RP04/05/06

READ-WRITE TEST

CZRJAC0

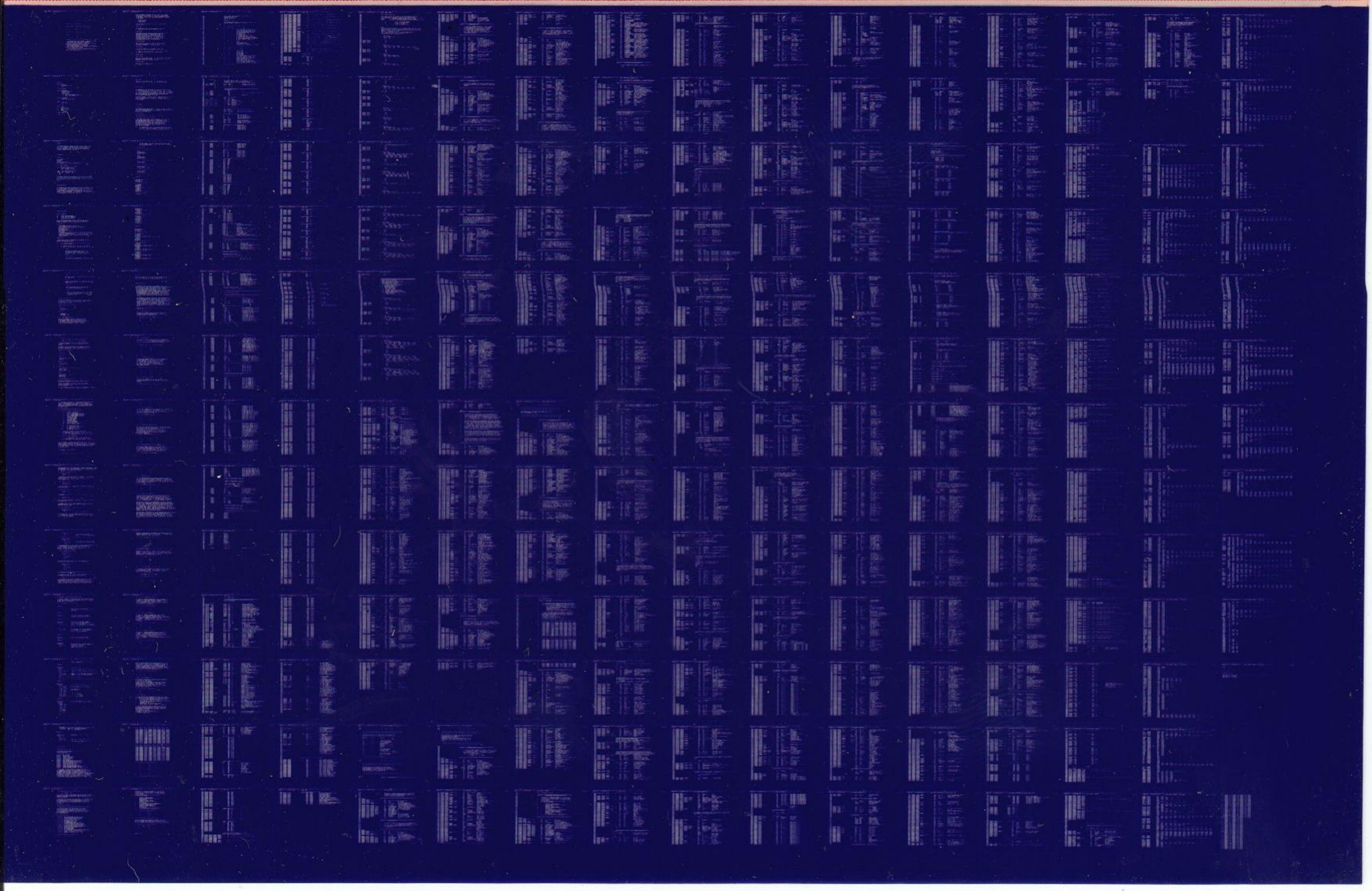
AH-9182C-MC

FICHE 1 OF 1

AUG 1978

digital

MADE IN USA



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

PRODUCT CODE AC-9180C-MC

PRODUCT NAME 'ZRJACO RP04/5 ' READ-WRITE TEST

DATE AUGUST 1978

MAINTAINER DIAGNOSTIC ENGINEERING

AUTHOR C HESS

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)
RH11 OR RH70 WITH 1 - 8 RP04/5/6 DISK DRIVES

2.2 PRELIMINARY PROGRAMS

RP04/5/6 DISKLESS CONTROLLER TEST
        PART 1 (MAINDEC-11-DZRJG)
        PART 2 (MAINDEC-11-DZRJH)

RP04/5/6 FUNCTIONAL CONTROLLER TEST
        PART 1 (MAINDEC-11-DZRJI)
        PART 2 (MAINDEC-11-DZRJJ)

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 RH11-RH70 ADDRESSES
214 COMBINATION OF 204 AND 210

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

4 2 OPERATOR ACTION

1 LOAD PROGRAM INTO MEMORY (SEE SECTION 3)
2 LOAD A FORMATTED PACK INTO DRIVE(S) TO BE TESTED
3 BRING DRIVE(S) TO ONLINE STATE, WRITE ENABLED, AND LOCKED ON PORT.
4 LOAD ADDRESS 200.
5 SET SWITCHES (SEE SECTION 5.)
6. PRESS START.
7 THE PROGRAM WILL TYPEOUT THE STATUS OF THE DRIVES ATTACHED TO THE SELECTED MASSBUS SUBSYSTEM. TO INHIBIT THIS TYPEOUT, DO NOT RESTART THE PROGRAM FROM ANY OF THE STARTING ADDRESSES, INSTEAD TYPE A 'CONTROL C' ON THE KEYBOARD TO RETURN THE PROGRAM TO COMMAND ENTRY MODE.

4 3 PROGRAM ACTION

IN AN EFFORT TO ALLOW CONVERSATION WITH A PROGRAM FOR THE PURPOSE OF CONTROLLING ITS OPERATION AND PARAMETERS THE FOLLOWING CONSTRUCTIONS HAVE BEEN ADOPTED

NOTE1 IN ALL EXAMPLES BRACKETS ARE USED FOR CLARITY AND ARE NOT TYPED BY THE USER

NOTE2 THE CARRRIAGE RETURN TYPED BY THE USER IS INDICATED BY <CR> AND WILL BE ECHOED AS A 'CARRIAGE RETURN-LINE FEED'

< ><CR> PERIOD

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

< ><CR> PERIOD PERIOD

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

THE START OF TEST EXECUTION

<,><CR> COMMA

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

</> SLASH

A MODIFICATION INDICATOR IF A SLASH FOLLOWS A TEST NUMBER, THE PROGRAM WILL OPEN THAT TEST FOR PARAMETER MODIFICATION

<U> CONTROL-U

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

<RUBOUT> 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 RH11 - RH70 ADDRESS SELECTION

STARTING THE PROGRAM AT 200 WILL RESULT IN AUTOMATIC SELECT OF THE DEFAULT VALUES OF BUS ADDRESS (RPCS1), VECTOR ADDRESS, AND PRIORITY LEVEL OF THE RH11-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

SEQ 0006

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 RH11 OR RH70 AND THE VECTOR
ADDRESS

THE PROGRAM ALLOWS THE ADDRESSES TO BE CHANGED ON WHEN THE
PROGRAM IS FIRST STARTED STARTING ADDRESSES 210(8) AND 214(8)
ARE TREATED AS ADDRESSES 200(8) OR 204(8) RESPECTIVELY

ADDRESS SELECTION EXAMPLES

EXAMPLE #1

  RPCS1=176700 / 177200

EXAMPLE #2

  RPCS1=176700 / 176300<CR>
  RHVEC=254 / 260<CR>
  RHPRIO=5 / 6

EXAMPLE #3

  RPCS1=176700<CR>
  RHVEC=254 / 260

EXAMPLE #4

  RH11/RP04 FAILED TO RESPOND TO ADDRESSING
  RPCS1   ERR PC
  176300 XXXXXX
  RPCS1=176300 / 176700

EXAMPLE #5

  RPCS1=176700 / 1776 67 6300<CR>
  RHVEC=254<CR>
  RHPRIO=5<CR>
  RPCS1=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.

EACH TEST CONTAINS TWO SETS OF CYLINDER LIMIT PARAMETERS PARAMETERS
'LC' AND 'FC' ARE USED BY RP04/5 DRIVES AND PARAMETERS 'LC'' AND

SEQ 0007

'FC'' ARE USED BY RP06 DRIVES THE PROGRAM DETERMINES WHICH DRIVE
IS BEING TESTED AND SELECTS THE CORRECT SET OF CYLINDER LIMIT
VALUES IF THE PROGRAM IS BEING USED TO TEST A SUBSYSTEM WHICH
CONTRAINS BOTH RP04/5 AND RP06 DRIVES, THE OPERATOR MUST CHANGE
BOTH SETS OF CYLINDER LIMITS IF THE TESTS ARE TO BE MODIFIED FOR
ALL DRIVES TESTED

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 FOR RP04/5'S
"LC"	LAST CYLINDER ADDRESS FOR RP04/5'S
"FC'"	FIRST CYLINDER ADDRESS FOR RP06'S
"LC'"	LAST CYLINDER ADDRESS FOR RP06'S
"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

SEQ 0008

DRIVE #3 USING TESTS 2 THRU 7 AND TEST 11 AND DOES NOT DESIRE TO CHANGE
THE PARAMETERS (INITIAL CYLINDER ADDRESS, FINAL CYLINDER ADDRESS, ETC)
THE USER WOULD TYPE '3<CR>' WHICH SAYS 'THIS IS THE END OF DRIVE ENTRY'
THE PROGRAM WILL THEN REQUEST TEST NUMBERS

THE TRANSACTION APPEARS AS FOLLOWS

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

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

IT NOW LOOKS LIKE THIS

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

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

THE TRANSACTION WOULD BE AS FOLLOWS

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

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

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

NOTICE THIS SAYS SELECT TEST 1, CONTINUE(,), SELECT TEST 3, OPEN(/),
SELECT TESTS 4-7, CONTINUE(,), SELECT TEST 10, OPEN(/), SELECT TEST
11, END OF INPUT ( )

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

(THE ENTIRE TRANSACTION IS REPEATED FOR CLARITY)

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

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

```
DRIVE(S)=4<CR>
```

```
        TEST=1,3/4-7,10/11<CR>
          TEST 3
            R=1 / <CR>          ,DO NOT ALTER-BUT CONTINUE
            FC=N /              ,WHERE 'N' IS FIRST CYLINDER ADDRESS
```

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

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

THE PROGRAM RESPONDS WITH THE PREVIOUSLY ASSIGNED PARAMETER FOR LAST CYLINDER ADDRESS IN THIS CASE USING 410 AS THE EXAMPLE THIS IS WHAT THE 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= 410 / 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= 410 / 20 <CR>
          TEST 10
            R=1 / 10. <CR>
```

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

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

```
        DRIVE(S)=
```

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

SEQ 0010

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=410 / 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 TC NEXT PARAMETER
    FC=0 / 50<CR>             ,CHANGE 'FC' TO 50, GO TO NEXT PARAMETER
    LC=410 / 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=410 / 10<CR>
    FC'=0 / <CR>              ,RP06 PARAMETER
    LC'=814 / <CR>            ,RP06 PARAMETER
    IC=64 / 0<CR>
    FT=0 / 2<CR>
    LT=18 / 2<CR>
    IT=1 / <CR>
    FS=0 / 4<CR>
    LS=22 / 4<CR>
    PAT=177777 / 400  <CR> ,RUN WITH PATTERN #8

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

DRIVE=1<CR>                   ,USE THE SAME PARAMETERS AS IN EXAMPLE
TEST=D/<CR>                   ,#7, BUT ALSO SPECIFY A DATA PATTERN (PAT #0)
  TEST 20
    R=1000 / <CR>
    FC=10 / <CR>
    LC=10 / <CR>
    FC'=0 / <CR>
    LC'=814 / <CR>
    IC=0 / <CR>
    FT=2 / <CR>
    L :2 / <CR>
    IT-' / <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=410 / 1<CR>    ,CHANGE LAST CYLINDER FROM 410 TO 1
              FC'=0 / <CR>
              LC'=814 / 2  <CR> ,CHANGE THE LAST CYLINDER FOR ALL RP06'S TO
                                ,2   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<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 RP04/5/6 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

6. ERRORS

THERE ARE ANUMBER OF ERRORS THAT CAN OCCUR IN THIS PROGRAM
WHEN AN ERROR IS ENCOUNTERED, THE CALL TO THE ERROR ROUTINE
IS MADE AND IF SW(13) IS NOT SET, AN ERROR MESSAGE PERTAINING
TO THE ERROR WILL BE TYPED EACH ERROR TYPEOUT WILL CONTAIN
THE FOLLOWING

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

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

6.1 ERROR TYPES

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

6.1.1 DRIVER ERROR

THESE ERRORS WILL BE DETECTED BY THE RH11/RP04/5/6 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. ACT11 AUTOMATIC MODE ASSUMES 16 BIT MODE.

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 15 MINUTES TO MAKE ONE PASS WITH RP04/5 DRIVES AND APPROXIMATELY 16 5 MINUTES TO A PASS WITH RP06 DRIVES. THIS ASSUMES THE DEFAULT TEST SEQUENCE (TESTS 0-10, 12-20) 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.

NOTE: THE PROGRAM STALLS FOR 2 MILLISECONDS BETWEEN SEEK ORDERS, THIS STALL TIME IS NOT INCLUDED IN THE CALCULATED SEEK TIMES THE 2 MILLISECOND STALL BETWEEN SEEK ORDERS IS SPECIFIED BY

SEQ 0016

THE RP04 VENDOR THE SEEK TIMES SPECIFIED FOR THE RP04
ARE POSITIONER MOVEMENT TIMES ONLY AND ARE NOT A MEASUREMENT
OF EFFECTIVE SEEK TIME

8 3 1 TIMING TOLERANCES

1 TEST 12 -- ROTATIONAL SPEED TIMES

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

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

2 TEST 13 -- ONE CYLINDER SEEK TIMES

MAXIMUM=10000 US
NOMINAL=7000 US

3 TEST 14 -- ACCESS TIME MEASUREMENT

MAXIMUM=30000 US
NOMINAL=28000 US

4 TEST 15 -- MAXIMUM SEEK TIMES

MAXIMUM=52000 US
NOMINAL=50000 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 409 SEEKS TIMED
 % REVERSE
MIN=5140 US
MAX=5960 US
AVG=5430 US 410 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=49990 US
MAX=51980 US
AVG=51010 US 128 SEEKS TIMED
 % REVERSE
MIN=48120 US
MAX=50650 US
AVG=49340 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=10940 US 3 ABOVE THE MAXIMUM OF 10000 US
AVG=5830 US 409 SEEKS TIMED
 % REVERSE
MIN=5040 US
MAX=5970 US
AVG=5330 US 410 SEEKS TIMED

ACCESS TIME MEASURMENTS
 % FORWARD
MIN=29730 US
MAX=31620 US 73 ABOVE THE MAXIMUM OF 30000 US
AVG=30320 US 128 SEEKS TIMED
 % REVERSE
MIN=28620
MAX=31230 US 128 ABOVE THE MAXIMUM OF 30000 US
AVG=30800 US 128 SEEKS TIMED

MAXIMUM SEEK TIMES
 % FORWARD
MIN=53510 US
MAX=54240 US 128 ABOVE THE MAXIMUM OF 52000 US
AVG=54020 US 128 SEEKS TIMED
 % REVERSE
MIN=52050 US
MAX=54550 US 128 ABOVE THE MAXIMUM OF 52000 US
AVG=52210 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. 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	-	410
LC'	-	814
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	-	128
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	-	410
FC'	-	0
LC'	-	814
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
FC'	-	0

SEQ 0020

```
                        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      -       410
                        FC'     -         0
                        LC'     -       814
                        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      -       410
                        FC'     -         0
                        LC'     -       814
                        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 UNITL "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      -     410
                        FC'     -       0
                        LC'     -     814
                        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 PARAMTERS 'FT' AND 'LT'

        THE FOLLOWING PARAMETERS ARE USED BY THE TEST

                        R       -    5000
                        FC      -       0
                        LC      -     410
                        FC'     -       0
                        LC'     -     814
                        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 (RPLA) TO DETERMINE THE ADDRESS OF THE SECTOR ROTATING INTO
        POSITION.  THE PROGRAM THEN ISSUES A WRITE HEADER AND DATA COMMAND
        FOR THAT SECTOR.  IF THE DRIVE'S POSITIONER HAS NOT SETTLED DOWN OR
        IF THE POSITIONER IS NOT ON CYLINDER (IF THE DRIVE IS AN RP04, THE
        OFF CYLINDER CONDITION MUST LAST FOR AT LEAST 800 US), THE DRIVE
        WILL REPORT A 'WRU' ERROR.  (RP05/6'S MAY ALSO REPORT 'NHS' ERROR UNDER
        ERRORS IN THIS TEST INDICATE THAT THE SERVO SYSTEM MAY NOT BE ADJUSTED
        CORRECTLY, THAT THE DRIVE IS MALFUNCTIONING, OR THAT A PCAK WITH
        MARGINAL SERVO TRACKS IS MOUNTED ON THE DRIVE.

        THIS TEST USES THE EXTENTION BITS IN THE LOOK-AHEAD REGISTER TO DETERMINE
        WHETHER OR NOT IT CAN PICK UP THE SECTOR ROTATING INTO POSITION.  THE
        TEST IS OPTIMIZED SUCH THAT IF THE DRIVE SIGNALS SEEK DONE WITHIN
        THE FIRST 80% OF THE SECTOR CURRENTLY UNDER THE HEAD, THE TEST WILL
        TRY TO ADDRESS THE NEXT SECTOR.  BASED ON OBSERVATION, THE PROGRAM
        IS ABLE TO START THE OPERATION WITHOUT LOSING A REVOLUTION MOST OF
        THE TIME.
```

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	-	410
FC'	-	0
LC'	-	814
IC	-	100
FT	-	0

9.10 TEST 11 - ALL SEEKS TEST

THIS TEST VERIFIES THAT THE DISK DRIVE CAN SEEK FROM EPCH 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	-	410
FC'	-	0
LC'	-	814
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 + OR - 2% IF 60HZ
16 67 MS/REV + OR - 2 5% IF 50HZ

THE FOLLOWING PARAMETERS ARE USED BY THE TEST

R	-	1
FC	-	0
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	-	410
FC'	-	0
LC'	-	814

9 13 TEST 14 - ACCESS TIME MEASUREMENT

THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO
CYLINDER 'LC', THEN A REVERSEK 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 30 MS
CYLINDER 'LC' DEFAULTS TO 136 (10) FOR AN RP04/5 OR TO 255 (10)
FOR AN RP06

THE TEST USES THE FOLLOWING PARAMETERS

R	-	1
FC	-	0
LC	-	136
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 410 (10) FOR RP04/5'S AND TO 814 (10)
FOR RP06'S.

THE TEST USES THE FOLLOWING PARAMETERS

R	-	1
FC	-	0
LC	-	410
FC'	-	0
LC'	-	814

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 - 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.

THE TEST USES THE FOLLOWING PARAMETERS

R	-	1
FC	-	0
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 18 IS WRITE CHECKED THEN TRACK 1 IS
REWRITTEN AND TRACK 2 THROUGH TRACK 18 IS WRITE CHECKED
THIS PROCEDURE IS CONTINUED UP THROUGH REWRITING TRACK 17
AND WRITE CHECKING TRACK 18.

THE TEST USES THE FOLLOWING PARAMETERS

R	-	1
FC	-	0
FC'	-	0
FS	-	0

9.17 TEST 20 - DATA TEST

THIS TEST PERFORMS DATA STORAGE AND RETRIEVAL ON CYLINDERS
"FC" THROUGH "LC" BY THE INCREMENT "IC" USING THE DATA PATTERNS
SPECIFIED. THE FOLLOWING SEQUENCE OCCURS FOR EACH CYLINDER.
1. SET "NT" TO "FT" THEN REPEAT 2-4 UNTIL "NT" > "LT"
2. WRITE THEN WRITE CHECK "FS" THROUGH "LS" OF TRACK "NT"
3. READ THEN SOFTWARE COMPARE "FS" THROUGH "LS" OF TRACK "NT"
4. INCREMENT "NT" BY "IT"
5. REPEAT STEPS 1-4 FOR EACH DATA PATTERN
6. REPEAT STEPS 1-5 FOR "FC" THROUGH "LC" ADVANCING BY "IC"

IF A WRITE CHECK ERROR OCCURS THE ERROR IS REPORTED AND
THE TRACK IN ERROR IS REWRITTEN AND CHECKED. THIS CHECK IS
ACCOMPLISHED BY PERFORMING TWO(2) SUCCESSIVE ERROR FREE
WRITE CHECKS. IF THE CHECK FAILS THE ERROR IS REPORTED AS
FATAL AND NO READ OCCURS.
FS DEFAULTS TO 1 AND LS DEFAULTS TO 0
PAT DEFAULTS TO 177777 (ALL POSSIBLE PATTERNS)
THE POSSIBLE PATTERNS ARE.

PAT 0	PAT 1	PAT 2	PAT 3	PAT 4	PAT 5	PAT 6	PAT 7
165555	000001	177776	000000	000000	052525	007417	026455
133333	000003	177774	000000	010421	052525	007417	026455
165555	000007	177770	000000	021042	052525	007417	026455
133333	000017	177760	177777	031463	125252	170360	151322
165555	000037	177740	177777	042104	125252	170360	151322
133333	000077	177700	177777	052525	125252	170360	151322
165555	000177	177600	000000	063146	052525	007417	026455
133333	000377	177400	000000	073567	052525	007417	026455
165555	000777	177000	177777	104210	125252	170360	151322
133333	001777	176000	177777	114631	125252	170360	151322
165555	003777	174000	000000	125252	052525	007417	026455
133333	007777	170000	177777	135673	125252	170360	151322
165555	017777	160000	000000	146314	052525	007417	026455
133333	037777	140000	177777	156735	125252	170360	151322
165555	077777	100000	000000	167356	052525	007417	026455
133333	177777	000000	177777	177777	125252	170360	151322

PAT 8	PAT 9	PAT 10	PAT 11	PAT 12	PAT 13	PAT 14	PAT 15
165555	000001	177776	172666	077777	153333	000000	177777
133333	000002	177775	155555	137777	066667	177777	000000
165556	000004	177773	172666	157777	153333	177777	000000
133333	000010	177767	155555	167777	066667	177777	000000
165556	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
165556	000400	177377	172666	177577	153333	177777	000000
133333	001000	176777	155555	177677	066667	177777	000000
165556	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	-	410
FC'	-	0
LC'	-	814
IC	-	64
FT	-	0
LT	-	18
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	-	410
FC'	-	0
LC'	-	814

9.19 TEST 22 - RP04 ACCESS TIME ADJUSTMENT TEST

THIS TEST PERFORMS SEEKS BETWEEN CYLINDERS 0 & 136 TO ALLOW THE
OPERATOR TO ADJUST THE ACCESS TIME ON AN RP04 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	-	136
FC'	-	0
LC'	-	255

10 PROGRAM LISTING

```
        TITLE  CZRJAC RP04/5/6 MECHANICAL AND READ/WRITE TEST
       ,*COPYRIGHT (C) 1976,1978
       ,*DIGITAL EQUIPMENT CORP
       ,*MAYNARD, MASS. 01754
       ,*
       ,*PROGRAM BY C  HESS
       ,*
       ,*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
```

```
1480
1481            000000                          .=0
1482                                            ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A " +2,HALT"
1483                                            ,*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
1484                                            ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
1485            000174                          .=174
1486  000174   000000                          DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
1487  000176   000000                          SWREG.    WORD  0               ,,SOFTWARE SWITCH REGISTER
1488
1489                                             SBTTL  ACT11 HOOKS
1490
1491                                            ,,*************************************************************
1492                                            ,HOOKS REQUIRED BY ACT11
1493            000200                                  $SVPC=.                 ,SAVE PC
1494            000046                                  .=46
1495  000046   017616                                  $ENDAD                  ,,1)SET LOC 46 TO ADDRESS OF $ENDAD IN  $EOP
1496            000052                                   =52
1497  000052   000000                                   WORD   0               ,,2)SET LOC 52 TO ZERO
1498            000200                                   =$SVPC                 ,, RESTORE PC
1499
1500                                             SBTTL  STARTING ADDRESSES
1501            000200                           =200
1502                                            ,*200 = NORMAL START
1503  000200   000137  004636                           JMP     @#START1
1504                                            ,*204 = SELECT OPERATING PARAMETERS
1505  000204   000137  004660                           JMP     @#START2
1506                                            ,*210 = SELECT RH11/RP04/5/6 ADDRESSES
1507  000210   000137  004626                           JMP     @#START3
1508                                            ,*214 = COMBINATION OF 204 AND 210
1509  000214   000137  004650                           JMP     @#START4
1510
1511                                             SBTTL  BASIC DEFINITIONS
1512
1513                                            ,*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
1514            001100                          STACK=  1100
1515                                            .EQUIV  EMT,ERROR       ,,BASIC DEFINITION OF ERROR CALL
1516                                            .EQUIV  IOT,SCOPE       ,,BASIC DEFINITION OF SCOPE CALL
1517
1518                                            ,*MISCELLANEOUS DEFINITIONS
1519            000011                          HT=     11              ,,CODE FOR HORIZONTAL TAB
1520            000012                          LF=     12              ;,CODE FOR LINE FEED
1521            000015                          CR=     15              ,,CODE FOR CARRIAGE RETURN
1522            000200                          CRLF=   200             ,,CODE FOR CARRIAGE RETURN-LINE FEED
1523            177776                          PS=     177776          ,,PROCESSOR STATUS WORD
1524                                            .EQUIV  PS,PSW
1525            177774                          STKLMT= 177774          ,,STACK LIMIT REGISTER
1526            177772                          PIRQ=   177772          ,,PROGRAM INTERRUPT REQUEST REGISTER
1527            177570                          DSWR=   177570          ,,HARDWARE SWITCH REGISTER
1528            177570                          DDISP=  177570          ;,HARDWARE DISPLAY REGISTER
1529
1530                                            ;*GENERAL PURPOSE REGISTER DEFINITIONS
1531            000000                          R0=     %0              ,,GENERAL REGISTER
1532            000001                          R1=     %1              ,,GENERAL REGISTER
1533            000002                          R2=     %2              ,,GENERAL REGISTER
1534            000003                          R3=     %3              ,,GENERAL REGISTER
1535            000004                          R4=     %4              ,,GENERAL REGISTER
```

```
                                R5=     %5              ;;GENERAL REGISTER
                                R6=     %6              ;;GENERAL REGISTER
                                R7=     %7              ;;GENERAL REGISTER
                                SP=     %6              ;;STACK POINTER
                                PC=     %7              ;;PROGRAM COUNTER

                                ;%PRIORITY LEVEL DEFINITIONS
                                PR0=    0               ;;PRIORITY LEVEL 0
                                PR1=    40              ;;PRIORITY LEVEL 1
                                PR2=    100             ;;PRIORITY LEVEL 2
                                PR3=    140             ;;PRIORITY LEVEL 3
                                PR4=    200             ;;PRIORITY LEVEL 4
                                PR5=    240             ;;PRIORITY LEVEL 5
                                PR6=    300             ;;PRIORITY LEVEL 6
                                PR7=    340             ;;PRIORITY LEVEL 7

                                ;%"SWITCH REGISTER" SWITCH DEFINITIONS
                                SW15=   100000
                                SW14=   40000
                                SW13=   20000
                                SW12=   10000
                                SW11=   4000
                                SW10=   2000
                                SW09=   1000
                                SW08=   400
                                SW07=   200
                                SW06=   100
                                SW05=   40
                                SW04=   20
                                SW03=   10
                                SW02=   4
                                SW01=   2
                                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)
                                BIT15=  100000
                                BIT14=  40000
                                BIT13=  20000
                                BIT12=  10000
                                BIT11=  4000
                                BIT10=  2000
                                BIT09=  1000
                                BIT08=  400
                                BIT07=  200
                                BIT06=  100
                                BIT05=  40
```

```
1592            000020                  BIT04=  20
1593            000010                  BIT03=  10
1594            000004                  BIT02=  4
1595            000002                  BIT01=  2
1596            000001                  BIT00=  1
1597                                     EQUIV  BIT09,BIT9
1598                                     EQUIV  BIT08,BIT8
1599                                    .EQUIV  BIT07,BIT7
1600                                     EQUIV  BIT06,BIT6
1601                                     EQUIV  BIT05,BIT5
1602                                    .EQUIV  BIT04,BIT4
1603                                     EQUIV  BIT03,BIT3
1604                                     EQUIV  BIT02,BIT2
1605                                    .EQUIV  BIT01,BIT1
1606                                     EQUIV  BIT00,BIT0
1607
1608                                    ,*BASIC "CPU" TRAP VECTOR ADDRESSES
1609            000004                  ERRVEC= 4               ,,TIME OUT AND OTHER ERRORS
1610            000010                  RESVEC= 10              ,,RESERVED AND ILLEGAL INSTRUCTIONS
1611            000014                  TBITVEC=14              ,,"T" BIT
1612            000014                  TRTVEC= 14              ,,TRACE TRAP
1613            000014                  BPTVEC= 14              ,,BREAKPOINT TRAP (BPT)
1614            000020                  IOTVEC= 20              ,,INPUT/OUTPUT TRAP (IOT) **SCOPE**
1615            000024                  PWRVEC= 24              ,,POWER FAIL
1616            000030                  EMTVEC= 30              ,,EMULATOR TRAP (EMT) **ERROR**
1617            000034                  TRAPVEC=34              ,,"TRAP" TRAP
1618            000060                  TKVEC=  60              ,,TTY KEYBOARD VECTOR
1619            000064                  TPVEC=  64              ,,TTY PRINTER VECTOR
1620            000240                  PIRQVEC=240             ,,PROGRAM INTERRUPT REQUEST VECTOR
1621                                    ,,*************************************************************
1622
1623                                     SBTTL  RH11 REGISTERS
1624
1625                                    ,,*************************************************************
1626
1627                                    ,CONTROL AND STATUS REGISTER 1 (RPCS1)
1628
1629            000100                  IE=     100                     ,INTERRUPT ENABLE (BIT #6)
1630            000200                  RDY=    200                     ,READY (BIT #7)
1631            000400                  A16=    400                     ,HIGH ORDER BUS ADDRESS BIT (BIT #8)
1632            001000                  A17=    1000                    ,HIGH ORDER BUS ADDRESS BIT (BIT #9)
1633            002000                  PSEL=   2000                    ,PORT SELECT (BIT #10)
1634            020000                  MCPE=   20000                   ,MASSBUSS PARITY ERROR (BIT #13)
1635            040000                  TRE=    40000                   ,TRANSFER ERROR (BIT #14)
1636                                    ;SC=    100000                  ,SPECIAL CONDITION (BIT #15)
1637
1638                                    ,WORD COUNT REGISTER (RPWC)
1639                                    ,(EACH BIT IS CALLED BY BIT NUMBER)
1640
1641                                    ,BUS ADDRESS REGISTER (RPBA)
1642                                    ,(EACH BIT IS CALLED BY BIT NUMBER)
1643
1644                                    ,CONTROL AND STATUS REGISTER 2 (RPCS2)
1645
1646            000001                  US1=    1                       ,UNIT SELECT (BIT #0)
1647            000002                  US2=    2                       ,UNIT SELECT (BIT #1)
```

```
1648            000004                  US4=    4                       ,UNIT SELECT (BIT #2)
1649            000010                  BAI=    10                      ,BUS ADDRESS INCREMENT INHIBIT (BIT #3)
1650                                    ,PAT=   20                      ,MASSBUS PARITY TEST (BIT #4)
1651            000040                  CLR=    40                      ,CLEAR (BIT #5)
1652            000100                  IR=     100                     ;INPUT READY (BIT #6)
1653            000200                  OR=     200                     ,OUTPUT READY (BIT #7)
1654            000400                  MPE=    400                     ;MASS BUS PARITY ERROR (BIT #8)
1655            001000                  MXF=    1000                    ,MISSED TRANSFER ERROR (BIT #9)
1656            002000                  PGE=    2000                    ;PROGRAM ERROR (BIT #10)
1657            004000                  NEM=    4000                    ,NON EXISTENT MEMORY (BIT #11)
1658            010000                  NED=    10000                   ,NON EXISTENT DRIVE (BIT #12)
1659            020000                  UPE=    20000                   ,UNIBUS PARITY ERROR (BIT #13)
1660            040000                  WCE=    40000                   ,WRITE CHECK ERROR (BIT #14)
1661            100000                  DLT=    100000                  ,DATA LATE (BIT #15)
1662
1663                                    ,DATA BUFFER REGISTER (RPDB)
1664                                    ,(EACH BIT IS CALLED BY BIT NUMBER)
1665
1666
1667                                    ,,*****************************************************************
1668
1669                                     SBTTL  RP04/5/6 REGISTERS
1670
1671                                    ,,*****************************************************************
1672
1673                                    ,CONTROL AND STATUS 1 REGISTER  (#00)
1674
1675            000001                  GO=     1                       ,GO BIT (BIT #0)
1676            000002                  F1=     2                       ,FUNCTION CODE BIT #1
1677            000004                  F2=     4                       ,FUNCTION CODE BIT #2
1678            000010                  F3=     10                      ,FUNCTION CODE BIT #3
1679            000020                  F4=     20                      ,FUNCTION CODE BIT #4
1680            000040                  F5=     40                      ,FUNCTION CODE BIT #5
1681            004000                  DVA=    4000                    ,DEVICE AVAILABLE (BIT #11)
1682
1683                                    ,DRIVE STATUS REGISTER (RPDS1) (#01)
1684
1685                                    ,DF5=   1                       DRIVE FORWARD 5"/SEC    (BIT #0)
1686            000002                  DFF20=  2                       ,DRIVE FORWARD 20"/SEC    (BIT #1)
1687            000004                  DIGB=   4                       ,DRIVE TO INNER GUARD BAND (BIT #2)
1688            000010                  GRV=    10                      ,GO REVERSE (BIT #3)
1689            000020                  DL64=   20                      ,DIFFERENCE LESS THAN 64 (BIT #4)
1690            000040                  DE1=    40                      ,DIFFERENCE EQUALS 1 (BIT #5)
1691            000100                  VV=     100                     ,VOLUME VALID (BIT #6)
1692            000200                  DRY=    200                     ,DRIVE READY (BIT #7)
1693            000400                  DPR=    400                     ,DRIVE PRESENT (BIT #8)
1694            001000                  PGM=    1000                    ,PROGRAMABLE (BIT #9)
1695            002000                  LST=    2000                    ,LAST SECTOR TRANSFERRED (BIT #10)
1696            004000                  WRL=    4000                    ,WRITE LOCK (BIT #11)
1697            010000                  MOL=    10000                   ,MEDIUM ON-LINE (BIT #12)
1698            020000                  PIP=    20000                   ,POSITIONING OPERATION IN PROGRESS (BIT #13)
1699            040000                  ERR=    40000                   ,COMPOSITE ERROR (BIT #14)
1700            100000                  ATA=    100000                  ,ATTENTION ACTIVE (BIT #15)
1701
1702                                    ,ERROR REGISTER #01 (RPER1) (#02)
1703
```

```
1704            000001          ILF=    1               ,ILLEGAL FUNCTION (BIT #0)
1705            000002          ILR=    2               ,ILLEGAL REGISTER (BIT #1)
1706            000004          RMR=    4               ,REGISTER MODIFICATION REFUSED (BIT #2)
1707            000010          PAR=    10              ,PARITY ERROR (BIT #3)
1708            000020          FER=    20              ,FORMAT ERROR (BIT #4)
1709            000040          WCF=    40              ,WRITE CLOCK FAIL (BIT #5)
1710            000100          ECH=    100             ,ECC HARD ERROR (BIT #6)
1711            000200          HCE=    200             ,HEADER COMPARE ERROR (BIT #7)
1712            000400          HCRC=   400             ,HEADER CRC ERROR (BIT #8)
1713            001000          AOE=    1000            ,ADDRESS OVERFLOW ERROR (BIT #9)
1714            002000          IAE=    2000            ,INVALID ADDRESS ERROR (BIT #10)
1715            004000          WLE=    4000            ,WRITE LOCK ERROR (BIT #11)
1716            010000          DTE=    10000           ,DRIVE TIMING ERROR (BIT #12)
1717            020000          OPI=    20000           ,OPERATION INCOMPLETE (BIT #13)
1718            040000          UNS=    40000           ,DRIVE UNSAFE (BIT #14)
1719            100000          DCK=    100000          ,DATA CHECK ERROR (BIT 15)
1720
1721                            ,MAINTAINABILITY REGISTER (RPMR)(#03)
1722
1723            000001          DMD=    1               ,DIAGINOSTIC MODE (BIT #0)
1724            000002          MCLK=   2               ,MAINTAINABILITY CLOCK (BIT #1)
1725            000004          MINX=   4               ,MAINTAINABILITY INDEX (BIT #2)
1726            000010          MSTCK=  10              ,MAINTAINABILITY SECTOR CLOCK (BIT #3)
1727            000020          MRD=    20              ,MAINTAINABILITY READ (BIT #4)
1728            000040          MWR=    40              ,MAINTAINABILITY WRITE (BIT #5)
1729            000200          DTSY=   200             ,MAINTAINABILITY SYNC DETECTED (BIT #7)
1730
1731                            ,ATTENTION SUMMARY PSEUDO-REGISTER (RPAS) (#04)
1732
1733            000001          AT0=    1               ,DEVICE 0 (BIT #0)
1734            000002          AT1=    2               ,DEVICE 1 (BIT #1)
1735            000004          AT2=    4               ,DEVICE 2 (BIT #2)
1736            000010          AT3=    10              ,DEVICE 3 (BIT #3)
1737            000020          AT4=    20              ,DEVICE 4 (BIT #4)
1738            000040          AT5=    40              ,DEVICE 5 (BIT #5)
1739            000100          AT6=    100             ,DEVICE 6 (BIT #6)
1740            000200          AT7=    200             ,DEVICE 7 (BIT #7)
1741
1742                            ,DESIRED SECTOR/TRACK ADDRESS REGISTER (RPDA) (#05)
1743                            ,(EACH BIT IS CALLED BY BIT NUMBER)
1744
1745                            ,DRIVE TYPE REGISTER (RPDT) (#06)
1746
1747            000001          DT00=   1               ,DRIVE TYPE NUMBER BIT 1
1748            000002          DT01=   2               ,DRIVE TYPE NUMBER BIT 2
1749            00C004          DT02=   4               ,DRIVE TYPE NUMBER BIT 3
1750            000010          DT03=   10              ,DRIVE TYPE NUMBER BIT 4
1751            000020          DT04=   20              ,DRIVE TYPE NUMBER BIT 5
1752            000040          DT05=   40              ,DRIVE TYPE NUMBER BIT 6
1753            000100          DT06=   100             ,DRIVE TYPE NUMBER BIT 7
1754            000200          DT07=   200             ,DRIVE TYPE NUMBER BIT 8
1755            000400          DT08=   400             ,DRIVE TYPE NUMBER BIT 9
1756            004000          DRQ=    4000            ,DRIVE REQUEST REQUIRED (BIT #11)
1757            020000          MOH=    20000           ,MOVING HEAD (BIT #13)
1758            040000          TAP=    40000           ,TAPE DRIVE (BIT #14)
1759            100000          NBA=    100000          ,NOT BLOCK ADDRESSED (BIT #15)
```

