          INC     @#STALLO            ;UPDATE THE TIME
007724  023737  001362  001336                  CMP     @#MXSTAL,@#STALLO ;TIME TO BIG?
007732  003347                                  BGT     1$                  ;NO--BRANCH
007734  005037  001336                          CLR     @#STALLO            ;YES--START OVER AT ZERO
007740  063701  001514          3$:             ADD     @#IC,R1             ;MOVE TO NEXT CYLINDER
007744  020137  001512                          CMP     R1,@#LC             ;LAST CYLINDER COMPLETED?
007750  003740                                  BLE     1$                  ;NO--BRANCH
```

```
2283  007752  013701  001512                  MOV     @#LC,R1             ;SET NC TO LC
2284  007756  012737  007756  001110          MOV     #.-$LPERR           ;SETUP THE ERROR LOOP ADDRESS
2285  007764  012706  001100                  MOV     #STACK,SP           ;LOAD THE STACK POINTER
2286  007770  010137  004136          4$:     MOV     R1,@#DPB.B+12       ;NC
2287  007774  004037  026144                  JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
2288  010000  005702                          TST     R2                  ;STALL?
2289  010002  001403                          BEQ     5$                  ;NO--BRANCH
2290  010004  004037  027364                  JSR     R0,@#STALL          ;YES--GO TO STALL ROUTINE
2291  010010  001336                          .WORD   STALLO              ;TIME POINTER
2292  010012  013737  001512  004136  5$:     MOV     @#LC,@#DPB.B+12     ;LC
2293  010020  004037  026144                  JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
2294  010024  005702                          TST     R2                  ;STALL?
2295  010026  001413                          BEQ     6$                  ;NO--BRANCH
2296  010030  004037  027364                  JSR     R0,@#STALL          ;YES--GO TO STALL ROUTINE
2297  010034  001336                          .WORD   STALLO              ;TIME POINTER
2298  010036  005237  001336                  INC     @#STALLO            ;UPDATE STALL TIME
2299  010042  023737  001362  001336          CMP     @#MXSTAL,@#STALLO   ;TIME TOO BIG?
2300  010050  003347                          BGT     4$                  ;NO--BRANCH
2301  010052  005037  001336                  CLR     @#STALLO            ;YES--SET STALL TIME BACK TO ZERO
2302  010056  163701  001514          6$:     SUB     @#IC,R1             ;NEXT CYLINDER
2303  010062  020137  001510                  CMP     R1,@#FC             ;DONE?
2304  010066  002340                          BGE     4$                  ;NO--BRANCH
2305  010070  000004                  EXIT4:  SCOPE                       ;LOOP
2306
2307                                  ;;*****************************************************************
2308                                  ;*TEST 5        CONVERGING/DIVERGING SEEK TEST
2309
2310                                  ;*      THIS TEST WILL CAUSE THE DRIVE TO EXECUTE FORWARD AND REVERSE
2311                                  ;*      SEEKS FROM "NC1" AND "NC2" RESPECTIVELY, "NC1" WILL BE INCREMENTED
2312                                  ;*      BY "IC" AND "NC2" WILL BE DECREMENTED BY "IC" UNTIL "NC1" IS
2313                                  ;*      GREATER THAN THE INITIAL VALUE OF "NC2" AND "NC2" IS
2314                                  ;*      LESS THAN THE INITIAL VALUE OF "NC1".  AT THE COMPLETION OF
2315                                  ;*      EACH SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO
2316                                  ;*      ENSURE PROPER OPERATION.  "NC1" AND "NC2" DEFAULT TO
2317                                  ;*      "FC" AND "LC" RESPECTIVELY.
2318
2319                                  ;;*****************************************************************
2320  010072                          TST5:
2321  010072  000240                          NOP
2322  010074  033737  001436  001234          BIT     @#BITS+<5*2>,TSTNMS ;DO THIS TEST?
2323  010102  001002                          BNE     64$                 ;YES--BRANCH
2324  010104  000137  010330                  JMP     TST6                ;NO--GO TO THE NEXT TEST
2325  010110  012737  000005  001102  64$:     MOV     #5,@#$TSTNM         ;SET UP TEST NUMBER AND
2326                                                                      ;CLEAR THE ERROR FLAG (SERFLG)
2327  010116  004737  025610                  JSR     PC,LOOPRM           ;LOAD THE PARMETERS FOR THE TEST
2328  010122  012737  010240  001110          MOV     #TEST5,@#$LPERR     ;SETUP THE LOOP ON ERROR ADDRESS
2329  010130  013777  001102  171004          MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2330  010136  013737  001506  001204          MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
2331  010144  112737  000031  001115          MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
2332
2333                                  ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2334  010152  032777  010000  170760          BIT     #SW12,@SWR          ;CHECK FOR SWITCH 12 SET
2335  010160  001413                          BEQ     20$                 ;IF = 0, THEN DON'T TYPE TEST NUMBER
2336  010162  013700  001102                  MOV     $TSTNM,R0           ;ELSE, TYPE THE NUMBER
2337  010166  042700  177000                  BIC     #177000,R0          ;MASK OUT THE HIGH ORDER BYTE
2338  010172  104401  001215                  TYPE    ,$CRLF
```

```
2339  010176  010046                        MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
2340                                                                  ;;TEST NUMBER
2341  010200  104403                        TYPOS                   ;;GO TYPE--OCTAL ASCII
2342  010202     002                        .BYTE   2               ;;TYPE 2 DIGIT(S)
2343  010203     000                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
2344  010204  104401  001215                TYPE    ,$CRLF
2345  010210                        20$:
2346
2347  010210  012737  010216  001106        MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
2348  010216  113737  001524  004134  1$:   MOVB    @#ES,@#DPB.B+10 ;ES
2349  010224  113737  001516  004135        MOVB    @#FT,@#DPB.B+11 ;FT
2350  010232  012737  010326  001252        MOV     #EXIT5,@#BYPASS ;GO TO EXIT5 ON ERROR
2351  010240  013701  001510        TEST5:  MOV     @#FC,R1         ;START NC1 AT FC
2352  010244  013702  001512                MOV     @#LC,R2         ;START NC2 AT LC
2353  010250  012737  010250  001110        MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2354  010256  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
2355  010262  010137  004136        1$:     MOV     R1,@#DPB.B+12   ;NC1
2356  010266  004037  026144                JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2357  010272  010237  004136                MOV     R2,@#DPB.B+12   ;NC2
2358  010276  004037  026144                JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2359  010302  063701  001514                ADD     @#IC,R1         ;NEXT NC1
2360  010306  163702  001514                SUB     @#IC,R2         ;NEXT NC2
2361  010312  020137  001512                CMP     R1,@#LC         ;DONE?
2362  010316  003003                        BGT     EXIT5           ;YES--BRANCH
2363  010320  020237  001510                CMP     R2,@#FC ;?
2364  010324  002356                        BGE     1$              ;NO--BRANCH
2365  010326  000004                EXIT5:  SCOPE                   ;LOOP
2366
2367                                ;;*****************************************************************
2368                                ;*TEST 6        SERVO ADDRESSING LOGIC NOISE GENERATOR
2369
2370                                ;*      IN THIS TEST A SEEK IS DONE TO CYL "NC" THEN A SEEK TO
2371                                ;*      NC+4 THEN NC+1 THEN NC+3 THEN NC+2 THEN NC+5.  NOW "NC" IS UPDATED
2372                                ;*      BY "IC" AND THE ABOVE SEQUENCE IS REPEATED UNITL "LC" IS
2373                                ;*      EXCEEDED BY ANY OF THE ABOVE VALUES.  THE INITIAL VALUE OF "NC"
2374                                ;*      IS "FC".  AT THE COMPLETION OF EACH SEEK COMMAND THE
2375                                ;*      PROPER INDICATORS ARE EXAMINED TO ENSURE PROPER OPERATION.
2376
2377                                ;;*****************************************************************
2378  010330                        TST6:
2379  010330  000240                        NOP
2380  010332  033737  001440  001234        BIT     @#BITS+<6*2>,TSTNMS ;DO THIS TEST?
2381  010340  001002                        BNE     64$             ;YES--BRANCH
2382  010342  000137  010632                JMP     TST7            ;NO--GO TO THE NEXT TEST
2383  010346  012737  000006  001102  64$:  MOV     #6,@#$TSTNM     ;SET UP TEST NUMBER AND
2384                                                                ;CLEAR THE ERROR FLAG ($ERFLG)
2385  010354  004737  025610                JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
2386  010360  012737  010476  001110        MOV     #TEST6,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
2387  010366  013777  001102  170546        MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2388  010374  013737  001506  001204        MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
2389  010402  112737  000031  001115        MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
2390
2391                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2392  010410  032777  010000  170522        BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
2393  010416  001413                        BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
2394  010420  013700  001102                MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
```

```
2395  010424  042700  177000                  BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
2396  010430  104401  001215                  TYPE    ,$CRLF
2397  010434  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
2398                                                                  ;;TEST NUMBER
2399  010436  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
2400  010440     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
2401  010441     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
2402  010442  104401  001215                  TYPE    ,$CRLF
2403  010446                          20$:
2404
2405  010446  012737  010454  001106          MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
2406  010454  113737  001524  004134  1$:     MOVB    @#FS,@#DPB.B+10 ;FS
2407  010462  113737  001516  004135          MOVB    @#FT,@#DPB.B+11 ;FT
2408  010470  012737  010630  001252          MOV     #EXIT6,@#BYPASS ;GO TO EXIT6 ON ERROR
2409  010476  013701  001510          TEST6:  MOV     @#FC,R1         ;PICKUP "FC"
2410  010502  013702  001512                  MOV     @#LC,R2         ;FORM LAST CYLINDER THAT
2411  010506  162702  000005                  SUB     #5,R2           ;IS AVAILABLE FOR TESTING
2412  010512  012737  010512  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2413  010520  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
2414  010524  020102                  1$:     CMP     R1,R2           ;LAST CYLINDER
2415  010526  003040                          BGT     EXIT6           ;YES--BRANCH
2416  010530  010137  004136                  MOV     R1,@#DPB.B+12   ;NC
2417  010534  004037  026144                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2418  010540  062737  000004  004136          ADD     #4,@#DPB.B+12   ;NC+4
2419  010546  004037  026144                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2420  010552  162737  000003  004136          SUB     #3,@#DPB.B+12   ;NC+1
2421  010560  004037  026144                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2422  010564  062737  000002  004136          ADD     #2,@#DPB.B+12   ;NC+3
2423  010572  004037  026144                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2424  010576  162737  000001  004136          SUB     #1,@#DPB.B+12   ;NC+2
2425  010604  004037  026144                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2426  010610  062737  000003  004136          ADD     #3,@#DPB.B+12   ;NC+5
2427  010616  004037  026144                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2428  010622  063701  001514                  ADD     @#IC,R1
2429  010626  000736                          BR      1$
2430  010630  000004                  EXIT6:  SCOPE                   ;LOOP
2431
2432                                  ;;*****************************************************************
2433                                  ;*TEST 7         RANDOM SEEK TEST
2434
2435                                  ;*      THIS TEST PERFORMS RANDOM SEEK OPERATIONS BETWEEN CYLINDERS 'FC'
2436                                  ;*      'LC'.  AFTER EACH SEEK, THE POSITION OF THE DRIVE IS VERIFIED BY
2437                                  ;*      READING A SECTOR FROM THE CURRENTLY ADDRESSED CYLINDER AND TRACK.
2438                                  ;*      THE TRACK ADDRESS IS INCREMENTED FOR EACH SEEK SO THAT VERIFICATION
2439                                  ;*      OF POSITIONING OCCURS USING EACH HEAD.  TRACK ADDRESSES ARE INCREMENTED
2440                                  ;*      BETWEEN PARAMTERS 'FT' AND 'LT'.
2441
2442                                  ;;*****************************************************************
2443  010632                          TST7:
2444  010632  000240                          NOP
2445  010634  033737  001442  001234          BIT     @#BITS+<7*2>,TSTNMS ;DO THIS TEST?
2446  010642  001002                          BNE     64$             ;YES--BRANCH
2447  010644  000137  011250                  JMP     TST10           ;NO--GO TO THE NEXT TEST
2448  010650  012737  000007  001102  64$:    MOV     #7,@#$TSTNM     ;SET UP TEST NUMBER AND
2449                                                                  ;CLEAR THE ERROR FLAG ($ERFLG)
2450  010656  004737  025610                  JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
```

```
2451  010662  012737  011012  001110          MOV     #TEST7,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
2452  010670  013777  001102  170244          MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2453  010676  013737  001506  001204          MOV     @#RPT,$TIMES     ;GET THE ITERATION COUNT
2454  010704  112737  000031  001115          MOVB    #25.,$ERMAX      ;MAX ERRORS ALLOWED FOR TEST
2455
2456                                           ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2457  010712  032777  010000  170220          BIT     #SW12,@SWR       ;CHECK FOR SWITCH 12 SET
2458  010720  001413                          BEQ     20$              ;IF = 0, THEN DON'T TYPE TEST NUMBER
2459  010722  013700  001102                  MOV     $TSTNM,R0        ;ELSE, TYPE THE NUMBER
2460  010726  042700  177000                  BIC     #177000,R0       ;MASK OUT THE HIGH ORDER BYTE
2461  010732  104401  001215                  TYPE    ,$CRLF
2462  010736  010046                          MOV     R0,-(SP)         ;;SAVE R0 FOR TYPEOUT
2463                                                                   ;;TEST NUMBER
2464  010740  104403                          TYPOS                    ;;GO TYPE--OCTAL ASCII
2465  010742     002                          .BYTE   2                ;;TYPE 2 DIGIT(S)
2466  010743     000                          .BYTE   0                ;;SUPPRESS LEADING ZEROS
2467  010744  104401  001215                  TYPE    ,$CRLF
2468  010750                          20$:
2469
2470  010750  113737  001516  004135          MOVB    FT,DPB.B+11      ;LOAD STARTING TRACK ADDRESS
2471  010756  112737  000105  004106          MOVB    #SEEK,@#DPB.A+2  ;SEEK=COMMAND
2472  010764  112737  000173  004126          MOVB    #READHD,DPB.B+2  ;READ HEADER & DATA COMMAND
2473  010772  013704  035514                  MOV     RMADR,R4         ;UNIBUS ADDRESS OF THE RH70
2474  010776  012737  011246  001252          MOV     #EXIT7,BYPASS    ;ERROR TERMINATION ADDRESS
2475  011004  012737  011012  001106          MOV     #TEST7,$LPADR    ;SETUP THE LOOP ON TEST ADDRESS
2476  011012  012706  001100          TEST7:  MOV     #STACK,SP        ;SETUP THE STACK POINTER
2477  011016  013737  001510  004136          MOV     FC,DPB.B+12      ;INITIAL CYLINDER ADDRESS
2478  011024  023737  001510  001512          CMP     FC,LC            ;CYLINDER LIMITS THE SAME ?
2479  011032  001422                          BEQ     1$               ;BR IF THEY ARE
2480  011034  004737  024510                  JSR     PC,$RAND         ;CYCYLE THE RANDOM NUMBER GENERATOR
2481  011040  013746  024606                  MOV     $HINUM,-(SP)     ;USE THE HIGH RANDOM NUMBER
2482  011044  005046                          CLR     -(SP)            ;UPPER DIVIDEND
2483  011046  013746  001512                  MOV     LC,-(SP)         ;FORM THE DIVISOR
2484  011052  005216                          INC     (SP)             ;INCREMENT
2485  011054  163716  001510                  SUB     FC,(SP)          ;SUBTRACT THE LOWER LIMIT
2486  011060  004737  024612                  JSR     PC,$DIV          ;DIVIDE
2487  011064  062637  004136                  ADD     (SP)+,DPB.B+12   ;ADD THE REMAINDER TO THE INITIAL CYLINDER
2488  011070  005726                          TST     (SP)+            ;DISCARD THE QUOTENT
2489  011072  013737  004136  004116          MOV     DPB.B+12,DPB.A+12  ;COPY NEW CYLINDER ADDRESS
2490  011100                          1$:
2491  011100  012737  011100  001110          MOV     #.,$LPERR        ;SETUP THE ERROR LOOP ADDRESS
2492  011106  012706  001100                  MOV     #STACK,SP        ;LOAD THE STACK POINTER
2493  011112  004037  026032                  JSR     R0,@#CALL.A      ;GO EXECUTE THE COMMAND
2494  011116  012737  011116  001110          MOV     #.,$LPERR        ;SETUP THE ERROR LOOP ADDRESS
2495  011124  012706  001100                  MOV     #STACK,SP        ;LOAD THE STACK POINTER
2496  011130  113764  004104  000010          MOVB    DPB.A,RMCS2(R4)  ;SELECT THE DRIVE
2497  011136  016446  000020                  MOV     RMLA(R4),-(SP)   ;GET THE LOOK AHEAD REGISTER
2498  011142  006316                          ASL     (SP)             ;ALIGN THE SECTOR ADDRESS
2499  011144  006316                          ASL     (SP)             ;ALIGN THE SECTOR ADDRESS
2500  011146  000316                          SWAB    (SP)             ;PUT ADDRESS IN LOWER BYTE
2501  011150  105766  000001                  TSTB    1(SP)            ;IN THE 1ST 20% OF SECTOR ?
2502  011154  001401                          BEQ     2$               ;BR IF YES
2503  011156  105216                          INCB    (SP)             ;INCREMENT THE SECTOR ADDRESS
2504  011160  105216                  2$:     INCB    (SP)             ;INCREMENT THE SECTOR ADDRESS
2505  011162  112637  004174                  MOVB    (SP)+,DTADPB+10  ;LOAD THE DPB
2506  011166  013746  001630                  MOV     PRMLMT+22,-(SP)  ;PUT LAST SECTOR ADDRESS ON THE STACK
```

```
                                                INC     (SP)                    ;INCREMENT IT
                                                CMPB    (SP)+,DTADPB+10         ;NEW SECTOR ADDRESS TOO LARGE ?
                                                BHIS    4$                      ;BR IF NOT
                                                BLO     3$                      ;BR IF ADDRESS IS 2 GREATER
                                                CLRB    DTADPB+10               ;RESET TO SECTOR ADDRESS 0
                                                BR      4$                      ;CONTINUE
                                        3$:     MOVB    #1,DTADPB+10            ;RESET ADDRESS TO SECTOR 1
                                        4$:
                                                JSR     R0,@#CALL.B             ;GO EXECUTE THE COMMAND
                                                INCB    DPB.B+11                ;INCREMENT THE TRACK ADDRESS
                                                CMPB    DPB.B+11,LT             ;MAXIMUM ?
                                                BLOS    EXIT7                   ;BR IF NOT
                                                MOVB    FT,DPB.B+11             ;RELOAD STARTING TRACK ADDRESS
                                        EXIT7:  SCOPE                           ;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 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 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,@#STSTNM            ;SET UP TEST NUMBER AND
                                                                                ;CLEAR THE ERROR FLAG (SERFLG)
                                                JSR     PC,LODPRM               ;LOAD THE PARMETERS FOR THE TEST
                                                MOV     #TST10,@#SLPERR  ;SETUP THE LOOP ON ERROR ADDRESS
                                                MOV     STSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
                                                MOV     @#RPT,STIMES            ;GET THE ITERATION COUNT
                                                MOVB    #25.,SERMAX             ;MAX ERRORS ALLOWED FOR TEST

                                                ;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
```

```
2563  011340  013700  001102            MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
2564  011344  042700  177000            BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
2565  011350  104401  001215            TYPE    ,$CRLF
2566  011354  010046                     MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
2567                                                             ;;TEST NUMBER
2568  011356  104403                     TYPOS                   ;;GO TYPE--OCTAL ASCII
2569  011360     002                     .BYTE   2               ;;TYPE 2 DIGIT(S)
2570  011361     000                     .BYTE   0               ;;SUPPRESS LEADING ZEROS
2571  011362  104401  001215            TYPE    ,$CRLF
2572  011366                     20$:
2573
2574  011366  012737  011374  001106            MOV     #1$,$LPADR      ;SETUP THE LOOP ADDRESS
2575  011374                     1$:
2576  011374  112737  000105  004106            MOVB    #SEEK,@#DPB.A+2 ;SEEK=COMMAND
2577  011402  112737  000161  004166            MOVB    #WRITE,DTADPB+2 ;COMMAND
2578  011410  113737  001516  004175            MOVB    FT,DTADPB+11    ;TRACK ADDRESS FOR THE WRITE
2579  011416  013737  001510  004116            MOV     FC,DPB.A+12     ;CYLINDER ADDRESS FOR THE SEEK
2580  011424  013737  001510  004176            MOV     FC,DTADPB+12    ;CYLINDER ADDRESS FOR THE WRITE
2581  011432  013737  001510  001532            MOV     FC,NC1          ;STARTING CYLINDER
2582  011440  013737  001514  001350            MOV     IC,DELTA        ;CYLINDER INCREMENT VALUE
2583  011446  012737  176000  004170            MOV     #-<256.*4.>,DTADPB+4  ;WORD COUNT
2584  011454  012737  050514  004172            MOV     #BUFFER,DTADPB+6  ;BUFFER ADDRESS
2585  011462  005000                     CLR     R0              ;PATTERN POINTER (WC PATTERN)
2586  011464  004737  031360            JSR     PC,SETBUF       ;LOAD THE WRITE BUFFER
2587  011470  005001                     CLR     R1              ;CLEAR REGISTER
2588  011472  113701  004104            MOVB    DPB.A,R1        ;LOAD DRIVE ADDRESS
2589  011476  013704  035514            MOV     RMADR,R4        ;UNIBUS ADDRESS OF THE RH70
2590  011502  004737  043346            JSR     PC,CLRQUE       ;CLEAR THE OPERATION QUEUES
2591  011506  012737  012410  001252            MOV     #EXIT10,BYPASS  ;ERROR EXIT FROM TEST
2592  011514                     TEST10:
2593  011514  012737  011514  001110            MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
2594  011522  012706  001100            MOV     #STACK,SP       ;LOAD THE STACK POINTER
2595  011526  012737  000340  177776            MOV     #PR7,@#PS       ;SET PRIORITY TO 7
2596  011534  005737  001244            TST     CLKSTA          ;SEE WHICH CLOCK ON SYSTEM
2597  011540  001415                     BEQ     3$              ;BR IF NO CLOCK
2598  011542  100405                     BMI     1$              ;BR IF KW11-L CLOCK
2599  011544  017746  167624            MOV     @PKV,-(SP)      ;SAVE THE VECTOR
2600  011550  013746  001374            MOV     PKV,-(SP)       ;SAVE THE VECTOR ADDRESS
2601  011554  000404                     BR      2$              ;CONTINUE
2602  011556  017746  167624     1$:    MOV     @LKV,-(SP)      ;SAVE THE 'L' CLOCK VECTOR
2603  011562  013746  001406            MOV     LKV,-(SP)       ;SAVE THE VECTOR ADDRESS
2604  011566  012776  012344  000000  2$:    MOV     #TST108,@(SP)   ;CHANGE THE VECTOR
2605  011574  012777  030052  023714  3$:    MOV     #DORTI,@RMVEC   ;CHANGE THE RM03 VECTOR
2606  011602  012737  000010  001344            MOV     #8.,SEKTMR      ;LOAD THE SEEK TIMER
2607  011610  012764  000040  000010            MOV     #BIT05,RMCS2(R4)  ;INIT THE MASSBUS
2608  011616  110164  000010                    MOVB    R1,RMCS2(R4)    ;RESELECT THE DRIVE
2609  011622  013764  004116  000034            MOV     DPB.A+12,RMDC(R4)  ;LOAD THE CYLINDER ADDRESS
2610  011630  013737  004116  001270            MOV     DPB.A+12,CYL.DS ;CYLINDER ADDRESS FOR ERROR MESSAGE
2611  011636  112764  000105  000000            MOVB    #SEEK,RMCS1(R4) ;START THE SEEK
2612  011644  005037  177776                    CLR     @#PS            ;CLEAR THE PRIORITY
2613  011650  105764  000012            4$:    TSTB    RMDS(R4)        ;HAS THE DRIVE FINISHED ?
2614  011654  100402                     BMI     5$              ;BR IF IT HAS
2615  011656  000001                     WAIT                    ;WAIT FOR THE OPERATION TO COMPLETE
2616  011660  000773                     BR      4$              ;CONTINUE
2617  011662  012737  000340  177776  5$:    MOV     #PR7,@#PS       ;CHANGE PRIORITY TO MAX
2618  011670  032764  040000  000012            BIT     #BIT14,RMDS(R4)  ;ERROR ?
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2619  011676  001412                        BEQ     6$                ;BR IF NOT
2620  011700  012702  004104                MOV     #DPB.A,R2         ;DPB POINTER
2621  011704  004737  042664                JSR     PC,SVRH70         ;SAVE THE REGISTERS
2622  011710  104023                        ERROR   23                ;ERROR DURING SEEK
2623  011712  012764  000040  000010        MOV     #BIT05,RMCS2(R4)  ;INIT THE MASSBUS
2624  011720  110164  000010                MOVB    R1,RMCS2(R4)      ;RESELECT THE DRIVE
2625  011724  012777  040320  023564  6$:    MOV     #ISR,@RMVEC       ;SETUP THE RM03 VECTOR
2626  011732  005737  001244                TST     CLKSTA            ;WHICH CLOCK
2627  011736  001405                        BEQ     TST10A            ;BR IF NONE
2628  011740  016676  000002  000000        MOV     2(SP),@(SP)       ;RELOAD THE CLOCK VECTOR
2629  011746  062706  000004                ADD     #4,SP             ;CORRECT THE STACK POINTER
2630  011752                          TST10A:
2631  011752  012737  011752  001110        MOV     #.,$LPERR         ;SETUP THE ERROR LOOP ADDRESS
2632  011760  012706  001100                MOV     #STACK,SP         ;LOAD THE STACK POINTER
2633  011764  110164  000010                MOVB    R1,RMCS2(R4)      ;SELECT THE DRIVE
2634  011770  016446  000020                MOV     RMLA(R4),-(SP)    ;GET THE LOOK AHEAD REGISTER
2635  011774  006316                        ASL     (SP)              ;ALIGN THE SECTOR ADDRESS
2636  011776  006316                        ASL     (SP)              ;ALIGN THE SECTOR ADDRESS
2637  012000  000316                        SWAB    (SP)              ;PUT ADDRESS IN LOWER BYTE
2638  012002  122766  000300  000001        CMPB    #300,1(SP)        ;IN THE LAST 20% OR SECTOR ?
2639  012010  001001                        BNE     2$                ;BR IF NOT
2640  012012  105216                        INCB    (SP)              ;INCREMENT THE SECTOR ADDRESS
2641  012014  105216                  2$:   INCB    (SP)              ;INCREMENT THE SECTOR ADDRESS
2642  012016  112637  004174                MOVB    (SP)+,DTADPB+10   ;LOAD THE DPB
2643  012022  013746  001630                MOV     PRMLMT+22,-(SP)   ;PUT MAXIMUM SECTOR ADDRESS ON THE STACK
2644  012026  005216                        INC     (SP)              ;INCREMENT PAST THE MAXIMUM ADDRESS
2645  012030  122637  004174                CMPB    (SP)+,DTADPB+10   ;NEW SECTOR ADDRESS TOO LARGE ?
2646  012034  101007                        BHI     4$                ;BR IF NOT
2647  012036  103403                        BLO     3$                ;BR IF ADDRESS IS 2 GREATER THAN MAXIMUM
2648  012040  105037  004174                CLRB    DTADPB+10         ;RESET TO SECTOR ADDRESS 0
2649  012044  000403                        BR      4$                ;CONTINUE
2650  012046  112737  000001  004174  3$:   MOVB    #1,DTADPB+10      ;RESET ADDRESS TO SECTOR 1
2651  012054  012703  004170        4$:     MOV     #DTADPB+4,R3      ;POINTER
2652  012060  012764  000111  000000        MOV     #DRVCLR,RMCS1(R4) ;CLEAR THE DRIVE
2653  012066  012364  000002                MOV     (R3)+,RMWC(R4)    ;LOAD THE WORD COUNT
2654  012072  012364  000004                MOV     (R3)+,RMBA(R4)    ;LOAD THE BUFFER ADDRESS
2655  012076  012364  000006                MOV     (R3)+,RMDA(R4)    ;LOAD THE TRACK/SECTOR ADDR
2656  012102  005037  004202                CLR     DTADPB+16         ;RESET 'DONE' INDICATOR
2657  012106  012737  004164  035426        MOV     #DTADPB,TRNSWT    ;LOAD 'TRANSFER' DPB ADDRESS
2658  012114  010137  035500                MOV     R1,DTUW           ;ADDRESS OF DRIVE TRANSFERING
2659  012120  112761  000001  035356        MOVB    #1,DRVACT(R1)     ;SET DRIVE ACTIVE INDICATOR
2660  012126  006301                        ASL     R1                ;SHIFT DRIVE ADDRESS
2661  012130  012761  001750  035460        MOV     #1000.,TIMER(R1)  ;SETUP THE OPERATION TIMER
2662  012136  006201                        ASR     R1                ;RESTORE R1
2663  012140  013764  004166  000000        MOV     DTADPB+2,RMCS1(R4) ;START THE OPERATION
2664  012146  005037  177776                CLR     @#PS              ;CLEAR THE PRIORITY
2665  012152  004037  026544                JSR     R0,DRVCL1         ;WAIT FOR OPERATION TO COMPLETE
2666  012156  023727  001346  001750  5$:   CMP     SEKCNT,#1000.     ;FINISHED SEEKS ?
2667  012164  001026                        BNE     6$                ;BR IF NOT
2668  012166  005037  001346                CLR     SEKCNT            ;CLEAR THE SEEK COUNT
2669  012172  063737  001514  001532        ADD     IC,NC1            ;ADD THE INCREMENT
2670  012200  023737  001532  001512        CMP     NC1,LC            ;EXCEEDED THE CYLINDER LIMIT ?
2671  012206  103100                        BHIS    EXIT10            ;BR IF IT HAS
2672  012210  013737  001512  001350        MOV     LC,DELTA          ;GET THE NEXT 'ZONE' ADDRESS
2673  012216  163737  001532  001350        SUB     NC1,DELTA         ;CHECK THE DIFFERENCE
2674  012224  023737  001514  001350        CMP     IC,DELTA          ;DIFFERENCE GREATER THAN THE INCREMENT ?
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2675  012232  101003                        BHI     6$              ;BR IF IT IS
2676  012234  013737  001514  001350        MOV     IC,DELTA        ;USE THE ICREMENT PARAMETER
2677  012242  005237  001346        6$:     INC     SEKCNT          ;COUNT THE NEXT SEEK
2678  012246  023737  001510  001512        CMP     FC,LC           ;BEGINNING AND ENDING CYLINDERS THE SAME ?
2679  012254  001002                        BNE     7$              ;BR IF NOT
2680  012256  000137  011514                JMP     TEST10          ;BR IF THEY ARE
2681  012262  013737  001532  004116  7$:   MOV     NC1,DPB.A+12    ;RESET THE CYLINDER ADDRESS
2682  012270  004737  024510                JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
2683  012274  013746  024606                MOV     $HINUM,-(SP)    ;USE THE HIGH RANDOM NUMBER
2684  012300  005046                        CLR     -(SP)           ;CLEAR THE UPPER DIVIDEND
2685  012302  013746  001350                MOV     DELTA,-(SP)     ;FORM THE DIVISOR
2686  012306  005216                        INC     (SP)            ;INCREMENT
2687  012310  004737  024612                JSR     PC,$DIV         ;DIVIDE
2688  012314  062637  004116                ADD     (SP)+,DPB.A+12  ;ADD THE REMAINDER TO THE INITIAL CYLINDER
2689  012320  005726                        TST     (SP)+           ;DISCARD THE QUOTENT
2690  012322  023737  004116  004176        CMP     DPB.A+12,DTADPB+12  ;SAME CYLINDER SELECTED AS LAST TIME ?
2691  012330  001754                        BEQ     7$              ;BR IF IT WAS
2692  012332  013737  004116  004176        MOV     DPB.A+12,DTADPB+12  ;COPY NEW CYLINDER ADDRESS
2693  012340  000137  011514                JMP     TEST10          ;CONTINUE
2694  012344  005337  001344        TST10B: DEC     SEKTMR          ;DECREMENT THE SEEK TIMER
2695  012350  001016                        BNE     1$              ;CONTINUE IF NOT DONE
2696  012352  012702  004104                MOV     #DPB.A,R2       ;DPB ADDRESS
2697  012356  004737  042664                JSR     PC,SVRH70       ;SAVE THE REGISTERS
2698  012362  104024                        ERROR   24              ;TIMEOUT DURING SEEK
2699  012364  012764  000040  000010        MOV     #BIT05,RMCS2(R4)  ;INIT THE MASSBUS
2700  012372  110164  000010                MOVB    R1,RMCS2(R4)    ;RESELECT THE DRIVE
2701  012376  016676  000002  000000        MOV     2(SP),@(SP)     ;RESTORE THE CLOCK VECTOR ADDRESS
2702  012404  000401                        BR      EXIT10          ;ABORT THE TEST
2703  012406  000002              1$:       RTI                     ;RETURN
2704  012410  000004              EXIT10:   SCOPE                   ;LOOP ?
2705
2706                                        ;;*****************************************************************
2707                                        ;*TEST 11       ALL SEEKS TEST
2708
2709                                        ;*      THIS TEST VERIFIES THAT THE DISK DRIVE CAN SEEK FROM EACH CYLINDER
2710                                        ;*      TO ALL OTHER CYLINDERS.
2711                                        ;*
2712                                        ;*      BEGINNING WITH CYLINDER 'FC', THE TEST SEEKS TO EACH CYLINDER
2713                                        ;*      BETWEEN 'FC' AND 'LC' FROM CYINDER 'FC'.  THE BEGINNING CYLINDER
2714                                        ;*      ADDRESS IS INCREMENTED AND THE TEST SEEKS BETWEEN THE NEW CYLINDER
2715                                        ;*      ADDRESS AND ALL CYLINDERS BETWEEN 'FC' AND 'LC'.  THE SEQUENCE
2716                                        ;*      CONTINUES UNTIL ALL CYLINDERS HAVE BEEN CHECKED.
2717
2718                                        ;;*****************************************************************
2719  012412                                TST11:
2720  012412  000240                        NOP
2721  012414  033737  001446  001234        BIT     @#BITS+<11*2>,TSTNMS ;DO THIS TEST?
2722  012422  001002                        BNE     64$             ;YES--BRANCH
2723  012424  000137  012670                JMP     TST12           ;NO--GO TO THE NEXT TEST
2724  012430  012737  000011  001102  64$:  MOV     #11,@#$TSTNM    ;SET UP TEST NUMBER AND
2725                                                                ;CLEAR THE ERROR FLAG (SERFLG)
2726  012436  004737  025610                JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
2727  012442  012737  012610  001110        MOV     #TEST11,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
2728  012450  013777  001102  166464        MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2729  012456  013737  001506  001204        MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
2730  012464  112737  000031  001115        MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
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2731
2732                                            ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2733  012472  032777  010000  166440            BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
2734  012500  001413                            BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
2735  012502  013700  001102                    MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
2736  012506  042700  177000                    BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
2737  012512  104401  001215                    TYPE    ,$CRLF
2738  012516  010046                            MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
2739                                            ;;TEST NUMBER
2740  012520  104403                            TYPOS                   ;;GO TYPE--OCTAL ASCII
2741  012522     002                            .BYTE   2               ;;TYPE 2 DIGIT(S)
2742  012523     000                            .BYTE   0               ;;SUPPRESS LEADING ZEROS
2743  012524  104401  001215                    TYPE    ,$CRLF
2744  012530                            20$:
2745
2746  012530  012737  012536  001106            MOV     #1$,$LPADR      ;SETUP THE LOOP ADDRESS
2747  012536  113737  001524  004134    1$:     MOVB    FS,DPB.B+10     ;SECTOR ADDRESS
2748  012544  113737  001524  004154            MOVB    FS,DPB.C+10     ;SECTOR ADDRESS
2749  012552  113737  001516  004135            MOVB    FT,DPB.B+11     ;TRACK ADDRESS
2750  012560  113737  001516  004155            MOVB    FT,DPB.C+11     ;TRACK ADDRESS
2751  012566  013737  001510  004136            MOV     FC,DPB.B+12     ;STARTING CYLINDER ADDRESS
2752  012574  013737  001510  004156            MOV     FC,DPB.C+12     ;STARTING CYLINDER ADDRESS
2753  012602  012737  012666  001252            MOV     #EXIT11,BYPASS  ;TEST ABORT EXIT
2754  012610  012706  001100            TEST11: MOV     #STACK,SP       ;SETUP THE STACK POINTER
2755  012614                            1$:
2756  012614  004037  026334                    JSR     R0,@#CALL.C     ;GO EXECUTE THE COMMAND
2757  012620  004037  026144                    JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
2758  012624  063737  001514  004156            ADD     IC,DPB.C+12     ;INCREMENT THE ENDING CYLINDER ADDRESS
2759  012632  023737  001512  004156            CMP     LC,DPB.C+12     ;CHECK IF EXCEEDING MAXIMUM
2760  012640  002365                            BGE     1$              ;BR IF NOT
2761  012642  013737  001510  004156            MOV     FC,DPB.C+12     ;RESET ENDING CYLINDER ADDRESS
2762  012650  063737  001514  004136            ADD     IC,DPB.B+12     ;INCREMENT THE STARTING ADDRESS
2763  012656  023737  001512  004136            CMP     LC,DPB.B+12     ;EXCEEDING MAXIMUM ?
2764  012664  002353                            BGE     1$              ;BR IF NOT
2765  012666  000004            EXIT11: SCOPE                           ;LOOP ?
2766
```

```
2767
2768                                    .SBTTL  *** TIMING TESTS ***
2769

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

                ;*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.

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

2787
2788                                    ;;*****************************************************************
2789                                    ;*TEST 12       ROTATIONAL SPEED TIMING TEST
2790
2791                                    ;*      THIS TEST WILL START A SEARCH TO CYLINDER 0, TRACK 0, SECTOR
2792                                    ;*      0.  AS SOON AS THE INTERRUPT OCCURS, THE GO BIT IS SET AGAIN
2793                                    ;*      AND THE OPERATION IS TIMED.  THIS PROCEDURE IS REPEATED 10
2794                                    ;*      TIMES THEN THE AVERAGE TIME IS CALCULATED AND CHECKED TO
2795                                    ;*      ENSURE IT IS WITHIN TOLERANCE:
2796                                    ;*              16.67 MS/REV + OR - 2% IF 60HZ
2797                                    ;*              16.67 MS/REV + OR - 2.5% IF 50HZ.
2798
2799                                    ;;*****************************************************************
2800   012670                           TST12:
2801   012670   000240                           NOP
2802   012672   033737   001450  001234         BIT     @#BITS+<12*2>,TSTNMS ;DO THIS TEST?
2803   012700   001002                           BNE     64$                  ;YES--BRANCH
2804   012702   000137   013464                 JMP     TST13                ;NO--GO TO THE NEXT TEST
2805   012706   012737   000012  001102  64$:   MOV     #12,@#$TSTNM         ;SET UP TEST NUMBER AND
2806                                            ;CLEAR THE ERROR FLAG ($ERFLG)
2807   012714   004737   025610                 JSR     PC,LODPRM            ;LOAD THE PARMETERS FOR THE TEST
2808   012720   012737   012670  001110         MOV     #TST12,@#$LPERR      ;SETUP THE ERROR LOOP ADDRESS
2809   012726   013777   001102  166206         MOV     $TSTNM,@DISPLAY      ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2810   012734   013737   001506  001204         MOV     @#RPT,$TIMES         ;GET THE ITERATION COUNT
2811   012742   112737   000031  001115         MOVB    #25.,$ERMAX          ;MAX ERRORS ALLOWED FOR TEST
2812
2813                                    ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2814   012750   032777   010000  166162         BIT     #SW12,@SWR           ;CHECK FOR SWITCH 12 SET
2815   012756   001413                           BEQ     20$                  ;IF = 0, THEN DON'T TYPE TEST NUMBER
2816   012760   013700   001102                 MOV     $TSTNM,R0            ;ELSE, TYPE THE NUMBER
2817   012764   042700   177000                 BIC     #177000,R0           ;MASK OUT THE HIGH ORDER BYTE
2818   012770   104401   001215                 TYPE    ,$CRLF
2819   012774   010046                           MOV     R0,-(SP)             ;;SAVE R0 FOR TYPEOUT
2820                                            ;;TEST NUMBER
2821   012776   104403                           TYPOS                        ;;GO TYPE--OCTAL ASCII
2822   013000      002                           .BYTE   2                    ;;TYPE 2 DIGIT(S)
```

```
2823  013001  000                       .BYTE   0               ;;SUPPRESS LEADING ZEROS
2824  013002  104401  001215            TYPE    ,$CRLF
2825  013006                    20$:
2826
2827  013006  005737  001244            TST     @#CLKSTA        ;KW11-P CLOCK?
2828  013012  003002                    BGT     1$              ;YES--START TEST
2829  013014  000137  013464            JMP     TST13           ;NO--GO TO NEXT TEST
2830  013020  012737  013020  001106    1$:     MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
2831  013026  004037  027670            JSR     R0,@#SRCH00     ;DO A MASSBUS INIT & RECAL
2832  013032  000402                    BR      2$              ;RETURN HERE IF NO ERROR
2833  013034  000137  013462            JMP     EXIT12          ;RETURN HERE IF ERROR
2834  013040  013764  001510  000034    2$:     MOV     @#FC,RMDC(R4)   ;FC
2835  013046  013746  001524            MOV     @#FS,-(SP)      ;FS
2836  013052  113766  001516  000001    MOVB    @#FT,1(SP)      ;FT
2837  013060  012664  000006            MOV     (SP)+,RMDA(R4)  ;LOAD FT/FS
2838  013064  012737  013462  001206    MOV     #EXIT12,$ESCAPE ;ESCAPE TO EXIT12 ON ERROR
2839  013072  005005                    CLR     R5              ;COUNT UP
2840  013074  012703  002774            MOV     #T7A,R3         ;60HZ PARAMETERS
2841  013100  032737  000100  001220    BIT     #SW06,@#C.SWR   ;60 HZ?
2842  013106  001402                    BEQ     TEST12          ;YES--BRANCH
2843  013110  012703  003004            MOV     #T7B,R3         ;NO--50 HZ PARAMETERS
2844  013114  012706  001100    TEST12: MOV     #STACK,SP       ;SETUP STACK
2845  013120  012701  000012            MOV     #10.,R1         ;TIME 10 SEARCHES
2846  013124  004737  030054            JSR     PC,@#STRTMR     ;INITIALIZE THE TIMERS
2847  013130  012777  013336  166236    MOV     #7$,@PKV        ;SETUP VECTOR IN CASE OF OVERFLOW
2848  013136  012777  030052  022352    MOV     #DORTI,@RMVEC   ;SETUP RM03 VECTOR
2849  013144  005077  166232    1$:     CLR     @PKB            ;START COUNTING AT ZERO
2850  013150  012777  000131  166222    MOV     #131,@PKCS      ;INT.EN., COUNT UP AT 100KHZ
2851  013156  012714  000131            MOV     #SEARCH,(R4)    ;START A SEARCH
2852  013162  000001                    WAIT                    ;WAIT ON INTERRUPT
2853  013164  042777  000101  166206    BIC     #101,@PKCS      ;STOP THE CLOCK
2854  013172  032764  040000  000012    BIT     #BIT14,RMDS(R4) ;ERROR?
2855  013200  001415                    BEQ     2$              ;NO--BRANCH
2856  013202  104412                    SAVREG                  ;SAVE R0-R5
2857  013204  012702  004164            MOV     #DTADPB,R2      ;DPB POINTER
2858  013210  004737  042664            JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
2859  013214  012764  000040  000010    MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
2860  013222  013764  004164  000010    MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
2861  013230  104413                    RESREG                  ;RESTORE R0-R5
2862  013232  104017                    ERROR   17
2863  013234  005077  166142    2$:     CLR     @PKB            ;START THE COUNT AT ZERO
2864  013240  012714  000131            MOV     #SEARCH,(R4)    ;START A SEARCH
2865  013244  012777  000131  166126    MOV     #131,@PKCS      ;START THE CLOCK
2866  013252  000001                    WAIT                    ;WAIT ON INTERRUPT
2867  013254  042777  000101  166116    BIC     #101,@PKCS      ;STOP THE CLOCK
2868  013262  032764  040000  000012    BIT     #BIT14,RMDS(R4) ;IS "ERR=1"?
2869  013270  001415                    BEQ     3$              ;NO--BRANCH
2870  013272  104412                    SAVREG                  ;SAVE R0-R5
2871  013274  012702  004164            MOV     #DTADPB,R2      ;DPB POINTER
2872  013300  004737  042664            JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
2873  013304  012764  000040  000010    MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
2874  013312  013764  004164  000010    MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
2875  013320  104413                    RESREG                  ;RESTORE R0-R5
2876  013322  104017                    ERROR   17              ;DISK ERROR OCCURRED
2877  013324  004737  030120    3$:     JSR     PC,@#COUNT      ;UPDATE THE COUNT
2878  013330  005301                    DEC     R1              ;DONE?
```

```
2879  013332  003304                          BGT     1$                ;NO--BRANCH
2880  013334  000424                          BR      8$                ;YES--GO TO THE EXIT
2881  013336  042777  000101  166034  7$:     BIC     #101,@PKCS        ;STOP THE CLOCK
2882  013344  005037  177776                  CLR     @#PS              ;DROP THE PRIORITY
2883  013350  012600                          MOV     (SP)+,R0          ;PC OF WAIT+2
2884  013352  005726                          TST     (SP)+             ;POP THE PS FROM THE STACK
2885  013354  104412                          SAVREG                    ;SAVE R0-R5
2886  013356  012702  004164                  MOV     #DTADPB,R2        ;DPB POINTER
2887  013362  004737  042664                  JSR     PC,@#SVRH70       ;SAVE ALL THE RH70/RM03 REGISTERS
2888  013366  012764  000040  000010          MOV     #BIT05,RMCS2(R4)  ;MASSBUS CLEAR
2889  013374  013764  004164  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
2890  013402  104413                          RESREG                    ;RESTORE R0-R5
2891  013404  104020                          ERROR   20                ;CLOCK OVERFLOWED
2892  013406                          8$:
2893  013406  012764  000040  000010          MOV     #BIT05,RMCS2(R4)  ;MASSBUS INIT.
2894  013414  013764  004164  000010          MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
2895  013422  004737  025074                  JSR     PC,@#ST.CLK       ;INITIALIZE THE CLOCK
2896  013426  012777  040320  022062          MOV     #ISR,@RMVEC       ;RESTORE RH70/RM03 INT. VECTOR
2897  013434  032737  000100  001220          BIT     #SW06,@#C.SWR     ;60 HZ?
2898  013442  001004                          BNE     9$                ;NO -- BRANCH
2899  013444  004037  030252                  JSR     R0,@#TYPTIM       ;GO TYPE THE TIMES
2900  013450  002774                          T7A                       ;POINTER
2901  013452  000403                          BR      EXIT12            ;GO TO EXIT
2902  013454                          9$:
2903  013454  004037  030252                  JSR     R0,@#TYPTIM       ;GO TYPE THE TIMES
2904  013460  003004                          T7B                       ;POINTER
2905  013462  000004                  EXIT12: SCOPE                     ;LOOP ?
2906
2907
2908                                  ;;*****************************************************************
2909                                  ;*TEST 13       ONE CYLINDER SEEK TIMING TEST
2910
2911                                  ;*      THIS TEST WILL COMMAND FORWARD SEEK CYCLES TO ADVANCE THE
2912                                  ;*      CYLINDER BY ONE UNTIL THE INCREMENT IS GREATER THAN THE
2913                                  ;*      CYLINDER 'LC', THEN REVERSE SEEK TO CYLINDER 'FC'.  THE
2914                                  ;*      TIME TO PERFORM EACH SEEK IS CHECKED TO ENSURE IT DOES NOT
2915                                  ;*      EXCEED THE MAXIMUM TIME PERMITTED FOR A ONE CYLINDER SEEK.
2916                                  ;*      THE TIME MUST BE LESS THAN 10MS.
2917
2918                                  ;;*****************************************************************
2919  013464                          TST13:
2920  013464  000240                          NOP
2921  013466  033737  001452  001234          BIT     @#BITS+<13*2>,TSTNMS ;DO THIS TEST?
2922  013474  001002                          BNE     64$               ;YES--BRANCH
2923  013476  000137  014166                  JMP     TST14             ;NO--GO TO THE NEXT TEST
2924  013502  012737  000013  001102  64$:    MOV     #13,@#$TSTNM      ;SET UP TEST NUMBER AND
2925                                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
2926  013510  004737  025610                  JSR     PC,LODPRM         ;LOAD THE PARMETERS FOR THE TEST
2927  013514  012737  013464  001110          MOV     #TST13,@#$LPERR   ;SETUP THE ERROR LOOP ADDRESS
2928  013522  013777  001102  165412          MOV     $TSTNM,@DISPLAY   ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
2929  013530  013737  001506  001204          MOV     @#RPT,$TIMES      ;GET THE ITERATION COUNT
2930  013536  112737  000031  001115          MOVB    #25.,$ERMAX       ;MAX ERRORS ALLOWED FOR TEST
2931
2932                                          ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
2933  013544  032777  010000  165366          BIT     #SW12,@SWR        ;CHECK FOR SWITCH 12 SET
2934  013552  001413                          BEQ     20$               ;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    ,$CRLF
                                20$:
                                        TST     @#CLKSTA        ;KW11-P CLOCK?
                                        BGT     1$              ;YES--START TEST
                                        JMP     TST14           ;NO--GO TO NEXT TEST
                                1$:     MOV     #1$,$LPADR      ;SETUP THE LOOP ADDRESS
                                        JSR     R0,@#SRCH00     ;DO A MASSBUS INIT. AND RECAL
                                        BR      2$              ;NO ERROR RETURN
                                        JMP     EXIT13          ;ERROR RETURN--SCOPE LOOP CALL
                                2$:     MOV     #T10,R3         ;PARAMETER POINTER
                                        MOV     #EXIT13,$ESCAPE ;;ESCAPE TO EXIT13 ON ERROR
                                TEST13: MOV     #STACK,SP       ;SETUP STACK
                                        MOV     FC,@#DTADPB+12  ;START WITH BEGINNING CYLINDER
                                        INC     DTADPB+12       ;INCREMENT THE BEGINNING CYLINDER
                                        CLR     R5              ;SET THE UP/DOWN SWITCH TO UP
                                        JSR     PC,@#STRTMR     ;INITIALIZE THE TIMERS
                                        MOV     #7$,@PKV        ;SETUP INCASE OF OVERFLOW
                                        MOV     #DORTI,@RMVEC   ;SET RM03 VECTOR
                                1$:     CLR     @PKB            ;START THE COUNTER AT ZERO
                                        MOV     @#DTADPB+12,RMDC(R4) ;LOAD DESIRED CYLINDER
                                        MOV     #SEEK,(R4)      ;START A SEEK
                                        MOV     #131,@PKCS      ;START THE CLOCK
                                        WAIT                    ;WAIT ON INTERRUPT
                                        BIC     #101,@PKCS      ;STOP THE CLOCK
                                        BIT     #BIT14,RMDS(R4) ;ANY DISK ERRORS?
                                        BEQ     2$              ;NO--BRANCH
                                        SAVREG                  ;SAVE R0-R5
                                        MOV     #DTADPB,R2      ;DPB POINTER
                                        JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
                                        MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
                                        MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
                                        RESREG                  ;RESTORE R0-R5
                                        ERROR   17              ;REPORT THE ERROR
                                2$:     JSR     PC,@#COUNT      ;COUNT THIS SEEKS TIME
                                        JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
                                        TST     R5              ;UP OR DOWN?
                                        BNE     4$              ;DOWN--BRANCH
                                3$:     INC     @#DTADPB+12     ;MOVE TO NEXT CYLINDER
                                        CMP     @#DTADPB+12,LC  ;OUT OF CYLINDERS?
                                        BLT     1$              ;NO--GO DO THE NEXT SEEK
                                        MOV     #-1,R5          ;SET UP/DOWN SWITCH TO DOWN
                                        BR      1$              ;GO DO THE NEXT SEEK
                                4$:     DEC     @#DTADPB+12     ;MOVE TO NEXT CYLINDER
                                        CMP     @#DTADPB+12,#0  ;OUT OF CYLINDERS?
                                        BGT     1$              ;NO--GO DO THE NEXT SEEK
                                        BR      8$              ;GO TO THE EXIT
                                7$:     BIC     #101,@PKCS      ;;STOP THE CLOCK
```

```
 2991  014066  005037  177776            CLR     @#PS                    ;DROP THE PRIORITY
 2992  014072  012600                    MOV     (SP)+,R0                ;PC OF WAIT+2
 2993  014074  005726                    TST     (SP)+                   ;POP THE PS FROM THE STACK
 2994  014076  104412                    SAVREG                          ;SAVE R0-R5
 2995  014100  012702  004164            MOV     #DTADPB,R2              ;DPB POINTER
 2996  014104  004737  042664            JSR     PC,@#SVRH70             ;SAVE ALL THE RH70/RM03 REGISTERS
 2997  014110  012764  000040  000010    MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
 2998  014116  013764  004164  000010    MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
 2999  014124  104413                    RESREG                          ;RESTORE R0-R5
 3000  014126  104020                    ERROR   20                      ;REPORT CLOCK OVERFLOW
 3001  014130                      8$:
 3002  014130  012764  000040  000010    MOV     #BIT05,RMCS2(R4) ;MASSBUS INIT.
 3003  014136  013764  004164  000010    MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
 3004  014144  004737  025074            JSR     PC,@#ST.CLK             ;INITIALIZE THE CLOCK
 3005  014150  012777  040320  021340    MOV     #ISR,@RMVEC             ;RESTORE RH70/RM03 INT. VECTOR
 3006  014156  004037  030252            JSR     R0,@#TYPTIM             ;GO TYPE THE TIMES
 3007  014162  003014                    T10                             ;POINTER
 3008  014164  000004              EXIT13: SCOPE                           ;LOOP ?
 3009
 3010
 3011                                    ;;*****************************************************************
 3012                                    ;*TEST 14       ACCESS TIME MEASUREMENT TEST
 3013
 3014                                    ;*      THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO
 3015                                    ;*      CYLINDER 'LC', THEN A REVERSEK FROM CYLINDER 'LC' TO
 3016                                    ;*      CYLINDER 0.  BOTH SEEKS ARE TIMED AND CHECKED TO ENSURE THEY
 3017                                    ;*      ARE WITHIN THE TOLERANCE ALLOWED FOR THE ACCESS TIME MEASUREMENT.
 3018                                    ;*      THIS SEQUENCE IS REPEATED 128 TIMES (FOR A TOTAL
 3019                                    ;*      OF 256 SEEKS).  THE AVERAGE ACCESS TIME MUST BE LESS THAN 30 MS.
 3020                                    ;*      CYLINDER 'LC' DEFAULTS TO 136 (10) FOR AN RM03/5 OR TO 255 (10)
 3021                                    ;*      FOR AN RM03.
 3022
 3023                                    ;;*****************************************************************
 3024  014166                      TST14:
 3025  014166  000240                    NOP
 3026  014170  033737  001454  001234    BIT     @#BITS+<14*2>,TSTNMS ;DO THIS TEST?
 3027  014176  001003                    BNE     64$                     ;YES--BRANCH
 3028  014200  000137  014742            JMP     TST15                   ;NO--GO TO THE NEXT TEST
 3029  014204  012737  000014  001102  64$:    MOV     #14,@#STSTNM            ;SET UP TEST NUMBER AND
 3030                                                                      ;CLEAR THE ERROR FLAG ($ERFLG)
 3031  014212  004737  025610            JSR     PC,LODPRM               ;LOAD THE PARMETERS FOR THE TEST
 3032  014216  012737  014166  001110    MOV     #TST14,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
 3033  014224  013777  001102  164710    MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 3034  014232  013737  001506  001204    MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
 3035  014240  112737  000031  001115    MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
 3036
 3037                                    ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
 3038  014246  032777  010000  164664    BIT     #SW12,@SWR              ;CHECK FOR SWITCH 12 SET
 3039  014254  001413                    BEQ     20$                     ;IF = 0, THEN DON'T TYPE TEST NUMBER
 3040  014256  013700  001102            MOV     $TSTNM,R0               ;ELSE, TYPE THE NUMBER
 3041  014262  042700  177000            BIC     #177000,R0              ;MASK OUT THE HIGH ORDER BYTE
 3042  014266  104401  001215            TYPE    ,$CRLF
 3043  014272  010046                    MOV     R0,-(SP)                ;;SAVE R0 FOR TYPEOUT
 3044                                                                    ;;TEST NUMBER
 3045  014274  104403                    TYPOS                           ;;GO TYPE--OCTAL ASCII
 3046  014276     002                    .BYTE   2                       ;;TYPE 2 DIGIT(S)
```

```
                                        .BYTE   0               ;;SUPPRESS LEADING ZEROS
                                        TYPE    ,$CRLF
                                20$:
                                        TST     @#CLKSTA        ;KW11-P CLOCK?
                                        BGT     1$              ;YES--START TEST
                                        JMP     TST15           ;NO--GO TO NEXT TEST
                                1$:     MOV     #1$,$LPADR      ;SET THE LOOP ADDRESS
                                        JSR     R0,@#SRCH00     ;DO A MASSBUS INIT & RECAL
                                        BR      2$              ;RETURN HERE IF NO ERROR
                                        JMP     EXIT14          ;RETURN HERE ON ERROR
                                2$:     MOV     #T11,R3         ;PARAMETER POINTER
                                        MOV     #EXIT14,$ESCAPE ;;ESCAPE TO EXIT14 ON ERROR
                                TEST14: MOV     #STACK,SP       ;SETUP STACK
                                        MOV     #128.,R1        ;REPEAT "0-136-0" 128 TIMES
                                        JSR     PC,@#STRTMR     ;INIT. THE COUNTERS
                                        MOV     #7$,@PKV        ;SET UP VECTOR IN CASE OF OVERFLOW
                                        MOV     #DORTI,@RMVEC   ;SETUP RM03 VECTOR
                                1$:     CLR     @PKB            ;START COUNT AT ZERO
                                        MOV     LC,RMDC(R4)     ;'MIDDLE' CYLINDER
                                        MOV     #SEEK,RMCS1(R4) ;START A SEEK
                                        MOV     #131,@PKCS      ;START THE CLOCK
                                        WAIT                    ;WAIT ON INTERRUPT
                                        BIC     #101,@PKCS      ;STOP CLOCK
                                        BIT     #BIT14,RMDS(R4) ;ERR=1?
                                        BEQ     2$              ;NO--BRANCH
                                        SAVREG                  ;SAVE R0-R5
                                        MOV     #DTADPB,R2      ;DPB POINTER
                                        JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
                                        MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
                                        MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
                                        RESREG                  ;RESTORE R0-R5
                                        ERROR   17
                                2$:     CLR     R5              ;SET UP/DOWN SWITCH TO UP
                                        JSR     PC,@#COUNT      ;UPDATE THE COUNT
                                        JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
                                        CLR     @PKB            ;START THE COUNT AT ZERO
                                        MOV     FC,RMDC(R4)     ;BEGINNING CYLINDER
                                        MOV     #SEEK,RMCS1(R4) ;START A SEEK
                                        MOV     #131,@PKCS      ;START THE CLOCK
                                        WAIT                    ;WAIT ON INTERRUPT
                                        BIC     #101,@PKCS      ;STOP THE CLOCK
                                        BIT     #BIT14,RMDS(R4) ;ERR=1?
                                        BEQ     3$              ;NO--BRANCH
                                        SAVREG                  ;SAVE R0-R5
                                        MOV     #DTADPB,R2      ;DPB POINTER
                                        JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
                                        MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
                                        MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
                                        RESREG                  ;RESTORE R0-R5
                                        ERROR   17
                                3$:     MOV     #-1,R5          ;SET UP/DOWN SWITCH TO DOWN
                                        JSR     PC,@#COUNT      ;UPDATE THE COUNT
                                        JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
                                        DEC     R1              ;DONE?
                                        BGT     1$              ;NO--BRANCH
```

```
3103  014632  000424                          BR      8$                      ;YES--EXIT
3104  014634  042777  000101  164536  7$:     BIC     #101,@PKCS              ;STOP THE CLOCK
3105  014642  005037  177776                  CLR     @#PS                    ;DROP THE PRIORITY
3106  014646  012600                          MOV     (SP)+,R0                ;PC OF WAIT+2
3107  014650  005726                          TST     (SP)+                   ;POP THE PS FROM THE STACK
3108  014652  104412                          SAVREG                          ;SAVE R0-R5
3109  014654  012702  004164                  MOV     #DTADPB,R2              ;DPB POINTER
3110  014660  004737  042664                  JSR     PC,@#SVRH70             ;SAVE ALL THE RH70/RM03 REGISTERS
3111  014664  012764  000040  000010          MOV     #BIT05,RMCS2(R4)        ;MASSBUS CLEAR
3112  014672  013764  004164  000010          MOV     @#DTADPB,RMCS2(R4)      ;SELECT DRIVE
3113  014700  104413                          RESREG                          ;RESTORE R0-R5
3114  014702  104020                          ERROR   20                      ;CLOCK OVERFLOWED
3115  014704                          8$:
3116  014704  012764  000040  000010          MOV     #BIT05,RMCS2(R4)        ;MASSBUS INIT.
3117  014712  013764  004164  000010          MOV     @#DTADPB,RMCS2(R4)      ;SELECT DRIVE
3118  014720  004737  025074                  JSR     PC,@#ST.CLK             ;INITIALIZE THE CLOCK
3119  014724  012777  040320  020564          MOV     #ISR,@RMVEC             ;RESTORE RH70/RM03 INT. VECTOR
3120  014732  004037  030252                  JSR     R0,@#TYPTIM             ;GO TYPE THE TIMES
3121  014736  003024                          T11                             ;POINTER
3122  014740  000004                  EXIT14: SCOPE                           ;LOOP ?
3123
3124                                  ;;*****************************************************************
3125                                  ;*TEST 15       MAXIMUM SEEK TIMING TEST
3126
3127                                  ;*      THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO
3128                                  ;*      CYLINDER 'LC', THEN A REVERSE SEEK FROM CYLINDER 'LC' TO
3129                                  ;*      CYLINDER 0.  BOTH SEEKS ARE TIMED AND CHECKED TO ENSURE
3130                                  ;*      THEY ARE WITHIN THE TOLERANCE ALLOWED FOR THE MAXIMUM SEEK
3131                                  ;*      TIME.  THIS SEQUENCE IS REPEATED 128 TIMES (FOR
3132                                  ;*      A TOTAL OF 256 SEEKS).  THE MAXIMUM SEEK TIME MUST BE LESS THAN
3133                                  ;*      54 MS.  'LC' DEFAULTS TO 410 (10) FOR RM03/5'S AND TO 814 (10)
3134                                  ;*      FOR RM03'S.
3135
3136                                  ;;*****************************************************************
3137  014742                          TST15:
3138  014742  000240                          NOP
3139  014744  033737  001456  001234          BIT     @#BITS+<15*2>,TSTNMS ;DO THIS TEST?
3140  014752  001002                          BNE     64$                     ;YES--BRANCH
3141  014754  000137  015516                  JMP     TST16                   ;NO--GO TO THE NEXT TEST
3142  014760  012737  000015  001102  64$:   MOV     #15,@#STSTNM            ;SET UP TEST NUMBER AND
3143                                                                          ;CLEAR THE ERROR FLAG (SERFLG)
3144  014766  004737  025610                  JSR     PC,LOOPRM               ;LOAD THE PARMETERS FOR THE TEST
3145  014772  012737  014742  001110          MOV     #TST15,@#LPERR          ;SETUP THE ERROR LOOP ADDRESS
3146  015000  013777  001102  164134          MOV     STSTNM,@DISPLAY         ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3147  015006  013737  001506  001204          MOV     @#RPT,$TIMES            ;GET THE ITERATION COUNT
3148  015014  112737  000031  001115          MOVB    #25.,$ERMAX             ;MAX ERRORS ALLOWED FOR TEST
3149
3150                                          ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
3151  015022  032777  010000  164110          BIT     #SW12,@SWR              ;CHECK FOR SWITCH 12 SET
3152  015030  001413                          BEQ     20$                     ;IF = 0, THEN DON'T TYPE TEST NUMBER
3153  015032  013700  001102                  MOV     STSTNM,R0               ;ELSE, TYPE THE NUMBER
3154  015036  042700  177000                  BIC     #177000,R0              ;MASK OUT THE HIGH ORDER BYTE
3155  015042  104401  001215                  TYPE    ,$CRLF
3156  015046  010046                          MOV     R0,-(SP)                ;;SAVE R0 FOR TYPEOUT
3157                                                                          ;;TEST NUMBER
3158  015050  104403                          TYPOS                           ;;GO TYPE--OCTAL ASCII
```

```
3159  015052  002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
3160  015053  000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
3161  015054  104401  001215               TYPE    ,$CRLF
3162  015060                       20$:
3163
3164  015060  005737  001244               TST     @#CLKSTA        ;KW11-P CLOCK
3165  015064  003002                       BGT     1$              ;YES--START TEST
3166  015066  000137  015516               JMP     TST16           ;NO--GO TO NEXT TEST
3167  015072  012737  015072  001106  1$:  MOV     #1$,$LPADR      ;SETUP THE LOOP ADDRESS
3168  015100  004037  027670               JSR     R0,@#SRCH00     ;DO A MASSBUS INIT & RECAL
3169  015104  000402                       BR      2$              ;RETURN HERE IF NO ERROR
3170  015106  000137  015514               JMP     EXIT15          ;RETURN HERE ON ERROR
3171  015112  012703  003034          2$:  MOV     #T12,R3         ;PARAMETER POINTER
3172  015116  012737  015514  001206       MOV     #EXIT15,$ESCAPE ;ESCAPE TO EXIT15 ON ERROR
3173  015124  012706  001100       TEST15: MOV     #STACK,SP       ;SETUP STACK
3174  015130  012701  000200               MOV     #128.,R1        ;REPEAT "0-'LC'-0" 128 TIMES
3175  015134  004737  030054               JSR     PC,@#STRTMR     ;INIT. THE TIMERS
3176  015140  012777  015410  164226       MOV     #7$,@PKV        ;SETUP VECTOR IN CASE OF OVERFLOW
3177  015146  012777  030052  020342       MOV     #DORTI,@RMVEC   ;SETUP RM03 VECTOR
3178  015154  005077  164222          1$:  CLR     @PKB            ;START COUNTING FROM ZERO
3179  015160  013764  001512  000034       MOV     LC,RMDC(R4)     ;MAXIMUM CYLINDER
3180  015166  012764  000105  000000       MOV     #SEEK,RMCS1(R4) ;START A SEEK
3181  015174  012777  000131  164176       MOV     #131,@PKCS      ;START THE CLOCK
3182  015202  000001                       WAIT                    ;WAIT ON INTERRUPT
3183  015204  042777  000101  164166       BIC     #101,@PKCS      ;STOP THE CLOCK
3184  015212  032764  040000  000012       BIT     #BIT14,RMDS(R4) ;ERR=1?
3185  015220  001415                       BEQ     2$              ;NO--BRANCH
3186  015222  104412                       SAVREG                  ;SAVE R0-R5
3187  015224  012702  004164               MOV     #DTADPB,R2      ;DPB POINTER
3188  015230  004737  042664               JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
3189  015234  012764  000040  000010       MOV     #BITO5,RMCS2(R4) ;MASSBUS CLEAR
3190  015242  013764  004164  000010       MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3191  015250  104413                       RESREG                  ;RESTORE R0-R5
3192  015252  104017                       ERROR   17
3193  015254  005005                  2$:  CLR     R5              ;SET THE UP/DOWN SWITCH TO UP
3194  015256  004737  030120               JSR     PC,@#COUNT      ;UP THE COUNT
3195  015262  004737  027446               JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3196  015266  005077  164110               CLR     @PKB            ;START COUNT AT ZERO
3197  015272  013764  001510  000034       MOV     FC,RMDC(R4)     ;BEGINNING CYLINDER
3198  015300  012764  000105  000000       MOV     #SEEK,RMCS1(R4) ;START A SEEK
3199  015306  012777  000131  164064       MOV     #131,@PKCS      ;START THE CLOCK
3200  015314  000001                       WAIT                    ;WAIT ON INTERRUPT
3201  015316  042777  000101  164054       BIC     #101,@PKCS      ;STOP THE CLOCK
3202  015324  032764  040000  000012       BIT     #BIT14,RMDS(R4) ;"ERR"=1?
3203  015332  001415                       BEQ     3$              ;NO--BRANCH
3204  015334  104412                       SAVREG                  ;SAVE R0-R5
3205  015336  012702  004164               MOV     #DTADPB,R2      ;DPB POINTER
3206  015342  004737  042664               JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
3207  015346  012764  000040  000010       MOV     #BITO5,RMCS2(R4) ;MASSBUS CLEAR
3208  015354  013764  004164  000010       MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3209  015362  104413                       RESREG                  ;RESTORE R0-R5
3210  015364  104017                       ERROR   17              ;REPORT THE ERROR
3211  015366  012705  177777          3$:  MOV     #-1,R5          ;SET THE UP/DOWN SWITCH TO DOWN
3212  015372  004737  030120               JSR     PC,@#COUNT      ;UPDATE THE COUNT
3213  015376  004737  027446               JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
3214  015402  005301                       DEC     R1              ;DONE?
```

```
3215  015404  003263                    BGT     1$              ;NO--BRANCH
3216  015406  000424                    BR      8$              ;YES--EXIT
3217  015410  042777  000101  163762 7$: BIC     #101,@PKCS      ;STOP THE CLOCK
3218  015416  005037  177776            CLR     @#PS            ;DROP THE PRIORITY
3219  015422  012600                    MOV     (SP)+,R0        ;PC OF WAIT+2
3220  015424  005726                    TST     (SP)+           ;POP THE PS FROM THE STACK
3221  015426  104412                    SAVREG                  ;SAVE R0-R5
3222  015430  012702  004164            MOV     #DTADPB,R2      ;DPB POINTER
3223  015434  004737  042664            JSR     PC,@#SVRH70     ;SAVE ALL THE RH70/RM03 REGISTERS
3224  015440  012764  000040  000010    MOV     #BIT05,RMCS2(R4) ;MASSBUS CLEAR
3225  015446  013764  004164  000010    MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3226  015454  104413                    RESREG                  ;RESTORE R0-R5
3227  015456  104020                    ERROR   20              ;CLOCK OVERFLOWED
3228  015460                        8$:
3229  015460  012764  000040  000010    MOV     #BIT05,RMCS2(R4) ;MASSBUS INIT.
3230  015466  013764  004164  000010    MOV     @#DTADPB,RMCS2(R4) ;SELECT DRIVE
3231  015474  004737  025074            JSR     PC,@#ST.CLK     ;INITIALIZE THE CLOCK
3232  015500  012777  040320  020010    MOV     #ISR,@RMVEC     ;RESTORE RH70/RM03 INT. VECTOR
3233  015506  004037  030252            JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
3234  015512  003034                    T12                     ;POINTER
3235  015514  000004            EXIT15: SCOPE                   ;LOOP ?
```

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

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

;/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*/:\*
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                                ;;*****************************************************************
                                ;*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 - 21 ARE WRITE CHECKED.  THEN
                                ;*      SECTOR 1 IS REWRITTEN AND SECTORS 0 - 21 ARE WRITE CHECKED.
                                ;*      THIS REWRITE AND WRITE CHECK PROCEDURE IS CONTINUED UP THROUGH
                                ;*      REWRITE SECTOR 21 AND WRITE CHECK SECTORS 0-21.
                                ;
                                ;;*****************************************************************
015516                          TST16:
015516  000240                          NOP
015520  033737  001460  001234          BIT     @#BITS+<16*2>,TSTNMS ;DO THIS TEST?
015526  001002                          BNE     64$             ;YES--BRANCH
015530  000137  016152                  JMP     TST17           ;NO--GO TO THE NEXT TEST
015534  012737  000016  001102  64$:    MOV     #16,@#STSTNM    ;SET UP TEST NUMBER AND
                                                                ;CLEAR THE ERROR FLAG (SERFLG)
015542  004737  025610                  JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
015546  012737  015650  001110          MOV     #TEST16,@#LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
015554  013777  001102  163360          MOV     STSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
015562  013737  001506  001204          MOV     @#RPT,STIMES    ;GET THE ITERATION COUNT
015570  113737  001364  001115          MOVB    ERR.CT,SERMAX   ;MAX ERRORS ALLOWED FOR TEST

                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
015576  032777  010000  163334          BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
015604  001413                          BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
015606  013700  001102                  MOV     STSTNM,R0       ;ELSE, TYPE THE NUMBER
015612  042700  177000                  BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
015616  104401  001215                  TYPE    ,SCRLF
015622  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                ;;TEST NUMBER
015624  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
015626     002                          .BYTE   2               ;;TYPE 2 DIGIT(S)
015627     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
015630  104401  001215                  TYPE    ,SCRLF
015634                          20$:
```

```
3292
3293  015634  012737  016150  001252          MOV     #EXIT16,@#BYPASS
3294  015642  012737  015650  001106          MOV     #TEST16,$LPADR  ;SETUP THE LOOP ADDRESS
3295  015650  012706  001100          TEST16: MOV     #STACK,SP       ;SET THE STACK POINTER
3296  015654  004737  030704                  JSR     PC,@#FILBUF     ;FILL THE BUFFER WITH SECTOR ADDRESSES
3297  015660  013737  001510  004176          MOV     @#FC,@#DTADPB+12 ;CYLINDER
3298  015666  113737  001516  004175          MOVB    @#FT,@#DTADPB+11 ;TRACK
3299  015674  105037  004174                  CLRB    @#DTADPB+10     ;SECTOR
3300  015700  013737  001352  004170          MOV     TRCKWC,@#DTADPB+4 ;WORD COUNT
3301  015706  012737  050514  004172          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3302  015714  012737  015714  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3303  015722  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3304  015726  012737  000161  004166          MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3305  015734  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3306  015740  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3307  015746  012737  015746  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3308  015754  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3309  015760  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3310  015764  012737  015764  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3311  015772  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3312  015776  004037  030742                  JSR     R0,@#CLRBUF     ;CLEAR BUFFER
3313  016002  012737  000171  004166          MOV     #READ,@#DTADPB+2 ;COMMAND = READ
3314  016010  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3315  016014  004037  031010                  JSR     R0,@#CKSCTR     ;CHECK THE SECTOR DATA READ
3316  016020  012700  050514                  MOV     #BUFFER,R0      ;BUFFER ADDRESS
3317  016024  005001                          CLR     R1              ;FIRST SECTOR
3318  016026  012737  016026  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3319  016034  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3320  016040  012737  000161  004166  1$:     MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3321  016046  012737  177400  004170          MOV     #SCTRWC,@#DTADPB+4 ;WORD COUNT
3322  016054  010037  004172                  MOV     R0,@#DTADPB+6   ;BUFFER ADDRESS
3323  016060  110137  004174                  MOVB    R1,@#DTADPB+10  ;SECTOR
3324  016064  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3325  016070  012737  016070  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3326  016076  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3327  016102  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3328  016110  013737  001352  004170          MOV     TRCKWC,@#DTADPB+4 ;WORD COUNT
3329  016116  012737  050514  004172          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3330  016124  105037  004174                  CLRB    @#DTADPB+10     ;SECTOR
3331  016130  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3332  016134  062700  001000                  ADD     #512.,R0        ;MOVE TO NEXT SECTOR
3333  016140  005201                          INC     R1
3334  016142  023701  001630                  CMP     PRMLMT+22,R1    ;DONE?
3335  016146  103334                          BHIS    1$              ;NO--BRANCH
3336  016150  000004          EXIT16: SCOPE                           ;LOOP ?
3337
3338                          ;;*****************************************************************
3339                          ;*TEST 17        TRACK ADDRESSING TEST
3340
3341                          ;*      THIS TEST WILL WRITE DATA IN THE FORM OF TRACK ADDRESSES
3342                          ;*      IN CYLINDER "FC" SECTOR "FS" OF EVERY TRACK WITH EACH TRACK
3343                          ;*      GETTING ITS OWN TRACK ADDRESS.
3344                          ;*      A WRITE CHECK IS THEN PERFORMED ON EACH TRACK TO ENSURE
3345                          ;*      THE DATA IS VALID.  THEN TRACK 0 IS REWRITTEN AND TRACK 1
3346                          ;*      THROUGH TRACK 18 IS WRITE CHECKED.  THEN TRACK 1 IS
3347                          ;*      REWRITTEN AND TRACK 2 THROUGH TRACK 18 IS WRITE CHECKED.
```

```
                                        ;*      THIS PROCEDURE IS CONTINUED UP THROUGH REWRITING TRACK 17
                                        ;*      AND WRITE CHECKING TRACK 18.
                                        ;
                                        ;;*********************************************************************
016152                                  TST17:
016152  000240                                  NOP
016154  033737  001462  001234                  BIT     @#BITS+<17*2>,TSTNMS ;DO THIS TEST?
016162  001002                                  BNE     64$             ;YES--BRANCH
016164  000137  016630                          JMP     TST20           ;NO--GO TO THE NEXT TEST
016170  012737  000017  001102  64$:            MOV     #17,@#STSTNM    ;SET UP TEST NUMBER AND
                                                                        ;CLEAR THE ERROR FLAG (SERFLG)
016176  004737  025610                          JSR     PC,LOOPRM       ;LOAD THE PARMETERS FOR THE TEST
016202  012737  016304  001110                  MOV     #TEST17,@#LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
016210  013777  001102  162724                  MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
016216  013737  001506  001204                  MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
016224  113737  001364  001115                  MOVB    ERR.CT,SERMAX   ;MAX ERRORS ALLOWED FOR TEST
                                        ;
                                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
016232  032777  010000  162700                  BIT     #SW12,@SWR      ;CHECK FOR SWITCH 12 SET
016240  001413                                  BEQ     20$             ;IF = 0, THEN DON'T TYPE TEST NUMBER
016242  013700  001102                          MOV     $TSTNM,R0       ;ELSE, TYPE THE NUMBER
016246  042700  177000                          BIC     #177000,R0      ;MASK OUT THE HIGH ORDER BYTE
016252  104401  001215                          TYPE    ,$CRLF
016256  010046                                  MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
                                                                        ;;TEST NUMBER
016260  104403                                  TYPOS                   ;;GO TYPE--OCTAL ASCII
016262     002                                  .BYTE   2               ;;TYPE 2 DIGIT(S)
016263     000                                  .BYTE   0               ;;SUPPRESS LEADING ZEROS
016264  104401  001215                          TYPE    ,$CRLF
016270                                  20$:
                                        ;
016270  012737  016626  001252                  MOV     #EXIT17,@#BYPASS
016276  012737  016304  001106                  MOV     #TEST17,$LPADR  ;SETUP THE LOOP ADDRESS
016304  012706  001100                  TEST17: MOV     #STACK,SP       ;SET THE STACK POINTER
016310  004737  030704                          JSR     PC,@#FILBUF     ;FILL THE BUFFER WITH TRACK ADDRESS
016314  012737  000161  004166                  MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
016322  013737  001510  004176                  MOV     @#FC,@#DTADPB+12 ;CYLINDER
016330  113737  001524  004174                  MOVB    @#FS,@#DTADPB+10 ;SECTOR
016336  012737  177400  004170                  MOV     #SCTRWC,@#DTADPB+4 ;WORD COUNT
016344  012737  050514  004172                  MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
016352  005000                                  CLR     R0              ;TRACK=0
016354  012737  016354  001110                  MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
016362  012706  001100                          MOV     #STACK,SP       ;LOAD THE STACK POINTER
016366  110037  004175                  1$:     MOVB    R0,@#DTADPB+11  ;TRACK ADDRESS
016372  004037  026524                          JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
016376  062737  001000  004172                  ADD     #256.*2.,@#DTADPB+6 ;UPDATE BUFFER ADDRESS
016404  005200                                  INC     R0              ;UPDATE TRACK NUMBER
016406  022700  000005                          CMP     #5,R0           ;OUT OF TRACKS?
016412  003365                                  BGT     1$              ;NO--BRANCH
016414  012737  050514  004172                  MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
016422  005000                                  CLR     R0
016424  012737  016424  001110                  MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
016432  012706  001100                          MOV     #STACK,SP       ;LOAD THE STACK POINTER
016436  012737  000151  004166                  MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK
016444  110037  004175                  2$:     MOVB    R0,@#DTADPB+11  ;TRACK ADDRESS
016450  004037  026524                          JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
```

```
3404  016454  062737  001000  004172          ADD     #256.*2.,@#DTADPB+6 ;UPDATE BUFFER ADDRESS
3405  016462  005200                          INC     R0                  ;UPDATE TRACK NUMBER
3406  016464  022700  000005                  CMP     #5,R0               ;OUT OF TRACKS?
3407  016470  003365                          BGT     2$                  ;NO--BRANCH
3408  016472  005000                          CLR     R0                  ;FIRST TRACK ADDRESS
3409  016474  110037  004175          3$:     MOVB    R0,@#DTADPB+11      ;TRACK
3410  016500  010001                          MOV     R0,R1               ;FORM BUFFER ADDRESS
3411  016502  012737  050514  004172          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3412  016510  005301                  4$:     DEC     R1
3413  016512  002411                          BLT     5$
3414  016514  062737  001000  004172          ADD     #256.*2.,@#DTADPB+6
3415  016522  000772                          BR      4$
3416  016524  012737  016524  001110          MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
3417  016532  012706  001100                  MOV     #STACK,SP           ;LOAD THE STACK POINTER
3418  016536  012737  000161  004166  5$:     MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3419  016544  004037  026524                  JSR     R0,@#DRVCAL         ;START A DATA TRANSFER
3420  016550  062737  001000  004172  6$:     ADD     #256.*2.,@#DTADPB+6 ;UPDATE BUFFER ADDRESS
3421  016556  105237  004175                  INCB    @#DTADPB+11         ;MOVE TO NEXT TRACK
3422  016562  012737  016562  001110          MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
3423  016570  012706  001100                  MOV     #STACK,SP           ;LOAD THE STACK POINTER
3424  016574  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3425  016602  004037  026524                  JSR     R0,@#DRVCAL         ;START A DATA TRANSFER
3426  016606  122737  000004  004175          CMPB    #4,@#DTADPB+11 ;OUT OF TRACKS?
3427  016614  003355                          BGT     6$                  ;NO--BRANCH
3428  016616  005200                          INC     R0                  ;NEXT TRACK TO WRITE
3429  016620  022700  000004                  CMP     #4,R0               ;OUT OF TRACKS?
3430  016624  003323                          BGT     3$                  ;NO--BRANCH
3431  016626  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 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
                                        ;*
                                        ;;*****************************************************************
016630                                  TST20:
016630  000240                                  NOP
016632  033737  001424  001236                  BIT     BITS+<20*2-40>,TSTNMS+2  ;DO THIS TEST ?
016640  001002                                  BNE     64$                      ;YES--BRANCH
016642  000137  017422                          JMP     TST21                    ;NO--GO TO THE NEXT TEST
016646  012737  000020  001102  64$:            MOV     #20,@#STSTNM             ;SET UP TEST NUMBER AND
                                                                                 ;CLEAR THE ERROR FLAG (SERFLG)
016654  004737  025610                          JSR     PC,LOOPRM                ;LOAD THE PARMETERS FOR THE TEST
016660  012737  017070  001110                  MOV     #TEST20,@#SLPERR  ;SETUP THE LOOP ON ERROR ADDRESS
016666  013777  001102  162246                  MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
016674  013737  001506  001204                  MOV     @#RPT,$TIMES             ;GET THE ITERATION COUNT
016702  113737  001364  001115                  MOVB    ERR.CT,SERMAX            ;MAX ERRORS ALLOWED FOR TEST

                                                ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
016710  032777  010000  162222                  BIT     #SW12,@SWR               ;CHECK FOR SWITCH 12 SET
016716  001413                                  BEQ     20$                      ;IF = 0, THEN DON'T TYPE TEST NUMBER
016720  013700  001102                          MOV     $TSTNM,R0                ;ELSE, TYPE THE NUMBER
016724  042700  177000                          BIC     #177000,R0               ;MASK OUT THE HIGH ORDER BYTE
016730  104401  001215                          TYPE    ,$CRLF
016734  010046                                  MOV     R0,-(SP)                 ;;SAVE R0 FOR TYPEOUT
                                                                                 ;;TEST NUMBER
016736  104403                                  TYPOS                            ;;GO TYPE--OCTAL ASCII
016740     002                                  .BYTE   2                        ;;TYPE 2 DIGIT(S)
016741     000                                  .BYTE   0                        ;;SUPPRESS LEADING ZEROS
016742  104401  001215                          TYPE    ,$CRLF
016746                                  20$:

                                                ;SET UP THE TRACK WORD COUNT FOR DATA TRANFER

016746  012737  016746  001106                  MOV     #.,$LPADR                ;SETUP THE LOOP ADDRESS
016754  005000                                  CLR     R0                       ;CLEAR SWITCH
016756  005004                                  CLR     R4                       ;FORM WORD COUNT IN R4
016760  013701  001526                          MOV     @#LS,R1                  ;LOAD LAST SECTOR
016764  163701  001524                          SUB     @#FS,R1                  ;COMPARE WITH FIRST SECTOR
016770  002004                                  BGE     1$                       ;SKIP NEXT IF FS < OR = LS

016772  063701  001630                          ADD     PRMLMT+22,R1             ;ADD MAXIMUM SECTOR ADDRESS TO
016776  005201                                  INC     R1                       ;MAKE THE DIFFERENCE POSITIVE
017000  005100                                  COM     R0                       ;SET SWITCH FOR FS > LS

017002  062704  000400                  1$:     ADD     #256.,R4                 ;WORDS/SECTOR
017006  005301                                  DEC     R1                       ;LS - FS SECTORS MINUS ONE
017010  002374                                  BGE     1$                       ;INCR. WORD COUNT IF NO. SECTORS STILL +
017012  005404                                  NEG     R4                       ;FORM NEGATIVE WORD COUNT
017014  010405                                  MOV     R4,R5                    ;COPY NORMAL WORD COUNT INTO SMALL WC
017016  005700                                  TST     R0                       ;FS > LS SWITCH SET?
017020  001412                                  BEQ     3$                       ;NO, SKIP NEXT
```

```
3544
3545  017022  005005                          CLR     R5              ;FORM WORD COUNT FOR FS > LS
3546  017024  013701  001630                  MOV     PRMLMT+22,R1    ;MAX SECTOR ADDRESS
3547  017030  163701  001524                  SUB     @#FS,R1         ;SUBTRACT THE FIRST SECTOR
3548  017034  062705  000400          2$:     ADD     #256.,R5        ;WORDS/SECTOR
3549  017040  005301                          DEC     R1              ;NO SECTORS MINUS ONE
3550  017042  002374                          BGE     2$              ;INCR. WORD COUNT IF NO. SECTORS STILL +
3551  017044  005405                          NEG     R5              ;FORM NEGATIVE WORD COUNT FOR THIS CASE
3552
3553                                          ;SET UP FOR DATA TRANSFERS AND PATTERN VARIATIONS
3554
3555  017046  113737  001524  004174  3$:     MOVB    @#FS,@#DTADPB+10 ;SECTOR
3556  017054  012737  050514  004172          MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER
3557  017062  012737  017420  001252          MOV     #EXIT20,@#BYPASS
3558  017070  012706  001100          TEST20: MOV     #STACK,SP       ;LOAD THE STACK POINTER
3559  017074  005037  001334                  CLR     @#WCEFLG        ;CLEAR THE WRITE CHECK ERROR FLAG
3560  017100  013701  001510                  MOV     @#FC,R1         ;PICKUP FIRST CYLINDER
3561  017104  000407                          BR      2$              ;SKIP PATTERN SET-UP FIRST TIME THRU
3562
3563  017106  005720                  1$:     TST     (R0)+           ;MOVE TO NEXT DATA PATTERN
3564  017110  022700  000040                  CMP     #16.*2.,R0      ;OUT OF PATTERNS?
3565  017114  003004                          BGT     3$              ;NO, STAY ON THIS CYLINDER UNTIL DONE
3566  017116  004037  030630                  JSR     R0,@#INCCYL     ;MOVE TO NEXT CYLINDER
3567  017122  000536                          BR      EXIT20          ;OUT OF CYLINDERS ---------------------->
3568
3569                                          ;DO NEXT CYLINDER
3570
3571  017124  005000                  2$:     CLR     R0              ;START WITH PATTERN 0
3572  017126  036037  001424  001530  3$:     BIT     BITS(R0),@#PAT  ;THIS PATTERN SELECTED?
3573  017134  001764                          BEQ     1$              ;NO, GO BACK AND GET ONE THAT WAS
3574  017136  013702  001516                  MOV     @#FT,R2         ;FIRST TRACK
3575  017142  010137  004176                  MOV     R1,@#DTADPB+12  ;LOAD THE CYLINDER
3576  017146  110237  004175          4$:     MOVB    R2,@#DTADPB+11  ;LOAD THE TRACK
3577
3578  017152  020127  001466                  CMP     R1,#822.        ;CHECK FOR LAST DISK CYLINDER
3579  017156  001003                          BNE     10$             ;SKIP LAST TRACK CHECK IF NOT
3580  017160  020227  000004                  CMP     R2,#4           ;LAST DISK TRACK ?
3581  017164  001515                          BEQ     EXIT20          ;DON'T TEST LAST TRACK AS IT HAS BAD
3582  017166                          10$:                            ;BLOCK INFORMATION STORED ON IT ------------>
3583
3584  017166  010437  004170                  MOV     R4,@#DTADPB+4   ;LOAD THE WORD COUNT
3585  017172  023701  001512                  CMP     LC,R1           ;LAST DISK CYLINDER TO TEST ?
3586  017176  003005                          BGT     5$              ;NO, SKIP TRACK CHECK
3587  017200  022702  000004                  CMP     #4,R2           ;LAST DISK TRACK TO TEST ?
3588  017204  003002                          BGT     5$              ;NO, SKIP NEXT
3589  017206  010537  004170*                 MOV     R5,@#DTADPB+4   ;SHORT WORD COUNT
3590  017212  017703  161722          5$:     MOV     @SWR,R3         ;INHIBIT WRITE AND
3591  017216  005103                          COM     R3              ;WRITE CHECK?
3592  017220  032703  000030                  BIT     #SW04!SW03,R3
3593  017224  001436                          BEQ     7$              ;YES--BRANCH
3594  017226  004737  031360                  JSR     PC,@#SETBUF     ;MOVE DATA PATTERN INTO THE BUFFER
3595  017232  032777  000020  161700          BIT     #SW04,@SWR      ;INHIBIT WRITE?
3596  017240  001012                          BNE     6$              ;YES, DO NEXT PORTION OF TESTING
3597  017242  012737  017242  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3598  017250  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3599  017254  012737  000161  004166          MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
```

```
3600
3601                                        ;DO A DATA TRANSFER
3602
3603  017262  004037  026524                JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3604  017266  032777  000010  161644  6$:   BIT     #SW03,@SWR      ;INHIBIT WRITE CHECK?
3605  017274  001012                        BNE     7$              ;YES--BRANCH
3606  017276  012737  017276  001110        MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3607  017304  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
3608  017310  012737  000151  004166        MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3609  017316  004037  026524                JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3610  017322  005737  001334          7$:   TST     @#WCEFLG        ;WRITE CHECK ERROR FLAG SET?
3611  017326  001404                        BEQ     8$              ;NO--BRANCH
3612  017330  032777  000001  161602        BIT     #SW00,@SWR      ;PERFORM READ AFTER FATAL "WCE"?
3613  017336  001424                        BEQ     9$              ;NO--BRANCH
3614  017340  032777  000004  161572  8$:   BIT     #SW02,@SWR      ;INHIBIT READ DATA AND SOFTWARE COMPARE?
3615  017346  001020                        BNE     9$              ;YES--BRANCH
3616  017350  012737  017350  001110        MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3617  017356  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
3618  017362  012737  000171  004166        MOV     #READ,@#DTADPB+2 ;COMMAND=READ
3619  017370  004037  026524                JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3620  017374  032777  000002  161536        BIT     #SW01,@SWR      ;COMPARE THE DATA?
3621  017402  001002                        BNE     9$              ;NO--BRANCH
3622  017404  004737  031450                JSR     PC,@#DATCMP     ;YES--DO IT
3623  017410  004037  030600          9$:   JSR     R0,@#INCTRK     ;MOVE TO NEXT TRACK
3624  017414  000634                        BR      1$              ;OUT OF TRACKS GO TO NEXT PATTERN
3625  017416  000653                        BR      4$              ;LOOP
3626  017420  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

                                ;;*****************************************************************
017422                          TST21:
017422  000240                          NOP
017424  033737  001426  001236          BIT     BITS+<21*2-40>,TSTNMS+2  ;DO THIS TEST ?
017432  001002                          BNE     64$                     ;YES--BRANCH
017434  000137  020236                  JMP     TST22                   ;NO--GO TO THE NEXT TEST
017440  012737  000021  001102  64$:    MOV     #21,@#STSTNM            ;SET UP TEST NUMBER AND
                                                                        ;CLEAR THE ERROR FLAG (SERFLG)
017446  004737  025610                  JSR     PC,LOOPRM               ;LOAD THE PARMETERS FOR THE TEST
017452  012737  017730  001110          MOV     #TEST21,@#LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
017460  013777  001102  161454          MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
017466  013737  001506  001204          MOV     @#RPT,$TIMES            ;GET THE ITERATION COUNT
017474  113737  001364  001115          MOVB    ERR.CT,SERMAX           ;MAX ERRORS ALLOWED FOR TEST

                                        ;THIS IS A MACRO TO TYPE OUT THE TEST BEING EXECUTED IF SW12 IS SET
017502  032777  010000  161430          BIT     #SW12,@SWR              ;CHECK FOR SWITCH 12 SET
017510  001413                          BEQ     20$                     ;IF = 0, THEN DON'T TYPE TEST NUMBER
017512  013700  001102                  MOV     $TSTNM,R0               ;ELSE, TYPE THE NUMBER
017516  042700  177000                  BIC     #177000,R0              ;MASK OUT THE HIGH ORDER BYTE
017522  104401  001215                  TYPE    ,$CRLF
017526  010046                          MOV     R0,-(SP)                ;;SAVE R0 FOR TYPEOUT
                                                                        ;;TEST NUMBER
017530  104403                          TYPOS                           ;;GO TYPE--OCTAL ASCII
017532     002                          .BYTE   2                       ;;TYPE 2 DIGIT(S)
017533     000                          .BYTE   0                       ;;SUPPRESS LEADING ZEROS
017534  104401  001215                  TYPE    ,$CRLF
017540                          20$:
```

```
3683  017540  012737  017540  001106          MOV     #.,$LPADR       ;SETUP THE LOOP ADDRESS
3684  017546  012737  020234  001252          MOV     #EXIT21,@#BYPASS
3685  017554  012737  176543  024606          MOV     #176543,@#SHINUM ;PRIME THE RANDOM NUMBER GENERATOR
3686  017562  012737  123456  024610          MOV     #123456,@#SLONUM
3687  017570  013737  001510  004176          MOV     @#FC,@#DTADPB+12 ;CYLINDER
3688  017576  013737  001352  004170          MOV     TRCKWC,@#DTADPB+4 ;WORD COUNT FOR 32/30 SECTORS (FULL TRACK)
3689  017604  012737  050514  004172          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
3690  017612  012737  000161  004166          MOV     #WRITE,@#DTADPB+2 ;COMMAND
3691  017620  032737  100000  001220          BIT     #SW15,@#C.SWR   ;WRITE THE DISK PACK BEFORE TESTING?
3692  017626  001027                          BNE     3$              ;NO--BEGIN TESTING
3693  017630  004037  031766                  JSR     R0,@#FILRAN     ;FILL DATA BUFFER WITH RANDOM DATA
3694  017634  005037  004174          1$:     CLR     @#DTADPB+10     ;SECTOR AND TRACK
3695  017640  012737  017640  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3696  017646  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3697  017652                          2$:
3698  017652  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER '
3699  017656  105237  004175                  INCB    @#DTADPB+11     ;NEXT TRACK
3700  017662  122737  000005  004175          CMPB    #5,@#DTADPB+11  ;TIME FOR NEXT CYLINDER ?
3701  017670  003370                          BGT     2$              ;NO--DO NEXT TRACK ON THIS CYL.
3702  017672  005237  004176                  INC     @#DTADPB+12     ;INCR CYLINDER ADDRESS
3703  017676  023737  001512  004176          CMP     @#LC,@#DTADPB+12 ;OUT OF CYLINDERS?
3704  017704  002353                          BGE     1$              ;NO--CONTINUE SEQUENTIAL RANDOM WRITE
3705
3706
3707  017706  012737  177400  004170  3$:     MOV     #SCTRWC,@#DTADPB+4 ;WORD COUNT
3708  017714  012737  017730  001106          MOV     #TEST21,@#$LPADR
3709  017722  012737  017730  001110          MOV     #TEST21,@#$LPERR
3710  017730  012706  001100          TEST21: MOV     #STACK,SP       ;SET STACK POINTER
3711
3712  017734  004037  032242                  JSR     R0,@#RANADR     ;GENERATE A RANDOM ADDRESS
3713  017740  013737  004174  001340          MOV     @#DTADPB+10,@#SVADR ;SAVE THE TRACK/SECTOR
3714  017746  013737  004176  001342          MOV     @#DTADPB+12,@#SVADR+2 ;SAVE THE CYLINDER
3715  017754  012737  000161  004166          MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
3716  017762  012701  050514                  MOV     #BUFFER,R1      ;WRITE BUFFER ADDRESS FOR "RANPAT"
3717  017766  010137  004172                  MOV     R1,@#DTADPB+6   ;INTO THE DATA PARAMETER BLOCK
3718  017772  004037  032206                  JSR     R0,@#RANPAT     ;GENERATE RANDOM 256 WORD PATTERN
3719                                                                  ;AND PUT INTO THE WRITE BUFFER
3720  017776  012737  017776  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3721  020004  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3722  020010  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3723
3724  020014  004037  032242                  JSR     R0,@#RANADR     ;GENERATE A NEW RANDOM ADDRESS
3725  020020  012737  000171  004166          MOV     #READ,@#DTADPB+2 ;COMMAND=READ DATA
3726  020026  012737  051314  004172          MOV     #BUFFER+512.,@#DTADPB+6 ;READ BUFFER ADDRESS
3727  020034  012737  020034  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3728  020042  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3729  020046  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3730  020052  004037  032010                  JSR     R0,@#RANCK      ;SOFTWARE CHECK THE DATA
3731
3732  020056  013737  001340  004174          MOV     @#SVADR,@#DTADPB+10 ;GET ADDRESS OF WHERE THE LAST
3733  020064  013737  001342  004176          MOV     @#SVADR+2,@#DTADPB+12 ;WRITE WAS PERFORMED
3734  020072  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3735  020100  012737  050514  004172          MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER ADDRESS FOR HARDWARE
3736                                                                  ;CHECK OF THE DATA
3737  020106  012737  020106  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3738  020114  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
```

```
3739  020120  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3740
3741  020124  004037  032242                  JSR     R0,@#RANADR     ;GENERATE A NEW RANDOM ADDRESS
3742  020130  012737  000171  004166          MOV     #READ,@#DTADPB+2 ;COMMAND=READ
3743  020136  012737  051514  004172          MOV     #BUFFER+512.,@#DTADPB+6 ;DATA BUFFER ADDRESS
3744  020144  012737  020144  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3745  020152  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3746  020156  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3747  020162  004037  032010                  JSR     R0,@#RANCK      ;SOFTWARE CHECK THE DATA
3748
3749  020166  013737  001340  004174          MOV     @#SVADR,@#DTADPB+10 ;GET DISK ADDRESS OF THE
3750  020174  013737  001342  004176          MOV     @#SVADR+2,@#DTADPB+12 ;LAST WRITE
3751  020202  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
3752  020210  012737  050514  004172          MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER ADDRESS
3753  020216  012737  020216  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
3754  020224  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
3755  020230  004037  026524                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
3756  020234  000004                  EXIT21: SCOPE                   ;LOOP ?
3757
3758                                  .SBTTL  *** RM03 ACCESS TIME ADJUSTMENT TEST ***
3759
3760                                  ;;*****************************************************************
3761                                  ;*TEST 22        RM03 ACCESS TIME ADJUSTMENT TEST
3762
3763                                  ;*      THIS TEST PERFORMS SEEKS BETWEEN CYLINDERS 0 & 136 TO ALLOW THE
3764                                  ;*      OPERATOR TO ADJUST THE ACCESS TIME ON AN RM03 USING THE
3765                                  ;*      DDU.  THE PROGRAM STALLS APPROXIMATELY 5 SECONDS BETWEEN SEEKS
3766                                  ;*      SO THAT THE ACCESS TIME INDICATORS ON THE DDU MAY BE OBSERVED.
3767
3768                                  ;;*****************************************************************
3769  020236                          TST22:
3770  020236  000240                          NOP
3771  020240  033737  001430  001236          BIT     BITS+<22*2-40>,TSTNMS+2  ;DO THIS TEST ?
3772  020246  001002                          BNE     64$             ;YES--BRANCH
3773  020250  000137  020406                  JMP     $EOP            ;NO--GO TO THE END OF THE PROGRAM
3774  020254  012737  000022  001102  64$:    MOV     #22,@#STSTNM    ;SET UP TEST NUMBER AND
3775                                                                  ;CLEAR THE ERROR FLAG (SERFLG)
3776  020262  004737  025610                  JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
3777  020266  012737  020324  001110          MOV     #TEST22,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
3778  020274  013777  001102  160640          MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3779  020302  013737  001506  001204          MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
3780  020310  112737  000144  001115          MOVB    #100.,$ERMAX    ;MAX ERRORS ALLOWED FOR TEST
3781  020316  012737  020324  001106          MOV     #TEST22,$LPADR  ;SETUP THE LOOP ADDRESS
3782  020324  012706  001100          TEST22: MOV     #STACK,SP       ;SETUP THE STACK POINTER
3783  020330  013737  001512  004116          MOV     LC,DPB.A+12     ;ENDING CYLINDER
3784  020336  112737  000105  004106          MOVB    #SEEK,@#DPB.A+2 ;SEEK=COMMAND
3785  020344  004037  026032                  JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
3786  020350  004037  027364                  JSR     R0,STALL        ;STALL
3787  020354  001360                          .WORD   STALL3          ;ADDRESS OF STALL VALUE
3788  020356  013737  001510  004116          MOV     FC,DPB.A+12     ;STARTING CYLINDER
3789  020364  112737  000105  004106          MOVB    #SEEK,@#DPB.A+2 ;SEEK=COMMAND
3790  020372  004037  026032                  JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
3791  020376  004037  027364                  JSR     R0,STALL        ;STALL
3792  020402  001360                          .WORD   STALL3          ;ADDRESS OF STALL VALUE
3793  020404  000004                  EXIT22: SCOPE                   ;LOOP ?
3794
```

```
                                .SBTTL  END OF PASS ROUTINE

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

020406                          $EOP:
020406  104401  020414                  TYPE    ,65$                    ;;TYPE ASCIZ STRING
020412  000410                          BR      64$                     ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <CR><LF><LF>/END OF PASS/
020434                          64$:
020434  005737  001232                  TST     @#DRVSEL                ;ANY DRIVES SELECTED?
020440  001434                          BEQ     1$                      ;NO--BRANCH
020442  104401  020450                  TYPE    ,67$                    ;;TYPE ASCIZ STRING
020446  000405                          BR      66$                     ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  / ON DRIVE/
020462                          66$:
020462  013746  001254                  MOV     @#CHKDRV,-(SP)          ;;SAVE @#CHKDRV FOR TYPEOUT
020466  104403                          TYPOS                           ;;GO TYPE--OCTAL ASCII
020470     002                          .BYTE   2                       ;;TYPE 2 DIGIT(S)
020471     000                          .BYTE   0                       ;;SUPPRESS LEADING ZEROS
020472  104401  020500                  TYPE    ,69$                    ;;TYPE ASCIZ STRING
020476  000412                          BR      68$                     ;;GET OVER THE ASCIZ
                                ;;69$:  .ASCIZ  /   ERRORS DETECTED=/
020524                          68$:
020524  013746  001112                  MOV     @#$ERTTL,-(SP)          ;;SAVE @#$ERTTL FOR TYPEOUT
020530  104402                          TYPOC                           ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
020532  005037  001112          1$:     CLR     @#$ERTTL                ;ZERO ERROR TOTAL
020536  005037  001102                  CLR     $TSTNM                  ;;ZERO THE TEST NUMBER
020542  005037  001204                  CLR     $TIMES                  ;;ZERO THE NUMBER OF ITERATIONS
020546  005237  001100                  INC     $PASS                   ;;INCREMENT THE PASS NUMBER
020552  042737  100000  001100          BIC     #100000,$PASS           ;;DON'T ALLOW A NEG. NUMBER
020560  005327                          DEC     (PC)+                   ;;LOOP?
020562  000010                  $EOPCT: .WORD   8.
020564  003027                          BGT     $DOAGN                  ;;YES
020566  012737                          MOV     (PC)+,@(PC)+            ;;RESTORE COUNTER
020570  000010                  $ENDCT: .WORD   8.
020572  020562                          $EOPCT
020574  104401  020602                  TYPE    ,65$                    ;;TYPE ASCIZ STRING
020600  000407                          BR      64$                     ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <CR><LF>/END OF TEST/
020620                          64$:
020620  104401  020650                  TYPE    ,$ENULL                 ;TYPE NULL CHARACTER
020624  013700  000042          $GET42: MOV     @#42,R0                 ;;GET MONITOR ADDRESS
020630  001405                          BEQ     $DOAGN                  ;;BRANCH IF NO MONITOR
020632  000005                          RESET                           ;;CLEAR THE WORLD
020634  004710                  $ENDAD: JSR     PC,(R0)                 ;;GO TO MONITOR
020636  000240                          NOP                             ;;SAVE ROOM
020640  000240                          NOP                             ;;FOR
020642  000240                          NOP                             ;;ACT11
020644                          $DOAGN:
020644  000137                          JMP     @(PC)+                  ;;RETURN
```

```
 3851  020646  006052                  $RTNAD: .WORD   RESTART
 3852  020650     377      377     000  $ENULL: .BYTE   -1,-1,0          ;;NULL CHARACTER STRING
 3853             020654                       .EVEN
```

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

                                        .SBTTL  ERROR HANDLER ROUTINE

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

020654                                  $ERROR:
020654  104407                                  CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
020656  032777  000400  160254                  BIT     #SW08,@SWR      ;SEND ERROR MESSAGE TO TTY?
020664  001411                                  BEQ     7$              ;YES--BRANCH
020666  005737  001230                          TST     @#LPTAVL        ;IS THERE A LINE PRINTER AVAILABLE?
020672  001406                                  BEQ     7$              ;NO--BRANCH
020674  013737  001420  001150                  MOV     @#LPS,@#$TPS    ;YES--SETUP STATUS
020702  013737  001422  001152                  MOV     @#LPB,@#$TPB    ;AND BUFFER REG.'S FOR LINE PRINTER
020710  105237  001103          7$:     INCB    $ERFLG                  ;;SET THE ERROR FLAG
020714  001775                                  BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
020716  013777  001102  160216                  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
020724  032777  002000  160206                  BIT     #BIT10,@SWR     ;;BELL ON ERROR?
020732  001402                                  BEQ     1$              ;;NO - SKIP
020734  104401  001210                          TYPE    ,$BELL          ;;RING BELL
020740  005237  001112          1$:     INC     $ERTTL                  ;;COUNT THE NUMBER OF ERRORS
020744  011637  001116                          MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
020750  162737  000002  001116                  SUB     #2,$ERRPC
020756  117737  160134  001114                  MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
020764  032777  020000  160146                  BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
020772  001004                                  BNE     20$             ;;SKIP TYPEOUTS
020774  004737  021062                          JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
021000  104401  001215                          TYPE    ,$CRLF
021004                                  20$:
021004  005777  160130          2$:     TST     @SWR                    ;;HALT ON ERROR
021010  100002                                  BPL     3$              ;;SKIP IF CONTINUE
021012  000000                                  HALT                    ;;HALT ON ERROR!
021014  104407                                  CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
021016  032777  001000  160114  3$:     BIT     #BIT09,@SWR             ;;LOOP ON ERROR SWITCH SET?
021024  001402                                  BEQ     4$              ;;BR IF NO
021026  013716  001110                          MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
021032  005737  001206          4$:     TST     $ESCAPE                 ;;CHECK FOR AN ESCAPE ADDRESS
021036  001402                                  BEQ     5$              ;;BR IF NONE
021040  013716  001206                          MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
021044                                  5$:
021044  013737  001414  001150                  MOV     @#TPS,@#$TPS    ;SET STATUS AND BUFFER REG.'S
021052  013737  001416  001152                  MOV     @#TPB,@#$TPB    ;FOR TTY
021060  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

021062  113737  001102  001176 TYPERR: MOVB    @#$TSTNM,@#$TMPO ;SAVE THE TEST NUMBER
021070  104412                        SAVREG                  ;SAVE R0 - R5
021072  162700  000004                SUB     #4,R0           ;FORM TEST PC
021076  010037  001162                MOV     R0,@#$REG0      ;COPY R0-R5 IN $REG0-$REG5
021102  010137  001164                MOV     R1,@#$REG1
021106  010237  001166                MOV     R2,@#$REG2
021112  010337  001170                MOV     R3,@#$REG3
021116  010437  001172                MOV     R4,@#$REG4
021122  010537  001174                MOV     R5,@#$REG5
021126  113700  001114                MOVB    @#$ITEMB,R0     ;PICKUP ERROR ITEM NUMBER
021132  010001                        MOV     R0,R1           ;AND COPY IT INTO R1
021134  005300                        DEC     R0              ;FORM INDEX FOR ERROR TABLE
021136  106300                        ASLB    R0
021140  106300                        ASLB    R0
021142  106300                        ASLB    R0
021144  103002                        BCC     1$              ;IS ERROR > 37?
021146  062700  000240                ADD     #ITEM41-$ERRTB,R0 ;YES--FORM OFFSET
021152  062700  004306        1$:     ADD     #$ERRTB,R0      ;FORM ADDRESS
021156  012037  021172                MOV     (R0)+,2$        ;GET ERROR MESSAGE (EM) POINTER
021162  001447                        BEQ     7$              ;BRANCH IF THERE ISN'T ONE
021164  104401  001215                TYPE    ,$CRLF          ;"CARRIAGE RETURN - LINE FEED
021170  104401                        TYPE
021172  000000        2$:     .WORD   0                       ;"EM" POINTER GOES HERE
021174  162701  000041                SUB     #41,R1          ;SPECIAL ERROR ITEM NUMBER?
021200  100440                        BMI     7$              ;NO--BRANCH
021202  013701  001260                MOV     @#$SVSTAT,R1    ;GET STATUS/ERROR INDICATOR
021206  106301                        ASLB    R1              ;STRIP "DONE" BIT (BIT07)
021210  006301                        ASL     R1              ;STRIP "ERROR" BIT (BIT15)
021212  012702  004254                MOV     #$TATBL,R2      ;1ST ADDRESS ON STATUS MESSAGE POINTERS
021216  005003                        CLR     R3              ;CARRIAGE RETURN-LINE FEED SWITCH
021220  104401  021226                TYPE    ,65$            ;;TYPE ASCIZ STRING
021224  000402                        BR      64$             ;;GET OVER THE ASCIZ
                        ;;65$:  .ASCIZ  / (/
                        64$:
021232                  3$:     MOV     (R2)+,5$        ;MESSAGE POINTER
021232  012237  021254                ASL     R1              ;TYPE THIS MESSAGE?
021236  006301                        BCC     6$              ;NO--BRANCH
021240  103013                        COM     R3              ;YES--TYPE A "CR" & "LF"?
021242  005103                        BNE     4$              ;NO--BRANCH
021244  001002                        TYPE    ,$CRLF          ;YES
021246  104401  001215        4$:     TYPE
021252  104401          5$:     .WORD   0                       ;MESSAGE POINTER GOES HERE
021254  000000                        TST     R1              ;MORE TO TYPE?
021256  005701                        BEQ     6$              ;NO--BRANCH
021260  001403                        TYPE    ,MSG.SP         ;YES--SPACES
021262  104401  044657                BR      3$              ;LOOP
021266  000761                6$:     BNE     3$              ;BRANCH IF NOT FINISHED
021270  001360
```

```
3966  021272  104401  021300          TYPE    ,67$            ;;TYPE ASCIZ STRING
3967  021276  000401                  BR      66$             ;;GET OVER THE ASCIZ
3968                          ;;67$:  .ASCIZ  /)/
3969  021302                  66$:
3970  021302  012037  021316  7$:     MOV     (R0)+,8$        ;PICK UP DATA HEADER (DH) POINTER
3971  021306  001404                  BEQ     9$              ;BRANCH IF NONE
3972  021310  104401  001215          TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
3973  021314  104401                  TYPE
3974  021316  000000          8$:     .WORD   0               ;"DH" POINTER GOES HERE
3975  021320  012001          9$:     MOV     (R0)+,R1        ;PICKUP DATA TABLE (DT) POINTER
3976  021322  001450                  BEQ     20$             ;BRANCH IF NONE
3977  021324  005005                  CLR     R5              ;SET INDENT SWITCH
3978  021326  012000                  MOV     (R0)+,R0        ;DATA FORMAT (DF) POINTER
3979  021330  012002                  MOV     (R0)+,R2        ;NUMBER OF DH'S TO TYPE
3980  021332  001441                  BEQ     17$             ;BRANCH IF DH NUMBER IS 0
3981  021334  005105                  COM     R5              ;NO INDENT
3982  021336  104401  001215          TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
3983  021342  112003          10$:    MOVB    (R0)+,R3        ;NUMBER OF DATA WORDS TO TYPE
3984  021344  112004                  MOVB    (R0)+,R4        ;AND HOW TO TYPE THEM
3985  021346  006004          11$:    ROR     R4              ;OCTAL OR DECIMAL?
3986  021350  103403                  BCS     12$             ;DECIMAL--BRANCH
3987  021352  013146                  MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
3988  021354  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3989  021356  000402                  BR      13$
3990  021360                  12$:
3991  021360  013146                  MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
3992  021362  104405                  TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
3993  021364  005303          13$:    DEC     R3              ;MORE NUMBERS TO TYPE?
3994  021366  001403                  BEQ     14$             ;NO--BRANCH
3995  021370  104401  044657          TYPE    ,MSG.SP         ;YES--TYPE SEPERATORS
3996  021374  000764                  BR      11$             ;LOOP
3997  021376  005302          14$:    DEC     R2              ;MORE DH'S?
3998  021400  003421                  BLE     20$             ;NO--BRANCH
3999  021402  104401  001215          TYPE    ,$CRLF          ;YES--START A NEW LINE
4000  021406  005105                  COM     R5              ;INDENT?
4001  021410  001002                  BNE     15$             ;NO--BRANCH
4002  021412  104401  044657          TYPE    ,MSG.SP         ;YES--TYPE SPACES
4003  021416  012037  021424  15$:    MOV     (R0)+,16$       ;GET NEXT DH
4004  021422  104401                  TYPE                    ;AND TYPE IT
4005  021424  000000          16$:    .WORD   0               ;DH POINTER GOES HERE
4006  021426  104401  001215          TYPE    ,$CRLF          ;CARRIAGE RETURN-LINE FEED
4007  021432  005705                  TST     R5              ;INDENT?
4008  021434  001342                  BNE     10$             ;NO--BRANCH
4009  021436  104401  044657  17$:    TYPE    ,MSG.SP         ;YES--TYPE SPACES
4010  021442  000737                  BR      10$             ;LOOP
4011  021444  104413          20$:    RESREG                  ;RESTORE R0 - R5
4012  021446  000207                  RTS     PC              ;RETURN
4013
4014                          .SBTTL  TYPE ROUTINE
4015
4016                          ;;*****************************************************************
4017                          ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
4018                          ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
4019                          ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
4020                          ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
4021                          ;*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
                                ;*

021450  105737  001157  $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
021454  100002                  BPL     1$              ;;BR IF YES
021456  000000                  HALT                    ;;HALT HERE IF NO TERMINAL
021460  000407                  BR      3$              ;;LEAVE
021462  010046          1$:     MOV     R0,-(SP)        ;;SAVE R0
021464  017600  000002          MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
021470  112046          2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
021472  001005                  BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
021474  005726                  TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
021476  012600          60$:    MOV     (SP)+,R0        ;;RESTORE R0
021500  062716  000002  3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
021504  000002                  RTI                     ;;RETURN
021506  122716  000011  4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
021512  001430                  BEQ     8$
021514  122716  000200          CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
021520  001006                  BNE     5$
021522  005726                  TST     (SP)+           ;;POP  <CR><LF> EQUIV
021524  104401                  TYPE                    ;;TYPE A CR AND LF
021526  001215                  $CRLF
021530  105037  021664          CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
021534  000755                  BR      2$              ;;GET NEXT CHARACTER
021536  004737  021620  5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
021542  123726  001156  6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
021546  001350                  BNE     2$              ;;IF NO GO GET NEXT CHAR.
021550  013746  001154          MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                        ;;AND THE NULL CHAR.
021554  105366  000001  7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
021560  002770                  BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
021562  004737  021620          JSR     PC,$TYPEC       ;;GO TYPE A NULL
021566  105337  021664          DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
021572  000770                  BR      7$              ;;LOOP

                                ;HORIZONTAL TAB PROCESSOR

021574  112716  000040  8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
021600  004737  021620  9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
021604  132737  000007  021664  BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
021612  001372                  BNE     9$              ;;TAB STOP
021614  005726                  TST     (SP)+           ;;POP SPACE OFF STACK
021616  000724                  BR      2$              ;;GET NEXT CHARACTER
021620  105777  157324  $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
021624  100375                  BPL     $TYPEC
021626  116677  000002  157316  MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
021634  122766  000015  000002  CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
021642  001003                  BNE     1$              ;;BRANCH IF NO
021644  105037  021664          CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
021650  000406                  BR      $TYPEX          ;;EXIT
```

```
 4078  021652  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
 4079  021660  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
 4080  021662  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
 4081  021664  000000                $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
 4082  021666  000207                $TYPEX: RTS     PC
 4083
 4084
 4085                                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
 4086
 4087                                ;;**************************************************************
 4088                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
 4089                                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
 4090                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
 4091                                ;*CALL:
 4092                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 4093                                ;*      TYPOS                   ;;CALL FOR TYPEOUT
 4094                                ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
 4095                                ;*      .BYTE   M               ;;M=1 OR 0
 4096                                ;*                                      ;;1=TYPE LEADING ZEROS
 4097                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
 4098                                ;*
 4099                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
 4100                                ;*$TYPOS OR $TYPOC
 4101                                ;*CALL:
 4102                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 4103                                ;*      TYPON                   ;;CALL FOR TYPEOUT
 4104                                ;*
 4105                                ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
 4106                                ;*CALL:
 4107                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
 4108                                ;*      TYPOC                   ;;CALL FOR TYPEOUT
 4109
 4110  021670  017646  000000        $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
 4111  021674  116637  000001  022113        MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
 4112  021702  112637  022115                MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
 4113  021706  062716  000002                ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
 4114  021712  000406                        BR      $TYPON
 4115  021714  112737  000001  022113  $TYPOC: MOVB   #1,$OFILL       ;;SET THE ZERO FILL SWITCH
 4116  021722  112737  000006  022115        MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
 4117  021730  112737  000005  022112  $TYPON: MOVB   #5,$OCNT        ;;SET THE ITERATION COUNT
 4118  021736  010346                        MOV     R3,-(SP)        ;;SAVE R3
 4119  021740  010446                        MOV     R4,-(SP)        ;;SAVE R4
 4120  021742  010546                        MOV     R5,-(SP)        ;;SAVE R5
 4121  021744  113704  022115                MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
 4122  021750  005404                        NEG     R4
 4123  021752  062704  000006                ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
 4124  021756  110437  022114                MOVB    R4,$OMODE       ;;SAVE IT FOR USE
 4125  021762  113704  022113                MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
 4126  021766  016605  000012                MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
 4127  021772  005003                        CLR     R3              ;;CLEAR THE OUTPUT WORD
 4128  021774  006105                1$:     ROL     R5              ;;ROTATE MSB INTO "C"
 4129  021776  000404                        BR      3$              ;;GO DO MSB
 4130  022000  006105                2$:     ROL     R5              ;;FORM THIS DIGIT
 4131  022002  006105                        ROL     R5
 4132  022004  006105                        ROL     R5
 4133  022006  010503                        MOV     R5,R3
```