```
1760
1761                            ;LOOK-AHEAD REGISTER (RPLA) (#07)
1762
1763    000001                  EXT1=   1               ;EXTENSION 1 (BIT #0)
1764    000002                  EXT2=   2               ;EXTENSION 2 (BIT #1)
1765    000004                  EXT4=   4               ;EXTENSION 3 (BIT #2)
1766    000010                  EXT10=  10              ;EXTENSION 4 (BIT #3)
1767    000020                  EXT20=  20              ;EXTENSION 5 (BIT #4)
1768    000040                  EXT40=  40              ;EXTENSION 6 (BIT #5)
1769    000100                  SC1=    100             ;SECTOR COUNT FIELD 0 (BIT #6)
1770    000200                  SC2=    200             ;SECTOR COUNT FIELD 1 (BIT #7)
1771                            ;SC4=   400             ;SECTOR COUNT FIELD 2 (BIT #8)
1772    001000                  SC10=   1000            ;SECTOR COUNT FIELD 3 (BIT #9)
1773    002000                  SC20=   2000            ;SECTOR COUNT FIELD 4 (BIT #10)
1774    004000                  TRK1=   4000            ;TRACK FIELD 1 (BIT #11)
1775    010000                  TRK2=   10000           ;TRACK FIELD 2 (BIT #12)
1776    020000                  TRK4=   20000           ;TRACK FIELD 3 (BIT #13)
1777    040000                  TRK10=  40000           ;TRACK FIELD 4 (BIT #14)
1778    100000                  TRK20=  100000          ;TRACK FIELD 5 (BIT #15)
1779
1780                            ;RP04 ERROR REGISTER #2 (RPER2) (#10)
1781
1782    000001                  WCU=    1               ;WRITE CURRENT UNSAFE (BIT #0)
1783    000002                  CSF=    2               ;CURRENT SINK FAILURE (BIT #1)
1784    000004                  WSU=    4               ;WRITE SELECT UNSAFE (BIT #2)
1785    000010                  CSU=    10              ;CURRENT SWITCH UNSAFE (BIT #3)
1786    000020                  MSE=    20              ;MOTOR SEQUENCE ERROR (BIT #4)
1787    000040                  TDF=    40              ;TRANSITIONS DETECTOR FAILURE (BIT #5)
1788    000100                  TUF=    100             ;TRANSITIONS UNSAFE (BIT #6)
1789    000200                  FEN=    200             ;FAILSAFE ENABLED (BIT #7)
1790    000400                  WRU=    400             ;WRITE READY UNSAFE (BIT #8)
1791    001000                  MHS=    1000            ;MULTIPLE HEAD SELECT (BIT #9)
1792    002000                  NHS=    2000            ;NO HEAD SELECTION (BIT #10)
1793    004000                  IXE=    4000            ;INDEX ERROR (BIT #11)
1794    010000                  VU30=   10000           ;30VOLT UNSAFE (BIT #12)
1795    020000                  PLU=    20000           ;PLO UNSAFE (BIT #13)
1796    100000                  ACU=    100000          ;AC UNSAFE (BIT #15)
1797
1798                            ;RP05/6 ERROR REGISTER #02 (RPER2) (#10)
1799
1800    000001                  WCU=    1               ;WRITE CURRENT UNSAFE (BIT #0)
1801    000002                  CSF=    2               ;CURRENT SINK FAILURE (BIT #1)
1802    000004                  WSU=    4               ;WRITE SELECT UNSAFE (BIT #2)
1803    000010                  CSU=    10              ;CURRENT SWITCH UNSAFE (BIT #3)
1804    000020                  RAW=    20              ;READ AND WRITE (BIT #4)
1805    000040                  TDF=    40              ;TRANSITIONS DETECTOR FAILURE (BIT #5)
1806    000100                  TUF=    100             ;TRANSITIONS UNSAFE (BIT #6)
1807    000200                  ABS=    200             ;ABNORMAL STOP (BIT #7)
1808    000400                  WRU=    400             ;WRITE READY UNSAFE (BIT #8)
1809    001000                  MHS=    1000            ;MUTLTIPLE HEAD SELECT (BIT #9)
1810    002000                  NHS=    2000            ;NO HEAD SELECTION (BIT #10)
1811    004000                  IXE=    4000            ;INDEX ERROR (BIT #11)
1812    020000                  PLU=    20000           ;PLO UNSAFE (BIT #12)
1813
1814                            ;OFFSET REGISTER (RPOF) (#11)
1815
```

```
1816            000001                  OF25=   1                       ,OFFSET 25 MICRO INCHES (BIT #0)
1817            000002                  OF50=   2                       ,OFFSET 50 MICRO INCHES (BIT #1)
1818            000004                  OF100=  4                       ,OFFSET 100 MICRO INCHES (BIT #2)
1819            000010                  OF200=  10                      ,OFFSET 200 MICRO INCHES (BIT #3)
1820            000020                  OF400=  20                      ,OFFSET 400 MICRO INCHES (BIT #4)
1821            000040                  OF800=  40                      ,OFFSET 800 MICRO INCHES (BIT #5)
1822            000200                  OFREV=  200                     ,OFFSET NEGATIVE (REVERSE) (BIT #5)
1823            002000                  HCI=    2000                    ,HEADER COMPARE INHIBIT (BIT #10)
1824            004000                  ECI=    4000                    ,ERROR CORRECTION CODE INHIBIT (BIT #11)
1825            010000                  FMT22=  10000                   ;FORMAT BIT (BIT #12
1826
1827                                    ,DESIRED CYLINDER ADDRESS (RPCA) (#12)
1828                                    ,(EACH BIT IS CALLED BY BIT NUMBER)
1829
1830                                    ,CURRENT CYLINDER ADDRESS (RPCC) (#13)
1831                                    ,(EACH BIT IS CALLED BY BIT NUMBER)
1832
1833                                    ,SERIAL NUMBER REGISTER (RPSN) (#14)
1834                                    ,(EACH IS CALLED BY BIT NUMBER)
1835
1836                                    ,RP04 ERROR REGISTER #03 (RPER3) (#15)
1837
1838            000001                  PSU=    1                       ,PACK SPEED UNSAFE (BIT #0)
1839            000002                  VUF=    2                       ,VELOCITY UNSAFE (BIT #1)
1840            000010                  UWR=    10                      ,ANY UNSAFE EXCEPT READ/WRITE (BIT #3)
1841            000040                  ACL=    40                      ,AC LOW (BIT #5)
1842            000100                  DCL=    100                     ,DC LOW (BIT #6)
1843            040000                  SKI=    40000                   ,SEEK INCOMPLETE (BIT #14)
1844            100000                  OCYL=   100000                  ,OFF CYLINDER (BIT #15)
1845
1846                                    ;RP05/6 ERROR REGISTER #03 (RPER3) (#15)
1847
1848            000001                  DCU=    1                       ,DC UNSAFE (BIT #0)
1849            000002                  WAO=    2                       ,WRITE AND OFFSET (BIT #1)
1850            000040                  ACL=    40                      ,AC LOW (BIT #5)
1851            000100                  DCL=    100                     ,DC LOW (BIT #6)
1852            020000                  OPE=    20000                   ,OPERATOR PLUG ERROR (BIT #13)
1853            040000                  SKI=    40000                   ;SEEK INCOMPLETE (BIT #14)
1854            100000                  OCYL=   100000                  ,OFF CYLINDER ERROR (BIT #15)
1855
1856                                    ;ECC POSITION REGISTER (RPEC1) (#16)
1857                                    ,(EACH BIT IS CALLED BY BIT NUMBER)
1858
1859                                    ;ECC PATTERN REGISTER (RPEC2) (#17)
1860                                    ,(EACH BIT IS CALLED BY BIT NUMBER)
1861
1862                                    ,,*****************************************************************************
1863
1864                                    ,OP CODE DEFINITIONS
1865            000101                  NOOP=101
1866            000103                  UNLOAD=103
1867            000105                  SEEK=105
1868            000107                  RECAL=107
1869            000111                  DRVCLR=111
1870            000113                  RELEASE=113
1871            000115                  OFFSET=115
```

```
1872            000117                  RTC=117
1873            000121                  READIN=121
1874            000123                  PACK=123
1875            000131                  SEARCH=131
1876            000151                  WRCKD=151
1877            000153                  WRCKHD=153
1878            000161                  WRITE=161
1879            000163                  WRTHD=163
1880            000171                  READ=171
1881            000173                  READHD=173
1882            000141                  GETREG=141
1883            000143                  SETFORM=143
1884            000145                  SELDRV=145
1885
1886                                    ;OTHER EQUATES
1887
1888            177400                  SCTRWC = -256                   ;WORD COUNT FOR SECTOR
1889            010000                  FMT22=10000                     ;FORMAT 22 BIT
1890
```

```
                                   .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
```

```
 1947            000012                  LF      =       12
 1948  001220    000000                  C SWR:  .WORD   0               ;CONTROL SWITCHES
 1949  001222    000000                  SAVCSW: .WORD   0               ;PREVIOUS CONTENTS OF 'C SWR'
 1950  001224    000000                  CNTRLC: .WORD   0               ;CONTROL "C" FLAG
 1951  001226    000000                  BUSADR: .WORD   0               ;GET ADDRESSES FROM THE TTY FLAG (0=NO, -1=YES)
 1952  001230    000000                  LPTAVL: .WORD   0               ;LPT AVAILABLE STATUS (0=NO,1=YES)
 1953  001232    000000                  DRVSEL: .WORD   0               ;DRIVES SELECTED FOR TESTING
 1954  001234    037777  000000          TSTNMS: .WORD   37777,0         ;RUN TESTS 0-15
 1955  001240    000000  000000          OPNFLG: .WORD   0,0             ;MODIFY TEST PARAMETER FLAGS
 1956  001244    000000                  CLKSTA: .WORD   0               ;CLOCK STATUS (0=NO CLOCK, +1=KW11-P,
 1957                                                                    ;AND -1=KW11-L)
 1958  001246    000020                  TICKMS: .WORD   16              ;16 MILLISECONDS PER CLOCK TICK
 1959  001250    040432                  TICKUS: .WORD   16666           ;16666 MIRCOSECONDS PER CLOCK TICK
 1960  001252    000000                  BYPASS: .WORD   0
 1961  001254    000000                  CHKDRV: .WORD   0               ;DRIVE UNDER TEST
 1962  001256    000000                  DRVMSK: .WORD   0               ;DRIVE MASK BIT
 1963  001260    000000                  SVSTAT: .WORD   0               ;STATUS/ERROR INDICATOR IS
 1964                                                                    ;SAVED HERE ON AN ERROR
 1965  001262    000000                  CYL.RD: .WORD   0               ;CYLINDER READ
 1966  001264    000000                  TRK.RD: .WORD   0               ;TRACK READ
 1967  001266    000000                  SEC.RD: .WORD   0               ;SECTOR READ
 1968  001270    000000                  CYL.DS: .WORD   0               ;CYLINDER DESIRED
 1969  001272    000000                  SEC DS: .WORD   0               ;SECTOR DESIRED
 1970  001274    000000                  TRK DS: .WORD   0               ;TRACK DESIRED
 1971  001276    000000                  TIM UP: .WORD   0               ;MINIMUM TIME
 1972  001300    000000                          .WORD   0               ;NUMBER OF COUNTS BELOW MIN  LIMIT
 1973  001302    000000                          WORD    0               ;MAXIMUM TIME
 1974  001304    000000                          .WORD   0               ;NUMBER OF COUNTS ABOVE MAX  LIMIT
 1975  001306    000000  000000                  .WORD   0,0             ;TOTAL TIME OF ALL SEEKS
 1976  001312    000000                          WORD    0               ;NUMBER OF SEEKS PERFORMED
 1977  001314    000000                  TIM DN  .WORD   0               ;MINIMUM TIME
 1978  001316    000000                          .WORD   0               ;NUMBER OF COUNTS BELOW MIN  LIMIT
 1979  001320    000000                          WORD    0               ;MAXIMUM TIME
 1980  001322    000000                          .WORD   0               ;NUMBER OF COUNTS ABOVE MAX  LIMIT
 1981  001324    000000  000000                  .WORD   0,0             ;TOTAL TIME OF ALL SEEKS
 1982  001330    000000                          .WORD   0               ;NUMBER OF SEEKS PERFORMED
 1983  001332    000000                  TIM PT: .WORD   0               ;POINTS TO TABLE OF TIMES
 1984  001334    000000                  WCEFLG: .WORD   0               ;FATAL WRITE CHECK ERROR FLAG (TEST 20)
 1985  001336    000000                  STALLO: .WORD   0               ;VARIABLE STALL (TEST 4)
 1986  001340    000000  000000          SVADR   .WORD   0,0             ;SAVE DISK ADDRESS (TEST 22)
 1987  001344    000000                  SEKTMR: .WORD   0               ;SEEK TIMER  (TEST 10)
 1988  001346    000000                  SEKCNT: .WORD   0               ;SEEK COUNTER
 1989  001350    000000                  DELTA:  .WORD   0               ;TESTING RANGE FOR SERVO SETTLE DOWN TEST
 1990  001352    165000                  TRCKWC. .WORD   -<256 *22. >    ;WORD COUNT FOR A FULL TRACK IN 16 BIT MODE
 1991  001354    000012                  STALL1: .WORD   10              ;10 MILLISECONDS STALL (TEST 0-11)
 1992  001356    000012                  STALL2: .WORD   10              ;10 MILLISECONDS STALL (TEST 16-21)
 1993  001360    011610                  STALL3: .WORD   5000.           ;5 SEC STALL (TEST 22)
 1994  001362    000031                  MXSTAL: .WORD   25              ;MAX  INCREMENTING STALL ALLOWED IN TEST 4
 1995  001364      144                   ERR.CT: .BYTE   100.            ;NUMBER OF ERRORS ALLOWED IN TESTS 16 - 21
 1996                                                                    ;BEFORE GOING TO THE NEXT TEST
 1997  001365      000                           .BYTE   0               ;RESERVED
 1998
 1999                                  ;ADDRESSES AND VECTORS
 2000  001366    176700                  RH ADR: .WORD   176700          ;RH11-RH70 UNIBUS ADDRESS
 2001  001370    000254  000240          RHVEC:  .WORD   254,5*32        ;RH11-RH70 VECTOR ADDRESS AND PRIORITY
 2002  001374    000104  000106          PKV     .WORD   104,106         ;KW11-P VECTOR ADDRESS
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2003  001400  172540          PKCS:   .WORD   172540          ;KW11-P CONTROL AND STATUS REG.
2004  001402  172542          PKB     .WORD   172542          ;KW11-P COUNT SET BUFFER
2005  001404  172544          PKC     .WORD   172544          ;KW11-P COUNTER
2006  001406  000100  000102  LKV.    .WORD   100,102         ;KW11-L VECTOR ADDRESS
2007  001412  177546          LKS     .WORD   177546          ;KW11-L STATUS REGISTER
2008  001414  177564          TPS     .WORD   177564          ,TTY PRINTER STATUS
2009  001416  177566          TPB.    .WORD   177566          ;TTY PRINTER BUFFER
2010  001420  177514          LPS     .WORD   177514          ;LINE PRINTER STATUS
2011  001422  177516          LPB      WORD   177516          ,LINE PRINTER BUFFER
2012
2013                          ,BIT TABLE
2014  001424  000001          BITS    .WORD   BIT00
2015  001426  000002                  .WORD   BIT01
2016  001430  000004                  .WORD   BIT02
2017  001432  000010                   WORD   BIT03
2018  001434  000020                  .WORD   BIT04
2019  001436  000040                  .WORD   BIT05
2020  001440  000100                  .WORD   BIT06
2021  001442  000200                  .WORD   BIT07
2022  001444  000400                  .WORD   BIT08
2023  001446  001000                  .WORD   BIT09
2024  001450  002000                  .WORD   BIT10
2025  001452  004000                  .WORD   BIT11
2026  001454  010000                  .WORD   BIT12
2027  001456  020000                   WORD   BIT13
2028  001460  040000                  .WORD   BIT14
2029  001462  100000                  .WORD   BIT15
2030  001464  000001                  .WORD   BIT00
2031  001466  000002                  .WORD   BIT01
2032  001470  000004                  .WORD   BIT02
2033  001472  000010                  .WORD   BIT03
2034  001474  000020                  .WORD   BIT04
2035  001476  000040                  .WORD   BIT05
2036  001500  000100                  .WORD   BIT06
2037  001502  000200                  .WORD   BIT07
2038
2039
2040                          ;COMMON STORAGE FOR TEST PARAMETER
2041  001504  000000          PRM:    .WORD   0
2042  001506  000000          RPT:    .WORD   0               ,REPEAT COUNTS FOR ALL TESTS
2043  001510  000000          FC      .WORD   0               ,FIRST CYLINDER
2044  001512  000000          LC      .WORD   0               ,LAST CYLINDER
2045  001514  000000          IC      .WORD   0               ,INCREMENT CYLINDER
2046  001516  000000          FT      .WORD   0               ,FIRST TRACK
2047  001520  000000          LT      .WORD   0               ,LAST TRACK
2048  001522  000000          IT·      WORD   0               ,INCREMENT TRACK
2049  001524  000000          FS      .WORD   0               ,FIRST SECTOR
2050  001526  000000          LS      .WORD   0               ,LAST SECTOR
2051  001530  000000          PAT·    .WORD   0               ,PATTERN CODE
2052  001532  000000          NC1      WORD   0               ,NEW CYLINDER ADDRESS
2053  001534  000000          NC2     .WORD   0               ,NEW CYLINDER ADDRESS
2054
2055                          ,TABLE OF PARAMETER POINTERS
2056  001536  002330          PRMPT.  .WORD   PRM0
2057  001540  002344                  .WORD   PRM1
2058  001542  002372                  .WORD   PRM2
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2059  001544  002414                          .WORD   PRM3
2060  001546  002436                          .WORD   PRM4
2061  001550  002460                          .WORD   PRM5
2062  001552  002502                          .WORD   PRM6
2063  001554  002524                          .WORD   PRM7
2064  001556  002544                          .WORD   PRM10
2065  001560  002564                          .WORD   PRM11
2066  001562  002606                          .WORD   PRM12
2067  001564  002622                          .WORD   PRM13
2068  001566  002636                          .WORD   PRM14
2069  001570  002652                          .WORD   PRM15
2070  001572  002666                          .WORD   PRM16
2071  001574  002700                          .WORD   PRM17
2072  001576  002712                          .WORD   PRM20
2073  001600  002744                          .WORD   PRM21
2074  001602  002760                          WORD    PRM22
2075  001604  000000                          .WORD   0               ,TERMINATOR
2076
2077                                  ,PARAMETER UPPER LIMIT
2078  001606  032767                  PRMLMT. .WORD   32767           ,"R"
2079  001610  000632                          .WORD   410.            ,"FC"
2080  001612  000632                          .WORD   410             ,"LC"
2081  001614  001456                          .WORD   814             ,"FC'"
2082  001616  001456                          .WORD   814             ,"LC'"
2083  001620  001456                          .WORD   814.            ,"IC"
2084  001622  000022                          WORD    18              ,"FT"
2085  001624  000022                          .WORD   18              ,"LT"
2086  001626  000022                          WORD    18              ,"IT"
2087  001630  000025                          WORD    21              ,"FS"
2088  001632  000025                          .WORD   21              ,"LS"
2089  001634  177777                          .WORD   177777          ,"PAT"
2090
2091                                  ,TABLE OF MESSAGE POINTERS
2092  001636  043002                  PRMMSG: .WORD   MSG.R
2093  001640  043004                          .WORD   MSG.FC
2094  001642  043007                          .WORD   MSG.LC
2095  001644  043012                          .WORD   MSGFCP
2096  001646  043016                          .WORD   MSGLCP
2097  001650  043022                          .WORD   MSG.IC
2098  001652  043025                          .WORD   MSG.FT
2099  001654  043030                          .WORD   MSG.LT
2100  001656  043033                          .WORD   MSG.IT
2101  001660  043036                          .WORD   MSG.FS
2102  001662  043041                          .WORD   MSG.LS
2103
2104                                  ;STATUS/ERROR INDICATOR MESSAGES POINTER TABLE
2105                                  ,DEFAULT VALUES OF TEST PARAMETERS
2106  001664  001125  000310  000632  DFLT.   WORD    1125,200.,410.,814.,0,0.,RECAL/SEEK (T0)
2107  001672  001456  000000  000000
2108  001700  003377  000144  000000          WORD    3377,100.,0,128.,0,256.,0,0,0,0,0.,SEEK/SEEK (T1)
2109  001706  000200  000000  000400
2110  001714  000000  000000  000000
2111  001722  000000  000000
2112  001726  001177  000001  000000          WORD    1177,1,0,410.,0,814.,1,0,0.,INCREMENT SEEK (T2)
2113  001734  000632  000000  001456
2114  001742  000001  000000  000000
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2115  001750  001177  000010  000000          WORD   1177,10,0,256 ,0,256 ,1,0,0 ,STEPPING SEEK (T3)
2116  001756  000400  000000  000400
2117  001764  000001  000000  000000
2118  001772  001177  000001  000000          WORD   1177,1,0,410. ,0,814 ,1,0,0 ,OSCILLATING SEEK (T4)
2119  002000  000632  000000  001456
2120  002006  000001  000000  000000
2121  002014  001177  000001  000000          WORD   1177,1,0,410. ,0,814 ,1,0,0 ;CONVERGING/DIVERGING SEEK (T5)
2122  002022  000632  000000  001456
2123  002030  000001  000000  000000
2124  002036  001177  000001  000000          WORD   1177,1,0,410. ,0,814 ,1,0,0 ,SERVO ADDRESSING LOGIC NOISE (T6)
2125  002044  000632  000000  001456
2126  002052  000001  000000  000000
2127  002060  000337  011610  000000          WORD   337,5000. ,0,410 ,0,814 ,0,18   ,RANDOM SEEK TEST (T7)
2128  002066  000632  000000  001456
2129  002074  000060  000022
2130  002100  000177  000001  000000          WORD   177,1,0,410 ,0,814 ,100 ,0  ,SERVO SETTLE DOWN TEST (T10)
2131  002106  000632  000000  001456
2132  002114  000144  000000
2133  002120  001177  000001  000000          WORD   1177,1,0,410. ,0,814 ,1,0,0      ,ALL SEEKS TEST (T11)
2134  002126  000632  000000  001456
2135  002134  000001  000000  000000
2136  002142  001113  000001  000000          WORD   1113,1,0,0,0,0  ;ROTATIONAL SPEED TIMING TEST (T12)
2137  002150  000000  000000  000000
2138  002156  000037  000001  000000          WORD   37,1,0,410. ,0,814       ,ONE CYLINDER SEEK TIMING TEST (T13)
2139  002164  000632  000000  001456
2140  002172  000037  000001  000000          WORD   37,1,0,136. ,0,255       ,ACCESS TIME MEASURMENT TEST (T14)
2141  002200  000210  000000  000377
2142  002206  000037  000001  000000          WORD   37,1,0,410. ,0,814       ,MAXIMUM SEEK TIMING TEST (T15)
2143  002214  000632  000000  001456
2144  002222  000113  000001  000000          WORD   113,1,0,0,0     ,SECTOR ADDRESSING TEST (T16)
2145  002230  000000  000000
2146  002234  001013  000001  000000          WORD   1013,1,0,0,0    ,TRACK ADDRESSING TEST (T17)
2147  002242  000000  000000
2148  002246  007777  000001  000000          WORD   7777,1,0,410 ,0,814 ,64 ,0,18 ,1,1,0,177777 ,DATA TEST (T20)
2149  002254  000632  000000  001456
2150  002262  000100  000000  000022
2151  002270  000001  000001  000000
2152  002276  177777
2153  002300  000037  047040  000000          WORD   37,20000. ,0,410 ,0,814  ,EXERCISER (T21)
2154  002306  000632  000000  001456
2156  002314  000037  011610  000000          WORD   37,5000 ,0,136 ,0,255   ,RP04 ACCESS TIME ADJUSTMENT TEST (T22)
2156  002322  000210  000000  000377
2157
2158                                    ,PARAMETER TABLES
2159
2160                                    ;RECAL/SEEK (T0)
2161  002330  001125                    PRM0:   .WORD   1125
2162  002332  000310                            .WORD   200
2163  002334  000632                            WORD    410.
2164  002336  001456                            WORD    814
2166  002340  000000                            .WORD   0
2166  002342  000000                            .WORD   0
2167
2168                                    ;SEEK/SEEK (T1)
2169  002344  003377                    PRM1:   WORD    3377
2170  002346  000144                            WORD    100
```

```
2171  002350  000000                    .WORD   0
2172  002352  000200                    .WORD   128
2173  002354  000000                    .WORD   0
2174  002356  000400                    .WORD   256
2175  002360  000000                    .WORD   0
2176  002362  000000                    .WORD   0
2177  002364  000000                    .WORD   0
2178  002366  000000                     WORD   0
2179  002370  000000                    .WORD   0
2180
2181                              ;INCREMENT SEEK (T2)
2182  002372  001177              PRM2  .WORD   1177
2183  002374  000001                    .WORD   1
2184  002376  000000                    .WORD   0
2185  002400  000632                     WORD   410
2186  002402  000000                    .WORD   0
2187  002404  001456                    .WORD   814
2188  002406  000001                     WORD   1
2189  002410  000000                     WORD   0
2190  002412  000000                    .WORD   0
2191
2192                              ;STEPPING SEEK (T3)
2193  002414  001177              PRM3  .WORD   1177
2194  002416  000001                    .WORD   1
2195  002420  000000                    .WORD   0
2196  002422  000400                    .WORD   256
2197  002424  000000                    .WORD   0
2198  002426  001000                    .WORD   512.
2199  002430  000001                    .WORD   1
2200  002432  000000                     WORD   0
2201  002434  000000                     WORD   0
2202
2203                              ;OSCILLATING SEEK (T4)
2204  002436  001177              PRM4   WORD   1177
2205  002440  000001                    .WORD   1
2206  002442  000000                    .WORD   0
2207  002444  000632                    .WORD   410
2208  002446  000000                    .WORD   0
2209  002450  001456                    .WORD   814
2210  002452  000001                    .WORD   1
2211  002454  000000                    .WORD   0
2212  002456  000000                     WORD   0
2213
2214                              ;CONVERGING/DIVERGING SEEK (T5)
2215  002460  001177              PRM5  .WORD   1177
2216  002462  000001                    .WORD   1
2217  002464  000000                    .WORD   0
2218  002466  000632                    .WORD   410.
2219  002470  000000                    .WORD   0
2220  002472  001456                     WORD   814
2221  002474  000001                    .WORD   1
2222  002476  000000                    .WORD   0
2223  002500  000000                    .WORD   0
2224
2225                              ;SERVO ADDRESSING LOGIC NOISE GENERATOR (T6)
2226  002502  001177              PRM6   WORD   1177
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COMMON TAGS SEQ 0042

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2227  002504  000001                    .WORD   1
2228  002506  000000                    .WORD   0
2229  002510  000632                    .WORD   410.
2230  002512  000000                    .WORD   0
2231  002514  001456                    .WORD   814
2232  002516  000001                     WORD   1
2233  002520  000000                    .WORD   0
2234  002522  000000                    .WORD   0
2235
2236                              ;RANDOM SEEK TEST (T7)
2237  002524  000337              PRM7    .WORD   337
2238  002526  011610                    .WORD   5000
2239  002530  000000                     WORD   0
2240  002532  000632                    .WORD   410
2241  002534  000000                    .WORD   0
2242  002536  001456                     WORD   814
2243  002540  000000                     WORD   0
2244  002542  000022                    .WORD   18
2245
2246                              ;SERVO SETTLE DOWN TEST (T10)
2247  002544  000177              PRM10   .WORD   177
2248  002546  000001                    .WORD   1
2249  002550  000000                    .WORD   0
2250  002552  000632                     WORD   410
2251  002554  000000                    .WORD   0
2252  002556  001456                     WORD   814.
2253  002560  000144                    .WORD   100.
2254  002562  000000                    .WORD   0
2255
2256                              ;ALL SEEKS TEST (T11)
2257  002564  001177              PRM11   .WORD   1177
2258  002566  000001                    .WORD   1
2259  002570  000000                     WORD   0
2260  002572  000632                    .WORD   410.
2261  002574  000000                     WORD   0
2262  002576  001456                    .WORD   814
2263  002600  000001                    .WORD   1
2264  002602  000000                     WORD   0
2265  002604  000000                     WORD   0
2266
2267                              ;ROTATIONAL SPEED TIMING TEST (T12)
2268  002606  001113              PRM12    WORD   1113
2269  002610  000001                    .WORD   1
2270  002612  000000                     WORD   0
2271  002614  000000                    .WORD   0
2272  002616  000000                     WORD   0
2273  002620  000000                    .WORD   0
2274
2275                              ;ONE CYLINDER SEEK TIMING TEST (T13)
2276  002622  000037              PRM13    WORD   37
2277  002624  000001                    .WORD   1
2278  002626  000000                     WORD   0
2279  002630  000632                     WORD   410
2280  002632  000000                    .WORD   0
2281  002634  001456                    .WORD   814
2282
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COMMON TAGS SEQ 0043

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2283                                    ;ACCESS TIME MEASURMENT TEST (T14)
2284  002636  000037                    PRM14   .WORD   37
2285  002640  000001                            WORD   1
2286  002642  000000                            WORD   0
2287  002644  000210                    .WORD   136
2288  002646  000000                    .WORD   0
2289  002650  000377                            WORD   255.
2290
2291                                    ;MAXIMUM SEEK TIMING TEST (T15)
2292  002652  000037                    PRM15   .WORD   37
2293  002654  000001                            WORD   1
2294  002656  000000                    .WORD   0
2295  002660  000632                            WORD   410
2296  002662  000000                    .WORD   0
2297  002664  001456                            WORD   814
2298
2299                                    ;SECTOR ADDRESSING TEST (T16)
2300  002666  000113                    PRM16   WORD   113
2301  002670  000001                            WORD   1
2302  002672  000000                    .WORD   0
2303  002674  000000                    .WORD   0
2304  002676  000000                    .WORD   0
2305
2306                                    ;TRACK ADDRESSING TEST (T17)
2307  002700  001013                    PRM17   WORD   1013
2308  002702  000001                            WORD   1
2309  002704  000000                    .WORD   0
2310  002706  000000                            WORD   0
2311  002710  000000                    .WORD   0
2312
2313                                    ;DATA TEST (T20)
2314  002712  007777                    PRM20   .WORD   7777
2315  002714  000001                    .WORD   1
2316  002716  000000                            WORD   0
2317  002720  000632                            WORD   410
2318  002722  000000                            WORD   0
2319  002724  001456                            WORD   814
2320  002726  000100                    .WORD   64
2321  002730  000000                            WORD   0
2322  002732  000022                    .WORD   18
2323  002734  000001                    .WORD   1
2324  002736  000001                    .WORD   1
2325  002740  000000                    .WORD   0
2326  002742  177777                    PTRN15  .WORD   177777
2327
2328                                    ;EXERCISER (T21)
2329  002744  000037                    PRM21.  .WORD   37
2330  002746  047040                    .WORD   20000
2331  002750  000000                    .WORD   0
2332  002752  000632                    .WORD   410
2333  002754  000000                    .WORD   0
2334  002756  001456                    .WORD   814
2335
2336                                    ;RP04 ACCESS TIME ADJUSTMENT TEST (T22)
2337  002760  000037                    PRM22.  .WORD   37
2338  002762  011610                    .WORD   5000
```

```
 2339  002764  000000                          .WORD   0
 2340  002766  000210                           WORD   136
 2341  002770  000000                           WORD   0
 2342  002772  000377                           WORD   255
 2343
 2344
 2345
 2346                                  ;SEEK TIMING LIMITS
 2347
 2348  002774  043422                  T7A      .WORD   MSG7
 2349  002776  000000                           WORD   0
 2350  003000  003142                           WORD   1634            ;(16 67-2%)**2
 2351  003002  003244                           WORD   1700            ;(16 67+2%)**2
 2352
 2353  003004  043422                  T7B      WORD   MSG7
 2354  003006  000000                           WORD   0
 2355  003010  003131                           WORD   1625            ;(16 67-2 5%)**2
 2356  003012  003255                           WORD   1709            ;(16 67+2 5%)**2
 2357
 2358  003014  043454                  T10      WORD   MSG10A
 2359  003016  043523                           WORD   MSG10B
 2360  003020  000000                           WORD   0               ;NO LOWER LIMIT
 2361  003022  001750                           WORD   1000            ;(7+3)**2
 2362
 2363  003024  043540                  T11      WORD   MSG11A
 2364  003026  043606                           WORD   MSG11B
 2365  003030  000000                           WORD   0               ;NO LOWER LIMIT
 2366  003032  012574                           WORD   5500            ;(28+2)**2
 2367
 2368  003034  043623                  T12      WORD   MSG12A
 2369  003036  043665                           WORD   MSG12B
 2370  003040  000000                           WORD   0               ;NO LOWER LIMIT
 2371  003042  012574                           WORD   5500            ;(50+2)**2
 2372
 2373  003044  003104                  PAT PT   .WORD   PAT0           ;TABLE OF POINTERS WHICH POINT TO THE
 2374  003046  003144                           WORD   PAT1            ;PATTERNS USED BY THE DATA TEST
 2375  003050  003204                          .WORD   PAT2
 2376  003052  003244                           WORD   PAT3
 2377  003054  003304                          .WORD   PAT4
 2378  003056  003344                          .WORD   PAT5
 2379  003060  003404                          .WORD   PAT6
 2380  003062  003444                           WORD   PAT7
 2381  003064  003504                           WORD   PAT8
 2382  003066  003544                           WORD   PAT9
 2383  003070  003604                           WORD   PAT10
 2384  003072  003644                           WORD   PAT11
 2385  003074  003704                           WORD   PAT12
 2386  003076  003744                           WORD   PAT13
 2387  003100  004004                           WORD   PAT14
 2388  003102  004044                           WORD   PAT15
 2389
 2390                                  ;PATTERNS 0 THRU 15
 2391
 2392  003104  165555                  PAT0     WORD   165555          ;PATTERN 0
 2393  003106  133333                           WORD   133333
 2394  003110  165555                           WORD   165555
```

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 2395  003112  133333                          WORD   133333
 2396  003114  165555                          WORD   165555
 2397  003116  133333                          WORD   133333
 2398  003120  165555                          WORD   165555
 2399  003122  133333                          WORD   133333
 2400  003124  165555                          WORD   165555
 2401  003126  133333                          WORD   133333
 2402  003130  165555                          WORD   165555
 2403  003132  133333                          WORD   133333
 2404  003134  165555                          WORD   165555
 2405  003136  133333                          WORD   133333
 2406  003140  165555                          WORD   165555
 2407  003142  133333                          WORD   133333
 2408
 2409  003144  000001                PAT1      WORD   000001          ;PATTERN 1
 2410  003146  000003                          WORD   000003
 2411  003150  000007                          WORD   000007
 2412  003152  000017                          WORD   000017
 2413  003154  000037                          WORD   000037
 2414  003156  000077                          WORD   000077
 2415  003160  000177                          WORD   000177
 2416  003162  000377                          WORD   000377
 2417  003164  000777                          WORD   000777
 2418  003166  001777                          WORD   001777
 2419  003170  003777                          WORD   003777
 2420  003172  007777                          WORD   007777
 2421  003174  017777                          WORD   017777
 2422  003176  037777                          WORD   037777
 2423  003200  077777                          WORD   077777
 2424  003202  177777                          WORD   177777
 2425
 2426  003204  177776                PAT2      WORD   177776          ;PATTERN 2
 2427  003206  177774                          WORD   177774
 2428  003210  177770                          WORD   177770
 2429  003212  177760                          WORD   177760
 2430  003214  177740                          WORD   177740
 2431  003216  177700                          WORD   177700
 2432  003220  177600                          WORD   177600
 2433  003222  177400                          WORD   177400
 2434  003224  177000                          WORD   177000
 2435  003226  176000                          WORD   176000
 2436  003230  174000                          WORD   174000
 2437  003232  170000                          WORD   170000
 2438  003234  160000                          WORD   160000
 2439  003236  140000                          WORD   140000
 2440  003240  100000                          WORD   100000
 2441  003242  000000                          WORD   000000
 2442
 2443  003244  000000                PAT3      WORD   000000          ;PATTERN 3
 2444  003246  000000                          WORD   000000
 2445  003250  000000                          WORD   000000
 2446  003252  177777                          WORD   177777
 2447  003254  177777                          WORD   177777
 2448  003256  177777                          WORD   177777
 2449  003260  000000                          WORD   000000
 2450  003262  000000                          WORD   000000
```

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2451  003264  177777                    WORD   177777
2452  003266  177777                    WORD   177777
2453  003270  000000                    WORD   000000
2454  003272  177777                    WORD   177777
2455  003274  000000                    WORD   000000
2456  003276  177777                    WORD   177777
2457  003300  000000                    WORD   000000
2458  003302  177777                    WORD   177777
2459
2460  003304  000000          PAT4      WORD   000000          ;PATTERN 4
2461  003306  010421                    WORD   010421
2462  003310  021042                    WORD   021042
2463  003312  031463                    WORD   031463
2464  003314  042104                    WORD   042104
2465  003316  052525                    WORD   052525
2466  003320  063146                    WORD   063146
2467  003322  073567                    WORD   073567
2468  003324  104210                    WORD   104210
2469  003326  114631                    WORD   114631
2470  003330  125252                    WORD   125252
2471  003332  135673                    WORD   135673
2472  003334  146314                    WORD   146314
2473  003336  156735                    WORD   156735
2474  003340  167356                    WORD   167356
2475  003342  177777                    WORD   177777
2476
2477  003344  052525          PAT5      WORD   052525          ;PATTERN 5
2478  003346  052525                    WORD   052525
2479  003350  052525                    WORD   052525
2480  003352  125252                    WORD   125252
2481  003354  125252                    WORD   125252
2482  003356  125252                    WORD   125252
2483  003360  052525                    WORD   052525
2484  003362  052525                    WORD   052525
2485  003364  125252                    WORD   125252
2486  003366  125252                    WORD   125252
2487  003370  052525                    WORD   052525
2488  003372  125252                    WORD   125252
2489  003374  052525                    WORD   052525
2490  003376  125252                    WORD   125252
2491  003400  052525                    WORD   052525
2492  003402  125252                    WORD   125252
2493
2494  003404  007417          PAT6      WORD   007417          ;PATTERN 6
2495  003406  007417                    WORD   007417
2496  003410  007417                    WORD   007417
2497  003412  170360                    WORD   170360
2498  003414  170360                    WORD   170360
2499  003416  170360                    WORD   170360
2500  003420  007417                    WORD   007417
2501  003422  007417                    WORD   007417
2502  003424  170360                    WORD   170360
2503  003426  170360                    WORD   170360
2504  003430  007417                    WORD   007417
2505  003432  170360                    WORD   170360
2506  003434  007417                    WORD   007417
```

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2507  003436  170360                    .WORD   170360
2508  003440  007417                    .WORD   007417
2509  003442  170360                    .WORD   170360
2510
2511  003444  026455          PAT7      .WORD   026455          ,PATTERN 7
2512  003446  026455                    .WORD   026455
2513  003450  026455                    .WORD   026455
2514  003452  151322                     WORD   151322
2515  003454  151322                    .WORD   151322
2516  003456  151322                    .WORD   151322
2517  003460  026455                    .WORD   026455
2518  003462  026455                    .WORD   026455
2519  003464  151322                    .WORD   151322
2520  003466  151322                    .WORD   151322
2521  003470  026455                    .WORD   026455
2522  003472  151322                    .WORD   151322
2523  003474  026455                    .WORD   026455
2524  003476  151322                    .WORD   151322
2525  003500  026455                    .WORD   026455
2526  003502  151322                     WORD   151322
2527
2528  003504  165555          PAT8.     .WORD   165555          ,PATTERN 8
2529  003506  133333                    .WORD   133333
2530  003510  165555                    .WORD   165555
2531  003512  133333                    .WORD   133333
2532  003514  165555                    .WORD   165555
2533  003516  133333                    .WORD   133333
2534  003520  165555                    .WORD   165555
2535  003522  133333                    .WORD   133333
2536  003524  165555                     WORD   165555
2537  003526  133333                     WORD   133333
2538  003530  165555                     WORD   165555
2539  003532  133333                     WORD   133333
2540  003534  165555                    .WORD   165555
2541  003536  133333                     WORD   133333
2542  003540  165555                     WORD   165555
2543  003542  133333                     WORD   133333
2544
2545  003544  000001          PAT9       WORD   000001          ,PATTERN 9
2546  003546  000002                     WORD   000002
2547  003550  000004                    .WORD   000004
2548  003552  000010                     WORD   000010
2549  003554  000020                    .WORD   000020
2550  003556  000040                     WORD   000040
2551  003560  000100                    .WORD   000100
2552  003562  000200                     WORD   000200
2553  003564  000400                     WORD   000400
2554  003566  001000                    .WORD   001000
2555  003570  002000                     WORD   002000
2556  003572  004000                    .WORD   004000
2557  003574  010000                    .WORD   010000
2558  003576  020000                    .WORD   020000
2559  003600  040000                    .WORD   040000
2560  003602  100000                    .WORD   100000
2561
2562  003604  177776          PAT10     .WORD   177776          ,PATTERN 10
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003606  177775                    .WORD   177775
003610  177773                    .WORD   177773
003612  177767                    .WORD   177767
003614  177757                    .WORD   177757
003616  177737                    .WORD   177737
003620  177677                    .WORD   177677
003622  177577                    .WORD   177577
003624  177377                    .WORD   177377
003626  176777                    .WORD   176777
003630  175777                    .WORD   175777
003632  173777                    .WORD   173777
003634  167777                    .WORD   167777
003636  157777                    .WORD   157777
003640  137777                    .WORD   137777
003642  077777                    .WORD   077777

003644  172666            PAT11   .WORD   172666          ,PATTERN 11
003646  155555                    .WORD   155555
003650  172666                    .WORD   172666
003652  155555                    .WORD   155555
003654  172666                    .WORD   172666
003656  155555                    .WORD   155555
003660  172666                    .WORD   172666
003662  155555                    .WORD   155555
003664  172666                    .WORD   172666
003666  155555                    .WORD   155555
003670  172666                    .WORD   172666
003672  155555                    .WORD   155555
003674  172666                    .WORD   172666
003676  155555                    .WORD   155555
003700  172666                    .WORD   172666
003702  155555                    .WORD   155555

003704  077777            PAT12   .WORD   077777          ,PATTERN 12
003706  137777                    .WORD   137777
003710  157777                    .WORD   157777
003712  167777                    .WORD   167777
003714  173777                    .WORD   173777
003716  175777                    .WORD   175777
003720  176777                    .WORD   176777
003722  177377                    .WORD   177377
003724  177577                    .WORD   177577
003726  177677                    .WORD   177677
003730  177737                    .WORD   177737
003732  177757                    .WORD   177757
003734  177767                    .WORD   177767
003736  177773                    .WORD   177773
003740  177775                    .WORD   177775
003742  177776                    .WORD   177776

003744  153333            PAT13.  .WORD   153333          ,PATTERN 13
003746  066667                    .WORD   066667
003750  153333                    .WORD   153333
003752  066667                    .WORD   066667
003754  153333                    .WORD   153333
003756  066667                    .WORD   066667
```