```
 4134  022010  006103                3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
 4135  022012  105337  022114              DECB    $OMODE          ;;TYPE THIS DIGIT?
 4136  022016  100016                      BPL     7$              ;;BR IF NO
 4137  022020  042703  177770              BIC     #177770,R3      ;;GET RID OF JUNK
 4138  022024  001002                      BNE     4$              ;;TEST FOR 0
 4139  022026  005704                      TST     R4              ;;SUPPRESS THIS 0?
 4140  022030  001403                      BEQ     5$              ;;BR IF YES
 4141  022032  005204                4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 4142  022034  052703  000060              BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 4143  022040  052703  000040        5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 4144  022044  110337  022110              MOVB    R3,8$           ;;SAVE FOR TYPING
 4145  022050  104401  022110              TYPE    ,8$             ;;GO TYPE THIS DIGIT
 4146  022054  105337  022112        7$:     DECB    $OCNT           ;;COUNT BY 1
 4147  022060  003347                      BGT     2$              ;;BR IF MORE TO DO
 4148  022062  002402                      BLT     6$              ;;BR IF DONE
 4149  022064  005204                      INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 4150  022066  000744                      BR      2$              ;;GO DO THE LAST DIGIT
 4151  022070  012605                6$:     MOV     (SP)+,R5        ;;RESTORE R5
 4152  022072  012604                      MOV     (SP)+,R4        ;;RESTORE R4
 4153  022074  012603                      MOV     (SP)+,R3        ;;RESTORE R3
 4154  022076  016666  000002  000004      MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 4155  022104  012616                      MOV     (SP)+,(SP)
 4156  022106  000002                      RTI                     ;;RETURN
 4157  022110     000                8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 4158  022111     000                      .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 4159  022112     000                $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 4160  022113     000                $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 4161  022114  000000                $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 4162
 4163                                .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
 4164
 4165                                ;;**************************************************************
 4166                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
 4167                                ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
 4168                                ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
 4169                                ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
 4170                                ;*REPLACED WITH SPACES.
 4171                                ;*CALL:
 4172                                ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
 4173                                ;*      TYPDS                   ;;GO TO THE ROUTINE
 4174
 4175  022116                        $TYPDS:
 4176  022116  010046                      MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 4177  022120  010146                      MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 4178  022122  010246                      MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 4179  022124  010346                      MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 4180  022126  010546                      MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 4181  022130  012746  020200              MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 4182  022134  016605  000020              MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 4183  022140  100004                      BPL     1$              ;;BR IF INPUT IS POS.
 4184  022142  005405                      NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 4185  022144  112766  000055  000001      MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 4186  022152  005000                1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 4187  022154  012703  022332              MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 4188  022160  112723  000040              MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 4189  022164  005002                2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
```

```
4190  022166  016001  022322          MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
4191  022172  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
4192  022174  002402                          BLT     4$              ;;BR IF DONE
4193  022176  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
4194  022200  000774                          BR      3$
4195  022202  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
4196  022204  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
4197  022206  001002                          BNE     5$              ;;FALL THROUGH IF 0
4198  022210  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
4199  022212  100407                          BMI     7$              ;;BR IF YES
4200  022214  106316                  5$:     ASLB    (SP)            ;;MSD?
4201  022216  103003                          BCC     6$              ;;BR IF NO
4202  022220  116663  000001  177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
4203  022226  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
4204  022232  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
4205  022236  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
4206  022240  005720                          TST     (R0)+           ;;JUST INCREMENTING
4207  022242  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
4208  022246  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
4209  022250  003002                          BGT     8$              ;;GO TO EXIT
4210  022252  010502                          MOV     R5,R2           ;;GET THE LSD
4211  022254  000764                          BR      6$              ;;GO CHANGE TO ASCII
4212  022256  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
4213  022260  100003                          BPL     9$              ;;BR IF NO
4214  022262  116663  177777  177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
4215  022270  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
4216  022272  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
4217  022274  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
4218  022276  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
4219  022300  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
4220  022302  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
4221  022304  104401  022332                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
4222  022310  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
4223  022316  012616                          MOV     (SP)+,(SP)
4224  022320  000002                          RTI                     ;;RETURN TO USER
4225  022322  023420                  $DTBL:  10000.
4226  022324  001750                          1000.
4227  022326  000144                          100.
4228  022330  000012                          10.
4229  022332  000004                  $DBLK:  .BLKW   4
4230
4231                                  .SBTTL  TTY INPUT ROUTINE
4232
4233                                  ;;*****************************************************************
4234                                  .ENABL  LSB
4235  022342  000000                  $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
4236  022344  000000                  $TKQIN: .WORD   0               ;;INPUT POINTER
4237  022346  000000                  $TKQOUT: .WORD  0               ;;OUTPUT POINTER
4238  022350  000002                  $TKQSRT: .BLKB  2               ;;TTY KEYBOARD QUEUE
4239          022352                  $TKQEND=.
4240
4241                                  ;*TK INITIALIZE ROUTINE
4242                                  ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
4243                                  ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
4244                                  ;
4245                                  ;*CALL:
```

```
                                        ;*      JSR     PC,$TKINT
                                        ;*      RETURN
                                        ;
 022352  005037  022342                 $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
 022356  012737  022350  022344                 MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
 022364  013737  022344  022346                 MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
 022372  012737  022422  000060                 MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
 022400  012737  000200  000062                 MOV     #200,@#TKVEC+2  ;;"BR" LEVEL 4
 022406  005777  156534                         TST     @$TKB           ;;CLEAR DONE FLAG
 022412  012777  000100  156524                 MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
 022420  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)
                                        ;
 022422  117746  156520                 $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
 022426  042716  177600                         BIC     #↑C177,(SP)     ;;STRIP THE JUNK
 022432  021627  000003                         CMP     (SP),#3         ;;IS IT A CONTROL C?
 022436  001007                                 BNE     1$              ;;BRANCH IF NO
 022440  104401  023552                         TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (↑C)
 022444  004737  022352                         JSR     PC,$TKINT       ;;INIT THE KEYBOARD
 022450  005726                                 TST     (SP)+           ;;CLEAN UP STACK
 022452  000137  004660                         JMP     START2          ;;CONTROL C RESTART
 022456  021627  000007                 1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
 022462  001004                                 BNE     2$              ;;BRANCH IF NO
 022464  022737  000176  001140                 CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
 022472  001500                                 BEQ     6$              ;;GO TO SWR CHANGE
                                        ;
 022474                                 2$:
 022474  022737  000002  022342                 CMP     #2,$TKCNT       ;;IS THE QUEUE FULL?
 022502  001004                                 BNE     3$              ;;BRANCH IF NO
 022504  104401  001210                         TYPE    ,$BELL          ;;RING THE TTY BELL
 022510  005726                                 TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
 022512  000451                                 BR      5$              ;;EXIT
 022514  021627  000023                 3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
 022520  001021                                 BNE     32$             ;;BRANCH IF NO
 022522  005077  156416                         CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
 022526  005726                                 TST     (SP)+           ;;CLEAN CHAR OFF STACK
 022530  105777  156410                 31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
 022534  100375                                 BPL     31$             ;;LOOP UNTIL ITS THERE
 022536  117746  156404                         MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
 022542  042716  177600                         BIC     #↑C177,(SP)     ;;MAKE IT 7-BIT ASCII
 022546  022627  000021                         CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
 022552  001366                                 BNE     31$             ;;BRANCH IF NO
 022554  012777  000100  156362                 MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
 022562  000002                                 RTI                     ;;RETURN
 022564  005237  022342                 32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
 022570  021627  000140                         CMP     (SP),#140       ;;IS IT UPPER CASE?
 022574  002405                                 BLT     4$              ;;BRANCH IF YES
 022576  021627  000175                         CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
 022602  003002                                 BGT     4$              ;;BRANCH IF YES
 022604  042716  000040                         BIC     #40,(SP)        ;;MAKE IT UPPER CASE
```

```
4302  022610  112677  177530          4$:     MOVB    (SP)+,@#STKQIN  ;;AND PUT IT IN QUEUE
4303  022614  005237  022344                  INC     $TKQIN          ;;UPDATE THE POINTER
4304  022620  023727  022344  022352          CMP     $TKQIN,#STKQEND ;;GO OFF THE END?
4305  022626  001003                          BNE     5$              ;;BRANCH IF NO
4306  022630  012737  022350  022344          MOV     #STKQSRT,$TKQIN ;;RESET THE POINTER
4307  022636  000002                  5$:     RTI                     ;;RETURN
4308
4309                                          ;;**************************************************************
4310                                          ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
4311                                          ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
4312                                          ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
4313                                          ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
4314  022640  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
4315  022646  001124                          BNE     15$             ;;EXIT IF NOT
4316  022650  105777  156270                  TSTB    @#TKS           ;;IS A CHAR WAITING?
4317  022654  100121                          BPL     15$             ;;IF NOT, EXIT
4318  022656  117746  156264                  MOVB    @#TKB,-(SP)     ;;YES
4319  022662  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
4320  022666  021627  000007                  CMP     (SP),#7         ;;IS IT A CONTROL-G?
4321  022672  001300                          BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
4322                                                                  ;;AND EXIT
4323
4324                                          ;;**************************************************************
4325                                          ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
4326                                          ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
4327                                          ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
4328  022674  123727  001134  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
4329  022702  001674                          BEQ     2$              ;;BRANCH IF YES
4330  022704  005726                          TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
4331  022706  004737  022352                  JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
4332  022712  005077  156226                  CLR     @#TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
4333  022716  112737  000001  001135          MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
4334
4335  022724  104401  023564                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
4336  022730  104401  023571          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
4337  022734  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
4338  022740  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
4339  022742  104401  023602                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
4340  022746  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
4341  022750  005046                          CLR     -(SP)           ;;THE NEW SWR
4342  022752  105777  156166          7$:     TSTB    @#TKS           ;;CHAR THERE?
4343  022756  100375                          BPL     7$              ;;IF NOT TRY AGAIN
4344
4345  022760  117746  156162                  MOVB    @#TKB,-(SP)     ;;PICK UP CHAR
4346  022764  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
4347
4348  022770  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
4349  022774  001015                          BNE     9$              ;;BRANCH IF NOT
4350  022776  104401  023552                  TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
4351  023002  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
4352  023006  123727  001135  000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
4353  023014  001003                          BNE     8$              ;;BRANCH IF NO
4354  023016  012777  000100  156120          MOV     #100,@#TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
4355  023024  000137  004660          8$:     JMP     START^2         ;;CONTROL-C RESTART
4356
4357
```

```
 4358  023030  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
 4359  023034  001005                          BNE     10$             ;;BRANCH IF NOT
 4360  023036  104401  023557                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (↑U)
 4361  023042  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 4362  023046  000737                          BR      19$             ;;LET'S TRY IT AGAIN
 4363
 4364
 4365  023050  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
 4366  023054  001022                          BNE     16$             ;;BRANCH IF NO
 4367  023056  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 4368  023062  001403                          BEQ     11$             ;;BRANCH IF YES
 4369  023064  016677  000002  156046          MOV     2(SP),@SWR      ;;SAVE NEW SWR
 4370  023072  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
 4371  023076  104401  001215          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 4372  023102  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 4373  023110  001003                          BNE     15$             ;;BRANCH IF NOT
 4374  023112  012777  000100  156024          MOV     #100,@STKS      ;;RE-ENABLE TTY KBD INTERRUPTS
 4375  023120  000002          15$:    RTI                             ;;RETURN
 4376  023122  004737  021620          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
 4377  023126  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
 4378  023132  002420                          BLT     18$             ;;BRANCH IF YES
 4379  023134  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
 4380  023140  003015                          BGT     18$             ;;BRANCH IF YES
 4381  023142  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 4382  023146  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
 4383  023152  001403                          BEQ     17$             ;;BRANCH IF YES
 4384  023154  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
 4385  023156  006316                          ASL     (SP)            ;;   CHAR OVER TO MAKE
 4386  023160  006316                          ASL     (SP)            ;;   ROOM FOR NEW ONE.
 4387  023162  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 4388  023166  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 4389  023172  000667                          BR      7$              ;;GET THE NEXT ONE
 4390  023174  104401  001214          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 4391  023200  000720                          BR      20$             ;;SIMULATE CONTROL-U
 4392                                  .DSABL  LSB
 4393
 4394
 4395                                  ;;**************************************************************
 4396                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
 4397                                  ;*CALL:
 4398                                  ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
 4399                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
 4400                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
 4401                                  ;
 4402
 4403  023202  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
 4404  023204  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE PS
 4405  023212  005066  000004                  CLR     4(SP)           ;;GET READY FOR A CHARACTER
 4406  023216  005046                          CLR     -(SP)           ;;PUT NEW PS ON STACK
 4407  023220  012746  023226                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
 4408  023224  000002                          RTI                     ;;POP NEW PC AND PS
 4409  023226                          64$:
 4410  023226  005737  022342          1$:     TST     $TKCNT          ;;WAIT ON A CHARACTER
 4411  023232  001775                          BEQ     1$
 4412  023234  005337  022342                  DEC     $TKCNT          ;;DECREMENT THE COUNTER
 4413  023240  117766  177102  000004          MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
```

```
4414  023246  005237  022346                INC     $TKQOUT                 ;;UPDATE THE POINTER
4415  023252  023727  022346  022352        CMP     $TKQOUT,#$TKQEND        ;;DID IT GO OFF OF THE END?
4416  023260  001003                        BNE     2$                      ;;BRANCH IF NO
4417  023262  012737  022350  022346        MOV     #$TKQSRT,$TKQOUT        ;;RESET THE POINTER
4418  023270  000002                2$:     RTI                             ;;RETURN
4419                                        ;;**************************************************************
4420                                        ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
4421                                        ;*CALL:
4422                                        ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
4423                                        ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
4424                                        ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
4425
4426  023272  010346                $RDLIN: MOV     R3,-(SP)                ;;SAVE R3
4427  023274  005046                        CLR     -(SP)                   ;;CLEAR THE RUBOUT KEY
4428  023276  012703  023526        1$:     MOV     #$TTYIN,R3              ;;GET ADDRESS
4429  023302  022703  023552        2$:     CMP     #$TTYIN+20.,R3          ;;BUFFER FULL?
4430  023306  101456                        BLOS    4$                      ;;BR IF YES
4431  023310  104410                        RDCHR                           ;;GO READ ONE CHARACTER FROM THE TTY
4432  023312  112613                        MOVB    (SP)+,(R3)              ;;GET CHARACTER
4433  023314  122713  000177        10$:    CMPB    #177,(R3)               ;;IS IT A RUBOUT
4434  023320  001022                        BNE     5$                      ;;BR IF NO
4435  023322  005716                        TST     (SP)                    ;;IS THIS THE FIRST RUBOUT?
4436  023324  001007                        BNE     6$                      ;;BR IF NO
4437  023326  112737  000134  023524        MOVB    #'\,9$                  ;;TYPE A BACK SLASH
4438  023334  104401  023524                TYPE    ,9$
4439  023340  012716  177777                MOV     #-1,(SP)                ;;SET THE RUBOUT KEY
4440  023344  005303                6$:     DEC     R3                      ;;BACKUP BY ONE
4441  023346  020327  023526                CMP     R3,#$TTYIN              ;;STACK EMPTY?
4442  023352  103434                        BLO     4$                      ;;BR IF YES
4443  023354  111337  023524                MOVB    (R3),9$                 ;;SETUP TO TYPEOUT THE DELETED CHAR.
4444  023360  104401  023524                TYPE    ,9$                     ;;GO TYPE
4445  023364  000746                        BR      2$                      ;;GO READ ANOTHER CHAR.
4446  023366  005716                5$:     TST     (SP)                    ;;RUBOUT KEY SET?
4447  023370  001406                        BEQ     7$                      ;;BR IF NO
4448  023372  112737  000134  023524        MOVB    #'\,9$                  ;;TYPE A BACK SLASH
4449  023400  104401  023524                TYPE    ,9$
4450  023404  005016                        CLR     (SP)                    ;;CLEAR THE RUBOUT KEY
4451  023406  122713  000025        7$:     CMPB    #25,(R3)                ;;IS CHARACTER A CTRL U?
4452  023412  001003                        BNE     8$                      ;;BR IF NO
4453  023414  104401  023557                TYPE    ,$CNTLU                 ;;TYPE A CONTROL "U"
4454  023420  000726                        BR      1$                      ;;GO START OVER
4455  023422  122713  000022        8$:     CMPB    #22,(R3)                ;;IS CHARACTER A "↑R"?
4456  023426  001011                        BNE     3$                      ;;BRANCH IF NO
4457  023430  105013                        CLRB    (R3)                    ;;CLEAR THE CHARACTER
4458  023432  104401  001215                TYPE    ,$CRLF                  ;;TYPE A "CR" & "LF"
4459  023436  104401  023526                TYPE    ,$TTYIN                 ;;TYPE THE INPUT STRING
4460  023442  000717                        BR      2$                      ;;GO PICKUP ANOTHER CHACTER
4461  023444  104401  001214        4$:     TYPE    ,$QUES                  ;;TYPE A '?'
4462  023450  000712                        BR      1$                      ;;CLEAR THE BUFFER AND LOOP
4463  023452  111337  023524        3$:     MOVB    (R3),9$                 ;;ECHO THE CHARACTER
4464  023456  104401  023524                TYPE    ,9$
4465  023462  122723  000015                CMPB    #15,(R3)+               ;;CHECK FOR RETURN
4466  023466  001305                        BNE     2$                      ;;LOOP IF NOT RETURN
4467  023470  105063  177777                CLRB    -1(R3)                  ;;CLEAR RETURN (THE 15)
4468  023474  104401  001216                TYPE    ,$LF                    ;;TYPE A LINE FEED
4469  023500  005726                        TST     (SP)+                   ;;CLEAN RUBOUT KEY FROM THE STACK
```

```
 4470  023502  012603                        MOV     (SP)+,R3        ;;RESTORE R3
 4471  023504  011646                        MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
 4472  023506  016666  000004  000002        MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
 4473  023514  012766  023526  000004        MOV     #$TTYIN,4(SP)
 4474  023522  000002                        RTI                     ;;RETURN
 4475  023524     000                  9$:    .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
 4476  023525     000                        .BYTE   0               ;;TERMINATOR
 4477  023526  000024               $TTYIN:  .BLKB   20.             ;;RESERVE 20. BYTES FOR TTY INPUT
 4478  023552  041536  005015     000  $CNTLC:  .ASCIZ  /↑C/<15><12>  ;;CONTROL "C"
 4479  023557     136  006525  000012  $CNTLU:  .ASCIZ  /↑U/<15><12>  ;;CONTROL "U"
 4480  023564  043536  005015     000  $CNTLG:  .ASCIZ  /↑G/<15><12>  ;;CONTROL "G"
 4481  023571     015  051412  051127  $MSWR:   .ASCIZ  <15><12>/SWR = /
 4482  023576  036440  000040
 4483  023602  020040  042516  020127  $MNEW:   .ASCIZ  /  NEW = /
 4484  023610  020075     000
 4485          023614               .EVEN
 4486
 4487                               .SBTTL  SCOPE HANDLER ROUTINE
 4488
 4489                               ;;*****************************************************************
 4490                               ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
 4491                               ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
 4492                               ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
 4493                               ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 4494                               ;*SW14=1        LOOP ON TEST
 4495                               ;*SW11=1        INHIBIT ITERATIONS
 4496                               ;*SW09=1        LOOP ON ERROR
 4497                               ;*CALL
 4498                               ;*      SCOPE           ;;SCOPE=IOT
 4499
 4500  023614                       $SCOPE:
 4501  023614  104407                        CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
 4502  023616  032777  040000  155314  1$:    BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
 4503  023624  001076                        BNE     $OVER           ;;YES IF SW14=1
 4504                               ;#####START OF CODE FOR THE XOR TESTER#####
 4505  023626  000416               $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
 4506                                                               ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
 4507  023630  013746  000004                MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
 4508  023634  012737  023654  000004        MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
 4509  023642  005737  177060                TST     @#177060        ;;TIME OUT ON XOR?
 4510  023646  012637  000004                MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
 4511  023652  000450                        BR      $SVLAD          ;;GO TO THE NEXT TEST
 4512  023654  022626               5$:      CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
 4513  023656  012637  000004                MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
 4514  023662  000413                        BR      7$              ;;LOOP ON THE PRESENT TEST
 4515  023664                       6$:;#####END OF CODE FOR THE XOR TESTER#####
 4516  023664  105737  001103        2$:    TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
 4517  023670  001421                        BEQ     3$              ;;BR IF NO
 4518  023672  123737  001115  001103        CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
 4519  023700  101015                        BHI     3$              ;;BR IF NO
 4520  023702  032777  001000  155230        BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
 4521  023710  001404                        BEQ     4$              ;;BR IF NO
 4522  023712  013737  001110  001106  7$:    MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
 4523  023720  000440                        BR      $OVER
 4524  023722  105037  001103        4$:    CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
 4525  023726  005037  001204                CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
```

```
4526  023732  000412                          BR      1$              ;;ESCAPE TO THE NEXT TEST
4527  023734  032777  004000  155176  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
4528  023742  001006                          BNE     1$              ;;BR IF YES
4529  023744  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
4530  023750  023737  001204  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
4531  023756  002021                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
4532  023760  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
4533  023766  013737  024036  001204          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
4534  023774  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
4535  024000  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
4536  024004  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
4537  024010  005037  001206                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
4538  024014  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
4539  024022  013777  001102  155112  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
4540  024030  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
4541  024034  000002                          RTI                     ;;FIXES PS
4542  024036  000001                  $MXCNT: 1                       ;;MAX. NUMBER OF ITERATIONS
4543
4544                                   .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
4545
4546                                   ;;**************************************************************
4547                                   ;*SAVE R0-R5
4548                                   ;*CALL:
4549                                   ;*      SAVREG
4550                                   ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
4551                                   ;*
4552                                   ;*TOP---(+16)
4553                                   ;* +2---(+18)
4554                                   ;* +4---R5
4555                                   ;* +6---R4
4556                                   ;* +8---R3
4557                                   ;*+10---R2
4558                                   ;*+12---R1
4559                                   ;*+14---R0
4560
4561  024040                           $SAVREG:
4562  024040  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
4563  024042  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
4564  024044  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
4565  024046  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
4566  024050  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
4567  024052  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
4568  024054  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
4569  024060  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
4570  024064  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
4571  024070  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
4572  024074  000002                          RTI
4573
4574                                   ;*RESTORE R0-R5
4575                                   ;*CALL:
4576                                   ;*      RESREG
4577  024076                           $RESREG:
4578  024076  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
4579  024102  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
4580  024106  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
4581  024112  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
```

```
                        MOV     (SP)+,R5        ;;POP STACK INTO R5
                        MOV     (SP)+,R4        ;;POP STACK INTO R4
                        MOV     (SP)+,R3        ;;POP STACK INTO R3
                        MOV     (SP)+,R2        ;;POP STACK INTO R2
                        MOV     (SP)+,R1        ;;POP STACK INTO R1
                        MOV     (SP)+,R0        ;;POP STACK INTO R0
                        RTI

                .SBTTL  TRAP DECODER

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

024134  010046  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
024136  016600  000002         MOV     2(SP),R0        ;;GET TRAP ADDRESS
024142  005740                 TST     -(R0)           ;;BACKUP BY 2
024144  111000                 MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
024146  006300                 ASL     R0              ;;POSITION FOR INDEXING
024150  016000  024170         MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
024154  000200                 RTS     R0              ;;GO TO ROUTINE


                ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO

024156  011646  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
024160  016666  000004  000002 MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
024166  000002                 RTI                     ;;RESTORE THE PSW

                .SBTTL  TRAP TABLE

                ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                ;*BY THE "TRAP" INSTRUCTION.

                ;       ROUTINE
                        -------
024170  024156  $TRPAD: .WORD   $TRAP2
024172  021450         $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
024174  021714         $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
024176  021670         $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
024200  021730         $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
024202  022116         $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

024204  022730         $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

024206  022640         $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
024210  023202         $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
024212  023272         $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
024214  024040         $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
024216  024076         $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

024220  016637  000002  024250  $SB2D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
024226  012746  024250          MOV     #1$,-(SP)       ;;SET POINTER
024232  004737  024254          JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
024236  062716  000005          ADD     #5,(SP)         ;;ONLY ALLOW FIVE CHARACTERS
024242  012666  000002          MOV     (SP)+,2(SP)     ;;PICKUP POINTER
024246  000207                  RTS     PC              ;;RETURN
024250  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


024254  104412          $DB2D:  SAVREG                  ;;SAVE REGISTERS
024256  016602  000002          MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
024262  012700  024434          MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
024266  010066  000002          MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
024272  012201                  MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
024274  012202                  MOV     (R2)+,R2
024276  012737  000012  024352  MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
024304  012704  024364          MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
024310  012705  024366          MOV     #$TNPWR+2,R5
024314  005003          1$:     CLR     R3              ;;CLEAR PARTIAL
024316  161401          2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
024320  005602                  SBC     R2
024322  161502                  SUB     (R5),R2
024324  002402                  BLT     3$              ;;BR IF TEN POWER TO LARGE
024326  005203                  INC     R3              ;;ADD 1 TO PARTIAL
024330  000772                  BR      2$              ;;LOOP
024332  062401          3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
024334  005502                  ADC     R2
024336  062402                  ADD     (R4)+,R2
024340  022525                  CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
024342  052703  000060          BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
024346  110320                  MOVB    R3,(R0)+        ;;SAVE IT
024350  005327                  DEC     (PC)+           ;;DONE?
024352  000000          4$:     .WORD   0
024354  001357                  BNE     1$              ;;BR IF NO
024356  105020                  CLRB    (R0)+           ;;TERMINATOR
024360  104413                  RESREG                  ;;RESTORE REGISTERS
```

```
 4694  024362  000207                    RTS     PC              ;;RETURN
 4695  024364  145000            $TNPWR: 145000                  ;;1.0E09
 4696  024366  035632                    35632
 4697  024370  160400                    160400                  ;;1.0E08
 4698  024372  002765                    2765
 4699  024374  113200                    113200                  ;;1.0E07
 4700  024376  000230                    230
 4701  024400  041100                    041100                  ;;1.0E06
 4702  024402  000017                    17
 4703  024404  103240                    103240                  ;;1.0E05
 4704  024406  000001                    1
 4705  024410  023420                    23420                   ;;1.0E04
 4706  024412  000000                    0
 4707  024414  001750                    1750                    ;;1.0E03
 4708  024416  000000                    0
 4709  024420  000144                    144                     ;;1.0E02
 4710  024422  000000                    0
 4711  024424  000012                    12                      ;;1.0E01
 4712  024426  000000                    0
 4713  024430  000001                    1                       ;;1.0E00
 4714  024432  000000                    0
 4715  024434  000014            $DECVL: .BLKB   12.             ;;RESERVE STORAGE FOR ASCIZ STRING
 4716
 4717                            .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
 4718
 4719                            ;;**************************************************************
 4720                            ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
 4721                            ;*LEADING NUMBERS.
 4722                            ;*CALL
 4723                            ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
 4724                            ;*      JSR     PC,@#$SUPRS
 4725
 4726
 4727  024450  010046            $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
 4728  024452  016600  000004            MOV     4(SP),R0        ;;PICKUP THE POINTER
 4729  024456  105710            1$:     TSTB    (R0)            ;;TERMINATEOR?
 4730  024460  001403                    BEQ     2$              ;;BR IF YES
 4731  024462  122720  000060            CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
 4732  024466  001773                    BEQ     1$              ;;BR IF YES
 4733  024470  005300            2$:     DEC     R0              ;;BACKUP BY "1"
 4734  024472  010037  024500            MOV     R0,3$           ;;SAVE FOR TYPING
 4735  024476  104401                    TYPE                    ;;GO TYPE
 4736  024500  000000            3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
 4737  024502  012600                    MOV     (SP)+,R0        ;;RESTORE R0
 4738  024504  012616                    MOV     (SP)+,(SP)      ;;RESTORE THE STACK
 4739  024506  000207                    RTS     PC              ;;RETURN
 4740
 4741                            .SBTTL  RANDOM NUMBER GENERATOR ROUTINE
 4742
 4743                            ;;**************************************************************
 4744                            ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
 4745                            ;*WITH A RANGE OF 0 TO 2(+33)-1.
 4746                            ;*CALL:
 4747                            ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
 4748                            ;*      RETURN                  ;;RETURN HERE THE RANDOM
 4749                            ;*                              ;;NUMBER WILL BE IN
```

```
                                        ;*                              ;;$SHINUM,$LONUM
                                        
                                        $RAND:
024510                                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
024510  010046                                 MOV     R1,-(SP)        ;;PUSH R1 ON STACK
024512  010146                                 MOV     R2,-(SP)        ;;PUSH R2 ON STACK
024514  010246                                 MOV     $LONUM,R0       ;;SET R0 WITH LOW
024516  013700  024610                         MOV     $SHINUM,R1      ;;SET R1 WITH HIGH
024522  013701  024606                         MOV     #-7,R2          ;;SET SHIFT COUNT
024526  012702  177771                 1$:     ASL     R0              ;;SHIFT R0 LEFT AND
024532  006300                                 ROL     R1              ;;ROTATE CARRY INTO R1 AND
024534  006101                                 INC     R2              ;;CHECK FOR DONE
024536  005202                                 BNE     1$              ;;CONTINUE SHIFT LOOP
024540  001374                                 ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
024542  063700  024610                         ADC     R1              ;;PROPOGATE CARRY
024546  005501                                 ADD     $SHINUM,R1      ;;ADD NUMBER TO MAKE X 129
024550  063701  024606                         ADD     #1057,R0        ;;ADD LOW CONSTANT
024554  062700  001057                         ADC     R1              ;;PROPOGATE CARRY
024560  005501                                 ADD     #47401,R1       ;;ADD HIGH CONSTANT
024562  062701  047401                         MOV     R0,$LONUM       ;;SAVE R0
024566  010037  024610                         MOV     R1,$SHINUM      ;;SAVE R1
024572  010137  024606                         MOV     (SP)+,R2        ;;POP STACK INTO R2
024576  012602                                 MOV     (SP)+,R1        ;;POP STACK INTO R1
024600  012601                                 MOV     (SP)+,R0        ;;POP STACK INTO R0
024602  012600                                 RTS     PC              ;;RETURN
024604  000207                  $SHINUM: .WORD  176543
024606  176543                  $LONUM:  .WORD  123456
024610  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
                                        
024612                                  $DIV:
024612  104400                                  TRAP                    ;;PUSH OLD PSW AND PC ON STACK
024614  042716  000017                         BIC     #17,(SP)        ;;STRIP AWAY CONDITION CODES
```

```
 4806  024620  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 4807  024622  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 4808  024624  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 4809  024626  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 4810  024630  005046                        CLR     -(SP)           ;;SAVE A PLACE FOR SIGNS
 4811  024632  012746  000021                MOV     #17.,-(SP)      ;;SETUP THE ITERATION COUNTER
 4812  024636  016601  000024                MOV     24(SP),R1       ;;PICKUP THE DIVIDEND
 4813  024642  016600  000022                MOV     22(SP),R0
 4814  024646  100005                        BPL     1$              ;;CHECK THE SIGN
 4815  024650  105366  000003                DECB    3(SP)           ;;KEEP TRACK OF THE SIGN
 4816  024654  005400                        NEG     R0              ;;AND NEGATE THE ORIGINAL
 4817  024656  005401                        NEG     R1              ;;NUMBER
 4818  024660  005600                        SBC     R0
 4819  024662  016602  000020        1$:     MOV     20(SP),R2       ;;PICKUP THE DIVISOR
 4820  024666  002407                        BLT     2$              ;;CHECK THE SIGN
 4821  024670  003011                        BGT     3$              ;;DIVISOR OF 0 IS A NO-NO
 4822  024672  052766  000003  000014        BIS     #3,14(SP)       ;;SET "V" & "C"
 4823  024700  012700  177777                MOV     #-1,R0          ;;SET REMAINDER TO ALL ONES
 4824  024704  000424                        BR      7$              ;;EXIT
 4825  024706  005266  000002        2$:     INC     2(SP)           ;;KEEP TRACK OF DIVISORS SIGN
 4826  024712  000401                        BR      4$
 4827  024714  005402                3$:     NEG     R2              ;;NEGATE THE ORIGINAL NUMBER
 4828  024716  000241                4$:     CLC                     ;;CLEAR "C"
 4829  024720  000405                        BR      6$              ;;START FORMING QUOTIENT
 4830  024722  006100                5$:     ROL     R0              ;;POSITION MSB'S
 4831  024724  010003                        MOV     R0,R3           ;;COPY
 4832  024726  060203                        ADD     R2,R3           ;;COMPARE DIVIDEND & DIVISOR
 4833  024730  103001                        BCC     6$              ;;BR IF DIVIDEND > DIVISOR
 4834  024732  010300                        MOV     R3,R0           ;;REMAINDER AFTER THIS LOOP
 4835  024734  006101                6$:     ROL     R1              ;;QUOTIENT BIT ENTERS HERE
 4836  024736  005316                        DEC     (SP)            ;;DONE?
 4837  024740  001370                        BNE     5$              ;;BR IF NO
 4838  024742  005701                        TST     R1              ;;OVERFLOW?
 4839  024744  100005                        BPL     8$              ;;BR IF NO
 4840  024746  052766  000002  000014        BIS     #2,14(SP)       ;;SET "V" IN RETURN STATUS WORD
 4841  024754  005000                        CLR     R0              ;;SET REMAINDER TO ALL ZEROS
 4842  024756  010001                7$:     MOV     R0,R1           ;;COPY REMAINDER INTO QUOTIENT
 4843  024760  005726                8$:     TST     (SP)+           ;;CLEAR COUNTER FROM STACK
 4844  024762  005716                        TST     (SP)            ;;REMAINDER SIGN CORRECTION NEEDED?
 4845  024764  002004                        BGE     9$              ;;BR IF NO
 4846  024766  005400                        NEG     R0              ;;NEGATE REMAINDER
 4847  024770  105066  000001                CLRB    1(SP)           ;;CLEAR SIGN
 4848  024774  005316                        DEC     (SP)            ;;BUT DON'T FORGET QUOTIENT
 4849  024776  005726                9$:     TST     (SP)+           ;;QUOTIENT SIGN CORRECTION NEEDED?
 4850  025000  001401                        BEQ     10$             ;;BR IF NO
 4851  025002  005401                        NEG     R1              ;;NEGATE QUOTIENT
 4852  025004  010166  000020        10$:    MOV     R1,20(SP)       ;;RETURN QUOTIENT AND
 4853  025010  010066  000016                MOV     R0,16(SP)       ;;REMAINDER TO USER
 4854  025014  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
 4855  025016  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
 4856  025020  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
 4857  025022  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
 4858  025024  012666  000002                MOV     (SP)+,2(SP)     ;;SETUP TO RETURN CONDITION CODES
 4859  025030  000002                        RTI                     ;;RETURN
 4860
 4861                          .SBTTL  *** PROGRAM SUBROUTINES ***
```

```
                                        ;SET "LPTAVL" TO THE PROPER STATE.
                                        ; LPTAVL = 0 IF NO LINE PRINTER AVAILABLE
                                        ; LPTAVL = 1 IF LINE PRINTER IS AVAILABLE
                                        ;CALL
                                        ;       JSR     PC,@#LP.AVL
                                        ;       RETURN
025032  005037  001230          LP.AVL: CLR     @#LPTAVL        ;START WITH NO PRINTER AVAIABLE
025036  012737  025062  000004          MOV     #1$,@#ERRVEC    ;SETUP THE TIMEOUT VECTOR
025044  005037  000006                  CLR     @#ERRVEC+2
025050  005777  154344                  TST     @LPS            ;IS THERE A LINE PRINTER?
025054  005237  001230                  INC     @#LPTAVL        ;YES--SET AVAILABLE SWITCH
025060  000401                          BR      2$
025062  022626                  1$:     CMP     (SP)+,(SP)+     ;NO--POP STACK
025064  012737  000006  000004  2$:     MOV     #ERRVEC+2,@#ERRVEC ;RESTORE TIMEOUT VECTOR
025072  000207                          RTS     PC              ;RETURN

                                        ;THIS ROUTINE WILL DETERMINE IF THERE IS A CLOCK ON THE SYSTEM
                                        ;AND IF THERE IS IT WILL SETUP THE VECTOR AND START THE CLOCK
                                        ;"CLKSTA" WILL INDICATE THE CLOCK TYPE
                                        ; 0= NO CLOCK
                                        ;+1= KW11-P
                                        ;-1= KW11-L
                                        ;THIS ROUTINE WILL ALSO SETUP "TICKMS" (TIME
                                        ;PER CLOCK TICK IN MILLISECONDS) AND "TICKUS"
                                        ;(TIME PER CLOCK TICK IN MICROSECONDS) AS
                                        ;PER SW00.
                                        ;SW00=0 -- 60HZ
                                        ;SW00=1 -- 50HZ
                                        ;CALL
                                        ;       JSR     PC,@#ST.CLK
                                        ;       RETURN

025074  010146                  ST.CLK: MOV     R1,-(SP)        ;SAVE R1
025076  012701  000006                  MOV     #ERRVEC+2,R1    ;SAVE AND SETUP TIMEOUT VECTOR
025102  011146                          MOV     (R1),-(SP)
025104  005011                          CLR     (R1)            ;LEVEL 0
025106  014146                          MOV     -(R1),-(SP)
025110  012711  025140                  MOV     #1$,(R1)        ;GO TO 1$ ON TIMEOUT
025114  005037  001244                  CLR     CLKSTA          ;SET CLOCK STATUS TO NO CLOCK
025120  005777  154254                  TST     @PKCS           ;IS THERE A KW11-P?
025124  012737  000001  001244          MOV     #1,CLKSTA       ;YES--SET STATUS TO KW11-P
025132  004737  025242                  JSR     PC,ST.PCLK      ;START THE KW11-P
025136  000414                          BR      3$              ;GO TO EXIT
025140  022626                  1$:     CMP     (SP)+,(SP)+     ;CLEAN UP THE STACK
025142  012711  025166                  MOV     #2$,(R1)        ;IF TIMEOUT GO TO 2$
025146  005777  154240                  TST     @LKS            ;IS THERE A KW11-L?
025152  012737  177777  001244          MOV     #-1,CLKSTA      ;YES-- SET STATUS TO KW11-L
025160  004737  025304                  JSR     PC,ST.LCLK      ;START THE KW11-L
025164  000401                          BR      3$              ;EXIT
025166  022626                  2$:     CMP     (SP)+,(SP)+     ;CLEAN UP THE STACK
025170  012621                  3$:     MOV     (SP)+,(R1)+     ;RESTORE THE TIMEOUT VECTOR
025172  012621                          MOV     (SP)+,(R1)+
025174  012601                          MOV     (SP)+,R1        ;RESTORE R1
025176  032737  000100  001220          BIT     #SW06,@#C.SWR   ;50HZ OR 60HZ?
```

```
 4918  025204  001407                        BEQ     4$                      ;BRANCH IF 60
 4919  025206  012737  000020  001246        MOV     #20,@#TICKMS            ;SETUP TIME PER
 4920  025214  012737  047040  001250        MOV     #20000.,@#TICKUS        ;TICK FOR 50HZ
 4921  025222  000406                        BR      5$
 4922  025224  012737  000016  001246  4$:   MOV     #16,@#TICKMS            ;SETUP TIME PER
 4923  025232  012737  040432  001250        MOV     #16666.,@#TICKUS        ;TICK FOR 60HZ
 4924  025240  000207                  5$:   RTS     PC                      ;RETURN
 4925
 4926  025242                           ST.PCLK:
 4927  025242  032737  000040  001220        BIT     #SW05,@#C.SWR           ;ALLOW SOFTWARE TIMEOUTS?
 4928  025250  001014                        BNE     1$                      ;NO--BRANCH
 4929  025252  012777  025340  154114        MOV     #SRVCLK,@PKV            ;SETUP THE KW11-P VECTOR
 4930  025260  012777  000300  154110        MOV     #300,@PKV+2
 4931  025266  012777  000001  154106        MOV     #1,@PKB                 ;COUNT ONE TICK
 4932  025274  012777  000115  154076        MOV     #115,@PKCS              ;"INT.EN." ,COUNT DOWN", "MODE 1 (REPEAT)",
                                                                             ;"LINE FREQ", AND "RUN"
 4934  025302  000207                  1$:   RTS     PC                      ;RETURN
 4935
 4936  025304                           ST.LCLK:
 4937  025304  032737  000040  001220        BIT     #SW05,@#C.SWR           ;ALLOW SOFTWARE TIMEOUTS?
 4938  025312  001011                        BNE     1$                      ;NO--BRANCH
 4939  025314  012777  025340  154064        MOV     #SRVCLK,@LKV            ;SETUP THE KW11-L VECTOR
 4940  025322  012777  000300  154060        MOV     #300,@LKV+2
 4941  025330  012777  000100  154054        MOV     #100,@LKS               ;START THE KW11-L
 4942  025336  000207                  1$:   RTS     PC                      ;RETURN
 4943
 4944  025340  013746  001246  SRVCLK: MOV     @#TICKMS,-(SP)          ;TIME PER TICK IN MILLISECONDS
 4945  025344  004737  041704                JSR     PC,@#RPTMR              ;COUNT THE ELASPED TIME
 4946  025350  000002                        RTI                             ;RETURN AFTER INTERRUPT
 4947
 4948                                   ;THIS ROUTINE SETS UP DEFAULT PARAMETER VALUES WHEN THE PROGRAM IS
 4949                                   ;STARTED OR WHEN THE VALUE OF BIT00 IN 'C.SWR' IS CHANGED.
 4950                                   ;CALL
 4951                                   ;       JSR     PC,LODFLT
 4952                                   ;       RETURN
 4953
 4954  025352                           LODFLT:
 4955  025352  010046                        MOV     R0,-(SP)                ;;PUSH R0 ON STACK
 4956  025354  010146                        MOV     R1,-(SP)                ;;PUSH R1 ON STACK
 4957  025356  010246                        MOV     R2,-(SP)                ;;PUSH R2 ON STACK
 4958  025360  010346                        MOV     R3,-(SP)                ;;PUSH R3 ON STACK
 4959  025362  012737  176777  001234        MOV     #176777,TSTNMS          ;SELECT TESTS 0-10, 12-17
 4960  025370  012737  000003  001236        MOV     #3,TSTNMS+2             ;SELECT TESTS 20 & 21
 4961  025376  012700  001664                MOV     #DFLT,R0                ;DEFAULT PARAMETERS POINTER
 4962  025402  012701  002330                MOV     #PRM0,R1                ;TABLE POINTER
 4963  025406  010102                        MOV     R1,R2                   ;STOP ADDRESS
 4964  025410  012021                  1$:   MOV     (R0)+,(R1)+             ;MOVE DEFAULT PARAMETERS INTO
 4965  025412  020002                        CMP     R0,R2                   ;RUN TIME TABLES ** DONE?
 4966  025414  103775                        BLO     1$                      ;NO--BRANCH
 4967  025416  012700  003504                MOV     #PAT8,R0                ;PAT0 DEFAULTS TO PATTERN 8
 4968  025422  012701  003104                MOV     #PAT0,R1
 4969  025426  012021                  2$:   MOV     (R0)+,(R1)+
 4970  025430  020027  003544                CMP     R0,#PAT9
 4971  025434  103774                        BLO     2$
 4972  025436  032737  000001  001220        BIT     #BIT00,C.SWR            ;16 BIT MODE ?
 4973  025444  001012                        BNE     3$                      ;BR IF 18 BIT MODE
```

```
 4974  025446  012737  000037  001630          MOV     #31.,PRMLMT+22  ;SET 'FS' LIMIT TO 31.
 4975  025454  012737  000037  001632          MOV     #31.,PRMLMT+24  ;SET 'LS' LIMIT TO 31.
 4976  025462  012737  160000  001352          MOV     #-<256.*32.>,TRCKWC  ;WORD COUNT FOR A 16 BIT TRACK
 4977  025470  000411                          BR      4$              ;CONTINUE
 4978  025472  012737  000035  001630  3$:     MOV     #29.,PRMLMT+22  ;SET 'FS' LIMIT TO 29.
 4979  025500  012737  000035  001632          MOV     #29.,PRMLMT+24  ;SET 'LS' LIMIT TO 29.
 4980  025506  012737  161000  001352          MOV     #-<256.*30.>,TRCKWC  ;WORD COUNT FOR AN 18 BIT TRACK
 4981  025514  012701  001536          4$:     MOV     #PRMPT,R1       ;ADDRESS OF PARAMETER POINTER TABLE
 4982  025520  005711                  5$:     TST     (R1)            ;END OF THE TABLE ?
 4983  025522  001425                          BEQ     8$              ;BR IF END
 4984  025524  032731  002000                  BIT     #BIT10,@(R1)+   ;'LS' SELECTED ?
 4985  025530  001773                          BEQ     5$              ;BR IF NOT
 4986  025532  016102  177776                  MOV     -2(R1),R2       ;PARAMETER TABLE ADDRESS
 4987  025536  011246                          MOV     (R2),-(SP)      ;PARAMETER ALLOCATION BITS
 4988  025540  012703  000013                  MOV     #11.,R3         ;NUMBER OF PARAMETERS (MAXIMUM) BEFORE 'LS'
 4989  025544  006216                  6$:     ASR     (SP)            ;COUNT THE PARAMETER
 4990  025546  103002                          BCC     7$              ;BR IF NOT USED
 4991  025550  062702  000002                  ADD     #2,R2           ;INCREMENT THE PARAMETER TABLE ADDRESS
 4992  025554  005303                  7$:     DEC     R3              ;COUNT THE PARAMETER
 4993  025556  001372                          BNE     6$              ;BR IF NOT THERE YET
 4994  025560  005726                          TST     (SP)+           ;CORRECT THE STACK POINTER
 4995  025562  021237  001630                  CMP     (R2),PRMLMT+22  ;IS 'LS' TOO LARGE FOR THE MODE SELECTED ?
 4996  025566  101754                          BLOS    5$              ;BR IF NOT
 4997  025570  013712  001630                  MOV     PRMLMT+22,(R2)  ;RESET VALUE FOR MODE USED
 4998  025574  000751                          BR      5$              ;CONTINUE
 4999  025576                          8$:
 5000  025576  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
 5001  025600  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
 5002  025602  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
 5003  025604  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
 5004  025606  000207                          RTS     PC              ;RETURN
 5005
 5006                                  ;THIS ROUTINE FILLS THE PARAMETER TABLE THE CURRENT TEST.
 5007                                  ;CALL
 5008                                  ;       MOV     #TESTNUM,$TSTNM  ;LOAD THE TEST NUMBER
 5009                                  ;       JSR     PC,LODPRM
 5010                                  ;       RETURN
 5011
 5012  025610                          LODPRM:
 5013  025610  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 5014  025612  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 5015  025614  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 5016  025616  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
 5017  025620  005004                          CLR     R4              ;CLEAR R4
 5018  025622  113704  001102                  MOVB    $TSTNM,R4       ;GET THE TEST NUMBER
 5019  025626  006304                          ASL     R4              ;SETUP TO ADDRESS WORDS
 5020  025630  016401  001536                  MOV     PRMPT(R4),R1    ;GET THE TEST'S PARAMETER TABLE ADDRESS
 5021  025634  012702  001504                  MOV     #PRM,R2         ;PARAMETER EXECUTION TABLE
 5022  025640  005003                          CLR     R3              ;R3 IS USED AS A COUNTER
 5023  025642  013704  001254                  MOV     CHKDRV,R4       ;DRIVE'S ADDRESS
 5024  025646  012122                          MOV     (R1)+,(R2)+     ;PARAMETER SPECIFIER
 5025  025650  006237  001504          1$:     ASR     PRM             ;THIS PARAMETER USED IN THE TEST ?
 5026  025654  103002                          BCC     2$              ;BR IF NOT
 5027  025656  012122                          MOV     (R1)+,(R2)+     ;LOAD THE VALUE
 5028  025660  000401                          BR      3$              ;CONTINUE
 5029  025662  005022                  2$:     CLR     (R2)+           ;CLEAR THE UNUSED PARAMETER LOCATION
```

```
                                        3$:     INC     R3              ;COUNT THE POSITION IN THE OUTPUT TABLE
                                                CMP     R3,#12.         ;FINISHED ?
                                                BEQ     6$              ;BR IF YES
                                                CMP     R3,#3           ;DOING THE CYLINDER ADDRESSES ?
                                                BNE     1$              ;BR IF NOT
                                                BITB    #BIT02,DRVTYP(R4)  ;RM03 ?
                                                BNE     5$              ;IF IT IS, OVERLAY FC & LC WITH FC' & LC'
                                                ADD     #2,R3           ;COUNT THE BYPASSED PARAMETERS (FC' & LC')
                                                ASR     PRM             ;SHIFT THE COUNTER
                                                BCC     4$              ;BR IF FC' IS NOT USED
                                                ADD     #2,R1           ;MOVE THE INPUT POINTER
                                        4$:     ASR     PRM             ;COUNT THE PARAMETER
                                                BCC     1$              ;BR IF LC' NOT USED
                                                ADD     #2,R1           ;MOVE THE INPUT PINTER
                                                BR      1$              ;KEEP GOING
                                                BR      1$              ;KEEP GOING
                                        5$:     SUB     #4,R2           ;BACKUP THE OUTPUT POINTER
                                                BR      1$              ;KEEP GOING
                                        6$:
                                                MOV     (SP)+,R4        ;;POP STACK INTO R4
                                                MOV     (SP)+,R3        ;;POP STACK INTO R3
                                                MOV     (SP)+,R2        ;;POP STACK INTO R2
                                                MOV     (SP)+,R1        ;;POP STACK INTO R1
                                                RTS     PC              ;RETURN

                                        ;THIS ROUTINE LOADS A READ HEADER AND DATA COMMAND OR A SEEK COMMAND
                                        ;INTO DPB.B+2 AND DPB.C+2, DEPENDING ON THE STATE OF "CONTROL SWITCH"
                                        ;BIT07.
                                        ;CALL
                                        ;       JSR     PC,@#LDCMD
                                        ;       RETURN

                                        LDCMD:  BIT     #SW07,@#C.SWR   ;DO EXPLICIT SEEKS?
                                                BNE     1$              ;YES--BRANCH
                                                MOV     #READHD,@#DPB.B+2 ;NO--SET UP FOR READ HEADER AND
                                                MOV     #READHD,@#DPB.C+2 ;DATA COMMAND
                                                BR      2$
                                        1$:     MOV     #SEEK,@#DPB.B+2 ;SETUP FOR SEEK COMMAND
                                                MOV     #SEEK,@#DPB.C+2
                                        2$:     RTS     PC

                                        ;THIS ROUTINE WILL CALL THE RM03 DRIVER AND THEN WAIT ON THE FUNCTION
                                        ;TO COMPLETE. IF AN ERROR OCCURS IT IS REPORTED.
                                        ;CALL
                                        ;       FILL "DPB" WITH COMMAND INFORMATION
                                        ;       JSR     R0,@#CALL.A
                                        ;       RETURN

                                        CALL.A: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
                                                JSR     R0,@#RM03       ;CALL RM03 DRIVER
                                                DPB.A
                                                BR      CALL.A
                                        1$:     TST     @#DPB.A+16      ;DONE?
                                                BEQ     1$              ;NO--LOOP
                                                BPL     3$              ;BRANCH IF NO ERROR
                                                MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
```

```
5086  026064  013737  004116  001270          MOV     @#DPB.A+12,@#CYL.DS ;CYLINDER
5087  026072  113737  004115  001274          MOVB    @#DPB.A+11,@#TRK.DS ;TRACK
5088  026100  113737  004114  001272          MOVB    @#DPB.A+10,@#SEC.DS ;SECTOR
5089  026106  012746  004122                  MOV     #DPB.A+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5090  026112  004737  027246                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5091  026116  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5092  026120  104041                          ERROR   41              ;
5093  026122  104042                          ERROR   42              ;PARITY ERROR
5094  026124  104043                          ERROR   43              ;UNSAFE ERROR
5095  026126  104044                          ERROR   44              ;NON-I/O ERROR
5096  026130  104045                          ERROR   45              ;I/O ERROR
5097  026132  013746  004122          2$:     MOV     DPB.A+16,-(SP)  ;STATUS WORD
5098  026136  004737  027206                  JSR     PC,LOP.CK       ;SEE IF LOOP, ABORT, OR CONTINUE
5099  026142  000200                  3$:     RTS     R0              ;RETURN
5100
5101                                  ;THIS ROUTINE IS THE SAME AS "CALL.A" EXCEPT FOR THE DPB USED AND IF
5102                                  ;THE COMMAND IS A READ HEADER AND DATA THE HEADER (CYLINDER, TRACK,
5103                                  ;AND SECTOR) READ IS CHECKED FOR VALIDITY.
5104                                  ;CALL
5105                                  ;       FILL DPB
5106                                  ;       JSR     R0,@#CALL.B
5107                                  ;       RETURN
5108
5109  026144  005037  001206  CALL.B: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5110  026150  004037  036236          JSR     R0,@#RM03       ;CALL RM03 DRIVER
5111  026154  004124                  DPB.B
5112  026156  000772                  BR      CALL.B
5113  026160  005737  004142  1$:     TST     DPB.B+16        ;DONE?
5114  026164  001775                  BEQ     1$              ;NO--BRANCH
5115  026166  100042                  BPL     4$              ;BRANCH IF NO ERROR
5116  026170  012737  026262  001206  MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
5117  026176  013737  004136  001270  MOV     @#DPB.B+12,@#CYL.DS ;CYLINDER
5118  026204  113737  004135  001274  MOVB    @#DPB.B+11,@#TRK.DS ;TRACK
5119  026212  113737  004134  001272  MOVB    @#DPB.B+10,@#SEC.DS ;SECTOR
5120  026220  012746  004142          MOV     #DPB.B+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5121  026224  004737  027246          JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5122  026230  062607                  ADD     (SP)+,PC        ;REPORT PROPER ERROR
5123  026232  104041                  ERROR   41              ;
5124  026234  104042                  ERROR   42              ;PARITY ERROR
5125  026236  104043                  ERROR   43              ;UNSAFE ERROR
5126  026240  104044                  ERROR   44              ;NON-I/O ERROR
5127  026242  005737  004220          TST     RM.REG+RMER1    ;DRIVE ERROR ?
5128  026246  001404                  BEQ     2$              ;BR IF NOT
5129  026250  032737  177677  004220  BIT     #^C100,RM.REG+RMER1  ;SEE IF ONLY 'HCE' SET
5130  026256  001406                  BEQ     4$              ;BR IF IT IS
5131  026260  104045          2$:     ERROR   45              ;I/O ERROR
5132  026262  013746  004142  3$:     MOV     DPB.B+16,-(SP)  ;STATUS WORD
5133  026266  004737  027206          JSR     PC,LOP.CK       ;SEE IF LOOP, ABORT, OR CONTINUE
5134  026272  000410                  BR      5$              ;CHECK FOR STALL
5135  026274  123727  004126  000173  4$:     CMPB    @#DPB.B+2,#READHD ;DOING IMPLIED SEEKS?
5136  026302  001004                  BNE     5$              ;NO--BRANCH
5137  026304  004037  027526          JSR     R0,@#VERIFY     ;YES--GO CHECK THE DATA
5138  026310  004134                  DPB.B+10
5139  026312  000407                  BR      6$              ;ERROR DURING VERIFY
5140  026314  032737  040000  001220  5$:     BIT     #SW14,@#C.SWR   ;STALL?
5141  026322  001403                  BEQ     6$              ;NO--BRANCH
```

```
                        JSR     R0,@#STALL      ;YES--CALL STALL ROUTINE
                        .WORD   STALL1          ;STALL TIME POINTER
                6$:     RTS     R0              ;RETURN

                ;THIS ROUTINE IS THE SAME AS "CALL.B" EXCEPT FOR THE DPB USED.
                ;CALL
                ;       FILL DPB
                ;       JSR     R0,@#CALL.C
                ;       RETURN

                CALL.C: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
                        JSR     R0,@#RM03       ;CALL RM03 DRIVER
                        DPB.C
                        BR      CALL.C
                1$:     TST     @#DPB.C+16      ;DONE?
                        BEQ     1$              ;NO--LOOP
                        BPL     4$              ;YES--BRANCH IF NO ERROR
                        MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
                        MOV     @#DPB.C+12,@#CYL.DS ;CYLINDER
                        MOVB    @#DPB.C+11,@#TRK.DS ;TRACK
                        MOVB    @#DPB.C+10,@#SEC.DS ;SECTOR
                        MOV     #DPB.C+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
                        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$:     ERROR   45              ;I/O ERROR
                3$:     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 TO
                ;$ERFLG EXIT IS TO THE NEXT TEST.
                ;CALL
                ;       FILL DPB
                ;       JSR     R0,@#DRVCAL
                ;       RETURN
```

```
5198  026524  005037  001206          DRVCAL: CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5199  026530  005037  001334                  CLR     @#WCEFLG        ;CLEAR WRITE CHECK ERROR FLAG
5200  026534  004037  036236                  JSR     R0,@#RM03       ;CALL RM03 DRIVER
5201  026540  004164                          DTADPB
5202  026542  000770                          BR      DRVCAL
5203  026544  005737  004202          DRVCL1: TST     @#DTADPB+16     ;DONE
5204  026550  001775                          BEQ     DRVCL1          ;NO--LOOP
5205  026552  100402                          BMI     1$              ;BR IF ERRORS
5206  026554  000137  027166                  JMP     10$             ;NO ERRORS
5207  026560                          1$:
5208  026560  012737  026634  001206          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
5209  026566  013737  004176  001270          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
5210  026574  113737  004175  001274          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
5211  026602  113737  004174  001272          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
5212  026610  012746  004202                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5213  026614  004737  027246                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5214  026620  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5215  026622  104041                          ERROR   41              ;
5216  026624  104042                          ERROR   42              ;PARITY ERROR
5217  026626  104043                          ERROR   43              ;UNSAFE ERROR
5218  026630  104044                          ERROR   44              ;NON-I/O ERROR
5219  026632  104045                          ERROR   45              ;I/O ERROR
5220  026634  122737  000020  001102  2$:     CMPB    #20,@#$TSTNM    ;TEST 20?
5221  026642  001137                          BNE     8$              ;NO--BRANCH
5222  026644  013746  004202                  MOV     DTADPB+16,-(SP) ;STATUS WORD
5223  026650  004737  027206                  JSR     PC,LOP.CK       ;SEE IF LOOP, ABORT, OR CONTINUE
5224  026654  122737  000151  004166          CMPB    #WRCKD,@#DTADPB+2 ;DOING A WRITE CHECK?
5225  026662  001133                          BNE     12$             ;NO--BRANCH
5226  026664  032737  040000  004214          BIT     #BIT14,@#RM.REG+10 ;IS "WCE"=1?
5227  026672  001527                          BEQ     12$             ;NO--BRANCH
5228  026674  032777  000020  152236          BIT     #SW04,@SWR      ;INHIBIT WRITES?
5229  026702  001123                          BNE     12$             ;YES--BRANCH
5230  026704  112737  000161  004166          MOVB    #WRITE,@#DTADPB+2 ;SETUP FOR A WRITE
5231  026712  005037  001206                  CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5232  026716  004037  036236                  JSR     R0,@#RM03       ;DO THE WRITE
5233  026722  004164                          DTADPB
5234  026724  000240                          NOP
5235  026726  005737  004202          3$:     TST     @#DTADPB+16     ;DONE?
5236  026732  001775                          BEQ     3$              ;NO--LOOP
5237  026734  100026                          BPL     4$              ;YES--BRANCH IF NO ERROR
5238  026736  012737  027142  001206          MOV     #8$,$ESCAPE     ;;ESCAPE TO 8$ ON ERROR
5239  026744  013737  004176  001270          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
5240  026752  113737  004175  001274          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
5241  026760  113737  004174  001272          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
5242  026766  012746  004202                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5243  026772  004737  027246                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5244  026776  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
5245  027000  104041                          ERROR   41              ;
5246  027002  104042                          ERROR   42              ;PARITY ERROR
5247  027004  104043                          ERROR   43              ;UNSAFE ERROR
5248  027006  104044                          ERROR   44              ;NON-I/O ERROR
5249  027010  104045                          ERROR   45              ;I/O ERROR
5250  027012  112737  000151  004166  4$:     MOVB    #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
5251  027020  004037  036236                  JSR     R0,@#RM03       ;DO THE WRITE CHECK
5252  027024  004164                          DTADPB
5253  027026  000240                          NOP
```

```
5254  027030  005737  004202          5$:     TST     @#DTADPB+16     ;DONE?
5255  027034  001775                  BEQ     5$              ;NO--LOOP
5256  027036  100410                  BMI     7$              ;YES--BRANCH IF ERROR
5257  027040  004037  036236          JSR     R0,@#RM03       ;DO A 2ND WRITE CHECK
5258  027044  004164                  DTADPB
5259  027046  000240                  NOP
5260  027050  005737  004202          6$:     TST     @#DTADPB+16     ;DONE?
5261  027054  001775                  BEQ     6$              ;NO--LOOP
5262  027056  100043                  BPL     10$             ;YES--BRANCH IF NO ERROR
5263  027060  012737  000001  001334  7$:     MOV     #1,@#WCEFLG     ;SET THE WRITE CHECK ERROR FLAG
5264  027066  012737  027142  001206          MOV     #8$,$ESCAPE     ;;ESCAPE TO 8$ ON ERROR
5265  027074  013737  004176  001270          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
5266  027102  113737  004175  001274          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
5267  027110  113737  004174  001272          MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
5268  027116  012746  004202                  MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5269  027122  004737  027246                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5270  027126  062607                  ADD     (SP)+,PC        ;REPORT PROPER ERROR
5271  027130  104041                  ERROR   41              ;
5272  027132  104042                  ERROR   42              ;PARITY ERROR
5273  027134  104043                  ERROR   43              ;UNSAFE ERROR
5274  027136  104044                  ERROR   44              ;NON-I/O ERROR
5275  027140  104046                  ERROR   46              ;FATAL WRITE CHECK
5276  027142  013746  004202          8$:     MOV     DTADPB+16,-(SP) ;STATUS WORD
5277  027146  004737  027206                  JSR     PC,LOP.CK       ;SEE IF LOOP, ABORT, OR CONTINUE
5278  027152  123737  001364  001103  12$:    CMPB    @#ERR.CT,@#SERFLG ;GO TO NEXT TEST?
5279  027160  101002                  BHI     10$             ;NO--BRANCH
5280  027162  013700  001252          9$:     MOV     @#BYPASS,R0     ;YES--GET EXIT ADDRESS
5281  027166  032737  040000  001220  10$:    BIT     #SW14,@#C.SWR   ;STALL?
5282  027174  001403                  BEQ     11$             ;NO--BRANCH
5283  027176  004037  027364                  JSR     R0,@#STALL      ;YES--CALL STALL ROUTINE
5284  027202  001356                  .WORD   STALL2          ;STALL TIME POINTER
5285  027204  000200                  11$:    RTS     R0
5286
5287                                  ;THIS SUBROUTINE CHECK FOR LOOP, ABORT, OR CONTINUE SWITCHES AFTER
5288                                  ;ERRORS 41, 42, 43, 44, 45, AND 46.
5289                                  ;CALL
5290                                  ;       MOV     DTA+16,-(SP)    ;STATUS WORD FROM DPB IN USE
5291                                  ;       JSR     PC,LOP.CK
5292                                  ;       RETURN
5293
5294  027206  032777  001000  151724  LOP.CK: BIT     #SW9,@SWR       ;LOOP ON ERROR
5295  027214  001402                  BEQ     1$              ;BR IF NOT
5296  027216  000177  151666                  JMP     @$LPERR         ;START AT THE LOOP ADDRESS
5297  027222  005037  001206          1$:     CLR     $ESCAPE         ;CLEAR ERROR ESCAPE FLAG
5298  027226  032766  072006  000002          BIT     #BIT14!BIT13!BIT12!BIT10!BIT02!BIT01,2(SP)  ;CHECK ERROR TYPE
5299  027234  001402                  BEQ     2$              ;BR IF DRIVE NOT OFFLINE, UNLOADED, OR
5300                                                          ;PERSISTENT UNSAFE OR FATAL MASSBUS PARITY
5301  027236  000137  020406                  JMP     $EOP            ;TERMINATE DRIVE
5302  027242  012616                  2$:     MOV     (SP)+,(SP)      ;ADJUST RETURN ADDRESS
5303  027244  000207                  RTS     PC
5304
5305                                  ;THIS ROUTINE FORMS AN INDEX THAT WILL BE USED TO DISPATCH
5306                                  ;TO THE PROPER ERROR CALL.  THE INDEX IS FORMED BY EXAMINING
5307                                  ;THE STATUS/ERROR INDICATOR OF THE APPLICABLE DPB.
5308                                  ;INDEX          STATUS/ERROR
5309                                  ;-----          ------------
```

```
5310                                    ;      0 BIT14!BIT13!BIT08!BIT01
5311                                    ;      2 BIT11!BIT10!BIT02
5312                                    ;      4 BIT12!BIT04
5313                                    ;      6 BIT05!BIT03!<BIT09 & COMMAND=NON-I/O>
5314                                    ;     10 BIT06!<BIT09 & COMMAND=I/O>
5315                                    ;CALL
5316                                    ;       JSR     #DPB+16,-(SP)   ;ADDRESS OF STATUS/ERROR INDICATOR
5317                                    ;       JSR     PC,@#ERINDX     ;FORM INDEX
5318                                    ;       RETURN                  ;INDEX IS ON THE STACK
5319
5320  027246  010046                    ERINDX: MOV     R0,-(SP)        ;SAVE R0
5321  027250  010146                            MOV     R1,-(SP)        ;SAVE R1
5322  027252  016600  000006                   MOV     6(SP),R0        ;GET STATUS/ERROR INDICATOR POINTER
5323  027256  011037  001260                   MOV     (R0),@#SVSTAT   ;SAVE THE STATUS/ERROR INDICATOR
5324  027262  005001                            CLR     R1              ;START INDEX AT ZERO
5325  027264  032710                            BIT     (PC)+,(R0)      ;FORM INDEX OF 0?
5326  027266  020402                            .WORD   BIT13!BIT08!BIT01
5327  027270  001027                            BNE     5$              ;YES--BRANCH
5328  027272  032710                            BIT     (PC)+,(R0)      ;FORM PARITY ERROR OR PORT REQUEST INDEX (2)?
5329  027274  006004                            .WORD   BIT11!BIT10!BIT02
5330  027276  001023                            BNE     4$              ;YES--BRANCH
5331  027300  032710                            BIT     (PC)+,(R0)      ;FORM UNSAFE INDEX (4)?
5332  027302  050020                            .WORD   BIT14!BIT12!BIT04
5333  027304  001017                            BNE     3$              ;YES--BRANCH
5334  027306  032710                            BIT     (PC)+,(R0)      ;FORM NON-I/O ERROR INDEX (6)?
5335  027310  000050                            .WORD   BIT05!BIT03
5336  027312  001013                            BNE     2$              ;YES--BRANCH
5337  027314  032710                            BIT     (PC)+,(R0)      ;FORM I/O ERROR INDEX (10)?
5338  027316  000100                            .WORD   BIT06
5339  027320  001007                            BNE     1$              ;YES--BRANCH
5340  027322  032710                            BIT     (PC)+,(R0)      ;SOFTWARE TIMEOUT?
5341  027324  001000                            .WORD   BIT09
5342  027326  001410                            BEQ     5$              ;NO--FORM INDEX OF 0
5343  027330  122760  000150  177762           CMPB    #150,-16(R0)    ;YES--I/O?
5344  027336  003001                            BGT     2$              ;NO--BRANCH
5345  027340  005201                    1$:     INC     R1              ;INDEX=10---ERROR=45 OR 46
5346  027342  005201                    2$:     INC     R1              ;INDEX=6---ERROR=44
5347  027344  005201                    3$:     INC     R1              ;INDEX=4---ERROR=43
5348  027346  005201                    4$:     INC     R1              ;INDEX=2---ERROR=42
5349  027350  006301                    5$:     ASL     R1              ;INDEX=0---ERROR=41
5350  027352  010166  000006                   MOV     R1,6(SP)        ;RETURN INDEX TO USER
5351  027356  012601                            MOV     (SP)+,R1        ;RESTORE R1
5352  027360  012600                            MOV     (SP)+,R0        ;RESTORE R0
5353  027362  000207                            RTS     PC              ;RETURN FROM CALL
5354
5355                                    ;THIS ROUTINE WILL PROVIDE A STALL IN MILLISECONDS FOR A SPECIFIC
5356                                    ;AMOUNT OF TIME IF BIT13 OF C.SWR = 0 OR A RANDOM AMOUNT OF TIME
5357                                    ;IF BIT 13 OF C.SWR = 1.
5358                                    ;STALL1 CONTAINS SPECIFIED TIME FOR TESTS 0 - 7, AND STALL2
5359                                    ;CONTAINS THE TIME FOR TESTS 16-21.
5360                                    ;CALL
5361                                    ;       JSR     R0,@#STALL
5362                                    ;       TIME POINTER            ;WHERE TO FIND THE STALL TIME
5363
5364  027364  013046                    STALL:  MOV     @(R0)+,-(SP)    ;PICKUP STALL TIME
5365  027366  032737  020000  001220            BIT     #SW13,@#C.SWR   ;USE A RANDOM TIME?
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5366  027374  001406                    BEQ     1$              ;NO--BRANCH
5367  027376  004737  024510            JSR     PC,@#$RAND      ;YES--FORM RANDOM NUMBER
5368  027402  013716  024610            MOV     @#$LONUM,(SP)   ;AND USE IT FOR THE STALL TIME
5369  027406  042716  177700            BIC     #^C77,(SP)      ;BUT NEVER > 64 MILLISECONDS
5370  027412  005046              1$:     CLR     -(SP)           ;CLEAR TEMP. LOCATION
5371  027414  162766  000001  000002    2$:     SUB     #1,2(SP)        ;MORE STALL REQUIRED?
5372  027422  103407                    BLO     4$              ;NO--BRANCH
5373  027424  012716  000144            MOV     #100.,(SP)      ;STALL FOR ABOUT 1 MILLISECOND
5374  027430  005700              3$:     TST     R0              ;NOP TO KILL TIME
5375  027432  005366  000000            DEC     0(SP)           ;COUNT
5376  027436  001374                    BNE     3$              ;LOOP IF MORE COUNTS NEEDED
5377  027440  000765                    BR      2$
5378  027442  022626              4$:     CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
5379  027444  000200                    RTS     R0              ;EXIT
5380
5381
5382                                  ;ROUTINE TO PROVIDE A 2 MS STALL AFTER A SEEK OPERATION IN THE SEEK TIMING
5383                                  ;TESTS.  THIS STALL IS REQUIRED TO COMPENSATE FOR THE 'ACCESS READY' DELAY
5384                                  ;IN THE RM03.  THIS STALL TIME IS NOT INCLUDED IN THE CALCULATED SEEK TIMES.
5385                                  ;CALL
5386                                  ;       JSR     PC,@#TWOMS
5387                                  ;       RETURN
5388
5389  027446  013746  177776          TWOMS:  MOV     @#PS,-(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
5390  027452  012737  000240  177776          MOV     #<5*32.>,@#PS   ;SET THE PROCESSOR PRIORITY TO 5
5391  027460  017746  151710                  MOV     @PKV,-(SP)      ;SAVE THE OLD CLOCK VECTOR ADDRESS
5392  027464  012777  027510  151702          MOV     #1$,@PKV        ;SETUP NEW VECTOR ADDRESS
5393  027472  012777  000310  151702          MOV     #200.,@PKB      ;LOAD THE CLOCK BUFFER
5394  027500  012777  000101  151672          MOV     #101,@PKCS      ;START THE CLOCK
5395  027506  000001                          WAIT                    ;WAIT FOR 2 MS
5396  027510  062706  000004          1$:     ADD     #4,SP           ;INCREMENT STACK FOR RETURN
5397  027514  012677  151654                  MOV     (SP)+,@PKV      ;RESTORE OLD CLOCK VECTOR
5398  027520  012637  177776                  MOV     (SP)+,@#PS      ;RESTORE THE OLD PROCESSOR STATUS
5399  027524  000207                          RTS     PC              ;RETURN
5400
5401                                  ;ROUTINE TO SOFTWARE COMPARE HEADER ON IMPLIED SEEKS
5402                                  ;CALL
5403                                  ;       JSR     R0,@#VERIFY
5404                                  ;       ADR POINTER             ;ADDRESS OF DPB+10 (SECTOR NUMBER)
5405                                  ;       RETURN
5406
5407  027526  010146          VERIFY: MOV     R1,-(SP)        ;SAVE R1
5408  027530  012001                  MOV     (R0)+,R1        ;GET ADDRESS OF DPB+10
5409  027532  042737  150000  050514  BIC     #150000,@#BUFFER ;STRIP FORMAT AND BAD SECTOR BITS FROM CYLINDER NUMBER
5410  027540  023761  050514  000002  CMP     @#BUFFER,2(R1)  ;CYLINDER NUMBER OK?
5411  027546  001003                  BNE     1$              ;NO--BRANCH
5412  027550  023711  050516          CMP     @#BUFFER+2,(R1) ;YES--HOW ABOUT TRACK/SECTOR?
5413  027554  001441                  BEQ     3$              ;BRANCH IF GOOD
5414  027556  013737  050514  001262  1$:     MOV     @#BUFFER,@#CYL.RD ;SAVE THE EXPECTED AND THE
5415  027564  113737  050517  001264          MOVB    @#BUFFER+3,@#TRK.RD ;RECIEVED CYLINDER, TRACK,
5416  027572  113737  050516  001266          MOVB    @#BUFFER+2,@#SEC.RD ;AND SECTOR
5417  027600  112137  001272                  MOVB    (R1)+,@#SEC.DS
5418  027604  112137  001274                  MOVB    (R1)+,@#TRK.DS
5419  027610  011137  001270                  MOV     (R1),@#CYL.DS
5420  027614  012737  027626  001206          MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
5421  027622  005740                  TST     -(R0)           ;MAKE IT TEST PC+4
```

```
5422  027624  104012                    ERROR   12              ;REPORT THE ERROR
5423  027626  012737  000107  004106  2$:       MOV     #RECAL,DPB.A+2  ;LOAD RECALIBRATE ORDER CODE
5424  027634  004037  026032                    JSR     R0,@#CALL.A     ;GO EXECUTE THE COMMAND
5425  027640  005037  001206                    CLR     $ESCAPE         ;CLEAR ERROR ESCAPE FLAG
5426  027644  032777  001000  151266            BIT     #SW9,@SWR       ;LOOP ON ERROR ?
5427  027652  001404                            BEQ     4$              ;BR IF NOT
5428  027654  000177  151230                    JMP     @$LPERR         ;RETURN TO ERROR LOOP ADDRESS
5429  027660  062700  000002            3$:     ADD     #2,R0           ;INCREMENT RETURN ADDRESS
5430  027664  012601                    4$:     MOV     (SP)+,R1        ;RESTORE R1
5431  027666  000200                            RTS     R0              ;EXIT
5432
5433                                    ;THIS ROUTINE WILL PERFORM A "MASSBUS" INIT. FOLLOWED BY
5434                                    ;A "RECALIBRATE" ON THE DRIVE UNDER TEST.
5435                                    ;NOTE: THIS ROUTINE DESTROYS R1 AND R4
5436                                    ;CALL
5437                                    ;       JSR     R0,SRCH00       ;DO A MASSBUS INIT. AND RECAL
5438                                    ;       RETURN1                 ;RETURN HERE IF NO ERROR
5439                                    ;       RETURN2                 ;RETURN HERE ON ERROR
5440
5441  027670  005001                    SRCH00: CLR     R1              ;INCASE OF ERROR (TYPTIM)
5442  027672  005037  177776                    CLR     @#PS
5443  027676  012777  040320  005612            MOV     #ISR,@RMVEC     ;SETUP INTERRUPT VECTOR
5444  027704  013704  035514                    MOV     @#RMADR,R4      ;PICKUP ADDRESS OF RMCS1
5445  027710  012764  000040  000010            MOV     #BIT05,RMCS2(R4) ;MASSBUS INIT.
5446  027716  005037  004174                    CLR     @#DTADPB+10     ;TRACK=0; SECTOR=0
5447  027722  005037  004176                    CLR     @#DTADPB+12     ;CYLINDER =0
5448  027726  012737  000107  004166            MOV     #RECAL,@#DTADPB+2 ;COMMAND = RECALIBRATE
5449  027734  005037  001206                    CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
5450  027740  004037  036236                    JSR     R0,@#RM03       ;CALL THE DRIVER
5451  027744  004164                            DTADPB                  ;DPB POINTER
5452  027746  000440                            BR      4$              ;QUEUE IS FULL
5453  027750  005737  004202            1$:     TST     DTADPB+16       ;WAIT ON DONE
5454  027754  001775                            BEQ     1$
5455  027756  100030                            BPL     3$              ;TAKE NORMAL EXIT IF NO ERROR
5456  027760  012737  030034  001206            MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
5457  027766  013737  004176  001270            MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER
5458  027774  113737  004175  001274            MOVB    @#DTADPB+11,@#TRK.DS ;TRACK
5459  030002  113737  004174  001272            MOVB    @#DTADPB+10,@#SEC.DS ;SECTOR
5460  030010  012746  004202                    MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
5461  030014  004737  027246                    JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
5462  030020  062607                            ADD     (SP)+,PC        ;REPORT PROPER ERROR
5463  030022  104041                            ERROR   41              ;
5464  030024  104042                            ERROR   42              ;PARITY ERROR
5465  030026  104043                            ERROR   43              ;UNSAFE ERROR
5466  030030  104044                            ERROR   44              ;NON-I/O ERROR
5467  030032  104045                            ERROR   45              ;I/O ERROR
5468  030034  005720                    2$:     TST     (R0)+           ;ADJUST FOR ERROR EXIT
5469  030036  000404                            BR      4$              ;GO TO THE EXIT
5470  030040  005064  000006            3$:     CLR     RMDA(R4)        ;TRACK AND SECTOR = 0
5471  030044  005064  000034                    CLR     RMDC(R4)        ;CYLINDER = 0
5472  030050  000200                    4$:     RTS     R0              ;RETURN
5473
5474                                    ;THIS IS AN RTI WHICH IS USED BY THE TIMING TESTS & THE SERVO SETTLE DOWN TEST
5475
5476  030052  000002                    DORTI:  RTI                     ;RETURN FROM INTERRUPT
5477
```

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                                        ;THIS ROUTINE WILL INITIALIZE THE TIMERS USED BY THE "TIMING ROUTI ES
                                        ;CALL
                                        ;       JSR     PC,@#STRTMR
                                        ;       RETURN

030054  104412                  STRTMR: SAVREG                  ;SAVE R0-R5
030056  012700  001276                  MOV     #TIM.UP,R0      ;START AT TIM.UP (MINIMUM)
030062  012701  001332                  MOV     #TIM.PT,R1      ;STOP AT TIM.PT
030066  005020                  1$:     CLR     (R0)+           ;CLEAR
030070  020001                          CMP     R0,R1           ;DONE?
030072  103775                          BLO     1$              ;NO--BRANCH
030074  012710  050514                  MOV     #BUFFER,(R0)    ;SETUP POINTER
030100  012737  077777  001276          MOV     #^CBIT15,@#TIM.UP ;SET MINIMUM TIME TO MAXIMUM
030106  012737  077777  001314          MOV     #^CBIT15,@#TIM.DN ;POSITIVE NUMBER
030114  104413                          RESREG                  ;RESTORE R0-R5
030116  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

030120  012702  001276          COUNT:  MOV     #TIM.UP,R2      ;PICKUP THE "UP" POINTER
030124  005705                          TST     R5              ;USE IT?
030126  001402                          BEQ     1$              ;YES--BRANCH
030130  012702  001314                  MOV     #TIM.DN,R2      ;NO--PICKUP "DOWN" POINTER
030134  027722  151244          1$:     CMP     @PKC,(R2)+      ;LESS THAN PREVIOUS LOW?
030140  002003                          BGE     2$              ;NO--BRANCH
030142  017762  151236  177776          MOV     @PKC,-2(R2)     ;YES--SAVE IT
030150  027763  151230  000004  2$:     CMP     @PKC,4(R3)      ;LESS THAN THE LOW LIMIT?
030156  002001                          BGE     3$              ;NO--BRANCH
030160  005212                          INC     (R2)            ;YES--COUNT IT
030162  005722                  3$:     TST     (R2)+           ;ADVANCE THE POINTER
030164  027722  151214                  CMP     @PKC,(R2)+      ;GREATER THAN PREVIOUS HIGH?
030170  003403                          BLE     4$              ;NO--BRANCH
030172  017762  151206  177776          MOV     @PKC,-2(R2)     ;YES--SAVE IT
030200  027763  151200  000006  4$:     CMP     @PKC,6(R3)      ;GREATER THAN THE HIGH LIMIT?
030206  003401                          BLE     5$              ;NO--BRANCH
030210  005212                          INC     (R2)            ;YES--COUNT IT
030212  005722                  5$:     TST     (R2)+           ;ADVANCE THE POINTER
030214  067722  151164                  ADD     @PKC,(R2)+      ;ADD THIS COUNT TO THE TOTAL
030220  005522                          ADC     (R2)+
030222  005212                          INC     (R2)            ;COUNT THIS READING
030224  022737  057004  001332          CMP     #BUFFER+<4*814.>,@#TIM.PT ;SAVE THIS COUNT?
030232  101406                          BLOS    6$              ;NO--BRANCH
030234  017777  151144  151070          MOV     @PKC,@TIM.PT    ;YES--WELL SAVE IT THEN
030242  062737  000002  001332          ADD     #2,@#TIM.PT     ;ADVANCE THE POINTER
030250  000207                  6$:     RTS     PC              ;RETURN

                                        ;THIS ROUTINE IS USED TO TYPE THE MINIMUM,
                                        ;MAXIMUM, AND AVERAGE TIMES FOR THE TIMING TESTS
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                                        ;IT WILL ALSO CHECK THE TIMES TO ENSURE
                                        ;THEY ARE WITHIN TOLERANCE AND IF NOT FLAG THE BAD TIMES.
                                        ;NOTE: THIS ROUTINE DESTROYS R2-R5
                                        ;CALL
                                        ;       JSR     R0,@#TYPTIM     ;GO REPORT THE TIMES
                                        ;       TABLE                   ;POINT TO THE PROPER TABLE
                                        ;       RETURN
                                        ;
                                        ;TABLE:MSGADR1                  ;ADDRESS OF ASCIZ MESSAGE NUMBER 1
                                        ;       MSGADR2                 ;ADDRESS OF ASCIZ MESSAGE NUMBER 2
                                        ;       MIN.ALLOWED             ;MINIMUM TIME ALLOWED
                                        ;       MAX.ALLOWED             ;MAXIMUM TIME ALLOWED

030252  012002                  TYPTIM: MOV     (R0)+,R2        ;PICKUP THE TABLE POINTER
030254  032777  000100  150656          BIT     #SW06,@SWR      ;INHIBIT TIME REPORTS?
030262  001145                          BNE     7$              ;YES--BRANCH
030264  012237  030304                  MOV     (R2)+,2$        ;ADDRESS OF MESSAGE NUMBER 1
030270  012205                          MOV     (R2)+,R5        ;ADDRESS OF MESSAGE NUMBER 2
030272  012203                          MOV     (R2)+,R3        ;PICKUP THE LOW LIMIT
030274  011202                          MOV     (R2),R2         ;AND THE HIGH LIMIT
030276  012704  001276                  MOV     #TIM.UP,R4      ;PARAMETER POINTER
030302  104401                  1$:     TYPE                    ;TYPE THE MESSAGE
030304  000000                  2$:     .WORD   0               ;ASCIZ MESSAGE POINTER GOES HERE
030306  005764  000014                  TST     14(R4)          ;DID ANY COUNTS OCCUR?
030312  001527                          BEQ     6$              ;NO--BRANCH
030314  104401  044517                  TYPE    ,MSGMIN         ;"MIN="
030320  012446                          MOV     (R4)+,-(SP)             ;PUT (R4)+ ON THE STACK
030322  004737  024220                  JSR     PC,@#$SB2D      ;CHANGE (R4)+ TO DECIMAL ASCIZ
030326  004737  024450                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
030332  104401  044544                  TYPE    ,MSGOUS         ;"0 US"
030336  005724                          TST     (R4)+           ;ANY SEEKS BELOW THE LOW LIMIT
030340  001421                          BEQ     3$              ;NO--BRANCH
030342  104401  044657                  TYPE    ,MSG.SP         ;"  "
030346  016446  177776                  MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
030352  004737  024220                  JSR     PC,@#$SB2D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
030356  004737  024450                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
030362  104401  044551                  TYPE    ,MBELOW         ;"BELOW THE MINIMUM OF"
030366  010346                          MOV     R3,-(SP)                ;PUT R3 ON THE STACK
030370  004737  024220                  JSR     PC,@#$SB2D      ;CHANGE R3 TO DECIMAL ASCIZ
030374  004737  024450                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
030400  104401  044544                  TYPE    ,MSGOUS
030404  104401  044526          3$:     TYPE    ,MSGMAX         ;"MAX="
030410  012446                          MOV     (R4)+,-(SP)             ;PUT (R4)+ ON THE STACK
030412  004737  024220                  JSR     PC,@#$SB2D      ;CHANGE (R4)+ TO DECIMAL ASCIZ
030416  004737  024450                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
030422  104401  044544                  TYPE    ,MSGOUS
030426  005724                          TST     (R4)+           ;ANY SEEKS ABOVE THE HIGH LIMIT
030430  000421                          BR      4$              ;NO--BRANCH
030432  104401  044657                  TYPE    ,MSG.SP         ;YES--REPORT HOW MANY
030436  016446  177776                  MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
030442  004737  024220                  JSR     PC,@#$SB2D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
030446  004737  024450                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
030452  104401  044600                  TYPE    ,MABOVE         ;"ABOVE THE MAXIMUM OF"
030456  010246                          MOV     R2,-(SP)                ;PUT R2 ON THE STACK
030460  004737  024220                  JSR     PC,@#$SB2D      ;CHANGE R2 TO DECIMAL ASCIZ
030464  004737  024450                  JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
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5590  030470  104401  044544            TYPE    ,MSGOUS
5591  030474  104401  044535    4$:     TYPE    ,MSGAVG         ;"AVG="
5592  030500  012446                    MOV     (R4)+,-(SP)     ;FORM THE AVERAGE
5593  030502  012446                    MOV     (R4)+,-(SP)
5594  030504  012446                    MOV     (R4)+,-(SP)
5595  030506  004737  024612            JSR     PC,@#$DIV
5596  030512  006126                    ROL     (SP)+           ;IS THE REMAINDER OVER HALF?
5597  030514  100001                    BPL     5$              ;NO--BRANCH
5598  030516  005216                    INC     (SP)            ;YES--ROUND UP
5599  030520                    5$:
5600  030520  004737  024220            JSR     PC,@#$SB2D      ;CHANGE  TO DECIMAL ASCIZ
5601  030524  004737  024450            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
5602  030530  104401  044544            TYPE    ,MSGOUS
5603  030534  104401  044657            TYPE    ,MSG.SP
5604  030540  016446  177776            MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
5605  030544  004737  024220            JSR     PC,@#$SB2D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
5606  030550  004737  024450            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
5607  030554  104401  044627            TYPE    ,MSGNUM         ;"SEEKS TIMED"
5608  030560  010537  030304            MOV     R5,2$           ;NEXT MESSAGE POINTER
5609  030564  001404                    BEQ     7$              ;IF NONE EXIT
5610  030566  005005                    CLR     R5              ;NO MORE THAN 2
5611  030570  000644                    BR      1$
5612  030572  104401  044644    6$:     TYPE    ,MSGNON
5613  030576  000200            7$:     RTS     R0              ;EXIT
5614
5615                            ;THIS SUBROUTINE WILL INCREMENT THE TRACK
5616                            ;NUMBER (R2) BY THE AMOUNT SPECIFIED BY 'IT'.
5617                            ;CALL
5618                            ;       JSR     R0,@#INCTRK
5619                            ;       RETURN1                 ;TRACK NUMBER GREATER THAN LT15
5620                            ;       RETURN2                 ;TRACK NUMBER INCREMENTED
5621
5622  030600  020237  001520    INCTRK: CMP     R2,@#LT         ;LAST TRACK COMPLETED?
5623  030604  001410                    BEQ     2$              ;YES--EXIT
5624  030606  063702  001522            ADD     @#IT,R2         ;NO--UPDATE TRACK
5625  030612  020237  001520            CMP     R2,@#LT         ;TRACK TO BIG?
5626  030616  003402                    BLE     1$              ;NO--EXIT
5627  030620  013702  001520            MOV     @#LT,R2         ;YES--SET TRACK TO LAST TRACK
5628  030624  005720            1$:     TST     (R0)+           ;ADJUST FOR RETURN 2
5629  030626  000200            2$:     RTS     R0              ;RETURN
5630
5631
5632                            ;THIS SUBROUTINE WILL INCREMENT THE CYLINDER
5633                            ;NUMBER (R1) BY THE AMOUNT SPECIFIED BY 'IC'.
5634                            ;CALL
5635                            ;       JSR     R0,@#INCCYL
5636                            ;       RETURN1                 ;CYLINDER NUMBER GREATER THAN LC15
5637                            ;       RETURN2                 ;CYLINDER NUMBER INCREMENTED
5638
5639  030630  020137  001512    INCCYL: CMP     R1,@#LC         ;LAST CYLINDER COMPLETED?
5640  030634  001410                    BEQ     2$              ;YES--EXIT
5641  030636  063701  001514            ADD     @#IC,R1         ;NO--UPDATE CYLINDER
5642  030642  020137  001512            CMP     R1,@#LC         ;CYLINDER TO BIG?
5643  030646  003402                    BLE     1$              ;NO--EXIT
5644  030650  013701  001512            MOV     @#LC,R1         ;YES--SET CYLINDER TO LAST CYLINDER
5645  030654  005720            1$:     TST     (R0)+           ;ADJUST FOR RETURN 2
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5646  030656  000200                  2$:     RTS     R0              ;RETURN
5647
5648                                  ;THIS ROUTINE DECREMENTS THE SECTOR ADDRESS.
5649                                  ;CALL
5650                                  ;       CLR     -(SP)           ;CLEAR THE STACK
5651                                  ;       JSR     PC,DECSEC       ;SUBROUTINE ENTRY
5652                                  ;       RETURN
5653
5654  030660  113766  004212  000002 DECSEC: MOVB    RM.REG+RMDA,2(SP)  ;PUT THE SECTOR ADDRESS ON THE STACK
5655  030666  005366  000002                DEC     2(SP)           ;DECREMENT THE ADDRESS
5656  030672  100003                        BPL     1$              ;BR IF NOT CORRECTION NEEDED
5657  030674  013766  001634  000002        MOV     PRMLMT+22.,2(SP)  ;OVERFLOW OCCURED, FORCE TO MAXIMUM ADDRESS
5658  030702  000207                  1$:     RTS     PC              ;RETURN
5659
5660                                  ;THIS SUBROUTINE IS USED TO FILL THE DATA BUFFER
5661                                  ;WITH ADDRESSES FROM 0 TO 21 WITH EACH ADDRESS
5662                                  ;BEING STORED IN 256 CONSECUTIVE LOCATIONS
5663                                  ;CALL
5664                                  ;       JSR     PC,@#FILBUF
5665                                  ;       RETURN
5666
5667  030704  104412                  FILBUF: SAVREG                  ;SAVE R0 - R5
5668  030706  005000                          CLR     R0              ;FIRST DISK ADDRESS
5669  030710  012701  050514                  MOV     #BUFFER,R1      ;START FILLING HERE
5670  030714  012702  000400          1$:     MOV     #256.,R2        ;DO 256 WORDS
5671  030720  010021                  2$:     MOV     R0,(R1)+        ;STORE
5672  030722  005302                          DEC     R2              ;MORE?
5673  030724  003375                          BGT     2$              ;YES--BRANCH
5674  030726  005200                          INC     R0              ;NO--UPDATE DISK ADDRESS
5675  030730  023700  001630                  CMP     PRMLMT+22,R0    ;DONE?
5676  030734  103367                          BHIS    1$              ;NO--BRANCH
5677  030736  104413                          RESREG                  ;RESTORE R0 - R5
5678  030740  000207                          RTS     PC              ;RETURN
5679
5680                                  ;THIS ROUTINE WILL CLEAR THE BUFFER BY
5681                                  ;SETTING EACH WORD TO "177400".
5682                                  ;CALL
5683                                  ;       JSR     R0,@#CLRBUF
5684                                  ;       RETURN
5685
5686  030742  104412                  CLRBUF: SAVREG                  ;SAVE R0 - R5
5687  030744  012701  177400                  MOV     #177400,R1      ;WORD TO FILL BUFFER WITH
5688  030750  012702  050514                  MOV     #BUFFER,R2      ;FIRST ADDRESS OF BUFFER
5689  030754  012703  076514                  MOV     #BUFFER+<512.*22.>,R3 ;LAST ADDRESS+2 OF BUFFER
5690  030760  010122          1$:     MOV     R1,(R2)+        ;FILL WORDS 1, 9,...249,...5625
5691  030762  010122                          MOV     R1,(R2)+        ;FILL WORDS 2,10,...250,...5626
5692  030764  010122                          MOV     R1,(R2)+        ;FILL WORDS 3,11,...251,...5627
5693  030766  010122                          MOV     R1,(R2)+        ;FILL WORDS 4,12,...252,...5628
5694  030770  010122                          MOV     R1,(R2)+        ;FILL WORDS 5,13,...253,...5629
5695  030772  010122                          MOV     R1,(R2)+        ;FILL WORDS 6,14,...254,...5630
5696  030774  010122                          MOV     R1,(R2)+        ;FILL WORDS 7,15,...255,...5631
5697  030776  010122                          MOV     R1,(R2)+        ;FILL WORDS 8,16,...256,...5632
5698  031000  020203                          CMP     R2,R3           ;DONE?
5699  031002  103766                          BLO     1$              ;NO--BRANCH
5700  031004  104413                          RESREG                  ;RESTORE R0 - R5
5701  031006  000200                          RTS     R0              ;RETURN FROM CALL
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```
                                ;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

031010  104412                  CKSCTR: SAVREG                  ;SAVE R0 - R5
031012  162706  000004                  SUB     #4,SP           ;RESERVE TEMP. STORAGE AREA
031016  005001                          CLR     R1              ;FIRST SECTOR
031020  012716  050514                  MOV     #BUFFER,(SP)    ;FIRST ADDRESS OF DATA BUFFER
031024  005066  000002                  CLR     2(SP)           ;NO ERRORS
031030  012702  000020          1$:     MOV     #16.,R2 ;LOOP COUNT (16*16=256)
031034  011603                          MOV     (SP),R3         ;GET 1ST ADDRESS OF THIS SECTORS DATA
031036                          2$:
031036  020123                          CMP     R1,(R3)+        ;WORD 1
031040  001063                          BNE     7$              ;BRANCH IF BAD
031042  020123                          CMP     R1,(R3)+        ;WORD 2
031044  001061                          BNE     7$              ;BRANCH IF BAD
031046  020123                          CMP     R1,(R3)+        ;WORD 3
031050  001057                          BNE     7$              ;BRANCH IF BAD
031052  020123                          CMP     R1,(R3)+        ;WORD 4
031054  001055                          BNE     7$              ;BRANCH IF BAD
031056  020123                          CMP     R1,(R3)+        ;WORD 5
031060  001053                          BNE     7$              ;BRANCH IF BAD
031062  020123                          CMP     R1,(R3)+        ;WORD 6
031064  001051                          BNE     7$              ;BRANCH IF BAD
031066  020123                          CMP     R1,(R3)+        ;WORD 7
031070  001047                          BNE     7$              ;BRANCH IF BAD
031072  020123                          CMP     R1,(R3)+        ;WORD 8
031074  001045                          BNE     7$              ;BRANCH IF BAD
031076  020123                          CMP     R1,(R3)+        ;WORD 9
031100  001043                          BNE     7$              ;BRANCH IF BAD
031102  020123                          CMP     R1,(R3)+        ;WORD 10
031104  001041                          BNE     7$              ;BRANCH IF BAD
031106  020123                          CMP     R1,(R3)+        ;WORD 11
031110  001037                          BNE     7$              ;BRANCH IF BAD
031112  020123                          CMP     R1,(R3)+        ;WORD 12
031114  001035                          BNE     7$              ;BRANCH IF BAD
031116  020123                          CMP     R1,(R3)+        ;WORD 13
031120  001033                          BNE     7$              ;BRANCH IF BAD
031122  020123                          CMP     R1,(R3)+        ;WORD 14
031124  001031                          BNE     7$              ;BRANCH IF BAD
031126  020123                          CMP     R1,(R3)+        ;WORD 15
031130  001027                          BNE     7$              ;BRANCH IF BAD
031132  020123                          CMP     R1,(R3)+        ;WORD 16
031134  001025                          BNE     7$              ;BRANCH IF BAD
031136  005302                          DEC     R2              ;FINISHED WITH THIS SECTORS DATA?
031140  001336                          BNE     2$              ;NO--BRANCH
031142  062716  001000          3$:     ADD     #512.,(SP)      ;YES--FIRST ADDRESS OF NEXT SECTOR
031146  005201                          INC     R1              ;MOVE TO NEXT SECTOR
031150  023701  001630                  CMP     PRMLMT+22,R1    ;DONE?
031154  103325                          BHIS    1$              ;NO--BRANCH
031156  005766  000002          4$:     TST     2(SP)           ;ERROR OCCUR?
031162  001406                          BEQ     6$              ;NO--BRANCH
```

```
 5758  031164  123737  001364  001103          CMPB    @#ERR.CT,@#SERFLG ;MAX. ERROR OCCURRED?
 5759  031172  101002                          BHI     6$                ;NO--BRANCH
 5760  031174  013700  001252            5$:   MOV     @#BYPASS,R0       ;TAKE ERROR EXIT
 5761  031200  062706  000004            6$:   ADD     #4,SP             ;FREE TEMP. AREA
 5762  031204  104413                          RESREG                    ;RESTORE R0 - R5
 5763  031206  000200                          RTS     R0                ;RETURN FROM CALL
 5764  031210  010304                    7$:   MOV     R3,R4             ;FORM WORD NUMBER AND
 5765  031212  161604                          SUB     (SP),R4           ;ADDRESS TO CONTINUE FROM
 5766  031214  010405                          MOV     R4,R5
 5767  031216  006204                          ASR     R4                ;WORD NUMBER
 5768  031220  042705  177740                  BIC     #^C37,R5
 5769  031224  001002                          BNE     8$                ;BRANCH IF NOT A MULTIPLE OF 16
 5770  031226  012705  000040                  MOV     #40,R5            ;SET TO WORD 16
 5771  031232  006305                    8$:   ASL     R5
 5772  031234  062705  031036                  ADD     #2$,R5            ;ADDRESS
 5773  031240  016337  177776  001126          MOV     -2(R3),@#$BDDAT   ;SAVE BAD DATA
 5774  031246  005766  000002                  TST     2(SP)             ;FIRST ERROR?
 5775  031252  001015                          BNE     10$               ;NO--BRANCH
 5776  031254  013737  004176  001270          MOV     @#DTADPB+12,@#CYL.DS ;CYLINDER NUMBER
 5777  031262  113737  004175  001274          MOVB    @#DTADPB+11,@#TRK.DS ;TRACK NUMBER
 5778  031270  012737  031300  001206          MOV     #9$,$ESCAPE       ;;ESCAPE TO 9$ ON ERROR
 5779  031276  104021                          ERROR   21                ;REPORT THE ERROR
 5780  031300  105166  000002            9$:   COMB    2(SP)             ;SET ERROR SWITCH
 5781  031304  000404                          BR      11$
 5782  031306                           10$:
 5783  031306  012737  031316  001206          MOV     #11$,$ESCAPE      ;;ESCAPE TO 11$ ON ERROR
 5784  031314  104022                          ERROR   22                ;REPORT THE ERROR
 5785  031316  032777  001000  147614    11$:  BIT     #SWD9,@SWR        ;LOOP ON ERROR?
 5786  031324  001323                          BNE     5$                ;YES
 5787  031326  032777  000002  147604          BIT     #SWD1,@SWR        ;STOP DATA COMPARE?
 5788  031334  001310                          BNE     4$                ;YES--BRANCH
 5789  031336  123737  001364  001103          CMPB    @#ERR.CT,@#SERFLG ;MAX. ERRORS?
 5790  031344  101713                          BLOS    5$                ;YES--BRANCH
 5791  031346  032777  000040  147564          BIT     #SWD5,@SWR        ;REPORT ONLY 1ST ERROR PER SECTOR?
 5792  031354  001272                          BNE     3$                ;YES--BRANCH
 5793  031356  000115                          JMP     (R5)
 5794
 5795                                  ;THIS ROUTINE WILL MOVE THE 16 WORDS OF THE
 5796                                  ;DESIRED PATTERN INTO THE DATA BUFFER.
 5797                                  ;CALL
 5798                                  ;       MOV     #NX,R0            ;PATTERN NUMBER INDEX TO R0
 5799                                  ;       JSR     PC,@#SETBUF
 5800
 5801  031360  104412                  SETBUF: SAVREG                    ;SAVE R0 - R5
 5802  031362  012701  050514                  MOV     #BUFFER,R1        ;FIRST ADDRESS
 5803  031366  013702  004170                  MOV     @#DTADPB+4,R2     ;WORD COUNT
 5804  031372  016003  003044            1$:   MOV     PAT.PT(R0),R3     ;PICKUP PATTERN POINTER
 5805  031376  012321                          MOV     (R3)+,(R1)+       ;MOVE WORD 1 INTO DATA BUFFER
 5806  031400  012321                          MOV     (R3)+,(R1)+       ;MOVE WORD 2 INTO DATA BUFFER
 5807  031402  012321                          MOV     (R3)+,(R1)+       ;MOVE WORD 3 INTO DATA BUFFER
 5808  031404  012321                          MOV     (R3)+,(R1)+       ;MOVE WORD 4 INTO DATA BUFFER
 5809  031406  012321                          MOV     (R3)+,(R1)+       ;MOVE WORD 5 INTO DATA BUFFER
 5810  031410  012321                          MOV     (R3)+,(R1)+       ;MOVE WORD 6 INTO DATA BUFFER
 5811  031412  012321                          MOV     (R3)+,(R1)+       ;MOVE WORD 7 INTO DATA BUFFER
 5812  031414  012321                          MOV     (R3)+,(R1)+       ;MOVE WORD 8 INTO DATA BUFFER
 5813  031416  012321                          MOV     (R3)+,(R1)+       ;MOVE WORD 9 INTO DATA BUFFER
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 5814  031420  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 10 INTO DATA BUFFER
 5815  031422  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 11 INTO DATA BUFFER
 5816  031424  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 12 INTO DATA BUFFER
 5817  031426  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 13 INTO DATA BUFFER
 5818  031430  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 14 INTO DATA BUFFER
 5819  031432  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 15 INTO DATA BUFFER
 5820  031434  012321                    MOV     (R3)+,(R1)+     ;MOVE WORD 16 INTO DATA BUFFER
 5821  031436  062702  000020            ADD     #16.,R2 ;DONE?
 5822  031442  001353                    BNE     1$              ;NO--BRANCH
 5823  031444  104413                    RESREG                  ;RESTORE R0 - R5
 5824  031446  000207                    RTS     PC              ;RETURN
 5825
 5826                                    ;THIS ROUTINE COMPARES A 16 WORD DATA PATTERN
 5827                                    ;AGAINST THE DATA BUFFER
 5828                                    ;CALL
 5829                                    ;       MOV     #NX,R0          ;PATTERN NUMBER INDEX TO R0
 5830                                    ;       JSR     PC,@#DATCMP
 5831                                    ;       RETURN
 5832
 5833  031450  104412                    DATCMP: SAVREG                  ;SAVE R0 - R5
 5834  031452  012701  050514                    MOV     #BUFFER,R1      ;FIRST ADDRESS OF BUFFER
 5835  031456  013702  004170                    MOV     @#DTADPB+4,R2   ;WORD COUNT
 5836  031462  005046                            CLR     -(SP)           ;NO ERROR
 5837  031464  016003  003044            1$:     MOV     PAT.PT(R0),R3   ;PATTERN POINTER
 5838  031470                            2$:
 5839  031470  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 1
 5840  031472  001044                            BNE     4$              ;BRANCH IF DIFFERENT
 5841  031474  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 2
 5842  031476  001042                            BNE     4$              ;BRANCH IF DIFFERENT
 5843  031500  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 3
 5844  031502  001040                            BNE     4$              ;BRANCH IF DIFFERENT
 5845  031504  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 4
 5846  031506  001036                            BNE     4$              ;BRANCH IF DIFFERENT
 5847  031510  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 5
 5848  031512  001034                            BNE     4$              ;BRANCH IF DIFFERENT
 5849  031514  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 6
 5850  031516  001032                            BNE     4$              ;BRANCH IF DIFFERENT
 5851  031520  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 7
 5852  031522  001030                            BNE     4$              ;BRANCH IF DIFFERENT
 5853  031524  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 8
 5854  031526  001026                            BNE     4$              ;BRANCH IF DIFFERENT
 5855  031530  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 9
 5856  031532  001024                            BNE     4$              ;BRANCH IF DIFFERENT
 5857  031534  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 10
 5858  031536  001022                            BNE     4$              ;BRANCH IF DIFFERENT
 5859  031540  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 11
 5860  031542  001020                            BNE     4$              ;BRANCH IF DIFFERENT
 5861  031544  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 12
 5862  031546  001016                            BNE     4$              ;BRANCH IF DIFFERENT
 5863  031550  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 13
 5864  031552  001014                            BNE     4$              ;BRANCH IF DIFFERENT
 5865  031554  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 14
 5866  031556  001012                            BNE     4$              ;BRANCH IF DIFFERENT
 5867  031560  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 15
 5868  031562  001010                            BNE     4$              ;BRANCH IF DIFFERENT
 5869  031564  162321                            SUB     (R3)+,(R1)+     ;CHECK WORD 16
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5870  031566  001006                        BNE     4$                      ;BRANCH IF DIFFERENT
5871  031570  062702  000020                ADD     #16.,R2                 ;DONE ?
5872  031574  001333                        BNE     1$                      ;NO--BRANCH
5873  031576  005726                3$:     TST     (SP)+                   ;YES -- CLEAN UP STACK
5874  031600  104413                        RESREG                          ;RESTORE R0 - R5
5875  031602  000207                        RTS     PC
5876  031604  010104                4$:     MOV     R1,R4                   ;FORM THE WORD NUMBER
5877  031606  162704  050514                SUB     #BUFFER,R4
5878  031612  006204                        ASR     R4                      ;WORD NUMBER
5879  031614  010305                        MOV     R3,R5                   ;FORM ADDRESS TO CONTINUE FROM
5880  031616  166005  003044                SUB     PAT.PT(R0),R5
5881  031622  006305                        ASL     R5
5882  031624  062705  031470                ADD     #2$,R5                  ;ADDRESS
5883  031630  064341                        ADD     -(R3),-(R1)             ;RECONSTRUCT THE BAD WORD
5884  031632  010137  001122                MOV     R1,@#$BDADR             ;SAVE THE ERROR INFORMATION
5885  031636  010337  001120                MOV     R3,@#$GDADR             ;
5886  031642  012137  001126                MOV     (R1)+,@#$BDDAT          ;
5887  031646  012337  001124                MOV     (R3)+,@#$GDDAT          ;
5888  031652  005716                        TST     (SP)                    ;1ST DATA COMPARE ERROR?
5889  031654  001023                        BNE     6$                      ;NO--BRANCH
5890  031656  013737  004176  001270        MOV     @#DTADPB+12,@#CYL.DS    ;CYLINDER
5891  031664  113737  004175  001274        MOVB    @#DTADPB+11,@#TRK.DS    ;TRACK
5892  031672  113737  004174  001272        MOVB    @#DTADPB+10,@#SEC.DS    ;SECTOR
5893  031700  016600  000016                MOV     16(SP),R0               ;GET TEST PC+4
5894  031704  012737  031714  001206        MOV     #5$,$ESCAPE             ;;ESCAPE TO 5$ ON ERROR
5895  031712  104013                        ERROR   13                      ;REPORT THE ERROR
5896  031714  016600  000014        5$:     MOV     14(SP),R0               ;PATTERN NUMBER INDEX
5897  031720  105116                        COMB    (SP)                    ;SET THE ERROR SWITCH
5898  031722  000404                        BR      7$
5899  031724                        6$:
5900  031724  012737  031734  001206        MOV     #7$,$ESCAPE             ;;ESCAPE TO 7$ ON ERROR
5901  031732  104014                        ERROR   14                      ;REPORT THE ERROR
5902  031734  032777  000002  147176  7$:   BIT     #SW01,@SWR              ;STOP DATA COMPARE?
5903  031742  001315                        BNE     3$                      ;YES--EXIT
5904  031744  123737  001364  001103        CMPB    @#ERR.CT,@#$ERFLG       ;MAX. ERRORS?
5905  031752  101004                        BHI     8$                      ;NO--BRANCH
5906  031754  013766  001252  000016        MOV     @#BYPASS,16(SP)         ;YES--ERROR EXIT
5907  031762  000705                        BR      3$
5908  031764  000115                8$:     JMP     (R5)                    ;NO--CONTINUE AT NEXT WORD
5909
5910                                        ;THIS ROUTINE WILL FILL THE DATA BUFFER (256*22 WORDS) WITH
5911                                        ;A RANDOM PATTERN.  THE FIRST TWO WORDS OF EVERY 256 WILL
5912                                        ;BE THE BASE OF THE RANDOM NUMBER GENERATOR FOR THE
5913                                        ;NEXT 254 WORDS.
5914                                        ;NOTE: THIS ROUTINE DESTROYS R1 AND R2
5915                                        ;CALL
5916                                        ;       JSR     R0,@#FILRAN
5917                                        ;       RETURN
5918
5919  031766  012701  050514        FILRAN: MOV     #BUFFER,R1
5920  031772  013702  001630                MOV     PRMLMT+22,R2            ;MAXIMUM NUMBER OF SECTORS
5921  031776  004037  032206        1$:     JSR     R0,@#RANPAT
5922  032002  005302                        DEC     R2
5923  032004  100374                        BPL     1$
5924  032006  000200                        RTS     R0
5925
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5926                                    ;THIS ROUTINE USES THE FIRST TWO WORDS OF THE
5927                                    ;READ BUFFER TO GENERATED A RANDOM PATTERN.  THEN
5928                                    ;THE READ BUFFER IS COMPARED TO THE PATTERN GENERATED.
5929                                    ;NOTE: THIS ROUTINE DESTROYS R1-R4
5930                                    ;CALL
5931                                    ;       JSR     R0,@#RANCK
5932                                    ;       RETURN
5933
5934  032010  013746  024606           RANCK:  MOV     @#$HINUM,-(SP)  ;SAVE THE PRESENT RANDOM NUMBER
5935  032014  013746  024610                   MOV     @#$LONUM,-(SP)
5936  032020  012702  051514                   MOV     #BUFFER+512.,R2 ;READ BUFFER ADDRESS
5937  032024  012701  052514                   MOV     #BUFFER+1024.,R1 ;RANDOM PATTERN ADDRESS
5938  032030  010103                           MOV     R1,R3           ;COPY IT INTO R3 FOR LATER USE
5939  032032  011237  024610                   MOV     (R2),@#$LONUM   ;PRIME THE RANDOM NUMBER GENERATOR
5940  032036  016237  000002  024606           MOV     2(R2),@#$HINUM
5941  032044  004037  032206                   JSR     R0,@#RANPAT     ;GENERATE A RANDOM PATTERN
5942  032050  012637  024610                   MOV     (SP)+,@#$LONUM  ;RESTORE PRESENT RANDOM NUMBER
5943  032054  012637  024606                   MOV     (SP)+,@#$HINUM
5944  032060  005046                           CLR     -(SP)           ;NO ERRORS
5945  032062  162322                   1$:     SUB     (R3)+,(R2)+     ;ARE THESE TWO WORDS DIFFERENT?
5946  032064  001441                           BEQ     4$              ;NO--BRANCH
5947  032066  012737  032140  001206           MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
5948  032074  064342                           ADD     -(R3),-(R2)     ;RECREATE THE BAD WORD
5949  032076  010237  001122                   MOV     R2,@#$BDADR     ;ADDRESS OF BAD DATA
5950  032102  010337  001120                   MOV     R3,@#$GDADR     ;ADDRESS OF GOOD DATA
5951  032106  012237  001126                   MOV     (R2)+,@#$BDDAT  ;BAD DATA
5952  032112  012337  001124                   MOV     (R3)+,@#$GDDAT  ;GOOD DATA
5953  032116  010204                           MOV     R2,R4           ;FORM WORD NUMBER (1 TO 256)
5954  032120  162704  051514                   SUB     #BUFFER+512.,R4
5955  032124  006204                           ASR     R4
5956  032126  005716                           TST     (SP)            ;FIRST ERROR
5957  032130  001002                           BNE     2$              ;NO--BRANCH
5958  032132  105116                           COMB    (SP)            ;YES--SET ERROR SWITCH
5959  032134  104015                           ERROR   15              ;REPORT THE ERROR
5960  032136  104016                   2$:     ERROR   16              ;REPORT THE ERROR
5961  032140  032777  001000  146772   3$:     BIT     #SW09,@SWR      ;LOOP ON ERROR?
5962  032146  001012                           BNE     5$              ;YES--BRANCH
5963  032150  123737  001364  001103           CMPB    @#ERR.CT,@#$ERFLG ;MAX. ERRORS OCCURRED?
5964  032156  101406                           BLOS    5$              ;YES--BRANCH
5965  032160  032777  000002  146752           BIT     #SW01,@SWR      ;STOP COMPARING?
5966  032166  001002                           BNE     5$              ;YES--BRANCH
5967  032170  020103                   4$:     CMP     R1,R3           ;ALL DATA BEEN COMPARED?
5968  032172  101333                           BHI     1$              ;NO--BRANCH
5969  032174  005726                   5$:     TST     (SP)+           ;ERROR OCCUR?
5970  032176  001402                           BEQ     6$              ;NO--BRANCH
5971  032200  013700  001252                   MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
5972  032204  000200                   6$:     RTS     R0              ;EXIT
5973
5974                                    ;THIS ROUTINE FILLS A 256 WORD BUFFER WITH A RANDOM
5975                                    ;PATTERN OF WHICH THE FIRST TWO WORDS ARE THE BASE
5976                                    ;OF THE PATTERN.
5977                                    ;CALL
5978                                    ;       MOV     #ADR,R1         ;ADDRESS OF THE BUFFER
5979                                    ;       JSR     R0,@#RANPAT
5980                                    ;       RETURN
5981
```

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 5982  032206  010246                RANPAT: MOV     R2,-(SP)        ;SAVE R2
 5983  032210  012702  000200                MOV     #256./2.,R2     ;GENERATE 256 WORDS
 5984  032214  000402                        BR      2$
 5985  032216  004737  024510        1$:     JSR     PC,@#$RAND      ;GENERATE A RANDOM NUMBER
 5986  032222  013721  024610        2$:     MOV     @#$LONUM,(R1)+  ;PUT LOW WORD IN BUFFER
 5987  032226  013721  024606                MOV     @#$HINUM,(R1)+  ;PUT HIGH WORD IN BUFFER
 5988  032232  005302                        DEC     R2              ;DONE?
 5989  032234  003370                        BGT     1$              ;NO--BRANCH
 5990  032236  012602                        MOV     (SP)+,R2        ;RESTORE R2
 5991  032240  000200                        RTS     R0              ;EXIT
 5992
 5993                                ;THIS ROUTINE GENERATES RANDOM CYLINDER, TRACK, AND SECTOR
 5994                                ;ADDRESSES AND SAVES THEN IN THE DPB (DTADPB+10, 11 & DTADPB+12).
 5995                                ;NOTE: THIS ROUTINE DESTROYS R1-R3
 5996                                ;CALL
 5997                                ;       JSR     R0,@#RANADR
 5998                                ;       RETURN
 5999
 6000  032242  004737  024510        RANADR: JSR     PC,@#$RAND      ;GENERATE A RANDOM NUMBER
 6001  032246  113701  024610                MOVB    @#$LONUM,R1     ;FORM SECTOR IN R1
 6002  032252  113702  024611                MOVB    @#$LONUM+1,R2   ;FORM TRACK IN R2
 6003  032256  013703  024606                MOV     @#$HINUM,R3     ;FORM CYLINDER IN R3
 6004  032262  105701                        TSTB    R1              ;ENSURE THE SECTOR IS BETWEEN 0 AND 31
 6005  032264  002403                        BLT     2$
 6006  032266  123701  001630        1$:     CMPB    PRMLMT+22,R1    ;CHECK MAXIMUM SECTOR ADDRESS
 6007  032272  103003                        BHIS    3$
 6008  032274  000241                2$:     CLC
 6009  032276  106001                        RORB    R1
 6010  032300  000772                        BR      1$
 6011  032302  105702                3$:     TSTB    R2              ;ENSURE THE TRACK IS BETWEEN 0 AND 4
 6012  032304  002403                        BLT     5$
 6013  032306  122702  000005        4$:     CMPB    #5,R2
 6014  032312  003003                        BGT     6$
 6015  032314  000241                5$:     CLC
 6016  032316  106002                        RORB    R2
 6017  032320  000772                        BR      4$
 6018  032322  023703  001510        6$:     CMP     @#FC,R3         ;ENSURE THE CYLINDER IS BETWEEN FC AND LC
 6019  032326  003413                        BLE     7$
 6020  032330  000241                        CLC
 6021  032332  006003                        ROR     R3
 6022  032334  005503                        ADC     R3
 6023  032336  001371                        BNE     6$
 6024  032340  010103                        MOV     R1,R3
 6025  032342  000303                        SWAB    R3
 6026  032344  060203                        ADD     R2,R3
 6027  032346  005203                        INC     R3
 6028  032350  003364                        BGT     6$
 6029  032352  005403                        NEG     R3
 6030  032354  000762                        BR      6$
 6031  032356  023703  001512        7$:     CMP     @#LC,R3
 6032  032362  002003                        BGE     8$
 6033  032364  000241                        CLC
 6034  032366  006003                        ROR     R3
 6035  032370  000772                        BR      7$
 6036  032372  023703  001510        8$:     CMP     @#FC,R3
 6037  032376  003403                        BLE     9$
```

```
                                        INC     R3
                                        SWAB    R3
                                        BR      7$
032406  110137  004174          9$:     MOVB    R1,@#DTADPB+10  ;SAVE SECTOR ADDRESS
032412  110237  004175                  MOVB    R2,@#DTADPB+11  ;SAVE TRACK ADDRESS
032416  010337  004176                  MOV     R3,@#DTADPB+12  ;SAVE CYLINDER ADDRESS
032422  000200                          RTS     R0              ;RETURN

                                ;THIS ROUTINE IS USED TO INPUT THE "CONTROL SWITCHES".
                                ;IF SWR<07>=1 THE PRESENT SETTING WILL BE TYPED AND THE NEW
                                ;SETTING IS READ AND STORED.
                                ;NOTE: THIS ROUTINE DESTROYS R3 AND R4
                                ;CALL
                                ;       JSR     PC,@#GETSWR
                                ;       RETURN                  ;(C.SWR)=DESIRED CONTROL SWITCHES

032424  032777  000200  146506  GETSWR: BIT     #SW07,@SWR      ;READ CONTROL SWITCHES?
032432  001430                          BEQ     2$              ;NO--BRANCH
032434  104401  032442                  TYPE    ,65$            ;;TYPE ASCIZ STRING
032440  000410                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <CR><LF>/SET SWR<07>=0/
032462                          64$:
032462  012703  043704          1$:     MOV     #MSG.CS,R3      ;"CONTROL SWITCHES="
032466  013704  001220                  MOV     @#C.SWR,R4      ;PRESENT CONTROL SWITCH SETTINGS
032472  004037  032516                  JSR     R0,@#GETNUM     ;GET THE NEW SWITCH SETTINGS
032476  000771                          BR      1$              ; COMMA
032500  000240                          NOP                     ;PERIOD
032502  013737  001220  001222          MOV     C.SWR,SAVCSW    ;SAVE PREVIOUS VALUE
032510  010437  001220                  MOV     R4,@#C.SWR      ; DOUBLE PERIOD-SAVE NEW SWITCH SETTING
032514  000207                  2$:     RTS     PC              ;RETURN FROM CALL

                                ;THIS ROUTINE WILL TYPE AN ASCIZ MESSAGE AND THEN
                                ;INPUT AN ASCIZ STRING AND CHANGE THE STRING TO OCTAL
                                ;IF REQUIRED.
                                ;NOTE: THIS ROUTINE DESTROYS R1
                                ;CALL
                                ;       MOV     #ADR,R3         ;ADDRESS OF ASCIZ MESSAGE
                                ;       MOV     #NUM,R4         ;OCTAL NUMBER
                                ;       JSR     R0,@#GETNUM
                                ;       RETURN1                 ;INPUT TERMINATED WITH A COMMA
                                ;       RETURN2                 ;WITH A PERIOD
                                ;       RETURN3                 ;WITH A DOUBLE PERIOD
                                ;                               ;R4=INPUT NUMBER AND
                                ;                               ;R2=R4*32 FOR ALL
                                ;                               ;THREE RETURNS