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 2619  003760  153333                          .WORD   153333
 2620  003762  066667                          .WORD   066667
 2621  003764  153333                          .WORD   153333
 2622  003766  066667                          .WORD   066667
 2623  003770  153333                           WORD   153333
 2624  003772  066667                          .WORD   066667
 2625  003774  153333                          .WORD   153333
 2626  003776  066667                          .WORD   066667
 2627  004000  153333                           WORD   153333
 2628  004002  066667                          .WORD   066667
 2629
 2630  004004  000000                PAT14:    .WORD   000000          ,PATTERN 14
 2631  004006  177777                          .WORD   177777
 2632  004010  177777                          .WORD   177777
 2633  004012  177777                          .WORD   177777
 2634  004014  177777                          .WORD   177777
 2635  004016  177777                          .WORD   177777
 2636  004020  177777                          .WORD   177777
 2637  004022  177777                          .WORD   177777
 2638  004024  177777                          .WORD   177777
 2639  004026  177777                          .WORD   177777
 2640  004030  177777                          .WORD   177777
 2641  004032  177777                          .WORD   177777
 2642  004034  177777                          .WORD   177777
 2643  004036  177777                          .WORD   177777
 2644  004040  177777                          .WORD   177777
 2645  004042  177777                          .WORD   177777
 2646
 2647  004044  177777                PAT15     .WORD   177777          ,PATTERN 15
 2648  004046  000000                           WORD   000000
 2649  004050  000000                          .WORD   000000
 2650  004052  000000                          .WORD   000000
 2651  004054  000000                          .WORD   000000
 2652  004056  000000                          .WORD   000000
 2653  004060  000000                           WORD   000000
 2654  004062  000000                           WORD   000000
 2655  004064  000000                          .WORD   000000
 2656  004066  000000                          .WORD   000000
 2657  004070  000000                          .WORD   000000
 2658  004072  000000                           WORD   000000
 2659  004074  000000                           WORD   000000
 2660  004076  000000                           WORD   000000
 2661  004100  000000                           WORD   000000
 2662  004102  000000                           WORD   000000
 2663
 2664                                ,DPB (DATA PARAMETER BLOCK)
 2665
 2666  004104      000               DPB A:    .BYTE   0               ,(0) DRIVE NUMBER
 2667  004105      000                          .BYTE   0               ,(1) OFFSET VALUE OR FMT22, ECI, AND HCI
 2668  004106      000                           BYTE   0               ,(2) COMMAND
 2669  004107      000                          .BYTE   0               ,(3) PSEL AND A17 AND A16
 2670  004110  000000                           WORD   0               ,(4) WORD COUNT (MUST BE NEG )
 2671  004112  047714                           WORD   BUFFER          ,(6) BUFFER ADDRESS OR
 2672                                                                  ,REGISTER TABLE POINTER
 2673  004114      000                          .BYTE   0               ,(10) SECTOR ADDRESS OR
 2674                                                                  ,FIRST REG  INDEX
```

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2675  004115      000                        BYTE   0              ;(11) TRACK ADDRESS OR
2676                                                                ,LAST REG.  INDEX
2677  004116  000000                         WORD   0              ,(12) CYLINDER ADDRESS
2678  004120  004204                         WORD   RP REG         ,(14) ERROR TABLE POINTER
2679                                                                ,POINTS TO THE FIRST OF TWENTY
2680                                                                ,LOCATIONS OF WHERE THE DRIVER
2681                                                                ,IS TO STORE THE RH11/RP04
2682                                                                ,REGISTERS ON AN ERROR.  IF LEFT
2683                                                                ,ZERO REGISTERS ARE NOT SAVED
2684  004122  000000                         WORD   0              ,(16) STATUS/ERROR INDICATOR
2685                                                                ,BIT15=1=>ERROR OCCURRED
2686                                                                ,BIT07=1=>DONE
2687                                                                ,BIT14-BIT09 AND BIT06-BIT03
2688                                                                ,INDICATE TYPE OF ERROR
2689
2690  004124      000          DPB B         BYTE   0              ,(0) DRIVE NUMBER
2691  004125      000                        BYTE   0              ,(1) OFFSET VALUE OR FMT22, ECI, AND HCI
2692  004126      000                        BYTE   0              ,(2) COMMAND
2693  004127      000                        BYTE   0              ,(3) PSEL AND A17 AND A16
2694  004130  177776                         WORD   -2             ,(4) WORD COUNT (MUST BE NEG )
2695  004132  047714                         WORD   BUFFER         ,(6) BUFFER ADDRESS OR
2696                                                                ,REGISTER TABLE POINTER
2697  004134      000                        BYTE   0              ,(10) SECTOR ADDRESS OR
2698                                                                ,FIRST REG.  INDEX
2699  004135      000                        BYTE   0              ,(11) TRACK ADDRESS OR
2700                                                                ,LAST REG.  INDEX
2701  004136  000000                         WORD   0              ,(12) CYLINDER ADDRESS
2702  004140  004204                         WORD   RP REG         ,(14) ERROR TABLE POINTER
2703                                                                ,POINTS TO THE FIRST OF TWENTY
2704                                                                ,LOCATIONS OF WHERE THE DRIVER
2705                                                                ,IS TO STORE THE RH11/RP04
2706                                                                ,REGISTERS ON AN ERROR.  IF LEFT
2707                                                                ,ZERO REGISTERS ARE NOT SAVED
2708  004142  000000                         WORD   0              ,(16) STATUS/ERROR INDICATOR
2709                                                                ,BIT15=1=>ERROR OCCURRED
2710                                                                ,BIT07=1=>DONE
2711                                                                ,BIT14-BIT09 AND BIT06-BIT03
2712                                                                ,INDICATE TYPE OF ERROR
2713
2714  004144      000          DPB C         BYTE   0              ,(0) DRIVE NUMBER
2715  004145      000                        BYTE   0              ,(1) OFFSET VALUE OR FMT22, ECI, AND HCI
2716  004146      000                        BYTE   0              ,(2) COMMAND
2717  004147      000                        BYTE   0              ,(3) PSEL AND A17 AND A16
2718  004150  177776                         WORD   -2             ,(4) WORD COUNT (MUST BE NEG )
2719  004152  047714                         WORD   BUFFER         ,(6) BUFFER ADDRESS OR
2720                                                                ,REGISTER TABLE POINTER
2721  004154      000                        BYTE   0              ,(10) SECTOR ADDRESS OR
2722                                                                ,FIRST REG.  INDEX
2723  004155      000                        BYTE   0              ,(11) TRACK ADDRESS OR
2724                                                                ,LAST REG.  INDEX
2725  004156  000000                         WORD   0              ,(12) CYLINDER ADDRESS
2726  004160  004204                         WORD   RP REG         ,(14) ERROR TABLE POINTER
2727                                                                ,POINTS TO THE FIRST OF TWENTY
2728                                                                ,LOCATIONS OF WHERE THE DRIVER
2729                                                                ,IS TO STORE THE RH11/RP04
2730                                                                ,REGISTERS ON AN ERROR  IF LEFT
```

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2731
2732  004162  000000                          WORD   0          ;ZERO REGISTERS ARE NOT SAVED.
2733                                                            ;(16) STATUS/ERROR INDICATOR
2734                                                            ;BIT15=1=>ERROR OCCURRED
2735                                                            ;BIT07=1=>DONE
2736                                                            ;BIT14-BIT09 AND BIT06-BIT03
2737                                                            ;INDICATE TYPE OF ERROR
2738  004164     000                 DTADPB: BYTE   0          ;(0) DRIVE NUMBER
2739  004165     000                         BYTE   0          ;(1) OFFSET VALUE OR FMT22, ECT, AND HCI
2740  004166     000                         .BYTE  0          ;(2) COMMAND
2741  004167     000                         BYTE   0          ;(3) PSEL AND A17 AND A16
2742  004170  000000                         WORD   0          ;(4) WORD COUNT (MUST BE NEG.)
2743  004172  047714                         .WORD  BUFFER     ;(6) BUFFER ADDRESS OR
2744                                                            ;REGISTER TABLE POINTER
2745  004174     000                         .BYTE  0          ;(10) SECTOR ADDRESS OR
2746                                                            ;FIRST REG. INDEX
2747  004175     000                         .BYTE  0          ;(11) TRACK ADDRESS OR
2748                                                            ;LAST REG. INDEX
2749  004176  000000                         WORD   0          ;(12) CYLINDER ADDRESS
2750  004200  004204                         .WORD  RP REG     ;(14) ERROR TABLE POINTER
2751                                                            ,POINTS TO THE FIRST OF TWENTY
2752                                                            ;LOCATIONS OF WHERE THE DRIVER
2753                                                            ;IS TO STORE THE RH11/RP04
2754                                                            ;REGISTERS ON AN ERROR  IF LEFT
2755                                                            ;ZERO REGISTERS ARE NOT SAVED
2756  004202  000000                         WORD   0          ,(16) STATUS/ERROR INDICATOR
2757                                                            ;BIT15=1=>ERROR OCCURRED
2758                                                            ,BIT07=1=>DONE
2759                                                            ,BIT14-BIT09 AND BIT06-BIT03
2760                                                            ,INDICATE TYPE OF ERROR
2761
2762
2763
2764                                ,SAVE RH11/RP04 REGISTERS HERE ON ERROR
2765
2766  004204  000000                RP REG. .WORD  0          ,RPCS1 (776700) CONTROL & STATUS #1
2767  004206  000000                        .WORD  0          ,RPWC (776702) WORD COUNT
2768  004210  000000                        .WORD  0          ,RPBA (776704) BUS ADDRESS
2769  004212  000000                        .WORD  0          ,RPDA (776706) DESIRED SECTOR/TRACK
2770  004214  000000                        .WORD  0          ,RPCS2 (776710) CONTROL & STATUS #2
2771  004216  000000                        .WORD  0          ,RPDS1 (776712) DISK STATUS
2772  004220  000000                         WORD  0          ,RPER1 (776714) ERROR REG. #1
2773  004222  000000                         WORD  0          ,RPAS (776716) ATTENTION SUMMARY
2774  004224  000000                         WORD  0          ,RPLA (776720) LOOK AHEAD
2775  004226  000000                        .WORD  0          ,RPDB (776722) DATA BUFFER
2776  004230  000000                        .WORD  0          ,RPMR (776724) MAINTAINABILITY
2777  004232  000000                        .WORD  0          ,RPDT (776726) DRIVE TYPE
2778  004234  000000                        .WORD  0          ,RPSN (776730) SERIAL NUMBER
2779  004236  000000                         WORD  0          ,RPOF (776732) OFFSET
2780  004240  000000                         WORD  0          ;RPCA (776734) DESIRED CYLINDER
2781  004242  000000                         WORD  0          ,RPCC (776736) CURRENT CYLINDER
2782  004244  000000                        .WORD  0          ;RPER2 (776740) ERROR REG #2
2783  004246  000000                         WORD  0          ;RPER3 (776742) ERROR REG #3
2784  004250  000000                        .WORD  0          ;RPEC1 (776744) ECC POSITION
2785  004252  000000                         WORD  0          ,RPEC2 (776746) ECC PATTERN
2786
```

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2787                                    ;STATUS/ERROR MESSAGE POINTER TABLE
2788  004254  044724                    STATBL: .WORD   MSGB14          ;OFFLINE OR UNSAFE DRIVE REQUESTED
2789  004256  044766                            .WORD   MSGB13          ,UNLOAD DRIVE REQUESTED
2790  004260  045017                            .WORD   MSGB12          ;PERSISTENT UNSAFE
2791  004262  045041                            .WORD   MSGB11          ;PARITY ERROR OCCURRED
2792  004264  045067                            .WORD   MSGB10          ;FATAL PARITY ERROR
2793  004266  045112                            .WORD   MSGB09          ;SOFTWARE TIMEOUT ON THIS DRIVE
2794  004270  045151                            WORD    MSGB08          ;SOFTWARE TIMEOUT ON ANOTHER DRIVE
2795  004272  045213                            .WORD   MSGB06          ;ERROR OCCURRED DURING I/O OPERATION
2796  004274  045257                            .WORD   MSGB05          ;ERROR OCCURRED DURING NON-I/O OPERATION
2797  004276  045327                            .WORD   MSGB04          ;UNSAFE OCCURRED
2798  004300  045347                            WORD    MSGB03          ,AUTOMATIC RECALIBRATE SEQUENCE OCCURRED
2799  004302  045417                            WORD    MSGB02          ,DRIVE HAS NOT RESPONDED TO PORT REQUEST
2800  004304  045467                            WORD    MSGB01          ,DRIVE HAS BECOME NONEXISTENT
```

```
                                    SBTTL  ERROR POINTER TABLE

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

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


 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
                                   ,*    RH11 INTERRUPT OCCURED (RPAS = 0)
                                   ,*    ERR PC  RPAS
                                   ,*    $ERRPC  $REG3

 004306  044045                         EM1
 004310  045525                         DH1
 004312  047106                         DT1
 004314  047540                         DF1

                                   ,*  ERROR ITEM 2
                                   ,*    UNEXPECTED ATTENTION OCCURRED
                                   ,*    ERR PC  DRIVE   RPAS    RPDS1   RPER1    RPER2    RPER3
                                   ,*    $ERRPC  $REG1   $REG3   RPERRS  RPERRS+2 RPERRS+4 RPERRS+6

 004316  044110                         EM2
 004320  045542                         DH2
 004322  047112                         DT2
 004324  047544                         DF2

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

 004326  044146                         EM3
 004330  045630                         DH3
 004332  047130                         DT3
 004334  047550                         DF3

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

```
2857                                    ;*    $TMPO   $ERRPC  WRT ADR WRT WD  RD WRD
2858
2859  004336  044203                            EM4
2860  004340  045665                            DH4
2861  004342  047140                            DT4
2862  004344  047554                            DF4
2863
2864                                    ;*  ERROR ITEM 5
2865                                    ;*    ADDRESS PLUG CHANGE BIT SET
2866                                    ;*    ERR PC  DRIVE   RPAS    RPDS1   RPER1     RPER2    RPER3
2867                                    ;*    $ERRPC  $REG1   $REG3   RPERRS  RPERRS+2  RPERRS+4 RPERRS+6
2868
2869  004346  044237                            EM5
2870  004350  045542                            DH2
2871  004352  047112                            DT2
2872  004354  047544                            DF2
2873
2874                                    ;*  ERROR ITEM 6 -- NOT USED
2875
2876  004356  000000                            0
2877  004360  000000                            0
2878  004362  000000                            0
2879  004364  000000                            0
2880
2881                                    ;*  ERROR ITEM 7 -- NOT USED
2882
2883  004366  000000                            0
2884  004370  000000                            0
2885  004372  000000                            0
2886  004374  000000                            0
2887
2888                                    ;*  ERROR ITEM 10
2889                                    ;*    RH11/RP04/5/6 FAILED TO RESPOND TO ADDRESSING
2890                                    ;*    RPCS1   ERR PC
2891                                    ;*    RH ADR  $ERRPC
2892
2893  004376  044273                            EM10
2894  004400  045734                            DH10
2895  004402  047172                            DT10
2896  004404  047560                            DF10
2897
2898                                    ;*  ERROR ITEM 11
2899                                    ;*    DRIVE SELECTED IS NOT ONLINE
2900                                    ;*    DRIVE   ERR PC
2901                                    ;*    $REG2   $ERRPC
2902
2903  004406  044351                            EM11
2904  004410  045753                            DH11
2905  004412  047176                            DT11
2906  004414  047564                            DF11
2907
2908                                    ;*  ERROR ITEM 12
2909                                    ;*    IMPROPER HEADER DATA
2910                                    ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
2911                                    ;*    $TMPO   $ERRPC  $REG0   CHKDRV  CYL DS  TRK DS  SEC DS
2912                                    ;*        GDCYL   GDTRK   GDSCTR  BDCYL   BDTRK   BDSCTR
```

```
2913                                    ;*        CYL DS  TRK DS  SEC DS  CYL RD  TRK RD  SEC RD
2914                                    ;*    CYLNDR, TRACK, AND SECTOR ARE DECIMAL
2915
2916  004416  044406                            EM12
2917  004420  045772                            DH12
2918  004422  047202                            DT12
2919  004424  047570                            DF12
2920
2921                                    ;*  ERROR ITEM 13
2922                                    ;*    DATA COMPARE FAILURE
2923                                    ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
2924                                    ;*    $TMP0   $ERRPC  $REG0   CHKDRV  CYL DS  TRK DS  SEC DS
2925                                    ;*        GDDAT   BDDAT   WRDCNT  GDADR   BDADR
2926                                    ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
2927                                    ;*      CYLNDR, TRACK, SECTOR, AND WRDCNT  ARE DECIMAL
2928
2929  004426  044433                            EM13
2930  004430  045772                            DH12
2931  004432  047234                            DT13
2932  004434  047600                            DF13
2933
2934                                    ;*  ERROR ITEM 14 -- FOLLOWS #13
2935                                    ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
2936
2937  004436  000000                            0
2938  004440  000000                            0
2939  004442  047252                            DT13A
2940  004444  047610                            DF14
2941
2942                                    ;*  ERROR ITEM 15
2943                                    ;*    DATA COMPARE FAILURE
2944                                    ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR
2945                                    ;*    $TMP0   $ERRPC  $REG0   CHKDRV  CYL DS  TRK DS  SEC DS
2946                                    ;*        GDDAT   BDDAT   WRDCNT  GDADR   BDADR
2947                                    ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
2948                                    ;*        CYLNDR, TRACK, SECTOR, AND WRDCNT ARE DECIMAL
2949
2950  004446  044433                            EM13
2951  004450  045772                            DH12
2952  004452  047234                            DT13
2953  004454  047600                            DF13
2954
2955                                    ;*  ERROR ITEM 16 -- FOLLOWS #15
2956                                    ;*        $GDDAT  $BDDAT  $REG4   $GDADR  $BDADR
2957
2958  004456  000000                            0
2959  004460  000000                            0
2960  004462  047252                            DT13A
2961  004464  047610                            DF14
2962
2963                                    ;*  ERROR ITEM 17
2964                                    ;*    DISK ERROR IN TIMING TEST
2965                                    ;*    TEST    ERR PC  DRIVE   RPCS1   RPDS1     RPER1     RPER2     RPER3
2966                                    ;*    $TMP0   $ERRPC  CHKDRV  RP REG  RP REG+12 RP REG+14 RP REG+40 RP REG+42
2967
2968  004466  044460                            EM17
```

```
2969  004470  046206                          DH17
2970  004472  047264                          DT17
2971  004474  047614                          DF17
2972
2973                                  ;*  ERROR ITEM 20
2974                                  ;*    CLOCK (KW11-P) OVERFLOW IN TIMING TEST
2975                                  ;*    TEST    ERR PC  DRIVE   RPCS1   RPDS1     RPER1     RPER2     RPER3
2976                                  ;*    $TMP0   $ERRPC  CHKDRV  RP REG  RP REG+12 RP REG+14 RP REG+40 RP REG+42
2977
2978  004476  044512                          EM20
2979  004500  046206                          DH17
2980  004502  047264                          DT17
2981  004504  047614                          DF17
2982
2983                                  ;*  ERROR ITEM 21
2984                                  ;*    DATA COMPARE FAILURE
2985                                  ;*    TEST      ERR PC  TST PC  DRIVE   CYLNDR  TRACK
2986                                  ;*    $TMP0     $ERRPC  $REG0   CHKDRV  CYL DS  TRK DS
2987                                  ;*        GDDAT   BDDAT   WRDCNT  SECTOR
2988                                  ;*        $REG1   $BDDAT  $REG4   $REG1
2989                                  ;*        CYLINDR, TRACK, WRDCNT, AND SECTOR ARE DECIMAL
2990
2991  004506  044433                          EM13
2992  004510  046304                          DH21
2993  004512  047304                          DT21
2994  004514  047620                          DF21
2995
2996                                  ;*  ERROR ITEM 22--FOLLOWS #21
2997                                  ;*        $REG1   $BDDAT   $REG4   $REG1
2998
2999  004516  000000                            0
3000  004520  000000                            0
3001  004522  047320                          DT21A
3002  004524  047630                          DF22
3003
3004                                  ;*  ERROR ITEM 23
3005                                  ;*      DISK ERROR DURING SEEK
3006                                  ;*      TEST    ERR PC  DRIVE   CYLNDR  RPCS1   RPCS2     RPDS1
3007                                  ;*      $TMP0   $ERRPC  CHKDRV  CYL DS  RP REG RP REG+10 RP REG+12
3008                                  ;*          RPER1     RPER2     RPER3     RPCA      RPCC
3009                                  ;*          RP REG+14 RP REG+40 RP REG+42 RP REG+34 RP REG+36
3010
3011  004526  044561                          EM23
3012  004530  046421                          DH23
3013  004532  047330                          DT23
3014  004534  047634                          DF23
3015
3016                                  ;*  ERROR ITEM 24
3017                                  ;*      SEEK NOT COMPLETE WITHIN 120 MS
3018                                  ;*      TEST    ERR PC  DRIVE   CYLNDR  RPCS1   RPCS2     RPDS1
3019                                  ;*      $TMP0   $ERRPC  CHKDRV  CYL DS  RP REG RP.REG+10 RP.REG+12
3020                                  ;*          RPER1     RPER2     RPER3     RPCA      RPCC
3021                                  ;*          RP REG+14 RP REG+40 RP REG+42 RP REG+34 RP.REG+36
3022
3023  004536  044610                          EM24
3024  004540  046421                          DH23
```

```
3025  004542  047330                          DT23
3026  004544  047634                          DF23
3027
3028
3029
3030                                  ,,**********************************************************************
3031                                  ,,**********************************************************************
3032                                  ,*  ERROR ITEMS 23-40 NOT USED
3033                                  ,*  ERROR ITEMS 41-46 WILL HAVE AN EM THAT
3034                                  ,*  VARIES DEPENDING ON THE ERROR, IT WILL BE IN THE FORM
3035                                  ,*  RH11/RP04/5/6 ERROR (MESSAGE)
3036                                  ,*  WHERE MESSAGE WILL BE ONE OR MORE OF THE FOLLOWING
3037                                  ,*  1)  OFFLINE OR UNSAFE DRIVE REQUESTED
3038                                  ,*  2)  UNLOADED DRIVE REQUESTED
3039                                  ,*  3)  PERSISTENT UNSAFE
3040                                  ,*  4)  PARITY ERROR OCCURRED
3041                                  ,*  5)  FATAL PARITY ERROR
3042                                  ,*  6)  SOFTWARE TIMEOUT ON THIS DRIVE
3043                                  ,*  7)  SOFTWARE TIMEOUT ON ANOTHER DRIVE
3044                                  ,*  8)  ERROR OCCURRED DURING I/O OPERATION
3045                                  ,*  9)  ERROR OCCURRED DURING NON-I/O OPERATION
3046                                  ,*  10) UNSAFE OCCURRED
3047                                  ,*  11) AUTOMATIC RECALIBRATE SEQUENCE OCCURRED
3048
3049  004546                          ITEM41
3050
3051                                  ,*  ERROR ITEM 41
3052                                  ,*    RH11/RP04/5/6 ERROR (MESSAGE)
3053                                  ,*    TEST    ERR PC  TST PC  DRIVE
3054                                  ,*    $TMPO   $ERRPC  $REGO   CHKDRV
3055
3056  004546  044650                    EM41
3057  004550  046554                    DH41
3058  004552  047360                    DT41
3059  004554  047644                    DF41
3060
3061                                  ,*  ERROR ITEM 42
3062                                  ,*    RH11/RP04/5/6 ERROR (MESSAGE)
3063                                  ,*    TEST    ERR PC  TST PC  DRIVE   RPCS1   RPCS2   RPDS1
3064                                  ,*    $TMPO   $ERRPC  $REGO   CHKDRV  RP REG  RP REG+10 RP REG+12
3065
3066  004556  044650                    EM41
3067  004560  046612                    DH42
3068  004562  047370                    DT42
3069  004564  047650                    DF42
3070
3071                                  ,*  ERROR ITEM 43
3072                                  ,*    RH11/RP04/5/6 ERROR (MESSAGE)
3073                                  ,*    TEST    ERR PC  TST PC  DRIVE   RPCS1   RPCS2   RPDS1
3074                                  ,*    $TMPO   $ERRPC  $REGO   CHKDRV  RP REG  RP REG+10 RP REG+12
3075                                  ,*        RPER1     RPER2     RPER3
3076                                  ,*        RP REG+14 RP REG+40 RP REG+42
3077
3078  004566  044650                    EM41
3079  004570  046612                    DH42
3080  004572  047406                    DT43
```

```
3081  004574  047654                          DF43
3082
3083                                  ;*  ERROR ITEM 44
3084                                  ;*    RH11/RP04/5/6 ERROR (MESSAGE)
3085                                  ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
3086                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV  CYL DS  TRK DS    SEC DS
3087                                  ;*        RPCS1     RPCS2     RPDS1     RPCC    RPCA     RPDA
3088                                  ;*        RP REG    RP REG+10 RP REG+12 RP REG+36 RP REG+34 RP REG+06
3089                                  ;*      RPER1       RPER2       RPER3
3090                                  ;*      RP REG+14   RP REG+40   RP REG+42
3091                                  ;*      CYLNDR, TRACK, AND SECTOR ARE DECIMAL
3092
3093  004576  044650                          EM41
3094  004600  045772                          DH12
3095  004602  047432                          DT44
3096  004604  047664                          DF44
3097
3098                                  ;*  ERROR ITEM 45
3099                                  ;*    RH11/RP04/5/6 ERROR (MESSAGE)
3100                                  ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
3101                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV  CYL DS  TRK DS    SEC DS
3102                                  ;*        RPCS1     RPCS2     RPDS1     RPCC      RPCA      RPDA
3103                                  ;*        RP REG    RP REG+10 RP REG+12 RP REG+36 RP REG+34 RP REG+06
3104                                  ;*      RPER1       RPER2       RPER3       RPWC      RPBA     RPDB
3105                                  ;*      RP REG+14   RP REG+40   RP REG+42   RP REG+2   RP REG+4 RP REG+22
3106                                  ;*      CYLNDR, TRACK, AND SECTOR ARE DECIMAL
3107
3108  004606  044650                          EM41
3109  004610  045772                          DH12
3110  004612  047472                          DT45
3111  004614  047700                          DF45
3112
3113                                  ;*  ERROR ITEM 46
3114                                  ;*    FATAL WRITE CHECK ERROR (MESSAGE)
3115                                  ;*    TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK     SECTOR
3116                                  ;*    $TMP0   $ERRPC  $REG0   CHKDRV  CYL DS  TRK DS    SEC DS
3117                                  ;*        RPCS1     RPCS2     RPDS1     RPCC      RPCA      RPDA
3118                                  ;*        RP REG    RP REG+10 RP REG+12 RP REG+36 RP REG+34 RP REG+06
3119                                  ;*      RPER1       RPER2       RPER3       RPWC      RPBA     RPDB
3120                                  ;*      RP REG+14   RP REG+40   RP REG+42   RP REG+2   RP REG+4 RP REG+22
3121                                  ;*      CYLNDR, TRACK, AND SECTOR ARE DECIMAL
3122
3123  004616  044674                          EM46
3124  004620  045772                          DH12
3125  004622  047472                          DT45
3126  004624  047700                          DF45
3127
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3128
3129                                    SBTTL  START OF PROGRAM
3130
3131
3132  004626  012737  177777  001226  START3  MOV     #-1,@#BUSADR    ;GET BUSADR FLAG
3133  004634  000402                          BR      STRT1A
3134  004636  005037  001226          START1  CLR     @#BUSADR        ;CLR BUSADR FLAG
3135  004642  005037  001224          STRT1A  CLR     @#CNTRLC        ;NO CONTROL "C"
3136  004646  000411                          BR      START
3137  004650  012737  177777  001226  START4  MOV     #-1,@#BUSADR    ;SET BUSADR FLAG
3138  004656  000402                          BR      STRT2A
3139  004660  005037  001226          START2  CLR     @#BUSADR        ;CLR BUSADR FLAG
3140  004664  012737  177777  001224  STRT2A  MOV     #-1,@#CNTRLC    ;SET CONTROL "C" FLAG
3141  004672  000005                  START   RESET
3142                                    SBTTL  INITIALIZE THE COMMON TAGS
3143                                  ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
3144  004674  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
3145  004700  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
3146  004702  022706  001140                  CMP     #SWR,R6 ;;DONE?
3147  004706  001374                          BNE     -6              ;;LOOP BACK IF NO
3148  004710  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
3149                                  ;;INITIALIZE A FEW VECTORS
3150  004714  012737  022610  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
3151  004722  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
3152  004730  012737  017636  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
3153  004736  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
3154  004744  012737  023136  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
3155  004752  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
3156  004760  012737  176543  023610          MOV     #176543,$HINUM  ;;PRIME THE RANDOM NUMBER GENERATOR
3157  004766  012737  123456  023612          MOV     #123456,$LONUM  ;;BOTH HIGH AND LOW WORDS
3158  004774  005037  001204                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
3159  005000  005037  001206                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
3160  005004  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
3161  005012  012737  005012  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
3162  005020  012737  005020  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
3163                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER  IF NOT FOUND OR IT IS
3164                                  ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER
3165  005026  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
3166  005032  012737  005066  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
3167  005040  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
3168  005046  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
3169  005054  022777  177777  174056          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
3170  005062  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
3171                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
3172  005064  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
3173  005066  012716  005074          64$     MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
3174  005072  000002                          RTI
3175  005074  012737  000176  001140  65$     MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
3176  005102  012737  000174  001142          MOV     #DISPREG,DISPLAY
3177  005110  012637  000004          66$     MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
3178
3179  005114  012700  001160                  MOV     #$REGAD,R0      ;FIRST ADDRESS
3180  005120  005020                  1$      CLR     (R0)+           ;CLEAR VARIABLE STORAGE
3181  005122  022700  001210                  CMP     #$BELL,R0       ;DONE?
3182  005126  001374                          BNE     1$              ;NO--BRANCH
3183  005130  013737  001414  001150          MOV     @#TPS,@#$TPS    ;SETUP THE STATUS AND BUFFER REG S
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3184  005136  013737  001416  001152          MOV     @#TPB,@#$TPB    ;FOR THE TYPE ROUTINE
3185  005144  005227  177777                  INC     #-1             ;FIRST START ?
3186  005150  001032                          BNE     3$              ;BR IF NOT
3187  005152  023737  000042  000046          CMP     @#42,@#46       ;ACT11 AUTOMATIC MODE?
3188  005160  001002                          BNE     4$              ;YES, SKIP TITLE PRINTOUT
3189  005162  104401  047714                  TYPE    ,TITLE          ;TYPE THE PROGRAM'S TITLE
3190  005166  005737  000042          4$      TST     42              ;AUTO ACCEPT OR CHAIN MODE ?
3191  005172  001006                          BNE     2$              ;BR IF EITHER
3192  005174  122737  000011  000041          CMPB    #11,41          ;LOADED FROM AN RP04/5/6 ?
3193  005202  001002                          BNE     2$              ;BR IF NOT
3194  005204  104401  050000                  TYPE    ,LOADRV         ;INSTRUCT THE OPERATOR TO REMOVE THE PACK
3195                                                                  ;ON DRIVE 0 IF DRIVE 0 IS TO BE TESTED
3196  005210  105737  000041          2$      TSTB    @#41            ;LOADED FROM PAPER TAPE ?
3197  005214  001410                          BEQ     3$              ;BR IF NOT
3198  005216  004737  050274                  JSR     PC,$SIZE        ;SIZE THE MEMORY
3199  005222  023727  050370  100000          CMP     $LSTAD,#100000  ;16K OR MORE ON THE SYSTEM ?
3200  005230  103002                          BHIS    3$              ;BR IF YES
3201  005232  104401  050176                  TYPE    ,NOLOAD         ;INFORM THE OPERATOR THAT THE 'XXDP' LOADER
3202                                                                  ;WILL BE OVERWRITTEN
3203  005236  004737  021346          3$      JSR     PC,$TKINT       ;TURN ON THE TTY KEYBOARD INTERRUPT
3204                                   SBTTL   GET VALUE FOR SOFTWARE SWITCH REGISTER
3205  005242  005737  000042                  TST     @#42            ;,ARE WE RUNNING UNDER XXDP/ACT?
3206  005246  001006                          BNE     67$             ;,BRANCH IF YES
3207  005250  023727  001140  000176          CMP     SWR,#SWREG      ;,SOFTWARE SWITCH REG SELECTED?
3208  005256  001005                          BNE     68$             ;,BRANCH IF NO
3209  005260  104406                          GTSWR                   ;,GET SOFT-SWR SETTINGS
3210  005262  000403                          BR      68$
3211  005264  112737  000001  001134  67$     MOVB    #1,$AUTOB       ;,SET AUTO-MODE INDICATOR
3212  005272                          68$
3213  005272  005227  177777                  INC     #-1             ;SEE IF FIRST START
3214  005276  0010?2                          BNE     SRTINT          ;BR IF NOT
3215  006300  004737  050372                  JSR     PC,GETADR       ;GET OR CHECK THE RH11 ADDRESS
3216  005304  104401  001215          SRTINT  TYPE    ,$CRLF          ;CR-LF
3217  005310  004737  024034                  JSR     PC,@#LP AVL     ;CHECK FOR A LINE PRINTER
3218  005314  005037  177776                  CLR     @#PS            ;ENSURE THE PRIORITY = 0
3219  005320  012737  000001  001104          MOV     #1,$ICNT        ;SET ITERATION COUNT TO 1
3220  005326  004737  031426                  JSR     PC,@#GETSWR     ;GO CHECK FOR CONTROL SWITCHES
3221  005332  004737  024076                  JSR     PC,@#ST CLK     ;INITIALIZE THE CLOCK
3222  005336  004737  034534          SETVEC  JSR     PC,RPINIT       ;CHECK THE DRIVE STATUS
3223  005342  012737  177777  034456          MOV     #-1,SAVEFG      ;SET THE SAVE REGISTERS FLAG
3224  005350  062727  177777  000000          ADD     #-1,#0          ;FIRST START ?
3225  005356  103003                          BCC     11$             ;BR IF YES
3226  005360  005737  001224                  TST     CNTRLC          ;CONTROL 'C' SWITCH SET ?
3227  005364  001102                          BNE     SRTDRV          ;CONTINUE IF YES
3228  005366  012737  000340  177776  11$     MOV     #PR7,PS         ;SET PRIORITY TO 7
3229  005374  005004                          CLR     R4              ;DRIVE TABLE POINTER
3230  005376  104401  001215                  TYPE    ,$CRLF          ;CR-LF
3231  005402  104401  043102                  TYPE    ,SYSTAT         ;TYPE STATUS HEADING
3232  005406                          1$
3233  005406  010446                          MOV     R4,-(SP)        ;,SAVE R4 FOR TYPEOUT
3234                                                                  ;,TYPE DRIVE NUMBER
3235  005410  104403                          TYPOS                   ;,GO TYPE--OCTAL ASCII
3236  005412     002                           BYTE    2               ;,TYPE 2 DIGIT(S)
3237  005413     000                           BYTE    0               ;,SUPPRESS LEADING ZEROS
3238  005414  104401  044042                  TYPE    ,MSG SP         ;SPACES
3239  005420  104401  044042                  TYPE    ,MSG SP         ;SPACES
```

```
3240  005424  105764  034370                  TSTB    DRVSTA(R4)          ,CHECK DRIVE'S STATUS
3241  005430  100416                          BMI     4$                  ,BR IF UNSAFE
3242  005432  001020                          BNE     5$                  ,BR IF ONLINE
3243  005434  105764  034400                  TSTB    DRVTYP(R4)          ,SEE IF OFFLINE OR NONEXISTENT
3244  005440  001404                          BEQ     2$                  ,BR IF NONEXISTENT
3245  005442  100006                          BPL     3$                  ,BR IF OFFLINE
3246  005444  104401  043176                  TYPE    ,NOTRP              ,DRIVE NOT AN RP04/5/6
3247  005450  000440                          BR      9$                  ,CHECK NEXT DRIVE
3248  005452  104401  043151          2$      TYPE    ,NOTPRS             ,DRIVE NOT PRESENT
3249  005456  000435                          BR      9$                  ,CHECK NEXT DRIVE
3250  005460  104401  043130          3$      TYPE    ,UNTOFF             ,DRIVE OFFLINE
3251  005464  000405                          BR      6$                  ,PRINT DRIVE TYPE
3252  005466  104401  043166          4$      TYPE    ,NOTSAF             ,DRIVE UNSAFE
3253  005472  000402                          BR      6$                  ,PRINT DRIVE TYPE
3254  005474  104401  043141          5$      TYPE    ,UNTON              ,DRIVE ONLINE
3255  005500  104401  044042          6$      TYPE    ,MSG SP             ,SPACES
3256  005504  012737  043214  005550          MOV     #RP04B,8$           ,ADDRESS OF RP04 MESSAGE
3257  005512  132764  000001  034400          BITB    #BIT00,DRVTYP(R4)   ,RP04 ?
3258  005520  001012                          BNE     7$                  ,BR IF YES
3259  005522  012737  043221  005550          MOV     #RP05,8$            ,ADDRESS OF RP05 MESSAGE
3260  005530  132764  000002  034400          BITB    #BIT01,DRVTYP(R4)   ,RP05 ?
3261  005536  001003                          BNE     7$                  ,BR IF YES
3262  005540  012737  043226  005550          MOV     #RP06,8$            ,ADDRESS OF RP06 MESSAGE
3263  005546  104401                  7$      TYPE                        ,TYPE THE DRIVE TYPE MESSAGE
3264  005550  000000                  8$      .WORD   0                   ,MESSAGE ADDRESS HERE
3265  005552  104401  001215          9$      TYPE    ,$CRLF              ,CR-LF
3266  005556  005204                          INC     R4                  ,INCREMENT DRIVE NUMBER/TABLE POINTER
3267  005560  020427  000010                  CMP     R4,#8               ,FINISHED ?
3268  005564  001310                          BNE     1$                  ,BR IF NOT
3269  005566  005037  177776                  CLR     PS                  ,SET PRIORITY BACK TO '0'
3270  005572  005737  001224          SRTDRV  TST     @#CNTRLC            ,CONTROL "C" START/RESTART?
3271  005576  001417                          BEQ     1$                  ,NO--BRANCH
3272  005600  013746  001222                  MOV     SAVCSW,-(SP)        ,GET THE PREVIOUS 'C SWR' CONTENTS
3273  005604  063716  001220                  ADD     C SWR,(SP)          ,SET UP TO SEE IF 'BIT00' IS DIFFERENT
3274  005610  032726  000001                  BIT     #BIT00,(SP)+        ,IS 'BIT00  DIFFERENT ?
3275  005614  001405                          BEQ     9$                  ,BR IF NOT
3276  005616  013737  001220  001222          MOV     C SWR,SAVCSW        ,STORE PRESENT 'C SWR' VALUE
3277  005624  004737  024354                  JSR     PC,LODFLT           ,RESET PARAMETERS TO THEIR DEFAULT VALUES
3278  005630  004737  031656          9$      JSR     PC,@#GT PRM         ,GET PARAMETERS
3279  005634  000420                          BR      4$
3280  005636  004737  024354          1$      JSR     PC,LODFLT           ,SETUP DEFAULT PARAMETERS
3281  005642  005037  001232                  CLR     DRVSEL              ,NO DRIVES SELECTED
3282  005646  005000                          CLR     R0                  ,DETERMINE THE DRIVES THAT
3283  005650  012701  000001                  MOV     #1,R1               ,ARE AVAILABLE FOR TESTING
3284  005654  105760  034370          2$      TSTB    DRVSTA(R0)
3285  005660  003403                          BLE     3$
3286  005662  156037  034504  001232          BISB    ATABIT(R0),@#DRVSEL
3287  005670  005200                  3$      INC     R0
3288  005672  106301                          ASLB    R1
3289  005674  001367                          BNE     2$
3290  005676  005037  034460          4$      CLR     @#SEEKFG            ,CLEAR SEEK FLAG
3291  005702  032737  000400  001220          BIT     #SW08,@#C SWR       ,DO SEEK BEFORE DATA TRANSFER?
3292  005710  001002                          BNE     5$                  ,YES--BRANCH
3293  005712  005137  034460                  COM     @#SEEKFG            ,NO
3294  005716  122737  000011  000041  5$      CMPB    #11,41  ,LOADED FROM AN RP04/5/6 ?
3295  005724  001003                          BNE     10$                 ,BR IF NOT
```

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3296  005726  042737  000001  001232          BIC     #BIT00,DRVSEL   ;CLEAR THE DRIVE 0 SELECTION BIT
3297  005734  104401  043233          10$     TYPE    ,DRIVES         ;'DRIVES(S) TO BE TESTED'
3298  005740  005037  017550                  CLR     @#SENDCT        ;DETERMINE PASSES TO MAKE AND
3299  005744  005000                          CLR     R0              ;THE DRIVES TO BE TESTED
3300  005746  013701  001232                  MOV     @#DRVSEL,R1     ;ANY DRIVES SELECTED?
3301  005752  001004                          BNE     6$              ;YES--BRANCH
3302  005754  104401  043264                  TYPE    ,NONE           ;'NONE'
3303
3304  005760  000137  017366                  JMP     @#SEOP          ;GO TO END OF PROGRAM
3305  005764  006201                  6$      ASR     R1              ;REPORT THE DRIVES TO BE TESTED
3306  005766  103011                          BCC     7$
3307  005770  005237  017550                  INC     @#SENDCT        ;GIVE THIS DRIVE A PASS
3308  005774  010046                          MOV     R0,-(SP)        ;;SAVE R0 FOR TYPEOUT
3309  005776  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
3310  006000     001                           BYTE    1               ;;TYPE 1 DIGIT(S)
3311  006001     000                           BYTE    0               ;;SUPPRESS LEADING ZEROS
3312  006002  005701                          TST     R1              ;MORE DRIVES?
3313  006004  001404                          BEQ     8$              ;NO--BRANCH
3314  006006  104401  043271                  TYPE    ,COMMA          ;','
3315  006012  005200                  7$      INC     R0              ;FORM DRIVE NUMBER
3316  006014  000763                          BR      6$
3317  006016  013737  017550  017542  8$      MOV     @#SENDCT,@#SEOPCT
3318  006024  005737  001244                  TST     @#CLKSTA        ;KW11-P AVAILABLE
3319  006030  003006                          BGT     RSTRT1          ;YES--BRANCH
3320  006032  032737  036000  001234          BIT     #36000,@#TSTNMS ;NO--ANY TIMING TESTS TO BE PERFORMED?
3321  006040  001402                          BEQ     RSTRT1          ;NO--BRANCH
3322  006042  104401  043273                  TYPE    ,NOCLOK         ;'NO KW11-P CLOCK, TIMING TESTS WILL NOT BE PERFORMED
3323  006046  005737  001232          RSTRT1  TST     DRVSEL          ;ANY DRIVES SELECTED ?
3324  006052  001002                          BNE     1$              ;BR IF YES
3325  006054  000137  004660                  JMP     START2          ;GET DRIVE SELECTION ENTRY
3326  006060  005037  001254          1$      CLR     CHKDRV          ;INIT  THE CHECK DRIVE KEY
3327  006064  012737  000001  001256          MOV     #1,DRVMSK       ;START TO CHECK DESIRED DRIVES
3328  006072  033737  001256  001232  RSTRT2  BIT     DRVMSK,DRVSEL   ;IS THIS DRIVE SELECTED?
3329  006100  001010                          BNE     DRVOK           ;YES--GO CHECK IF DRIVE IS READY FOR TESTING
3330  006102  012706  001100          RESTART MOV     #STACK,SP       ;SETUP THE STACK POINTER
3331  006106  005237  001254                  INC     CHKDRV          ;MOVE  TO NEXT DRIVE NUMBER
3332  006112  106337  001256                  ASLB    DRVMSK          ;POSITION THE MASK
3333  006116  103753                          BCS     RSTRT1          ;BRANCH IF THE DRIVE NUMBER NEEDS INITIALIZED
3334  006120  000764                          BR      RSTRT2
3335
3336  006122  013702  001254          DRVOK   MOV     CHKDRV,R2       ;PICKUP THE DRIVE NUMBER
3337  006126  105762  034370                  TSTB    DRVSTA(R2)      ;IS DESIRED DRIVE ON-LINE?
3338  006132  003005                          BGT     1$              ;YES, BRANCH
3339  006134  104011                          ERROR   11              ;DRIVE SELECTED IS NOT ONLINE
3340  006136  043737  001256  001232          BIC     DRVMSK,DRVSEL   ;CLEAR DRIVE'S SELECTION BIT
3341  006144  000756                          BR      RESTART         ;RETURN
3342  006146  010237  004104          1$      MOV     R2,@#DPB.A      ;SET THE DRIVE NUMBER INTO THE DPB'S
3343  006152  010237  004124                  MOV     R2,@#DPB.B
3344  006156  010237  004144                  MOV     R2,@#DPB.C
3345  006162  010237  004164                  MOV     R2,@#DTADPB
3346  006166  004737  024770                  JSR     PC,@#LDCMD      ;LOAD COMMAND INTO DPB B AND DPB C
3347  006172  012737  017366  001252          MOV     #SEOP,@#BYPASS  ;IF ERROR GO TO END OF PROGRAM
3348  006200  112737  000020  004105          MOVB    #FMT22/256 ,DPB A+1  ;ASSUME 16 BIT FORMAT
3349  006206  032737  000001  001220          BIT     #BIT00,C.SWR    ;16 BIT FORMAT REQUESTED ?
3350  006214  001402                          BEQ     2$              ;BR IF YES
3351  006216  105037  004105                  CLRB    DPB A+1         ;CLEAR THE 'FMT22' BIT
```

```
3352  006222  112737  000143  004106  2$      MOVB    #SETFORM,@DPB A+2  ,SET THE FORMAT BIT PER DPB A+1
3353  006230  004037  025034                  JSR     R0,@#CALL A        ,GO EXECUTE THE COMMAND
3354  006234  112737  000107  004106          MOVB    #RECAL,@#DPB A+2           ,RECAL=COMMAND
3355  006242  004037  025034                  JSR     R0,@#CALL A        ,GO EXECUTE THE COMMAND
3356  006246  104401  043361                  TYPE    ,TESTNG            ,'TESTING DRIVE '
3357  006252  010246                          MOV     R2,-(SP)           ,,SAVE R2 FOR TYPEOUT
3358  006254  104403                          TYPOS                      ,,GO TYPE--OCTAL ASCII
3359  006256     001                           BYTE    1                 ,,TYPE 1 DIGIT(S)
3360  006257     000                           BYTE    0                 ,,SUPPRESS LEADING ZEROS
3361  006260  104401  044042                  TYPE    ,MSG SP            ,TYPE SPACES
3362  006264  104401  043403                  TYPE    ,SERIAL            ,'SERIAL NUMBER '
3363  006270  012700  000004                  MOV     #4,R0              ,FOUR DIGITS TO TYPE
3364  006274  013701  004234                  MOV     @#REG+30,R1        ,SERIAL NUMBER
3365  006300  005002                  3$      CLR     R2                 ,ZERO
3366  006302  006101                          ROL     R1                 ,PUT THE NEXT DIGIT
3367  006304  006102                          ROL     R2                 ,INTO R2
3368  006306  006101                          ROL     R1
3369  006310  006102                          ROL     R2
3370  006312  006101                          ROL     R1
3371  006314  006102                          ROL     R2
3372  006316  006101                          ROL     R1
3373  006320  006102                          ROL     R2
3374  006322  062702  000060                  ADD     #'0,R2             ,MAKE IT ASCII
3375  006326  010227                          MOV     R2,(PC)+           ,SAVE IT
3376  006330  000000                  4$      WORD    0
3377  006332  104401  006330                  TYPE    ,4$                ,TYPE
3378  006336  005300                          DEC     R0                 ,ALL DIGITS TYPED?
3379  006340  003357                          BGT     3$                 ,NO -- BRANCH
3380  006342  104401  001215                  TYPE    ,$CRLF
3381  006346  113737  001364  001115          MOVB    ERR CT,$ERMAX      ,SETUP MAX ERROR COUNT
```

```
                                SBTTL  #### TESTS ####

        ,/*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*
        ,/*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*
        ,/*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*

        ,*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

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

                                SBTTL  *** SEEK TESTS ***

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

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

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

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