032516  010337  032524  GETNUM: MOV     R3,2$           ;SAVE MESSAGE POINTER
032522  104401          1$:     TYPE                    ;TYPE THE MESSAGE
032524  000000          2$:     .WORD   0               ;MESSAGE POINTER GOES HERE
032526  010446                  MOV     R4,-(SP)        ;;SAVE R4 FOR TYPEOUT
032530  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
032532  104401  043730          TYPE    ,SLASH          ; / '
032536  104411                  RDLIN                   ;READ AN ASCIZ STRING
032540  012601                  MOV     (SP)+,R1        ;ADDRESS OF FIRST CHARACTER
032542  004037  034766          JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
032546  032522                  1$                      ;ILLEGAL CHARACTER
```

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                                        1$                      ;CARRIAGE RETURN
                                        3$                      ;"/"
                                        7$                      ;"."
                                        8$                      ;"'"
                                        11$                     ;DIGIT 0-9
                            11$:        DEC     R1              ;DECREMENT THE INPUT POINTER
                            3$:
032564  004037  035226                  JSR     R0,@#CK.NUM     ;CHECK THE NUMBER
032570  032522                          1$                      ;ILLEGAL INPUT
032572  032604                          6$                      ;TERMINATED WITH A "," OR "CR"
032574  032602                          5$                      ;TERMINATED WITH A "'"
032576  032600                          4$                      ;TERMINATED WITH A ".."
032600  005720                  4$:     TST     (R0)+           ;DOUBLE PERIOD
032602  005720                  5$:     TST     (R0)+           ;SINGLE PERIOD
032604  010204                  6$:     MOV     R2,R4           ;COMMA--SAVE INPUT NUMBER
032606  000414                          BR      10$             ;GO TO EXIT
032610  105711                  7$:     TSTB    (R1)            ;TERMINATOR AFTER A COMMA?
032612  001343                          BNE     1$              ;NO--LOOP
032614  000411                          BR      10$             ;YES--EXIT
032616  105711                  8$:     TSTB    (R1)            ;TERMINATOR AFTER A PERIOD?
032620  001406                          BEQ     9$              ;YES--EXIT
032622  122721  000056                  CMPB    #'.,(R1)+       ;NO--DOUBLE PERIOD?
032626  001335                          BNE     1$              ;NO--LOOP
032630  105711                          TSTB    (R1)            ;YES--TERMINATOR?
032632  001333                          BNE     1$              ;NO--LOOP
032634  005720                          TST     (R0)+           ;DOUBLE PERIOD
032636  005720                  9$:     TST     (R0)+           ;PERIOD
032640  010402                  10$:    MOV     R4,R2           ;COMMA--POSITION THE
032642  000302                          SWAB    R2              ;NUMBER IN CASE IT
032644  006202                          ASR     R2              ;IS THE PRIORITY LEVEL
032646  006202                          ASR     R2
032650  006202                          ASR     R2
032652  000200                          RTS     R0              ;EXIT

                            ;THIS ROUTINE IS USED TO CHANGE OR MODIFY
                            ;THE TEST PARAMETERS.  IT GIVES THE OPERATOR
                            ;THE CAPABILITY OF SPECIFYING WHICH DRIVES TO TEST, WHICH
                            ;TESTS TO RUN AND HOW MANY TIMES TO
                            ;REPEAT EACH TEST

032654  104412                  GT.PRM: SAVREG                  ;SAVE R0 - R5
032656  005037  001232          GT.PR1: CLR     DRVSEL          ;NO DRIVE SELECTED
032662  104401  032670                  TYPE    ,65$            ;;TYPE ASCIZ STRING
032666  000406                          BR      64$             ;;GET OVER THE ASCIZ
                            ;;65$:      .ASCIZ  <CR><LF>/DRIVE(S)=/
032704                      64$:
032704  104411                          RDLIN                   ;READ TTY
032706  012601                          MOV     (SP)+,R1        ;ADDRESS OF ASCIZ STRING
032710  004037  034766                  JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
032714  032656                          GT.PR1                  ;ILLEGAL CHARACTER
032716  032656                          GT.PR1                  ;CARRIAGE RETURN
032720  032656                          GT.PR1                  ;"/"
032722  032656                          GT.PR1                  ;"."
032724  032656                          GT.PR1                  ;"'"
032726  032730                          1$                      ;DIGIT 0-9
032730  005301                  1$:     DEC     R1
```

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6150  032732                          2$:
6151  032732  012702  000007                  MOV     #7,R2   ;UPPER LIMIT OF INPUT
6152  032736  004037  035042                  JSR     R0,@#CK.DIG     ;CHECK THE DIGIT(S)
6153  032742  032656                          GT.PR1                  ;ILLEGAL INPUT
6154  032744  032656                          GT.PR1                  ;INPUT TO LARGE
6155  032746  032754                          3$                      ;TERMINATED WITH A ",." OR "CR"
6156  032750  033000                          4$                      ;TERMINATED WITH A "-"
6157  032752  033000                          4$                      ;TERMINATED WITH A "."
6158  032754  156237  035502  001232  3$:     BISB    ATABIT(R2),DRVSEL ;SET THE DRIVE SELECTED BIT
6159  032762  105741                          TSTB    -(R1)           ;WAS THE LINE TERMINATED?
6160  032764  001362                          BNE     2$              ;NO-GET THE NEXT DRIVE
6161  032766  005037  001234                  CLR     @#TSTNMS        ;DESELECT ALL TESTS
6162  032772  005037  001236                  CLR     TSTNMS+2
6163  032776  000405                          BR      GTTST1          ;YES--SELECT TEST
6164  033000  156237  035502  001232  4$:     BISB    ATABIT(R2),DRVSEL ;SET THE SELECTED DRIVE BITS
6165  033006  104413                  GT.PR2: RESREG                  ;RESTORE R0 - R5
6166  033010  000207                          RTS     PC              ;EXIT
6167
6168  033012                          GTTST1:
6169  033012  104401  033020                  TYPE    ,65$            ;;TYPE ASCIZ STRING
6170  033016  000403                          BR      64$             ;;GET OVER THE ASCIZ
6171                                  ;;65$:  .ASCIZ  /TEST=/
6172  033026                          64$:
6173  033026  104411                          RDLIN                   ;READ AN ASCIZ STRING
6174  033030  012601                          MOV     (SP)+,R1        ;POINTER TO R1
6175  033032  122711  000056                  CMPB    #'.,(R1)        ;DOUBLE PERIOD?
6176  033036  001007                          BNE     1$              ;NO--BRANCH
6177  033040  122761  000056  000001          CMPB    #'.,1(R1)
6178  033046  001003                          BNE     1$
6179  033050  105761  000002                  TSTB    2(R1)           ;"CR"?
6180  033054  001754                          BEQ     GT.PR2          ;YES--EXIT
6181  033056  005037  001234          1$:     CLR     TSTNMS          ;NO TEST SELECTED
6182  033062  005037  001236                  CLR     TSTNMS+2
6183  033066  005037  001240                  CLR     OPNFLG          ;NO TESTS TO BE OPENED
6184  033072  005037  001242                  CLR     OPNFLG+2
6185  033076  121127  000123          GTTST2: CMPB    (R1),#'S        ;ALL SEEK TESTS?
6186  033102  001004                          BNE     1$              ;NO--BRANCH
6187  033104  052737  000777  001234          BIS     #777,TSTNMS     ;YES--SELECT TESTS 0-10
6188  033112  000552                          BR      GTTST3
6189  033114  121127  000124          1$:     CMPB    (R1),#'T        ;ALL TIMING TESTS?
6190  033120  001004                          BNE     2$              ;NO--BRANCH
6191  033122  052737  036000  001234          BIS     #36000,TSTNMS   ;YES--SELECT TESTS 12-15
6192  033130  000543                          BR      GTTST3
6193  033132  121127  000101          2$:     CMPB    (R1),#'A        ;ALL ADDRESSING TESTS?
6194  033136  001004                          BNE     3$              ;NO--BRANCH
6195  033140  052737  140000  001234          BIS     #140000,TSTNMS  ;YES--SELECT TESTS 16 & 17
6196  033146  000534                          BR      GTTST3
6197  033150  121127  000104          3$:     CMPB    (R1),#'D        ;DATA TEST?
6198  033154  001004                          BNE     4$              ;NO--BRANCH
6199  033156  052737  000001  001236          BIS     #1,TSTNMS+2     ;YES--SELECT TEST 20
6200  033164  000525                          BR      GTTST3
6201  033166  121127  000105          4$:     CMPB    (R1),#'E        ;EXERCISER TEST?
6202  033172  001004                          BNE     5$              ;NO--BRANCH
6203  033174  052737  000002  001236          BIS     #2,TSTNMS+2     ;YES--SELECT TEST 21
6204  033202  000516                          BR      GTTST3
6205  033204  004037  034712          5$:     JSR     R0,@#CK.OCT     ;OCTAL DIGIT?
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6206  033210  000514                        BR      GTTST4          ;NO--BRANCH
6207  033212  010205                        MOV     R2,R5           ;YES--SAVE IT
6208  033214  005201                        INC     R1              ;MOVE TO NEXT CHARACTER
6209  033216  004037  034712                JSR     R0,@#CK.OCT     ;OCTAL DIGIT
6210  033222  000405                        BR      6$              ;NO--BRANCH
6211  033224  005201                        INC     R1              ;MOVE TO NEXT CHARACTER
6212  033226  006305                        ASL     R5              ;SCALE HIGH DIGIT
6213  033230  006305                        ASL     R5
6214  033232  006305                        ASL     R5
6215  033234  060502                        ADD     R5,R2           ;COMBINE HIGH & LOW DIGITS
6216  033236  020227  000022        6$:     CMP     R2,#$TN-1       ;VALID TEST NUMBER?
6217  033242  003263                        BGT     GTTST1          ;NO--BRANCH
6218  033244  010237  033436                MOV     R2,9$           ;SAVE THE TEST NUMBER
6219  033250  010204                        MOV     R2,R4           ;CONVERT TEST NUMBER INTO AN INDEX
6220  033252  042704  000017                BIC     #17,R4          ;CLEAR UNWANTED BITS
6221  033256  006204                        ASR     R4              ;SHIFT THE BITS
6222  033260  006204                        ASR     R4              ;SHIFT THE BITS
6223  033262  006204                        ASR     R4              ;SHIFT THE BITS
6224  033264  006302                        ASL     R2
6225  033266  056264  001424  001234        BIS     BITS(R2),TSTNMS(R4)  ;SELECT TEST
6226  033274  121127  000055                CMPB    (R1),#'-        ;TEST STRING?
6227  033300  001060                        BNE     GTTST4          ;NO--BRANCH
6228  033302  005201                        INC     R1              ;YES--MOVE TO NEXT CHARACTER
6229  033304  004037  034712                JSR     R0,@#CK.OCT     ;OCTAL DIGIT?
6230  033310  000640                        BR      GTTST1          ;NO--BRANCH
6231  033312  010205                        MOV     R2,R5           ;YES--SAVE IT
6232  033314  005201                        INC     R1              ;MOVE TO NEXT CHARACTER
6233  033316  004037  034712                JSR     R0,@#CK.OCT     ;OCTAL DIGIT?
6234  033322  000405                        BR      7$              ;NO--BRANCH
6235  033324  005201                        INC     R1              ;YES--MOVE TO NEXT CHARACTER
6236  033326  006305                        ASL     R5              ;SCALE HIGH DIGIT
6237  033330  006305                        ASL     R5
6238  033332  006305                        ASL     R5
6239  033334  060502                        ADD     R5,R2           ;COMBINE HIGH & LOW DIGIT
6240  033336  020227  000022        7$:     CMP     R2,#$TN-1       ;VALID TEST NUMBER?
6241  033342  003223                        BGT     GTTST1          ;NO--BRANCH
6242  033344  023702  033436                CMP     9$,R2           ;IS THE FIRST NUMBER OF THE
6243                                                                ;STRING SMALLER THAN THE LAST?
6244  033350  002220                        BGE     GTTST1          ;NO--BRANCH
6245  033352  010246                        MOV     R2,-(SP)        ;SAVE ENDING TEST NUMBER
6246  033354  013702  033436                MOV     9$,R2           ;GET STARTING TEST NUMBER
6247  033360  012637  033436                MOV     (SP)+,9$        ;STORE ENDING TEST NUMBER
6248  033364  006337  033436                ASL     9$              ;SHIFT ENDING TEST NUMBER
6249  033370  006302                        ASL     R2              ;SHIFT TEST NUMBER
6250  033372  010204                8$:     MOV     R2,R4           ;COPY TEST NUMBER INTO R4
6251  033374  042704  000037                BIC     #37,R4          ;CLEAR LOWER BITS
6252  033400  006204                        ASR     R4              ;SHIFT THE TEST NUMBER
6253  033402  006204                        ASR     R4              ;SHIFT THE TEST NUMBER
6254  033404  006204                        ASR     R4              ;SHIFT THE TEST NUMBER
6255  033406  006204                        ASR     R4              ;SHIFT THE TEST NUMBER
6256  033410  056264  001424  001234        BIS     BITS(R2),TSTNMS(R4)  ;SELECT THE TEST
6257  033416  062702  000002                ADD     #2,R2           ;INECREMENT THE TEST NUMBER
6258  033422  020237  033436                CMP     R2,9$           ;SEE IF FINISHED
6259  033426  101761                        BLOS    8$              ;BR IF NOT
6260  033430  162702  000002                SUB     #2,R2           ;CORRECT TEST NUMBER
6261  033434  000402                        BR      GTTST4          ;CONTINUE
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6262  033436  000000                  9$:     .WORD   0               ;STORE TEST NUMBER HERE
6263  033440  005201                  GTTST3: INC     R1              ;MOVE TO NEXT CHARACTER
6264  033442  121127  000056          GTTST4: CMPB    (R1),#'.        ;"PERIOD"?
6265  033446  001441                          BEQ     GTTST5          ;YES--BRANCH
6266  033450  005737  001234                  TST     TSTNMS          ;ANY TEST SELECTED THIS CYCLE?
6267  033454  001005                          BNE     1$              ;BR IF YES
6268  033456  005737  001236                  TST     TSTNMS+2        ;ANY TEST SELECTED THIS CYCLE ?
6269  033462  001002                          BNE     1$              ;BR IF YES
6270  033464  000137  033012                  JMP     GTTST1          ;NO
6271  033470  121127  000057          1$:     CMPB    (R1),#'/        ;"OPEN"?
6272  033474  001004                          BNE     2$              ;NO--BRANCH
6273  033476  056264  001424  001240          BIS     BITS(R2), OPNFLG(R4)  ;YES--SET BITS FOR TEST TO OPEN
6274  033504  000405                          BR      3$
6275  033506  121127  000054          2$:     CMPB    (R1),#',        ;"COMMA"?
6276  033512  001402                          BEQ     3$              ;BR IF YES
6277  033514  000137  033012                  JMP     GTTST1          ;NO
6278  033520  005201                  3$:     INC     R1              ;MOVE TO NEXT CHARACTER
6279  033522  105711                          TSTB    (R1)            ;"CR"?
6280  033524  001402                          BEQ     4$              ;BR IF 'CR'
6281  033526  000137  033076                  JMP     GTTST2          ;NO--GO GET NEXT CHARACTER
6282  033532  005737  001240          4$:     TST     OPNFLG          ;ANY TESTS TO OPEN ?
6283  033536  001042                          BNE     OPNTST          ;BR IF YES
6284  033540  005737  001242                  TST     OPNFLG+2        ;ANY TESTS TO OPEN ?
6285  033544  001037                          BNE     OPNTST          ;BR IF YES
6286  033546  000137  033012                  JMP     GTTST1          ;NO--START AGAIN
6287  033552  005201                  GTTST5: INC     R1              ;MOVE TO NEXT CHARACTER
6288  033554  121127  000056                  CMPB    (R1),#'.        ;"PERIOD"?
6289  033560  001414                          BEQ     GTTST6          ;YES--BRANCH
6290  033562  105711                          TSTB    (R1)            ;"CR"?
6291  033564  001402                          BEQ     1$              ;YES--BRANCH
6292  033566  000137  033012                  JMP     GTTST1
6293  033572  005737  001240          1$:     TST     OPNFLG          ;ANY TESTS TO OPEN ?
6294  033576  001022                          BNE     OPNTST          ;BR IF YES
6295  033600  005737  001242                  TST     OPNFLG+2        ;ANY TESTS TO OPEN ?
6296  033604  001017                          BNE     OPNTST          ;BR IF YES
6297  033606  000137  033006                  JMP     GT.PR2          ;NO--GO START TESTING
6298  033612  005201                  GTTST6: INC     R1              ;MOVE TO NEXT CHARACTER
6299  033614  105711                          TSTB    (R1)            ;"CR"?
6300  033616  001402                          BEQ     1$              ;YES--BRANCH
6301  033620  000137  033012                  JMP     GTTST1          ;NO--GO ASK FOR TEST
6302  033624  005737  001240          1$:     TST     OPNFLG          ;ANY TESTS TO OPEN ?
6303  033630  001005                          BNE     OPNTST          ;BR IF YES
6304  033632  005737  001242                  TST     OPNFLG+2        ;ANY TESTS TO OPEN ?
6305  033636  001002                          BNE     OPNTST          ;BR IF YES
6306  033640  000137  033006                  JMP     GT.PR2          ;NO--GO START TESTING
6307
6308                                  ;OPEN THE SELECTED TEST FOR CHANGES
6309
6310  033644  104412                  OPNTST: SAVREG                  ;SAVE R0 - R5
6311  033646  005027                          CLR     (PC)+           ;START WITH TEST 0
6312  033650  000000                  OPN.CT: .WORD   0               ;COUNT STORED HERE
6313  033652  000411                          BR      OPN.2           ;SKIP THE INCREMENT
6314  033654  005237  033650          OPN.1:  INC     OPN.CT          ;MOVE TO THE NEXT TEST
6315  033660  022737  000022  033650          CMP     #STN-1,OPN.CT   ;TEST NUMBER TOO BIG?
6316  033666  002003                          BGE     OPN.2           ;NO--OPEN THE NEXT TEST
6317  033670  104413                          RESREG                  ;RESTORE R0 - R5
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6318  033672  000137  033012                JMP     GTTST1          ;YES--GO ASK FOR MORE TESTS
6319  033676  013705  033650        OPN.2:  MOV     OPN.CT,R5       ;SETUP TO USE THE
6320  033702  006305                ASL     R5              ;TEST NUMBER AS AN INDEX
6321  033704  013703  033650                MOV     OPN.CT,R3       ;GET INDEX
6322  033710  042703  000017                BIC     #17,R3          ;CLEAR LOWER TEST BITS
6323  033714  006203                ASR     R3              ;SHIFT TEST NUMBER
6324  033716  006203                ASR     R3              ;SHIFT TEST NUMBER
6325  033720  006203                ASR     R3              ;SHIFT TEST NUMBER
6326  033722  036563  001424  001240        BIT     BITS(R5),OPNFLG(R3)  ;OPEN THIS TEST?
6327  033730  001751                BEQ     OPN.1           ;NO--MOVE TO NEXT TEST
6328  033732  104401  033740                TYPE    ,65$            ;;TYPE ASCIZ STRING
6329  033736  000404                BR      64$             ;;GET OVER THE ASCIZ
6330                        ;;65$:  .ASCIZ  / TEST /
6331  033750                        64$:
6332  033750  013746  033650                MOV     OPN.CT,-(SP)    ;;SAVE OPN.CT FOR TYPEOUT
6333                                                        ;;TEST NUMBER
6334  033754  104403                TYPOS                   ;;GO TYPE--OCTAL ASCII
6335  033756     002                .BYTE   2               ;;TYPE 2 DIGIT(S)
6336  033757     000                .BYTE   0               ;;SUPPRESS LEADING ZEROS
6337  033760  104401  001215                TYPE    ,$CRLF          ;TYPE "CR" & "LF"
6338  033764  016500  001536                MOV     PRMPT(R5),R0    ;PICKUP PARAMETER POINTER
6339  033770  011046                MOV     (R0),-(SP)      ;SAVE THE VARIABLE INDICATOR
6340  033772  012702  001504                MOV     #PRM,R2         ;FIRST ADDRESS OF TABLE
6341  033776  000405                BR      2$
6342  034000  006216        1$:     ASR     (SP)            ;CHECK FOR A VARIABLE
6343  034002  103403                BCS     2$              ;GO MOVE THIS ONE
6344  034004  001404                BEQ     OPNPRM          ;DONE
6345  034006  005722                TST     (R2)+           ;BUMP THE POINTER
6346  034010  000773                BR      1$
6347  034012  012022        2$:     MOV     (R0)+,(R2)+     ;MOVE THIS VARIABLE INTO THE
6348  034014  000771                BR      1$              ;COMMON AREA
6349  034016  013716  001504  OPNPRM: MOV     @#PRM,(SP)      ;GET THE VARIABLE INDICATOR
6350  034022  005004                CLR     R4              ;ZERO THE INDEX
6351  034024  006216        1$:     ASR     (SP)            ;CHECK FOR A VARIABLE
6352  034026  103403                BCS     3$              ;GO GET IT
6353  034030  001772                BEQ     OPNPRM          ;OUT OF VARIABLES
6354  034032  005724        2$:     TST     (R4)+           ;UPDATE THE INDEX
6355  034034  000773                BR      1$
6356  034036  005764  001606        3$:     TST     PRMLMT(R4)      ;IS THE MAX. MAGNITUDE NEG?
6357  034042  100466                BMI     OPNPAT          ;YES--THEN IT IS THE PATTERN
6358  034044  104401  044657                TYPE    ,MSG.SP         ;TYPE SPACES
6359  034050  016437  001636  034060        MOV     PRMMSG(R4),4$   ;TYPE THE NAME OF THIS VARIABLE
6360  034056  104401                TYPE
6361  034060  000000        4$:     .WORD   0
6362  034062  104401  043702                TYPE    ,MSG.EQ         ;TYPE "="
6363  034066  016446  001506                MOV     RPT(R4),-(SP)           ;PUT RPT(R4) ON THE STACK
6364  034072  004737  024220                JSR     PC,@#$SB2D      ;CHANGE RPT(R4) TO DECIMAL ASCIZ
6365  034076  004737  024450                JSR     PC,@#$SUPRS     ;TYPE,WITHOUT LEADING ZEROS
6366  034102  104401  043730                TYPE    ,SLASH          ;' /'
6367  034106  104411                RDLIN
6368  034110  012601                MOV     (SP)+,R1        ;READ AN ASCIZ STRING
6369  034112  004037  034766                JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6370  034116  034036                3$                      ;ILLEGAL CHARACTER
6371  034120  034032                2$                      ;CARRIAGE RETURN
6372  034122  034170                8$                      ;"/"
6373  034124  034132                5$                      ;","
```

```
 6374  034126  034140                        6$                      ;" "
 6375  034130  034166                        7$                      ;DIGIT 0-9
 6376  034132  105711                  5$:   TSTB    (R1)              ;"CR"?
 6377  034134  001340                        BNE     3$                ;NO--STAY ON THIS VARIABLE
 6378  034136  000735                        BR      2$                ;YES--MOVE TO NEXT VARIABLE
 6379  034140  105711                  6$:   TSTB    (R1)              ;IS THERE A "CR" AFTER THE PERIOD?
 6380  034142  001002                        BNE     64$               ;NO
 6381  034144  000137  034560              JMP     OPN.N2            ;YES--GO CLOSE THIS TEST
 6382  034150  122721  000056        64$:  CMPB    #'.,(R1)+         ;DOUBLE PERIOD?
 6383  034154  001330                        BNE     3$                ;NO--GO ASK FOR THIS VARIABLE
 6384  034156  105711                        TSTB    (R1)              ;YES--IS A "CR" AFTER THE DOUBLE PERIOD?
 6385  034160  001326                        BNE     3$                ;NO--ASK FOR THIS VARIABLE AGAIN
 6386  034162  000137  034576              JMP     OPN.X2            ;YES--CLOSE ALL TEST
 6387  034166  005301                  7$:   DEC     R1                ;BACK THE POINTER UP BY ONE
 6388  034170                        8$:
 6389  034170  016402  001606              MOV     PRMLMT(R4),R2     ;UPPER LIMIT OF INPUT
 6390  034174  004037  035042              JSR     R0,@#CK.DIG       ;CHECK THE DIGIT(S)
 6391  034200  034036                        3$                      ;ILLEGAL INPUT
 6392  034202  034036                        3$                      ;INPUT TO LARGE
 6393  034204  034212                        9$                      ;TERMINATED WITH A "," OR "CR"
 6394  034206  034554                        OPN.N1                  ;TERMINATED WITH A "."
 6395  034210  034572                        OPN.X1                  ;TERMINATED WITH A ".."
 6396  034212  010264  001506        9$:   MOV     R2,RPT(R4)        ;SAVE THIS VARIABLE
 6397  034216  000705                        BR      2$                ;MOVE TO NEXT VARIABLE
 6398  034220  104401  044657        OPNPAT: TYPE    ,MSG.SP           ;TYPE SPACES
 6399  034224  104401  043676                TYPE    ,MSG.PAT          ;TYPE "PAT"
 6400  034230  104401  043702                TYPE    ,MSG.EQ           ;TYPE "="
 6401  034234  016446  001506                MOV     RPT(R4),-(SP)     ;;SAVE RPT(R4) FOR TYPEOUT
 6402  034240  104402                        TYPOC                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 6403  034242  104401  044660                TYPE    ,MSG.SP+1         ;TYPE ONE SPACE
 6404  034246  104411                        RDLIN                     ;READ ASCIZ STRING
 6405  034250  012601                        MOV     (SP)+,R1          ;PICKUP POINTER
 6406  034252  004037  034766              JSR     R0,@#CK.CHR       ;CHECK ONE CHARACTER
 6407  034256  034220                        OPNPAT                    ;ILLEGAL CHARACTER
 6408  034260  034016                        OPNPRM                    ;CARRIAGE RETURN
 6409  034262  034314                        3$                      ;"/"
 6410  034264  034016                        OPNPRM                    ;"'"
 6411  034266  034272                        1$                      ;","
 6412  034270  034312                        2$                      ;DIGIT 0-9
 6413  034272  105711                  1$:   TSTB    (R1)              ;"CR" AFTER THE PERIOD?
 6414  034274  001531                        BEQ     OPN.N2            ;YES--GO CLOSE THIS TEST
 6415  034276  122721  000056              CMPB    #'.,(R1)+         ;NO--PERIOD?
 6416  034302  001346                        BNE     OPNPAT            ;NO--LOOP
 6417  034304  105711                        TSTB    (R1)              ;"CR" AFTER A DOUBLE PERIOD?
 6418  034306  001533                        BEQ     OPN.X2            ;YES--GO START TESTING
 6419  034310  000743                        BR      OPNPAT            ;NO--LOOP
 6420  034312  005301                  2$:   DEC     R1                ;BACKUP THE ASCII POINTER
 6421  034314                        3$:
 6422  034314  004037  035226              JSR     R0,@#CK.NUM       ;CHECK THE NUMBER
 6423  034320  034220                        OPNPAT                    ;ILLEGAL INPUT
 6424  034322  034330                        4$                      ;TERMINATED WITH A "," OR "CR"
 6425  034324  034554                        OPN.N1                  ;TERMINATED WITH A "."
 6426  034326  034572                        OPN.X1                  ;TERMINATED WITH A ".."
 6427  034330  010264  001506        4$:   MOV     R2,RPT(R4)        ;SAVE THE INPUT NUMBER
 6428  034334  006002                        ROR     R2                ;OPEN PATTERN 0?
 6429  034336  103227                        BCC     OPNPRM            ;NO--START AT BEGINNING OF PARAMETER TABLE
```

```
 6430  034340  104412                    SAVREG                  ;SAVE R0 - R5
 6431  034342  005000                    CLR     R0              ;START WITH WORD 0
 6432  034344  012704  003104            MOV     #PAT0,R4
 6433  034350
 6434  034350  104401  034356            TYPE    ,65$            ;;TYPE ASCIZ STRING
 6435  034354  000403                    BR      64$             ;;GET OVER THE ASCIZ
 6436                                    .ASCIZ  /   WD/
 6437  034364
 6438  034364  010046                    MOV     R0,-(SP)                ;PUT R0 ON THE STACK
 6439  034366  004737  024220            JSR     PC,@#$SB2D      ;CHANGE R0 TO DECIMAL ASCIZ
 6440  034372  004737  024450            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
 6441  034376  104401  043702            TYPE    ,MSG.EQ         ;TYPE "="
 6442  034402  011446                    MOV     (R4),-(SP)      ;;SAVE (R4) FOR TYPEOUT
 6443  034404  104402                    TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 6444  034406  104411                    RDLIN                   ;READ ASCIZ STRING
 6445  034410  012601                    MOV     (SP)+,R1        ;PICKUP THE POINTER
 6446  034412  004037  034766            JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
 6447  034416  034350                    1$                      ;ILLEGAL CHARACTER
 6448  034420  034452                    4$                      ;CARRIAGE RETURN
 6449  034422  034434                    2$                      ;"/"
 6450  034424  034452                    4$                      ;"."
 6451  034426  034466                    5$                      ;"'"
 6452  034430  034432                    10$                     ;DIGIT 0-9
 6453  034432  005301                    DEC     R1              ;BACKUP THE ASCII POINTER
 6454  034434
 6455  034434  004037  035226            JSR     R0,@#CK.NUM     ;CHECK THE NUMBER
 6456  034440  034350                    1$                      ;ILLEGAL INPUT
 6457  034442  034450                    3$                      ;TERMINATED WITH A "," OR "CR"
 6458  034444  034506                    6$                      ;TERMINATED WITH A ":"
 6459  034446  034520                    8$                      ;TERMINATED WITH A ".."
 6460  034450  010214                    MOV     R2,(R4)         ;SAVE THE INPUT
 6461  034452  005724                    TST     (R4)+           ;MOVE TO NEXT WORD
 6462  034454  005200                    INC     R0              ;INCREMENT THE COUNT
 6463  034456  022700  000020            CMP     #16.,R0         ;COUNT TO LARGE?
 6464  034462  003332                    BGT     1$              ;NO--BRANCH
 6465  034464  000726                    BR      OPNWDS          ;YES--BRANCH
 6466  034466  105711                    TSTB    (R1)            ;"CR" AFTER THE PERIOD?
 6467  034470  001407                    BEQ     7$              ;YES--GO CLOSE THIS TEST
 6468  034472  122721  000056            CMPB    #'.,(R1)+       ;NO--PERIOD?
 6469  034476  001324                    BNE     1$              ;NO--BRANCH ILLEGAL INPUT STRING
 6470  034500  105711                    TSTB    (R1)            ;"CR" AFTER THE "PERIOD-PERIOD"?
 6471  034502  001407                    BEQ     9$              ;YES--GO START TESTING
 6472  034504  000721                    BR      1$              ;NO--LOOP
 6473  034506  010224                    MOV     R2,(R4)+        ;SAVE THE INPUT
 6474  034510  004737  034532            JSR     PC,@#CLSWDS     ;CLOSE THE DATA PATTERN
 6475  034514  104413                    RESREG                  ;RESTORE R0 - R5
 6476  034516  000420                    BR      OPN.N2          ;MOVE TO NEXT TEST
 6477  034520  010224                    MOV     R2,(R4)+        ;SAVE THE INPUT
 6478  034522  004737  034532            JSR     PC,@#CLSWDS     ;CLOSE THE DATA PATTERN
 6479  034526  104413                    RESREG                  ;RESTORE R0 - R5
 6480  034530  000422                    BR      OPN.X2          ;START TESTING
 6481  034532  012701  003104            MOV     #PAT0,R1        ;FIRST ADDRESS OF DATA PATTERN
 6482  034536  005200                    INC     R0              ;COUNT THE LAST WORD THAT WAS STORED
 6483  034540  022700  000017            CMP     #15.,R0         ;END OF TABLE
 6484  034544  002402                    BLT     2$              ;YES--EXIT
 6485  034546  012124                    MOV     (R1)+,(R4)+     ;COPY
```

```
034550  000772                  BR      1$              ;LOOP
034552  000207          2$:     RTS     PC              ;RETURN
034554  010264  001506  OPN.N1: MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
034560  005726          OPN.N2: TST     (SP)+           ;CLEAN OFF THE STACK
034562  004737  034632          JSR     PC,CLOSE        ;CLOSE THIS TEST
034566  000137  033654          JMP     OPN.1           ;GO OPEN THE NEXT TEST
034572  010264  001506  OPN.X1: MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
034576  005726          OPN.X2: TST     (SP)+           ;CLEAN OFF THE STACK
034600  004737  034632  1$:     JSR     PC,CLOSE        ;CLOSE THIS TEST
034604  005725          2$:     TST     (R5)+           ;UPDATE THE INDEX
034606  020527  000034          CMP     R5,#16*2        ;INDEX TO BIG?
034612  002403                  BLT     3$              ;NO--BRANCH
034614  104413                  RESREG                  ;RESTORE R0 - R5
034616  000137  033006          JMP     GT.PR2          ;GO TO EXIT
034622  036503  001424  3$:     BIT     BITS(R5),R3     ;IS THIS TEST OPEN FOR CHANGE?
034626  001364                  BNE     1$              ;YES--GO CLOSE IT
034630  000765                  BR      2$              ;NO--MOVE TO NEXT TEST
034632  104412          CLOSE:  SAVREG                  ;SAVE R0 - R5
034634  012700  001504          MOV     #PRM,R0         ;"FROM" ADDRESS
034640  016501  001536          MOV     PRMPT(R5),R1    ;"TO" ADDRESS
034644  012002                  MOV     (R0)+,R2        ;"FROM" INDICATOR
034646  012103                  MOV     (R1)+,R3        ;"TO" INDICATOR
034650  012704  000001          MOV     #1,R4           ;TEST BIT START A "RPT"
034654  030402          1$:     BIT     R4,R2           ;PARAMETER TO BE MOVED?
034656  001403                  BEQ     2$              ;NO--BRANCH
034660  030403                  BIT     R4,R3           ;A PLACE TO PUT IT?
034662  001404                  BEQ     3$              ;NO--BRANCH
034664  011011                  MOV     (R0),(R1)       ;YES--MOVE "FROM" TO "TO"
034666  030403          2$:     BIT     R4,R3           ;"TO" PARAMETER?
034670  001401                  BEQ     3$              ;NO--BRANCH
034672  005721                  TST     (R1)+           ;YES--UPDATE THE POINTER
034674  005720          3$:     TST     (R0)+           ;UPDATE FROM POINTER
034676  006304                  ASL     R4              ;POSITION THE TEST BIT
034700  032704  002000          BIT     #BIT10,R4       ;DONE?
034704  001763                  BEQ     1$              ;NO--BRANCH
034706  104413                  RESREG                  ;RESTORE R0 - R5
034710  000207                  RTS     PC              ;RETURN
                        ;THIS ROUTINE IS USED TO CHECK IF AN
                        ;ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7.
                        ;CALL
                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
                        ;       JSR     R0,@#CK.OCT     ;CHECK THE CHARACTER
                        ;       RETURN1                 ;CHARACTER IS NOT BETWEEN 0-7
                        ;       RETURN2                 ;CHARACTER IS IN R2 AS A
                        ;                               ;OCTAL DIGIT
034712  121127  000060  CK.OCT: CMPB    (R1),#'0        ;LESS THAN ZERO?
034716  103407                  BLO     1$              ;YES -- BRANCH
034720  121127  000067          CMPB    (R1),#'7        ;GREATER THAN SEVEN?
034724  101004                  BHI     1$              ;YES -- BRANCH
034726  111102                  MOVB    (R1),R2         ;GET THE CHARACTER
034730  042702  177770          BIC     #^C7,R2         ;STRIP AWAY THE ASCII
034734  005720                  TST     (R0)+           ;ADJUST FOR RETURN
034736  000200          1$:     RTS     R0              ;RETURN

                        ;THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
```

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                                        ;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

034740  121127  000060         CK.DEC: CMPB    (R1),#'0        ;LESS THAN ZERO?
034744  103407                        BLO     1$              ;YES -- BRANCH
034746  121127  000071                CMPB    (R1),#'9                ;GREATER THAN NINE?
034752  101004                        BHI     1$              ;YES -- BRANCH
034754  111102                        MOVB    (R1),R2         ;GET THE CHARACTER
034756  042702  000060                BIC     #'0,R2          ;STRIP AWAY THE ASCII
034762  005720                        TST     (R0)+           ;ADJUST FOR RETURN
034764  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

034766  105711                 CK.CHR: TSTB    (R1)            ;"CARRIAGE RETURN"?
034770  001420                        BEQ     4$              ;YES -- BRANCH
034772  121127  000057                CMPB    (R1),#'/        ;"SLASH"?
034776  001414                        BEQ     3$              ;YES -- BRANCH
035000  121127  000054                CMPB    (R1),#',        ;"COMMA"?
035004  001410                        BEQ     2$              ;YES -- BRANCH
035006  121127  000056                CMPB    (R1),#'.        ;"PERIOD"?
035012  001404                        BEQ     1$              ;YES -- BRANCH
035014  004037  034740                JSR     R0,@#CK.DEC     ;"DIGIT"?
035020  000406                        BR      5$              ;NO -- BRANCH
035022  005720                        TST     (R0)+           ;DIGIT BETWEEN 0-9
035024  005720                 1$:     TST     (R0)+           ;PERIOD
035026  005720                 2$:     TST     (R0)+           ;COMMA
035030  005720                 3$:     TST     (R0)+           ;SLASH
035032  005720                 4$:     TST     (R0)+           ;CARRIAGE RETURN
035034  005201                         INC     R1              ;MOVE POINTER TO NEXT CHARACTER
035036  011000                 5$:     MOV     (R0),R0         ;UNKNOWN CHARACTER
035040  000200                         RTS     R0              ;RETURN

                                        ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
                                        ;CHARACTERS AND FORMS A DECIMAL VALUE BINARY NUMBER IN R2.
                                        ;CALL
                                        ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
                                        ;       MOV     #NUM,R2         ;MAX. MAGNITUDE OF INPUT NUMBER
                                        ;       JSR     R0,@#CK.DIG     ;CHECK DIGITS
                                        ;       RETURN  ADR1            ;ILLEGAL CHARACTER -- R2=?
```

```
                                        ;       RETURN  ADR2            ;INPUT NUMBER TO LARGE -- R2=?
                                        ;       RETURN  ADR3            ;"COMMA" -- R2 = NUMBER
                                        ;       RETURN  ADR4            ;"PERIOD" -- R2 = NUMBER
                                        ;       RETURN  ADR5            ;"PERIOD-PERIOD" -- R2 = NUMBER

035042  010446                          CK.DIG: MOV     R4,-(SP)        ;SAVE R4
035044  010346                                  MOV     R3,-(SP)        ;SAVE R3
035046  010246                                  MOV     R2,-(SP)        ;SAVE THE MAX. SIZE ON THE STACK
035050  005002                                  CLR     R2              ;START WITH 0
035052  005003                                  CLR     R3
035054  005004                                  CLR     R4
035056  004037  034766                        JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
035062  035212                                  8$                      ;ILLEGAL CHARACTER
035064  035212                                  8$                      ;CARRIAGE RETURN
035066  035212                                  8$                      ;"/"
035070  035212                                  8$                      ;"."
035072  035212                                  8$                      ;","
035074  035076                                  1$                      ;DIGIT 0-9
035076  006303                          1$:     ASL     R3              ;2
035100  010346                                  MOV     R3,-(SP)        ;SAVE *2
035102  006303                                  ASL     R3              ;4
035104  006303                                  ASL     R3              ;8
035106  062603                                  ADD     (SP)+,R3        ;(*8)+(*2)=*10.
035110  060203                                  ADD     R2,R3           ;UPDATE THE INPUT NUMBER
035112  004037  034766                        JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
035116  035212                                  8$                      ;ILLEGAL CHARACTER
035120  035132                                  9$                      ;CARRIAGE RETURN
035122  035212                                  8$                      ;"/"
035124  035140                                  3$                      ;"."
035126  035136                                  2$                      ;","
035130  035076                                  1$                      ;DIGIT 0-9
035132  005301                          9$:     DEC     R1              ;BACKUP THE CHARACTER POINTER
035134  000401                                  BR      3$              ;CONTINE
035136  005724                          2$:     TST     (R4)+           ;"PERIOD"
035140  005724                          3$:     TST     (R4)+           ;"COMMA" OR "CR"
035142  004037  034766                        JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
035146  035212                                  8$                      ;ILLEGAL CHARACTER
035150  035202                                  6$                      ;CARRIAGE RETURN
035152  035212                                  8$                      ;"/"
035154  035212                                  8$                      ;"."
035156  035162                                  4$                      ;","
035160  035172                                  5$                      ;DIGIT 0-9
035162  005724                          4$:     TST     (R4)+           ;"PERIOD-PERIOD"
035164  105711                                  TSTB    (R1)            ;"CR"?
035166  001405                                  BEQ     6$              ;YES--BRANCH
035170  000410                                  BR      8$
035172  126127  177776  000054          5$:     CMPB    -2(R1),#',      ;WAS CHARACTER BEFORE THE DIGIT A COMMA?
035200  001004                                  BNE     8$              ;NO--EXIT
035202  020316                          6$:     CMP     R3,(SP)         ;INPUT TO LARGE?
035204  101001                                  BHI     7$              ;YES -- BRANCH
035206  060400                                  ADD     R4,R0           ;ADJUST RETURN ADDRESS
035210  005720                          7$:     TST     (R0)+
035212  010302                          8$:     MOV     R3,R2           ;NUMBER TO R2
035214  005726                                  TST     (SP)+           ;CLEAN MAX. SIZE OFF OF STACK
035216  012603                                  MOV     (SP)+,R3        ;RESTORE R3
035220  012604                                  MOV     (SP)+,R4        ;RESTORE R4
```

```
6654  035222  011000                    MOV     (R0),R0         ;GET RETURN ADDRESS
6655  035224  000200                    RTS     R0              ;RETURN
6656
6657                                    ;THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
6658                                    ;AND FORMS AN OCTAL NUMBER IN R2
6659                                    ;CALL:
6660                                    ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
6661                                    ;       JSR     R0,@#CK.NUM     ;GO FORM THE NUMBER
6662                                    ;       RETURN  ADR1            ;ILLEGAL CHARACTER IN THE INPUT STRING
6663                                    ;       RETURN  ADR2            ;"COMMA" OR "CR"--R2=NUMBER
6664                                    ;       RETURN  ADR3            ;"PERIOD"--R2=NUMBER
6665                                    ;       RETURN  ADR4            ;"PERIOD-PERIOD"--R2=NUMBER
6666
6667  035226  010346                    CK.NUM: MOV     R3,-(SP)        ;SAVE R3
6668  035230  005003                            CLR     R3              ;START NUMBER AT ZERO
6669  035232  004037  034712                    JSR     R0,@#CK.OCT     ;OCTAL DIGIT?
6670  035236  000440                            BR      6$              ;NO--BRANCH
6671  035240  005201                    1$:     INC     R1              ;MOVE TO NEXT CHARACTER
6672  035242  006303                            ASL     R3              ;FOR THE OCTAL NUMBER IN R3
6673  035244  103435                            BCS     6$              ;DON'T LET IT GET TO BIG
6674  035246  006303                            ASL     R3
6675  035250  103433                            BCS     6$
6676  035252  006303                            ASL     R3
6677  035254  103431                            BCS     6$
6678  035256  060203                            ADD     R2,R3
6679  035260  004037  034712                    JSR     R0,@#CK.OCT     ;IS THIS AN OCTAL DIGIT?
6680  035264  000401                            BR      2$              ;NO--FIND OUT WHAT IT IS
6681  035266  000764                            BR      1$              ;YES--MAKE IT PART OF THE NUMBER
6682  035270  010302                    2$:     MOV     R3,R2           ;SAVE THE OCTAL NUMBER
6683  035272  005003                            CLR     R3              ;START WITH ZERO INDEX
6684  035274  004037  034766                    JSR     R0,@#CK.CHR     ;CHECK ONE CHARACTER
6685  035300  035340                            6$                      ;ILLEGAL CHARACTER
6686  035302  035330                            5$                      ;CARRIAGE RETURN
6687  035304  035340                            6$                      ;"/"
6688  035306  035330                            5$                      ;":"
6689  035310  035314                            3$                      ;","
6690  035312  035340                            6$                      ;DIGIT 0-9
6691  035314  005723                    3$:     TST     (R3)+           ;"PERIOD"
6692  035316  121127  000056                    CMPB    (R1),#'.        ;"PERIOD-PERIOD"?
6693  035322  001002                            BNE     5$              ;NO--BRANCH
6694  035324  005201                            INC     R1              ;YES--ADVANCE THE POINTER
6695  035326  005723                    4$:     TST     (R3)+           ;"PERIOD-PERIOD"
6696  035330  005723                    5$:     TST     (R3)+           ;"COMMA"
6697  035332  105711                            TSTB    (R1)            ;"CR"?
6698  035334  001001                            BNE     6$              ;NO--BRANCH
6699  035336  060300                            ADD     R3,R0           ;YES--SAVE THE OCTAL NUMBER
6700  035340  012603                    6$:     MOV     (SP)+,R3        ;RESTORE R3
6701  035342  011000                            MOV     (R0),R0         ;PICKUP EXIT ADDRESS
6702  035344  000200                            RTS     R0              ;RETURN
```

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

                                .SBTTL  SINGLE/DUAL PORT RH70/RM03 DRIVER (REV 1.0)

                                ;COPYRIGHT (C) 1976
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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

035346  000000  000000  000000  RMERRS: .WORD   0,0,0,0
035354  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

035356      000                 DRVACT: .BYTE   0               ;DRIVE 0
035357      000                         .BYTE   0               ;DRIVE 1
035360      000                         .BYTE   0               ;DRIVE 2
035361      000                         .BYTE   0               ;DRIVE 3
035362      000                         .BYTE   0               ;DRIVE 4
035363      000                         .BYTE   0               ;DRIVE 5
035364      000                         .BYTE   0               ;DRIVE 6
035365      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

035366      000                 DRVSTA: .BYTE   0               ;DRIVE 0
035367      000                         .BYTE   0               ;DRIVE 1
035370      000                         .BYTE   0               ;DRIVE 2
035371      000                         .BYTE   0               ;DRIVE 3
035372      000                         .BYTE   0               ;DRIVE 4
035373      000                         .BYTE   0               ;DRIVE 5
035374      000                         .BYTE   0               ;DRIVE 6
035375      000                         .BYTE   0               ;DRIVE 7

                                ;TABLE OF DRIVE TYPES (DRVTYP=8 BYTES)
                                        ;DRVTYP=0 IF DRIVE IS NONEXISTENT (DRVSTA=0, ALSO)
                                        ;DRVTYP=4 IF DRIVE IS RM03
                                        ;DRVTYP=-1 IF NOT RM03

035376      000                 DRVTYP: .BYTE   0               ;DRIVE 0
035377      000                         .BYTE   0               ;DRIVE 1
```

```
6759  035400  000                     .BYTE   0               ;DRIVE 2
6760  035401  000                     .BYTE   0               ;DRIVE 3
6761  035402  000                     .BYTE   0               ;DRIVE 4
6762  035403  000                     .BYTE   0               ;DRIVE 5
6763  035404  000                     .BYTE   0               ;DRIVE 6
6764  035405  000                     .BYTE   0               ;DRIVE 7
6765
6766                          ;TABLE OF DUAL PORT INITIALIZATION INDICATORS
6767                                  ;DPINT=0 IF INITIALIZATION IS NOT ACTIVE ON THE DRIVE
6768                                  ;DPINT<0 IF INITIALIZATION IS IN PROGRESS
6769
6770  035406  000                     DPINT:  .BYTE   0               ;DRIVE 0
6771  035407  000                             .BYTE   0               ;DRIVE 1
6772  035410  000                             .BYTE   0               ;DRIVE 2
6773  035411  000                             .BYTE   0               ;DRIVE 3
6774  035412  000                             .BYTE   0               ;DRIVE 4
6775  035413  000                             .BYTE   0               ;DRIVE 5
6776  035414  000                             .BYTE   0               ;DRIVE 6
6777  035415  000                             .BYTE   0               ;DRIVE 7
6778
6779                          ;TABLE OF PENDING DUAL PORT REQUESTS
6780                                  ;DPRQS=0 IF THAT A DUAL PORT REQUEST IS NOT PENDING FOR THAT DRIVE
6781                                  ;DPRQS<0 IF THAT A DUAL PORT REQUEST IS PENDING FOR THAT DRIVE
6782
6783  035416  000                     DPRQS:  .BYTE   0               ;DRIVE 0
6784  035417  000                             .BYTE   0               ;DRIVE 1
6785  035420  000                             .BYTE   0               ;DRIVE 2
6786  035421  000                             .BYTE   0               ;DRIVE 3
6787  035422  000                             .BYTE   0               ;DRIVE 4
6788  035423  000                             .BYTE   0               ;DRIVE 5
6789  035424  000                             .BYTE   0               ;DRIVE 6
6790  035425  000                             .BYTE   0               ;DRIVE 7
6791
6792                          ;TRANSFER WAIT FLAG (TRNSWT=1 WORD)
6793                                  ;THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
6794                                  ;"DPB" OF THE I/O OPERATION.
6795
6796  035426  000000          TRNSWT: .WORD   0
6797
6798                          ;SEARCH WAIT KEYS (SRCHWT=1 WORD)
6799                                  ;THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
6800                                  ;THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
6801                                  ;REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
6802                                  ;EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
6803
6804  035430  000000          SRCHWT: .WORD   0
6805
6806                          ;RM03 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
6807                                  ;ACTDRV=0 IF DRIVER IS INACTIVE
6808                                  ;ACTDRV>0 IF DRIVER IS ACTIVE
6809
6810  035432  000             ACTDRV: .BYTE   0
6811
6812                          ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
6813                                  ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
6814                                  ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE
```

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6815
6816  035433  000                   ACTSTR: .BYTE   0
6817
6818                                ;UNLOAD FLAG (ULDFLG=8 BYTES)
6819                                        ;ULDFLG=0 IF NO UNLOAD COMMAND
6820                                        ;ULDFLG>0 IF UNLOAD COMMAND IN PROGRESS
6821                                        ;ULDFLG<0 IF UNLOAD COMMAND IN WAIT QUEUE
6822
6823  035434  000                   ULDFLG: .BYTE   0               ;DRIVE 0
6824  035435  000                           .BYTE   0               ;DRIVE 1
6825  035436  000                           .BYTE   0               ;DRIVE 2
6826  035437  000                           .BYTE   0               ;DRIVE 3
6827  035440  000                           .BYTE   0               ;DRIVE 4
6828  035441  000                           .BYTE   0               ;DRIVE 5
6829  035442  000                           .BYTE   0               ;DRIVE 6
6830  035443  000                           .BYTE   0               ;DRIVE 7
6831
6832                                ;LOOK AHEAD COUNT (LACNT=8 BYTES)
6833                                        ;LACNT WILL INDICATE THE NUMBER OF LOOK AHEADS PERFORMED
6834
6835  035444  000                   LACNT:  .BYTE   0               ;DRIVE 0
6836  035445  000                           .BYTE   0               ;DRIVE 1
6837  035446  000                           .BYTE   0               ;DRIVE 2
6838  035447  000                           .BYTE   0               ;DRIVE 3
6839  035450  000                           .BYTE   0               ;DRIVE 4
6840  035451  000                           .BYTE   0               ;DRIVE 5
6841  035452  000                           .BYTE   0               ;DRIVE 6
6842  035453  000                           .BYTE   0               ;DRIVE 7
6843
6844                                ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
6845                                        ;SAVEFG <0 IF SAVE THE RH70/RM03 REGISTERS WHEN THE
6846                                        ;OPERATIUN IS COMPLETED AS PER (DPB+14).
6847                                        ;SAVEFG=0 IF SAVE THE RH70/RM03 REGISTERS, AS PER
6848                                        ;(DPB+14), AFTER AN ERROR.
6849
6850  035454  000000                SAVEFG: .WORD   0
6851
6852                                ;SEEK FLAG (SEEKFG=1 WORD)
6853                                        ;SEEKFG=0 IF WHEN THE DISK ADDRESS ISN'T IN THE WINDOW
6854                                        ;FOR A DATA TRANSFER START A SEARCH COMMAND
6855                                        ;SEEKFG<0 IF DATA TRANSFER WILL DO IMPLIED SEEKS,
6856                                        ;DISREGARD THE WINDOW
6857
6858  035456  177777                SEEKFG: .WORD   -1
6859
6860                                ;TIMEOUT TABLE (TIMER=8 WORDS)
6861                                        ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
6862
6863  035460  177777                TIMER:  .WORD   -1      ;DRIVE 0
6864  035462  177777                        .WORD   -1      ;DRIVE 1
6865  035464  177777                        .WORD   -1      ;DRIVE 2
6866  035466  177777                        .WORD   -1      ;DRIVE 3
6867  035470  177777                        .WORD   -1      ;DRIVE 4
6868  035472  177777                        .WORD   -1      ;DRIVE 5
6869  035474  177777                        .WORD   -1      ;DRIVE 6
6870  035476  177777                        .WORD   -1      ;DRIVE 7
```

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                                ;DATA TRANSFER UNDERWAY INDICATOR (DTUW=1 WORD)
                                        ;DTUW<0 IF NO DATA TRANSFER UNDERWAY
                                        ;DTUW=+N (WHERE N=0 TO 7) IMPLIES DATA TRANSFER UNDERWAY ON DRIVE N

035500  177777                  DTUW:   .WORD   -1

                                ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
                                        ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
                                        ;ATTENTION BIT

035502      001                 ATABIT: .BYTE   1       ;DRIVE 0
035503      002                         .BYTE   2       ;DRIVE 1
035504      004                         .BYTE   4       ;DRIVE 2
035505      010                         .BYTE   10      ;DRIVE 3
035506      020                         .BYTE   20      ;DRIVE 4
035507      040                         .BYTE   40      ;DRIVE 5
035510      100                         .BYTE   100     ;DRIVE 6
035511      200                         .BYTE   200     ;DRIVE 7

                                ;FSRM03 TO RH70 "MASSBUS CONTROL BUS PARITY ERRORS" (MCPE) ALLOWED BEFORE
                                ;CALLING IT FATAL (MCPEMX=1 WORD)

035512  000003                  MCPEMX: .WORD   3

                                ;STORAGE FOR RMADR (THE FIRST ADDRESS (776700) OF THE RH70/RM03),
                                ;RMVEC (THE VECTOR ADDRESS (254)), AND RMVEC+2 (THE BR LEVEL (5)).

035514  176700                  RMADR:  .WORD   176700
035516  000254  000240          RMVEC:  .WORD   254,5*32.

                                ;MAXIMUM NUMBER OF LOOK AHEADS ALLOWED IS 4 (MXLACT=1 WORD)

035522  000004                  MXLACT: .WORD   4
                                ;MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)

035524  001000                  MXDLTA: .WORD   8.*64.
                                ;MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)

035526  000200                  MNDLTA: .WORD   2*64.
                                ;MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)

035530  000005                  MXWNDW: .WORD   5

                                ;DEFINITIONS OF THE RH70/RM03 ADDRESS INDEXES

        000000                  RMCS1=0                 ;CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
        000002                  RMWC=2                  ;WORD COUNT REGISTER (NOT A DRIVE REG)
        000004                  RMBA=4                  ;UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
        000006                  RMDA=6                  ;DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
        000010                  RMCS2=10                ;CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
        000012                  RMDS=12                 ;DRIVE STATUS REGISTER (DRIVE REG 01)
        000014                  RMER1=14                ;ERROR REGISTER #1 (DRIVE REG. 02)
        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.)
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                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
                                        ;
035532  104412                  RMINIT: SAVREG                          ;SAVE R0 - R5
035534  013746  177776                  MOV     @#PS,-(SP)              ;SAVE THE PRESENT PROCESSOR STATUS
035540  012737  000240  177776          MOV     #<5*32.>,@#PS           ;CHANGE THE PRIORITY TO 5
035546  004737  043346                  JSR     PC,CLRQUE               ;CLEAR ALL REQUEST QUEUES
035552  012701  035346                  MOV     #RMERRS,R1              ;FIRST ADDRESS TO BE CLEARED
035556  012702  035456                  MOV     #SEEKFG,R2              ;LAST ADDRESS TO BE CLEARED
035562  005021                  1$:     CLR     (R1)+                   ;CLEAR
035564  020102                          CMP     R1,R2                   ;ARE WE DONE?
035566  103775                          BLO     1$                      ;BRANCH IF NO
035570  012702  035500                  MOV     #DTUW,R2                ;LAST ADDRESS
035574  012721  177777          2$:     MOV     #-1,(R1)+               ;INITIALIZE
035600  020102                          CMP     R1,R2                   ;DONE?
035602  101774                          BLOS    2$                      ;LOOP IF NO
035604  005037  035366                  CLR     DRVSTA                  ;SET ALL DRIVES TO OFFLINE
035610  005037  035370                  CLR     DRVSTA+2
035614  005037  035372                  CLR     DRVSTA+4
035620  005037  035374                  CLR     DRVSTA+6
035624  013703  035516                  MOV     RMVEC,R3                ;SETUP THE RH70/RM03 VECTOR
035630  012723  040320                  MOV     #ISR,(R3)+
035634  013713  035520                  MOV     RMVEC+2,(R3)
035640  013704  035514                  MOV     RMADR,R4                ;FIRST ADDRESS OF RH70/RM03
035644  012764  000040  000010          MOV     #BIT05,RMCS2(R4)          ;MASSBUS INIT
035652  005001                          CLR     R1                      ;START WITH DRIVE 0
035654  004037  035744          3$:     JSR     R0,DRVINT               ;INIT THE DRIVE
035660  000401                          BR      4$                      ;'DVA' NOT SET OR PARITY ERROR
035662  000402                          BR      5$                      ;NORMAL RETURN
035664  105061  035366          4$:     CLRB    DRVSTA(R1)              ;SET DRIVE STATUS TO OFFLINE
035670  005201                  5$:     INC     R1                      ;GO TO NEXT DRIVE
035672  042701  177770                  BIC     #^C7,R1                 ;MASK OUT UNUSED BITS
035676  001366                          BNE     3$                      ;BR IF MORE DRIVES TO GO
035700  012701  000007                  MOV     #7,R1                   ;START WITH DRIVE 7
035704  005037  177776                  CLR     @#PS                    ;CLEAR THE PROCESSOR STATUS
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  6983  035710  105761  035406          6$:     TSTB    DPINT(R1)       ;WAITING FOR DRIVE TO SWITCH PORTS ?
  6984  035714  001405                          BEQ     8$              ;BR NOT WAITING
  6985  035716  004737  043002                  JSR     PC,SET.IE       ;SET INTERRUPT
  6986  035722  105761  035406          7$:     TSTB    DPINT(R1)       ;DRIVE SWITCHED PORTS ?
  6987  035726  001375                          BNE     7$              ;BR IF NOT
  6988  035730  005301                  8$:     DEC     R1              ;GO TO THE NEXT DRIVE
  6989  035732  100366                          BPL     6$              ;CHECK NEXT DRIVE
  6990  035734  012637  177776                  MOV     (SP)+,@#PS      ;RESTORE THE PROCESSOR STATUS
  6991  035740  104413                          RESREG                  ;RESTORE R0 - R5
  6992  035742  000207                          RTS     PC              ;BYE-BYE
  6993
  6994                                  ;DRIVE INITILIZATION ROUTINE
  6995                                          ;THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
  6996                                          ;AN RM03. IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT22
  6997                                          ;IS SET TO A "1". THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
  6998                                          ;INSURE THEY ARE ALL ON A "1". AND DEPENDING ON THEIR STATE,
  6999                                          ;DRVSTA IS SET TO THE PROPER CONDITION.
  7000                                  ;CALL
  7001                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
  7002                                  ;       MOV     RMADR,R4        ;UNIBUS ADDRESS OF RH70/RM03 (RMCS1)
  7003                                  ;       JSR     R0,DRVINT       ;CALLED BY A JSR
  7004                                  ;       RETURN1                 ;ERROR OCCURRED (PARITY)
  7005                                  ;       RETURN2                 ;NORMAL RETURN
  7006                                  ;
  7007
  7008  035744  010546                  DRVINT: MOV     R5,-(SP)        ;SAVE R5
  7009  035746  105061  035366          DULP:   CLRB    DRVSTA(R1)      ;START DRIVE STATUS AS OFFLINE
  7010  035752  105061  035376                  CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
  7011  035756  105061  035434                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
  7012  035762  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT A DRIVE
  7013  035766  112764  000111  000000          MOVB    #111,RMCS1(R4)  ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
  7014  035774  032764  010000  000010          BIT     #BIT12,RMCS2(R4) ;NONEXISTENT DRIVE?
  7015  036002  001403                          BEQ     1$              ;NO---BRANCH
  7016  036004  004737  043002                  JSR     PC,SET.IE       ;GO SET "IE" WITHOUT A "TRE"
  7017  036010  000476                          BR      6$              ;LEAVE THIS ROUTINE
  7018  036012  105061  035366          1$:     CLRB    DRVSTA(R1)      ;SET DRIVE STATUS TO OFFLINE
  7019  036016  032764  004000  000000          BIT     #BIT11,RMCS1(R4)  ;SEE IF DRIVE AVAILABLE
  7020  036024  001750                          BEQ     DULP            ;BR IF DRIVE NOT AVAILABLE
  7021  036026  004037  042312                  JSR     R0,RD.RM        ;READ THE DRIVE TYPE REG.
  7022  036032  000026                          RMDT
  7023  036034  036232                          8$                      ;ERROR RETURN ADDRESS
  7024  036036  012605                          MOV     (SP)+,R5        ;PUT DRIVE TYPE IN R5
  7025  036040  112761  000004  035376          MOVB    #4,DRVTYP(R1)   ;SET RM03 INDICATOR
  7026  036046  022705  020024                  CMP     #20024,R5       ;SINGLE PORT RM03 ?
  7027  036052  001407                          BEQ     2$              ;BR IF YES
  7028  036054  022705  024024                  CMP     #24024,R5       ;DUAL PORT RM03 ?
  7029  036060  001404                          BEQ     2$              ;BR IF YES
  7030  036062  112761  177777  035376          MOVB    #-1,DRVTYP(R1)  ;SET INDICATOR TO 'OTHER'
  7031  036070  000446                          BR      6$              ;EXIT
  7032  036072  012746  000121          2$:     MOV     #121,-(SP)      ;DO A "READ-IN PRESET"
  7033  036076  004037  042472                  JSR     R0,WRT.RM
  7034  036102  000000                          RMCS1
  7035  036104  036232                          8$
  7036  036106  012746  010000                  MOV     #BIT12,-(SP)    ;SET FMT22=1
  7037  036112  004037  042472                  JSR     R0,WRT.RM
  7038  036116  000032                          RMOF
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7039  036120  036232                          8$
7040  036122  004037  042312                  JSR     R0,RD.RM        ;READ RMDS
7041  036126  000012                          RMDS
7042  036130  036232                          8$
7043  036132  012605                          MOV     (SP)+,R5        ;AND SAVE IT IN R5
7044  036134  100015                          BPL     4$              ;BRANCH IF ATA=0
7045  036136  116164  035502  000016          MOVB    ATABIT(R1),RMAS(R4) ;CLEAR ATTENTION BIT
7046  036144  004037  042312                  JSR     R0,RD.RM        ;FIND OUT WHY ATA=1
7047  036150  000014                          RMER1
7048  036152  036232                          8$
7049  036154  006126                          ROL     (SP)+           ;IS IT UNSAFE?
7050  036156  100004                          BPL     4$              ;BR IF NOT
7051  036160  112761  177777  035366          MOVB    #-1,DRVSTA(R1)  ;SET UNSAFE INDICATOR
7052  036166  000407                          BR      6$              ;EXIT
7053  036170  005105                  4$:     COM     R5              ;CHECK MOL, DPR, DRY, AND VV
7054  036172  042705  167077                  BIC     #^C<BIT12!BIT08!BIT07!BIT06>,R5
7055  036176  001003                          BNE     6$              ;BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
7056  036200  112761  000001  035366          MOVB    #1,DRVSTA(R1)   ;SET DRIVE STATUS TO ONLINE
7057  036206  005720                  6$:     TST     (R0)+           ;STEP OVER THE ERROR RETURN
7058  036210  000410                          BR      8$              ;EXIT
7059  036212  006301                  7$:     ASL     R1              ;CHANGE INDEX TO ADDRESS WORDS
7060  036214  012761  003720  035460          MOV     #2000.,TIMER(R1)  ;START 2 SEC TIMER
7061  036222  006201                          ASR     R1              ;RESTORE R1
7062  036224  112761  177777  035406          MOVB    #-1,DPINT(R1)   ;SET PORT INITIALIZE INIDICATOR
7063  036232  012605                  8$:     MOV     (SP)+,R5        ;RESTORE R5
7064  036234  000200                          RTS     R0              ;EXIT
7065
7066                                  ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
7067                                  ;
7068                                  ;CALL
7069                                  ;
7070                                  ;       JSR     R0,@#RM03       ;CALL THE RM03 DRIVER
7071                                  ;       PNTADR                  ;ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
7072                                  ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
7073                                  ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
7074                                                                  ;IS AN ERROR CONDITION
7075
7076  036236  013746  177776          RM03:   MOV     @#PS,-(SP)      ;SAVE THE CALLING STATUS
7077  036242  013737  035520  177776          MOV     RMVEC+2,@#PS    ;DON'T ALLOW ANY RM03 INTERRUPTS
7078  036250  112737  000001  035432          MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
7079  036256  104412                          SAVREG                  ;SAVE R0 - R5
7080  036260  011002                          MOV     (R0),R2         ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
7081  036262  005062  000016                  CLR     16(R2)          ;CLEAR THE STATUS/ERROR INDICATOR
7082  036266  111201                          MOVB    (R2),R1         ;PICKUP THE DRIVE NUMBER
7083  036270  013704  035514                  MOV     RMADR,R4        ;UNIBUS ADDRESS OF RMCS1
7084  036274  105761  035366                  TSTB    DRVSTA(R1)      ;CHECK DRIVES STATUS
7085  036300  003014                          BGT     1$              ;BRANCH IF ONLINE
7086  036302  105761  035434                  TSTB    ULDFLG(R1)      ;UNLOAD COMMAND IN QUEUE?
7087  036306  001036                          BNE     3$              ;BRANCH IF YES
7088  036310  105761  035406                  TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE
7089  036314  001042                          BNE     5$              ;BR IF YES
7090  036316  004037  035744                  JSR     R0,DRVINT       ;GO INIT. THE DRIVE
7091  036322  000434                          BR      4$              ;ERROR RETURN
7092  036324  105761  035366                  TSTB    DRVSTA(R1)      ;IS DRIVE STATUS ONLINE?
7093  036330  003445                          BLE     6$              ;BR IF NOT
7094  036332  105761  035416          1$:     TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
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7095  036336  001031                        BNE     5$                      ;BR IF YES
7096  036340  010164  000010                MOV     R1,RMCS2(R4)            ;SELECT THE DRIVE
7097  036344  004037  043444                JSR     R0,DRVQUE               ;PUT THIS REQUEST IN QUEUE
7098  036350  000460                        BR      9$                      ;QUEUE IS FULL
7099  036352  122762  000103  000002        CMPB    #103,2(R2)              ;IS THIS REQ. FOR AN UNLOAD?
7100  036360  001003                        BNE     2$                      ;BR IF NO
7101  036362  112761  177777  035434        MOVB    #-1,ULDFLG(R1)          ;SET THE "UNLOAD IN QUEUE" FLAG
7102  036370  105761  035356          2$:   TSTB    DRVACT(R1)              ;IS THIS DRIVE ACTIVE?
7103  036374  001043                        BNE     8$                      ;BR IF YES
7104  036376  004737  036530                JSR     PC,OPT                  ;CALL THE OPTIMIZER
7105  036402  000440                        BR      8$
7106  036404  012762  120000  000016  3$:   MOV     #BIT15!BIT13,16(R2) ;SET THE "UNLOAD IN QUEUE" ERROR FLAG
7107  036412  000434                        BR      8$                      ;EXIT
7108  036414  004737  037610          4$:   JSR     PC,CI7                  ;GO HANDLE THE PARITY ERROR
7109  036420  000431                        BR      8$
7110  036422  004037  043444          5$:   JSR     R0,DRVQUE               ;PUT REQUEST IN QUEUE
7111  036426  000431                        BR      9$                      ;QUEUE IS FULL
7112  036430  032714  000100                BIT     #BIT06,(R4)             ;IE BIT SET ?
7113  036434  001023                        BNE     8$                      ;YES
7114  036436  004737  043002                JSR     PC,SET.IE               ;SET THE INTERRUPT
7115  036442  000420                        BR      8$                      ;RETURN
7116  036444  105761  035366          6$:   TSTB    DRVSTA(R1)              ;SEE IF DRIVE OFFLINE OR UNSAFE
7117  036450  002412                        BLT     7$                      ;BR IF UNSAFE
7118  036452  012762  140000  000016        MOV     #BIT15!BIT14,16(R2)  ;SET OFFLINE ERROR INDICATOR
7119  036460  105761  035376                TSTB    DRVTYP(R1)              ;SEE IF OFFLINE OR NONEXISTENT
7120  036464  001007                        BNE     8$                      ;BR IF OFFLINE
7121  036466  012762  100002  000016        MOV     #BIT15!BIT01,16(R2)  ;REPORT DRIVE NONEXISTENT
7122  036474  000403                        BR      8$                      ;GO TO EXIT
7123  036476  012762  110000  000016  7$:   MOV     #BIT15!BIT12,16(R2)  ;DRIVE IS UNSAFE
7124  036504  104413                  8$:   RESREG                          ;RESTORE R0 - R5
7125  036506  005720                        TST     (R0)+                   ;SETUP FOR NORMAL RETURN
7126  036510  000401                        BR      10$                     ;FINISH UP, THEN EXIT
7127  036512  104413                  9$:   RESREG                          ;RESTORE R0 - R5
7128  036514  005720                  10$:  TST     (R0)+                   ;CORRECT THE RETURN ADDRESS
7129  036516  105037  035432                CLRB    ACTDRV                  ;CLEAR "ACTIVE DRIVER" FLAG
7130  036522  012637  177776                MOV     (SP)+,@#PS              ;RETURN "PS" TO USER LEVEL
7131  036526  000200                        RTS     R0                      ;RETURN TO CALLER
7132
7133                                  ;OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
7134                                  ;
7135                                  ;CALL
7136                                  ;       MOV     #DRVNUM,R1              ;DRIVE NUMBER TO R1
7137                                  ;       JSR     PC,OPT                  ;SETUP A COMMAND
7138                                  ;
7139  036530  104412                  OPT:   SAVREG                          ;SAVE R0 - R5
7140  036532  013746  177776                MOV     @#PS,-(SP)              ;SAVE PROC. STATUS
7141  036536  146137  035502  035430        BICB    ATABIT(R1),SRCHWT       ;CLEAR LA SEACH FLAG
7142  036544  105061  035416                CLRB    DPRQS(R1)               ;RESET THE PORT REQ FLAG ****
7143  036550  004737  043520                JSR     PC,GETREQ               ;GET "DPB" POINTER OF REQUEST
7144  036554  005702                        TST     R2                      ;IS THERE A REQUEST IN QUEUE?
7145  036556  001472                        BEQ     7$                      ;NO--BRANCH TO EXIT
7146  036560  010164  000010                MOV     R1,RMCS2(R4)            ;LOAD THE DRIVE ADDRESS *******
7147  036564  012764  000111  000000        MOV     #111,RMCS1(R4)          ;CLEAR THE DRIVE
7148  036572  032764  004000  000000        BIT     #BIT11,RMCS1(R4)        ;DVA SET ?
7149  036600  001446                        BEQ     5$                      ;TO PROT REQUEST ,IF NOT
7150  036602  105761  035366          10$:  TSTB    DRVSTA(R1)              ;IS DRIVE ONLINE?
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 7151  036606  003014                        BGT     1$                      ;YES--BRANCH
 7152  036610  004737  043542                JSR     PC,POPQUE               ;NO--REMOVE REQUEST FROM QUEUE
 7153  036614  012762  140000  000016        MOV     #BIT15!BIT14,16(R2)  ;SET OFFLINE STATUS/ERROR INDICATOR
 7154  036622  105761  035366                TSTB    DRVSTA(R1)              ;IS DRIVE UNSAFE ?
 7155  036626  100053                        BPL     8$                      ;BR TO EXIT IF NOT
 7156  036630  012762  110000  000016        MOV     #BIT15!BIT12,16(R2)  ;SET UNSAFE STATUS/ERROR INDICATOR
 7157  036636  000447                        BR      8$                      ;BRANCH TO EXIT
 7158  036640                          1$:
 7159                                  ;       MOV     #111,-(SP)              ;LOAD COMMAND ONTO THE STACK
 7160                                  ;       JSR     R0,WRT.RM               ;LOAD THE REGISTER
 7161                                  ;       RMCS1                           ;REGISTER INCREMENT
 7162                                  ;       6$                              ;ERROR RETURN ADDRESS
 7163                                  ;       BIT     #BIT11,(R4)             ;DRIVE AVAILABLE ?
 7164                                  ;       BEQ     9$                      ;BR IF NOT
 7165  036640  122762  000150  000002        CMPB    #150,2(R2)              ;IS THE REQUEST FOR I/O?
 7166  036646  002403                        BLT     2$                      ;YES--BRANCH
 7167  036650  004737  037174                JSR     PC,CI4                  ;CALL THE COMMAND INITIATOR
 7168  036654  000440                        BR      8$                      ;BRANCH TO EXIT
 7169  036656  005737  035500          2$:   TST     DTUW                    ;DATA TRANSFER UNDERWAY?
 7170  036662  002012                        BGE     4$                      ;YES--GO START A SEARCH
 7171  036664  005737  035456                TST     SEEKFG                  ;DO IMPLIED SEEKS?
 7172  036670  100404                        BMI     3$                      ;YES---BRANCH
 7173  036672  004037  040144                JSR     R0,LA                   ;NO--DO LOOK AHEAD
 7174  036676  000427                        BR      8$                      ;RETURN HERE ON A PARITY ERROR
 7175  036700  000403                        BR      4$                      ;GO START A SEARCH
 7176  036702  004737  036766          3$:   JSR     PC,CI1                  ;START A DATA TRANSFER
 7177  036706  000423                        BR      8$
 7178  036710  004737  037074          4$:   JSR     PC,CI3                  ;START A SEARCH
 7179  036714  000420                        BR      8$                      ;GO TO THE EXIT
 7180  036716  112761  177777  035416  5$:   MOVB    #-1,DPRQS(R1)           ;SET PORT REQUEST INDICATOR
 7181  036724  010103                        MOV     R1,R3                   ;SET UP TO ADDRESS WORDS
 7182  036726  006303                        ASL     R3                      ;CONVERT TO WORD INDEX
 7183  036730  012763  023420  035460        MOV     #10000.,TIMER(R3)  ;START 10 SEC TIMER
 7184  036736  000402                        BR      7$                      ;EXIT
 7185  036740  004737  037610          6$:   JSR     PC,CI7                  ;PROCESS THE PARITY ERROR
 7186  036744  032714  000100          7$:   BIT     #BIT06,(R4)             ;SEE IF 'IE' ALREADY SET
 7187  036750  001002                        BNE     8$                      ;BR IF SET
 7188  036752  004737  043002                JSR     PC,SET.IE               ;SET "IE" WITHOUT A "TRE"
 7189  036756  012637  177776          8$:   MOV     (SP)+,@#PS              ;RESTORE PROC. STATUS
 7190  036762  104413                        RESREG                          ;RESTORE R0 - R5
 7191  036764  000207                        RTS     PC
 7192
 7193                                  ;COMMAND INITIATOR
 7194                                  ;
 7195                                  ;CALL
 7196                                  ;       MOV     #DRVNUM,R1              ;DRIVE NUMBER
 7197                                  ;       MOV     #DPB,R2                 ;ADDRESS OF DPB
 7198                                  ;       JSR     PC,CI?                  ;CI?= CI1,CI3, OR CI4
 7199                                  ;                                       ;WHERE:
 7200                                  ;                                       ;CI1=DATA TRANSFER
 7201                                  ;                                       ;CI2=SEARCH REQUESTED BY DATA XFER
 7202                                  ;                                       ;CI4=NOT DATA TRANSFER
 7203
 7204  036766  004737  043542          CI1:  JSR     PC,POPQUE               ;REMOVE REQUEST FROM "DRIVES WAIT" QUEUE
 7205  036772  010237  035426                MOV     R2,TRNSWT               ;PUT REQ. IN TRANSFER WAIT QUEUE
 7206  036776  010203                        MOV     R2,R3                   ;DPB ADDRESS TO R3
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7207  037000  013704  035514          MOV     RMADR,R4        ;RMCS1 ADDRESS
7208  037004  010164  000010          MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7209  037010  062703  000004          ADD     #4,R3           ;DESIRED WORD COUNT
7210  037014  062704  000002          ADD     #2,R4           ;RMWC ADDRESS
7211  037020  012324                  MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
7212  037022  012324                  MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
7213  037024  012346                  MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
7214  037026  004037  042472          JSR     R0,WRT.RM       ;CALL THE LOAD(WRITE) ROUTINE
7215  037032  000006                  RMDA                    ;INDEX OF REGISTER TO LOAD
7216  037034  037610                  CI7                     ;ERROR RETURN ADDRESS
7217  037036  012346                  MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
7218  037040  004037  042472          JSR     R0,WRT.RM
7219  037044  000034                  RMDC
7220  037046  037610                  CI7
7221  037050  016246  000002          MOV     2(R2),-(SP)     ;LOAD "COMMAND+GO", "A17&A16", AND "PSEL"
7222  037054  004037  042472          JSR     R0,WRT.RM
7223  037060  000000                  RMCS1
7224  037062  037610                  CI7
7225  037064  010137  035500          MOV     R1,DTUW         ;SET "DATA TRANSFER UNDERWAY"
7226  037070  000137  037552          JMP     CI5
7227  037074  013704  035514  CI3:    MOV     RMADR,R4        ;RMCS1 ADDRESS
7228  037100  010164  000010          MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7229  037104  016246  000012          MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
7230  037110  004037  042472          JSR     R0,WRT.RM
7231  037114  000034                  RMDC
7232  037116  037610                  CI7
7233  037120  116203  000010          MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
7234                          ;       SUB     MXWNDW,R3       ;BACKUP BY MAX. SEARCH FOR I/O WINDOW
7235                          ;       BGE     1$
7236                          ;       ADD     #32.,R3
7237  037124  010346          1$:     MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
7238  037126  042716  177740          BIC     #177740,(SP)    ;CHOP OF ALL EXENTED BITS ,IF ANY
7239  037132  116266  000011  000001  MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
7240  037140  004037  042472          JSR     R0,WRT.RM       ;LOAD DESIRED TRACK & SECTOR
7241  037144  000006                  RMDA
7242  037146  037610                  CI7
7243  037150  012746  000131          MOV     #131,-(SP)      ;START A SEARCH
7244  037154  004037  042472          JSR     R0,WRT.RM
7245  037160  000000                  RMCS1
7246  037162  037610                  CI7
7247  037164  156137  035502  035430  BISB    ATABIT(R1),SRCHWT       ;SET "SEARCH WAIT" KEY
7248  037172  000567                  BR      CI5
7249  037174  013704  035514  CI4:    MOV     RMADR,R4        ;RMCS1 ADDRESS
7250  037200  010164  000010          MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7251  037204  116203  000002          MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
7252  037210  122703  000131          CMPB    #131,R3         ;IS IT A SEARCH COMMAND?
7253  037214  001007                  BNE     1$              ;BRANCH IF NO
7254  037216  016246  000010          MOV     10(R2),-(SP)    ;LOAD DESIRED TRACK & SECTOR
7255  037222  004037  042472          JSR     R0,WRT.RM
7256  037226  000006                  RMDA
7257  037230  037610                  CI7
7258  037232  000403                  BR      2$              ;GO LOAD CYLINDER
7259  037234  122703  000105  1$:     CMPB    #105,R3         ;IS IT A SEEK COMMAND
7260  037240  001007                  BNE     3$              ;BRANCH IF NO
7261  037242  016246  000012  2$:     MOV     12(R2),-(SP)    ;LOAD DESIRED CYLINDER
7262  037246  004037  042472          JSR     R0,WRT.RM
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7263  037252  000034                        RMDC
7264  037254  037610                        CI7
7265  037256  000546                        BR      CI6
7266  037260  122703  000115        3$:     CMPB    #115,R3         ;IS IT AN "OFFSET" COMMAND?
7267  037264  001013                        BNE     4$              ;BR IF NO
7268  037266  004037  042312                JSR     R0,RD.RM        ;MERGE THE OFFSET VALUE INTO RMOF
7269  037272  000032                        RMOF                    ;BUT DON'T CHANGE THE UPPER
7270  037274  037610                        CI7
7271  037276  116216  000001                MOVB    1(R2),(SP)      ;BYTE WHEN LOADING THE
7272  037302  004037  042472                JSR     R0,WRT.RM       ;REGISTER (RMOF)
7273  037306  000032                        RMOF
7274  037310  037610                        CI7
7275  037312  000530                        BR      CI6             ;GO START THE COMMAND
7276  037314  122703  000107        4$:     CMPB    #107,R3         ;IS IT A "RECALIBRATE" COMMAND?
7277  037320  001525                        BEQ     CI6             ;BRANCH IF YES
7278  037322  122703  000117                CMPB    #117,R3         ;IS IT A RETURN TO CENTER?
7279  037326  001522                        BEQ     CI6             ;BRANCH IF YES
7280  037330  122703  000103                CMPB    #103,R3         ;IS IT AN "UNLOAD" COMMAND?
7281  037334  001016                        BNE     5$              ;BRANCH IF NO
7282  037336  112761  000001  035356        MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE INDICATOR
7283  037344  105061  035366                CLRB    DRVSTA(R1)      ;PUT DRIVE STATUS TO OFFLINE
7284  037350  112761  000001  035434        MOVB    #1,ULDFLG(R1)   ;SET "UNLOAD IN PROGRESS" FLAG
7285  037356  010346                        MOV     R3,-(SP)        ;START THE "UNLOAD" COMMAND
7286  037360  004037  042472                JSR     R0,WRT.RM
7287  037364  000000                        RMCS1
7288  037366  037610                        CI7
7289  037370  000207                        RTS     PC              ;RETURN TO USER
7290  037372  122703  000143        5$:     CMPB    #143,R3         ;IS IT A "SET FORMAT" COMMAND?
7291  037376  001014                        BNE     6$              ;BRANCH IF NO
7292  037400  004037  042312                JSR     R0,RD.RM        ;READ THE OFFSET REGISTER
7293  037404  000032                        RMOF
7294  037406  037610                        CI7
7295  037410  116266  000001  000001        MOVB    1(R2),1(SP)     ;COMBINE "FMT22","ECI", AND "HCI"
7296  037416  004037  042472                JSR     R0,WRT.RM       ;LOAD "FMT22", "ECI", AND/OR "HCI".
7297  037422  000032                        RMOF
7298  037424  037610                        CI7
7299  037426  000436                        BR      12$
7300  037430  122703  000141        6$:     CMPB    #141,R3         ;IS IT A "GET REGISTER" COMMAND?
7301  037434  001023                        BNE     10$             ;BRANCH IF NO
7302  037436  016203  000006        7$:     MOV     6(R2),R3        ;POINTS TO 1ST ADDRESS OF WHERE
7303                                                                ;TO PUT THE REGISTER(S)
7304  037442  116237  000010  037460        MOVB    10(R2),9$       ;INIT. THE INDEX FOR THE FIRST REG.
7305  037450  116205  000011                MOVB    11(R2),R5       ;INDEX OF LAST REG. TO MOVE
7306  037454  004037  042312        8$:     JSR     R0,RD.RM        ;READ RH70/RM03 REGISTER
7307  037460  000000        9$:     RMCS1                           ;INDEX OF REG. TO READ
7308  037462  037610                        CI7
7309  037464  012623                        MOV     (SP)+,(R3)+     ;GET THE CONTENTS OF RH70//RM03 REG.
7310  037466  023705  037460                CMP     9$,R5           ;LAST REG. BEEN READ?
7311  037472  001414                        BEQ     12$             ;GET OUT IF YES
7312  037474  062737  000002  037460        ADD     #2,9$           ;INCREASE THE INDEX BY 2
7313  037502  000764                        BR      8$              ;LOOP--MORE TO READ
7314  037504  122703  000145        10$     CMPB    #145,R3         ;IS IT A "SELECT DRIVE" COMMAND?
7315  037510  001405                        BEQ     12$             ;BRANCH IF YES
7316  037512  010346                11$:    MOV     R3,-(SP)        ;LOAD THE COMMAND
7317  037514  004037  042472                JSR     R0,WRT.RM
7318  037520  000000                        RMCS1
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7319  037522  037610                        CI7
7320  037524  004737  043542                12$:    JSR     PC,POPQUE       ;REMOVE REQ. FROM QUEUE
7321  037530  052762  000200  000016                BIS     #BIT07,16(R2)   ;SET THE "DONE" BIT
7322  037536  005737  035454                        TST     SAVEFG          ;SAVE THE RH70/RM03 REGISTERS?
7323  037542  100002                        BPL     13$             ;BRANCH IF NO
7324  037544  004737  042664                JSR     PC,SVRH70       ;YES--GO SAVE THE REGISTERS
7325  037550  000207                13$:    RTS     PC              ;RETURN TO USER
7326  037552  006301                CI5:    ASL     R1
7327  037554  012761  001750  035460        MOV     #1000.,TIMER(R1)        ;SET A ONE SECOND TIMER
7328  037562  006201                        ASR     R1
7329  037564  112761  000001  035356        MOVB    #1,DRVACT(R1)   ;SET THE DRIVE ACTIVE
7330  037572  000207                        RTS     PC              ;RETURN TO THE USER
7331  037574  010346                CI6:    MOV     R3,-(SP)        ;LOAD THE COMMAND
7332  037576  004037  042472                JSR     R0,WRT.RM
7333  037602  000000                        RMCS1
7334  037604  037610                        CI7
7335  037606  000761                        BR      CI5
7336  037610  032764  010000  000010  CI7:  BIT     #BIT12,RMCS2(R4)  ;DRIVE NON-EXISTENT ?
7337  037616  001034                        BNE     CI8             ;BR IF YES
7338  037620  005702                1$:     TST     R2              ;ANYTHING IN QUEUE ?
7339  037622  001405                        BEQ     CI7B            ;BR IF NOT
7340  037624  012762  104000  000016        MOV     #BIT15!BIT11,16(R2)     ;SET "PARITY" ERROR INDICATOR
7341  037632  004737  042664                JSR     PC,SVRH70       ;GO SAVE THE RH70/RM03 REGISTERS
7342  037636  012746  000111        CI7B:   MOV     #111,-(SP)      ;DO A "DRIVE CLEAR"
7343  037642  004037  042472                JSR     R0,WRT.RM
7344  037646  000000                        RMCS1
7345  037650  037710                        CI8
7346  037652  004737  043424                JSR     PC,EMPTYQ       ;EMPTY THE QUEUE
7347  037656  105061  035434                CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD IN QUEUE FLAG
7348  037662  105061  035356                CLRB    DRVACT(R1)      ;DRIVE IS IDLE
7349  037666  020137  035500                CMP     R1,DTUW         ;IF THIS DRIVE HAD AN I/O REQUEST
7350  037672  001005                        BNE     1$              ;IN PROGRESS CLEAR ALL OF THE FLAGS
7351  037674  005037  035426                CLR     TRNSWT
7352  037700  012737  177777  035500        MOV     #-1,DTUW
7353  037706  000207                1$:     RTS     PC
7354  037710  104412                CI8:    SAVREG                  ;SAVE R0 - R5
7355  037712  032764  010000  000010        BIT     #BIT12,RMCS2(R4)  ;IS 'NED' SET ?
7356  037720  001002                        BNE     1$              ;BR IF YES
7357  037722  005001                        CLR     R1
7358  037724  005003                        CLR     R3
7359  037726  105761  035356        1$:     TSTB    DRVACT(R1)      ;DRIVE ACTIVE?
7360  037732  001443                        BEQ     5$              ;BRANCH IF NO
7361  037734  013702  035426                MOV     TRNSWT,R2       ;GET THE "TRANSFER WAIT" QUEUE
7362  037740  020137  035500                CMP     R1,DTUW         ;DID THIS DRIVE HAVE AN I/O IN PROGRESS?
7363  037744  001402                        BEQ     2$              ;BRANCH IF YES
7364  037746  004737  043520                JSR     PC,GETREQ       ;GET THE DPB POINTER
7365  037752  005702                2$:     TST     R2              ;QUEUE ENTRY FOR DRIVE ?
7366  037754  001415                        BEQ     4$              ;BR IF NOT
7367  037756  032764  010000  000010        BIT     #BIT12,RMCS2(R4)  ;'NED' SET ?
7368  037764  001404                        BEQ     3$              ;BR IF NOT
7369  037766  012762  100002  000016        MOV     #BIT15!BIT01,16(R2)  ;SET 'DRIVE NON-EXISTENT' INDICATOR
7370  037774  000405                        BR      4$              ;CONTINUE
7371  037776  012762  102000  000016  3$:   MOV     #BIT15!BIT10,16(R2) ;SET "NON-CLEARABLE PARITY" ERROR INDICATOR
7372  040004  004737  042664                JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
7373  040010  012763  177777  035460  4$:   MOV     #-1,TIMER(R3)   ;STOP THE TIMER
7374  040016  105061  035356                CLRB    DRVACT(R1)      ;SET "DRIVE ACTIVE" TO IDLE
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7375  040022  020137  035500              CMP     R1,DTUW         ;IS THIS DRIVE SETUP FOR A TRANSFER
7376  040026  001005                      BNE     5$              ;BR IF NOT
7377  040030  012737  177777  035500      MOV     #-1,DTUW        ;RESET THE INDICATOR
7378  040036  005037  035426              CLR     TRNSWT          ;CLEAR THE TRANSFER QUEUE
7379  040042  105061  035434      5$:     CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
7380  040046  032764  010000  000010      BIT     #BIT12,RMCS2(R4)  ;'NED' SET ?
7381  040054  001021                      BNE     6$              ;BR IF YES
7382  040056  005201                      INC     R1              ;MOVE TO THE NEXT DRIVE
7383  040060  062703  000002              ADD     #2,R3
7384  040064  042701  177770              BIC     #^C7,R1
7385  040070  001316                      BNE     1$              ;BRANCH IF MORE DRIVES
7386  040072  012737  177777  035500      MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
7387  040100  005037  035426              CLR     TRNSWT          ;CLEAR THE 'TRANSFER WAIT' QUEUE
7388  040104  004737  043346              JSR     PC,CLRQUE       ;CLEAR ALL OF THE REQUEST QUEUES
7389  040110  012764  000040  000010      MOV     #BIT05,RMCS2(R4) ;DO A MASSBUS INIT.
7390  040116  000406                      BR      7$              ;CONTINUE
7391  040120  004737  043424      6$:     JSR     PC,EMPTYQ       ;CLEAR THE DRIVE'S QUEUE
7392  040124  105061  035366              CLRB    DRVSTA(R1)      ;SET DRIVE TO OFFLINE
7393  040130  105061  035376              CLRB    DRVTYP(R1)      ;CLEAR THE DRIVE TYPE INDICATOR
7394  040134  004737  043002      7$:     JSR     PC,SET.IE       ;SET "IE" WITHOUT "TRE"
7395  040140  104413                      RESREG                  ;RESTORE R0 - R5
7396  040142  000207                      RTS     PC              ;RETURN
7397
7398                                  ;LOOK AHEAD ROUTINE
7399                                  ;
7400                                  ;CALL
7401                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
7402                                  ;       MOV     #DPB,R2         ;POINT TO DPB
7403                                  ;       JSR     R0,LA           ;GO CHECK THE WINDOW
7404                                  ;       RETURN1                 ;ERROR RETURN
7405                                  ;       RETURN2                 ;START A SEARCH
7406                                  ;       RETURN3                 ;START A DATA TRANSFER
7407
7408  040144  013704  035514      LA:     MOV     RMADR,R4        ;GET RMCS1'S ADDRESS
7409  040150  010164  000010              MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7410  040154  004037  042312              JSR     R0,RD.RM        ;READ DRIVE STATUS
7411  040160  000012                      RMDS
7412  040162  040312                      4$                      ;ERROR RETURN ADDRESS
7413  040164  042716  157577              BIC     #^C020200,(SP)  ;ON CYLINDER ?
7414  040170  022726  000200              CMP     #200,(SP)+      ;PIP=0,DRY=1?
7415  040174  001044                      BNE     3$              ;NO
7416  040176  105261  035444              INCB    LACNT(R1)       ;INCREMENT THE LOOK AHEAD COUNT
7417  040202  126137  035444  035522      CMPB    LACNT(R1),MXLACT ;EXCEED MAX?
7418  040210  003033                      BGT     2$              ;BRANCH IF YES
7419  040212  116203  000010              MOVB    10(R2),R3       ;GET DESIRED SECTOR ADDRESS AND
7420  040216  000303                      SWAB    R3              ;MULT. BY 64--ALIGN WITH
7421  040220  006203                      ASR     R3              ;LOOK AHEAD REGISTER
7422  040222  006203                      ASR     R3
7423  040224  012737  000340  177776      MOV     #340,@#PS       ;PRIORITY LEVEL "7"
7424  040232  004037  042312      6$:     JSR     R0,RD.RM        ;READ LOOK AHEAD REGISTER
7425  040236  000020                      RMLA
7426  040240  040312                      4$
7427  040242  021664  000020              CMP     (SP),RMLA(R4)   ;CORRECT LA NUMBER ?
7428  040246  001402                      BEQ     7$              ;YES
7429  040250  005726                      TST     (SP)+           ;NO,CLEAR STACK
7430  040252  000415                      BR      3$
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 7431  040254  162603              7$:     SUB     (SP)+,R3        ;CALCULATE THE DELTA
 7432  040256  002002                      BGE     1$
 7433  040260  062703  004000              ADD     #<32.*64.>,R3   ;MAKE THE DELTA POSITIVE
 7434  040264  023703  035524      1$:     CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
 7435  040270  002406                      BLT     3$              ;IF IT IS WITHIN THE
 7436  040272  023703  035526              CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
 7437  040276  002003                      BGE     3$              ;THE LOOK AHEAD COUNT
 7438  040300  105061  035444      2$:     CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
 7439  040304  005720                      TST     (R0)+
 7440  040306  005720              3$:     TST     (R0)+           ;ADJUST THE RETURN ADDRESS
 7441  040310  000402                      BR      5$              ;EXIT
 7442  040312  004737  037610      4$:     JSR     PC,CI7          ;PROCESS THE ERROR
 7443  040316  000200              5$:     RTS     R0              ;RETURN
 7444
 7445                              ;INTERRUPT SERVICE ROUTINE
 7446
 7447  040320  112737  000001  035432 ISR:  MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
 7448  040326  104412                      SAVREG                  ;SAVE R0 - R5
 7449  040330  013704  035514              MOV     RMADR,R4        ;ADDRESS OF RHSCS1
 7450  040334  013701  035500              MOV     DTUW,R1         ;GET "DATA TRANSFER UNDERWAY" INDICATOR
 7451  040340  002403                      BLT     1$              ;BRANCH IF NO DATA TRANSFER UNDERWAY
 7452  040342  004737  040364              JSR     PC,TD           ;CALL TRANSFER DONE
 7453  040346  000402                      BR      2$              ;EXIT
 7454  040350  004737  040534      1$:     JSR     PC,SC           ;CALL SPECIAL CONDITIONS
 7455  040354  104413              2$:     RESREG                  ;RESTORE R0 - R5
 7456  040356  105037  035432              CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
 7457  040362  000002                      RTI                     ;RETURN
 7458
 7459                              ;TRANSFER DONE ROUTINE
 7460
 7461  040364  105061  035356      TD:     CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
 7462  040370  012737  177777  035500      MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
 7463  040376  006301                      ASL     R1
 7464  040400  012761  177777  035460      MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
 7465  040406  006201                      ASR     R1
 7466  040410  013702  035426              MOV     TRNSWT,R2       ;GET "DPB" ADDRESS FROM THE
 7467  040414  005037  035426              CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
 7468  040420  052762  000200  000016      BIS     #BIT07,16(R2)   ;SET DONE
 7469  040426  010164  000010              MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
 7470  040432  004037  042312              JSR     R0,RD.RM        ;TRANSFER ERROR(TRE=1)?
 7471  040436  000000                      RMCS1
 7472  040440  037610                      CI7
 7473  040442  006126                      ROL     (SP)+
 7474  040444  100417                      BMI     3$              ;BR IF YES
 7475  040446  005737  035454              TST     SAVEFG          ;SAVE THE RH70/RM03 REGISTERS?
 7476  040452  100002                      BPL     1$              ;BRANCH IF NO
 7477  040454  004737  042664              JSR     PC,SVRH70       ;YES--SAVE THE REGISTERS
 7478  040460                      1$:
 7479  040460  004737  043520              JSR     PC,GETREQ       ;GET DPB POINTER
 7480  040464  005702                      TST     R2              ;ENTRY FOR DRIVE ?
 7481  040466  001403                      BEQ     2$              ;BR IF NOT
 7482  040470  004737  036530              JSR     PC,OPT          ;CALL OPTIMIZER
 7483  040474  000417                      BR      SC              ;CHECK OTHER DRIVES
 7484                              ;THE RELEASE DRIVE COMMAND IS FORECD TO ENTER FOR DUAL PORT OPERATION
 7485  040476  012714  000113      2$:     MOV     #113,(R4)       ;RELEASE THE DRIVE
 7486  040502  000414                      BR      SC              ;CHECK FOR OTHER DRIVES
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 7487  040504  052762  100100  000016  3$:     BIS     #BIT15!BIT06,16(R2) ;SET DATA ERROR FLAG
 7488  040512  004737  043424                  JSR     PC,EMPTYQ           ;EMPTY THE "DRIVE'S WAIT" QUEUE
 7489  040516  004737  042664                  JSR     PC,SVRH70           ;SAVE THE RH70/RM03 REGISTERS
 7490  040522  012714  040111                  MOV     #40111,(R4)         ;ISSUE A "DRIVE CLEAR"
 7491  040526  012714  000113                  MOV     #113,(R4)           ;ISSUE A RELEASE TO THE DRIVE
 7492  040532  000400                          BR      SC                  ;CHECK FOR OTHER DRIVES
 7493
 7494
 7495
 7496                                  ;SPECIAL CONDITION ROUTINE
 7497
 7498  040534  116403  000016          SC:     MOVB    RMAS(R4),R3         ;READ "RMAS"
 7499  040540  001014                          BNE     2$                  ;BRANCH IF ANY 'ATA' BITS SET
 7500  040542  004037  042312                  JSR     R0,RD.RM            ;READ CONTROL AND STATUS REGISTER
 7501  040546  000000                          RMCS1
 7502  040550  037710                          CI8
 7503  040552  106126                          ROLB    (SP)+               ;IS "IE"=1?
 7504  040554  100405                          BMI     1$                  ;YES, NO DRIVES TO CHECK
 7505  040556  004037  043610                  JSR     R0,ES.SAV           ;SAVE THE ADDRESS IN '$ESCAPE'
 7506  040562  104001                          ERROR   1                   ;REPORT AN ILLEGAL INTERRUPT
 7507  040564  004737  043002                  JSR     PC,SET.IE           ;SET INTERRUPT ENABLE
 7508  040570  000207          1$:     RTS     PC                          ;RETURN
 7509  040572  005046          2$:     CLR     -(SP)                       ;PROCESS ALL DRIVES THAT HAVE
 7510  040574  110316                  MOVB    R3,(SP)                     ;AN "ATA"=1
 7511  040576  012703  000001          MOV     #1,R3
 7512  040602  005001                  CLR     R1
 7513  040604  030316          SC3:    BIT     R3,(SP)             ;ATA=1?
 7514  040606  001005                  BNE     SC5                 ;YES--BRANCH
 7515  040610  005201          SC4:    INC     R1                  ;MOVE TO THE NEXT DRIVE
 7516  040612  106303                  ASLB    R3
 7517  040614  001373                  BNE     SC3                 ;BRANCH IF MORE TO CHECK?
 7518  040616  005726                  TST     (SP)+               ;CLEAN OFF THE STACK
 7519  040620  000207                  RTS     PC                  ;RETURN TO USER
 7520  040622  105761  035406  SC5:    TSTB    DPINT(R1)           ;INITIALIZING THE DRIVE ?
 7521  040626  001402                  BEQ     1$                  ;BR IF NOT
 7522  040630  000137  041546          JMP     SC13                ;PROCESS THE DRIVE
 7523  040634  105761  035416  1$:     TSTB    DPRQS(R1)           ;PORT REQUEST OUTSTANDING ?
 7524  040640  001402                  BEQ     2$                  ;BR IF NOT
 7525  040642  000137  041546          JMP     SC13                ;START THE OUTSTANDING COMMAND
 7526  040646  105761  035366  2$:     TSTB    DRVSTA(R1)          ;CHECK THE DRIVE STATUS
 7527  040652  003025                  BGT     5$                  ;BRANCH IF ONLINE
 7528  040654  105761  035434          TSTB    ULDFLG(R1)          ;UNLOAD IN PROGRESS?
 7529  040660  003422                  BLE     5$                  ;BRANCH IF NOT
 7530  040662  004737  043520          JSR     PC,GETREQ           ;GET DPB POINTER
 7531  040666  004737  042664          JSR     PC,SVRH70           ;SAVE THE RH70/RM03 REGISTERS
 7532  040672  004737  041476          JSR     PC,SC12             ;SAVE RMDS, RMER1, RMER2, AND RMMR2
                                                                    ;ALSO DO A DRIVE INIT (DRVINT)
 7534  040676  105761  035366          TSTB    DRVSTA(R1)          ;DID DRIVE COME ONLINE?
 7535  040702  003416                  BLE     6$                  ;NO---BRANCH
 7536  040704  032737  040000  035346  BIT     #BIT14,RMERRS       ;WAS THERE AN ERROR?
 7537  040712  001002                  BNE     3$                  ;BR IF ERROR
 7538  040714  000137  041366          JMP     SC11                ;NO ERROR
 7539  040720  013705  035350  3$:     MOV     RMERRS+2,R5         ;YES -- PICKUP RMER1 AND
 7540  040724  000502                  BR      SC6A                ;GO PROCESS THE ERROR
 7541  040726  105761  035356  5$:     TSTB    DRVACT(R1)          ;DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
 7542  040732  001033                  BNE     SC6                 ;BR IF EITHER
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7543  040734  004737  041476              JSR     PC,SC12         ;SAVE RMDS, RMER1, RMER2, AND RMMR2
7544                                                                ;ALSO DO A DRVINT
7545  040740  105761  035406        6$:   TSTB    DPINT(R1)       ;TRYING TO INIT THE DRIVE ?
7546  040744  001321                      BNE     SC4             ;BR IF YES, CHECK ON MORE DRIVES
7547  040746  105761  035366              TSTB    DRVSTA(R1)      ;CHECK ON DRIVE'S STATUS
7548  040752  100412                      BMI     7$              ;BR IF UNSAFE
7549  040754  032737  020000  035352      BIT     #BIT13,RMERRS+4 ;ADDRESS PLUG CHANGED ?
7550  040762  001013                      BNE     8$              ;BR IF YES
7551  040764  012746  000113              MOV     #113,-(SP)      ;RELEASE COMMAND
7552  040770  004037  042472              JSR     R0,WRT.RM       ;WRITE THE COMMAND INTO RMCS1
7553  040774  000000                      RMCS1                   ;REGISTER INDEX
7554  040776  041336                      SC8                     ;PARITY EXIT ADDRESS
7555  041000  011605        7$:   MOV     (SP),R5                 ;PICKUP (RMAS) BEFORE THE ERROR CALL
7556  041002  004037  043610              JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
7557  041006  104002                      ERROR   2               ;REPORT THE UNEXPECTED ATTENTION
7558  041010  000677                      BR      SC4             ;GO CHECK FOR MORE ATA'S
7559  041012                        8$:
7560  041012  004037  043610              JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
7561  041016  104005                      ERROR   5               ;REPORT THE ADDRESS PLUG CHANGE
7562  041020  000673                      BR      SC4             ;CHECK FOR MORE DRIVES
7563  041022  006301              SC6:    ASL     R1              ;SETUP TO ADDRESS WORDS
7564  041024  012761  177777  035460      MOV     #-1,TIMER(R1)   ;STOP THE TIMER
7565  041032  006201                      ASR     R1              ;RESTORE THE DRIVE ADDRESS
7566  041034  004737  043520              JSR     PC,GETREQ       ;GET THE DPB POINTER FROM THE QUEUE
7567  041040  010164  000010              MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7568  041044  004037  042312              JSR     R0,RD.RM        ;READ THE RM03'S STATUS REG.
7569  041050  000012                      RMDS
7570  041052  041336                      SC8
7571  041054  011605                      MOV     (SP),R5         ;AND PUT IT IN R5
7572  041056  006126                      ROL     (SP)+           ;WAS THERE AN ERROR?
7573  041060  100407                      BMI     1$              ;BR IF ERROR
7574  041062  105761  035356              TSTB    DRVACT(R1)      ;CHECK DRIVE'S STATE
7575  041066  003137                      BGT     SC11            ;BR IF DRIVE ACTIVE WITH ORDER
7576  041070  052762  100210  000016      BIS     #BIT15!BIT07!BIT03,16(R2)  ;INFORM USER OF ERROR RECOVER COMPLETION
7577  041076  000470                      BR      SC7
7578  041100  004037  042312        1$:   JSR     R0,RD.RM        ;READ ERROR REGISTER #1
7579  041104  000014                      RMER1
7580  041106  041336                      SC8
7581  041110  012605                      MOV     (SP)+,R5        ;AND SAVE IT IN R5
7582  041112  004737  042664              JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
7583  041116  012746  000111              MOV     #111,-(SP)      ;ISSUE A DRIVE CLEAR
7584  041122  004037  042472              JSR     R0,WRT.RM
7585  041126  000000                      RMCS1
7586  041130  041336                      SC8
7587  041132  006105              SC6A:   ROL     R5              ;WAS "UNSAFE" CONDITION =1?
7588  041134  100406                      BMI     1$              ;BRANCH IF YES
7589  041136  005702                      TST     R2              ;ANYTHING IN QUEUE ?
7590  041140  001447                      BEQ     SC7             ;BR IF NOT
7591  041142  052762  100240  000016      BIS     #BIT15!BIT07!BIT05,16(R2)       ;INFORM USER OF ERROR
7592  041150  000443                      BR      SC7
7593  041152  004037  042312        1$:   JSR     R0,RD.RM        ;READ DRIVE STATUS REG. #1
7594  041156  000012                      RMDS
7595  041160  041336                      SC8
7596  041162  011605                      MOV     (SP),R5         ;SAVE RMDS IN R5
7597  041164  006126                      ROL     (SP)+           ;"ERR"=1?
7598  041166  100011                      BPL     2$              ;BR IF NO--UNSAFE CLEARED
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7599  041170  112761  177777  035366          MOVB    #-1,DRVSTA(R1)  ;DRIVE IS UNSAFE
7600  041176  004737  042664                  JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
7601  041202  052762  110000  000016          BIS     #BIT15!BIT12,16(R2)     ;INFORM USER OF UNSAFE ERROR
7602  041210  000423                          BR      SC7
7603  041212  032705  010000          2$:     BIT     #BIT12,R5       ;"MOL" = 1 ?
7604  041216  001015                          BNE     3$              ;BR IF YES
7605  041220  112761  177777  035350          MOVB    #-1,DRVACT(R1)  ;ACTIVE ERROR RECOVER
7606  041226  112761  000001  035366          MOVB    #1,DRVSTA(R1)   ;ONLINE
7607  041234  006301                          ASL     R1
7608  041236  012761  072460  035460          MOV     #30000.,TIMER(R1) ;START 30 SECOND TIMER
7609  041244  006201                          ASR     R1
7610  041246  000137  040610                  JMP     SC4
7611  041252  052762  100220  000016  3$:     BIS     #BIT15!BIT07!BIT04,16(R2)       ;INFORM USER OF ERROR
7612  041260  105061  035356          SC7:    CLRB    DRVACT(R1)      ;DRIVE IS IDLE
7613  041264  004737  043424                  JSR     PC,EMPTYQ       ;DUMP THE QUEUE
7614  041270  105761  035434                  TSTB    ULDFLG(R1)      ;UNLOAD IN RMOGRESS OR QUEUE?
7615  041274  003002                          BGT     1$              ;BR IF NOT
7616  041276  105061  035434                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
7617  041302  116164  035502  000016  1$:     MOVB    ATABIT(R1),RMAS(R4)   ;CLEAR ATTENTION BIT
7618  041310  105761  035366                  TSTB    DRVSTA(R1)      ;IS THE DRIVE UNSAFE ?
7619  041314  100406                          BMI     2$              ;BR IF IT IS
7620  041316  012746  000113                  MOV     #113,-(SP)      ;RELEASE COMMAND
7621  041322  004037  042472                  JSR     R0,WRT.RM       ;WRITE THE COMMAND INTO RPCS1
7622  041326  000000                          RMCS1                   ;REGISTER INDEX
7623  041330  041336                          SC8                     ;PARITY EXIT ADDRESS
7624  041332  000137  040610          2$:     JMP     SC4             ;CHECK FOR MORE DRIVES
7625  041336  105761  035356          SC8:    TSTB    DRVACT(R1)      ;IS DRIVE IDLE?
7626  041342  001405                          BEQ     1$              ;YES--BRANCH
7627  041344  004737  043520                  JSR     PC,GETREQ       ;GET DPB POINTER
7628  041350  004737  037610                  JSR     PC,CI7          ;PROCESS THE PARITY ERROR
7629  041354  000402                          BR      2$              ;CONTINUE
7630  041356  004737  037636          1$:     JSR     PC,CI7B         ;PROCESS THE UNCORRECTABLE PARITY ERROR
7631  041362  000137  040610          2$:     JMP     SC4             ;CHECK MORE DRIVES
7632  041366  105761  035434          SC11:   TSTB    ULDFLG(R1)      ;"UNLOAD IN PROGRESS"?
7633  041372  003402                          BLE     1$              ;BRANCH IF NO
7634  041374  105061  035434                  CLRB    ULDFLG(R1)      ;CLEAR UNLOAD FLAG
7635  041400  105061  035356          1$:     CLRB    DRVACT(R1)      ;SET DRIVE IDLE
7636  041404  136137  035502  035430          BITB    ATABIT(R1),SRCHWT   ;DOING A SEARCH OPERATION FOR
7637                                                                  ;AN I/O COMMAND?
7638  041412  001012                          BNE     2$              ;BRANCH IF YES
7639  041414  004737  043542                  JSR     PC,POPQUE       ;REMOVE REQUEST FROM QUEUE
7640  041420  052762  000200  000016          BIS     #BIT07,16(R2)   ;SET "DONE" BIT
7641  041426  005737  035454                  TST     SAVEFG          ;SAVE THE REGISTERS?
7642  041432  100002                          BPL     2$              ;BRANCH IF NO
7643  041434  004737  042664                  JSR     PC,SVRH70       ;YES--SAVE ALL OF THE RH70/RM03 REG'S
7644  041440  116164  035502  000016  2$:     MOVB    ATABIT(R1),RMAS(R4)   ;CLEAR ATTENTION BIT
7645  041446  146137  035502  035430          BICB    ATABIT(R1),SRCHWT       ;CLEAR IMPLIED SEEK SET
7646  041454  006301                          ASL     R1              ;WORD INDEX
7647  041456  012761  177777  035460          MOV     #-1,TIMER(R1)   ;STOP CLOCK
7648  041464  006201                          ASR     R1              ;RESTORE R1
7649  041466  004737  036530                  JSR     PC,OPT          ;START A REQUEST
7650  041472  000137  040610                  JMP     SC4             ;CHECK FOR MORE DRIVES
7651  041476  010164  000010          SC12:   MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7652  041502  016437  000012  035346          MOV     RMDS(R4),RMERRS ;SAVE THE FOUR REGISTERS THAT
7653  041510  016437  000014  035350          MOV     RMER1(R4),RMERRS+2      ;WILL TELL US SOMETHING
7654  041516  016437  000042  035352          MOV     RMER2(R4),RMERRS+4
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 7655  041524  016437  000040  035354          MOV     RMMR2(R4),RMERRS+6
 7656  041532  004037  035744                  JSR     R0,DRVINT           ;INIT. THE STATE OF THE DRIVE
 7657  041536  000401                          BR      1$                  ;TAKE ERROR EXIT
 7658  041540  000207                          RTS     PC                  ;RETURN
 7659  041542  005726                  1$:     TST     (SP)+               ;POP PC OFF OF THE STACK
 7660  041544  000674                          BR      SC8                 ;PROCESS THE PARITY ERROR
 7661  041546  006301                  SC13:   ASL     R1                  ;SETUP TO ADDRESS WORDS
 7662  041550  012761  177777  035460          MOV     #-1,TIMER(R1)       ;STOP THE TIMER
 7663  041556  006201                          ASR     R1                  ;
 7664  041560  010164  000010                  MOV     R1,RMCS2(R4)        ;SELECT THE DRIVE
 7665  041564  116164  035502  000016          MOVB    ATABIT(R1),RMAS(R4) ;CLEAR THE ATTENTION BIT
 7666  041572  105761  035406          1$:     TSTB    DPINT(R1)           ;INITIALIZING THE DRIVE ?
 7667  041576  001424                          BEQ     2$                  ;BR IF NOT
 7668  041600  105061  035406                  CLRB    DPINT(R1)           ;CLEAR THE INIT INDICATOR
 7669  041604  004037  035744                  JSR     R0,DRVINT           ;GO INIT THE DRIVE
 7670  041610  000240                          NOP                         ;DUMMY PARITY ERROR RETURN
 7671  041612  105761  035366                  TSTB    DRVSTA(R1)          ;DRIVE ONLINE ?
 7672  041616  003014                          BGT     2$                  ;BR IF YES -- START ORDER
 7673  041620  005702                          TST     R2                  ;QUEUE ENTRY FOR THE DRIVE
 7674  041622  001426                          BEQ     3$                  ;BR IF NOT
 7675  041624  004737  043520                  JSR     PC,GETREQ           ;GET DPB ADDRESS
 7676  041630  052762  140000  000016          BIS     #BIT15!BIT14,16(R2) ;INFORM USER THAT DRIVE OFFLINE
 7677  041636  004737  042664                  JSR     PC,SVRH70           ;SAVE THE REGISTERS
 7678  041642  004737  043424                  JSR     PC,EMPTYQ           ;EMPTY THE REQUEST QUEUE
 7679  041646  000414                          BR      3$
 7680  041650  032764  004000  000000  2$:     BIT     #BIT11,RMCS1(R4)            ;DVA SET ?
 7681  041656  001006                          BNE     4$                  ;SET THEN CALL OPT
 7682  041660  006301                          ASL     R1
 7683  041662  012761  023420  035460          MOV     #10000.,TIMER(R1)
 7684  041670  006201                          ASR     R1
 7685  041672  000402                          BR      3$
 7686  041674  004737  036530          4$:     JSR     PC,OPT              ;START THE PENDING REQUEST
 7687  041700  000137  040610          3$:     JMP     SC4                 ;PROCESS OTHER DRIVES
 7688
 7689                                  ;/RM03 TIMER ROUTINE
 7690                                  ;CALL
 7691                                  ;       MOV     #TIME,-(SP)         ;ELASPED TIME IN MILLISECONDS ON THE STACK
 7692                                  ;       JSR     PC,RPTMR            ;CALL RM03 TIME ROUTINE
 7693
 7694  041704  005737  035432          RPTMR:  TST     ACTDRV              ;CHECK "ACTDRV & ACTSTR"
 7695  041710  001027                          BNE     4$                  ;IF NON ZERO EXIT
 7696  041712  112737  000001  035433          MOVB    #1,ACTSTR           ;SET "ACTSTR"
 7697  041720  104412                          SAVREG                      ;SAVE R0 - R5
 7698  041722  005001                          CLR     R1                  ;START WITH DRIVE 0
 7699  041724  005003                          CLR     R3
 7700  041726  005763  035460          1$:     TST     TIMER(R3)           ;IS THE TIMER RUNNING?
 7701  041732  002406                          BLT     2$                  ;BRANCH IF NO
 7702  041734  166663  000002  035460          SUB     2(SP),TIMER(R3)     ;COUNT THE INTERVAL
 7703  041742  003002                          BGT     2$                  ;BR IF NO SOFTWARE TIMEOUT
 7704  041744  004737  041774                  JSR     PC,STO              ;CALL SOFTWARE TIMEOUT ROUTINE
 7705  041750  005201                  2$:     INC     R1                  ;MOVE TO NEXT DRIVE
 7706  041752  005723                          TST     (R3)+
 7707  041754  022701  000010                  CMP     #8.,R1              ;OUT OF DRIVES?
 7708  041760  003362                          BGT     1$                  ;BRANCH IF NO
 7709  041762  104413                  3$:     RESREG                      ;RESTORE R0 - R5
 7710  041764  105037  035433                  CLRB    ACTSTR              ;ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
```