```
3438
3439                                    ;*      THIS TEST WILL CAUSE THE DRIVE TO EXECUTE A RECALIBRATE
3440                                    ;*      COMMAND CYCLE AND THEN SEEK FORWARD TO CYLINDER "LC" AT
3441                                    ;*      THE COMPLETION OF BOTH COMMANDS STATUS INDICATIONS ARE
3442                                    ;*      CHECKED TO ENSURE NO ERRORS OCCURRED.
3443
3444                                    ;;*************************************************************
3445  006354                            TST0:
3446  006354  000240                           NOP
3447  006356  033737  001424  001234           BIT     @#BITS+(0*2),TSTNMS ;DO THIS TEST?
3448  006364  001002                           BNE     64$                 ;YES--BRANCH
3449  006366  000137  006516                   JMP     TST1                ;NO--GO TO THE NEXT TEST
3450  006372  012737  000000  001102  64$:     MOV     #0,@#STSTNM         ;SET UP TEST NUMBER AND
3451                                                                        ;CLEAR THE ERROR FLAG (SERFLG)
3452  006400  004737  024612                   JSR     PC,LOOPRM           ;LOAD THE PARMETERS FOR THE TEST
3453  006404  012737  006500  001110           MOV     #TEST0,@#SLPERR     ;SETUP THE LOOP ON ERROR ADDRESS
3454  006412  013777  001102  172522           MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3455  006420  013737  001506  001204           MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
3456  006426  112737  000031  001115           MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
3457  006434  112737  000107  004106           MOVB    #RECAL,@#DPB.A+2            ;RECAL=COMMAND
3458  006442  113737  001524  004134           MOVB    @#FS,@#DPB.B+10     ;FS
3459  006450  113737  001516  004135           MOVB    @#FT,@#DPB.B+11     ;FT
3460  006456  013737  001512  004136           MOV     @#LC,@#DPB.B+12     ;LC
3461  006464  012737  006514  001252           MOV     #EXIT0,@#BYPASS     ;GO TO EXIT0 ON ERROR
3462  006472  012737  006500  001106           MOV     #TEST0,$LPADR       ;SETUP LOOP ADDRESS
3463  006500  012706  001100          TEST0:   MOV     #STACK,SP           ;SET UP STACK POINTER
3464  006504  004037  025034                   JSR     R0,@#CALL.A         ;GO EXECUTE THE COMMAND
3465  006510  004037  025146                   JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
3466  006514  000004                   EXIT0:  SCOPE                       ;LOOP
3467
3468                                    ;;*************************************************************
3469                                    ;*TEST 1        SEEK/SEEK TEST
3470
3471                                    ;*      THIS TEST WILL CAUSE THE DRIVE TO EXECUTE A FORWARD SEEK
3472                                    ;*      CYCLE TO "LC", "LT", "LS" FOLLOWED BY A REVERSE SEEK CYCLE TO
3473                                    ;*      "FC", "FT", "FS".  AT THE COMPLETION OF EACH SEEK, THE PROPER
3474                                    ;*      INDICATORS ARE EXAMINED TO ENSURE PROPER OPERATION
3475                                    ;*      "LC" WILL DEFAULT TO 128 AND "FC", "FT", "LT", "FS", AND "LS"
3476                                    ;*      WILL DEFAULT TO 0
3477
3478                                    ;;*************************************************************
3479  006516                            TST1:
3480  006516  000240                           NOP
3481  006520  033737  001426  001234           BIT     @#BITS+(1*2),TSTNMS ;DO THIS TEST?
3482  006526  001002                           BNE     64$                 ;YES--BRANCH
3483  006530  000137  006674                   JMP     TST2                ;NO--GO TO THE NEXT TEST
3484  006534  012737  000001  001102  64$:     MOV     #1,@#STSTNM         ;SET UP TEST NUMBER AND
3485                                                                        ;CLEAR THE ERROR FLAG (SERFLG)
3486  006542  004737  024612                   JSR     PC,LOOPRM           ;LOAD THE PARMETERS FOR THE TEST
3487  006546  012737  006556  001110           MOV     #TEST1,@#SLPERR     ;SETUP THE LOOP ON ERROR ADDRESS
3488  006554  013777  001102  172360           MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3489  006562  013737  001506  001204           MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
3490  006570  112737  000031  001115           MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
3491  006576  113737  001524  004134           MOVB    @#FS,@#DPB.B+10     ;FS
3492  006604  113737  001526  004154           MOVB    @#LS,@#DPB.C+10     ;LS
3493  006612  113737  001516  004135           MOVB    @#FT,@#DPB.B+11     ;FT
```

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3494  006620  113737  001520  004155          MOVB    @#LT,@#DPB C+11 ,LT
3495  006626  013737  001510  004136          MOV     @#FC,@#DPB B+12 ,FC
3496  006634  013737  001512  004156          MOV     @#LC,@#DPB C+12 ;LC
3497  006642  012737  006672  001252          MOV     #EXIT1,@#BYPASS ;GO TO EXIT1 ON ERROR
3498  006650  012737  006656  001106          MOV     #TEST1,$LPADR   ;SETUP LOOP ADDRESS
3499  006656  012706  001100          TEST1:  MOV     #STACK,SP       ;SET THE STACK POINTER
3500  006662  004037  025336                  JSR     R0,@#CALL.C     ;GO EXECUTE THE COMMAND
3501  006666  004037  025146                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
3502  006672  000004                  EXIT1:  SCOPE                   ;LOOP
3503
3504                                  ;;**********************************************************************
3505                                  ;*TEST 2         INCREMENT/SEEK TEST
3506
3507                                  ;*      THIS TEST WILL COMMAND FORWARD SEEK CYCLES TO ADVANCE THE
3508                                  ;*      CYLINDER ADDRESS FROM "FC" TO "LC" BY THE INCREMENT "IC"
3509                                  ;*      WHEN THE RESULTANT CYLINDER ADDRESS (NC) EXCEEDS
3510                                  ;*      "LC" REVERSE SEEK CYCLES ARE INITIATED, STARTING
3511                                  ;*      AT THE LAST LEGAL "NC" AND DECREMENTING BY "IC"
3512                                  ;*      UNTIL "NC" IS LESS THAN "FC". AT THE COMPLETION OF EACH
3513                                  ;*      SEEK COMMAND THE PROPER INDICATORS ARE EXAMINED TO
3514                                  ;*      ENSURE PROPER OPERATION.
3515
3516                                  ;;**********************************************************************
3517  006674                          TST2.
3518  006674  000240                          NOP
3519  006676  033737  001430  001234          BIT     @#BITS+(2*2),TSTNMS ;DO THIS TEST?
3520  006704  001002                          BNE     64$             ,YES--BRANCH
3521  006706  000137  007112                  JMP     TST3            ,NO--GO TO THE NEXT TEST
3522  006712  012737  000002  001102  64$     MOV     #2,@#$TSTNM     ,SET UP TEST NUMBER AND
3523                                                                  ;CLEAR THE ERROR FLAG ($ERFLG)
3524  006720  004737  024612                  JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
3525  006724  012737  007004  001110          MOV     #TEST2,@#$LPERR  ,SETUP THE LOOP ON ERROR ADDRESS
3526  006732  013777  001102  172202          MOV     $TSTNM,@DISPLAY  ,LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3527  006740  013737  001506  001204          MOV     @#RPT,$TIMES    ,GET THE ITERATION COUNT
3528  006746  112737  000031  001115          MOVB    #25.,$ERMAX     ,MAX ERRORS ALLOWED FOR TEST
3529  006754  012737  006762  001106          MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
3530  006762  113737  001524  004134  1$      MOVB    @#FS,@#DPB B+10 ,FS
3531  006770  113737  001516  004135          MOVB    @#FT,@#DPB B+11 ,FT
3532  006776  012737  007110  001252          MOV     #EXIT2,@#BYPASS ,GO TO EXIT2 ON ERROR
3533  007004  013737  001510  004136  TEST2   MOV     @#FC,@#DPB.B+12 ,FC
3534  007012  012737  007012  001110          MOV     #.,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
3535  007020  012706  001100                  MOV     #STACK,SP       ,LOAD THE STACK POINTER
3536  007024                          INCSK
3537  007024  004037  025146                  JSR     R0,@#CALL B     ,GO EXECUTE THE COMMAND
3538  007030  063737  001514  004136          ADD     @#IC,@#DPB B+12 ,MOVE TO NEXT CYLINDER
3539  007036  023737  001512  004136          CMP     @#LC,@#DPB B+12 ,OUT OF CYLINDERS?
3540  007044  002367                          BGE     INCSK           ,NO--BRANCH
3541  007046  013737  001512  004136          MOV     @#LC,@#DPB B+12
3542  007054  012737  007054  001110          MOV     #.,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
3543  007062  012706  001100                  MOV     #STACK,SP       ,LOAD THE STACK POINTER
3544  007066                          DECSK.
3545  007066  004037  025146                  JSR     R0,@#CALL B     ,GO EXECUTE THE COMMAND
3546  007072  163737  001514  004136          SUB     @#IC,@#DPB B+12
3547  007100  023737  001510  004136          CMP     @#FC,@#DPB B+12
3548  007106  003767                          BLE     DECSK
3549  007110  000004                  EXIT2.  SCOPE                   ,LOOP
```

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                                             ;;*************************************************************
                                             ;*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 ENSURE PROPER
                                             ;*        OPERATION

                                             ;;*************************************************************
 007112                                      TST3:
 007112  000240                                      NOP
 007114  033737  001432  001234                      BIT     @#BITS+<3*2>,TSTNMS ;DO THIS TEST?
 007122  001002                                      BNE     64$                 ;YES--BRANCH
 007124  000137  007306                              JMP     TST4                ;NO--GO TO THE NEXT TEST
 007130  012737  000003  001102  64$:                MOV     #3,@#$TSTNM         ;SET UP TEST NUMBER AND
                                                                                 ;CLEAR THE ERROR FLAG ($ERFLG)
 007136  004737  024612                              JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
 007142  012737  007222  001110                      MOV     #TEST3,@#$LPERR     ;SETUP THE LOOP ON ERROR ADDRESS
 007150  013777  001102  171764                      MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 007156  013737  001506  001204                      MOV     @#RPT,$TIMES        ;GET THE ITERATION COUNT
 007164  112737  000031  001115                      MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
 007172  012737  007200  001106                      MOV     #1$,$LPADR          ;SETUP TEST LOOP ADDRESS
 007200  113737  001524  004134  1$:                 MOVB    @#FS,@#DPB.B+10     ;FS
 007206  113737  001516  004135                      MOVB    @#FT,@#DPB.B+11     ;FT
 007214  012737  007304  001252                      MOV     #EXIT3,@#BYPASS     ;GO TO BYPASS ON ERROR
 007222  013737  001510  004136  TEST3:              MOV     @#FC,@#DPB.B+12     ;FC
 007230  012737  007230  001110                      MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
 007236  012706  001100                              MOV     #STACK,SP           ;LOAD THE STACK POINTER
 007242  004037  025146                              JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
 007246  013701  001514                              MOV     IC,R1               ;CYLINDER 1
 007252  012737  007252  001110                      MOV     #.,$LPERR           ;SETUP THE ERROR LOOP ADDRESS
 007260  012706  001100                              MOV     #STACK,SP           ;LOAD THE STACK POINTER
 007264  010137  004136          1$:                 MOV     R1,@#DPB.B+12       ;DESIRED CYLINDER
 007270  004037  025146                              JSR     R0,@#CALL.B         ;GO EXECUTE THE COMMAND
 007274  006301                                      ASL     R1                  ;MOVE TO NEXT CYLINDER
 007276  020137  001512                              CMP     R1,@#LC             ;DONE?
 007302  003770                                      BLE     1$                  ;NO--LOOP
 007304  000004                  EXIT3:              SCOPE

                                             ;;*************************************************************
                                             ;*TEST 4          OSCILLATING SEEK TEST

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

                                             ;;*************************************************************
 007306                                      TST4:
 007306  000240                                      NOP
 007310  033737  001434  001234                      BIT     @#BITS+<4*2>,TSTNMS ;DO THIS TEST?
 007316  001002                                      BNE     64$                 ;YES--BRANCH
 007320  000137  007674                              JMP     TST5                ;NO--GO TO THE NEXT TEST
 007324  012737  000004  001102  64$:                MOV     #4,@#$TSTNM         ;SET UP TEST NUMBER AND
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3606                                                    ;CLEAR THE ERROR FLAG ($ERFLG)
3607  007332  004737  024612                  JSR     PC,LOOPRM       ;LOAD THE PARMETERS FOR THE TEST
3608  007336  012737  007432  001110          MOV     #TEST4,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
3609  007344  013777  001102  171570          MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3610  007352  013737  001506  001204          MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
3611  007360  112737  000031  001115          MOVB    #25.,$ERMAX     ,MAX ERRORS ALLOWED FOR TEST
3612  007366  012737  007374  001106          MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
3613  007374  113737  001524  004134  1$      MOVB    @#FS,@#DPB.B+10 ,FS
3614  007402  113737  001516  004135          MOVB    @#FT,@#DPB.B+11 ,FT
3615  007410  012737  007672  001252          MOV     #EXIT4,@#BYPASS ,GO TO EXIT4 ON ERROR
3616  007416  005002                          CLR     R2              ,CLEAR STALL SWITCH (NO STALL)
3617  007420  032737  010000  001220          BIT     #SW12,@#C.SWR   ,STALL REQUIRED?
3618  007426  001401                          BEQ     TEST4           ;NO--BRANCH
3619  007430  005102                          COM     R2              ,YES--SET SWITCH
3620  007432  013701  001510          TEST4   MOV     @#FC,R1         ,SET NC TO FC
3621  007436  005037  001336                  CLR     @#STALLO        ;START AT ZERO IF STALLS REQUIRED
3622  007442  012737  007442  001110          MOV     #.,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
3623  007450  012706  001100                  MOV     #STACK,SP       ,LOAD THE STACK POINTER
3624  007454  010137  004136          1$      MOV     R1,@#DPB.B+12   ,NC
3625  007460  004037  025146                  JSR     R0,@#CALL B     ,GO EXECUTE THE COMMAND
3626  007464  005702                          TST     R2              ,STALL?
3627  007466  001403                          BEQ     2$              ,NO--BRANCH
3628  007470  004037  026366                  JSR     R0,@#STALL      ,YES-GO TO STALL ROUTINE
3629  007474  001336                           WORD   STALLO          ,TIME POINTER
3630  007476  013737  001510  004136  2$      MOV     FC,@#DPB B+12   ;FC
3631  007504  004037  025146                  JSR     R0,@#CALL B     ,GO EXECUTE THE COMMAND
3632  007510  005702                          1ST     R2              ,STALL?
3633  007512  001413                          BEQ     3$              ,NO--BRANCH
3634  007514  004037  026366                  JSR     R0,@#STALL      ,YES--GO TO STALL ROUTINE
3635  007520  001336                           WORD   STALLO          ,TIME POINTER
3636  007522  005237  001336                  INC     @#STALLO        ;UPDATE THE TIME
3637  007526  023737  001362  001336          CMP     @#MXSTAL,@#STALLO ;TIME TO BIG?
3638  007534  003347                          BGT     1$              ,NO--BRANCH
3639  007536  005037  001336                  CLR     @#STALLO        ,YES--START OVER AT ZERO
3640  007542  063701  001514          3$      ADD     @#IC,R1         ,MOVE TO NEXT CYLINDER
3641  007546  020137  001512                  CMP     R1,@#LC         ,LAST CYLINDER COMPLETED?
3642  007552  003740                          BLE     1$              ,NO--BRANCH
3643  007554  013701  001512                  MOV     @#LC,R1         ,SET NC TO LC
3644  007560  012737  007560  001110          MOV     #.,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
3645  007566  012706  001100                  MOV     #STACK,SP       ,LOAD THE STACK POINTER
3646  007572  010137  004136          4$      MOV     R1,@#DPB B+12   ,NC
3647  007576  004037  025146                  JSR     R0,@#CALL B     ,GO EXECUTE THE COMMAND
3648  007602  005702                          TST     R2              ,STALL?
3649  007604  001403                          BEQ     5$              ,NO--BRANCH
3650  007606  004037  026366                  JSR     R0,@#STALL      ,YES--GO TO STALL ROUTINE
3651  007612  001336                           WORD   STALLO          ,TIME POINTER
3652  007614  013737  001512  004136  5$      MOV     @#LC,@#DPB B+12 ,LC
3653  007622  004037  025146                  JSR     R0,@#CALL B     ,GO EXECUTE THE COMMAND
3654  007626  005702                          TST     R2              ,STALL?
3655  007630  001413                          BEQ     6$              ,NO--BRANCH
3656  007632  004037  026366                  JSR     R0,@#STALL      ,YES--GO TO STALL ROUTINE
3657  007636  001336                          .WORD   STALLO          ,TIME POINTER
3658  007640  005237  001336                  INC     @#STALLO        ,UPDATE STALL TIME
3659  007644  023737  001362  001336          CMP     @#MXSTAL,@#STALLO ,TIME TOO BIG?
3660  007652  003347                          BGT     4$              ,NO--BRANCH
3661  007654  005037  001336                  CLR     @#STALLO        ,YES--SET STALL TIME BACK TO ZERO
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007660  163701  001514          6$      SUB     @#IC,R1         ;NEXT CYLINDER
007664  020137  001510                  CMP     R1,@#FC         ;DONE?
007670  002340                          BGE     4$              ;NO--BRANCH
007672  000004                  EXIT4   SCOPE                   ;LOOP

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

                                ;;*************************************************************
007674                          TST5
007674  000240                          NOP
007676  033737  001436  001234          BIT     @#BITS+<5*2>,TSTNMS ;DO THIS TEST?
007704  001002                          BNE     64$             ;YES--BRANCH
007706  000137  010074                  JMP     TST6            ;NO--GO TO THE NEXT TEST
007712  012737  000005  001102  64$     MOV     #5,@#$TSTNM     ;SET UP TEST NUMBER AND
                                                                ;CLEAR THE ERROR FLAG ($ERFLG)
007720  004737  024612                  JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
007724  012737  010004  001110          MOV     #TEST5,@#$LPERR ;SETUP THE LOOP ON ERROR ADDRESS
007732  013777  001102  171202          MOV     $TSTNM,@DISPLAY ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
007740  013737  001506  001204          MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
007746  112737  000031  001115          MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
007754  012737  007762  001106          MOV     #1$,$LPADR      ;SETUP LOOP ADDRESS
007762  113737  001524  004134  1$      MOVB    @#FS,@#DPB.B+10 ;FS
007770  113737  001516  004135          MOVB    @#FT,@#DPB.B+11 ;FT
007776  012737  010072  001252          MOV     #EXIT5,@#BYPASS ;GO TO EXIT5 ON ERROR
010004  013701  001510          TEST5   MOV     @#FC,R1         ;START NC1 AT FC
010010  013702  001512                  MOV     @#LC,R2         ;START NC2 AT LC
010014  012737  010014  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
010022  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
010026  010137  004136          1$      MOV     R1,@#DPB.B+12   ;NC1
010032  004037  025146                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
010036  010237  004136                  MOV     R2,@#DPB.B+12   ;NC2
010042  004037  025146                  JSR     R0,@#CALL.B     ;GO EXECUTE THE COMMAND
010046  063701  001514                  ADD     @#IC,R1         ;NEXT NC1
010052  163702  001514                  SUB     @#IC,R2         ;NEXT NC2
010056  020137  001512                  CMP     R1,@#LC         ;DONE?
010062  003003                          BGT     EXIT5           ;YES--BRANCH
010064  020237  001510                  CMP     R2,@#FC ;?
010070  002356                          BGE     1$              ;NO--BRANCH
010072  000004                  EXIT5   SCOPE                   ;LOOP

                                ;;*************************************************************
                                ;*TEST 6        SERVO ADDRESSING LOGIC NOISE GENERATOR

                                ;*      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 UNITL "LC" IS
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                                        ;*      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
                                        ;;**********************************************************************
010074                                  TST6
010074  000240                                NOP
010076  033737  001440  001234                BIT     @#BITS+(6*2),TSTNMS ,DO THIS TEST?
010104  001002                                BNE     64$                 ,YES--BRANCH
010106  000137  010340                        JMP     TST7                ,NO--GO TO THE NEXT TEST
010112  012737  000006  001102  64$           MOV     #6,@#$TSTNM         ,SET UP TEST NUMBER AND
                                                                          ,CLEAR THE ERROR FLAG ($ERFLG)
010120  004737  024612                        JSR     PC,LODPRM           ,LOAD THE PARMETERS FOR THE TEST
010124  012737  010204  001110                MOV     #TEST6,@#$LPERR     ,SETUP THE LOOP ON ERROR ADDRESS
010132  013777  001102  171002                MOV     $TSTNM,@DISPLAY     ,LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
010140  013737  001506  001204                MOV     @#RPT,$TIMES        ,GET THE ITERATION COUNT
010146  112737  000031  001115                MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
010154  012737  010162  001106                MOV     #1$,$LPADR          ,SETUP LOOP ADDRESS
010162  113737  001524  004134  1$            MOVB    @#FS,@#DPB+10       ,FS
010170  113737  001516  004135                MOVB    @#FT,@#DPB+11       ,FT
010176  012737  010336  001252                MOV     #EXIT6,@#BYPASS     ,GO TO EXIT6 ON ERROR
010204  013701  001510          TEST6         MOV     @#FC,R1             ,PICKUP "FC"
010210  013702  001512                        MOV     @#LC,R2             ,FORM LAST CYLINDER THAT
010214  162702  000005                        SUB     #5,R2               ,IS AVAILABLE FOR TESTING
010220  012737  010220  001110                MOV     #.,$LPERR           ,SETUP THE ERROR LOOP ADDRESS
010226  012706  001100                        MOV     #STACK,SP           ,LOAD THE STACK POINTER
010232  020102                  1$            CMP     R1,R2               ,LAST CYLINDER
010234  003040                                BGT     EXIT6               ,YES--BRANCH
010236  010137  004136                        MOV     R1,@#DPB+12         ,NC
010242  004037  025146                        JSR     R0,@#CALL+8         ,GO EXECUTE THE COMMAND
010246  062737  000004  004136                ADD     #4,@#DPB+12         ,NC+4
010254  004037  025146                        JSR     R0,@#CALL+8         ,GO EXECUTE THE COMMAND
010260  162737  000003  004136                SUB     #3,@#DPB+12         ,NC+1
010266  004037  025146                        JSR     R0,@#CALL+8         ,GO EXECUTE THE COMMAND
010272  062737  000002  004136                ADD     #2,@#DPB+12         ,NC+3
010300  004037  025146                        JSR     R0,@#CALL+8         ,GO EXECUTE THE COMMAND
010304  162737  000001  004136                SUB     #1,@#DPB+12         ,NC+2
010312  004037  025146                        JSR     R0,@#CALL+8         ,GO EXECUTE THE COMMAND
010316  062737  000003  004136                ADD     #3,@#DPB+12         ,NC+5
010324  004037  025146                        JSR     R0,@#CALL+8         ,GO EXECUTE THE COMMAND
010330  063701  001514                        ADD     @#IC,R1
010334  000736                                BR      1$
010336  000004                  EXIT6         SCOPE                       ,LOOP

                                        ;;**********************************************************************
                                        ;*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 PARAMTERS 'FT' AND 'LT'

                                        ;;**********************************************************************
010340                                  TST7
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3774  010340  000240                          NOP
3775  010342  033737  001442  001234          BIT     @#JITS+(7*2),TSTNMS ,DO THIS TEST?
3776  010350  001002                          BNE     6$                  ,YES--BRANCH
3777  010352  000137  010720                  JMP     TST10               ,NO--GO TO THE NEXT TEST
3778  010356  012737  000007  001102  64$     MOV     #7,@#$TSTNM         ,SET UP TEST NUMBER AND
3779                                                                      ,CLEAR THE ERROR FLAG (SERFLG)
3780  010364  004737  024612                  JSR     PC,LODPRM           ;LOAD THE PARMETERS FOR THE TEST
3781  010370  012737  010462  001110          MOV     #TEST7,@#$LPERR     ,SETUP THE LOOP ON ERROR ADDRESS
3782  010376  013777  001102  170536          MOV     $TSTNM,@DISPLAY     ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3783  010404  013737  001506  001204          MOV     @#RPT,$TIMES        ,GET THE ITERATION COUNT
3784  010412  112737  000031  001115          MOVB    #25.,$ERMAX         ;MAX ERRORS ALLOWED FOR TEST
3785  010420  113737  001516  004135          MOVB    FT,DPB B+11         ,LOAD STARTING TRACK ADDRESS
3786  010426  112737  000105  004106          MOVB    #SEEK,@#DPB A+2     ;SEEK=COMMAND
3787  010434  112737  000173  004126          MOVB    #READHD,DPB.B+2     ;READ HEADER & DATA COMMAND
3788  010442  013704  034516                  MOV     RPADR,R4            ;UNIBUS ADDRESS OF THE RH11
3789  010446  012737  010716  001252          MOV     #EXIT7,BYPASS       ,ERROR TERMINATION ADDRESS
3790  010454  012737  010462  001106          MOV     #TEST7,$LPADR       ,SETUP THE LOOP ON TEST ADDRESS
3791  010462  012706  001100          TEST7   MOV     #STACK,SP           ,SETUP THE STACK POINTER
3792  010466  013737  001510  004136          MOV     FC,DPB B+12         ,INITIAL CYLINDER ADDRESS
3793  010474  023737  001510  001512          CMP     FC,LC               ,CYLINDER LIMITS THE SAME ?
3794  010502  001422                          BEQ     1$                  ,BR IF THEY ARE
3795  010504  004737  023512                  JSR     PC,$RAND            ,CYCYLE THE RANDOM NUMBER GENERATOR
3796  010510  013746  023610                  MOV     $HINUM,-(SP)        ,USE THE HIGH RANDOM NUMBER
3797  010514  005046                          CLR     -(SP)               ,UPPER DIVIDEND
3798  010516  013746  001512                  MOV     LC,-(SP)            ,FORM THE DIVISOR
3799  010522  005216                          INC     (SP)                ,INCREMENT
3800  010524  163716  001510                  SUB     FC,(SP)             ,SUBTRACT THE LOWER LIMIT
3801  010530  004737  023614                  JSR     PC,$DIV             ,DIVIDE
3802  010534  062637  004136                  ADD     (SP)+,DPB B+12      ,ADD THE REMAINDER TO THE INITIAL CYLINDER
3803  010540  005726                          TST     (SP)+               ,DISCARD THE QUOTENT
3804  010542  013737  004136  004116          MOV     DPB B+12,DPB A+12   ,COPY NEW CYLINDER ADDRESS
3805  010550                          1$
3806  010550  012737  010550  001110          MOV     #.,$LPERR           ,SETUP THE ERROR LOOP ADDRESS
3807  010556  012706  001100                  MOV     #STACK,SP           ,LOAD THE STACK POINTER
3808  010562  004037  025034                  JSR     R0,@#CALL A         ,GO EXECUTE THE COMMAND
3809  010566  012737  010566  001110          MOV     #.,$LPERR           ,SETUP THE ERROR LOOP ADDRESS
3810  010574  012706  001100                  MOV     #STACK,SP           ,LOAD THE STACK POINTER
3811  010600  113764  004104  000010          MOVB    DPB A,RPCS2(R4)     ,SELECT THE DRIVE
3812  010606  016446  000020                  MOV     RPLA(R4),-(SP)      ,GET THE LOOK AHEAD REGISTER
3813  010612  006316                          ASL     (SP)                ,ALIGN THE SECTOR ADDRESS
3814  010614  006316                          ASL     (SP)                ,ALIGN THE SECTOR ADDRESS
3815  010616  000316                          SWAB    (SP)                ,PUT ADDRESS IN LOWER BYTE
3816  010620  105766  000001                  TSTB    1(SP)               ,IN THE 1ST 20% OF SECTOR ?
3817  010624  001401                          BEQ     2$                  ,BR IF YES
3818  010626  105216                          INCB    (SP)                ,INCREMENT THE SECTOR ADDRESS
3819  010630  105216                  2$      INCB    (SP)                ,INCREMENT THE SECTOR ADDRESS
3820  010632  112637  004174                  MOVB    (SP)+,DTADPB+10     ,LOAD THE DPB
3821  010636  013746  001630                  MOV     PRMLMT+22.,-(SP)    ,PUT LAST SECTOR ADDRESS ON THE STACK
3822  010642  005216                          INC     (SP)                ,INCREMENT IT
3823  010644  122637  004174                  CMPB    (SP)+,DTADPB+10     ,NEW SECTOR ADDRESS TOO LARGE ?
3824  010650  103007                          BHIS    4$                  ,BR IF NOT
3825  010652  103403                          BLO     3$                  ,BR IF ADDRESS IS 2 GREATER
3826  010654  105037  004174                  CLRB    DTADPB+10           ,RESET TO SECTOR ADDRESS 0
3827  010660  000403                          BR      4$                  ,CONTINUE
3828  010662  112737  000001  004174  3$      MOVB    #1,DTADPB+10        ,RESET ADDRESS TO SECTOR 1
3829  010670                          4$
```

```
3830  010670  004037  025146                  JSR     R0,@#CALL B     ;GO EXECUTE THE COMMAND
3831  010674  105237  004135                  INCB    DPB B+11        ;INCREMENT THE TRACK ADDRESS
3832  010700  123737  004135  001520          CMPB    DPB B+11,LT     ;MAXIMUM ?
3833  010706  101403                          BLOS    EXIT7           ;BR IF NOT
3834  010710  113737  001516  004135          MOVB    FT,DPB B+11     ;RELOAD STARTING TRACK ADDRESS
3835  010716  000004                  EXIT7   SCOPE                   ;LOOP ?
3836
3837
3838                                  ;*********************************************************************
3839                                  ;*TEST 10       SERVO SETTLE DOWN TEST
3840
3841                                  ;*      THIS TEST VERIFIES THAT THE SERVO HAS SETTLED DOWN AND THAT
3842                                  ;*      THE DRIVE IS ON CYLINDER WHEN THE DRIVE INDICATES SEEK COMPLETE
3843                                  ;*      RANDOM SEEKS ARE ISSUED BETWEEN CYLINDERS 'NC1' AND 'NC1+1C'
3844                                  ;*      ('NC1' STARTS AT VALUE 'FC').  AT THE COMPLETION OF 1000 (10) SEEKS,
3845                                  ;*      'NC1' IS INCREMENTED BY VALUE '1C' AND THE SEQUENCE IS REPEATED
3846                                  ;*      THE TEST IS COMPLETED WHEN 'NC1' HAS BEEN INCREMENTED BEYOND 'LC'
3847                                  ;*
3848                                  ;*      WHEN THE SEEK COMPLETES, THE PROGRAM READS THE DRIVE'S LOOK-AHEAD
3849                                  ;*      REGISTER (RPLA) TO DETERMINE THE ADDRESS OF THE SECTOR ROTATING INTO
3850                                  ;*      POSITION.  THE PROGRAM THEN ISSUES A WRITE HEADER AND DATA COMMAND
3851                                  ;*      FOR THAT SECTOR.  IF THE DRIVE'S POSITIONER HAS NOT SETTLED DOWN OR
3852                                  ;*      IF THE POSITIONER IS NOT ON CYLINDER (IF THE DRIVE IS AN RP04, THE
3853                                  ;*      OFF CYLINDER CONDITION MUST LAST FOR AT LEAST 800 US), THE DRIVE
3854                                  ;*      WILL REPORT A 'WRU' ERROR.  (RP05/6'S MAY ALSO REPORT 'NHS' ERROR UNDER
3855                                  ;*      ERRORS IN THIS TEST INDICATE THAT THE SERVO SYSTEM MAY NOT BE ADJUSTED
3856                                  ;*      CORRECTLY, THAT THE DRIVE IS MALFUNCTIONING, OR THAT A PACK WITH
3857                                  ;*      MARGINAL SERVO TRACKS IS MOUNTED ON THE DRIVE
3858                                  ;*
3859                                  ;*      THIS TEST USES THE EXTENTION BITS IN THE LOOK-AHEAD REGISTER TO DETERMINE
3860                                  ;*      WHETHER OR NOT IT CAN PICK UP THE SECTOR ROTATING INTO POSITION.  THE
3861                                  ;*      TEST IS OPTIMIZED SUCH THAT IF THE DRIVE SIGNALS SEEK DONE WITHIN
3862                                  ;*      THE FIRST 80% OF THE SECTOR CURRENTLY UNDER THE HEAD, THE TEST WILL
3863                                  ;*      TRY TO ADDRESS THE NEXT SECTOR.  BASED ON OBSERVATION, THE PROGRAM
3864                                  ;*      IS ABLE TO START THE OPERATION WITHOUT LOSING A REVOLUTION MOST OF
3865                                  ;*      THE TIME
3866                                  ;*
3867                                  ;*      THIS TEST IS VALID ONLY IF THE OPERATION IS STARTED WITHIN A FEW
3868                                  ;*      HUNDRED MICRO-SECONDS AFTER SEEK DONE OCCURS.  THE NECESSARY TIME
3869                                  ;*      TIME DEPENDENT PARAMETERS OCCUR FREQUENTLY ENOUGH WITHIN THE REQUIRED
3870                                  ;*      RANGE TO PERMIT THIS TEST TO BE EFFECTIVE
3871
3872                                  ;;*********************************************************************
3873  010720                          TST10
3874  010720  000240                          NOP
3875  010722  033737  001444  001234          BIT     @#BITS+<10*2>,TSTNMS ;DO THIS TEST?
3876  010730  001002                          BNE     64$             ;YES--BRANCH
3877  010732  000137  012024                  JMP     TST11           ;NO--GO TO THE NEXT TEST
3878  010736  012737  000010  001102  64$     MOV     #10,@#$TSTNM    ;SET UP TEST NUMBER AND
3879                                                                  ;CLEAR THE ERROR FLAG ($ERFLG)
3880  010744  004737  024612                  JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
3881  010750  012737  011126  001110          MOV     #TEST10,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
3882  010756  013777  001102  170156          MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
3883  010764  013737  001506  001204          MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
3884  010772  112737  000031  001115          MOVB    #25 ,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
3885  011000  012737  011006  001106          MOV     #1$,$LPADR      ;SETUP THE LOOP ADDRESS
```

```
 3886  011006                                  1$
 3887  011006  112737  000105  004106          MOVB    #SEEK,@#DPB A+2 ;SEEK=COMMAND
 3888  011014  112737  000161  004166          MOVB    #WRITE,DTADPB+2 ;COMMAND
 3889  011022  113737  001516  004175          MOVB    FT,DTADPB+11    ;TRACK ADDRESS FOR THE WRITE
 3890  011030  013737  001510  004116          MOV     FC,DPB A+12     ;CYLINDER ADDRESS FOR THE SEEK
 3891  011036  013737  001510  004176          MOV     FC,DTADPB+12    ;CYLINDER ADDRESS FOR THE WRITE
 3892  011044  013737  001510  001532          MOV     FC,NC1          ,STARTING CYLINDER
 3893  011052  013737  001514  001350          MOV     IC,DELTA        ,CYLINDER INCREMENT VALUE
 3894  011060  012737  176000  004170          MOV     #-(256.*2),DTADPB+4  ;WORD COUNT
 3895  011066  012737  047714  004172          MOV     #BUFFER,DTADPB+6  ,BUFFER ADDRESS
 3896  011074  005000                          CLR     R0              ;PATTERN POINTER (WC PATTERN)
 3897  011076  004737  030362                  JSR     PC,SETBUF       ,LOAD THE WRITE BUFFER
 3898  011102  005001                          CLR     R1              ,CLEAR REGISTER
 3899  011104  113701  004104                  MOVB    DPB A,R1        ,LOAD DRIVE ADDRESS
 3900  011110  013704  034516                  MOV     RPADR,R4        ,UNIBUS ADDRESS OF THE RH11
 3901  011114  004737  042520                  JSR     PC,CLRQUE       ,CLEAR THE OPERATION QUEUES
 3902  011120  012737  012022  001252          MOV     #EXIT10,BYPASS  ,ERROR EXIT FROM TEST
 3903  011126                                  TEST10
 3904  011126  012737  011126  001110          MOV     #.,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
 3905  011134  012706  001100                  MOV     #STACK,SP       ,LOAD THE STACK POINTER
 3906  011140  012737  000340  177776          MOV     #PR7,@#PS       ,SET PRIORITY TO 7
 3907  011146  005737  001244                  TST     CLKSTA          ,SEE WHICH CLOCK ON SYSTEM
 3908  011152  001415                          BEQ     3$              ,BR IF NO CLOCK
 3909  011154  100405                          BMI     1$              ,BR IF KW11-L CLOCK
 3910  011156  017746  170212                  MOV     @PKV,-(SP)      ,SAVE THE VECTOR
 3911  011162  013746  001374                  MOV     PKV,-(SP)       ,SAVE THE VECTOR ADDRESS
 3912  011166  000404                          BR      2$              ,CONTINUE
 3913  011170  017746  170212          1$      MOV     @LKV,-(SP)      ,SAVE THE 'L' CLOCK VECTOR
 3914  011174  013746  001406                  MOV     LKV,-(SP)       ,SAVE THE VECTOR ADDRESS
 3915  011200  012776  011756  000000  2$      MOV     #TST10B,@(SP)   ,CHANGE THE VECTOR
 3916  011206  012777  027054  023304  3$      MOV     #DORTI,@RPVEC   ;CHANGE THE RP04/RP05 VECTOR
 3917  011214  012737  000010  001344          MOV     #8.,SEKTMR      ,LOAD THE SEEK TIMER
 3918  011222  012764  000040  000010          MOV     #BIT05,RPCS2(R4)  ,INIT THE MASSBUS
 3919  011230  110164  000010                  MOVB    R1,RPCS2(R4)    ,RESELECT THE DRIVE
 3920  011234  013764  004116  000034          MOV     DPB A+12,RPCA(R4)  ,LOAD THE CYLINDER ADDRESS
 3921  011242  013737  004116  001270          MOV     DPB A+12,CYL DS ,CYLINDER ADDRESS FOR ERROR MESSAGE
 3922  011250  112764  000105  000000          MOVB    #SEEK,RPCS1(R4) ,START THE SEEK
 3923  011256  005037  177776                  CLR     @#PS            ,CLEAR THE PRIORITY
 3924  011262  105764  000012          4$      TSTB    RPDS1(R4)       ,HAS THE DRIVE FINISHED ?
 3925  011266  100402                          BMI     5$              ,BR IF IT HAS
 3926  011270  000001                          WAIT                    ,WAIT FOR THE OPERATION TO COMPLETE
 3927  011272  000773                          BR      4$              ,CONTINUE
 3928  011274  012737  000340  177776  5$      MOV     #PR7,@#PS       ,CHANGE PRIORITY TO MAX
 3929  011302  032764  040000  000012          BIT     #BIT14,RPDS1(R4)  ,ERROR ?
 3930  011310  001412                          BEQ     6$              ,BR IF NOT
 3931  011312  012702  004104                  MOV     #DPB A,R2       ,DPB POINTER
 3932  011316  004737  042036                  JSR     PC,SVRH11       ,SAVE THE REGISTERS
 3933  011322  104023                          ERROR   23              ,ERROR DURING SEEK
 3934  011324  012764  000040  000010          MOV     #BIT05,RPCS2(R4)  ,INIT THE MASSBUS
 3935  011332  110164  000010                  MOVB    R1,RPCS2(R4)    ;RESELECT THE DRIVE
 3936  011336  012777  037400  023154  6$      MOV     #ISR,@RPVEC     ,SETUP THE RP04/RP05 VECTOR
 3937  011344  005737  001244                  TST     CLKSTA          ,WHICH CLOCK
 3938  011350  001405                          BEQ     TST10A          ,BR IF NONE
 3939  011352  016676  000002  000000          MOV     2(SP),@(SP)     ,RELOAD THE CLOCK VECTOR
 3940  011360  062706  000004                  ADD     #4,SP           ,CORRECT THE STACK POINTER
 3941  011364                                  TST10A
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```
 3942  011364  012737  011364  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
 3943  011372  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 3944  011376  110164  000010                  MOVB    R1,RPCS2(R4)    ;SELECT THE DRIVE
 3945  011402  016446  000020                  MOV     RPLA(R4),-(SP)  ;GET THE LOOK AHEAD REGISTER
 3946  011406  006316                          ASL     (SP)            ;ALIGN THE SECTOR ADDRESS
 3947  011410  006316                          ASL     (SP)            ;ALIGN THE SECTOR ADDRESS
 3948  011412  000316                          SWAB    (SP)            ;PUT ADDRESS IN LOWER BYTE
 3949  011414  122766  000300  000001          CMPB    #300,1(SP)      ;IN THE LAST 20% OR SECTOR ?
 3950  011422  001001                          BNE     2$              ;BR IF NOT
 3951  011424  105216                          INCB    (SP)            ;INCREMENT THE SECTOR ADDRESS
 3952  011426  105216                  2$      INCB    (SP)            ;INCREMENT THE SECTOR ADDRESS
 3953  011430  112637  004174                  MOVB    (SP)+,DTADPB+10 ;LOAD THE DPB
 3954  011434  013746  001630                  MOV     PRMLMT+22,-(SP) ;PUT MAXIMUM SECTOR ADDRESS ON THE STACK
 3955  011440  005216                          INC     (SP)            ;INCREMENT PAST THE MAXIMUM ADDRESS
 3956  011442  122637  004174                  CMPB    (SP)+,DTADPB+10 ;NEW SECTOR ADDRESS TOO LARGE ?
 3957  011446  101007                          BHI     4$              ;BR IF NOT
 3958  011450  103403                          BLO     3$              ;BR IF ADDRESS IS 2 GREATER THAN MAXIMUM
 3959  011452  105037  004174                  CLRB    DTADPB+10       ;RESET TO SECTOR ADDRESS 0
 3960  011456  000403                          BR      4$              ;CONTINUE
 3961  011460  112737  000001  004174  3$      MOVB    #1,DTADPB+10    ;RESET ADDRESS TO SECTOR 1
 3962  011466  012703  004170          4$      MOV     #DTADPB+4,R3    ;POINTER
 3963  011472  012764  000111  000000          MOV     #DRVCLR,RPCS1(R4)  ;CLEAR THE DRIVE
 3964  011500  012364  000002                  MOV     (R3)+,RPWC(R4)  ;LOAD THE WORD COUNT
 3965  011504  012364  000004                  MOV     (R3)+,RPBA(R4)  ;LOAD THE BUFFER ADDRESS
 3966  011510  012364  000006                  MOV     (R3)+,RPDA(R4)  ;LOAD THE TRACK/SECTOR ADDR
 3967  011514  005037  004202                  CLR     DTADPB+16       ;RESET 'DONE' INDICATOR
 3968  011520  012737  004164  034430          MOV     #DTADPB,TRNSWT  ;LOAD 'TRANSFER' DPB ADDRESS
 3969  011526  010137  034502                  MOV     R1,DTUW         ;ADDRESS OF DRIVE TRANSFERING
 3970  011532  112761  000001  034360          MOVB    #1,DRVACT(R1)   ;SET DRIVE ACTIVE INDICATOR
 3971  011540  006301                          ASL     R1              ;SHIFT DRIVE ADDRESS
 3972  011542  012761  001750  034462          MOV     #1000,TIMER(R1)  ;SETUP THE OPERATION TIMER
 3973  011550  006201                          ASR     R1              ;RESTORE R1
 3974  011552  013764  004166  000000          MOV     DTADPB+2,RPCS1(R4)  ;START THE OPERATION
 3975  011560  005037  177776                  CLR     @#PS            ;CLEAR THE PRIORITY
 3976  011564  004037  025546                  JSR     R0,DRVCL1       ;WAIT FOR OPERATION TO COMPLETE
 3977  011570  023727  001346  001750  5$      CMP     SEKCNT,#1000    ;FINISHED SEEKS ?
 3978  011576  001026                          BNE     6$              ;BR IF NOT
 3979  011600  005037  001346                  CLR     SEKCNT          ;CLEAR THE SEEK COUNT
 3980  011604  063737  001514  001532          ADD     IC,NC1          ;ADD THE INCREMENT
 3981  011612  023737  001532  001512          CMP     NC1,LC          ;EXCEEDED THE CYLINDER LIMIT ?
 3982  011620  103100                          BHIS    EXIT10          ;BR IF IT HAS
 3983  011622  013737  001512  001350          MOV     LC,DELTA        ;GET THE NEXT 'ZONE' ADDRESS
 3984  011630  163737  001532  001350          SUB     NC1,DELTA       ;CHECK THE DIFFERENCE
 3985  011636  023737  001514  001350          CMP     IC,DELTA        ;DIFFERENCE GREATER THAN THE INCREMENT ?
 3986  011644  101003                          BHI     6$              ;BR IF IT IS
 3987  011646  013737  001514  001350          MOV     IC,DELTA        ;USE THE ICREMENT PARAMETER
 3988  011654  005237  001346          6$      INC     SEKCNT          ;COUNT THE NEXT SEEK
 3989  011660  023737  001510  001512          CMP     FC,LC           ;BEGINNING AND ENDING CYLINDERS THE SAME ?
 3990  011666  001002                          BNE     7$              ;BR IF NOT
 3991  011670  000137  011126                  JMP     TEST10          ;BR IF THEY ARE
 3992  011674  013737  001532  004116  7$      MOV     NC1,DPB A+12    ;RESET THE CYLINDER ADDRESS
 3993  011702  004737  023512                  JSR     PC,$RAND        ;CYCLE THE RANDOM NUMBER GENERATOR
 3994  011706  013746  023610                  MOV     $HINUM,-(SP)    ;USE THE HIGH RANDOM NUMBER
 3995  011712  005046                          CLR     -(SP)           ;CLEAR THE UPPER DIVIDEND
 3996  011714  013746  001350                  MOV     DELTA,-(SP)     ;FORM THE DIVISOR
 3997  011720  005216                          INC     (SP)            ;INCREMENT
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 3998  011722  004737  023614                   JSR     PC,$DIV          ;DIVIDE
 3999  011726  062637  004116                   ADD     (SP)+,DPB A+12   ,ADD THE REMAINDER TO THE INITIAL CYLINDER
 4000  011732  005726                           TST     (SP)+            ,DISCARD THE QUOTENT
 4001  011734  023737  004116  004176           CMP     DPB.A+12,DTADPB+12  ;SAME CYLINDER SELECTED AS LAST TIME ?
 4002  011742  001754                           BEQ     7$               ,BR IF IT WAS
 4003  011744  013737  004116  004176           MOV     DPB A+12,DTADPB+12  ;COPY NEW CYLINDER ADDRESS
 4004  011752  000137  011126                   JMP     TEST10           ,CONTINUE
 4005  011756  005337  001344           TST10B  DEC     SEKTMR           ,DECREMENT THE SEEK TIMER
 4006  011762  001016                           BNE     1$               ,CONTINUE IF NOT DONE
 4007  011764  012702  004104                   MOV     #DPB A,R2        ,DPB ADDRESS
 4008  011770  004737  042036                   JSR     PC,SVRH11        ,SAVE THE REGISTERS
 4009  011774  104024                           ERROR   24               ,TIMEOUT DURING SEEK
 4010  011776  012764  000040  000010           MOV     #B!TOS,RPCS2(R4)  ,INIT THE MASSBUS
 4011  012004  110164  000010                   MOVB    R1,RPCS2(R4)     ,RESELECT THE DRIVE
 4012  012010  016676  000002  000000           MOV     2(SP),@(SP)      ,RESTORE THE CLOCK VECTOR ADDRESS
 4013  012016  000401                           BR      EXIT10           ,ABORT THE TEST
 4014  012020  000002                   1$      RTI                      ,RETURN
 4015  012022  000004                   EXIT10  SCOPE                    ,LOOP ?
 4016
 4017                                   ,,**********************************************************************
 4018                                   ,*TEST 11       ALL SEEKS TEST
 4019
 4020                                   ,*      THIS TEST VERIFIES THAT THE DISK DRIVE CAN SEEK FROM EACH CYLINDER
 4021                                   ,*      TO ALL OTHER CYLINDERS
 4022                                   ,*
 4023                                   ,*      BEGINNING WITH CYLINDER 'FC', THE TEST SEEKS TO EACH CYLINDER
 4024                                   ,*      BETWEEN 'FC' AND 'LC' FROM CYINDER 'FC'   THE BEGINNING CYLINDER
 4025                                   ,*      ADDRESS IS INCREMENTED AND THE TEST SEEKS BETWEEN THE NEW CYLINDER
 4026                                   ,*      ADDRESS AND ALL CYLINDERS BETWEEN 'FC' AND 'LC'   THE SEQUENCE
 4027                                   ,*      CONTINUES UNTIL ALL CYLINDERS HAVE BEEN CHECKED
 4028
 4029                                   ,,**********************************************************************
 4030  012024                           TST11
 4031  012024  000240                           NOP
 4032  012026  033737  001446  001234           BIT     @#BITS+<11*2>,TSTNMS ,DO THIS TEST?
 4033  012034  001002                           BNE     64$              ,YES--BRANCH
 4034  012036  000137  012244                   JMP     TST12            ,NO--GO TO THE NEXT TEST
 4035  012042  012737  000011  001102   64$     MOV     #11,@#$TSTNM     ;SET UP TEST NUMBER AND
 4036                                           ;CLEAR THE ERROR FLAG ($ERFLG)
 4037  012050  004737  024612                   JSR     PC,LOOPRM        ;LOAD THE PARMETERS FOR THE TEST
 4038  012054  012737  012164  001110           MOV     #TEST11,@#$LPERR  ,SETUP THE LOOP ON ERROR ADDRESS
 4039  012062  013777  001102  167052           MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 4040  012070  013737  001506  001204           MOV     @#RPT,$TIMES     ;GET THE ITERATION COUNT
 4041  012076  112737  000031  001115           MOVB    #25.,$ERMAX      ,MAX ERRORS ALLOWED FOR TEST
 4042  012104  012737  012112  001106           MOV     #1$,$LPADR       ,SETUP THE LOOP ADDRESS
 4043  012112  113737  001524  004134   1$:     MOVB    FS,DPB.B+10      ;SECTOR ADDRESS
 4044  012120  113737  001524  004154           MOVB    FS,DPB.C+10      ;SECTOR ADDRESS
 4045  012126  113737  001516  004135           MOVB    FT,DPB.B+11      ;TRACK ADDRESS
 4046  012134  113737  001516  004155           MOVB    FT,DPB.C+11      ,TRACK ADDRESS
 4047  012142  013737  001510  004136           MOV     FC,DPB.B+12      ,STARTING CYLINDER ADDRESS
 4048  012150  013737  001510  004156           MOV     FC,DPB.C+12      ,STARTING CYLINDER ADDRESS
 4049  012156  012737  012242  001252           MOV     #EXIT11,BYPASS   ,TEST ABORT EXIT
 4050  012164  012706  001100           TEST11. MOV     #STACK,SP        ,SETUP THE STACK POINTER
 4051  012170                           1$
 4052  012170  004037  025336                   JSR     R0,@#CALL C      ,GO EXECUTE THE COMMAND
 4053  012174  004037  025146                   JSR     R0,@#CALL B      ,GO EXECUTE THE COMMAND
```

```
 4054  012200  063737  001514  004156          ADD     IC,DPB C+12     ,INCREMENT THE ENDING CYLINDER ADDRESS
 4055  012206  023737  001512  004156          CMP     LC,DPB C+12     ,CHECK IF EXCEEDING MAXIMUM
 4056  012214  002365                          BGE     1$              ,BR IF NOT
 4057  012216  013737  001510  004156          MOV     FC,DPB C+12     ,RESET ENDING CYLINDER ADDRESS
 4058  012224  063737  001514  004136          ADD     IC,DPB B+12     ,INCREMENT THE STARTING ADDRESS
 4059  012232  023737  001512  004136          CMP     LC,DPB B+12     ,EXCEEDING MAXIMUM ?
 4060  012240  002353                          BGE     1$              ,BR IF NOT
 4061  012242  000004                  EXIT11  SCOPE                   ,LOOP ?
 4062
```

```
 4063
 4064                                       SBTTL  *** TIMING TESTS ***
 4065

        ,/*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*
        ,/*  /*  /*  /*  /*  /* :/*  /*  /* ·/*  /*  /*  /*  /*  /*  /*  /*  /*
        ,/* ./*  /*  /* ./* ./* :/* :/* ./* :/*  /*  /*  /* ./*  /*  /*  /*  /*

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

        ;/: */: */: */: */: */: */: */: */: */: */: */: */: */: */. */: */  */  *
        ;/: */: */: */: */: */: */: */: */: */: */: */: */: */. */. */· */  */  *
        ;/: */: */: */: */: */: */: */: */: */: */: */: */: */: */: */. */  */  *

 4083
 4084                                      ;;**************************************************************
 4085                                      ,*TEST 12       ROTATIONAL SPEED TIMING TEST
 4086
 4087                                      ;*      THIS TEST WILL START A SEARCH TO CYLINDER 0, TRACK 0, SECTOR
 4088                                      ,*      0.  AS SOON AS THE INTERRUPT OCCURS, THE GO BIT IS SET AGAIN
 4089                                      ,*      AND THE OPERATION IS TIMED   THIS PROCEDURE IS REPEATED 10
 4090                                      ,*      TIMES THEN THE AVERAGE TIME IS CALCULATED AND CHECKED TO
 4091                                      ,*      ENSURE IT IS WITHIN TOLERANCE
 4092                                      ,*              16 67 MS/REV + OR - 2% IF 60HZ
 4093                                      ,*              16 67 MS/REV + OR - 2 5% IF 50HZ
 4094
 4095                                      ,,**************************************************************
 4096  012244                              TST12.
 4097  012244  000240                              NOP
 4098  012246  033737  001450  001234              BIT     @#BITS+<12*2>,TSTNMS ;DO THIS TEST?
 4099  012254  001002                              BNE     64$              ,YES--BRANCH
 4100  012256  000137  013002                      JMP     TST13            ,NO--GO TO THE NEXT TEST
 4101  012262  012737  000012  001102  64$         MOV     #12,@#$TSTNM     ,SET UP TEST NUMBER AND
 4102                                                                       ;CLEAR THE ERROR FLAG ($ERFLG)
 4103  012270  004737  024612                      JSR     PC,LODPRM        ;LOAD THE PARMETERS FOR THE TEST
 4104  012274  012737  012244  001110              MOV     #TST12,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
 4105  012302  013777  001102  166632              MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 4106  012310  013737  001506  001204              MOV     @#RPT,$TIMES     ;GET THE ITERATION COUNT
 4107  012316  112737  000031  001115              MOVB    #25.,$ERMAX      ;MAX ERRORS ALLOWED FOR TEST
 4108  012324  005737  001244                      TST     @#CLKSTA         ;KW11-P CLOCK?
 4109  012330  003002                              BGT     1$               ,YES--START TEST
 4110  012332  000137  013002                      JMP     TST13            ;NO--GO TO NEXT TEST
 4111  012336  012737  012336  001106  1$          MOV     #1$,$LPADR       ;SETUP LOOP ADDRESS
 4112  012344  004037  026672                      JSR     R0,@#SRCH00      ,DO A MASSBUS INIT & RECAL
 4113  012350  000402                              BR      2$               ,RETURN HERE IF NO ERROR
 4114  012352  000137  013000                      JMP     EXIT12           ,RETURN HERE IF ERROR
 4115  012356  013764  001510  000034  2$          MOV     @#FC,RPCA(R4)    ,FC
 4116  012364  013746  001524                      MOV     @#FS,-(SP)       ,FS
 4117  012370  113766  001516  000001              MOVB    @#FT,1(SP)       ,FT
 4118  012376  012664  000006                      MOV     (SP)+,RPDA(R4)   ,LOAD FT/FS
```

```
4119  012402  012737  013000  001206          MOV     #EXIT12,$ESCAPE ;;ESCAPE TO EXIT12 ON ERROR
4120  012410  005005                          CLR     R5              ;COUNT UP
4121  012412  012703  002774                  MOV     #T7A,R3         ;60HZ PARAMETERS
4122  012416  032737  000100  001220          BIT     #SW06,@#C SWR   ;60 HZ?
4123  012424  001402                          BEQ     TEST12          ;YES--BRANCH
4124  012426  012703  003004                  MOV     #T7B,R3         ;NO--50 HZ PARAMETERS
4125  012432  012706  001100          TEST12: MOV     #STACK,SP       ;SETUP STACK
4126  012436  012701  000012                  MOV     #10.,R1         ;TIME 10 SEARCHES
4127  012442  004737  027056                  JSR     PC,@#STRTMR     ;INITIALIZE THE TIMERS
4128  012446  012777  012654  166720          MOV     #7$,@PKV        ;SETUP VECTOR IN CASE OF OVERFLOW
4129  012454  012777  027054  022036          MOV     #DORTI,@RPVEC   ;SETUP RP04/5/6 VECTOR
4130  012462  005077  166714          1$      CLR     @PKB            ;START COUNTING AT ZERO
4131  012466  012777  000131  166704          MOV     #131,@PKCS      ;INT ENL, COUNT UP AT 100KHZ
4132  012474  012714  000131                  MOV     #SEARCH,(R4)    ,START A SEARCH
4133  012500  000001                          WAIT                    ,WAIT ON INTERRUPT
4134  012502  042777  000101  166670          BIC     #101,@PKCS      ,STOP THE CLOCK
4135  012510  032764  040000  000012          BIT     #BIT14,RPDS1(R4) ,ERROR?
4136  012516  001415                          BEQ     2$              ,NO--BRANCH
4137  012520  104412                          SAVREG                  ,SAVE R0-R5
4138  012522  012702  004164                  MOV     #DTADPB,R2      ,DPB POINTER
4139  012526  004737  042036                  JSR     PC,@#SVRH11     ,SAVE ALL THE RH11/RP04 REGISTERS
4140  012532  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS CLEAR
4141  012540  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
4142  012546  104413                          RESREG                  ,RESTORE R0-R5
4143  012550  104017                          ERROR   17
4144  012552  005077  166624          2$      CLR     @PKB            ,START THE COUNT AT ZERO
4145  012556  012714  000131                  MOV     #SEARCH,(R4)    ,START A SEARCH
4146  012562  012777  000131  166610          MOV     #131,@PKCS      ,START THE CLOCK
4147  012570  000001                          WAIT                    ,WAIT ON INTERRUPT
4148  012572  042777  000101  166600          BIC     #101,@PKCS      ,STOP THE CLOCK
4149  012600  032764  040000  000012          BIT     #BIT14,RPDS1(R4) ,IS "ERR=1"?
4150  012606  001415                          BEQ     3$              ,NO--BRANCH
4151  012610  104412                          SAVREG                  ,SAVE R0-R5
4152  012612  012702  004164                  MOV     #DTADPB,R2      ,DPB POINTER
4153  012616  004737  042036                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
4154  012622  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ;MASSBUS CLEAR
4155  012630  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ;SELECT DRIVE
4156  012636  104413                          RESREG                  ,RESTORE R0-R5
4157  012640  104017                          ERROR   17              ,DISK ERROR OCCURRED
4158  012642  004737  027122          3$:     JSR     PC,@#COUNT      ;UPDATE THE COUNT
4159  012646  005301                          DEC     R1              ,DONE?
4160  012650  003304                          BGT     1$              ,NO--BRANCH
4161  012652  000424                          BR      8$              ;YES--GO TO THE EXIT
4162  012654  042777  000101  166516  7$:     BIC     #101,@PKCS      ,STOP THE CLOCK
4163  012662  005037  177776                  CLR     @#PS            ,DROP THE PRIORITY
4164  012666  012600                          MOV     (SP)+,R0        ,PC OF WAIT+2
4165  012670  005726                          TST     (SP)+           ,POP THE PS FROM THE STACK
4166  012672  104412                          SAVREG                  ;SAVE R0-R5
4167  012674  012702  004164                  MOV     #DTADPB,R2      ,DPB POINTER
4168  012700  004737  042036                  JSR     PC,@#SVRH11     ,SAVE ALL THE RH11/RP04 REGISTERS
4169  012704  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS CLEAR
4170  012712  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
4171  012720  104413                          RESREG                  ,RESTORE R0-R5
4172  012722  104020                          ERROR   20              ,CLOCK OVERFLOWED
4173  012724                          8$
4174  012724  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS INIT
```

```
 4175  012732  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ;SELECT DRIVE
 4176  012740  004737  024076                  JSR     PC,@#ST CLK        ;INITIALIZE THE CLOCK
 4177  012744  012777  037400  021546          MOV     #ISR,@RPVEC        ;RESTORE RH11/RP04/5/6 INT  VECTOR
 4178  012752  032737  000100  001220          BIT     #SW06,@#C SWR      ;60 HZ?
 4179  012760  001004                          BNE     9$                 ;NO -- BRANCH
 4180  012762  004037  027254                  JSR     R0,@#TYPTIM        ;GO TYPE THE TIMES
 4181  012766  002774                          T7A                        ;POINTER
 4182  012770  000403                          BR      EXIT12             ;GO TO EXIT
 4183  012772                          9$
 4184  012772  004037  027254                  JSR     R0,@#TYPTIM        ;GO TYPE THE TIMES
 4185  012776  003004                          T7B                        ;POINTER
 4186  013000  000004                  EXIT12  SCOPE                      ;LOOP ?
 4187
 4188
 4189                                  ;;*****************************************************************
 4190                                  ;*TEST 13       ONE CYLINDER SEEK TIMING TEST
 4191
 4192                                  ;*      THIS TEST WILL COMMAND FORWARD SEEK CYCLES TO ADVANCE THE
 4193                                  ;*      CYLINDER BY ONE UNTIL THE INCREMENT IS GREATER THAN THE
 4194                                  ;*      CYLINDER 'LC', THEN REVERSE SEEK TO CYLINDER 'FC'   THE
 4195                                  ;*      TIME TO PERFORM EACH SEEK IS CHECKED TO ENSURE IT DOES NOT
 4196                                  ;*      EXCEED THE MAXIMUM TIME PERMITTED FOR A ONE CYLINDER SEEK
 4197                                  ;*      THE TIME MUST BE LESS THAN 10MS
 4198
 4199                                  ;;*****************************************************************
 4200  013002                          TST13
 4201  013002  000240                          NOP
 4202  013004  033737  001452  001234          BIT     @#BITS+<13*2>,TSTNMS ;DO THIS TEST?
 4203  013012  001002                          BNE     64$                ;YES--BRANCH
 4204  013014  000137  013446                  JMP     TST14              ;NO--GO TO THE NEXT TEST
 4205  013020  012737  000013  001102  64$     MOV     #13,@#$TSTNM       ;SET UP TEST NUMBER AND
 4206                                                                     ;CLEAR THE ERROR FLAG (SERFLG)
 4207  013026  004737  024612                  JSR     PC,LOOPRM          ;LOAD THE PARMETERS FOR THE TEST
 4208  013032  012737  013002  001110          MOV     #TST13,@#$LPERR    ;SETUP THE ERROR LOOP ADDRESS
 4209  013040  013777  001102  166074          MOV     $TSTNM,@DISPLAY    ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 4210  013046  013737  001506  001204          MOV     @#RPT,$TIMES       ;GET THE ITERATION COUNT
 4211  013054  112737  000031  001115          MOVB    #25 ,$ERMAX        ;MAX ERRORS ALLOWED FOR TEST
 4212  013062  005737  001244                  TST     @#CLKSTA           ;KW11-P CLOCK?
 4213  013066  003002                          BGT     1$                 ;YES--START TEST
 4214  013070  000137  013446                  JMP     TST14              ;NO--GO TO NEXT TEST
 4215  013074  012737  013074  001106  1$      MOV     #1$,$LPADR         ;SETUP THE LOOP ADDRESS
 4216  013102  004037  026672                  JSR     R0,@#SRCH00        ;DO A MASSBUS INIT. AND RECAL
 4217  013106  000402                          BR      2$                 ;NO ERROR RETURN
 4218  013110  000137  013444                  JMP     EXIT13             ;ERROR RETURN--SCOPE LOOP CALL
 4219  013114  012703  003014          2$      MOV     #T10,R3            ;PARAMETER POINTER
 4220  013120  012737  013444  001206          MOV     #EXIT13,$ESCAPE    ;;ESCAPE TO EXIT13 ON ERROR
 4221  013126  012706  001100          TEST13. MOV     #STACK,SP          ;SETUP STACK
 4222  013132  013737  001510  004176          MOV     FC,@#DTADPB+12     ;START WITH BEGINNING CYLINDER
 4223  013140  005237  004176                  INC     DTADPB+12          ;INCREMENT THE BEGINNING CYLINDER
 4224  013144  005006                          CLR     R5                 ;SET THE UP/DOWN SWITCH TO UP
 4226  013146  004737  027056                  JSR     PC,@#STRTMR        ;INITIALIZE THE TIMERS
 4226  013152  012777  013340  166214          MOV     #7$,@PKV           ;SETUP INCASE OF OVERFLOW
 4227  013160  012777  027054  021332          MOV     #DORTI,@RPVEC      ;SET RP04/5/6 VECTOR
 4228  013166  005077  166210          1$      CLR     @PKB               ;START THE COUNTER AT ZERO
 4229  013172  013764  004176  000034          MOV     @#DTADPB+12,RPCA(R4) ;LOAD DESIRED CYLINDER
 4230  013200  012714  000105                  MOV     #SEEK,(R4)         ;START A SEEK
```

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4231  013204  012777  000131  166166          MOV     #131,@PKCS      ,START THE CLOCK
4232  013212  000001                          WAIT                    ,WAIT ON INTERRUPT
4233  013214  042777  000101  166156          BIC     #101,@PKCS      ,STOP THE CLOCK
4234  013222  032764  040000  000012          BIT     #BIT14,RPDS1(R4) ,ANY DISK ERRORS?
4235  013230  001415                          BEQ     2$              ,NO--BRANCH
4236  013232  104412                          SAVREG                  ,SAVE R0-R5
4237  013234  012702  004164                  MOV     #DTADPB,R2      ,DPB POINTER
4238  013240  004737  042036                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
4239  013244  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ;MASSBUS CLEAR
4240  013252  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
4241  013260  104413                          RESREG                  ,RESTORE R0-R5
4242  013262  104017                          ERROR   17              ,REPORT THE ERROR
4243  013264  004737  027122          2$      JSR     PC,@#COUNT      ;COUNT THIS SEEK'S TIME
4244  013270  004737  026450                  JSR     PC,@#TWOMS      ,STALL FOR 2 MILLISECONDS
4245  013274  005705                          TST     R5              ;UP OR DOWN?
4246  013276  001011                          BNE     4$              ,DOWN--BRANCH
4247  013300  005237  004176          3$      INC     @#DTADPB+12     ,MOVE TO NEXT CYLINDER
4248  013304  023737  004176  001512          CMP     @#DTADPB+12,LC  ,OUT OF CYLINDERS?
4249  013312  002725                          BLT     1$              ,NO--GO DO THE NEXT SEEK
4250  013314  012705  177777                  MOV     #-1,R5          ,SET UP/DOWN SWITCH TO DOWN
4251  013320  000722                          BR      1$              ,GO DO THE NEXT SEEK
4252  013322  005337  004176          4$      DEC     @#DTADPB+12     ,MOVE TO NEXT CYLINDER
4253  013326  023727  004176  000000          CMP     @#DTADPB+12,#0  ,OUT OF CYLINDERS?
4254  013334  003314                          BGT     1$              ,NO--GO DO THE NEXT SEEK
4255  013336  000424                          BR      8$              ,GO TO THE EXIT
4256  013340  042777  000101  166032  7$      BIC     #101,@PKCS      ,STOP THE CLOCK
4257  013346  005037  177776                  CLR     @#PS            ,DROP THE PRIORITY
4258  013352  012600                          MOV     (SP)+,R0        ,PC OF WAIT+2
4259  013354  005726                          TST     (SP)+           ,POP THE PS FROM THE STACK
4260  013356  104412                          SAVREG                  ,SAVE R0-R5
4261  013360  012702  004164                  MOV     #DTADPB,R2      ;DPB POINTER
4262  013364  004737  042036                  JSR     PC,@#SVRH11     ,SAVE ALL THE RH11/RP04 REGISTERS
4263  013370  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS CLEAR
4264  013376  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
4265  013404  104413                          RESREG                  ,RESTORE R0-R5
4266  013406  104020                          ERROR   20              ;REPORT CLOCK OVERFLOW
4267  013410                          8$
4268  013410  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS INIT.
4269  013416  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
4270  013424  004737  024076                  JSR     PC,@#ST CLK     ,INITIALIZE THE CLOCK
4271  013430  012777  037400  021062          MOV     #ISR,@RPVEC     ,RESTORE RH11/RP04/5/6 INT  VECTOR
4272  013436  004037  027254                  JSR     R0,@#TYPTIM     ;GO TYPE THE TIMES
4273  013442  003014                          T10                     ,POINTER
4274  013444  000004                  EXIT13  SCOPE                   ,LOOP ?
4275
4276
4277                                  ,,**********************************************************************
4278                                  ,*TEST 14       ACCESS TIME MEASURMENT TEST
4279
4280                                  ,*      THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO
4281                                  ,*      CYLINDER 'LC', THEN A REVERSEK FROM CYLINDER 'LC' TO
4282                                  ,*      CYLINDER 0.  BOTH SEEKS ARE TIMED AND CHECKED TO ENSURE THEY
4283                                  ,*      ARE WITHIN THE TOLERANCE ALLOWED FOR THE ACCESS TIME MEASURMENT
4284                                  ,*      THIS SEQUENCE IS REPEATED 128 TIMES (FOR A TOTAL
4285                                  ,*      OF 256 SEEKS)  THE AVERAGE ACCESS TIME MUST BE LESS THAN 30 MS
4286                                  ,*      CYLINDER 'LC' DEFAULTS TO 136 (10) FOR AN RP04/5 OR TO 255 (10)
```

```
                                        ;*      FOR AN RP06

                                        ;;*****************************************************************
        013446                          TST14
        013446  000240                          NOP
        013450  033737  001454  001234          BIT     @#BITS+<14*2>,TSTNMS ;DO THIS TEST?
        013456  001002                          BNE     64$             ;YES--BRANCH
        013460  000137  014164                  JMP     TST15           ;NO--GO TO THE NEXT TEST
        013464  012737  000014  001102  64$     MOV     #14,@#$TSTNM    ;SET UP TEST NUMBER AND
                                                                        ;CLEAR THE ERROR FLAG ($ERFLG)
        013472  004737  024612                  JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
        013476  012737  013446  001110          MOV     #TST14,@#$LPERR ;SETUP THE ERROR LOOP ADDRESS
        013504  013777  001102  165430          MOV     $TSTNM,@DISPLAY ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
        013512  013737  001506  001204          MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
        013520  112737  000031  001115          MOVB    #25.,$ERMAX     ;MAX ERRORS ALLOWED FOR TEST
        013526  005737  001244                  TST     @#CL.STA        ;KW11-P CLOCK?
        013532  003002                          BGT     1$              ;YES--START TEST
        013534  000137  014164                  JMP     TST15           ;NO--GO TO NEXT TEST
        013540  012737  013540  001106  1$      MOV     #1$,$LPADR      ;SET THE LOOP ADDRESS
        013546  004037  026672                  JSR     R0,@#SRCH00     ;DO A MASSBUS INIT & RECAL
        013552  000402                          BR      2$              ;RETURN HERE IF NO ERROR
        013554  000137  014162                  JMP     EXIT14          ;RETURN HERE ON ERROR
        013560  012703  003024          2$      MOV     #T11,R3         ;PARAMETER POINTER
        013564  012737  014162  001206          MOV     #EXIT14,$ESCAPE ;;ESCAPE TO EXIT14 ON ERROR
        013572  012706  001100          TEST14  MOV     #STACK,SP       ;SETUP STACK
        013576  012701  000200                  MOV     #128.,R1        ;REPEAT "0-136-0" 128 TIMES
        013602  004737  027056                  JSR     PC,@#STRTMR     ;INIT  THE COUNTERS
        013606  012777  014056  165560          MOV     #7$,@PKV        ;SET UP VECTOR IN CASE OF OVERFLOW
        013614  012777  027054  020676          MOV     #DORTI,@RPVEC   ;SETUP RP04/5/6 VECTOR
        013622  005077  165554          1$      CLR     @PKB            ;START COUNT AT ZERO
        013626  013764  001512  000034          MOV     LC,RPCA(R4)     ;'MIDDLE' CYLINDER
        013634  012764  000105  000000          MOV     #SEEK,RPCS1(R4) ;START A SEEK
        013642  012777  000131  165530          MOV     #131,@PKCS      ;START THE CLOCK
        013650  000001                          WAIT                    ;WAIT ON INTERRUPT
        013652  042777  000101  165520          BIC     #101,@PKCS      ;STOP CLOCK
        013660  032764  040000  000012          BIT     #BIT14,RPDS1(R4) ;ERR=1?
        013666  001415                          BEQ     2$              ;NO--BRANCH
        013670  104412                          SAVREG                  ;SAVE R0-R5
        013672  012702  004164                  MOV     #DTADPB,R2      ;DPB POINTER
        013676  004737  042036                  JSR     PC,@#SVRH11     ;SAVE ALL THE RH11/RP04 REGISTERS
        013702  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ;MASSBUS CLEAR
        013710  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ;SELECT DRIVE
        013716  104413                          RESREG                  ;RESTORE R0-R5
        013720  104017                          ERROR   17
        013722  005005                  2$      CLR     R5              ;SET UP/DOWN SWITCH TO UP
        013724  004737  027122                  JSR     PC,@#COUNT      ;UPDATE THE COUNT
        013730  004737  026450                  JSR     PC,@#TWOMS      ;STALL FOR 2 MILLISECONDS
        013734  005077  165442                  CLR     @PKB            ;START THE COUNT AT ZERO
        013740  013764  001510  000034          MOV     FC,RPCA(R4)     ;BEGINNING CYLINDER
        013746  012764  000105  000000          MOV     #SEEK,RPCS1(R4) ;START A SEEK
        013754  012777  000131  165416          MOV     #131,@PKCS      ;START THE CLOCK
        013762  000001                          WAIT                    ;WAIT ON INTERRUPT
        013764  042777  000101  165406          BIC     #101,@PKCS      ;STOP THE CLOCK
        013772  032764  040000  000012          BIT     #BIT14,RPDS1(R4) ;ERR=1?
        014000  001415                          BEQ     3$              ;NO--BRANCH
        014002  104412                          SAVREG                  ;SAVE R0-R5
```

```
 4343  014004  012702  004164                  MOV     #DTADPB,R2          ,DPB POINTER
 4344  014010  004737  042036                  JSR     PC,@#SVRH11         ,SAVE ALL THE RH11/RP04 REGISTERS
 4345  014014  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS CLEAR
 4346  014022  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
 4347  014030  104413                          RESREG                      ,RESTORE R0-R5
 4348  014032  104017                          ERROR   17
 4349  014034  012705  177777          3$      MOV     #-1,R5              ,SET UP/DOWN SWITCH TO DOWN
 4350  014040  004737  027122                  JSR     PC,@#COUNT          ,UPDATE THE COUNT
 4351  014044  004737  026450                  JSR     PC,@#TWOMS          ,STALL FOR 2 MILLISECONDS
 4352  014050  005301                          DEC     R1                  ,DONE?
 4353  014052  003263                          BGT     1$                  ,NO--BRANCH
 4354  014054  000424                          BR      8$                  ,YES--EXIT
 4355  014056  042777  000101  165314  7$      BIC     #101,@PKCS          ,STOP THE CLOCK
 4356  014064  005037  177776                  CLR     @#PS                ,DROP THE PRIORITY
 4357  014070  012600                          MOV     (SP)+,R0            ,PC OF WAIT+2
 4358  014072  005726                          TST     (SP)+               ,POP THE PS FROM THE STACK
 4359  014074  104412                          SAVREG                      ,SAVE R0-R5
 4360  014076  012702  004164                  MOV     #DTADPB,R2          ,DPB POINTER
 4361  014102  004737  042036                  JSR     PC,@#SVRH11         ,SAVE ALL THE RH11/RP04 REGISTERS
 4362  014106  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS CLEAR
 4363  014114  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
 4364  014122  104413                          RESREG                      ,RESTORE R0-R5
 4365  014124  104020                          ERROR   20                  ,CLOCK OVERFLOWED
 4366  014126                          8$
 4367  014126  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS INIT
 4368  014134  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
 4369  014142  004737  024076                  JSR     PC,@#ST CLK         ,INITIALIZE THE CLOCK
 4370  014146  012777  037400  020344          MOV     #ISR,@RPVEC         ,RESTORE RH11/RP04/5/6 INT  VECTOR
 4371  014154  004037  027254                  JSR     R0,@#TYPTIM         ,GO TYPE THE TIMES
 4372  014160  003024                          T11                         ,POINTER
 4373  014162  000004                  EXIT14  SCOPE                       ,LOOP ?
 4374
 4375                                  ,,**********************************************************************
 4376                                  ,*TEST 15       MAXIMUM SEEK TIMING TEST
 4377
 4378                                  ,*      THIS TEST WILL COMMAND A FORWARD SEEK FROM CYLINDER 0 TO
 4379                                  ,*      CYLINDER 'LC', THEN A REVERSE SEEK FROM CYLINDER 'LC' TO
 4380                                  ,*      CYLINDER 0.  BOTH SEEKS ARE TIMED AND CHECKED TO ENSURE
 4381                                  ,*      THEY ARE WITHIN THE TOLERANCE ALLOWED FOR THE MAXIMUM SEEK
 4382                                  ,*      TIME.  THIS SEQUENCE IS REPEATED 128 TIMES (FOR
 4383                                  ,*      A TOTAL OF 256 SEEKS)  THE MAXIMUM SEEK TIME MUST BE LESS THAN
 4384                                  ,*      54 MS  'LC' DEFAULTS TO 410 (10) FOR RP04/5'S AND TO 814 (10)
 4385                                  ,*      FOR RP06'S
 4386
 4387                                  ,,**********************************************************************
 4388  014164                          TST15
 4389  014164  000240                          NOP
 4390  014166  033737  001456  001234          BIT     @#BITS+<15*2>,TSTNMS ,DO THIS TEST?
 4391  014174  001002                          BNE     64$                 ,YES--BRANCH
 4392  014176  000137  014702                  JMP     TST16               ,NO--GO TO THE NEXT TEST
 4393  014202  012737  000015  001102  64$     MOV     #15,@#$TSTNM        ,SET UP TEST NUMBER AND
 4394                                                                      ,CLEAR THE ERROR FLAG ($ERFLG)
 4395  014210  004737  024612                  JSR     PC,LODPRM           ,LOAD THE PARMETERS FOR THE TEST
 4396  014214  012737  014164  001110          MOV     #TST15,@#$LPERR ,SETUP THE ERROR LOOP ADDRESS
 4397  014222  013777  001102  164712          MOV     $TSTNM,@DISPLAY  ,LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 4398  014230  013737  001506  001204          MOV     @#RPT,$TIMES        ,GET THE ITERATION COUNT
```

```
4399  014236  112737  000031  001115          MOVB    #25 ,$ERMAX     ,MAX ERRORS ALLOWED FOR TEST
4400  014244  005737  001244                  TST     @#CLKSTA        ,KW11-P CLOCK
4401  014250  003002                          BGT     1$              ,YES--START TEST
4402  014252  000137  014702                  JMP     TST16           ,NO--GO TO NEXT TEST
4403  014256  012737  014256  001106  1$      MOV     #1$,$LPADR      ,SETUP THE LOOP ADDRESS
4404  014264  004037  026672                  JSR     R0,@#SRCH00     ,DO A MASSBUS INIT & RECAL
4405  014270  000402                          BR      2$              ,RETURN HERE IF NO ERROR
4406  014272  000137  014700                  JMP     EXIT15          ,RETURN HERE ON ERROR
4407  014276  012703  003034          2$      MOV     #T12,R3         ;PARAMETER POINTER
4408  014302  012737  014700  001206          MOV     #EXIT15,$ESCAPE ;,ESCAPE TO EXIT15 ON ERROR
4409  014310  012706  001100          TEST15  MOV     #STACK,SP       ,SETUP STACK
4410  014314  012701  000200                  MOV     #128 ,R1        ,REPEAT "0-'LC'-0" 128 TIMES
4411  014320  004737  027056                  JSR     PC,@#STRTMR     ,INIT  THE TIMERS
4412  014324  012777  014574  165042          MOV     #7$,@PKV        ,SETUP VECTOR IN CASE OF OVERFLOW
4413  014332  012777  027054  020160          MOV     #DORTI,@RPVEC   ,SETUP RP04/5/6 VECTOR
4414  014340  005077  165036          1$      CLR     @PKB            ,START COUNTING FROM ZERO
4415  014344  013764  001512  000034          MOV     LC,RPCA(R4)     ,MAXIMUM CYLINDER
4416  014352  012764  000105  000000          MOV     #SEEK,RPCS1(R4) ,START A SEEK
4417  014360  012777  000131  165012          MOV     #131,@PKCS      ,START THE CLOCK
4418  014366  000001                          WAIT                    ,WAIT ON INTERRUPT
4419  014370  042777  000101  165002          BIC     #101,@PKCS      ,STOP THE CLOCK
4420  014376  032764  040000  000012          BIT     #BIT14,RPDS1(R4) ,ERR=1?
4421  014404  001415                          BEQ     2$              ,NO--BRANCH
4422  014406  104412                          SAVREG                  ,SAVE R0-R5
4423  014410  012702  004164                  MOV     #DTADPB,R2      ,DPB POINTER
4424  014414  004737  042036                  JSR     PC,@#SVRH11     ,SAVE ALL THE RH11/RP04 REGISTERS
4425  014420  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS CLEAR
4426  014426  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
4427  014434  104413                          RESREG                  ,RESTORE R0-R5
4428  014436  104017                          ERROR   17
4429  014440  005005                  2$      CLR     R5              ,SET THE UP/DOWN SWITCH TO UP
4430  014442  004737  027122                  JSR     PC,@#COUNT      ,UP THE COUNT
4431  014446  004737  026450                  JSR     PC,@#TWOMS      ,STALL FOR 2 MILLISECONDS
4432  014452  005077  164724                  CLR     @PKB            ,START COUNT AT ZERO
4433  014456  013764  001510  000034          MOV     FC,RPCA(R4)     ,BEGINNING CYLINDER
4434  014464  012764  000105  000000          MOV     #SEEK,RPCS1(R4) ,START A SEEK
4435  014472  012777  000131  164700          MOV     #131,@PKCS      ,START THE CLOCK
4436  014500  000001                          WAIT                    ,WAIT ON INTERRUPT
4437  014502  042777  000101  164670          BIC     #101,@PKCS      ,STOP THE CLOCK
4438  014510  032764  040000  000012          BIT     #BIT14,RPDS1(R4) ,"ERR"=1?
4439  014516  001415                          BEQ     3$              ,NO--BRANCH
4440  014520  104412                          SAVREG                  ,SAVE R0-R5
4441  014522  012702  004164                  MOV     #DTADPB,R2      ,DPB POINTER
4442  014526  004737  042036                  JSR     PC,@#SVRH11     ,SAVE ALL THE RH11/RP04 REGISTERS
4443  014532  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,MASSBUS CLEAR
4444  014540  013764  004164  000010          MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
4445  014546  104413                          RESREG                  ,RESTORE R0-R5
4446  014560  104017                          ERROR   17              ,REPORT THE ERROR
4447  014562  012705  177777          3$      MOV     #-1,R5          ,SET THE UP/DOWN SWITCH TO DOWN
4448  014566  004737  027122                  JSR     PC,@#COUNT      ,UPDATE THE COUNT
4449  014562  004737  026450                  JSR     PC,@#TWOMS      ,STALL FOR 2 MILLISECONDS
4450  014566  006301                          DEC     R1              ,DONE?
4451  014570  003263                          BGT     1$              ,NO--BRANCH
4452  014572  000424                          BR      8$              ,YES--EXIT
4453  014574  042777  000101  164576  7$      BIC     #101,@PKCS      ,STOP THE CLOCK
4454  014602  005037  177776                  CLR     @#PS            ,DROP THE PRIORITY
```

```
4455  014606  012600                        MOV     (SP)+,R0        ,PC OF WAIT+2
4456  014610  005726                        TST     (SP)+           ,POP THE PS FROM THE STACK
4457  014612  104412                        SAVREG                  ,SAVE R0-R5
4458  014614  012702  004164                MOV     #DTADPB,R2      ,DPB POINTER
4459  014620  004737  042036                JSR     PC,@#SVRH11     ,SAVE P.. IME RH11/RP04 REGISTERS
4460  014624  012764  000040  000010        MOV     #BIT05,RPCS2(R4)  MASSBUS CLEAR
4461  014632  013764  004164  000010        MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
4462  014640  104413                        RESREG                  ,RESTORE R0-R5
4463  014642  104020                        ERROR   20              ,CLOCK OVERFLOWED
4464  014644                          8$
4465  014644  012764  000040  000010        MOV     #BIT05,RPCS2(R4) ,MASSBUS INIT
4466  014652  013764  004164  000010        MOV     @#DTADPB,RPCS2(R4) ,SELECT DRIVE
4467  014660  004737  024076                JSR     PC,@#ST CLK     ,INITIALIZE THE CLOCK
4468  014664  012777  037400  017626        MOV     #ISR,@RPVEC     ,RESTORE RH11/RP04/5/6 INT  VECTOR
4469  014672  004037  027254                JSR     R0,@#TYPTIM     ,GO TYPE THE TIMES
4470  014676  003034                        T12                     ,POINTER
4471  014700  000004                  EXIT15  SCOPE                   ,LOOP ?
```