```
7711  041770  012616                  4$:     MOV     (SP)+,(SP)      ;ADJUST THE STACK
7712  041772  000207                          RTS     PC              ;RETURN
7713
7714                                  ;SOFTWARE TIMEOUT ROUTINE
7715                                  ;
7716                                  ;NOTE: THIS ROUTINE MUST BE ENTERED AT PRIORITY 6
7717                                  ;       OR GREATER
7718                                  ;
7719                                  ;CALL:  STO
7720                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
7721                                  ;       JSR     PC,STO          ;CALL
7722                                  ;       RETURN
7723
7724  041774  010146                  STO:    MOV     R1,-(SP)        ;SAVE R1
7725  041776  010246                          MOV     R2,-(SP)        ;SAVE R2
7726  042000  010346                          MOV     R3,-(SP)        ;SAVE R3
7727  042002  010446                          MOV     R4,-(SP)        ;SAVE R4
7728  042004  013704  035514                  MOV     RMADR,R4        ;GET ADDRESS OF "RMCS1"
7729  042010  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT THE DRIVE
7730  042014  004037  042312                  JSR     R0,RD.RM        ;READ "DRIVE STATUS REG"
7731  042020  000012                          RMDS
7732  042022  042174                          STO5
7733  042024  105726                          TSTB    (SP)+           ;IS "DRY"=1?
7734  042026  100434                          BMI     ST02            ;BR IF YES
7735  042030  105761  035406          ST01:   TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
7736  042034  001031                          BNE     ST02            ;BR IF YES
7737  042036  105761  035416                  TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
7738  042042  001026                          BNE     ST02            ;BR IF YES
7739  042044  013702  035426                  MOV     TRNSWT,R2       ;PICKUP TRANSFER WAIT QUEUE
7740  042050  020137  035500                  CMP     R1,DTUW         ;TRANSFER UNDERWAY ON THIS DRIVE?
7741  042054  001404                          BEQ     1$              ;BRANCH IF YES
7742  042056  000137  042300                  JMP     ST09            ;IF NOT DON'T BOTHER DRIVES
7743  042062  004737  043520                  JSR     PC,GETREQ       ;GET DPB ADDRESS
7744  042066  052762  101000  000016  1$:     BIS     #BIT15!BIT09,16(R2) ;SET THE ERROR FLAGS
7745  042074  004737  042664                  JSR     PC,SVRH70       ;SAVE RH70/RM03 REGISTERS
7746  042100  012764  000040  000010          MOV     #BIT05,RMCS2(R4) ;"INIT" THE MASS BUS
7747  042106  105061  035356                  CLRB    DRVACT(R1)      ;DRIVE IS IDLE
7748  042112  105061  035434                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
7749  042116  000470                          BR      ST09            ;DON'T BOTHER OTHER DRIVES
7750  042120  116405  000016          ST02:   MOVB    RMAS(R4),R5     ;READ ATTENTION REG
7751  042124  136105  035502                  BITB    ATABIT(R1),R5   ;IS ATTENTION FOR THIS DRIVE UP ?
7752  042130  001007                          BNE     ST03            ;YES--BRANCH
7753  042132  105761  035406                  TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
7754  042136  001021                          BNE     ST06            ;BR IF YES - DRIVE NOT ONLINE
7755  042140  105761  035416                  TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
7756  042144  001035                          BNE     ST07            ;BR IF YES - NO RESPONSE TO REQUEST
7757  042146  000454                          BR      ST09            ;OTHER WISE EXIT
7758  042150  105761  035406          ST03:   TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
7759  042154  001003                          BNE     1$              ;BR IF INIT PENDING
7760  042156  105761  035416                  TSTB    DPRQS(R1)       ;PORT REQUEST PENDING ?
7761  042162  001446                          BEQ     ST09            ;BR IF NOT
7762  042164  012763  177777  035460  1$:     MOV     #-1,TIMER(R3)   ;STOP THE TIMER
7763  042172  000442                          BR      ST09            ;EXIT
7764  042174  004737  037710          ST05:   JSR     PC,CI8          ;GO HANDLE THE PARITY ERROR
7765  042200  000437                          BR      ST09
7766  042202  105061  035406          ST06:   CLRB    DPINT(R1)       ;CLEAR THE INITIALIZE INDICATOR
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7767  042206  105061  035366                CLRB    DRVSTA(R1)          ;SET UNIT OFFLINE
7768  042212  012763  177777  035460        MOV     #-1,TIMER(R3)  ;STOP THE TIMER
7769  042220  004737  043520                JSR     PC,GETREQ           ;GET THE DPB ADDRESS
7770  042224  005702                        TST     R2                  ;REQUEST IN QUEUE ?
7771  042226  001424                        BEQ     ST09                ;BR IF NOT
7772  042230  052762  140000  000016        BIS     #BIT15!BIT14,16(R2)  ;INFORM THE USER DRIVE NOT AVAILABLE
7773  042236  000414                        BR      ST08                ;FINISH
7774  042240  012763  177777  035460  ST07: MOV     #-1,TIMER(R3)       ;STOP THE TIMER
7775  042246  105061  035416                CLRB    DPRQS(R1)           ;CLEAR PORT REQUEST INDICATOR
7776  042252  004737  043520                JSR     PC,GETREQ           ;GET DPB ADDRESS
7777  042256  005702                        TST     R2                  ;QUEUE ENTRY FOR DRIVE ?
7778  042260  001407                        BEQ     ST09                ;BR IF NONE
7779  042262  012762  100004  000016        MOV     #BIT15!BIT2,16(R2)  ;INFORM USER OF PORT REQUEST ERROR
7780  042270  004737  043424  ST08: JSR     PC,EMPTYQ           ;CLEAR THE QUEUE FOR THE DRIVE
7781  042274  004737  042664                JSR     PC,SVRH70           ;SAVE THE REGISTERS
7782  042300  012604  ST09: MOV     (SP)+,R4            ;RESTORE R4
7783  042302  012603                        MOV     (SP)+,R3            ;RESTORE R3
7784  042304  012602                        MOV     (SP)+,R2            ;RESTORE R2
7785  042306  012601                        MOV     (SP)+,R1            ;RESTORE R1
7786  042310  000207                        RTS     PC                  ;RETURN
7787
7788                          ;ROUTINE TO READ A RH70/RM03 REGISTER
7789                          ;
7790                          ;CALL
7791                          ;       JSR     R0,RD.RM            ;GO READ A REGISTER
7792                          ;       INDEX                       ;REG. INDEX FROM BASE
7793                          ;       ERRADR                      ;ERROR ADDRESS--PROCESS ERROR STARTING
7794                          ;                                   ;AT THIS ADDRESS
7795                          ;       RETURN                      ;CONTENTS OF REG. IS ON THE STACK
7796                          ;
7797  042312  013737  035512  042460  RD.RM:  MOV     MCPEMX,RD.RM2       ;MAX. RETRYS ALLOWED
7798  042320  011646                        MOV     (SP),-(SP)          ;SAVE R0 FOR RETURN
7799  042322  013737  035514  042336        MOV     RMADR,RD.ADR        ;FORM THE DESIRED ADDRESS
7800  042330  062037  042336                ADD     (R0)+,RD.ADR        ;USING THE BASE AND THE INDEX
7801  042334  013727  RD.RM1: MOV     @(PC)+,(PC)+        ;READ THE DESIRED REGISTER OF THE RM03
7802  042336  000000  RD.ADR: .WORD  0                   ;ADDRESS IS FORMED HERE
7803  042340  000000  RD.WRD: .WORD  0                   ;REG. CONTENTS PUT HERE
7804  042342  013766  042340  000002        MOV     RD.WRD,2(SP)        ;RETURN IT TO THE USER
7805  042350  013746  035514                MOV     RMADR,-(SP)         ;PUT THE ADDRESS ON THE STACK
7806  042354  062716  000010                ADD     #RMCS2,(SP)         ;FORM THE ADDRESS OF RMCS2
7807  042360  032736  010000                BIT     #BIT12,@(SP)+       ;CHECK THE 'NED' BIT
7808  042364  001037                        BNE     RD.RM3              ;BR IF DRIVE NON-EXISTENT
7809  042366  017746  173122                MOV     @RMADR,-(SP)        ;READ RMCS1
7810  042372  032716  020000                BIT     #BIT13,(SP)         ;DID MCPE SET?
7811  042376  001002                        BNE     1$                  ;BRANCH IF YES
7812  042400  022620                        CMP     (SP)+,(R0)+         ;ADJUST FOR RETURN
7813  042402  000432                        BR      RD.RM4              ;EXIT
7814  042404  1$:
7815  042404  004037  043610                JSR     R0,ES.SAV           ;SAVE THE ADDRESS IN '$ESCAPE'
7816  042410  104003                        ERROR   3                   ;REPORT "MCPE" ERROR
7817  042412  005737  035500                TST     DTUW                ;DATA TRANSFER UNDERWAY?
7818  042416  100405                        BMI     2$                  ;NO--BRANCH
7819  042420  032716  040000                BIT     #BIT14,(SP)         ;NO--"TRE"=1?
7820  042424  001402                        BEQ     2$                  ;NO--BRANCH
7821  042426  005726                        TST     (SP)+               ;YES--CLEAN OFF THE STACK AND
7822  042430  000415                        BR      RD.RM3              ;TAKE THE FATAL ERROR EXIT
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7823  042432  052716  040000          2$:     BIS     #BIT14,(SP)     ;CLEAR "MCPE" BY SENDING A "1" TO "TRE"
7824  042436  000316                          SWAB    (SP)            ;POSITION BEFORE WRITING
7825  042440  013737  035514  042454         MOV     RMADR,3$        ;FORM ADDRESS OF HIGH BYTE
7826  042446  005237  042454                  INC     3$
7827  042452  112637                          MOVB    (SP)+,@(PC)+    ;WRITE THE HIGH BYTE OF RMCS1
7828  042454  000000                  3$:     .WORD   0               ;ADDRESS STORAGE
7829  042456  005327                          DEC     (PC)+           ;EXCEEDED MAX. RETRYS
7830  042460  000003                  RD.RM2: .WORD   3
7831  042462  002324                          BGE     RD.RM1          ;BRANCH IF NO
7832  042464  011000                  RD.RM3: MOV     (R0),R0         ;FATAL ERROR EXIT
7833  042466  012616                          MOV     (SP)+,(SP)
7834  042470  000200                  RD.RM4: RTS     R0
7835
7836                                  ;ROUTINE TO WRITE A REGISTER
7837                                  ;
7838                                  ;CALL
7839                                  ;       MOV     DATA,-(SP)      ;DATA TO BE LOADED ON THE STACK
7840                                  ;       JSR     R0,WRT.RM       ;CALL THE ROUTINE TO LOAD(WRITE) THE REG.
7841                                  ;       INDEX                   ;INDEX OF THE REGISTER TO BE LOADED
7842                                  ;       ERRADR                  ;ADDRESS TO RETURN TO ON AN ERROR
7843                                  ;       RETURN                  ;ERROR FREE RETURN
7844
7845  042472  013737  035512  042650  WRT.RM: MOV     MCPEMX,WRT.R2   ;MAX RETRYS ALLOWED
7846  042500  016637  000002  042560          MOV     2(SP),WRT.WD    ;SAVE THE WORD TO WRITE
7847  042506  012616                          MOV     (SP)+,(SP)      ;ADJUST THE STACK
7848  042510  012037  042562                  MOV     (R0)+,WRT.AD    ;GET INDEX OF REGISTER TO BE WRITTEN
7849  042514  001015                          BNE     1$              ;BRANCH IF NOT RMCS1
7850  042516  122737  000150  042560          CMPB    #150,WRT.WD     ;IS THE COMMAND FOR DATA TRANSFERS?
7851  042524  002411                          BLT     1$              ;YES--DON'T GET THE OLD A16 & A17, & PSEL
7852  042526  004037  042312                  JSR     R0,RD.RM        ;NO---COMBINE A16&A17, & PSEL WITH
7853  042532  000000                          RMCS1                   ;THE COMMAND BEFORE SENDING IT TO
7854  042534  042654                          WRT.R3                  ;THE RH70/RM03
7855  042536  000316                          SWAB    (SP)
7856  042540  042716  177770                  BIC     #^C7,(SP)
7857  042544  112637  042561                  MOVB    (SP)+,WRT.WD+1
7858  042550  063737  035514  042562  1$:     ADD     RMADR,WRT.AD    ;FORM THE ADDRESS OF THE DISK REG.
7859  042556  012737                  WRT.R1: MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG.
7860  042560  000000                  WRT.WD: .WORD   0               ;WORD TO WRITE GOES HERE
7861  042562  000000                  WRT.AD: .WORD   0               ;ADDRESS IS FORMED HERE
7862  042564  013746  035514                  MOV     RMADR,-(SP)     ;PUT THE ADDRESS ON THE STACK
7863  042570  062716  000010                  ADD     #RMCS2,(SP)     ;FORM THE ADDRESS OF RMCS2
7864  042574  032736  010000                  BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
7865  042600  001025                          BNE     WRT.R3          ;BR IF DRIVE NON-EXISTENT
7866  042602  004037  042312                  JSR     R0,RD.RM        ;CHECK FOR PARITY ERROR ON WRITE
7867  042606  000014                          RMER1
7868  042610  042654                          WRT.R3
7869  042612  032726  000010                  BIT     #BIT03,(SP)+
7870  042616  001420                          BEQ     WRT.R4          ;BRANCH IF "PAR=0"
7871  042620  016037  177776  042632          MOV     -2(R0),1$       ;PICKUP THE INDEX
7872  042626  004037  042312                  JSR     R0,RD.RM        ;READ THE REG.
7873  042632  000000                  1$:     .WORD   0               ;REG. INDEX
7874  042634  042654                          WRT.R3                  ;RETURN TO THIS ADDRESS ON ERROR
7875  042636  004037  043610                  JSR     R0,ES.SAV       ;SAVE THE ADDRESS IN '$ESCAPE'
7876  042642  104004                          ERROR   4               ;REPORT THE PARITY ON WRITE ERROR
7877  042644  005726                          TST     (SP)+           ;CLEAR OFF THE STACK
7878  042646  005327                          DEC     (PC)+           ;DECREMENT THE ERROR COUNT
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7879  042650  000003                  WRT.R2: .WORD   3               ;RETRY COUNTER
7880  042652  002341                          BGE     WRT.R1          ;TRY AGAIN IF NOT FINISHED
7881  042654  011000                  WRT.R3: MOV     (R0),R0         ;TAKE THE "PARITY ON WRITE" ERROR EXIT
7882  042656  000401                          BR      WRT.R5          ;EXIT
7883  042660  005720                  WRT.R4: TST     (R0)+           ;ADJUST FOR ERROR FREE EXIT
7884  042662  000200                  WRT.R5: RTS     R0
7885
7886                                  ;ROUTINE TO SAVE THE RH70/RP04/5/RM03 REGISTERS AS PER DPB+14
7887                                  ;
7888                                  ;CALL
7889                                  ;       MOV     #DPBNUM,R2      ;DPB POINTER TO R2
7890                                  ;       JSR     PC,SVRH70       ;SAVE THE DRIVES REG'S
7891
7892  042664  104412                  SVRH70: SAVREG                  ;SAVE R0 - R5
7893  042666  005702                          TST     R2              ;QUEUE ENTRY FOR THE DRIVE ?
7894  042670  001442                          BEQ     6$              ;BR IF NONE
7895  042672  013704  035514                  MOV     RMADR,R4
7896  042676  111264  000010                  MOVB    (R2),RMCS2(R4)  ;SELECT DRIVE
7897  042702  016203  000014                  MOV     14(R2),R3       ;GET THE ERROR TABLE POINTER
7898  042706  001433                          BEQ     6$              ;EXIT IF NO ADDRESS
7899  042710  005037  042744                  CLR     3$              ;COUNTER & POINTER
7900  042714  023727  042744  000022  1$:     CMP     3$,#RMDB        ;REACHED THE BUFFER REGISTER ?
7901  042722  001006                          BNE     2$              ;BR IF NOT
7902  042724  032764  000200  000010          BIT     #BIT07,RMCS2(R4)  ;'OR' SET ?
7903  042732  001002                          BNE     2$              ;BR IF SET
7904  042734  005023                          CLR     (R3)+           ;STORE RMDB AS ZEROES
7905  042736  000405                          BR      4$              ;CONTINUE
7906  042740  004037  042312          2$:     JSR     R0,RD.RM        ;READ THE SELECTED REGISTER
7907  042744  000000          3$:     .WORD   0                       ;REGISTER INDEX
7908  042746  042772                  5$                              ;ERROR RETURN ADDRESS
7909  042750  012623                          MOV     (SP)+,(R3)+     ;STORE THE REGISTER CONTENTS
7910  042752  023727  042744  000046  4$:     CMP     3$,#RMEC2       ;REACHED THE END ?
7911  042760  001406                          BEQ     6$              ;BR IF YES
7912  042762  062737  000002  042744          ADD     #2,3$           ;INCREMENT THE REGISTER INDEX
7913  042770  000751                          BR      1$              ;CONTINUE READING THE REGISTERS
7914  042772  004737  037610          5$:     JSR     PC,CI7          ;PROCESS THE UNCORRECTABLE PARITY ERROR
7915  042776  104413                  6$:     RESREG                  ;RESTORE R0 - R5
7916  043000  000207                          RTS     PC              ;RETURN
7917
7918                                  ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A "TRE"
7919                                  ;CALL
7920                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
7921                                  ;       JSR     PC,SET.IE       ;SET "IE"
7922                                  ;       RETURN
7923
7924  043002  010446                  SET.IE: MOV     R4,-(SP)        ;SAVE R4
7925  043004  013704  035514                  MOV     RMADR,R4        ;PICKUP ADDRESS OF RMCS1
7926  043010  010164  000010                  MOV     R1,RMCS2(R4)    ;SELECT DRIVE
7927  043014  011446                          MOV     (R4),-(SP)      ;READ RMCS1
7928  043016  052716  040000                  BIS     #BIT14,(SP)     ;SET THE "TRE" BIT OF THE WORD READ
7929  043022  000316                          SWAB    (SP)            ;ADJUST FOR DATO
7930  043024  112714  000100                  MOVB    #BIT06,(R4)     ;SET "IE"
7931  043030  032764  010000  000010          BIT     #BIT12,RMCS2(R4)  ;IS "NED"=1?
7932  043036  001002                          BNE     1$              ;YES--CLEAR "TRE"
7933  043040  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
7934  043042  000402                          BR      2$
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 7935  043044  112664  000001          1$:     MOVB    (SP)+,1(R4)     ;CLEAR "TRE"
 7936  043050  012604                  2$:     MOV     (SP)+,R4        ;RESTORE R4
 7937  043052  000207                          RTS     PC              ;RETURN TO CALLER
 7938
 7939                                  ;QUEUE COUNT
 7940  043054      000                 QCNT:   .BYTE   0               ;DRIVE 0
 7941  043055      000                         .BYTE   0               ;DRIVE 1
 7942  043056      000                         .BYTE   0               ;DRIVE 2
 7943  043057      000                         .BYTE   0               ;DRIVE 3
 7944  043060      000                         .BYTE   0               ;DRIVE 4
 7945  043061      000                         .BYTE   0               ;DRIVE 5
 7946  043062      000                         .BYTE   0               ;DRIVE 6
 7947  043063      000                         .BYTE   0               ;DRIVE 7
 7948
 7949                                  ;QUEUE INPUT POINTERS
 7950
 7951  043064  043146                  QINPT:  .WORD   QDRV0            ;DRIVE 0
 7952  043066  043166                          .WORD   QDRV1            ;DRIVE 1
 7953  043070  043206                          .WORD   QDRV2            ;DRIVE 2
 7954  043072  043226                          .WORD   QDRV3            ;DRIVE 3
 7955  043074  043246                          .WORD   QDRV4            ;DRIVE 4
 7956  043076  043266                          .WORD   QDRV5            ;DRIVE 5
 7957  043100  043306                          .WORD   QDRV6            ;DRIVE 6
 7958  043102  043326                          .WORD   QDRV7            ;DRIVE 7
 7959
 7960                                  ;QUEUE OUTPUT POINTERS
 7961
 7962  043104  043146                  QOUTPT: .WORD   QDRV0            ;DRIVE 0
 7963  043106  043166                          .WORD   QDRV1            ;DRIVE 1
 7964  043110  043206                          .WORD   QDRV2            ;DRIVE 2
 7965  043112  043226                          .WORD   QDRV3            ;DRIVE 3
 7966  043114  043246                          .WORD   QDRV4            ;DRIVE 4
 7967  043116  043266                          .WORD   QDRV5            ;DRIVE 5
 7968  043120  043306                          .WORD   QDRV6            ;DRIVE 6
 7969  043122  043326                          .WORD   QDRV7            ;DRIVE 7
 7970
 7971  043124  043146                  QSTART: .WORD   QDRV0            ;DRIVE 0 START ADDRESS
 7972  043126  043166                  QSTOP:  .WORD   QDRV1            ;DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
 7973  043130  043206                          .WORD   QDRV2            ;STOP DRIVE 1--START DRIVE 2
 7974  043132  043226                          .WORD   QDRV3            ;STOP DRIVE 2--START DRIVE 3
 7975  043134  043246                          .WORD   QDRV4            ;STOP DRIVE 3--START DRIVE 4
 7976  043136  043266                          .WORD   QDRV5            ;STOP DRIVE 4--START DRIVE 5
 7977  043140  043306                          .WORD   QDRV6            ;STOP DRIVE 5--START DRIVE 6
 7978  043142  043326                          .WORD   QDRV7            ;STOP DRIVE 6--START DRIVE 7
 7979  043144  043346                          .WORD   QTERM            ;STOP DRIVE 7
 7980
 7981                                  ;DRIVE REQUEST QUEUES
 7982
 7983  043146  000010                  QDRV0:  .BLKW   10
 7984  043166  000010                  QDRV1:  .BLKW   10
 7985  043206  000010                  QDRV2:  .BLKW   10
 7986  043226  000010                  QDRV3:  .BLKW   10
 7987  043246  000010                  QDRV4:  .BLKW   10
 7988  043266  000010                  QDRV5:  .BLKW   10
 7989  043306  000010                  QDRV6:  .BLKW   10
 7990  043326  000010                  QDRV7:  .BLKW   10
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  7991            043346                  QTERM=.
  7992
  7993                                    ;ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
  7994                                    ;
  7995                                    ;CALL
  7996                                    ;       JSR     PC,CLRQUE
  7997
  7998  043346   104412                  CLRQUE: SAVREG                  ;SAVE R0 - R5
  7999  043350   012702   043054                 MOV     #QCNT,R2        ;ZERO THE QUEUE COUNTS
  8000  043354   005022                         CLR     (R2)+           ;DRIVES 0 & 1
  8001  043356   005022                         CLR     (R2)+           ;DRIVES 2 & 3
  8002  043360   005022                         CLR     (R2)+           ;DRIVES 4 & 5
  8003  043362   005022                         CLR     (R2)+           ;DRIVES 6 & 7
  8004  043364   012703   000010                MOV     #8.,R3          ;MOVE THE STARTING
  8005  043370   012701   043124                MOV     #QSTART,R1      ;ADDRESS OF THE QUEUE INTO
  8006  043374   012122                 1$:     MOV     (R1)+,(R2)+     ;THE QUEUE INPUT POINTER
  8007  043376   005303                         DEC     R3
  8008  043400   001375                         BNE     1$
  8009  043402   012703   000010                MOV     #8.,R3          ;MOVE THE STARTING ADDRESS
  8010  043406   012701   043124                MOV     #QSTART,R1      ;OF THE QUEUE INTO THE
  8011  043412   012122                 2$:     MOV     (R1)+,(R2)+     ;QUEUE OUTPUT POINTER
  8012  043414   005303                         DEC     R3
  8013  043416   001375                         BNE     2$
  8014  043420   104413                         RESREG                  ;RESTORE R0 - R5
  8015  043422   000207                         RTS     PC
  8016
  8017                                    ;EMPTY THE QUEUE SPECIFIED BY R1
  8018                                    ;
  8019                                    ;CALL
  8020                                    ;       MOV     DRVNUM,R1       ;DRIVE NUMBER TO R1
  8021                                    ;       JSR     PC,EMPTYQ
  8022
  8023  043424   105061   043054          EMPTYQ: CLRB    QCNT(R1)        ;CLEAR NUMBER OF ITEMS IN QUEUE
  8024  043430   006301                         ASL     R1
  8025  043432   016161   043064   043104        MOV     QINPT(R1),QOUTPT(R1) ;SET OUTPUT QUEUE POINTER=INPUT POINTER
  8026  043440   006201                         ASR     R1
  8027  043442   000207                         RTS     PC
  8028
  8029                                    ;ROUTINE TO PUT A REQUEST IN QUEUE
  8030                                    ;
  8031                                    ;CALL
  8032                                    ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
  8033                                    ;       MOV     #DPB,R2         ;ADDRESS OF PARAMETER BLOCK
  8034                                    ;       JSR     R0,DRVQUE       ;GO PUT REQUEST IN QUEUE
  8035                                    ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
  8036                                    ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE
  8037
  8038  043444   122761   000010   043054 DRVQUE: CMPB    #10,QCNT(R1)    ;IS QUEUE FULL?
  8039  043452   001421                         BEQ     2$              ;BR IF YES-TAKE RETURN1
  8040  043454   105261   043054                INCB    QCNT(R1)        ;INCREMENT QUEUE COUNT
  8041  043460   006301                         ASL     R1
  8042  043462   010271   043064                MOV     R2,@QINPT(R1)   ;PUT THIS REQUEST IN QUEUE
  8043  043466   062761   000002   043064       ADD     #2,QINPT(R1)    ;UPDATE THE QUEUE POINTER
  8044  043474   026161   043064   043126       CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
  8045  043502   001003                         BNE     1$              ;BRANCH IF NO
  8046  043504   016161   043124   043064       MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
```

```
                                ;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
043520  005002                          TSTB    QCNT(R1)        ;IS THERE ANY REQUEST IN QUEUE?
043522  105761  043054                  BEQ     2$              ;NO---BRANCH
043526  001404                  1$:     ASL     R1
043530  006301                          MOV     @QOUTPT(R1),R2  ;PICKUP "DPB" POINTER FOR THIS DRIVE
043532  017102  043104                  ASR     R1
043536  006201                  2$:     RTS     PC              ;RETURN TO USER
043540  000207

                                ;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

043542  105361  043054        POPQUE: DECB    QCNT(R1)        ;DECREMENT QUEUE COUNT
043546  006301                          ASL     R1
043550  017102  043104                  MOV     @QOUTPT(R1),R2  ;GET THE "DPB" POINTER
043554  005071  043104                  CLR     @QOUTPT(R1)     ;REMOVE DPB ADDRESS FROM THE QUEUE
043560  062761  000002  043104          ADD     #2,QOUTPT(R1)   ;UPDATE THE QUEUE POINTER
043566  026161  043104  043126          CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
043574  001003                          BNE     1$              ;NO--BRANCH TO EXIT
043576  016161  043124  043104          MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
043604  006201                  1$:     ASR     R1
043606  000207                          RTS     PC              ;RETURN TO USER

                                ;ROUTINE TO SAVE THE CONTENTS OF '$ESCAPE' WHEN THE DRIVER
                                ;REPORTS AN ERROR DIRECTLY.
                                ;
                                ;CALL
                                ;       JSR     R0,ES.SAV
                                ;       ERROR   N               ;;THE ERROR CALL
                                ;       RETURN                  ;THE RETURN IS PAST THE ERROR CALL

043610  012037  043624        ES.SAV: MOV     (R0)+,1$        ;GET THE ERROR CALL
043614  013746  001206                  MOV     $ESCAPE,-(SP)   ;SAVE THE ADDRESS IN '$ESCAPE'
043620  005037  001206                  CLR     $ESCAPE         ;CLEAR THE ESCAPE RETURN
043624  000000                  1$:     .WORD   0               ;THE ERROR CALL IS MOVED HERE
043626  012637  001206                  MOV     (SP)+,$ESCAPE   ;RESTORE THE ESCAPE ADDRESS
043632  000200                          RTS     R0              ;RETURN

                                .SBTTL  ASCIZ MESSAGES
```

```
                                MSG.R:  .ASCIZ  /R/
                                MSG.FC: .ASCIZ  /FC/
                                MSG.LC: .ASCIZ  /LC/
                                MSGFCP: .ASCIZ  /FC'/
                                MSGLCP: .ASCIZ  /LC'/
                                MSG.IC: .ASCIZ  /IC/
                                MSG.FT: .ASCIZ  /FT/
                                MSG.LT: .ASCIZ  /LT/
                                MSG.IT: .ASCIZ  /IT/
                                MSG.FS: .ASCIZ  /FS/
                                MSG.LS: .ASCIZ  /LS/
                                MSG.PAT:        .ASCIZ  /PAT/
                                MSG.EQ: .ASCIZ  /=/
                                MSG.CS: .ASCIZ  <CR><LF>/CONTROL SWITCHES=/

                                SLASH:  .ASCIZ  @ / @
                                SYSTAT: .ASCIZ  /UNIT STATUS:/<CR><LF><LF>

                                UNTMSG: .ASCIZ  /DRIVE/
                                UNTOFF: .ASCIZ  / OFFLINE/

                                UNTON:  .ASCIZ  / ONLINE/

                                NOTPRS: .ASCIZ  / NOT PRESENT/

                                NOTSAF: .ASCIZ  / UNSAFE/

                                NOTRM:  .ASCIZ  @ NOT RM03@

                                ISRM03: .ASCIZ  /RM03/
                                DRIVES: .ASCIZ  <CR><LF>/DRIVE(S) TO BE TESTED /

                                NONE:   .ASCIZ  /NONE/
                                COMMA:  .ASCIZ  /,/
                                NOCLOK: .ASCIZ  <CR><LF>/NO KW11-P CLOCK, TIMING TESTS WILL NOT BE PERFORMED/

                                TESTNG: .ASCIZ  <CR><LF><LF>/TESTING DRIVE /
```

```
 8159  044217  000123  051105  040511  SERIAL: .ASCIZ  /SERIAL NUMBER /
 8160  044224  020114  052516  041115
 8161  044232  051105  000040
 8162
 8163  044236  005015  051012  052117  MSG7:   .ASCIZ  <CR><LF><LF>/ROTATIONAL SPEED TIMES/
 8164  044244  052101  047511  040516
 8165  044252  020114  050123  042505
 8166  044260  020104  044524  042515
 8167  044266  000123
 8168  044270  005015  047412  042516  MSG10A: .ASCIZ  <CR><LF><LF>/ONE CYLINDER SEEK TIMES/<CR><LF>/ * FORWARD/
 8169  044276  041440  046131  047111
 8170  044304  042504  020122  042523
 8171  044312  045505  052040  046511
 8172  044320  051505  005015  025040
 8173  044326  043040  051117  040527
 8174  044334  042122  000000
 8175  044337  000015  020012  020052  MSG10B: .ASCIZ  <CR><LF>/ * REVERSE/
 8176  044344  042522  042526  051522
 8177  044352  000105
 8178  044354  005015  040412  041503  MSG11A: .ASCIZ  <CR><LF><LF>/ACCESS TIME MEASUREMENT/<CR><LF>/ * FORWARD/
 8179  044362  051505  020123  044524
 8180  044370  042515  046440  040505
 8181  044376  052523  042522  042515
 8182  044404  052116  005015  025040
 8183  044412  043040  051117  040527
 8184  044420  042122  000000
 8185  044423  000015  020012  020052  MSG11B: .ASCIZ  <CR><LF>/ * REVERSE/
 8186  044430  042522  042526  051522
 8187  044436  000105
 8188  044440  005015  046412  054101  MSG12A: .ASCIZ  <CR><LF><LF>/MAXIMUM SEEK TIMES/<CR><LF>/ * FORWARD/
 8189  044446  046511  046525  051440
 8190  044454  042505  020113  044524
 8191  044462  042515  006523  020012
 8192  044470  020052  047506  053522
 8193  044476  051101  000104
 8194  044502  005015  025040  051040  MSG12B: .ASCIZ  <CR><LF>/ * REVERSE/
 8195  044510  053105  051105  042523
 8196  044516  000000
 8197
 8198  044517  000015  046412  047111  MSGMIN: .ASCIZ  <CR><LF>/MIN=/
 8199  044524  000075
 8200  044526  005015  040515  036530  MSGMAX: .ASCIZ  <CR><LF>/MAX=/
 8201  044534  000000
 8202  044535  000015  040412  043526  MSGAVG: .ASCIZ  <CR><LF>/AVG=/
 8203  044542  000075
 8204  044544  020060  051525  000000  MSGOUS: .ASCIZ  /0 US/
 8205  044551  000040  042502  047514  MBELOW: .ASCIZ  / BELOW THE MINIMUM OF /
 8206  044556  020127  044124  020105
 8207  044564  044515  044516  052515
 8208  044572  020115  043117  000040
 8209  044600  040440  047502  042526  MABOVE: .ASCIZ  / ABOVE THE MAXIMUM OF /
 8210  044606  052040  042510  046440
 8211  044614  054101  046511  046525
 8212  044622  047440  020106  000000
 8213  044627  000040  042523  045505  MSGNUM: .ASCIZ  / SEEKS TIMED/
 8214  044634  020123  044524  042515
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 8215  044642  000104
 8216  044644  047040  052117  052040  MSGNON: .ASCIZ  / NOT TIMED/
 8217  044652  046511  042105     000
 8218  044657     040  000040          MSG.SP: .ASCIZ  /  /            ;TWO (2) SPACES
 8219
 8220                                  .SBTTL  ERROR HEADER (EM) MESSAGES
 8221
 8222  044662  044122  030067  044440  EM1:    .ASCIZ  /RH70 INTERRUPT OCCURRED (RMAS = 0)/
 8223  044670  052116  051105  052522
 8224  044676  052120  047440  041503
 8225  044704  051125  042522  020104
 8226  044712  051050  040515  020123
 8227  044720  020075  024460     000
 8228  044725     125  042516  050130  EM2:    .ASCIZ  /UNEXPECTED ATTENTION OCCURRED/
 8229  044732  041505  042524  020104
 8230  044740  052101  042524  052116
 8231  044746  047511  020116  041517
 8232  044754  052503  051122  042105
 8233  044762     000
 8234  044763     115  051501  041123  EM3:    .ASCIZ  /MASSBUS PARITY ERROR(MCPE=1)/
 8235  044770  051525  050040  051101
 8236  044776  052111  020131  051105
 8237  045004  047522  024122  041515
 8238  045012  042520  030475  000051
 8239  045020  040515  051523  052502  EM4:    .ASCIZ  /MASSBUS PARITY ERROR(PAR=1)/
 8240  045026  020123  040520  044522
 8241  045034  054524  042440  051122
 8242  045042  051117  050050  051101
 8243  045050  030475  000051
 8244  045054  042101  051104  051505  EM5:    .ASCIZ  /ADDRESS PLUG CHANGE BIT SET/
 8245  045062  020123  046120  043525
 8246  045070  041440  040510  043516
 8247  045076  020105  044502  020124
 8248  045104  042523  000124
 8249  045110  044122  030067  051057  EM10:   .ASCIZ  "RH70/RM03 FAILED TO RESPOND TO ADDRESSING"
 8250  045116  030115  020063  040506
 8251  045124  046111  042105  052040
 8252  045132  020117  042522  050123
 8253  045140  047117  020104  047524
 8254  045146  040440  042104  042522
 8255  045154  051523  047111  000107
 8256  045162  051104  053111  020105  EM11:   .ASCIZ  /DRIVE SELECTED IS NOT ONLINE/
 8257  045170  042523  042514  052103
 8258  045176  042105  044440  020123
 8259  045204  047516  020124  047117
 8260  045212  044514  042516     000
 8261  045217     111  050115  047522  EM12:   .ASCIZ  /IMPROPER HEADER DATA/
 8262  045224  042520  020122  042510
 8263  045232  042101  051105  042040
 8264  045240  052101  000101
 8265  045244  040504  040524  041440  EM13:   .ASCIZ  /DATA COMPARE FAILURE/
 8266  045252  046517  040520  042522
 8267  045260  043040  044501  052514
 8268  045266  042522     000
 8269  045271     104  051511  020113  EM17:   .ASCIZ  /DISK ERROR IN TIMING TEST/
 8270  045276  051105  047522  020122
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8271   045304  047111  052040  046511
8272   045312  047111  020107  042524
8273   045320  052123     000
8274   045323     103  047514  045503  EM20:   .ASCIZ  /CLOCK (KW11-P) OVERFLOW IN TIMING TEST/
8275   045330  024040  053513  030461
8276   045336  050055  020051  053117
8277   045344  051105  046106  053517
8278   045352  044440  020116  044524
8279   045360  044515  043516  052040
8280   045366  051505  000124
8281   045372  044504  045523  042440  EM23:   .ASCIZ  /DISK ERROR DURING SEEK/
8282   045400  051122  051117  042040
8283   045406  051125  047111  020107
8284   045414  042523  045505     000
8285   045421     123  042505  020113  EM24:   .ASCIZ  /SEEK NOT COMPLETE WITHIN 120 MS/
8286   045426  047516  020124  047503
8287   045434  050115  042514  042524
8288   045442  053440  052111  044510
8289   045450  020116  031061  020060
8290   045456  051515     000
8291   045461     122  033510  027460  EM41:   .ASCIZ  "RH70/RM03 ERROR"
8292   045466  046522  031460  042440
8293   045474  051122  051117     000
8294   045501     106  052101  046101  EM46:   .ASCIZ  /FATAL WRITE CHECK ERROR/
8295   045506  053440  044522  042524
8296   045514  041440  042510  045503
8297   045522  042440  051122  051117
8298   045530     000
8299
8300                            .SBTTL  STATUS/ERROR INDICATOR MESSAGES
8301
8302   045531     117  043106  044514  MSGB14: .ASCIZ  /OFFLINE OR UNSAFE DRIVE REQUESTED/
8303   045536  042516  047440  020122
8304   045544  047125  040523  042506
8305   045552  042040  044522  042526
8306   045560  051040  050505  042525
8307   045566  052123  042105     000
8308   045573     125  046116  040517  MSGB13: .ASCIZ  /UNLOADED DRIVE REQUESTED/
8309   045600  042504  020104  051104
8310   045606  053111  020105  042522
8311   045614  052521  051505  042524
8312   045622  000104
8313   045624  042520  051522  051511  MSGB12: .ASCIZ  /PERSISTENT UNSAFE/
8314   045632  042524  052116  052440
8315   045640  051516  043101  000105
8316   045646  040520  044522  054524  MSGB11: .ASCIZ  /PARITY ERROR OCCURRED/
8317   045654  042440  051122  051117
8318   045662  047440  041503  051125
8319   045670  042522  000104
8320   045674  040506  040524  020114  MSGB10: .ASCIZ  /FATAL PARITY ERROR/
8321   045702  040520  044522  054524
8322   045710  042440  051122  051117
8323   045716     000
8324   045717     123  043117  053524  MSGB09: .ASCIZ  /SOFTWARE TIMEOUT ON THIS DRIVE/
8325   045724  051101  020105  044524
8326   045732  042515  052517  020124
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8327  045740  047117  052040  044510
8328  045746  020123  051104  053111
8329  045754  000105
8330  045756  047523  052106  040527  MSGB08: .ASCIZ  /SOFTWARE TIMEOUT ON ANOTHER DRIVE/
8331  045764  042522  052040  046511
8332  045772  047505  052125  047440
8333  046000  020116  047101  052117
8334  046006  042510  020122  051104
8335  046014  053111  000105
8336  046020  051105  047522  020122  MSGB06: .ASCIZ  "ERROR OCCURRED DURING I/O OPERATION"
8337  046026  041517  052503  051122
8338  046034  042105  042040  051125
8339  046042  047111  020107  027511
8340  046050  020117  050117  051105
8341  046056  052101  047511  000116
8342  046064  051105  047522  020122  MSGB05: .ASCIZ  "ERROR OCCURRED DURING NON-I/O OPERATION"
8343  046072  041517  052503  051122
8344  046100  042105  042040  051125
8345  046106  047111  020107  047516
8346  046114  026516  027511  020117
8347  046122  050117  051105  052101
8348  046130  047511  000116
8349  046134  047125  040523  042506  MSGB04: .ASCIZ  /UNSAFE OCCURRED/
8350  046142  047440  041503  051125
8351  046150  042522  000104
8352  046154  052501  047524  040515  MSGB03: .ASCIZ  /AUTOMATIC RECALIBRATE SEQUENCE OCCURRED/
8353  046162  044524  020103  042522
8354  046170  040503  044514  051102
8355  046176  052101  020105  042523
8356  046204  052521  047105  042503
8357  046212  047440  041503  051125
8358  046220  042522  000104
8359  046224  051104  053111  020105  MSGB02: .ASCIZ  /DRIVE HAS NOT RESPONDED TO PORT REQUEST/
8360  046232  040510  020123  047516
8361  046240  020124  042522  050123
8362  046246  047117  042504  020104
8363  046254  047524  050040  051117
8364  046262  020124  042522  052521
8365  046270  051505  000124
8366  046274  051104  053111  020105  MSGB01: .ASCIZ  /DRIVE HAS BECOME NON-EXISTENT/
8367  046302  040510  020123  042502
8368  046310  047503  042515  047040
8369  046316  047117  042455  044530
8370  046324  052123  047105  000124
8371
8372                                  .SBTTL  DATA HEADER (DT) MESSAGES
8373
8374  046332  051105  020122  041520  DH1:    .ASCIZ  /ERR PC  RMAS/
8375  046340  020040  046522  051501
8376  046346     000
8377  046347     105  051122  050040  DH2:    .ASCIZ  /ERR PC  DRIVE   RMAS    RMDS    RMER1   RMMR2   RMER2/
8378  046354  020103  042040  044522
8379  046362  042526  020040  051040
8380  046370  040515  020123  020040
8381  046376  051040  042115  020123
8382  046404  020040  046522  051105
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8383  046412  020061  020040  046522
8384  046420  051115  020062  020040
8385  046426  046522  051105  000062
8386  046434  042524  052123  020040  DH3:    .ASCIZ  /TEST    ERR PC  ADDRESS DATA/
8387  046442  020040  051105  020122
8388  046450  041520  020040  042101
8389  046456  051104  051505  020123
8390  046464  040504  040524     000
8391  046471     124  051505  020124  DH4:    .ASCIZ  /TEST    ERR PC  ADDRESS GDDATA  BDDATA/
8392  046476  020040  042440  051122
8393  046504  050040  020103  040440
8394  046512  042104  042522  051523
8395  046520  043440  042104  052101
8396  046526  020101  041040  042104
8397  046534  052101  000101
8398  046540  046522  051503  020061  DH10:   .ASCIZ  /RMCS1   ERR PC/
8399  046546  020040  051105  020122
8400  046554  041520     000
8401  046557     104  044522  042526  DH11:   .ASCIZ  /DRIVE   ERR PC/
8402  046564  020040  042440  051122
8403  046572  050040  000103
8404  046576  042524  052123  020040  DH12:   .ASCIZ  /TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR/
8405  046604  020040  051105  020122
8406  046612  041520  020040  051524
8407  046620  020124  041520  020040
8408  046626  051104  053111  020105
8409  046634  020040  054503  047114
8410  046642  051104  020040  051124
8411  046650  041501  020113  020040
8412  046656  042523  052103  051117
8413  046664     000
8414  046665     107  041504  046131  DH12A:  .ASCIZ  /GDCYL   GDTRK   GDSCTR  BDCYL   BDTRK   BDSCTR/
8415  046672  020040  043440  052104
8416  046700  045522  020040  043440
8417  046706  051504  052103  020122
8418  046714  041040  041504  046131
8419  046722  020040  041040  052104
8420  046730  045522  020040  041040
8421  046736  051504  052103  000122
8422  046744  042107  040504  020124  DH13A:  .ASCIZ  /GDDAT   BDDAT   WRDCNT  GDADR   BDADR/
8423  046752  020040  042102  040504
8424  046760  020124  020040  051127
8425  046766  041504  052116  020040
8426  046774  042107  042101  020122
8427  047002  020040  042102  042101
8428  047010  000122
8429  047012  042524  052123  020040  DH17:   .ASCIZ  /TEST    ERR PC  DRIVE   RMCS1   RMDS    RMER1   RMMR2   RMER2/
8430  047020  020040  051105  020122
8431  047026  041520  020040  051104
8432  047034  053111  020105  020040
8433  047042  046522  051503  020061
8434  047050  020040  046522  051504
8435  047056  020040  051040  042515
8436  047064  030522  020040  051040
8437  047072  046515  031122  020040
8438  047100  051040  042515  031122
```

```
 8439  047106      000
 8440  047107      124  051505  020124  DH21:   .ASCIZ  /TEST   ERR PC  TST PC  DRIVE   CYLNDR  TRACK/
 8441  047114   020040  042440  051122
 8442  047122   050040  020103  052040
 8443  047130   052123  050040  020103
 8444  047136   042040  044522  042526
 8445  047144   020040  041440  046131
 8446  047152   042116  020122  052040
 8447  047160   040522  045503      000
 8448  047165      107  042104  052101  DH21A:  .ASCIZ  /GDDAT   BDDAT   WRDCNT  SECTOR/
 8449  047172   020040  041040  042104
 8450  047200   052101  020040  053440
 8451  047206   042122  047103  020124
 8452  047214   051440  041505  047524
 8453  047222   000122
 8454  047224   042524  052123  020040  DH23:   .ASCIZ  /TEST   ERR PC  DRIVE   CYLNDR  RMCS1   RMCS2   RMDS/
 8455  047232   020040  051105  020122
 8456  047240   041520  020040  051104
 8457  047246   053111  020105  020040
 8458  047254   054503  047114  051104
 8459  047262   020040  046522  051503
 8460  047270   020061  020040  046522
 8461  047276   051503  020062  020040
 8462  047304   046522  051504      000
 8463  047311      122  042515  030522  DH23A:  .ASCIZ  /RMER1   RMMR2   RMER2   RMDC    RMHR/
 8464  047316   020040  051040  046515
 8465  047324   031122  020040  051040
 8466  047332   042515  031122  020040
 8467  047340   051040  042115  020103
 8468  047346   020040  051040  044115
 8469  047354   000122
 8470  047356   042524  052123  020040  DH41:   .ASCIZ  /TEST   ERR PC  TST PC  DRIVE/
 8471  047364   020040  051105  020122
 8472  047372   041520  020040  051524
 8473  047400   020124  041520  020040
 8474  047406   051104  053111  000105
 8475  047414   042524  052123  020040  DH42:   .ASCIZ  /TEST   ERR PC  TST PC  DRIVE   RMCS1   RMCS2   RMDS/
 8476  047422   020040  051105  020122
 8477  047430   041520  020040  051524
 8478  047436   020124  041520  020040
 8479  047444   051104  053111  020105
 8480  047452   020040  046522  051503
 8481  047460   020061  020040  046522
 8482  047466   051503  020062  020040
 8483  047474   046522  051504      000
 8484  047501      122  042515  030522  DH43A:  .ASCIZ  /RMER1   RMMR2   RMER2/
 8485  047506   020040  051040  046515
 8486  047514   031122  020040  051040
 8487  047522   042515  031122      000
 8488  047527      122  041515  030523  DH44A:  .ASCIZ  /RMCS1   RMCS2   RMDS    RMHR    RMDC    RMDA/
 8489  047534   020040  051040  041515
 8490  047542   031123  020040  051040
 8491  047550   042115  020123  020040
 8492  047556   046522  051110  020040
 8493  047564   020040  046522  041504
 8494  047572   020040  020040  046522
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 8495  047600  040504     000
 8496  047603     122  042515  030522  DH44B:  .ASCIZ  /RMER1   RMMR2   RMER2/
 8497  047610  020040  051040  046515
 8498  047616  031122  020040  051040
 8499  047624  042515  031122     000
 8500  047631     122  042515  030522  DH45A:  .ASCIZ  /RMER1   RMMR2   RMER2   RMWC    RMBA    RMDB/
 8501  047636  020040  051040  046515
 8502  047644  031122  020040  051040
 8503  047652  042515  031122  020040
 8504  047660  051040  053515  020103
 8505  047666  020040  051040  041115
 8506  047674  020101  020040  051040
 8507  047702  042115  000102
 8508
 8509
 8510                                  .EVEN
 8511
 8512                                  .SBTTL  DATA TABLE (DT)
 8513
 8514  047706  001116  001170          DT1:    .WORD   $ERRPC,$REG3
 8515  047712  001116  001164  001170  DT2:    .WORD   $ERRPC,$REG1,$REG3,RMERRS,RMERRS+2,RMERRS+4,RMERRS+6
 8516  047720  035346  035350  035352
 8517  047726  035354
 8518  047730  001176  001116  042336  DT3:    .WORD   $TMPO,$ERRPC,RD.ADR,RD.WRD
 8519  047736  042340
 8520  047740  001176  001116  042562  DT4:    .WORD   $TMPO,$ERRPC,WRT.ADR,WRT.WD,RD.WRD
 8521  047746  042560  042340
 8522  047752  001176  001116  001164  DT5:    .WORD   $TMPO,$ERRPC,$REG1,$REG5,RMERRS,RMERRS+2,RMERRS+4,RMERRS+6
 8523  047760  001174  035346  035350
 8524  047766  035352  035354
 8525  047772  001366  001116          DT10:   .WORD   RH.ADR,$ERRPC
 8526  047776  001166  001116          DT11:   .WORD   $REG2,$ERRPC
 8527  050002  001176  001116  001162  DT12:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS,SEC.DS
 8528  050010  001254  001270  001274
 8529  050016  001272
 8530  050020  001270  001274  001272  DT12A:  .WORD   CYL.DS,TRK.DS,SEC.DS,CYL.RD,TRK.RD,SEC.RD
 8531  050026  001262  001264  001266
 8532  050034  001176  001116  001162  DT13:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS,SEC.DS
 8533  050042  001254  001270  001274
 8534  050050  001272
 8535  050052  001124  001126  001172  DT13A:  .WORD   $GDDAT,$BDDAT,$REG4,$GDADR,$BDADR
 8536  050060  001120  001122
 8537  050064  001176  001116  001254  DT17:   .WORD   $TMPO,$ERRPC,CHKDRV,RM.REG,RM.REG+12,RM.REG+14,RM.REG+40,RM.REG+42
 8538  050072  004204  004216  004220
 8539  050100  004244  004246
 8540  050104  001176  001116  001162  DT21:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV,CYL.DS,TRK.DS
 8541  050112  001254  001270  001274
 8542  050120  001164  001126  001172  DT21A:  .WORD   $REG1,$BDDAT,$REG4,$REG1
 8543  050126  001164
 8544  050130  001176  001116  001254  DT23:   .WORD   $TMPO,$ERRPC,CHKDRV,CYL.DS,RM.REG,RM.REG+10,RM.REG+12
 8545  050136  001270  004204  004214
 8546  050144  004216
 8547  050146  004220  004244  004246  DT23A:  .WORD   RM.REG+14,RM.REG+40,RM.REG+42,RM.REG+34,RM.REG+36
 8548  050154  004240  004242
 8549  050160  001176  001116  001162  DT41:   .WORD   $TMPO,$ERRPC,$REG0,CHKDRV
 8550  050166  001254
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8551  050170  001176  001116  001162  DT42:   .WORD   $TMPO,$ERRPC,$REGO,CHKDRV,RM.REG,RM.REG+10,RM.REG+12
8552  050176  001254  004204  004214
8553  050204  004216
8554  050206  001176  001116  001162  DT43:   .WORD   $TMPO,$ERRPC,$REGO,CHKDRV,RM.REG,RM.REG+10,RM.REG+12
8555  050214  001254  004204  004214
8556  050222  004216
8557  050224  004220  004244  004246  DT43A:  .WORD   RM.REG+14,RM.REG+40,RM.REG+42
8558  050232  001176  001116  001162  DT44:   .WORD   $TMPO,$ERRPC,$REGO,CHKDRV,CYL.DS,TRK.DS,SEC.DS
8559  050240  001254  001270  001274
8560  050246  001272
8561  050250  004204  004214  004216  DT44A:  .WORD   RM.REG,RM.REG+10,RM.REG+12,RM.REG+36,RM.REG+34,RM.REG+06
8562  050256  004242  004240  004212
8563  050264  004220  004244  004246  DT44B:  .WORD   RM.REG+14,RM.REG+40,RM.REG+42
8564  050272  001176  001116  001162  DT45:   .WORD   $TMPO,$ERRPC,$REGO,CHKDRV,CYL.DS,TRK.DS,SEC.DS
8565  050300  001254  001270  001274
8566  050306  001272
8567  050310  004204  004214  004216  DT45A:  .WORD   RM.REG,RM.REG+10,RM.REG+12,RM.REG+36,RM.REG+34,RM.REG+06
8568  050316  004242  004240  004212
8569  050324  004220  004244  004246  DT45B:  .WORD   RM.REG+14,RM.REG+40,RM.REG+42,RM.REG+2,RM.REG+4,RM.REG+22
8570  050332  004206  004210  004226
8571
8572                                  .SBTTL  DATA FORMAT (DF) TABLE
8573
8574  050340  000001                  DF1:    .WORD   1               ;NUMBER OF DATA HEADERS
8575  050342     002                          .BYTE   2               ;NUMBER OF WORDS IN DATA TABLE
8576  050343     000                          .BYTE   0               ;ALL 3 NUMBERS ARE OCTAL
8577
8578  050344  000001                  DF2:    .WORD   1
8579  050346     007                          .BYTE   7
8580  050347     000                          .BYTE   0
8581
8582  050350  000001                  DF3:    .WORD   1
8583  050352     004                          .BYTE   4
8584  050353     000                          .BYTE   0
8585
8586  050354  000001                  DF4:    .WORD   1
8587  050356     005                          .BYTE   5
8588  050357     000                          .BYTE   0
8589
8590  050360  000001                  DF10:   .WORD   1
8591  050362     002                          .BYTE   2
8592  050363     000                          .BYTE   0
8593
8594  050364  000001                  DF11:   .WORD   1
8595  050366     002                          .BYTE   2
8596  050367     000                          .BYTE   0
8597
8598  050370  000002                  DF12:   .WORD   2               ;2 DH'S TO BE TYPED
8599  050372     007                          .BYTE   7               ;7 DATA WORDS FOLLOW THE 1ST DH
8600  050373     160                          .BYTE   160             ;WORDS 1-4 ARE OCTAL 5-7 ARE DECIMAL
8601  050374  046665                          .WORD   DH12A           ;ADDRESS OF 2ND DH
8602  050376     006                          .BYTE   6               ;6 DATA WORDS FOLLOW THE 2ND DH
8603  050377     000                          .BYTE   0               ;ALL WORDS ARE OCTAL
8604
8605  050400  000002                  DF13:   .WORD   2
8606  050402     007                          .BYTE   7
```

```
8607  050403  160                     .BYTE   160
8608  050404  046744                  .WORD   DH13A
8609  050406  005                     .BYTE   5
8610  050407  004                     .BYTE   4               ;WORD 3 IS DECIMAL
8611
8612  050410  000000          DF14:   .WORD   0
8613  050412  005                     .BYTE   5
8614  050413  004                     .BYTE   4               ;WORD 3 IS DECIMAL
8615
8616  050414  000001          DF17:   .WORD   1
8617  050416  010                     .BYTE   ^D8
8618  050417  000                     .BYTE   0
8619
8620  050420  000002          DF21:   .WORD   2
8621  050422  006                     .BYTE   6
8622  050423  060                     .BYTE   60
8623  050424  047165                  .WORD   DH21A
8624  050426  004                     .BYTE   4
8625  050427  014                     .BYTE   14
8626
8627  050430  000000          DF22:   .WORD   0
8628  050432  004                     .BYTE   4
8629  050433  014                     .BYTE   14
8630
8631  050434  000002          DF23:   .WORD   2
8632  050436  007                     .BYTE   7
8633  050437  010                     .BYTE   10              ;WORD 4 IS DECIMAL
8634  050440  047311                  .WORD   DH23A
8635  050442  005                     .BYTE   5
8636  050443  000                     .BYTE   0
8637
8638
8639  050444  000001          DF41:   .WORD   1
8640  050446  004                     .BYTE   4
8641  050447  000                     .BYTE   0
8642
8643  050450  000001          DF42:   .WORD   1
8644  050452  007                     .BYTE   7
8645  050453  000                     .BYTE   0
8646
8647  050454  000002          DF43:   .WORD   2
8648  050456  007                     .BYTE   7
8649  050457  000                     .BYTE   0
8650  050460  047501                  .WORD   DH43A
8651  050462  003                     .BYTE   3
8652  050463  000                     .BYTE   0
8653
8654  050464  000003          DF44:   .WORD   3
8655  050466  007                     .BYTE   7
8656  050467  160                     .BYTE   160
8657  050470  047527                  .WORD   DH44A
8658  050472  006                     .BYTE   6
8659  050473  000                     .BYTE   0
8660  050474  047603                  .WORD   DH44B
8661  050476  003                     .BYTE   3
8662  050477  000                     .BYTE   0
```

```
                                        DF45:   .WORD   3
                                                .BYTE   7
                                                .BYTE   160
                                                .WORD   DH44A
                                                .BYTE   6
                                                .BYTE   0
                                                .WORD   DH45A
                                                .BYTE   6
                                                .BYTE   0

                                        .EVEN
                050514                  BUFFER=.