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

          ./*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*
          ./*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*
          ./*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*  /*

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

          ./  */  */  */  */  */  */  */  */  */  */  */  */  */  */  */  */  */  *
          ./  */  */  */  */  */  */  */  */  */  */  */  */  */  */  */  */  */  *
          ./  */  */  */  */  */  */  */  */  */  */  */  */  */  */  */  */  */  *


                                          ,,**********************************************************
                                          ,*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

                                          ,,**********************************************************
 014702                                   TST16
 014702  000240                                  NOP
 014704  033737  001460  001234                  BIT     @#BITS+<16*2>,TSTNMS ,DO THIS TEST?
 014712  001002                                  BNE     64$             ,YES--BRANCH
 014714  000137  015300                          JMP     TST17           ,NO--GO TO THE NEXT TEST
 014720  012737  000016  001102  64$             MOV     #16,@#$TSTNM    ,SET UP TEST NUMBER AND
                                                                         ,CLEAR THE ERROR FLAG ($ERFLG)
 014726  004737  024612                          JSR     PC,LODPRM       ,LOAD THE PARMETERS FOR THE TEST
 014732  012737  014776  001110                  MOV     #TEST16,@#$LPERR  ,SETUP THE LOOP ON ERROR ADDRESS
 014740  013777  001102  164174                  MOV     $TSTNM,@DISPLAY  ,LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 014746  013737  001506  001204                  MOV     @#RPT,$TIMES    ,GET THE ITERATION COUNT
 014754  113737  001364  001115                  MOVB    ERR CT,$ERMAX   ,.AX ERRORS ALLOWED FOR TEST
 014762  012737  015276  001252                  MOV     #EXIT16,@#BYPASS
 014770  012737  014776  001106                  MOV     #TEST16,$LPADR  ,SETUP THE LOOP ADDRESS
 014776  012706  001100                  TEST16  MOV     #STACK,SP       ,SET THE STACK POINTER
 015002  004737  027706                          JSR     PC,@#FILBUF     ,FILL THE BUFFER WITH SECTOR ADDRESSES
 015006  013737  001510  004176                  MOV     @#FC,@#DTADPB+12 ,CYLINDER
 015014  113737  001516  004175                  MOVB    @#FT,@#DTADPB+11 ,TRACK
 015022  105037  004174                          CLRB    @#DTADPB+10     ,SECTOR
 015026  013737  001352  004170                  MOV     TRCKWC,@#DTADPB+4 ,WORD COUNT
 015034  012737  047714  004172                  MOV     #BUFFER,@#DTADPB+6 ,BUFFER ADDRESS
 015042  012737  015042  001110                  MOV     # ,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
 015050  012706  001100                          MOV     #STACK,SP       ,LOAD THE STACK POINTER
 015054  012737  000161  004166                  MOV     #WRITE,@#DTADPB+2 ,COMMAND=WRITE DATA
 015062  004037  025526                          JSR     R0,@#DRVCAL     ,START A DATA TRANSFER
 015066  012737  000151  004166                  MOV     #WRCKD,@#DTADPB+2 ,COMMAND=WRITE CHECK DATA
```

```
 4528  015074  012737  015074  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
 4529  015102  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 4530  015106  004037  025526                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 4531  015112  012737  015112  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
 4532  015120  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 4533  015124  004037  027744                  JSR     R0,@#CLRBUF     ;CLEAR BUFFER
 4534  015130  012737  000171  004166          MOV     #READ,@#DTADPB+2 ;COMMAND = READ
 4535  015136  004037  025526                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 4536  015142  004037  030012                  JSR     R0,@#CKSCTR     ;CHECK THE SECTOR DATA READ
 4537  015146  012700  047714                  MOV     #BUFFER,R0      ;BUFFER ADDRESS
 4538  015152  005001                          CLR     R1              ;FIRST SECTOR
 4539  015154  012737  015154  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
 4540  015162  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 4541  015166  012737  000161  004166  1$      MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
 4542  015174  012737  177400  004170          MOV     #SCTRWC,@#DTADPB+4 ;WORD COUNT
 4543  015202  010037  004172                  MOV     R0,@#DTADPB+6   ;BUFFER ADDRESS
 4544  015206  110137  004174                  MOVB    R1,@#DTADPB+10  ;SECTOR
 4545  015212  004037  025526                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 4546  015216  012737  015216  001110          MOV     #.,$LPERR       ;SETUP THE ERROR LOOP ADDRESS
 4547  015224  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 4548  015230  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
 4549  015236  013737  001352  004170          MOV     TRCKWC,@#DTADPB+4 ;WORD COUNT
 4550  015244  012737  047714  004172          MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
 4551  015252  105037  004174                  CLRB    @#DTADPB+10     ;SECTOR
 4552  015256  004037  025526                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
 4553  015262  062700  001000                  ADD     #512.,R0        ;MOVE TO NEXT SECTOR
 4554  015266  005201                          INC     R1
 4555  015270  023701  001630                  CMP     PRMLMT+22.,R1   ;DONE?
 4556  015274  103334                          BHIS    1$              ;NO--BRANCH
 4557  015276  000004                  EXIT16  SCOPE                   ;LOOP ?
 4558
 4559                                  ;;**********************************************************************
 4560                                  ;*TEST 17       TRACK ADDRESSING TEST
 4561
 4562                                  ;*      THIS TEST WILL WRITE DATA IN THE FORM OF TRACK ADDRESSES
 4563                                  ;*      IN CYLINDER "FC" SECTOR "FS" OF EVERY TRACK WITH EACH TRACK
 4564                                  ;*      GETTING ITS OWN TRACK ADDRESS
 4565                                  ;*      A WRITE CHECK IS THEN PERFORMED ON EACH TRACK TO ENSURE
 4566                                  ;*      THE DATA IS VALID.  THEN TRACK 0 IS REWRITTEN AND TRACK 1
 4567                                  ;*      THROUGH TRACK 18 IS WRITE CHECKED  THEN TRACK 1 IS
 4568                                  ;*      REWRITTEN AND TRACK 2 THROUGH TRACK 18 IS WRITE CHECKED
 4569                                  ;*      THIS PROCEDURE IS CONTINUED UP THROUGH REWRITING TRACK 17
 4570                                  ;*      AND WRITE CHECKING TRACK 18.
 4571
 4572                                  ;;**********************************************************************
 4573  015300                          TST17:
 4574  015300  000240                          NOP
 4575  015302  033737  001462  001234          BIT     @#BITS+<17*2>,TSTNMS ;DO THIS TEST?
 4576  015310  001002                          BNE     64$             ;YES--BRANCH
 4577  015312  000137  015720                  JMP     TST20           ;NO--GO TO THE NEXT TEST
 4578  015316  012737  000017  001102  64$     MOV     #17,@#STSTNM    ;SET UP TEST NUMBER AND
 4579                                                                  ;CLEAR THE ERROR FLAG (SERFLG)
 4580  015324  004737  024612                  JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
 4581  015330  012737  015374  001110          MOV     #TEST17,@#$LPERR ;SETUP THE LOOP ON ERROR ADDRESS
 4582  015336  013777  001102  163576          MOV     $TSTNM,@DISPLAY ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 4583  015344  013737  001506  001204          MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
```

```
4584  015352  113737  001364  001115          MOVB    ERR CT,$ERMAX   ,MAX ERRORS ALLOWED FOR TEST
4585  015360  012737  015716  001252          MOV     #EXIT17,@#BYPASS
4586  015366  012737  015374  001106          MOV     #TEST17,$LPADR  ,SETUP THE LOOP ADDRESS
4587  015374  012706  001100          TEST17  MOV     #STACK,SP       ,SET THE STACK POINTER
4588  015400  004737  027706                  JSR     PC,@#FILBUF     ,FILL THE BUFFER WITH TRACK ADDRESS
4589  015404  012737  000161  004166          MOV     #WRITE,@#DTADPB+2 ,COMMAND=WRITE DATA
4590  015412  013737  001510  004176          MOV     @#FC,@#DTADPB+12 ;CYLINDER
4591  015420  113737  001524  004174          MOVB    @#FS,@#DTADPB+10 ,SECTOR
4592  015426  012737  177400  004170          MOV     #SCTRWC,@#DTADPB+4 ,WORD COUNT
4593  015434  012737  047714  004172          MOV     #BUFFER,@#DTADPB+6 ,BUFFER ADDRESS
4594  015442  005000                          CLR     R0              ,TRACK=0
4595  015444  012737  015444  001110          MOV     # ,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
4596  015452  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
4597  015456  110037  004175          1$      MOVB    R0,@#DTADPB+11  ,TRACK ADDRESS
4598  015462  004037  025526                  JSR     R0,@#DRVCAL     ,START A DATA TRANSFER
4599  015466  062737  001000  004172          ADD     #256.*2.,@#DTADPB+6 ,UPDATE BUFFER ADDRESS
4600  015474  005200                          INC     R0              ,UPDATE TRACK NUMBER
4601  015476  022700  000023                  CMP     #19.,R0         ,OUT OF TRACKS?
4602  015502  003365                          BGT     1$              ,NO--BRANCH
4603  015504  012737  047714  004172          MOV     #BUFFER,@#DTADPB+6 ,BUFFER ADDRESS
4604  015512  005000                          CLR     R0
4605  015514  012737  015514  001110          MOV     # ,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
4606  015522  012706  001100                  MOV     #STACK,SP       ,LOAD THE STACK POINTER
4607  015526  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ,COMMAND=WRITE CHECK
4608  015534  110037  004175          2$      MOVB    R0,@#DTADPB+11  ;TRACK ADDRESS
4609  015540  004037  025526                  JSR     R0,@#DRVCAL     ,START A DATA TRANSFER
4610  015544  062737  001000  004172          ADD     #256*2.,@#DTADPB+6 ,UPDATE BUFFER ADDRESS
4611  015552  005200                          INC     R0              ,UPDATE TRACK NUMBER
4612  015554  022700  000023                  CMP     #19.,R0 ,OUT OF TRACKS?
4613  015560  003365                          BGT     2$              ,NO--BRANCH
4614  015562  005000                          CLR     R0              ,FIRST TRACK ADDRESS
4615  015564  110037  004175          3$      MOVB    R0,@#DTADPB+11  ,TRACK
4616  015570  010001                          MOV     R0,R1           ,FORM BUFFER ADDRESS
4617  015572  012737  047714  004172          MOV     #BUFFER,@#DTADPB+6 ,BUFFER ADDRESS
4618  015600  005301                  4$      DEC     R1
4619  015602  002411                          BLT     5$
4620  015604  062737  001000  004172          ADD     #256.*2,@#DTADPB+6
4621  015612  000772                          BR      4$
4622  015614  012737  015614  001110          MOV     # ,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
4623  015622  012706  001100                  MOV     #STACK,SP       ,LOAD THE STACK POINTER
4624  015626  012737  000161  004166  5$      MOV     #WRITE,@#DTADPB+2 ,COMMAND=WRITE DATA
4625  015634  004037  025526                  JSR     R0,@#DRVCAL     ,START A DATA TRANSFER
4626  015640  062737  001000  004172  6$      ADD     #256.*2.,@#DTADPB+6 ,UPDATE BUFFER ADDRESS
4627  015646  105237  004175                  INCB    @#DTADPB+11     ,MOVE TO NEXT TRACK
4628  015652  012737  015652  001110          MOV     #.,$LPERR       ,SETUP THE ERROR LOOP ADDRESS
4629  015660  012706  001100                  MOV     #STACK,SP       ,LOAD THE STACK POINTER
4630  015664  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ,COMMAND=WRITE CHECK DATA
4631  015672  004037  025526                  JSR     R0,@#DRVCAL     ,START A DATA TRANSFER
4632  015676  122737  000022  004175          CMPB    #18.,@#DTADPB+11 ,OUT OF TRACKS?
4633  015704  003355                          BGT     6$              ,NO--BRANCH
4634  015706  005200                          INC     R0              ,NEXT TRACK TO WRITE
4635  015710  022700  000022                  CMP     #18,R0          ,OUT OF TRACKS?
4636  015714  003323                          BGT     3$              ,NO--BRANCH
4637  015716  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
                                   ;*

                                   ;;*************************************************************************
 015720                            TST20
 015720 000240                             NOP
 015722 033737 001424 001236               BIT     BITS+<20*2-40>,TSTNMS+2  ;DO THIS TEST ?
 015730 001002                             BNE     64$             ;YES--BRANCH
 015732 000137 016440                      JMP     TST21           ;NO--GO TO THE NEXT TEST
 015736 012737 000020 001102       64$:    MOV     #20,@#$TSTNM    ;SET UP TEST NUMBER AND
                                                                   ;CLEAR THE ERROR FLAG ($ERFLG)
 015744 004737 024612                      JSR     PC,LODPRM       ;LOAD THE PARMETERS FOR THE TEST
 015750 012737 016122 001110               MOV     #TEST20,@#$LPERR  ;SETUP THE LOOP ON ERROR ADDRESS
 015756 013777 001102 163156               MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
 015764 013737 001506 001204               MOV     @#RPT,$TIMES    ;GET THE ITERATION COUNT
 015772 113737 001364 001115               MOVB    ERRCT,$ERMAX    ;MAX ERRORS ALLOWED FOR TEST
 016000 012737 016000 001106               MOV     #.,$LPADR       ;SETUP THE LOOP ADDRESS
 016006 005000                             CLR     R0              ;CLEAR SWITCH
 016010 005004                             CLR     R4              ;FORM WORD COUNT IN R4
 016012 013701 001526                      MOV     @#LS,R1
 016016 163701 001524                      SUB     @#FS,R1
 016022 002004                             BGE     1$              ;BRANCH IF FS < OR = LS
 016024 063701 001630                      ADD     PRMLMT+22,R1    ;ADD MAXIMUM SECTOR ADDRESS TO
 016030 005201                             INC     R1              ;MAKE THE DIFFERENCE POSITIVE
 016032 005100                             COM     R0              ;SET SWITCH
 016034 062704 000400              1$:     ADD     #256.,R4
 016040 005301                             DEC     R1
 016042 002374                             BGE     1$
 016044 005404                             NEG     R4
 016046 010405                             MOV     R4,R5           ;COPY NORMAL WORD COUNT INTO SMALL WC
 016050 005700                             TST     R0              ;SWITCH SET?
 016052 001412                             BEQ     3$              ;NO--BRANCH
 016054 005005                             CLR     R5              ;FORM WORD COUNT FOR LS < FS
 016056 013701 001630                      MOV     PRMLMT+22,R1
 016062 163701 001524                      SUB     @#FS,R1
 016066 062705 000400              2$:     ADD     #256.,R5
 016072 005301                             DEC     R1
 016074 002374                             BGE     2$
 016076 005405                             NEG     R5
 016100 113737 001524 004174       3$:     MOVB    @#FS,@#DTADPB+10 ;SECTOR
 016106 012737 047714 004172               MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER
 016114 012737 016436 001252               MOV     #EXIT20,@#BYPASS
 016122 012706 001100              TEST20: MOV     #STACK,SP       ;LOAD THE STACK POINTER
 016126 005037 001334                      CLR     @#WCEFLG        ;CLEAR THE WRITE CHECK ERROR FLAG
 016132 013701 001510                      MOV     @#FC,R1 ;PICKUP FIRST CYLINDER
 016136 000407                             BR      2$
 016140 005720                     1$:     TST     (R0)+           ;MOVE TO NEXT DATA PATTERN
 016142 022700 000040                      CMP     #16.*2.,R0      ;OUT OF PATTERNS?
 016146 003004                             BGT     3$              ;NO--BRANCH
 016150 004037 027632                      JSR     R0,@#INCCYL     ;MOVE TO NEXT CYLINDER
 016154 000530                             BR      EXIT20          ;OUT OF CYLINDERS
 016156 005000                     2$:     CLR     R0              ;START WITH PATTERN 0
```

```
4750  016160  036037  001424  001530  3$      BIT     @#PAT,@#BITS(R0)  ;THIS PATTERN SELECTED?
4751  016166  001764                          BEQ     1$                ;NO--BRANCH
4752  016170  013702  001516                  MOV     @#FT,R2           ;FIRST TRACK
4753  016174  010137  004176                  MOV     R1,@#DTADPB+12    ;CYLINDER
4754  016200  110237  004175          4$      MOVB    R2,@#DTADPB+11    ;TRACK
4755  016204  010437  004170                  MOV     R4,@#DTADPB+4     ;WORD COUNT
4756  016210  023701  001512                  CMP     LC,R1             ;LAST DISK CYLINDER?
4757  016214  003005                          BGT     5$                ;NO--BRANCH
4758  016216  022702  000022                  CMP     #18.,R2           ;LAST DISK TRACK?
4759  016222  003002                          BGT     5$                ;NO--BRANCH
4760  016224  010537  004170                  MOV     R5,@#DTADPb+4     ;SHORT WORD COUNT
4761  016230  017703  162704          5$      MOV     @SWR,R3           ;INHIBIT WRITE AND
4762  016234  005103                          COM     R3                ;WRITE CHECK?
4763  016236  032703  000030                  BIT     #SW04!SW03,R3
4764  016242  001436                          BEQ     7$                ;YES--BRANCH
4765  016244  004737  030362                  JSR     PC,@#SETBUF       ;MOVE DATA PATTERN INTO THE BUFFER
4766  016250  032777  000020  162662          BIT     #SW04,@SWR        ;INHIBIT WRITE?
4767  016256  001012                          BNE     6$                ;YES--BRANCH
4768  016260  012737  016260  001110          MOV     #.,$LPERR         ;SETUP THE ERROR LOOP ADDRESS
4769  016266  012706  001100                  MOV     #STACK,SP         ;LOAD THE STACK POINTER
4770  016272  012737  000161  004166          MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
4771  016300  004037  025526                  JSR     R0,@#DRVCAL       ;START A DATA TRANSFER
4772  016304  032777  000010  162626  6$      BIT     #SW03,@SWR        ;INHIBIT WRITE CHECK?
4773  016312  001012                          BNE     7$                ;YES--BRANCH
4774  016314  012737  016314  001110          MOV     #.,$LPERR         ;SETUP THE ERROR LOOP ADDRESS
4775  016322  012706  001100                  MOV     #STACK,SP         ;LOAD THE STACK POINTER
4776  016326  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
4777  016334  004037  025526                  JSR     R0,@#DRVCAL       ;START A DATA TRANSFER
4778  016340  005737  001334          7$      TST     @#WCEFLG          ;WRITE CHECK ERROR FLAG SET?
4779  016344  001404                          BEQ     8$                ;NO--BRANCH
4780  016346  032777  000001  162564          BIT     #SW00,@SWR        ;PERFORM READ AFTER FATAL "WCE"?
4781  016354  001424                          BEQ     9$                ;NO--BRANCH
4782  016356  032777  000004  162554  8$      BIT     #SW02,@SWR        ;INHIBIT READ DATA AND SOFTWARE COMPARE?
4783  016364  001020                          BNE     9$                ;YES--BRANCH
4784  016366  012737  016366  001110          MOV     #.,$LPERR         ;SETUP THE ERROR LOOP ADDRESS
4785  016374  012706  001100                  MOV     #STACK,SP         ;LOAD THE STACK POINTER
4786  016400  012737  000171  004166          MOV     #READ,@#DTADPB+2  ;COMMAND=READ
4787  016406  004037  025526                  JSR     R0,@#DRVCAL       ;START A DATA TRANSFER
4788  016412  032777  000002  162520          BIT     #SW01,@SWR        ;COMPARE THE DATA?
4789  016420  001002                          BNE     9$                ;NO--BRANCH
4790  016422  004737  030452                  JSR     PC,@#DATCMP       ;YES--DO IT
4791  016426  004037  027602          9$      JSR     R0,@#INCTRK       ;MOVE TO NEXT TRACK
4792  016432  000642                          BR      1$                ;OUT OF TRACKS GO TO NEXT PATTERN
4793  016434  000661                          BR      4$                ;LOOP
4794  016436  000004                  EXIT20  SCOPE                     ;SCOPE LOOP
```

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

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

                                            ;;*************************************************************
016440  000240                              TST21:
016440  000240                                      NOP
016442  033737  001426  001236                      BIT     BITS+<21*2-40>,TSTNMS+2  ;DO THIS TEST ?
016450  001002                                      BNE     64$                ;YES--BRANCH
016452  000137  017216                              JMP     TST22              ;NO--GO TO THE NEXT TEST
016456  012737  000021  001102  64$:                MOV     #21,@#$TSTNM       ;SET UP TEST NUMBER AND
                                                                               ;CLEAR THE ERROR FLAG ($ERFLG)
016464  004737  024612                              JSR     PC,LOOPRM          ;LOAD THE PARMETERS FOR THE TEST
016470  012737  016710  001110                      MOV     #TEST21,@#$LPERR   ;SETUP THE LOOP ON ERROR ADDRESS
016476  013777  001102  162436                      MOV     $TSTNM,@DISPLAY   ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
016504  013737  001506  001204                      MOV     @#RPT,$TIMES       ;GET THE ITERATION COUNT
016512  113737  001364  001115                      MOVB    ERR.CT,$ERMAX      ;MAX ERRORS ALLOWED FOR TEST
016520  012737  016520  001106                      MOV     #.,$LPADR          ;SETUP THE LOOP ADDRESS
016526  012737  017214  001252                      MOV     #EXIT21,@#BYPASS
016534  012737  176543  023610                      MOV     #176543,@#$HINUM ;PRIME THE RANDOM NUMBER GENERATOR
016542  012737  123456  023612                      MOV     #123456,@#$LONUM
016550  013737  001510  004176                      MOV     @#FC,@#DTADPB+12 ;CYLINDER
016556  013737  001362  004170                      MOV     TRCKWC,@#DTADPB+4 ;WORD COUNT
016564  012737  047714  004172                      MOV     #BUFFER,@#DTADPB+6 ;BUFFER ADDRESS
016572  012737  000161  004166                      MOV     #WRITE,@#DTADPB+2 ;COMMAND
016600  032737  100000  001220                      BIT     #SW15,@#C.SWR     ;WRITE THE DISK PACK BEFORE TESTING?
016606  001027                                      BNE     3$                ;NO--BRANCH
016610  004037  030770                              JSR     R0,@#FILRAN       ;FILL DATA BUFFER WITH RANDOM DATA
016614  005037  004174          1$:                 CLR     @#DTADPB+10       ;SECTOR AND TRACK
016620  012737  016620  001110                      MOV     #.,$LPERR         ;SETUP THE ERROR LOOP ADDRESS
016626  012706  001100                              MOV     #STACK,SP         ;LOAD THE STACK POINTER
016632                          2$:
016632  004037  025526                              JSR     R0,@#DRVCAL       ;START A DATA TRANSFER
016636  105237  004175                              INCB    @#DTADPB+11       ;NEXT TRACK
```

```
4851  016642  122737  000023  004175          CMPB    #19.,@#DTADPB+11 ,TIME FOR NEXT CYLINDER
4852  016650  003370                          BGT     2$              ,NO--BRANCH
4853  016652  005237  004176                  INC     @#DTADPB+12
4854  016656  023737  001512  004176          CMP     @#LC,@#DTADPB+12 ,OUT OF CYLINDERS?
4855  016664  002353                          BGE     1$              ,NO--BRANCH
4856  016666  012737  177400  004170  3$      MOV     #SCTRWC,@#DTADPB+4 ,WORD COUNT
4857  016674  012737  016710  001106          MOV     #TEST21,@#SLPADR
4858  016702  012737  016710  001110          MOV     #TEST21,@#SLPERR
4859  016710  012706  001100          TEST21  MOV     #STACK,SP       ;SET STACK POINTER
4860  016714  004037  031244                  JSR     R0,@#RANADR     ,GENERATE A RANDOM ADDRESS
4861  016720  013737  004174  001340          MOV     @#DTADPB+10,@#SVADR ,SAVE THE TRACK/SECTOR
4862  016726  013737  004176  001342          MOV     @#DTADPB+12,@#SVADR+2 ,SAVE THE CYLINDER
4863  016734  012737  000161  004166          MOV     #WRITE,@#DTADPB+2 ;COMMAND=WRITE DATA
4864  016742  012701  047714                  MOV     #BUFFER,R1      ;BUFFER ADDRESS
4865  016746  010137  004172                  MOV     R1,@#DTADPB+6
4866  016752  004037  031210                  JSR     R0,@#RANPAT     ;GENERATE RANDOM PATTERN
4867  016756  012737  016756  001110          MOV     .,$LPERR        ,SETUP THE ERROR LOOP ADDRESS
4868  016764  012706  001100                  MOV     #STACK,SP       ,LOAD THE STACK POINTER
4869  016770  004037  025526                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
4870  016774  004037  031244                  JSR     R0,@#RANADR
4871  017000  012737  000171  004166          MOV     #READ,@#DTADPB+2 ;COMMAND=READ DATA
4872  017006  012737  050714  004172          MOV     #BUFFER+512.,@#DTADPB+6 ;BUFFER ADDRESS
4873  017014  012737  017014  001110          MOV     .,$LPERR        ,SETUP THE ERROR LOOP ADDRESS
4874  017022  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
4875  017026  004037  025526                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
4876  017032  004037  031012                  JSR     R0,@#RANCK      ;CHECK THE DATA
4877  017036  013737  001340  004174          MOV     @#SVADR,@#DTADPB+10 ;GET ADDRESS OF WHERE THE LAST
4878  017044  013737  001342  004176          MOV     @#SVADR+2,@#DTADPB+12 ;WRITE WAS PERFORMED
4879  017052  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ;COMMAND=WRITE CHECK DATA
4880  017060  012737  047714  004172          MOV     #BUFFER,@#DTADPB+6 ;DATA BUFFER ADDRESS
4881  017066  012737  017066  001110          MOV     .,$LPERR        ;SETUP THE ERROR LOOP ADDRESS
4882  017074  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
4883  017100  004037  025526                  JSR     R0,@#DRVCAL     ;START A DATA TRANSFER
4884  017104  004037  031244                  JSR     R0,@#RANADR     ,GENERATE A RANDOM ADDRESS
4885  017110  012737  000171  004166          MOV     #READ,@#DTADPB+2 ,COMMAND=READ
4886  017116  012737  050714  004172          MOV     #BUFFER+512.,@#DTADPB+6 ;DATA BUFFER ADDRESS
4887  017124  012737  017124  001110          MOV     .,$LPERR        ,SETUP THE ERROR LOOP ADDRESS
4888  017132  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
4889  017136  004037  025526                  JSR     R0,@#DRVCAL     ,START A DATA TRANSFER
4890  017142  004037  031012                  JSR     R0,@#RANCK      ;CHECK THE DATA
4891  017146  013737  001340  004174          MOV     @#SVADR,@#DTADPB+10 ;GET DISK ADDRESS OF THE
4892  017154  013737  001342  004176          MOV     @#SVADR+2,@#DTADPB+12 ;LAST WRITE
4893  017162  012737  000151  004166          MOV     #WRCKD,@#DTADPB+2 ,COMMAND=WRITE CHECK DATA
4894  017170  012737  047714  004172          MOV     #BUFFER,@#DTADPB+6 ,DATA BUFFER ADDRESS
4895  017176  012737  017176  001110          MOV     .,$LPERR        ,SETUP THE ERROR LOOP ADDRESS
4896  017204  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
4897  017210  004037  025526                  JSR     R0,@#DRVCAL     ,START A DATA TRANSFER
4898  017214  000004                  EXIT21: SCOPE                   ,LOOP ?
4899
4900                                   SBTTL  *** RP04 ACCESS TIME ADJUSTMENT TEST ***
4901
4902                                  ;*****************************************************************
4903                                  ;*TEST 22        RP04 ACCESS TIME ADJUSTMENT TEST
4904
4905                                  ;*      THIS TEST PERFORMS SEEKS BETWEEN CYLINDERS 0 & 136 TO ALLOW THE
4906                                  ;*      OPERATOR TO ADJUST THE ACCESS TIME ON AN RP04 USING THE
```

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                                        T22     RP04 ACCESS TIME ADJUSTMENT TEST                                        SEQ 0093

                                        .*      DDU   THE PROGRAM STALLS APPROXIMATELY 5 SECONDS BETWEEN SEEKS
                                        .*      SO THAT THE ACCESS TIME INDICATORS ON THE DDU MAY BE OBSERVED

                                        ..**********************************************************************
017216                                  TST22
017216  000240                                  NOP
017220  033737  001430  001236                  BIT     BITS+<22*2-40>,TSTNMS+2  ,DO THIS TEST ?
017226  001002                                  BNE     64$                      ,YES--BRANCH
017230  000137  017366                          JMP     $EOP                     ,NO--GO TO THE END OF THE PROGRAM
017234  012737  000022  001102  64$             MOV     #22,@#$TSTNM             ,SET UP TEST NUMBER AND
                                                                                 ;CLEAR THE ERROR FLAG (SERFLG)
017242  004737  024612                          JSR     PC,LOOPRM                ;LOAD THE PARMETERS FOR THE TEST
017246  012737  017304  001110                  MOV     #TEST22,@#$LPERR  ,SETUP THE LOOP ON ERROR ADDRESS
017254  013777  001102  161660                  MOV     $TSTNM,@DISPLAY  ;LOAD THE TEST NUMBER INTO THE DISPLAY REGISTER
017262  013737  001506  001204                  MOV     @#RPT,$TIMES             ,GET THE ITERATION COUNT
017270  112737  000144  001115                  MOVB    #100.,$ERMAX             ;MAX ERRORS ALLOWED FOR TEST
017276  012737  017304  001106                  MOV     #TEST22,$LPADR   ,SETUP THE LOOP ADDRESS
017304  012706  001100          TEST22          MOV     #STACK,SP                ,SETUP THE STACK POINTER
017310  013737  001512  004116                  MOV     LC,DPB A+12              ,ENDING CYLINDER
017316  112737  000105  004106                  MOVB    #SEEK,@#DPB A+2  ,SEEK=COMMAND
017324  004037  025034                          JSR     R0,@#CALL A              ,GO EXECUTE THE COMMAND
017330  004037  026366                          JSR     R0,STALL                 ,STALL
017334  001360                                   WORD   STALL3                   ;ADDRESS OF STALL VALUE
017336  013737  001510  004116                  MOV     FC,DPB A+12              ,STARTING CYLINDER
017344  112737  000105  004106                  MOVB    #SEEK,@#DPB A+2  ,SEEK=COMMAND
017352  004037  025034                          JSR     R0,@#CALL A              ,GO EXECUTE THE COMMAND
017356  004037  026366                          JSR     R0,STALL                 ,STALL
017362  001360                                   WORD   STALL3                   ,ADDRESS OF STALL VALUE
017364  000004          EXIT22          SCOPE                                   ,LOOP ?



                                         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

017366                                  $EOP
017366  104401  017374                          TYPE    ,65$             ,,TYPE ASCIZ STRING
017372  000410                                  BR      64$              ,,GET OVER THE ASCIZ
                                        ,,65$    ASCIZ  <CR><LF><LF>/END OF PASS/
017414                                  64$
017414  005737  001232                          TST     @#DRVSEL         ,ANY DRIVES SELECTED?
017420  001434                                  BEQ     1$               ,NO--BRANCH
017422  104401  017430                          TYPE    ,67$             ,,TYPE ASCIZ STRING
017426  000405                                  BR      66$              ,,GET OVER THE ASCIZ
                                        ,,67$    ASCIZ  / ON DRIVE/
017442                                  66$
017442  013746  001254                          MOV     @#C:#KDRV,-(SP)  ,,SAVE @#CHKDRV FOR TYPEOUT
017446  104403                                  TYPOS                    ,,GO TYPE--OCTAL ASCII
017450     002                                   BYTE   2                ,,TYPE 2 DIGIT(S)
017451     000                                   BYTE   0                ,,SUPPRESS LEADING ZEROS
017452  104401  017460                          TYPE    ,69$             ,,TYPE ASCIZ STRING
```

```
 4963  017456  000412                          BR      68$                ,,GET OVER THE ASCIZ
 4964                                ,,69$      ASCIZ   /   ERRORS DETECTED=/
 4965  017504                        68$
 4966  017504  013746  001112                  MOV     @#SERTTL,-(SP)     ,,SAVE @#SERTTL FOR TYPEOUT
 4967  017510  104402                          TYPOC                      ,,GO TYPE--OCTAL ASCII(ALL DIGITS)
 4968  017512  005037  001112          1$      CLR     @#SERTTL           ,ZERO ERROR TOTAL
 4969  017516  005037  001102                  CLR     $TSTNM             ,,ZERO THE TEST NUMBER
 4970  017522  005037  001204                  CLR     $TIMES             ,,ZERO THE NUMBER OF ITERATIONS
 4971  017526  005237  001100                  INC     $PASS              ,,INCREMENT THE PASS NUMBER
 4972  017532  042737  100000  001100          BIC     #100000,$PASS      ,,DON'T ALLOW A NEG  NUMBER
 4973  017540  005327                          DEC     (PC)+              ,,LOOP?
 4974  017542  000010                $EOPCT    WORD    8
 4975  017544  003030                          BGT     $DOAGN             ,,YES
 4976  017546  012737                          MOV     (PC)+,@(PC)+       ,,RESTORE COUNTER
 4977  017550  000010                $ENDCT    .WORD   8
 4978  017552  017542                          $EOPCT
 4979  017554  104401  017562                  TYPE    ,65$               ,,TYPE ASCIZ STRING
 4980  017560  000410                          BR      64$                ,,GET OVER THE ASCIZ
 4981                                ,,65$      ASCIZ   <CR><LF>/END OF TEST /
 4982  017602                        64$
 4983  017602  104401  017632                  TYPE    ,$ENULL            ,TYPE NULL CHARACTER
 4984  017606  013700  000042        $GET42    MOV     @#42,R0            ,,GET MONITOR ADDRESS
 4985  017612  001405                          BEQ     $DOAGN             ,,BRANCH IF NO MONITOR
 4986  017614  000005                          RESET                      ,,CLEAR THE WORLD
 4987  017616  004710                $ENDAD    JSR     PC,(R0)            ,,GO TO MONITOR
 4988  017620  000240                          NOP                        ,,SAVE ROOM
 4989  017622  000240                          NOP                        , FOR
 4990  017624  000240                          NOP                        ,,ACT11
 4991  017626                        $DOAGN
 4992  017626  000137                          JMP     @(PC)+             ,,RETURN
 4993  017630  006102                $RTNAD    WORD    RESTART
 4994  017632    377     377   000   $ENULL    BYTE    -1,-1,0            ,,NULL CHARACTER STRING
 4995          017636                          EVEN
```

```
 4996
 4997                                    SBTTL  ### SYSMAC SUBROUTINES ###
 4998
 4999                                    SBTTL  ERROR HANDLER ROUTINE
 5000
 5001                                    ,,##########################################################################
 5002                                    ,#THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
 5003                                    ,#SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
 5004                                    ,#AND GO TO TYPERR ON ERROR
 5005                                    ,#THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE
 5006                                    ,#SW15=1        HALT ON ERROR
 5007                                    ,#SW13=1        INHIBIT ERROR TYPEOUTS
 5008                                    ,#SW10=1        BELL ON ERROR
 5009                                    ,#SW09=1        LOOP ON ERROR
 5010                                    ,#CALL
 5011                                    ,#      ERROR   N       ,,ERROR=EMT AND N=ERROR ITEM NUMBER
 5012
 5013  017636                            $ERROR
 5014  017636  104407                            CKSWR                   ,,TEST FOR CHANGE IN SOFT-SWR
 5015  017640  032777  000400  161272            BIT     #SW08,@SWR      ,SEND ERROR MESSAGE TO TTY?
 5016  017646  001411                            BEQ     7$              ,YES--BRANCH
 5017  017650  005737  001230                    TST     @#LPTAVL        ,IS THERE A LINE PRINTER AVAILABLE?
 5018  017654  001406                            BEQ     7$              ,NO--BRANCH
 5019  017656  013737  001420  001150            MOV     @#LPS,@#$TPS    ,YES--SETUP STATUS
 5020  017664  013737  001422  001152            MOV     @#LPB,@#$TPB    ,AND BUFFER REG 'S FOR LINE PRINTER
 5021  017672  105237  001103          7$        INCB    $ERFLG          ,,SET THE ERROR FLAG
 5022  017676  001775                            BEQ     7$              ,,DON'T LET THE FLAG GO TO ZERO
 5023  017700  013777  001102  161234            MOV     $TSTNM,@DISPLAY ,,DISPLAY TEST NUMBER AND ERROR FLAG
 5024  017706  032777  002000  161224            BIT     #BIT10,@SWR     ,,BELL ON ERROR?
 5025  017714  001402                            BEQ     1$              ,,NO - SKIP
 5026  017716  104401  001210                    TYPE    ,$BELL          ,,RING BELL
 5027  017722  005237  001112          1$        INC     $ERTTL          ,,COUNT THE NUMBER OF ERRORS
 5028  017726  011637  001116                    MOV     (SP),$ERRPC     ,,GET ADDRESS OF ERROR INSTRUCTION
 5029  017732  162737  000002  001116            SUB     #2,$ERRPC
 5030  017740  117737  161152  001114            MOVB    @$ERRPC,$ITEMB  ,,STRIP AND SAVE THE ERROR ITEM CODE
 5031  017746  032777  020000  161164            BIT     #BIT13,@SWR     ,,SKIP TYPEOUT IF SET
 5032  017754  001004                            BNE     20$             ,,SKIP TYPEOUTS
 5033  017756  004737  020056                    JSR     PC,TYPERR       ,,GO TO USER ERROR ROUTINE
 5034  017762  104401  001215                    TYPE    ,$CRLF
 5035  017766                          20$
 5036  017766  005777  161146          2$        TST     @SWR            ,,HALT ON ERROR
 5037  017772  100002                            BPL     3$              ,,SKIP IF CONTINUE
 5038  017774  000000                            HALT                    ,,HALT ON ERROR!
 5039  017776  104407                            CKSWR                   ,,TEST FOR CHANGE IN SOFT SWR
 5040  020000  032777  001000  161132  3$        BIT     #BIT09,@SWR     ,,LOOP ON ERROR SWITCH SET?
 5041  020006  001402                            BEQ     4$              ,,BR IF NO
 5042  020010  013716  001110                    MOV     $LPERR,(SP)     ,,FUDGE RETURN FOR LOOPING
 5043  020014  005737  001206          4$        TST     $ESCAPE         ,,CHECK FOR AN ESCAPE ADDRESS
 5044  020020  001402                            BEQ     5$              ,,BR IF NONE
 5045  020022  013716  001206                    MOV     $ESCAPE,(SP)    ,,FUDGE RETURN ADDRESS FOR ESCAPE
 5046  020026                          5$
 5047  020026  023737  000042  000046            CMP     @#42,@#46               ,ACT11 AUTOMATIC MODE?
 5048  020034  001001                            BNE     6$              ,NO, CONTINUE
 5049  020036  000240                            NOP
 5050  020040  013737  001414  001150  6$        MOV     @#TPS,@#$TPS    ,SET STATUS AND BUFFER REG 'S
 5051  020046  013737  001416  001152            MOV     @#TPB,@#$TPB    ,FOR TTY
```

```
5052  020054  000002                          RTI                     ;RETURN FROM ERROR CALL
5053
5054                                  ;;*****************;*************************************************
5055                                   $BTTL  TYPERR - TYPE ERROR ROUTINE
5056                                  ;THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE
5057                                  ;WHICH ERROR IS TO BE REPORTED, IT THEN OBTAINS, FROM THE "ERROR
5058                                  ;TABLE" ($ERRTB), AND REPORTS THE APPROPIATE INFORMATION
5059                                  ;CONCERNING THE ERROR
5060                                  ;CALL
5061                                  ;       JSR     PC,@#TYPERR
5062                                  ;       RETURN
5063
5064  020056  113737  001102  001176  TYPERR  MOVB    @#$TSTNM,@#$TMPO        ;SAVE THE TEST NUMBER
5065  020064  104412                  SAVREG                  ;SAVE R0 - R5
5066  020066  162700  000004          SUB     #4,R0           ;FORM TEST PC
5067  020072  010037  001162          MOV     R0,@#$REG0      ;COPY R0-R5 IN $REG0-$REG5
5068  020076  010137  001164          MOV     R1,@#$REG1
5069  020102  010237  001166          MOV     R2,@#$REG2
5070  020106  010337  001170          MOV     R3,@#$REG3
5071  020112  010437  001172          MOV     R4,@#$REG4
5072  020116  010537  001174          MOV     R5,@#$REG5
5073  020122  113700  001114          MOVB    @#$ITEMB,R0     ;PICKUP ERROR ITEM NUMBER
5074  020126  010001                  MOV     R0,R1           ;AND COPY IT INTO R1
5075  020130  005300                  DEC     R0              ;FORM INDEX FOR ERROR TABLE
5076  020132  106300                  ASLB    R0
5077  020134  106300                  ASLB    R0
5078  020136  106300                  ASLB    R0
5079  020140  103002                  BCC     1$              ;IS ERROR > 37?
5080  020142  062700  000240          ADD     #ITEM41-$ERRTB,R0 ;YES--FORM OFFSET
5081  020146  062700  004306  1$      ADD     #$ERRTB,R0      ;FORM ADDRESS
5082  020152  012037  020166          MOV     (R0)+,2$        ;GET ERROR MESSAGE (EM) POINTER
5083  020156  001447                  BEQ     7$              ;BRANCH IF THERE ISN'T ONE
5084  020160  104401  001215          TYPE    ,$CRLF          ;"CARRIAGE RETURN - LINE FEED
5085  020164  104401                  TYPE
5086  020166  000000          2$      .WORD   0               ;"EM" POINTER GOES HERE
5087  020170  162701  000041          SUB     #41,R1          ;SPECIAL ERROR ITEM NUMBER?
5088  020174  100440                  BMI     7$              ;NO--BRANCH
5089  020176  013701  001260          MOV     @#$VSTAT,R1     ;GET STATUS/ERROR INDICATOR
5090  020202  106301                  ASLB    R1              ;STRIP "DONE" BIT (BIT07)
5091  020204  006301                  ASL     R1              ;STRIP "ERROR" BIT (BIT15)
5092  020206  012702  004254          MOV     #STATBL,R2      ;1ST ADDRESS ON STATUS MESSAGE POINTERS
5093  020212  005003                  CLR     R3              ;CARRIAGE RETURN-LINE FEED SWITCH
5094  020214  104401  020222          TYPE    ,65$            ;;TYPE ASCIZ STRING
5095  020220  000402                  BR      64$             ;;GET OVER THE ASCIZ
5096                          ;;65$    .ASCIZ  / (/
5097  020226                  64$
5098  020226  012237  020250  3$      MOV     (R2)+,5$        ;MESSAGE POINTER
5099  020232  006301                  ASL     R1              ;TYPE THIS MESSAGE?
5100  020234  103013                  BCC     6$              ;NO--BRANCH
5101  020236  005103                  COM     R3              ;YES--TYPE A "CR" & "LF"?
5102  020240  001002                  BNE     4$              ;NO--BRANCH
5103  020242  104401  001215          TYPE    ,$CRLF          ;YES
5104  020246  104401          4$      TYPE
5105  020250  000000          5$      .WORD   0               ;MESSAGE POINTER GOES HERE
5106  020252  005701                  TST     R1              ;MORE TO TYPE?
5107  020254  001403                  BEQ     6$              ;NO--BRANCH
```

```
 5108  020256  104401  044042                TYPE    ,MSG SP          ,YES--SPACES
 5109  020262  000761                        BR      3$               ,LOOP
 5110  020264  001360                6$      BNE     3$               ,BRANCH IF NOT FINISHED
 5111  020266  104401  020274                TYPE    ,67$             ,,TYPE ASCIZ STRING
 5112  020272  000401                        BR      66$              ,,GET OVER THE ASCIZ
 5113                                  ,,67$   ASCIZ   /)/
 5114  020276                        66$
 5115  020276  012037  020312        7$      MOV     (R0)+,8$         ,PICK UP DATA HEADER (DH) POINTER
 5116  020302  001404                        BEQ     9$               ,BRANCH IF NONE
 5117  020304  104401  001215                TYPE    ,$CRLF           ,CARRIAGE RETURN-LINE FEED
 5118  020310  104401                        TYPE
 5119  020312  000000                8$      .WORD   0                ,"DH" POINTER GOES HERE
 5120  020314  012001                9$      MOV     (R0)+,R1         ,PICKUP DATA TABLE (DT) POINTER
 5121  020316  001450                        BEQ     20$              ,BRANCH IF NONE
 5122  020320  005005                        CLR     R5               ,SET INDENT SWITCH
 5123  020322  012000                        MOV     @(R0)+,R0        ,DATA FORMAT (DF) POINTER
 5124  020324  012002                        MOV     (R0)+,R2         ,NUMBER OF DH'S TO TYPE
 5125  020326  001441                        BEQ     17$              ,BRANCH IF DH NUMBER IS 0
 5126  020330  005105                        COM     R5               ,NO INDENT
 5127  020332  104401  001215                TYPE    ,$CRLF           ,CARRIAGE RETURN-LINE FEED
 5128  020336  112003                10$     MOVB    (R0)+,R3         ,NUMBER OF DATA WORDS TO TYPE
 5129  020340  112004                        MOVB    (R0)+,R4         ,AND HOW TO TYPE THEM
 5130  020342  006004                11$     ROR     R4               ,OCTAL OR DECIMAL?
 5131  020344  103403                        BCS     12$              ,DECIMAL--BRANCH
 5132  020346  013146                        MOV     @(R1)+,-(SP)     ,,SAVE @(R1)+ FOR TYPEOUT
 5133  020350  104402                        TYPOC                    ,,GO TYPE--OCTAL ASCII(ALL DIGITS)
 5134  020352  000402                        BR      13$
 5135  020354                        12$
 5136  020354  013146                        MOV     @(R1)+,-(SP)     ,,SAVE @(R1)+ FOR TYPEOUT
 5137  020356  104405                        TYPDS                    ,,GO TYPE--DECIMAL ASCII WITH SIGN
 5138  020360  005303                13$     DEC     R3               ,MORE NUMBERS TO TYPE?
 5139  020362  001403                        BEQ     14$              ,NO--BRANCH
 5140  020364  104401  044042                TYPE    ,MSG SP          ,YES--TYPE SEPERATORS
 5141  020370  000764                        BR      11$              ,LOOP
 5142  020372  005302                14$     DEC     R2               ,MORE DH'S?
 5143  020374  003421                        BLE     20$              ,NO--BRANCH
 5144  020376  104401  001215                TYPE    ,$CRLF           ,YES--START A NEW LINE
 5145  020402  005105                        COM     R5               ,INDENT?
 5146  020404  001002                        BNE     15$              ,NO--BRANCH
 5147  020406  104401  044042                TYPE    ,MSG SP          ,YES--TYPE SPACES
 5148  020412  012037  020420        15$     MOV     (R0)+,16$        ,GET NEXT DH
 5149  020416  104401                        TYPE                     ,AND TYPE IT
 5150  020420  000000                16$     .WORD   0                ,DH POINTER GOES HERE
 5151  020422  104401  001215                TYPE    ,$CRLF           ,CARRIAGE RETURN-LINE FEED
 5152  020426  005705                        TST     R5               ,INDENT?
 5153  020430  001342                        BNE     10$              ,NO--BRANCH
 5154  020432  104401  044042        17$     TYPE    ,MSG SP          ,YES--TYPE SPACES
 5155  020436  000737                        BR      10$              ,LOOP
 5156  020440  104413                20$     RESREG                   ,RESTORE R0 - R5
 5157  020442  000207                        RTS     PC               ,RETURN
 5158
 5159                                   SBTTL   TYPE ROUTINE
 5160
 5161                                  ,,*****************************************************************
 5162                                  ,*ROUTINE TO TYPE ASCIZ MESSAGE  MESSAGE MUST TERMINATE WITH A 0 BYTE
 5163                                  ,*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED
```

```
5164                                    .$NOTE1         $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER
5165                                    .$NOTE2         $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED
5166                                    .$NOTE3         $FILLC CONTAINS THE CHARACTER TO FILL AFTER
5167                                    .$
5168                                    .$CALL
5169                                    .$1) USING A TRAP INSTRUCTION
5170                                    .$      TYPE    .MESADR         ..MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
5171                                    .$OR
5172                                    .$      TYPE
5173                                    .$      MESADR
5174                                    .$
5175
5176  020444  105737  001157    $TYPE   TSTB    $TPFLG          ..IS THERE A TERMINAL?
5177  020450  100002                    BPL     1$              ..BR IF YES
5178  020452  000000                    HALT                    ..HALT HERE IF NO TERMINAL
5179  020454  000407                    BR      3$              ..LEAVE
5180  020456  010046            1$      MOV     R0,-(SP)        ..SAVE R0
5181  020460  017600  000002            MOV     @2(SP),R0       ..GET ADDRESS OF ASCIZ STRING
5182  020464  112046            2$      MOVB    (R0)+,-(SP)     ..PUSH CHARACTER TO BE TYPED ONTO STACK
5183  020466  001005                    BNE     4$              ..BR IF IT ISN'T THE TERMINATOR
5184  020470  005726                    TST     (SP)+           ..IF TERMINATOR POP IT OFF THE STACK
5185  020472  012600            60$     MOV     (SP)+,R0        ..RESTORE R0
5186  020474  062716  000002    3$      ADD     #2,(SP)         ..ADJUST RETURN PC
5187  020500  000002                    RTI                     ..RETURN
5188  020502  122716  000011    4$      CMPB    #HT,(SP)        ..BRANCH IF <HT>
5189  020506  001430                    BEQ     8$
5190  020510  122716  000200            CMPB    #CRLF,(SP)      ..BRANCH IF NOT <CRLF>
5191  020514  001006                    BNE     5$
5192  020516  005726                    TST     (SP)+           ..POP  <CR><LF> EQUIV
5193  020520  104401                    TYPE                    ..TYPE A CR AND LF
5194  020522  001215                    $CRLF
5195  020524  105037  020660            CLRB    $CHARCNT        ..CLEAR CHARACTER COUNT
5196  020530  000755                    BR      2$              ..GET NEXT CHARACTER
5197  020532  004737  020614    5$      JSR     PC,$TYPEC       ..GO TYPE THIS CHARACTER
5198  020536  123726  001156    6$      CMPB    $FILLC,(SP)+    ..IS IT TIME FOR FILLER CHARS ?
5199  020542  001350                    BNE     2$              ..IF NO GO GET NEXT CHAR
5200  020544  013746  001154            MOV     $NULL,-(SP)     ..GET # OF FILLER CHARS  NEEDED
5201                                                            ..AND THE NULL CHAR
5202  020550  105366  000001    7$      DECB    1(SP)           ..DOES A NULL NEED TO BE TYPED?
5203  020554  002770                    BLT     6$              ..BR IF NO--GO POP THE NULL OFF OF STACK
5204  020556  004737  020614            JSR     PC,$TYPEC       ..GO TYPE A NULL
5205  020562  105337  020660            DECB    $CHARCNT        ..DO NOT COUNT AS A COUNT
5206  020566  000770                    BR      7$              ..LOOP
5207
5208                                    .HORIZONTAL TAB PROCESSOR
5209
5210  020570  112716  000040    8$      MOVB    #' ,(SP)        ..REPLACE TAB WITH SPACE
5211  020574  004737  020614    9$      JSR     PC,$TYPEC       ..TYPE A SPACE
5212  020600  132737  000007  020660    BITB    #7,$CHARCNT     ..BRANCH IF NOT AT
5213  020606  001372                    BNE     9$              ..TAB STOP
5214  020610  005726                    TST     (SP)+           ..POP SPACE OFF STACK
5215  020612  000724                    BR      2$              ..GET NEXT CHARACTER
5216  020614  105777  160330    $TYPEC  TSTB    @$TPS           ..WAIT UNTIL PRINTER IS READY
5217  020620  100375                    BPL     $TYPEC
5218  020622  116677  000002  160322    MOVB    2(SP),@$TPB     ..LOAD CHAR TO BE TYPED INTO DATA REG
5219  020630  122766  000015  000002    CMPB    #CR,2(SP)       ..IS CHARACTER A CARRIAGE RETURN?
```

```
5220  020636  001003                          BNE     1$              ;;BRANCH IF NO
5221  020640  105037  020660                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
5222  020644  000406                          BR      $TYPEX          ;;EXIT
5223  020646  122766  000012  000002  1$      CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
5224  020654  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
5225  020656  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
5226  020660  000000                $CHARCNT  WORD    0               ;;CHARACTER COUNT STORAGE
5227  020662  000207                $TYPEX    RTS     PC
5228
5229
5230                                  SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
5231
5232                                ;;**************************************************************
5233                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
5234                                ;*OCTAL (ASCII) NUMBER AND TYPE IT
5235                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
5236                                ;*CALL
5237                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
5238                                ;*      TYPOS                   ;;CALL FOR TYPEOUT
5239                                ;*       BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
5240                                ;*       BYTE   M               ;;M=1 OR 0
5241                                ;*                                      ;;1=TYPE LEADING ZEROS
5242                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
5243                                ;*
5244                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
5245                                ;*$TYPOS OR $TYPOC
5246                                ;*CALL
5247                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
5248                                ;*      TYPON                   ;;CALL FOR TYPEOUT
5249                                ;*
5250                                ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
5251                                ;*CALL
5252                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
5253                                ;*      TYPOC                   ;;CALL FOR TYPEOUT
5254
5255  020664  017646  000000        $TYPOS    MOV     @(SP),-(SP)     ;;PICKUP THE MODE
5256  020670  116637  000001  021107          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
5257  020676  112637  021111                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
5258  020702  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
5259  020706  000406                          BR      $TYPON
5260  020710  112737  000001  021107  $TYPOC. MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
5261  020716  112737  000006  021111          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
5262  020724  112737  000005  021106  $TYPON  MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
5263  020732  010346                          MOV     R3,-(SP)        ;;SAVE R3
5264  020734  010446                          MOV     R4,-(SP)        ;;SAVE R4
5266  020736  010546                          MOV     R5,-(SP)        ;;SAVE R5
5266  020740  113704  021111                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
5267  020744  005404                          NEG     R4
5268  020746  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX  ALLOWED
5269  020752  110437  021110                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
5270  020756  113704  021107                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
5271  020762  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
5272  020766  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
5273  020770  006105                  1$      ROL     R5              ;;ROTATE MSB INTO "C"
5274  020772  000404                          BR      3$              ;;GO DO MSB
5275  020774  006105                  2$      ROL     R5              ;;FORM THIS DIGIT
```

```
 5276  020776  006105                        ROL     R5
 5277  021000  006105                        ROL     R5
 5278  021002  010503                        MOV     R5,R3
 5279  021004  006103                3$      ROL     R3              ;;GET LSB OF THIS DIGIT
 5280  021006  105337  021110                DECB    $OMODE          ;;TYPE THIS DIGIT?
 5281  021012  100016                        BPL     7$              ;;BR IF NO
 5282  021014  042703  177770                BIC     #  7770,R3      ;;GET RID OF JUNK
 5283  021020  001002                        BNE     4$              ;;TEST FOR 0
 5284  021022  005704                        TST     R4              ;;SUPPRESS THIS 0?
 5285  021024  001403                        BEQ     5$              ;;BR IF YES
 5286  021026  005204                4$      INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 5287  021030  052703  000060                BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 5288  021034  052703  000040          5$    BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 5289  021040  110337  021104                MOVB    R3,8$           ;;SAVE FOR TYPING
 5290  021044  104401  021104                TYPE    ,8$             ;;GO TYPE THIS DIGIT
 5291  021050  105337  021106          7$    DECB    $OCNT           ;;COUNT BY 1
 5292  021054  003347                        BGT     2$              ;;BR IF MORE TO DO
 5293  021056  002402                        BLT     6$              ;;BR IF DONE
 5294  021060  005204                        INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 5295  021062  000744                        BR      2$              ;;GO DO THE LAST DIGIT
 5296  021064  012605                6$      MOV     (SP)+,R5        ;;RESTORE R5
 5297  021066  012604                        MOV     (SP)+,R4        ;;RESTORE R4
 5298  021070  012603                        MOV     (SP)+,R3        ;;RESTORE R3
 5299  021072  016666  000002  000004        MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 5300  021100  012616                        MOV     (SP)+,(SP)
 5301  021102  000002                        RTI                     ;;RETURN
 5302  021104     000                8$      .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 5303  021105     000                        .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 5304  021106     000                $OCNT   .BYTE   0               ;;OCTAL DIGIT COUNTER
 5305  021107     000                $OFILL  .BYTE   0               ;;ZERO FILL SWITCH
 5306  021110  000000                $OMODE  .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 5307
 5308                                 .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
 5309
 5310                                ;;*******************************************************************
 5311                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
 5312                                ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT  DEPENDING ON WHETHER THE
 5313                                ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
 5314                                ;*BEFORE THE FIRST DIGIT OF THE NUMBER  LEADING ZEROS WILL ALWAYS BE
 5315                                ;*REPLACED WITH SPACES
 5316                                ;*CALL.
 5317                                ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
 5318                                ;*      TYPDS                   ;;GO TO THE ROUTINE
 5319
 5320  021112                        $TYPDS
 5321  021112  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 5322  021114  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 5323  021116  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 5324  021120  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 5325  021122  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 5326  021124  012746  020200                MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 5327  021130  016605  000020                MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 5328  021134  100004                        BPL     1$              ;;BR IF INPUT IS POS
 5329  021136  005405                        NEG     R5              ;;MAKE THE BINARY NUMBER POS
 5330  021140  112766  000055  000001        MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG
 5331  021146  005000                1$      CLR     R0              ;;ZERO THE CONSTANTS INDEX
```

```
5332  021150  012703  021326                MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
5333  021154  112723  000040                MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
5334  021160  005002                 2$      CLR     R2              ;;CLEAR THE BCD NUMBER
5335  021162  016001  021316                MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
5336  021166  160105                 3$      SUB     R1,R5           ;;FORM THIS BCD DIGIT
5337  021170  002402                         BLT     4$              ;;BR IF DONE
5338  021172  005202                         INC     R2              ;;INCREASE THE BCD DIGIT BY 1
5339  021174  000774                         BR      3$
5340  021176  060105                 4$      ADD     R1,R5           ;;ADD BACK THE CONSTANT
5341  021200  005702                         TST     R2              ;;CHECK IF BCD DIGIT=0
5342  021202  001002                         BNE     5$              ;;FALL THROUGH IF 0
5343  021204  105716                         TSTB    (SP)            ;;STILL DOING LEADING 0'S?
5344  021206  100407                         BMI     7$              ;;BR IF YES
5345  021210  106316                 5$      ASLB    (SP)            ;;MSD?
5346  021212  103003                         BCC     6$              ;;BR IF NO
5347  021214  116663  000001  177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
5348  021222  052702  000060          6$    BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
5349  021226  052702  000040          7$    BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
5350  021232  110223                         MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
5351  021234  005720                         TST     (R0)+           ;;JUST INCREMENTING
5352  021236  020027  000010                CMP     R0,#10          ;;CHECK THE TABLE INDEX
5353  021242  002746                         BLT     2$              ;;GO DO THE NEXT DIGIT
5354  021244  003002                         BGT     8$              ;;GO TO EXIT
5355  021246  010502                         MOV     R5,R2           ;;GET THE LSD
5356  021250  000764                         BR      6$              ;;GO CHANGE TO ASCII
5357  021252  105726                 8$      TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
5358  021254  100003                         BPL     9$              ;;BR IF NO
5359  021256  116663  177777  177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
5360  021264  105013                 9$      CLRB    (R3)            ;;SET THE TERMINATOR
5361  021266  012605                         MOV     (SP)+,R5        ;;POP STACK INTO R5
5362  021270  012603                         MOV     (SP)+,R3        ;;POP STACK INTO R3
5363  021272  012602                         MOV     (SP)+,R2        ;;POP STACK INTO R2
5364  021274  012601                         MOV     (SP)+,R1        ;;POP STACK INTO R1
5365  021276  012600                         MOV     (SP)+,R0        ;;POP STACK INTO R0
5366  021300  104401  021326                TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
5367  021304  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
5368  021312  012616                         MOV     (SP)+,(SP)
5369  021314  000002                         RTI                     ;;RETURN TO USER
5370  021316  023420                 $DTBL   10000
5371  021320  001750                         1000
5372  021322  000144                         100
5373  021324  000012                         10
5374  021326  000004                 $DBLK    BLKW   4
5375
5376                                  SBTTL   TTY INPUT ROUTINE
5377
5378                                  ;;**************************************************************************
5379                                  ENABL   LSB
5380  021336  000000                 $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
5381  021340  000000                 $TKQIN: .WORD   0               ;;INPUT POINTER
5382  021342  000000                 $TKQOUT: .WORD  0               ;;OUTPUT POINTER
5383  021344  000002                 $TKQSRT: .BLKB  2               ;;TTY KEYBOARD QUEUE
5384          021346                 $TKQEND=.
5385
5386                                  ;*TK INITIALIZE ROUTINE
5387                                  ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
```

```
5388                                    ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
5389                                    ;
5390                                    ;*CALL.
5391                                    ;*      JSR     PC,$TKINT
5392                                    ;*      RETURN
5393                                    ;
5394  021346  005037  021336             $TKINT  CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
5395  021352  012737  021344  021340           MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
5396  021360  013737  021340  021342           MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS
5397  021366  012737  021416  000060           MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
5398  021374  012737  000200  000062           MOV     #200,@#TKVEC+2  ;;"BR" LEVEL 4
5399  021402  005777  157540                   TST     @$TKB           ;;CLEAR DONE FLAG
5400  021406  012777  000100  157530           MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
5401  021414  000207                           RTS     PC              ;;RETURN TO CALLER
5402
5403                                    ;*TK SERVICE ROUTINE
5404                                    ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
5405                                    ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
5406                                    ;*IT IN THE QUEUE.
5407                                    ;*IF THE CHARACTER IS A "CONTROL-C" ( C) $TKINT IS CALLED AND
5408                                    ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (START2)
5409                                    ;
5410  021416  117746  157524             $TKSRV  MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
5411  021422  042716  177600                     BIC     #^C177,(SP)     ;;STRIP THE JUNK
5412  021426  021627  000003                     CMP     (SP),#3         ;;IS IT A CONTROL C?
5413  021432  001007                             BNE     1$              ;;BRANCH IF NO
5414  021434  104401  022546                     TYPE    ,$CNTLC         ;;TYPE A CONTROL-C ( C)
5415  021440  004737  021346                     JSR     PC,$TKINT       ;;INIT THE KEYBOARD
5416  021444  005726                             TST     (SP)+           ;;CLEAN UP STACK
5417  021446  000137  004660                     JMP     START2          ;;CONTROL C RESTART
5418  021452  021627  000007             1$      CMP     (SP),#7         ;;IS IT A CONTROL G?
5419  021456  001004                             BNE     2$              ;;BRANCH IF NO
5420  021460  022737  000176  001140             CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
5421  021466  001500                             BEQ     6$              ;;GO TO SWR CHANGE
5422
5423  021470                             2$
5424  021470  022737  000002  021336             CMP     #2,$TKCNT       ;;IS THE QUEUE FULL?
5425  021476  001004                             BNE     3$              ;;BRANCH IF NO
5426  021500  104401  001210                     TYPE    ,$BELL          ;;RING THE TTY BELL
5427  021504  005726                             TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
5428  021506  000451                             BR      5$              ;;EXIT
5429  021510  021627  000023             3$      CMP     (SP),#23        ;;IS IT A CONTROL-S?
5430  021514  001021                             BNE     32$             ;;BRANCH IF NO
5431  021516  005077  157422                     CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
5432  021522  005726                             TST     (SP)+           ;;CLEAN CHAR OFF STACK
5433  021524  105777  157414             31$     TSTB    @$TKS           ;;WAIT FOR A CHAR
5434  021530  100375                             BPL     31$             ;;LOOP UNTIL ITS THERE
5435  021532  117746  157410                     MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
5436  021536  042716  177600                     BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
5437  021542  022627  000021                     CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
5438  021546  001366                             BNE     31$             ;;BRANCH IF NO
5439  021550  012777  000100  157366             MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
5440  021556  000002                             RTI                     ;;RETURN
5441  021560  005237  021336             32$     INC     $TKCNT          ;;COUNT THIS CHARACTER
5442  021564  021627  000140                     CMP     (SP),#140       ;;IS IT UPPER CASE?
5443  021570  002405                             BLT     4$              ;;BRANCH IF YES
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5444  021572  021627  000175                  CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
5445  021576  003002                          BGT     4$              ;;BRANCH IF YES
5446  021600  042716  000040                  BIC     #40,(SP)        ;;MAKE IT UPPER CASE
5447  021604  112677  177530          4$      MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
5448  021610  005237  021340                  INC     $TKQIN          ;;UPDATE THE POINTER
5449  021614  023727  021340  021346          CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
5450  021622  001003                          BNE     5$              ;;BRANCH IF NO
5451  021624  012737  021344  021340          MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
5452  021632  000002                  5$      RTI                     ;;RETURN
5453
5454                                  ;;**************************************************************
5455                                  ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
5456                                  ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
5457                                  ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
5458                                  ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
5459  021634  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
5460  021642  001124                          BNE     15$             ;;EXIT IF NOT
5461  021644  105777  157274                  TSTB    @$TKS           ;;IS A CHAR WAITING?
5462  021650  100121                          BPL     15$             ;;IF NOT, EXIT
5463  021652  117746  157270                  MOVB    @$TKB,-(SP)     ;;YES
5464  021656  042716  177600                  BIC     # C177,(SP)     ;;MAKE IT  7-BIT ASCII
5465  021662  021627  000007                  CMP     (SP),#7         ;;IS IT A CONTROL-G?
5466  021666  001300                          BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
5467                                                                  ;;AND EXIT
5468
5469                                  ;;**************************************************************
5470                                  ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
5471                                  ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
5472                                  ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED
5473  021670  123727  001134  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
5474  021676  001674                          BEQ     2$              ;;BRANCH IF YES
5475  021700  005726                          TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
5476  021702  004737  021346                  JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
5477  021706  005077  157232                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
5478  021712  112737  000001  001135          MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
5479
5480  021720  104401  022560                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G ( G)
5481  021724  104401  022565          $GTSWR. TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
5482  021730  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
5483  021734  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
5484  021736  104401  022576                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
5485  021742  005046                  19$     CLR     -(SP)           ;;CLEAR COUNTER
5486  021744  005046                          CLR     -(SP)           ;;THE NEW SWR
5487  021746  105777  157172          7$      TSTB    @$TKS           ;;CHAR THERE?
5488  021752  100375                          BPL     7$              ;;IF NOT TRY AGAIN
5489
5490  021754  117746  157166                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
5491  021760  042716  177600                  BIC     # C177,(SP)     ;;MAKE IT 7-BIT ASCII
5492
5493  021764  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
5494  021770  001015                          BNE     9$              ;;BRANCH IF NOT
5495  021772  104401  022546                  TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C ( C)
5496  021776  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
5497  022002  123727  001135  000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
5498  022010  001003                          BNE     8$              ;;BRANCH IF NO
5499  022012  012777  000100  157124          MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
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```
5500  022020  000137  004660          8$      JMP     START2          ;;CONTROL-C RESTART
5501
5502
5503  022024  021627  000025          9$      CMP     (SP),#25        ;;IS IT A CONTROL-U?
5504  022030  001005                          BNE     10$             ;;BRANCH IF NOT
5505  022032  104401  022553                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U ( U)
5506  022036  062706  000006          20$     ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
5507  022042  000737                          BR      19$             ;;LET'S TRY IT AGAIN
5508
5509
5510  022044  021627  000015          10$     CMP     (SP),#15        ;;IS IT A <CR>?
5511  022050  001022                          BNE     16$             ;;BRANCH IF NO
5512  022052  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
5513  022056  001403                          BEQ     11$             ;;BRANCH IF YES
5514  022060  016677  000002  157052          MOV     2(SP),@SWR      ;;SAVE NEW SWR
5515  022066  062706  000006          11$     ADD     #6,SP           ;;CLEAR UP STACK
5516  022072  104401  001215          14$     TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
5517  022076  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
5518  022104  001003                          BNE     15$             ;;BRANCH IF NOT
5519  022106  012777  000100  157030          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
5520  022114  000002                  15$     RTI                     ;;RETURN
5521  022116  004737  020614          16$     JSR     PC,$TYPEC       ;;ECHO CHAR
5522  022122  0216.7  000060                  CMP     (SP),#60        ;;CHAR < 0?
5523  022126  002420                          BLT     18$             ;;BRANCH IF YES
5524  022130  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
5525  022134  003015                          BGT     18$             ;;BRANCH IF YES
5526  022136  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
5527  022142  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
5528  022146  001403                          BEQ     17$             ;;BRANCH IF YES
5529  022150  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
5530  022152  006316                          ASL     (SP)            ;;   CHAR OVER TO MAKE
5531  022154  006316                          ASL     (SP)            ;;   ROOM FOR NEW ONE
5532  022156  005266  000002          17$     INC     2(SP)           ;;KEEP COUNT OF CHAR
5533  022162  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
5534  022166  000667                          BR      7$              ;;GET THE NEXT ONE
5535  022170  104401  001214          18$     TYPE    ,$QUES          ;;TYPE ?<CR><LF>
5536  022174  000720                          BR      20$             ;;SIMULATE CONTROL-U
5537                                  DSABL   LSB
5538
5539
5540                                  ;;*****************************************************************
5541                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
5542                                  ;*CALL
5543                                  ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
5544                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
5545                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
5546                                  ;
5547
5548  022176  011646          $RDCHR  MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
5549  022200  016666  000004  000002          MOV     4(SP),2(SP)     ;;THE PS
5550  022206  005066  000004                  CLR     4(SP)           ;;GET READY FOR A CHARACTER
5551  022212  005046                          CLR     -(SP)           ;;PUT NEW PS ON STACK
5552  022214  012746  022222                  MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
5553  022220  000002                          RTI                     ;;POP NEW PC AND PS
5554  022222                          64$
5555  022222  005737  021336          1$      TST     $TKCNT          ;;WAIT ON A CHARACTER
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5556  022226  001775                        BEQ     1$
5557  022230  005337  021336                DEC     $TKCNT          ;;DECREMENT THE COUNTER
5558  022234  117766  177102  000004        MOVB    @$TKQOUT,4(SP)  ;;GET ONE CHARACTER
5559  022242  005237  021342                INC     $TKQOUT         ;;UPDATE THE POINTER
5560  022246  023727  021342  021346        CMP     $TKQOUT,#STKQEND ;;DID IT GO OFF OF THE END?
5561  022254  001003                        BNE     2$              ;;BRANCH IF NO
5562  022256  012737  021344  021342        MOV     #STKQSRT,STKQOUT ;;RESET THE POINTER
5563  022264  000002                2$      RTI                     ;;RETURN
5564                                        ;;**************************************************************
5565                                        ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
5566                                        ;*CALL
5567                                        ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
5568                                        ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
5569                                        ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
5570
5571  022266  010346                $RDLIN  MOV     R3,-(SP)        ;;SAVE R3
5572  022270  005046                        CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
5573  022272  012703  022522        1$      MOV     #$TTYIN,R3      ;;GET ADDRESS
5574  022276  022703  022546        2$      CMP     #$TTYIN+20,R3   ;;BUFFER FULL?
5575  022302  101456                        BLOS    4$              ;;BR IF YES
5576  022304  104410                        RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
5577  022306  112613                        MOVB    (SP)+,(R3)      ;;GET CHARACTER
5578  022310  122713  000177        10$     CMPB    #177,(R3)       ;;IS IT A RUBOUT
5579  022314  001022                        BNE     5$              ;;BR IF NO
5580  022316  005716                        TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
5581  022320  001007                        BNE     6$              ;;BR IF NO
5582  022322  112737  000134  022520        MOVB    #'\,9$          ;;TYPE A BACK SLASH
5583  022330  104401  022520                TYPE    ,9$
5584  022334  012716  177777                MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
5585  022340  005303                6$      DEC     R3              ;;BACKUP BY ONE
5586  022342  020327  022522                CMP     R3,#$TTYIN      ;;STACK EMPTY?
5587  022346  103434                        BLO     4$              ;;BR IF YES
5588  022350  111337  022520                MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR
5589  022354  104401  022520                TYPE    ,9$             ;;GO TYPE
5590  022360  000746                        BR      2$              ;;GO READ ANOTHER CHAR
5591  022362  005716                5$      TST     (SP)            ;;RUBOUT KEY SET?
5592  022364  001406                        BEQ     7$              ;;BR IF NO
5593  022366  112737  000134  022520        MOVB    #'\,9$          ;;TYPE A BACK SLASH
5594  022374  104401  022520                TYPE    ,9$
5595  022400  005016                        CLR     (SP)            ;;CLEAR THE RUBOUT KEY
5596  022402  122713  000025        7$      CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
5597  022406  001003                        BNE     8$              ;;BR IF NO
5598  022410  104401  022553                TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
5599  022414  000726                        BR      1$              ;;GO START OVER
5600  022416  122713  000022        8$      CMPB    #22,(R3)        ;;IS CHARACTER A " R"?
5601  022422  001011                        BNE     3$              ;;BRANCH IF NO
5602  022424  106013                        CLRB    (R3)            ;;CLEAR THE CHARACTER
5603  022426  104401  001215                TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
5604  022432  104401  022522                TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
5605  022436  000717                        BR      2$              ;;GO PICKUP ANOTHER CHACTER
5606  022440  104401  001214        4$      TYPE    ,$QUES          ;;TYPE A '?'
5607  022444  000712                        BR      1$              ;;CLEAR THE BUFFER AND LOOP
5608  022446  111337  022520        3$      MOVB    (R3),9$         ;;ECHO THE CHARACTER
5609  022452  104401  022520                TYPE    ,9$
5610  022456  122723  000015                CMPB    #15,(R3)+       ;;CHECK FOR RETURN
5611  022462  001305                        BNE     2$              ;;LOOP IF NOT RETURN
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5612  022464  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
5613  022470  104401  001216                  TYPE    ,$LF            ;;TYPE A LINE FEED
5614  022474  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
5615  022476  012603                          MOV     (SP)+,R3        ;;RESTORE R3
5616  022500  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
5617  022502  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
5618  022510  012766  022522  000004          MOV     #$TTYIN,4(SP)
5619  022516  000002                          RTI                     ;;RETURN
5620  022520     000                  9$      BYTE    0               ;;STORAGE FOR ASCII CHAR  TO TYPE
5621  022521     000                          BYTE    0               ;;TERMINATOR
5622  022522  000024              $TTYIN:     BLKB    20              ; RESERVE 20  BYTES FOR TTY INPUT
5623  022546  041536  005015     000  $CNTLC: .ASCIZ  / C/<15><12>    ;;CONTROL "C"
5624  022553     136  006525  000012  $CNTLU: .ASCIZ  / U/<15><12>    ;;CONTROL "U"
5625  022560  043536  005015     000  $CNTLG  ASCIZ   / G/<15><12>    ;;CONTROL "G"
5626  022565     015  051412  051127  $MSWR   ASCIZ   <15><12>/SWR = /
5627  022572  036440  000040
5628  022576  020040  042516  020127  $MNEW:  .ASCIZ  /  NEW = /
5629  022604  020075     000
5630          022610                   EVEN
5631
5632                                   SBTTL  SCOPE HANDLER ROUTINE
5633
5634                                   ;;**********************************************************************
5635                                   ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS  IT WILL INCREMENT
5636                                   ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG (DISPLAY<7 0>)
5637                                   ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15 08>
5638                                   ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE
5639                                   ;*SW14=1        LOOP ON TEST
5640                                   ;*SW11=1        INHIBIT ITERATIONS
5641                                   ;*SW09=1        LOOP ON ERROR
5642                                   ;*CALL
5643                                   ;*      SCOPE           ;;SCOPE=IOT
5644
5645  022610                           $SCOPE
5646  022610  104407                          CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
5647  022612  032777  040000  156320  1$      BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
5648  022620  001101                          BNE     $OVER           ;;YES IF SW14=1
5649                                   ;#####START OF CODE FOR THE XOR TESTER#####
5650  022622  000416                  $XTSTR  BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
5651                                                                  ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
5652  022624  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
5653  022630  012737  022650  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
5654  022636  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
5655  022642  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
5656  022646  000453                          BR      $SVLAD          ;;GO TO THE NEXT TEST
5657  022650  022626                  5$      CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
5658  022652  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
5659  022656  000413                          BR      7$              ;;LOOP ON THE PRESENT TEST
5660  022660                           6$ ,#####END OF CODE FOR THE XOR TESTER#####
5661  022660  105737  001103          2$      TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
5662  022664  001421                          BEQ     3$              ;;BR IF NO
5663  022666  123737  001115  001103          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
5664  022674  101015                          BHI     3$              ;;BR IF NO
5665  022676  032777  001000  156234          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
5666  022704  001404                          BEQ     4$              ;;BR IF NO
5667  022706  013737  001110  001106  7$      MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
```