050514  005015  046412  044501        TITLE:  .ASCII  <CR><LF><LF>/MAINDEC-11-DZRMF-A/<CR><LF>
050522  042116  041505  030455
050530  026461  055104  046522
050536  026506  006501     012
050543     122  030115  020063                .ASCII  @RM03 EXTENDED DRIVE TEST@<CR><LF>
050550  054105  042524  042116
050556  042105  042040  044522
050564  042526  052040  051505
050572  006524     012
050575     112  046125  026531                .ASCIZ  /JULY-1977/<CR><LF><LF>
050602  034461  033467  005015
050610  000012
050612  005015  047524  052040        LOADRV: .ASCII  <CR><LF>/TO TEST DRIVE 0 REPLACE THE 'XXDP' PACK ON DRIVE 0/<CR><LF>
050620  051505  020124  051104
050626  053111  020105  020060
050634  042522  046120  041501
050642  020105  044124  020105
050650  054047  042130  023520
050656  050040  041501  020113
050664  047117  042040  044522
050672  042526  030040  005015
050700  044527  044124  040440                .ASCII  /WITH ANOTHER PACK, CLEAR MEMORY LOCATION 40, AND RESTART/<CR><LF>
050706  047516  044124  051105
050714  050040  041501  026113
050722  041440  042514  051101
050730  046440  046505  051117
050736  020131  047514  040503
050744  044524  047117  032040
050752  026060  040440  042116
050760  051040  051505  040524
050766  052122  005015
050772  044124  020105  051120                .ASCIZ  /THE PROGRAM/<CR><LF>
051000  043517  040522  006515
051006  000012
051010  005015  054523  052123        NOLOAD: .ASCIZ  <CR><LF>/SYSTEM HAS 16K MEMORY, 'XXDP' LOADER WILL BE OVERWRITTEN/<CR><L
051016  046505  044040  051501
051024  030440  045466  046440
051032  046505  051117  026131
051040  023440  054130  050104
051046  020047  047514  042101
051054  051105  053440  046111
051062  020114  042502  047440
```

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 8719  051070  042526  053522  044522
 8720  051076  052124  047105  005015
 8721  051104  000012
 8722
 8723                          .EVEN
 8724
 8725                          .SBTTL  ROUTINE TO SIZE MEMORY
 8726
 8727                          ;;*****************************************************************
 8728                          ;*CALL:
 8729                          ;*      JSR     PC,$SIZE
 8730                          ;*      RETURN
 8731                          ;*$LSTAD WILL CONTAIN THE LAST AVAILABLE MEMORY LOCATION
 8732
 8733  051106  010046          $SIZE:  MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
 8734  051110  010146                  MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
 8735  051112  013746  000004          MOV     @#ERRVEC,-(SP)  ;;SAVE PRESENT ERROR VECTOR PS & PC
 8736  051116  013746  000006          MOV     @#ERRVEC+2,-(SP)
 8737  051122  010600                  MOV     SP,R0           ;;SAVE THE STACK POINTER
 8738                          ;;SET THE ERRVEC PS TO THE PRESENT PS
 8739  051124  104400                  TRAP                    ;;PUSH OLD PSW AND PC ON STACK
 8740  051126  012637  000006          MOV     (SP)+,@#ERRVEC+2        ;;SAVE THE PSW IN @#ERRVEC+2
 8741  051132  012737  051152  000004  MOV     #2$,@#ERRVEC    ;;SET FOR TIMEOUT
 8742  051140  012701  020000          MOV     #20000,R1       ;;FIRST ADDRESS
 8743  051144  005711          1$:     TST     (R1)            ;;TEST THIS ADDRESS
 8744  051146  005721                  TST     (R1)+           ;;STEP TO NEXT ADDRESS
 8745  051150  000775                  BR      1$              ;;TRY ANOTHER
 8746  051152  162701  000002  2$:     SUB     #2,R1           ;;DROP BACK
 8747  051156  010006                  MOV     R0,SP           ;;RESTORE THE STACK
 8748  051160  012637  000006          MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
 8749  051164  012637  000004          MOV     (SP)+,@#ERRVEC
 8750  051170  010137  051202          MOV     R1,$LSTAD       ;;LAST ADDRESS
 8751  051174  012601                  MOV     (SP)+,R1        ;;RESTORE R1
 8752  051176  012600                  MOV     (SP)+,R0        ;;RESTORE R0
 8753  051200  000207                  RTS     PC
 8754  051202  000000          $LSTAD: .WORD   0               ;;CONTAINS THE LAST ADDRESS
 8755
 8756                          ;;*****************************************************************
 8757                          .SBTTL  GETADR - GET BUS ADDRESS AND VECTOR ADDRESS
 8758                          ;THIS ROUTINE IS USED TO ENSURE THE BUS ADDRESS
 8759                          ;OF THE RH70/RM03 IS SETUP TO READ THE PROPER VALUE.
 8760                          ;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
 8761                          ;REQUIRED.
 8762                          ;NOTE: THIS ROUTINE DESTROYS R0-R4
 8763                          ;CALL
 8764                          ;
 8765                          ;       JSR     PC,@#GETADR
 8766                          ;       RETURN
 8767
 8768  051204  005737  001226  GETADR: TST     @#BUSADR        ;INPUT FROM TTY REQUESTED?
 8769  051210  001427                  BEQ     7$              ;NO--BRANCH
 8770  051212  005037  001226          CLR     @#BUSADR        ;YES--CLEAR THE REQUEST FLAG
 8771  051216  012700  001366  1$:     MOV     #RH.ADR,R0      ;FIRST ADDRESS
 8772  051222  012703  051362          MOV     #MRMCS1,R3      ;"RMCS1="
 8773  051226  011004                  MOV     (R0),R4         ;PRESENT RMCS1 ADDRESS
 8774  051230  004037  032516          JSR     R0,@#GETNUM     ;GET NEW RMCS1
```

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                                        BR      2$              ;COMMA
                                        BR      1$              ;PERIOD
                                        BR      5$              ;DOUBLE PERIOD
                                2$:     MOV     R4,(R0)+        ;SAVE NEW RMCS1
051373                                  MOV     #MRHVEC,R3      ;"RHVEC="
                                        MOV     (R0),R4         ;PRESENT RH70 VECTOR ADDRESS
032516                                  JSR     R0,@#GETNUM     ;GET NEW RHVEC
                                        BR      3$              ;COMMA
                                        BR      1$              ;PERIOD
                                        BR      5$              ;DOUBLE PERIOD
                                3$:     MOV     R4,(R0)+        ;SAVE NEW RHVEC
                                5$:     MOV     R4,(R0)         ;SAVE INPUT
000004                          7$:     MOV     @#ERRVEC,R1     ;SAVE THE ERROR VECTOR
051330  000004                          MOV     #8$,@#ERRVEC    ;SETUP FOR TRAP
130060                                  TST     @RH.ADR         ;CHECK FOR RH70/RM03
000004                                  MOV     R1,@#ERRVEC     ;RESTORE ERROR VECTOR
001366                                  MOV     #RH.ADR,R0      ;FIRST ADDRESS OF NEW PARAMETERS
035514                                  MOV     #RMADR,R1       ;FIRST ADDRESS OF WHERE TO PUT THEM
                                        MOV     (R0)+,(R1)+     ;BUS ADDRESS
                                        MOV     (R0)+,(R1)+     ;VECTOR ADDRESS
                                        RTS     PC              ;RETURN
000004                          8$:     MOV     R1,@#ERRVEC     ;RESTORE ERROR VECTOR
                                        CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
                                        ERROR   10              ;REPORT THE ERROR
000042                                  TST     @#42            ;IS THERE A MONITOR?
001724                                  BEQ     1$              ;NO--GO ASK FOR ADDRESS
001232                                  CLR     @#DRVSEL        ;YES--NO DRIVES SELECTED
020562                                  CLR     @#SEOPCT        ;NO PASSES
020406                                  JMP     @#SEOP          ;GO TO END OF PROGRAM

046522  051503  MRMCS1:  .ASCIZ  <CR><LF>/RMCS1=/
036461  000
051012  053110  MRHVEC:  .ASCIZ  <CR><LF>/RHVEC=/
041505  000075
                        .END
```

```
ACTDRV  035432          6810#  7078*  7129*  7447*  7456*  7694
ACTSTR  035433          6816#  7696*  7710*
AOE   = 001000           284#
ATA   = 100000           271#
ATABIT  035502          1849   6158   6164   6882#  7045   7141   7247   7617   7636   7644   7645   7665   7751
AT0   = 000001           332#
AT1   = 000002           333#
AT2   = 000004           334#
AT3   = 000010           335#
AT4   = 000020           336#
AT5   = 000040           337#
AT6   = 000100           338#
AT7   = 000200           339#
A16   = 000400           207#
A17   = 001000           208#
BAI   = 000010           225#
BITS    001424           576#   2012   2061   2114   2172   2227   2322   2380   2445   2549   2721   2802   2921
                        3026   3139   3268   3354   3498   3572   3658   3771   6225   6256   6273   6326   6500
BIT0  = 000001           182#
BIT00 = 000001           172#    182    576    592   1837   1859   1914   4972
BIT01 = 000002           171#    181    577    593   5298   5326   7121   7369
BIT02 = 000004           170#    180    578    594   1823   5035   5298   5329
BIT03 = 000010           169#    179    579    595   5335   7576   7869
BIT04 = 000020           168#    178    580    596   5332   7611
BIT05 = 000040           167#    177    581    597   2607   2623   2699   2859   2873   2888   2893   2973   2997
                        3002   3076   3094   3111   3116   3189   3207   3224   3229   5335   5445   6972   7389
                        7591   7746
BIT06 = 000100           166#    176    582    598   5338   7054   7112   7186   7487   7930
BIT07 = 000200           165#    175    583    599   7054   7321   7468   7576   7591   7611   7640   7902
BIT08 = 000400           164#    174    584   5326   7054
BIT09 = 001000           163#    173    585   3898   4520   5341   7744
BIT1  = 000002           181#
BIT10 = 002000           162#    586   3882   4984   5298   5329   6519   7371
BIT11 = 004000           161#    587   4527   5329   7019   7148   7340   7680
BIT12 = 010000           160#    588   5298   5332   7014   7036   7054   7123   7156   7336   7355   7367   7380
                        7601   7603   7807   7864   7931
BIT13 = 020000           159#    589   3889   5298   5326   7106   7549   7810
BIT14 = 040000           158#    590   2618   2854   2868   2968   3071   3089   3184   3202   4502   5226   5298
                        5332   7118   7153   7536   7676   7772   7819   7823   7928
BIT15 = 100000           157#    591   5490   5491   7106   7118   7121   7123   7153   7156   7340   7369   7371
                        7487   7576   7591   7601   7611   7676   7744   7772   7779
BIT2  = 000004           180#   7779
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= 050514          1239   1263   1287   1311   2584   3301   3316   3329   3387   3397   3411   3556   3689
                        3716   3726   3735   3743   3752   5409*  5410   5412   5414   5415   5416   5489   5526
                        5669   5688   5689   5713   5802   5834   5877   5919   5936   5937   5954   8675#
BUSADR  001226           513#  1700*  1702*  1705*  1707*  8768   8770*
BYPASS  001252           522#  1912*  2041*  2092*  2142*  2200*  2255*  2350*  2408*  2474*  2591*  2753*  3293*
                        3379*  3557*  3684*  5280   5760   5906   5971
```

```
CALL.A  026032  1918  1920  2044  2493  3785  3790  5078#  5081  5424
CALL.B  026144  2045  2096  2147  2155  2204  2209  2265  2271  2287  2293  2356  2358  2417
                2419  2421  2423  2425  2427  2515  2757  5109#  5112
CALL.C  026334  2095  2756  5152#  5155
CHKDRV  001254   523#  1891*  1896*  1901  3816  5023  8527  8532  8537  8540  8544  8549  8551
                8554  8558  8564
CI1     036766  7176  7204#
CI3     037074  7178  7227#
CI4     037174  7167  7249#
CI5     037552  7226  7248  7326#  7335
CI6     037574  7265  7275  7277  7279  7331#
CI7     037610  7108  7185  7216  7220  7224  7232  7242  7246  7257  7264  7270  7274  7288
                7294  7298  7308  7319  7334  7336#  7442  7472  7628  7914
CI7B    037636  7339  7342  7630
CI8     037710  7337  7345  7354#  7502  7764
CKSCTR  031010  3315  5710#
CKSWR = 104407  3872  3897  4501  4629#
CK.CHR  034766  6092  6142  6369  6406  6446  6572#  6609  6622  6633  6684
CK.DEC  034740  6550#  6580
CK.DIG  035042  6152  6390  6603#
CK.NUM  035226  6101  6422  6455  6667#
CK.OCT  034712  6205  6209  6229  6233  6532#  6669  6679
CLKSTA  001244   518#  1881  2596  2626  2827  2946  3051  3164  4902*  4904*  4910*
CLOSE   034632  6490  6494  6503#
CLR   = 000040   227#
CLRBUF  030742  3312  5686#
CLRQUE  043346  2590  6954  7388  7998#
CLSWDS  034532  6474  6478  6481#
CNTRLC  001224   512#  1703*  1708*  1792  1833
COMMA   044105  1877  8144#
CONT  = 000100   300#
COUNT   030120  2877  2977  3081  3099  3194  3212  5505#
CR    = 000015   97#  508#  3809  3840  4074  4084  6059  6139  8116  8122  8138  8145  8155
                8163  8168  8175  8178  8185  8188  8194  8198  8200  8202  8677  8681  8686
                8689  8698  8708  8711  8805  8807
CRLF  = 000200   98#  4045  4084
CYL.DS  001270  530#  2610*  5086*  5117*  5160*  5209*  5239*  5265*  5419*  5457*  5776*  5890*  8527
                8530  8532  8540  8544  8558  8564
CYL.RD  001262  527#  5414*  8530
C.SWR   001220  510#  1836  1839  1854  1914  2257  2841  2897  3691  4917  4927  4937  4972
                5062  5140  5183  5281  5365  6061  6065  6066*
DATCMP  031450  3622  5833#
DCK   = 100000  290#
DDISP = 177570  104#  481  1736
DECSEC  030660  5654#
DECSK   007170  2154#  2158
DELTA   001350   551#  2582*  2672*  2673*  2674  2676*  2685
DFLT    001664   672#  4961
DF1     050340  1400  8574#
DF10    050360  1464  8590#
DF11    050364  1474  8594#
DF12    050370  1487  8598#
DF13    050400  1500  1521  8605#
DF14    050410  1508  1529  8612#
DF17    050414  1539  1549  8616#
DF2     050344  1410  1440  8578#
```

```
DF21    050420          1562    8620#
DF22    050430          1570    8627#
DF23    050434          1582    1594    8631#
DF3     050350          1420    8582#
DF4     050354          1430    8586#
DF41    050444          1627    8639#
DF42    050450          1637    8643#
DF43    050454          1649    8647#
DF44    050464          1664    8654#
DF45    050500          1679    1694    8664#
DH1     046332          1398    8374#
DH10    046540          1462    8398#
DH11    046557          1472    8401#
DH12    046576          1485    1498    1519    1662    1677    1692    8404#
DH12A   046665          8414#   8601
DH13A   046744          8422#   8608
DH17    047012          1537    1547    8429#
DH2     046347          1408    1438    8377#
DH21    047107          1560    8440#
DH21A   047165          8448#   8623
DH23    047224          1580    1592    8454#
DH23A   047311          8463#   8634
DH3     046434          1418    8386#
DH4     046471          1428    8391#
DH41    047356          1625    8470#
DH42    047414          1635    1647    8475#
DH43A   047501          8484#   8650
DH44A   047527          8488#   8657    8667
DH44B   047603          8496#   8660
DH45A   047631          8500#   8670
DISPLA  001142           481#   1736*   1744*   2019*   2068*   2121*   2179*   2234*   2329*   2387*   2452*   2556*   2728*
                        2809*   2928*   3033*   3146*   3275*   3361*   3505*   3665*   3778*   3881*   4539*
DISPRE  000174            62#   1744
DLT   = 100000           237#
DMD   = 000001           294#    313#
DORTI   030052          2605    2848    2961    3064    3177    5476#
DPB.A   004104          1234#   1907*   1913*   1916*   1917*   1919*   2037*   2471*   2489*   2496    2576*   2579*   2588
                        2609    2610    2620    2681*   2688*   2690    2692    2696    3783*   3784*   3788*   3789*   5080
                        5082    5086    5087    5088    5089    5097    5423*
DPB.B   004124          1258#   1908*   2038*   2039*   2040*   2086*   2088*   2090*   2140*   2141*   2143*   2148*   2149
                        2151*   2156*   2157    2198*   2199*   2201*   2208*   2253*   2254*   2264*   2270*   2286*   2292*
                        2348*   2349*   2355*   2357*   2406*   2407*   2416*   2418*   2420*   2422*   2424*   2426*   2470*
                        2472*   2477*   2487*   2489    2516*   2517    2519*   2747*   2749*   2751*   2762*   2763    5064*
                        5067*   5111    5113    5117    5118    5119    5120    5132    5135    5138
DPB.C   004144          1282#   1909*   2087*   2089*   2091*   2748*   2750*   2752*   2758*   2759    2761*   5065*   5068*
                        5154    5156    5160    5161    5162    5163    5175    5178    5181
DPINT   035406          6770#   6983    6986    7062*   7088    7520    7545    7666    7668*   7735    7753    7758    7766*
DPR   = 000400           264#
DPRQS   035416          6783#   7094    7142*   7180*   7523    7737    7755    7760    7775*
DRIVES  044047          1860    8138#
DRQ   = 004000           355#
DRVACT  035356          2659*   6729#   7102    7282*   7329*   7348*   7359    7374*   7461*   7541    7574    7605*   7612*
                        7625    7635*   7747*
DRVCAL  026524          3305    3309    3314    3324    3331    3392    3403    3419    3425    3603    3609    3619    3698
                        3722    3729    3739    3746    3755    5198#   5202
DRVCLR= 000111           431#   2652
```

F16


```
DRVCL1  026544  2665  5203#  5204
DRVINT  035744  6974  7008#  7090  7656  7669
DRVMSK  001256  524#  1892*  1893  1897*  1905
DRVOK   006072  1894  1901#
DRVQUE  043444  7097  7110  8038#
DRVSEL  001232  515#  1844*  1849*  1859*  1863  1886  1893  1905*  3810  6135*  6158*  6164*  8801*
DRVSTA  035366  1806  1847  1902  6743#  6964*  6965*  6966*  6967*  6977*  7009*  7018*  7051*  7056*
                7084  7092  7116  7150  7154  7283*  7392*  7526  7534  7547  7599*  7606*  7618
                7671  7767*
DRVTYP  035376  1809  1823  5035  6757#  7010*  7025*  7030*  7119  7393*
DRY   = 000200  263#
DSWR  = 177570  103#  480  1735
DTADPB  004164  1306#  1910*  2505*  2508  2511*  2513*  2577*  2578*  2580*  2583*  2584*  2642*  2645
                2648*  2650*  2651  2656*  2657  2663  2690  2692*  2857  2860  2871  2874  2886
                2889  2894  2956*  2957*  2963  2971  2974  2981*  2982  2986*  2987  2995  2998
                3003  3074  3077  3092  3095  3109  3112  3117  3187  3190  3205  3208  3222
                3225  3230  3297*  3298*  3299*  3300*  3301*  3304*  3306*  3313*  3320*  3321*  3322*
                3323*  3327*  3328*  3329*  3330*  3383*  3384*  3385*  3386*  3387*  3391*  3393*  3397*
                3401*  3402*  3404*  3409*  3411*  3414*  3418*  3420*  3421*  3424*  3426  3555*  3556*
                3575*  3576*  3584*  3589*  3599*  3608*  3618*  3687*  3688*  3689*  3690*  3694*  3699*
                3700  3702*  3703  3707*  3713  3714  3715*  3717*  3725*  3726*  3732*  3733*  3734*
                3735*  3742*  3743*  3749*  3750*  3751*  3752*  5201  5203  5209  5210  5211  5212
                5222  5224  5230*  5233  5235  5239  5240  5241  5242  5250*  5252  5254  5258
                5260  5265  5266  5267  5268  5276  5446*  5447*  5448*  5451  5453  5457  5458
                5459  5460  5776  5777  5803  5835  5890  5891  5892  6041*  6042*  6043*
DTE   = 010000  287#
DTG   = 000020  317#
DTO   = 020000  326#
DTUW    035500  2658*  6876#  6960  7169  7225*  7349  7352*  7362  7375  7377*  7386*  7450  7462*
                7740  7817
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     047706  1399  8514#
DT10    047772  1463  8525#
DT11    047776  1473  8526#
DT12    050002  1486  8527#
DT12A   050020  8530#
DT13    050034  1499  1520  8532#
DT13A   050052  1507  1528  8535#
DT17    050064  1538  1548  8537#
DT2     047712  1409  1439  8515#
DT21    050104  1561  8540#
DT21A   050120  1569  8542#
DT23    050130  1581  1593  8544#
DT23A   050146  8547#
DT3     047730  1419  8518#
DT4     047740  1429  8520#
DT41    050160  1626  8549#
DT42    050170  1636  8551#
```

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DT43    050206            1648    8554#
DT43A   050224            8557#
DT44    050232            1663    8558#
DT44A   050250            8561#
DT44B   050264            8563#
DT45    050272            1678    1693    8564#
DT45A   050310            8567#
DT45B   050324            8569#
DT5     047752            8522#
DULP    035746            7009#   7020
DVA   = 004000             257#
EBL   = 020000             307#
ECH   = 000100             281#
ECI   = 004000             398#
ECRC  = 001000             303#
EECC  = 000020             298#
EMPTYQ  043424            7346    7391    7488    7613    7678    7780    8023#
EMTVEC= 000030             192#   1720*   1721*
EM1     044662            1397    8222#
EM10    045110            1461    8249#
EM11    045162            1471    8256#
EM12    045217            1484    8261#
EM13    045244            1497    1518    1559    8265#
EM17    045271            1536    8269#
EM2     044725            1407    8228#
EM20    045323            1546    8274#
EM23    045372            1579    8281#
EM24    045421            1591    8285#
EM3     044763            1417    8234#
EM4     045020            1427    8239#
EM41    045461            1624    1634    1646    1661    1676    8291#
EM46    045501            1691    8294#
EM5     045054            1437    8244#
ERINDX  027246            5090    5121    5164    5213    5243    5269    5320#   5461
ERR   = 040000             270#
ERRVEC= 000004             185#   1733    1734*   1745*   4507    4508*   4510*   4513*   4871*   4872*   4877*   4897    8735
                          8736    8740*   8741*   8748*   8749*   8787    8788*   8790*   8796*
ERR.CT  001364             557#   1946    3277    3363    3507    3667    5278    5758    5789    5904    5963
ESRC  = 004000             305#
ES.SAV  043610            7505    7556    7560    7815    7875    8093#
EXIT0   006522            2041    2046#
EXIT1   006736            2092    2097#
EXIT10  012410            2591    2671    2702    2704#
EXIT11  012666            2753    2765#
EXIT12  013462            2833    2838    2901    2905#
EXIT13  014164            2952    2954    3008#
EXIT14  014740            3057    3059    3122#
EXIT15  015514            3170    3172    3235#
EXIT16  016150            3293    3336#
EXIT17  016626            3379    3431#
EXIT2   007212            2142    2159#
EXIT20  017420            3557    3567    3581    3626#
EXIT21  020234            3684    3756#
EXIT22  020404            3793#
EXIT3   007444            2200    2213#
EXIT4   010070            2255    2305#
```

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EXIT5   010326          2350    2362    2365#
EXIT6   010630          2408    2415    2430#
EXIT7   011246          2474    2518    2520#
FC      001510           606#   2090    2143    2157    2201    2260    2270    2303    2351    2363    2409    2477    2478
                        2485    2579    2580    2581    2678    2751    2752    2761    2834    2956    3084    3197    3297
                        3384    3560    3687    3788    6018    6036
FER   = 000020           279#
FILBUF  030704          3296    3382    5667#
FILRAN  031766          3693    5919#
FMT22 = 010000           399#    451#   1913
FS      001524           612#   2038    2086    2140    2198    2253    2348    2406    2747    2748    2835    3385    3530
                        3547    3555
FT      001516           609#   2039    2088    2141    2199    2254    2349    2407    2470    2519    2578    2749    2750
                        2836    3298    3574
F1    = 000002           252#
F2    = 000004           253#
F3    = 000010           254#
F4    = 000020           255#
F5    = 000040           256#
GETADR  051204          1781    8768#
GETNUM  032516          6062    6084#   8774    8781
GETREG= 000141           444#
GETREQ  043520          7143    7364    7479    7530    7566    7627    7675    7743    7769    7776    8059#
GETSWR  032424          1786    6054#
GNS   = ****** U          61    3808    3814    3822    3839    3951    3968    4621    4622    4623    4624    4625    4627
                        4629    4630    4631    4632    4633    6058    6138    6171    6330    6436
GO    = 000001           251#
GTSWR = 104406          1775    4627#
GTTST1  033012          6163    6168#   6217    6230    6241    6244    6270    6277    6286    6292    6301    6318
GTTST2  033076          6185#   6281
GTTST3  033440          6188    6192    6196    6200    6204    6263#
GTTST4  033442          6206    6227    6261    6264#
GTTST5  033552          6265    6287#
GTTST6  033612          6289    6298#
GT.PRM  032654          1841    6134#
GT.PR1  032656          6135#   6143    6144    6145    6146    6147    6153    6154
GT.PR2  033006          6165#   6180    6297    6306    6499
HCE   = 000200           282#
HCI   = 002000           397#
HCRC  = 000400           283#
HT    = 000011            95#   4043    4084
IAE   = 002000           285#
IC      001514           608#   2148    2156    2205    2280    2302    2359    2360    2428    2582    2669    2674    2676
                        2758    2762    5641
IE    = 000100           205#
ILF   = 000001           275#
ILR   = 000002           276#
INCCYL  030630          3566    5639#
INCSK   007126          2146#   2150
INCTRK  030600          3623    5622#
IOTVEC= 000020           190#   1718*   1719*
IR    = 000100           228#
ISR     040320          2625    2896    3005    3119    3232    5443    6969    7447#
ISRMO3  044042          1822    8137#
IT      001522           611#   5624
ITEM41  004546          1617#   3935
```

```
KIPARO= ****** U        8731
LA      040144          7173    7408#
LACNT   035444          6835#   7416*   7417    7438*
LC      001512           607#   2040    2091    2149    2151    2211    2281    2283    2292    2352    2361    2410    2478
                        2483    2670    2672    2678    2759    2763    2982    3066    3179    3585    3703    3783    5639
                        5642    5644    6031
LDCMD   025766          1911    5062#
LF    = 000012            96#    509#   3809    3840    4078    4084    6059    6139    8116    8122    8138    8145    8155
                        8163    8168    8175    8178    8185    8188    8194    8198    8200    8202    8677    8681    8686
                        8689    8698    8708    8711    8805    8807
LKS     001412           569#   4909    4941*
LKV     001406           568#   2602    2603    4939*   4940*
LOADRV  050612          1760    8689#
LODFLT  025352          1840    1843    4954#
LODPRM  025610          2017    2066    2119    2177    2232    2327    2385    2450    2554    2726    2807    2926    3031
                        3144    3273    3359    3503    3663    3776    5012#
LOP.CK  027206          5098    5133    5176    5223    5277    5294#
LPB     001422           573#   3878
LPS     001420           572#   3877    4873
LPTAVL  001230           514#   3875    4870*   4874*
LP.AVL  025032          1783    4870#
LS      001526           613#   2087    3529
LSIT  = 000002           295#
LST   = 002000           266#
LT      001520           610#   2089    2517    5622    5625    5627
MABOVE  044600          5586    8209#
MBELOW  044551          5570    8205#
MCLK  = 004000           324#
MCPE  = 020000           210#
MCPEMX  035512          6894#   7797    7845
MDF   = 000100           319#
MI    = 000004           315#
MNDLTA  035526          6910#   7436
MOC   = 000400           321#
MOH   = 020000           356#
MOL   = 010000           268#
MPE   = 000400           230#
MRD   = 002000           323#
MRHVEC  051373          8779    8807#
MRMCS1  051362          8772    8805#
MS    = 000040           318#
MSC   = 000002           314#
MSEN  = 010000           325#
MSER  = 000200           320#
MSGAVG  044535          5591    8202#
MSGB01  046274          1368    8366#
MSGB02  046224          1367    8359#
MSGB03  046154          1366    8352#
MSGB04  046134          1365    8349#
MSGB05  046064          1364    8342#
MSGB06  046020          1363    8336#
MSGB08  045756          1362    8330#
MSGB09  045717          1361    8324#
MSGB10  045674          1360    8320#
MSGB11  045646          1359    8316#
MSGB12  045624          1358    8313#
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MSGB13  045573          1357    8308#
MSGB14  045531          1356    8302#
MSGFCP  043644           658    8106#
MSGLCP  043650           659    8107#
MSGMAX  044526          5575    8200#
MSGMIN  044517          5559    8198#
MSGNON  044644          5612    8216#
MSGNUM  044627          5607    8213#
MSG.CS  043704          6060    8116#
MSG.EQ  043702          6362    6400    6441    8115#
MSG.FC  043636           656    8104#
MSG.FS  043670           664    8112#
MSG.FT  043657           661    8109#
MSG.IC  043654           660    8108#
MSG.IT  043665           663    8111#
MSG.LC  043641           657    8105#
MSG.LS  043673           665    8113#
MSG.LT  043662           662    8110#
MSG.PA  043676          6399    8114#
MSG.R   043634           655    8103#
MSG.SP  044657          1804    1805    1821    1926    3963    3995    4002    4009    5566    5582    5603    6358    6398
                        6403    8218#
MSGOUS  044544          5563    5574    5579    5590    5602    8204#
MSG10A  044270           926    8168#
MSG10B  044337           927    8175#
MSG11A  044354           931    8178#
MSG11B  044423           932    8185#
MSG12A  044440           936    8188#
MSG12B  044502           937    8194#
MSG7    044236           916     921    8163#
MUR   = 001000           322#
MWP   = 000010           316#
MXDLTA  035524          6907#   7434
MXF   = 001000           231#
MXLACT  035522          6904#   7417
MXSTAL  001362           556#   2277    2299
MXWNDW  035530          6913#
NBA   = 100000           358#
NC1     001532           615#   2581*   2669*   2670    2673    2681
NC2     001534           616#
NED   = 010000           234#
NEM   = 004000           233#
NOCLOK  044107          1885    8145#
NOLOAD  051010          1767    8711#
NONE    044100          1865    8143#
NOOP  = 000101           427#
NOTPRS  044003          1814    8130#
NOTRM   044030          1812    1825    8135#
NOTSAF  044020          1818    8133#
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  001240          517#  6183*  6184*  6273*  6282  6284  6293  6295  6302  6304  6326
OPNPAT  034220         6357   6398#  6407   6416   6419  6423
OPNPRM  034016         6344   6349#  6353   6408   6410  6429
OPNTST  033644         6283   6285   6294   6296   6303  6305  6310#
OPNWDS  034342         6431#  6465
OPN.CT  033650         6312#  6314*  6315   6319   6321  6332
OPN.N1  034554         6394   6425   6488#
OPN.N2  034560         6381   6414   6476   6489#
OPN.X1  034572         6395   6426   6492#
OPN.X2  034576         6386   6418   6480   6493#
OPN.1   033654         6314#  6327   6491
OPN.2   033676         6313   6316   6319#
OPT     036530         7104   7139#  7482   7649  7686
OR      = 000200          229#
PACK    = 000123          436#
PAR     = 000010          278#
PAT     001530          614#  3572
PAT.PT  003044          941#  5804   5837   5880
PAT0    003104          941    960#  4968   6432  6481
PAT1    003144          942    977#
PAT10   003604          951   1130#
PAT11   003644          952   1147#
PAT12   003704          953   1164#
PAT13   003744          954   1181#
PAT14   004004          955   1198#
PAT15   004044          956   1215#
PAT2    003204          943    994#
PAT3    003244          944   1011#
PAT4    003304          945   1028#
PAT5    003344          946   1045#
PAT6    003404          947   1062#
PAT7    003444          948   1079#
PAT8    003504          949   1096#  4967
PAT9    003544          950   1113#  4970
PDA     = 000400          302#
PGE     = 002000          232#
PGM     = 001000          265#
PHA     = 000200          301#
PIP     = 020000          269#
PIRQ    = 177772          102#
PIRQVE= 000240            196#
PKB     001402          566#  2849*  2863*  2962*  3065*  3083*  3178*  3196*  4931*  5393*
PKC     001404          567#  5509   5511   5512   5516   5518   5519   5523   5528
PKCS    001400          565#  2850*  2853*  2865*  2867*  2881*  2965*  2967*  2990*  3068*  3070*  3086*  3088*
                       3104#  3181*  3183*  3199*  3201*  3217*  4903   4932*  5394*
PKV     001374          564#  2599   2600   2847*  2960*  3063*  3176*  4929*  4930*  5391   5392*  5397*
PLFS    = 002000          304#
POPQUE  043542         7152   7204   7320   7639   8074#
PRM     001504          603#  5021   5025*  5038*  5041*  6340  6349  6504
PRMLMT  001606          641#  2506   2643   3334   3533   3546  4974*  4975*  4978*  4979*  4995  4997  5657
                       5675   5754   5920   6006   6356   6389
PRMMSG  001636          655#  6359
PRMPT   001536          619#  4981   5020   6338   6505
PRM0    002330          619    729#  4962
PRM1    002344          620    737#
```

```
PRM10   002544              627     815#
PRM11   002564              628     825#
PRM12   002606              629     836#
PRM13   002622              630     844#
PRM14   002636              631     852#
PRM15   002652              632     860#
PRM16   002666              633     868#
PRM17   002700              634     875#
PRM2    002372              621     750#
PRM20   002712              635     882#
PRM21   002744              636     897#
PRM22   002760              637     905#
PRM3    002414              622     761#
PRM4    002436              623     772#
PRM5    002460              624     783#
PRM6    002502              625     794#
PRM7    002524              626     805#
PR0   = 000000              119#
PR1   = 000040              120#
PR2   = 000100              121#
PR3   = 000140              122#
PR4   = 000200              123#
PR5   = 000240              124#
PR6   = 000300              125#
PR7   = 000340              126#  1794    2595    2617
PS    = 177776               99#   100    1784*   1794*   1832*   2595*   2612*   2617*   2664*   2882*   2991*   3105*   3218*
                            5389  5390*   5398*   5442*   6952    6953*   6982*   6990*   7076    7077*   7130*   7140    7189*
                            7423*
PSEL  = 002000              209#
PSW   = 177776              100#
PTRN15  002742              894#
PWRVEC= 000024              191#
QCNT    043054              7940#   7999    8023*   8038    8040*   8060    8074*
QDRV0   043146              7951    7962    7971    7983#
QDRV1   043166              7952    7963    7972    7984#
QDRV2   043206              7953    7964    7973    7985#
QDRV3   043226              7954    7965    7974    7986#
QDRV4   043246              7955    7966    7975    7987#
QDRV5   043266              7956    7967    7976    7988#
QDRV6   043306              7957    7968    7977    7989#
QDRV7   043326              7958    7969    7978    7990#
QINPT   043064              7951#   8025    8042*   8043*   8044    8046*
QOUTPT  043104              7962#   8025*   8063    8076    8077*   8078*   8079    8081*
QSTART  043124              7971#   8005    8010    8046    8081
QSTOP   043126              7972#   8044    8079
QTERM = 043346              7979    7991#
RANADR  032242              3712    3724    3741    6000#
RANCK   032010              3730    3747    5934#
RANPAT  032206              3718    5921    5941    5982#
RDCHR = 104410              4431    4630#
RDLIN = 104411              4631#   6090    6140    6173    6367    6404    6444
RDY   = 000200               206#
RD.ADR  042336              7799*   7800*   7802#   8518
RD.RM   042312              7021    7040    7046    7268    7292    7306    7410    7424    7470    7500    7568    7578    7593
                            7730    7797#   7852    7866    7872    7906
RD.RM1  042334              7801#   7831
```

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RD.RM2  042460  7797* 7830#
RD.RM3  042464  7808  7822  7832#
RD.RM4  042470  7813  7834#
RD.WRD  042340  7803# 7804  8518  8520
READ   = 000171   442# 3313  3618  3725  3742
READHD= 000173   443# 2472  5064  5065  5135  5178
READIN= 000121   435#
RECAL  = 000107   430# 1919  2037  5423  5448
RELEAS= 000113   432#
RESREG= 104413  2861  2875  2890  2975  2999  3078  3096  3113  3191  3209  3226  4011  4633#
                4693  5492  5677  5700  5762  5823  5874  6165  6317  6475  6479  6498  6521
                6991  7124  7127  7190  7395  7455  7709  7915  8014
RESTAR  006052  1895# 1906  3851
RESVEC= 000010   186#
REX    = 010000   306#
RHVEC   001370   563#
RH.ADR  001366   562# 8525  8771  8789  8791
RMADR   035514  2473  2589  5444  6899# 6971  7083  7207  7227  7249  7408  7449  7728  7799
                7805  7809  7825  7858  7862  7895  7925  8792
RMAS   = 000016  6924# 7045* 7498  7617* 7644* 7665* 7750
RMBA   = 000004  2654* 6919#
RMCS1  = 000000  2611* 2652* 2663* 3067* 3085* 3180* 3198* 6917# 7013* 7019  7034  7147* 7148
                7223  7245  7287  7307  7318  7333  7344  7471  7501  7553  7585  7622  7680
                7853
RMCS2  = 000010  2496* 2607* 2608* 2623* 2624* 2633* 2699* 2700* 2859* 2860* 2873* 2874* 2888*
                2889* 2893* 2894* 2973* 2974* 2997* 2998* 3002* 3003* 3076* 3077* 3094* 3095*
                3111* 3112* 3116* 3117* 3189* 3190* 3207* 3208* 3224* 3225* 3229* 3230* 5445*
                6921# 6972* 7012* 7014  7096* 7146* 7208* 7228* 7250* 7336  7355  7367  7380
                7389* 7409* 7469* 7567* 7651* 7664* 7729* 7746* 7806  7863  7896* 7902  7926*
                7931
RMDA   = 000006  2835* 2837* 5470* 5654  6920# 7215  7241  7256
RMDB   = 000022  6926# 7900
RMDC   = 000034  2609* 2834* 2963* 3066* 3084* 3179* 3197* 5471* 6931# 7219  7231  7263
RMDS   = 000012  2613  2618  2854  2868  2968  3071  3089  3184  3202  6922# 7041  7411  7569
                7594  7652  7731
RMDT   = 000026  6928# 7022
RMEC1  = 000044  6935#
RMEC2  = 000046  6936# 7910
RMERRS  035346  6721# 6955  7536  7539  7549  7652* 7653* 7654* 7655* 8515  8522
RMER1  = 000014  5127  5129  5170  5172  6923# 7047  7579  7653  7867
RMER2  = 000042  6934# 7654
RMHR   = 000036  6932#
RMINIT  035532  1788  6951#
RMLA   = 000020  2497  2634  6925# 7425  7427
RMMR1  = 000024  6927#
RMMR2  = 000040  6933# 7655
RMOF   = 000032  6930# 7038  7269  7273  7293  7297
RMR    = 000004   277#
RMSN   = 000030  6929#
RMVEC   035516  2605* 2625* 2848* 2896* 2961* 3005* 3064* 3119* 3177* 3232* 5443* 6900# 6968
                6970  7077
RMWC   = 000002  2653* 6918#
RM.REG  004204  1246  1270  1294  1318  1334# 1929  5127  5129  5170  5172  5226  5654  8537
                8544  8547  8551  8554  8557  8561  8563  8567  8569
RM03    036236  5079  5110  5153  5200  5232  5251  5257  5450  7076#
RPT     001506   605# 2020  2069  2122  2180  2235  2330  2388  2453  2557  2729  2810  2929
```

```
                    3034    3147    3276    3362    3506    3666    3779    6363    6396*   6401    6427*   6488*   6492*
RPTMR   041704      4945    7694#
RSTRT1  006016      1882    1884    1886#   1898
RSTRT2  006042      1893#   1899
RTC     = 000117     434#     *
SAVCSW  001222      511#    1835    1839*   6065*
SAVEFG  035454      1789*   6850#   7322    7475    7641
SAVREG= 104412      2856    2870    2885    2970    2994    3073    3091    3108    3186    3204    3221    3920    4632#
                    4667    5483    5667    5686    5710    5801    5833    6134    6310    6430    6503    6951    7079
                    7139    7354    7448    7697    7892    7998
SC      040534      7454    7483    7486    7492    7498#
SCTRWC= 177400       450#   3321    3386    3707
SC0     = 000100     363#
SC1     = 000200     364#
SC11    041366      7538    7575    7632#
SC12    041476      7532    7543    7651#
SC13    041546      7522    7525    7661#
SC2     = 000400     365#
SC3     040604      7513#   7517
SC4     040610      7515#   7546    7558    7562    7610    7624    7631    7650    7687
SC5     040622      7514    7520#
SC6     041022      7542    7563#
SC6A    041132      7540    7587#
SC7     041260      7577    7590    7592    7602    7612#
SC8     041336      7554    7570    7580    7586    7595    7623    7625#   7660
SEARCH= 000131       437#   2851    2864
SEC.DS  001272       531#   5088*   5119*   5162*   5211*   5241*   5267*   5417*   5459*   5892*   8527    8530    8532
                    8558    8564
SEC.RD  001266       529#   5416*   8530
SEEK    = 000105     429#   2471    2576    2611    2964    3067    3085    3180    3198    3784    3789    5067    5068
SEEKFG  035456      1853*   1856*   6858#   6956    7171
SEKCNT  001346       550#   2666    2668*   2677*
SEKTMR  001344       549#   2606*   2694*
SELDRV= 000145       446#
SERIAL  044217      1927    8159#
SETBUF  031360      2586    3594    5801#
SETFOR= 000143       445#   1917    1919    2037    2471    2576    3784    3789
SETVEC  005326      1788#
SET.IE  043002      6985    7016    7114    7188    7394    7507    7924#
SKI     = 040000     416#
SLASH   043730      6089    6366    8121#
SRCHWT  035430      6804#   7141*   7247*   7636    7645*
SRCHOO  027670      2831    2950    3055    3168    5441#
SRTDRV  005542      1793    1833#
SRTINT  005274      1780    1782#
SRVCLK  025340      4929    4939    4944#
STACK = 001100        90#   1716    1895    2043    2094    2145    2153    2203    2207    2263    2285    2354    2413
                    2476    2492    2495    2594    2632    2754    2844    2955    3060    3173    3295    3303    3308
                    3311    3319    3326    3381    3390    3400    3417    3423    3558    3598    3607    3617    3696
                    3710    3721    3728    3738    3745    3754    3782
STALL   027364      2268    2274    2290    2296    3786    3791    5142    5185    5283    5364#
STALL0  001336       547#   2261*   2269    2275    2276*   2277    2279*   2291    2297    2298*   2299    2301*
STALL1  001354       553#   5143    5186
STALL2  001356       554#   5284
STALL3  001360       555#   3787    3792
START   004672      1704    1709#
```

```
START1  004636            79    1702#
START2  004660            81    1707#  1888   4272   4355
START3  004626            83    1700#
START4  004650            85    1705#
STATBL  004254          1356#   3947
STKLMT= 177774           101#
ST0     041774          7704    7724#
ST01    042030          7735#
ST02    042120          7734    7736   7738   7750#
ST03    042150          7752    7758#
ST05    042174          7732    7764#
ST06    042202          7754    7766#
ST07    042240          7756    7774#
ST08    042270          7773    7780#
ST09    042300          7742    7749   7757   7761   7763   7765   7771   7778   7782#
STRTMR  030054          2846    2959   3062   3175   5483#
STRT1A  004642          1701    1703#
STRT2A  004664          1706    1708#
ST.CLK  025074          1787    2895   3004   3118   3231   4896#
ST.LCL  025304          4911    4936#
ST.PCL  025242          4905    4926#
SVADR   001340           548#   3713*  3714*  3732   3733   3749   3750
SVRH70  042664          2621    2697   2858   2872   2887   2972   2996   3075   3093   3110   3188   3206   3223
                        7324    7341   7372   7477   7489   7531   7582   7600   7643   7677   7745   7781   7892#
SVSTAT  001260           525#   3944   5323*
SWR     001140           480#   1714   1735*  1737   1743*  1773   2024   2073   2126   2184   2239   2334   2392
                        2457    2561   2733   2814   2933   3038   3151   3280   3366   3510   3590   3595   3604
                        3612    3614   3620   3670   3873   3882   3889   3894   3898   4275   4314   4369*  4502
                        4520    4527   5228   5294   5426   5548   5785   5787   5791   5902   5961   5965   6054
SWREG   000176            63#   1743   1773   4275   4314   4337
SW0     = 000001          154#
SW00    = 000001          144#    154   3612
SW01    = 000002          143#    153   3620   5787   5902   5965
SW02    = 000004          142#    152   3614
SW03    = 000010          141#    151   3592   3604
SW04    = 000020          140#    150   3592   3595   5228
SW05    = 000040          139#    149   4927   4937   5791
SW06    = 000100          138#    148   2841   2897   4917   5548
SW07    = 000200          137#    147   5062   6054
SW08    = 000400          136#    146   1854   3873
SW09    = 001000          135#    145   5785   5961
SW1     = 000002          153#
SW10    = 002000          134#
SW11    = 004000          133#
SW12    = 010000          132#   2024   2073   2126   2184   2239   2257   2334   2392   2457   2561   2733   2814
                         2933    3038   3151   3280   3366   3510   3670
SW13    = 020000          131#   5365
SW14    = 040000          130#   5140   5183   5281
SW15    = 100000          129#   3691
SW2     = 000004          152#
SW3     = 000010          151#
SW4     = 000020          150#
SW5     = 000040          149#
SW6     = 000100          148#
SW7     = 000200          147#
SW8     = 000400          146#
```

```
SW9    = 001000            145#    5294    5426
SYSTAT   043734           1797    8122#
TAP    = 040000            357#
TBITVE=  000014            187#
TD       040364           7452    7461#
TESTNG   044175           1921    8155#
TEST0    006506           2018    2042    2043#
TEST1    006722           2067    2093    2094#
TEST10   011514           2555    2592#   2680    2693
TEST11   012610           2727    2754#
TEST12   013114           2842    2844#
TEST13   013646           2955#
TEST14   014350           3060#
TEST15   015124           3173#
TEST16   015650           3274    3294    3295#
TEST17   016304           3360    3380    3381#
TEST2    007106           2120    2143#
TEST20   017070           3504    3558#
TEST21   017730           3664    3708    3709    3710#
TEST22   020324           3777    3781    3782#
TEST3    007362           2178    2201#
TEST4    007630           2233    2258    2260#
TEST5    010240           2328    2351#
TEST6    010476           2386    2409#
TEST7    011012           2451    2475    2476#
TICKMS   001246            520#   4919*   4922*   4944
TICKUS   001250            521#   4920*   4923*
TIMER    035460           2661*   6863#   7060*   7183*   7327*   7373*   7464*   7564*   7608*   7647*   7662*   7683*   7700
                          7702*   7762*   7768*   7774*
TIM.DN   001314            539#   5491*   5508
TIM.PT   001332            545#   5485    5526    5528*   5529*
TIM.UP   001276            533#   5484    5490*   5505    5554
TITLE    050514           1755    8677#
TKVEC  = 000060            194#   4252*   4253*
TPB      001416            571#   1752    3906
TPS      001414            570#   1751    3905
TPVEC  = 000064            195#
TRAPVE=  000034            193#   1722*   1723*
TRCKWC   001352            552#   3300    3328    3688    4976*   4980*
TRE    = 040000            211#
TRK.DS   001274            532#   5087*   5118*   5161*   5210*   5240*   5266*   5418*   5458*   5777*   5891*   8527    8530
                          8532    8540    8558    8564
TRK.RD   001264            528#   5415*   8530
TRNSWT   035426           2657*   6796#   7205*   7351*   7361    7378*   7387*   7466    7467*   7739
TRTVEC=  000014            188#
TSTNMS   001234            516#   1883    2012    2061    2114    2172    2227    2322    2380    2445    2549    2721    2802
                          2921    3026    3139    3268    3354    3498    3658    3771    4959*   4960*   6161*   6162*   6181*
                          6182*   6187*   6191*   6195*   6199*   6203*   6225*   6256*   6266    6268
TST0     006324           2010#
TST1     006524           2014    2059#
TST10    011250           2447    2547#
TST10A   011752           2627    2630#
TST10B   012344           2604    2694#
TST11    012412           2551    2719#
TST12    012670           2723    2800#   2808
TST13    013464           2804    2829    2919#   2927
```

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TST14   014166          2923    2948    3024#   3032
TST15   014742          3028    3053    3137#   3145
TST16   015516          3141    3166    3266#
TST17   016152          3270    3352#
TST2    006740          2063    2112#
TST20   016630          3356    3496#
TST21   017422          3500    3656#
TST22   020236          3660    3769#
TST3    007214          2116    2170#
TST4    007446          2174    2225#
TST5    010072          2229    2320#
TST6    010330          2324    2378#
TST7    010632          2382    2443#
TWOMS   027446          2978    3082    3100    3195    3213    5389#
TYPDS = 104405          3992    4625#
TYPE  = 104401          1755    1760    1767    1782    1796    1797    1804    1805    1812    1814    1816    1818    1820
                        1821    1825    1826    1828    1860    1865    1877    1885    1921    1926    1927    1942    1945
                        2028    2034    2077    2083    2130    2136    2188    2194    2243    2249    2338    2344    2396
                        2402    2461    2467    2565    2571    2737    2743    2818    2824    2937    2943    3042    3048
                        3155    3161    3284    3290    3370    3376    3514    3520    3674    3680    3806    3812    3820
                        3837    3841    3884    3892    3939    3940    3949    3958    3959    3963    3966    3972    3973
                        3982    3995    3999    4002    4004    4006    4009    4048    4145    4221    4269    4281    4335
                        4336    4339    4350    4360    4371    4390    4438    4444    4449    4453    4458    4459    4461
                        4464    4468    4621#   4735    5555    5559    5563    5566    5570    5574    5575    5579    5582
                        5586    5590    5591    5602    5603    5607    5612    6056    6085    6089    6136    6169    6328
                        6337    6358    6360    6362    6366    6398    6399    6400    6403    6434    6441
TYPERR  021062          3891    3919#
TYPOC = 104402          3825    3988    4338    4622#   6088    6402    6443
TYPON = 104404          4624#
TYPOS = 104403          1801    1872    1923    2031    2080    2133    2191    2246    2341    2399    2464    2568    2740
                        2821    2940    3045    3158    3287    3373    3517    3677    3817    4623#   6334
TYPTIM  030252          2899    2903    3006    3120    3233    5547#
T10     003014           926#   2953    3007
T11     003024           931#   3058    3121
T12     003034           936#   3171    3234
T7A     002774           916#   2840    2900
T7B     003004           921#   2843    2904
ULDFLG  035434          6823#   7011*   7086    7101*   7284*   7347*   7379*   7528    7614    7616*   7632    7634*   7748*
UNLOAD= 000103           428#
UNS   = 040000           289#
UNTMSG  043754          8125#
UNTOFF  043762          1816    8126#
UNTON   043773          1820    8128#
UPE   = 020000           235#
US1   = 000001           222#
US2   = 000002           223#
US4   = 000004           224#
VERIFY  027526          5137    5180    5407#
VV    = 000100           262#
WC    = 000040           299#
WCE   = 040000           236#
WCEFLG  001334           546#   3559*   3610    5199*   5263*
WCF   = 000040           280#
WD    = 000010           297#
WLE   = 004000           286#
WRCKD = 000151           438#   3306    3327    3401    3424    3608    3734    3751    5224    5250
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WRCKHD= 000153            439#
WRITE = 000161            440#  2577  3304  3320  3383  3418  3599  3690  3715  5230
WRL   = 004000            267#
WRTHD = 000163            441#
WRT.AD  042562           7848*  7858*  7861#  8520
WRT.RM  042472           7033   7037   7214   7218   7222   7230   7240   7244   7255   7262   7272   7286   7296
                         7317   7332   7343   7552   7584   7621   7845#
WRT.R1  042556           7859#  7880
WRT.R2  042650           7845*  7879#
WRT.R3  042654           7854   7865   7868   7874   7881#
WRT.R4  042660           7870   7883#
WRT.R5  042662           7882   7884#
WRT.WD  042560           7846*  7850   7857*  7860#  8520
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$BDADR  001122            472#  5884*  5949*  8535
$BDDAT  001126            474#  5773*  5886*  5951*  8535   8542
$BELL   001210            503#  1749   3884   3908   4281   4478
$CHARC  021664           4050*  4060*  4067   4076*  4081#
$CKSWR  022640           4314#  4629
$CMTAG  001100            460#  1711   1712   1720   1726   1727
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$CM2  = 000014            492#   493#   494#   495#   496#   497#   498#
$CM3  = 000006            490#   492
$CM4  = 000003            498#   499#   500#   501#
$CNTLC  023552           4269   4350   4478#
$CNTLG  023564           4335   4480#
$CNTLU  023557           4360   4453   4479#
$CRLF   001215            505#  1782   1796   1828   1945   2028   2034   2077   2083   2130   2136   2188   2194
                         2243   2249   2338   2344   2396   2402   2461   2467   2565   2571   2737   2743   2818
                         2824   2937   2943   3042   3048   3155   3161   3284   3290   3370   3376   3514   3520
                         3674   3680   3892   3908   3939   3958   3972   3982   3999   4006   4049   4084   4371
                         4458   4478   6337
$DBLK   022332           4187   4221   4229#
$DB2D   024254           4648   4667#
$DECVL  024434           4669   4715#
$DIV    024612           2486   2687   4803#  5595
$DOAGN  020644           3833   3843   3849#
$DTBL   022322           4190   4225#
$ENDAD  020634             71   3845#
$ENDCT  020570           1861*  1870*  1880   3835#
$ENULL  020650           3841   3852#
$EOP    020406           1867   1912   3773   3805#  5301   8803
$EOPCT  020562           1880*  3832#  3836   8802*
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$ERMAX  001115            469#  1728*  1946*  2021*  2070*  2123*  2181*  2236*  2331*  2389*  2454*  2558*  2730*
                         2811*  2930*  3035*  3148*  3277*  3363*  3507*  3667*  3780*  4518   4538*  4543
$ERROR  020654           1720   3871#
$ERRPC  001116            470#  3886*  3887*  3888   3908   8514   8515   8518   8520   8522   8525   8526   8527
                         8532   8537   8540   8544   8549   8551   6554   8558   8564
$ERRTB  004306           1383#  3935   3936
$ERTTL  001112            467#  3824   3826*  3885*  3908
$ESCAP  001206            502#  1727*  2838*  2954*  3059*  3172*  3901   3903   3908   4537*  5078*  5085*  5109*
                         5116*  5152*  5159*  5198*  5208*  5231*  5238*  5264*  5297*  5420*  5425*  5449*  5456*
                         5778*  5783*  5894*  5900*  5947*  7505   7556   7560   7815   7875   8085   8094   8095*
                         8097*
$FILLC  001156            488#  4053   4084
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$GDDAT  001124          473#  5887*  5952*  8535
$GET42  020624         3842#
$GTSWR  022730         4336#  4627
$HD   = 000000           11
$HINUM  024606         1724*  2481   2683   3685*  4757   4765   4770*  4775#  5934   5940*  5943*  5987   6003
$ICNT   001104          464#  1785*  4529*  4530   4532*  4542
$INTAG  001135          478#  4333*  4352   4372   4485
$ITEMB  001114          468#  3888*  3908   3928
$LF     001216          506#  3908   4084   4468   4478
$LONUM  024610         1725*  3686*  4756   4763   4769*  4776#  5368   5935   5939*  5942*  5986   6001   6002
$LPADR  001106          465#  1729*  2042*  2093*  2139*  2197*  2252*  2347*  2405*  2475*  2574*  2746*  2830*
                       2949*  3054*  3167*  3294*  3380*  3526*  3683*  3708*  3781*  4522*  4535*  4540   4542
$LPERR  001110          466#  1730*  2018*  2067*  2120*  2144*  2152*  2178*  2202*  2206*  2233*  2262*  2284*
                       2328*  2353*  2386*  2412*  2451*  2491*  2494*  25[illegible]*  2593*  2631*  2727*  2808*  2927*
                       3032*  3145*  3274*  3302*  3307*  3310*  3318*  3325*  3360*  3389*  3399*  3416*  3422*
                       3504*  3597*  3606*  3616*  3664*  3695*  3709*  3720*  3727*  3737*  3744*  3753*  3777*
                       3900   4522   4536*  4542   5296   5428
$LSTAD  051202         1765   8750*  8754#
$MAIL   ****** U       1747   1773   3894   4037   4535
$MNEW   023602         4339   4483#
$MSWR   023571         4336   4481#
$MXCNT  024036         4533   4542#
$NULL   001154          486#  4055   4084
$NWTST= 000001         2001#  2003   2048#  2050   2099#  2101   2161#  2163   2215#  2217   2307#  2309   2367#
                       2369   2432#  2434   2523#  2525   2706#  2708   2788#  2790   2908#  2910   3011#  3013
                       3124#  3126   3253#  3255   3338#  3340   3434#  3436   3629#  3631   3760#  3762
$OCNT   022112         4117*  4146*  4159#
$OMODE  022114         4112*  4116*  4121   4124*  4135*  4161#
$OVER   024022         4503   4523   4531   4539#
$PASS   001100          461#  3829*  3830*  3852
$QUES   001214          504#  3908   4084   4390   4461   4478
$RAND   024510         2480   2682   4752#  5367   5985   6000
$RDCHR  023202         4403#  4630
$RDDEC= ****** U       4632
$RDLIN  023272         4426#  4631
$RDOCT= ****** U       4632
$RDSZ   000024         4419#
$REGAD  001160          490#  1747
$REGO   001162          492#  3922*  8527   8532   8540   8549   8551   8554   8558   8564
$REG1   001164          493#  3923*  8515   8522   8542
$REG2   001166          494#  3924*  8526
$REG3   001170          495#  3925*  8514   8515
$REG4   001172          496#  3926*  8535   8542
$REG5   001174          497#  3927*  8522
$RESRE  024076         4577#  4633
$RTNAD  020646         3851#
$R2A    ****** U       4634
$SAVRE  024040         4561#  4632
$SB2D   024220         4646#  5561   5568   5572   5577   5584   5588   5600   5605   6364   6439
$SCOPE  023614         1718   4500#
$SETUP= 000147         1700#  1717   1718   1720   1722   1724   1726   1727   1729   1770   3827   3872   3897
                       3905   4273   4278   4279   4309   4485   4501
$SIZE   051106         1764   8733#
$STUP = 177777         1700#
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$SVLAD  023774          4511   4534#
$SVPC = 000200            69#    74
$SWR  = 167000             1#    11     40     41     42     43     44     45   453#    501    502    503   1726
                        1727   1729   1730   2022   2071   2124   2182   2237   2332   2390   2455   2559   2731
                        2812   2931   3036   3149   3278   3364   3508   3668   3781   3802   3828   3844   3850
                        3852   3863   3864   3865   3866   3867   3882   3889   3894   3898   3908   4493   4494
                        4495   4496   4497   4502   4514   4516   4517   4518   4525   4526   4527   4536   4539
                        4542
$SWRMK= 000000          4497
$TIMES  001204           501#  1726*  2020*  2069*  2122*  2180*  2235*  2330*  2388*  2453*  2557*  2729*  2810*
                        2929*  3034*  3147*  3276*  3362*  3506*  3666*  3779*  3828*  4525*  4530   4533*  4542
$TKB    001146           483#  4234   4254   4265   4290   4318   4345
$TKCNT  022342          4235#  4249*  4279   4296*  4410   4412*
$TKINT  022352          1769   4249#  4270   4331
$TKQEN= 022352          4239#  4304   4415
$TKQIN  022344          4236#  4250*  4251   4302*  4303*  4304   4306*
$TKQOU  022346          4237#  4251*  4413   4414*  4415   4417*
$TKQSR  022350          4238#  4250   4306   4417
$TKS    001144           482#  4234   4255*  4286*  4288   4294*  4316   4332*  4342   4354*  4374*
$TKSRV  022422          4252   4265#
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                        8558   8564
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$TMP2   001202           500#
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                        2237#  2307   2320   2322   2331   2332#  2367   2378   2380   2389   2390#  2432   2443
                        2445   2454   2455#  2523   2547   2549   2558   2559#  2706   2719   2721   2730   2731#
                        2788   2800   2802   2811   2812#  2908   2919   2921   2930   2931#  3011   3024   3026
                        3035   3036#  3124   3137   3139   3148   3149#  3253   3266   3268   3277   3278#  3338
                        3352   3354   3363   3364#  3434   3496   3498   3507   3508#  3629   3656   3658   3667
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$TPB    001152           485#  1752*  3878*  3906*  4073*  4084
$TPFLG  001157           489#  4031   4084
$TPS    001150           484#  1751*  3877*  3905*  4071   4084
$TRAP   024134          1722   4598#
$TRAP2  024156          4609#  4620
$TRP  = 000014          4613#  4622#  4623#  4624#  4625#  4626#  4627   4628#  4629   4630#  4631#  4632#  4633#
                        4634#
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                        2230*  2234   2241   2325*  2329   2336   2383*  2387   2394   2446*  2452   2459   2552*
                        2556   2563   2724*  2728   2735   2805*  2809   2816   2924*  2928   2935   3029*  3033
                        3040   3142*  3146   3153   3271*  3275   3282   3357*  3361   3368   3501*  3505   3512
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                        5018   5220
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$TYPDS  022116          4175#  4625
$TYPE   021450          4031#  4613   4621
$TYPEC  021620          4052   4059   4066   4071#  4072   4376
$TYPEX  021666          4077   4079   4082#
$TYPOC  021714          4115#  4622
$TYPON  021730          4114   4117#  4624
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$XTSTR  023626          4505#
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.     = 051404            57#     61#     69      70#     72#     74#     77#     459#    507     1715    1729    1730    2144
                        2152    2202    2206    2262    2284    2353    2412    2491    2494    2593    2631    3302    3307
                        3310    3318    3325    3389    3399    3416    3422    3526    3597    3606    3616    3683    3695
                        3720    3727    3737    3744    3753    3809#   3852    3853#   3908    3952#   4084    4229#   4234
                        4238#   4239    4240    4477#   4478    4485#   4542    4543    4715#   6331#   7983#   7984#   7985#
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CKDIG     1696#  6150  6388
CKNUM     1696#  6100  6421  6454
COMMEN     197#  1950  1985  2770  3239
COMND     1696#  1919  2037  2471  2575  3784  3789
DO        1696#  1918  1920  2044  2045  2095  2096  2147  2155  2204  2209  2265  2271  2287  2293
          2356   2358  2417  2419  2421  2423  2425  2427  2493  2514  2755  2757  3785  3790  5424
DODTA     1696#  3305  3309  3314  3324  3331  3392  3403  3419  3425  3603  3609  3619  3697  3722
          3729   3739  3746  3755
DRV.IN    1696#  2892  3001  3115  3228
ENDCOM     197#  1978  1996  2783  3248
ENDPAS    1696#  3837
ERRCAL    6704#  7505  7556  7559  7814  7875
ERREND    1696#  3905
ERROR       91#  1904  2622  2698  2862  2876  2891  2976  3000  3079  3097  3114  3192  3210  3227
          5092   5093  5094  5095  5096  5123  5124  5125  5126  5131  5166  5167  5168  5169  5174
          5215   5216  5217  5218  5219  5245  5246  5247  5248  5249  5271  5272  5273  5274  5275
          5422   5463  5464  5465  5466  5467  5779  5784  5895  5901  5959  5960  7506  7557  7561
          7816   7876  8798
ERRTYP    1696#  3873
ER.NDX    1696#  5086  5117  5160  5209  5239  5265  5457
ESCAPE     197#  2838  2954  3059  3172  5085  5116  5159  5207  5238  5264  5420  5456  5778  5782
          5894   5899  5947
GETPRI     197#  4803  8739
GETSWR       1#   197#  1770
LOOP      1696#  2144  2152  2202  2206  2262  2284  2353  2412  2490  2494  2592  2630  3302  3307
          3310   3318  3325  3389  3399  3416  3422  3597  3606  3616  3695  3720  3727  3737  3744
          3753
MORETA     453#   508
MORE.S    1696#  2010  2059  2112  2170  2225  2320  2378  2443  2547  2719  2800  2919  3024  3137
          3266   3352  3496  3656  3769
MSG       2001#  2003  2048#  2050  2099#  2101  2161#  2163  2215#  2217  2307#  2309  2367#  2369  2432#
          2434   2522#  2525  2706#  2708  2787#  2790  2908#  2910  3011#  3013  3124#  3126  3253#  3255
          3338#  3340  3434#  3436  3629#  3631  3760#  3762
MULT       197#
NEWTST     197#  2001  2048  2099  2161  2215  2307  2367  2432  2523  2706  2788  2908  3011  3124
          3253   3338  3434  3629  3760
POP        197#  4216  4582  4771  4854  4999  5048
PUSH       197#  4175  4562  4752  4805  4954  5012
REPORT     197#  1696#  2899  2902  3006  3120  3233
RM03.D       1#  6704
SAV.RH    1696#  2856  2870  2885  2970  2994  3073  3091  3108  3186  3204  3221
SCOPE       92#  2046  2097  2159  2213  2305  2365  2430  2520  2704  2765  2905  3008  3122  3235
          3336   3431  3626  3756  3793
SETPRI     197#  4406
SETTRA    4613#  4622  4623  4624  4625  4627  4629  4630  4631  4632  4633
SETUP      197#  1710
SET.TN    1696#  2011  2060  2113  2171  2226  2321  2379  2444  2548  2720  2801  2920  3025  3138
          3267   3353  3497  3657  3770
SKIP       197#
SLASH      197#
SPACE      197#
STARS       67   197#   201   243   247   424   455   507  1598  2001  2009  2048  2058  2099  2111
          2161   2169  2215  2224  2307  2319  2367  2377  2432  2442  2523  2546  2706  2718  2788
          2799   2908  2918  3011  3023  3124  3136  3253  3265  3338  3351  3434  3495  3629  3655
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SWRSU    197#  1731#
TRMTRP  4613#
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        3278    3364    3508    3668
TYPBIN   197#
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TYPEND  1696#   3806
TYPNAM   197#
TYPNUM   197#
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TYPOCT   197#   3824    3987    4337    6087    6401    6442
TYPTXT   197#   3806    3812    3820    3837    3949    3966    6056    6136    6168    6328    6433
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$SCMTM   453#    498     499     500
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.HEADE     1#
.SETUP     1#   1700
.SWRHI     1#     36
.SWRLO    46#     47      48      49      50      51      52      53
.$ACTI     1#     65
.$CATC     1#     55
.$CMTA     1#    453
.$DB2D     1#   4654
.$DIV      1#   4778
.$EOP      1#   3797
.$ERRO     1#   3857
.$RAND     1#   4741
.$RDDE     1#
.$RDOC     1#
.$READ     1#   4231
.$SAVE     1#   4544
.$SB2D     1#   4635
.$SCOP     1#   4487
.$SIZE     1#   8725
.$SUPR     1#   4717
.$TRAP     1#   4590
.$TYPD     1#   4163
.$TYPE     1#   4014
.$TYPO     1#   4085

. ABS.  051404     000

 ERRORS DETECTED:  0

 RM03:DZRMFA,DZRMFA/NL:MD/SOL/CRF=RM03:RMDRV4.P11,DZRMFA.P11
 RUN-TIME: 30 26 2 SECONDS
```

RUN-TIME RATIO: 649/59=10.8
CORE USED: 45K (89 PAGES)