```
5668  022714  000443                          BR      $OVER
5669  022716  105037  001103          4$      CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
5670  022722  005037  001204                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
5671  022726  000415                          BR      1$              ;;ESCAPE TO THE NEXT TEST
5672  022730  032777  004000  156202  3$      BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
5673  022736  001011                          BNE     1$              ;;BR IF YES
5674  022740  005737  001100                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
5675  022744  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
5676  022746  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
5677  022752  023737  001204  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
5678  022760  002021                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
5679  022762  012737  000001  001104  1$      MOV     #1,$ICNT        ;;REINITIALIZE THE ;TERATION COUNTER
5680  022770  013737  023040  001204          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
5681  022776  105237  001102          $SVLAD  INCB    $TSTNM          ;;COUNT TEST NUMBERS
5682  023002  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
5683  023006  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
5684  023012  005037  001206                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
5685  023016  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
5686  023024  013777  001102  156110  $OVER   MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
5687  023032  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
5688  023036  000002                          RTI                     ;;FIXES PS
5689  023040  000001                  $MXCNT  1                       ;;MAX  NUMBER OF ITERATIONS
5690
5691                                    SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
5692
5693                                  ;;*********************************************************************
5694                                  ;*SAVE R0-R5
5695                                  ;*CALL
5696                                  ;*      SAVREG
5697                                  ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE
5698                                  ;*
5699                                  ;*TOP---(+16)
5700                                  ;* +2---(+18)
5701                                  ;* +4---R5
5702                                  ;* +6---R4
5703                                  ;* +8---R3
5704                                  ;*+10---R2
5705                                  ;*+12---R1
5706                                  ;*+14---R0
5707
5708  023042                          $SAVREG
5709  023042  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
5710  023044  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5711  023046  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
5712  023050  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
5713  023052  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
5714  023054  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
5715  023056  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
5716  023062  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
5717  023066  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
5718  023072  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
5719  023076  000002                          RTI
5720
5721                                  ;*RESTORE R0-R5
5722                                  ;*CALL
5723                                  ;*      RESREG
```

```
5724  023100                          $RESREG
5725  023100  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
5726  023104  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
5727  023110  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
5728  023114  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
5729  023120  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
5730  023122  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
5731  023124  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
5732  023126  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
5733  023130  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
5734  023132  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
5735  023134  000002                          RTI
5736
5737                                   SBTTL  TRAP DECODER
5738
5739                                  ;;*****************************************************************
5740                                  ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
5741                                  ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
5742                                  ;*OF THE DESIRED ROUTINE.  THEN USING THE ADDRESS OBTAINED IT WILL
5743                                  ;*GO TO THAT ROUTINE
5744
5745  023136  010046                  $TRAP.  MOV     R0,-(SP)        ;;SAVE R0
5746  023140  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
5747  023144  005740                          TST     -(R0)           ;;BACKUP BY 2
5748  023146  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
5749  023150  006300                          ASL     R0              ;;POSITION FOR INDEXING
5750  023152  016000  023172                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
5751  023156  000200                          RTS     R0              ;;GO TO ROUTINE
5752
5753
5754                                  ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
5755
5756  023160  011646                  $TRAP2  MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
5757  023162  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
5758  023170  000002                          RTI                     ;;RESTORE THE PSW
5759
5760                                   SBTTL  TRAP TABLE
5761
5762                                  ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
5763                                  ;*BY THE "TRAP" INSTRUCTION
5764
5765                                  ;       ROUTINE
5766                                  ;       -------
5767  023172  023160                  $TRPAD   WORD   $TRAP2
5768  023174  020444                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
5769  023176  020710                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
5770  023200  020664                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
5771  023202  020724                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
5772  023204  021112                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
5773
5774  023206  021724                          $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING
5775
5776  023210  021634                          $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
5777  023212  022176                          $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
5778  023214  022266                          $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
5779  023216  023042                          $SAVREG ;;CALL=SAVREG   TRAP+12(104412) SAVE R0-R5 ROUTINE
```

```
5780  023220  023100                          $RESREG ,,CALL=RESREG   TRAP+13(104413) RESTORE R0-R5 ROUTINE
5781
5782                                   SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
5783
5784                                  ,,*****************************************************************
5785                                  ,*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
5786                                  ,*UNSIGNED DECIMAL ASCIZ NUMBER
5787                                  ,*CALL
5788                                  ,*      MOV     NUMBER,-(SP)    ,,PUT BINARY NUMBER ON THE STACK
5789                                  ,*      JSR     PC,@#$SB2D      ,,CALL
5790                                  ,*      RETURN                  ,,ADDRESS OF THE 1ST ASCIZ CHAR IS ON THE STACK
5791
5792
5793  023222  016637  000002  023252  $SB2D   MOV     2(SP),1$        ,,SAVE BINARY NUMBER
5794  023230  012746  023252          1$      MOV     #1$,-(SP)       ,,SET POINTER
5795  023234  004737  023256                  JSR     PC,@#$DB2D      ,,CALL DOUBLE LENGTH CONVERT
5796  023240  062716  000005                  ADD     #5,(SP)         ,,ONLY ALLOW FIVE CHARACTERS
5797  023244  012666  000002                  MOV     (SP)+,2(SP)     ,,PICKUP POINTER
5798  023250  000207                          RTS     PC              ,,RETURN
5799  023252  000000  000000          1$      WORD    0,0
5800
5801                                   SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
5802
5803                                  ,,*****************************************************************
5804                                  ,*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
5805                                  ,*DECIMAL (ASCII) NUMBER.  THE SIGN OF THE BINARY NUMBER MUST BE
5806                                  ,*POSITIVE
5807                                  ,*CALL
5808                                  ,*      MOV     #PNTR,-(SP)     ,,POINTER TO LOW WORD OF BINARY NUMBER
5809                                  ,*      JSR     PC,@#$DB2D
5810                                  ,*      RETURN                  ,,THE FIRST ADDRESS OF ASCIZ
5811                                                                  ,,IS ON THE STACK
5812
5813
5814  023256  104412                  $DB2D   SAVREG                  ,,SAVE REGISTERS
5815  023260  016602  000002                  MOV     2(SP),R2        ,,PICKUP THE DATA POINTER
5816  023264  012700  023436                  MOV     #$DECVL,R0      ,,GET ADDRESS OF "$DECVL" STRING
5817  023270  010066  000002                  MOV     R0,2(SP)        ,,PUT ADDRESS OF ASCIZ STRING ON STACK
5818  023274  012201                          MOV     (R2)+,R1        ,,PICKUP THE BINARY NUMBER
5819  023276  012202                          MOV     (R2)+,R2
5820  023300  012737  000012  023354          MOV     #10.,4$         ,,SET UP TO DO 10 CONVERSIONS
5821  023306  012704  023366                  MOV     #$TNPWR,R4      ,,ADDRESS OF TEN POWER
5822  023312  012705  023370                  MOV     #$TNPWR+2,R5
5823  023316  005003                  1$      CLR     R3              ,,CLEAR PARTIAL
5824  023320  161401                  2$      SUB     (R4),R1         ,,SUBTRACT TEN POWER
5825  023322  006602                          SBC     R2
5826  023324  161502                          SUB     (R5),R2
5827  023326  002402                          BLT     3$              ,,BR IF TEN POWER TO LARGE
5828  023330  005203                          INC     R3              ,,ADD 1 TO PARTIAL
5829  023332  000772                          BR      2$              ,,LOOP
5830  023334  062401                  3$      ADD     (R4)+,R1        ,,RESTORE SUBTRACTED VALUE
5831  023336  005502                          ADC     R2
5832  023340  062402                          ADD     (R4)+,R2
5833  023342  022525                          CMP     (R5)+,(R5)+     ,,MOVE TO NEXT TEN POWER
5834  023344  052703  000060                  BIS     #'0,R3          ,,CHANGE PARTIAL TO ASCII
5835  023350  110320                          MOVB    R3,(R0)+        ,,SAVE IT
```

```
5836  023352  005327                          DEC     (PC)+           ,,DONE?
5837  023354  000000                  4$       WORD    0
5838  023356  001357                          BNE     1$              ,,BR IF NO
5839  023360  105020                          CLRB    (R0)+           ,,TERMINATOR
5840  023362  104413                          RESREG                  ,,RESTORE REGISTERS
5841  023364  000207                          RTS     PC              ,,RETURN
5842  023366  145000                  $TNPWR  145000                  ,,1 0E09
5843  023370  035632                          35632
5844  023372  160400                          160400                  ,,1 0E08
5845  023374  002765                          2765
5846  023376  113200                          113200                  ,,1 0E07
5847  023400  000230                          230
5848  023402  041100                          041100                  ,,1 0E06
5849  023404  000017                          17
5850  023406  103240                          103240                  ,,1 0E05
5851  023410  000001                          1
5852  023412  023420                          23420                   ,,1 0E04
5853  023414  000000                          0
5854  023416  001750                          1750                    ,,1 0E03
5855  023420  000000                          0
5856  023422  000144                          144                     ,,1 0E02
5857  023424  000000                          0
5858  023426  000012                          12                      ,,1 0E01
5859  023430  000000                          0
5860  023432  000001                          1                       ,,1 0E00
5861  023434  000000                          0
5862  023436  000014                  $DECVL   BLKB    12             ,,RESERVE STORAGE FOR ASCIZ STRING
5863
5864                                   SBTTL   TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
5865
5866                                  ,,*****************************************************************
5867                                  ,*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
5868                                  ,*LEADING NUMBERS
5869                                  ,*CALL
5870                                  ,*      MOV     #NUMADR,-(SP)   ,,FIRST ADDRESS OF ASCIZ STRING
5871                                  ,*      JSR     PC,@#$SUPRS
5872
5873
5874  023452  010046                  $SUPRS  MOV     R0,-(SP)        ,,SAVE R0
5875  023454  016600  000004                  MOV     4(SP),R0        ,,PICKUP THE POINTER
5876  023460  105710                  1$      TSTB    (R0)            ,,TERMINATEOR?
5877  023462  001403                          BEQ     2$              ,,BR IF YES
5878  023464  122720  000060                  CMPB    #'0,(R0)+       ,,IS THIS AN ASCII "0" ?
5879  023470  001773                          BEQ     1$              ,,BR IF YES
5880  023472  005300                  2$      DEC     R0              ,,BACKUP BY "1"
5881  023474  010037  023502                  MOV     R0,3$           ,,SAVE FOR TYPING
5882  023500  104401                          TYPE                    ,,GO TYPE
5883  023502  000000                  3$       WORD   0               ,,ASCIZ POINTER GOES HERE
5884  023504  012600                          MOV     (SP)+,R0        ,,RESTORE R0
5885  023506  012616                          MOV     (SP)+,(SP)      ,,RESTORE THE STACK
5886  023510  000207                          RTS     PC              ,,RETURN
5887
5888                                   SBTTL   RANDOM NUMBER GENERATOR ROUTINE
5889
5890                                  ,,*****************************************************************
5891                                  ,*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
```

RANDOM NUMBER GENERATOR ROUTINE SEQ 0111

```
5892                                    ;*WITH A RANGE OF 0 TO 2(+33)-1
5893                                    ;*CALL
5894                                    ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
5895                                    ;*      RETURN                  ;;RETURN HERE THE RANDOM
5896                                    ;*                              ;;NUMBER WILL BE IN
5897                                    ;*                              ;;$HINUM,$LONUM
5898
5899  023512                            $RAND
5900  023512  010046                            MOV     R0,-(SP)        ;;PUSH R0 ON STACK
5901  023514  010146                            MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5902  023516  010246                            MOV     R2,-(SP)        ;;PUSH R2 ON STACK
5903  023520  013700  023612                    MOV     $LONUM,R0       ;;SET R0 WITH LOW
5904  023524  013701  023610                    MOV     $HINUM,R1       ;;SET R1 WITH HIGH
5905  023530  012702  177771                    MOV     #-7,R2          ;;SET SHIFT COUNT
5906  023534  006300                    1$      ASL     R0              ;;SHIFT R0 LEFT AND
5907  023536  006101                            ROL     R1              ;;ROTATE CARRY INTO R1 AND
5908  023540  005202                            INC     R2              ;;CHECK FOR DONE
5909  023542  001374                            BNE     1$              ;;CONTINUE SHIFT LOOP
5910  023544  063700  023612                    ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
5911  023550  005501                            ADC     R1              ;;PROPOGATE CARRY
5912  023552  063701  023610                    ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
5913  023556  062700  001057                    ADD     #1057,R0        ;;ADD LOW CONSTANT
5914  023562  005501                            ADC     R1              ;;PROPOGATE CARRY
5915  023564  062701  047401                    ADD     #47401,R1       ;;ADD HIGH CONSTANT
5916  023570  010037  023612                    MOV     R0,$LONUM       ;;SAVE R0
5917  023574  010137  023610                    MOV     R1,$HINUM       ;;SAVE R1
5918  023600  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
5919  023602  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
5920  023604  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
5921  023606  000207                            RTS     PC              ;;RETURN
5922  023610  176543                    $HINUM   WORD    176543
5923  023612  123456                    $LONUM   WORD    123456
5924
5925                                     SBTTL   INTEGER DIVIDE ROUTINE
5926
5927                                    ;;**************************************************************************
5928                                    ;*THIS ROUTINE WILL DIVIDE A 32-BIT TWO'S COMPLEMENT INTEGER
5929                                    ;*DIVIDEND BY A 16-BIT TWO'S COMPLEMENT INTEGER DIVISOR GIVING
5930                                    ;*A 16-BIT TWO'S COMPLEMENT INTEGER QUOTIENT AND A 16-BIT REMAINDER
5931                                    ;*DIVISION WILL BE PERFORMED SO THAT THE REMAINDER IS OF THE
5932                                    ;*SAME SIGN AS THE DIVIDEND
5933                                    ;*CALL.
5934                                    ;*      MOV     LOW DIVIDEND,-(SP) ;;THE HIGH DIVIDEND MUST BE < 1/2
5935                                    ;*      MOV     HIGH DIVIDEND -(SP),    AS LARGE AS THE DIVISOR
5936                                    ;*      MOV     DIVISOR,-(SP)
5937                                    ;*      JSR     PC,$DIV
5938                                    ;*      RETURN                  ;;QUOTIENT & REMAINDER ARE ON THE STACK
5939                                    ;*      "V"=0   IMPLIES NO ERROR
5940                                    ;*      "V"=1   IMPLIES ERROR OCCURRED
5941                                    ;*              "C"=0   DIVIDE OVERFLOW OCCURRED
5942                                    ;*              "C"=1   ATTEMPTED TO DIVIDE BY ZERO
5943                                    ;*
5944                                    ;*
5945                                    ;*      STACK   NO ERROR        OVERFLOW        DIVIDE BY ZERO
5946                                    ;*      -----   --------        --------        -------------
5947                                    ;*      TOP     REMAINDER       ALL ZEROS       ALL ONES
```

```
                                        .*      +2      QUOTIENT        ALL ZEROS       ALL ONES

023614                                  $DIV
023614  104400                                  TRAP                    ,,PUSH OLD PSW AND PC ON STACK
023616  042716  000017                          BIC     #17,(SP)        ,,STRIP AWAY CONDITION CODES
023622  010046                                  MOV     R0,-(SP)        ,,PUSH R0 ON STACK
023624  010146                                  MOV     R1,-(SP)        ,,PUSH R1 ON STACK
023626  010246                                  MOV     R2,-(SP)        ,,PUSH R2 ON STACK
023630  010346                                  MOV     R3,-(SP)        ,,PUSH R3 ON STACK
023632  005046                                  CLR     -(SP)           ,,SAVE A PLACE FOR SIGNS
023634  012746  000021                          MOV     #17,-(SP)       ,,SETUP THE ITERATION COUNTER
023640  016601  000024                          MOV     24(SP),R1       ,,PICKUP THE DIVIDEND
023644  016600  000022                          MOV     22(SP),R0
023650  100005                                  BPL     1$              ,,CHECK THE SIGN
023652  105366  000003                          DECB    3(SP)           ,,KEEP TRACK OF THE SIGN
023656  005400                                  NEG     R0              ,,AND NEGATE THE ORIGINAL
023660  005401                                  NEG     R1              ,,NUMBER
023662  005600                                  SBC     R0
023664  016602  000020                  1$:     MOV     20(SP),R2       ,,PICKUP THE DIVISOR
023670  002407                                  BLT     2$              ,,CHECK THE SIGN
023672  003011                                  BGT     3$              ,,DIVISOR OF 0 IS A NO-NO
023674  052766  000003  000014                  BIS     #3,14(SP)       ,,SET "V" & "C"
023702  012700  177777                          MOV     #-1,R0          ,,SET REMAINDER TO ALL ONES
023706  000424                                  BR      7$              ,,EXIT
023710  005266  000002                  2$:     INC     2(SP)           ,,KEEP TRACK OF DIVISORS SIGN
023714  000401                                  BR      4$
023716  005402                          3$:     NEG     R2              ,,NEGATE THE ORIGINAL NUMBER
023720  000241                          4$:     CLC                     ,,CLEAR "C"
023722  000405                                  BR      6$              ,,START FORMING QUOTIENT
023724  006100                          5$:     ROL     R0              ,,POSITION MSB'S
023726  010003                                  MOV     R0,R3           ,,COPY
023730  060203                                  ADD     R2,R3           ,,COMPARE DIVIDEND & DIVISOR
023732  103001                                  BCC     6$              ,,BR IF DIVIDEND > DIVISOR
023734  010300                                  MOV     R3,R0           ,,REMAINDER AFTER THIS LOOP
023736  006101                          6$:     ROL     R1              ,,QUOTIENT BIT ENTERS HERE
023740  005316                                  DEC     (SP)            ,,DONE?
023742  001370                                  BNE     5$              ,,BR IF NO
023744  005701                                  TST     R1              ,,OVERFLOW?
023746  100005                                  BPL     8$              ,,BR IF NO
023750  052766  000002  000014                  BIS     #2,14(SP)       ,,SET "V" IN RETURN STATUS WORD
023756  005000                                  CLR     R0              ,,SET REMAINDER TO ALL ZEROS
023760  010001                          7$:     MOV     R0,R1           ,,COPY REMAINDER INTO QUOTIENT
023762  005726                          8$:     TST     (SP)+           ,,CLEAR COUNTER FROM STACK
023764  005716                                  TST     (SP)            ,,REMAINDER SIGN CORRECTION NEEDED?
023766  002004                                  BGE     9$              ,,BR IF NO
023770  005400                                  NEG     R0              ,,NEGATE REMAINDER
023772  105066  000001                          CLRB    1(SP)           ,,CLEAR SIGN
023776  005316                                  DEC     (SP)            ,,BUT DON'T FORGET QUOTIENT
024000  005726                          9$:     TST     (SP)+           ,,QUOTIENT SIGN CORRECTION NEEDED?
024002  001401                                  BEQ     10$             ,,BR IF NO
024004  005401                                  NEG     R1              ,,NEGATE QUOTIENT
024006  010166  000020                  10$:    MOV     R1,20(SP)       ,,RETURN QUOTIENT AND
024012  010066  000016                          MOV     R0,16(SP)       ,,REMAINDER TO USER
024016  012603                                  MOV     (SP)+,R3        ,,POP STACK INTO R3
024020  012602                                  MOV     (SP)+,R2        ,,POP STACK INTO R2
024022  012601                                  MOV     (SP)+,R1        ,,POP STACK INTO R1
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024024  012600                                MOV     (SP)+,R0           ,,POP STACK INTO R0
024026  012666  000002                        MOV     (SP)+,2(SP)        ,,SETUP TO RETURN CONDITION CODES
024032  000002                                RTI                        ,,RETURN

                                       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

024034  005037  001230                LP AVL  CLR     @#LPTAVL           ,START WITH NO PRINTER AVAIABLE
024040  012737  024064  000004                MOV     #1$,@#ERRVEC       ,SETUP THE TIMEOUT VECTOR
024046  005037  000006                        CLR     @#ERRVEC+2
024052  005777  155342                        TST     @LPS               ,IS THERE A LINE PRINTER?
024056  005237  001230                        INC     @#LPTAVL           ,YES--SET AVAILABLE SWITCH
024062  000401                                BR      2$
024064  022626                        1$      CMP     (SP)+,(SP)+        ,NO--POP STACK
024066  012737  000006  000004        2$      MOV     #ERRVEC+2,@#ERRVEC ,RESTORE TIMEOUT VECTOR
024074  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

024076  010146                        ST CLK. MOV     R1,-(SP)           ,SAVE R1
024100  012701  000006                        MOV     #ERRVEC+2,R1       ,SAVE AND SETUP TIMEOUT VECTOR
024104  011146                                MOV     (R1),-(SP)
024106  005011                                CLR     (R1)               ,LEVEL 0
024110  014146                                MOV     -(R1),-(SP)
024112  012711  024142                        MOV     #1$,(R1)           ,GO TO 1$ ON TIMEOUT
024116  005037  001244                        CLR     CLKSTA             ,SET CLOCK STATUS TO NO CLOCK
024122  005777  155252                        TST     @PKCS              ,IS THERE A KW11-P?
024126  012737  000001  001244                MOV     #1,CLKSTA          ,YES--SET STATUS TO KW11-P
024134  004737  024244                        JSR     PC,ST.PCLK         ,START THE KW11-P
024140  000414                                BR      3$                 ;GO TO EXIT
024142  022626                        1$      CMP     (SP)+,(SP)+        ;CLEAN UP THE STACK
024144  012711  024170                        MOV     #2$,(R1)           ;IF TIMEOUT GO TO 2$
024150  005777  155236                        TST     @LKS               ,IS THERE A KW11-L?
024154  012737  177777  001244                MOV     #-1,CLKSTA         ;YES-- SET STATUS TO KW11-L
024162  004737  024306                        JSR     PC,ST LCLK         ,START THE KW11-L
024166  000401                                BR      3$                 ,EXIT
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6060  024170  022626                    2$      CMP     (SP)+,(SP)+     ,CLEAN UP THE STACK
6061  024172  012621                    3$      MOV     (SP)+,(R1)+     ,RESTORE THE TIMEOUT VECTOR
6062  024174  012621                            MOV     (SP)+,(R1)+
6063  024176  012601                            MOV     (SP)+,R1        ,RESTORE R1
6064  024200  032737  000100  001220            BIT     #SW06,@#C SWR   ,50HZ OR 60HZ?
6065  024206  001407                            BEQ     4$              ,BRANCH IF 60
6066  024210  012737  000020  001246            MOV     #20,@#TICKMS    ;SETUP TIME PER
6067  024216  012737  047040  001250            MOV     #20000 ,@#TICKUS ,TICK FOR 50HZ
6068  024224  000406                            BR      5$
6069  024226  012737  000016  001246  4$        MOV     #16,@#TICKMS    ;SETUP TIME PER
6070  024234  012737  040432  001250            MOV     #16666 ,@#TICKUS ,TICK FOR 60HZ
6071  024242  000207                    5$      RTS     PC              ,RETURN
6072
6073  024244                            ST PCLK
6074  024244  032737  000040  001220            BIT     #SW05,@#C SWR   ,ALLOW SOFTWARE TIMEOUTS?
6075  024252  001014                            BNE     1$              ,NO--BRANCH
6076  024254  012777  024342  155112            MOV     #SRVCLK,@PKV    ,SETUP THE KW11-P VECTOR
6077  024262  012777  000300  155106            MOV     #300,@PKV+2
6078  024270  012777  000001  155104            MOV     #1,@PKB         ,COUNT ONE TICK
6079  024276  012777  000115  155074            MOV     #115,@PKCS      ,"INT EN.",COUNT DOWN", "MODE 1 (REPEAT)",
6080                                                                    ,"LINE FREQ", AND "RUN"
6081  024304  000207                    1$      RTS     PC              ,RETURN
6082
6083  024306                            ST LCLK
6084  024306  032737  000040  001220            BIT     #SW05,@#C SWR   ,ALLOW SOFTWARE TIMEOUTS?
6085  024314  001011                            BNE     1$              ,NO--BRANCH
6086  024316  012777  024342  155062            MOV     #SRVCLK,@LKV    ,SETUP THE KW11-L VECTOR
6087  024324  012777  000300  155056            MOV     #300,@LKV+2
6088  024332  012777  000100  155052            MOV     #100,@LKS       ,START THE KW11-L
6089  024340  000207                    1$      RTS     PC              ,RETURN
6090
6091  024342  013746  001246            SRVCLK: MOV     @#TICKMS,-(SP)  ,TIME PER TICK IN MILLISECONDS
6092  024346  004737  040736                    JSR     PC,@#RPTMR      ,COUNT THE ELASPED TIME
6093  024352  000002                            RTI                     ,RETURN AFTER INTERRUPT
6094
6095                                    ,THIS ROUTINE SETS UP DEFAULT PARAMETER VALUES WHEN THE PROGRAM IS
6096                                    ,STARTED OR WHEN THE VALUE OF BIT00 IN 'C SWR' IS CHANGED
6097                                    ,CALL
6098                                    ;       JSR     PC,LODFLT
6099                                    ,       RETURN
6100
6101  024354                            LODFLT
6102  024354  010046                            MOV     R0,-(SP)        ,,PUSH R0 ON STACK
6103  024356  010146                            MOV     R1,-(SP)        ,,PUSH R1 ON STACK
6104  024360  010246                            MOV     R2,-(SP)        ,;PUSH R2 ON STACK
6105  024362  010346                            MOV     R3,-(SP)        ,,PUSH R3 ON STACK
6106  024364  012737  176777  001234            MOV     #176777,TSTNMS  ,SELECT TESTS 0-10, 12-17
6107  024372  012737  000001  001236            MOV     #1,TSTNMS+2     ;SET SELECT BIT FOR TEST 20
6108  024400  012700  001664                    MOV     #DFLT,R0        ,DEFAULT PARAMETERS POINTER
6109  024404  012701  002330                    MOV     #PRM0,R1        ;TABLE POINTER
6110  024410  010102                            MOV     R1,R2           ,STOP ADDRESS
6111  024412  012021                    1$      MOV     (R0)+,(R1)+     ;MOVE DEFAULT PARAMETERS INTO
6112  024414  020002                            CMP     R0,R2           ,RUN TIME TABLES ** DONE?
6113  024416  103775                            BLO     1$              ,NO--BRANCH
6114  024420  012700  003504                    MOV     #PAT8,R0        ,PAT0 DEFAULTS TO PATTERN 8
6115  024424  012701  003104                    MOV     #PAT0,R1
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6116  024430  012021                    2$      MOV     (R0)+,(R1)+
6117  024432  020027  003544                    CMP     R0,#PAT9
6118  024436  103774                            BLO     2$
6119  024440  032737  000001  001220            BIT     #BIT00,C.SWR    ;16 BIT MODE ?
6120  024446  001012                            BNE     3$              ;BR IF 18
6121  024450  012737  000025  001630            MOV     #21.,PRMLMT+22  ;SET 'FS' LIMIT TO 21
6122  024456  012737  000025  001632            MOV     #21.,PRMLMT+24  ;SET 'LS' LIMIT TO 21
6123  024464  012737  165000  001352            MOV     #-<256.*22.>,TRCKWC ;WORD COUNT FOR A 16 BIT TRACK
6124  024472  000411                            BR      4$              ;CONTINUE
6125  024474  012737  000023  001630  3$        MOV     #19.,PRMLMT+22  ;SET 'FS' LIMIT TO 19
6126  024502  012737  000023  001632            MOV     #19.,PRMLMT+24  ;SET 'LS' LIMIT TO 19
6127  024510  012737  166000  001352            MOV     #-<256.*20.>,TRCKWC ;WORD COUNT FOR COUNT FOR AN 18 BIT TRACK
6128  024516  012701  001536          4$        MOV     #PRMPT,R1       ;ADDRESS OF PARAMETER POINTER TABLE
6129  024522  005711                5$        TST     (R1)            ;END OF THE TABLE ?
6130  024524  001425                            BEQ     8$              ;BR IF END
6131  024526  032731  002000                    BIT     #BIT10,@(R1)+   ;'LS' SELECTED ?
6132  024532  001773                            BEQ     5$              ;BR IF NOT
6133  024534  016102  177776                    MOV     -2(R1),R2       ;PARAMETER TABLE ADDRESS
6134  024540  011246                            MOV     (R2),-(SP)      ;PARAMETER ALLOCATION BITS
6135  024542  012703  000013                    MOV     #11.,R3         ;NUMBER OF PARAMETERS (MAXIMUM) BEFORE 'LS'
6136  024546  006216                6$        ASR     (SP)            ;COUNT THE PARAMETER
6137  024550  103002                            BCC     7$              ;BR IF NOT USED
6138  024552  062702  000002                    ADD     #2,R2           ;INCREMENT THE PARAMETER TABLE ADDRESS
6139  024556  005303                7$        DEC     R3              ;COUNT THE PARAMETER
6140  024560  001372                            BNE     6$              ;BR IF NOT THERE YET
6141  024562  005726                            TST     (SP)+           ;CORRECT THE STACK POINTER
6142  024564  021237  001630                    CMP     (R2),PRMLMT+22  ;IS 'LS' TOO LARGE FOR THE MODE SELECTED ?
6143  024570  101754                            BLOS    5$              ;BR IF NOT
6144  024572  013712  001630                    MOV     PRMLMT+22,(R2)  ;RESET VALUE FOR MODE USED
6145  024576  000751                            BR      5$              ;CONTINUE
6146  024600                        8$
6147  024600  012603                            MOV     (SP)+,R3        ;;POP STACK INTO R3
6148  024602  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
6149  024604  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
6150  024606  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
6151  024610  000207                            RTS     PC              ;RETURN
6152
6153                                    ;THIS ROUTINE FILLS THE PARAMETER TABLE THE CURRENT TEST
6154                                    ;CALL
6155                                    ;       MOV     #TESTNUM,$TSTNM ;LOAD THE TEST NUMBER
6156                                    ;       JSR     PC,LODPRM
6157                                    ;       RETURN
6158
6159  024612                            LODPRM:
6160  024612  010146                            MOV     R1,-(SP)        ;;PUSH R1 ON STACK
6161  024614  010246                            MOV     R2,-(SP)        ;;PUSH R2 ON STACK
6162  024616  010346                            MOV     R3,-(SP)        ;;PUSH R3 ON STACK
6163  024620  010446                            MOV     R4,-(SP)        ;;PUSH R4 ON STACK
6164  024622  005004                            CLR     R4              ;CLEAR R4
6165  024624  113704  001102                    MOVB    $TSTNM,R4       ;GET THE TEST NUMBER
6166  024630  006304                            ASL     R4              ;SETUP TO ADDRESS WORDS
6167  024632  016401  001536                    MOV     PRMPT(R4),R1    ;GET THE TEST'S PARAMETER TABLE ADDRESS
6168  024636  012702  001504                    MOV     #PRM,R2         ;PARAMETER EXECUTION TABLE
6169  024642  005003                            CLR     R3              ;R3 IS USED AS A COUNTER
6170  024644  013704  001254                    MOV     CHKDRV,R4       ;DRIVE'S ADDRESS
6171  024650  012122                            MOV     (R1)+,(R2)+     ;PARAMETER SPECIFIER
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6172  024652  006237  001504          1$      ASR     PRM             ;THIS PARAMETER USED IN THE TEST ?
6173  024656  103002                          BCC     2$              ;BR IF NOT
6174  024660  012122                          MOV     (R1)+,(R2)+     ;LOAD THE VALUE
6175  024662  000401                          BR      3$              ;CONTINUE
6176  024664  005022                  2$      CLR     (R2)+           ;CLEAR THE UNUSED PARAMETER LOCATION
6177  024666  005203                  3$      INC     R3              ;COUNT THE POSITION IN THE OUTPUT TABLE
6178  024670  020327  000014                  CMP     R3,#12          ;FINISHED ?
6179  024674  001430                          BEQ     6$              ;BR IF YES
6180  024676  020327  000003                  CMP     R3,#3           ;DOING THE CYLINDER ADDRESSES ?
6181  024702  001363                          BNE     1$              ;BR IF NOT
6182  024704  132764  000004  034400          BITB    #BIT02,DRVTYP(R4)  ;RP06 ?
6183  024712  001016                          BNE     5$              ;BR IF IT IS
6184  024714  062703  000002                  ADD     #2,R3           ,COUNT THE BYPASSED PARAMETERS (FC' & LC')
6185  024720  006237  001504                  ASR     PRM             ;SHIFT THE COUNTER
6186  024724  103002                          BCC     4$              ;BR IF FC' IS NOT USED
6187  024726  062701  000002                  ADD     #2,R1           ;MOVE THE INPUT POINTER
6188  024732  006237  001504          4$      ASR     PRM             ;COUNT THE PARAMETER
6189  024736  103345                          BCC     1$              ,BR IF LC' NOT USED
6190  024740  062701  000002                  ADD     #2,R1           ,MOVE THE INPUT PINTER
6191  024744  000742                          BR      1$              ,KEEP GOING
6192  024746  000741                          BR      1$              ,KEEP GOING
6193  024750  162702  000004          5$      SUB     #4,R2           ;BACKUP THE OUTPUT POINTER
6194  024754  000736                          BR      1$              ,KEEP GOING
6195  024756                          6$
6196  024756  012604                          MOV     (SP)+,R4        ..,POP STACK INTO R4
6197  024760  012603                          MOV     (SP)+,R3        ,,,POP STACK INTO R3
6198  024762  012602                          MOV     (SP)+,R2        ,,,POP STACK INTO R2
6199  024764  012601                          MOV     (SP)+,R1        ,,,POP STACK INTO R1
6200  024766  000207                          RTS     PC              ,RETURN
6201
6202                                  ,THIS ROUTINE LOADS A READ HEADER AND DATA COMMAND OR A SEEK COMMAND
6203                                  ,INTO DPB.B+2 AND DPB C+2, DEPENDING ON THE STATE OF "CONTROL SWITCH"
6204                                  ,BIT07
6205                                  ,CALL
6206                                  ,       JSR     PC,@#LDCMD
6207                                  ,       RETURN
6208
6209  024770  032737  000200  001220  LDCMD.  BIT     #SW07,@#C.SWR   ,DO EXPLICIT SEEKS?
6210  024776  001007                          BNE     1$              ,YES--BRANCH
6211  025000  012737  000173  004126          MOV     #READHD,@#DPB.B+2 ,NO--SET UP FOR READ HEADER AND
6212  025006  012737  000173  004146          MOV     #READHD,@#DPB.C+2 ;DATA COMMAND
6213  025014  000406                          BR      2$
6214  025016  012737  000105  004126  1$:     MOV     #SEEK,@#DPB B+2 ;SETUP FOR SEEK COMMAND
6215  025024  012737  000105  004146          MOV     #SEEK,@#DPB.C+2
6216  025032  000207                  2$.     RTS     PC
6217
6218                                  ;THIS ROUTINE WILL CALL THE RP04/5/6 DRIVER AND THEN WAIT ON THE FUNCTION
6219                                  ,TO COMPLETE.  IF AN ERROR OCCURS IT IS REPORTED
6220                                  ;CALL
6221                                  ;       FILL "DPB" WITH COMMAND INFORMATION
6222                                  ,       JSR     R0,@#CALL.A
6223                                  ,       RETURN
6224
6225  025034  005037  001206  CALL.A: CLR     @#$ESCAPE       ,NO ESCAPE ADDRESS
6226  025040  004037  035304          JSR     R0,@#RP04       ,CALL RP04 DRIVER
6227  025044  004104                  DPB A
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6228  025046  000772                        BR      CALL.A
6229  025050  005737  004122          1$    TST     @#DPB.A+16      ;DONE?
6230  025054  001775                        BEQ     1$              ;NO--LOOP
6231  025056  100032                        BPL     3$              ;BRANCH IF NO ERROR
6232  025060  012737  025134  001206        MOV     #2$,$ESCAPE     ;;ESCAPE TO 2$ ON ERROR
6233  025066  013737  004116  001270        MOV     @#DPB.A+12,@#CYL.DS ;CYLINDER
6234  025074  113737  004115  001274        MOVB    @#DPB.A+11,@#TRK.DS ;TRACK
6235  025102  113737  004114  001272        MOVB    @#DPB.A+10,@#SEC.DS ;SECTOR
6236  025110  012746  004122                MOV     #DPB A+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
6237  025114  004737  026250                JSR     PC,@. ?INDX     ;FORM DISPATCH INDEX
6238  025120  062607                        ADD     (SP)+,PC        ;REPORT PROPER ERROR
6239  025122  104041                        ERROR   41              ,
6240  025124  104042                        ERROR   42              ;PARITY ERROR
6241  025126  104043                        ERROR   43              ,UNSAFE ERROR
6242  025130  104044                        ERROR   44              ,NON-I/O ERROR
6243  025132  104045                        ERROR   45              ;I/O ERROR
6244  025134  013746  004122          2$    MOV     DPB A+16,-(SP)  ;STATUS WORD
6245  025140  004737  026210                JSR     PC,LOP.CK       ,SEE IF LOOP, ABORT, OR CONTINUE
6246  025144  000200                  3$    RTS     R0              ,RETURN
6247
6248                                  ,THIS ROUTINE IS THE SAME AS "CALL A" EXCEPT FOR THE DPB USED AND IF
6249                                  ,THE COMMAND IS A READ HEADER AND DATA THE HEADER (CYLINDER, TRACK,
6250                                  ,AND SECTOR) READ IS CHECKED FOR VALIDITY
6251                                  ,CALL
6252                                  ;       FILL DPB
6253                                  ;       JSR     R0,@#CALL.B
6254                                  ,       RETURN
6255
6256  025146  005037  001206          CALL B: CLR     @#$ESCAPE       ,NO ESCAPE ADDRESS
6257  025152  004037  035304                  JSR     R0,@#RP04       ,CALL RP04 DRIVER
6258  025156  004124                          DPB.B
6259  025160  000772                  BR      CALL.B
6260  025162  005737  004142          1$      TST     DPB.B+16        ;DONE?
6261  025166  001775                          BEQ     1$              ,NO--BRANCH
6262  025170  100042                          BPL     4$              ;BRANCH IF NO ERROR
6263  025172  012737  025264  001206          MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
6264  025200  013737  004136  001270          MOV     @#DPB.B+12,@#CYL.DS ;CYLINDER
6265  025206  113737  004135  001274          MOVB    @#DPB.B+11,@#TRK.DS ;TRACK
6266  025214  113737  004134  001272          MOVB    @#DPB.B+10,@#SEC.DS ;SECTOR
6267  025222  012746  004142                  MOV     #DPB.B+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
6268  025226  004737  026250                  JSR     PC,@#ERINDX     ,FORM DISPATCH INDEX
6269  025232  062607                          ADD     (SP)+,PC        ,REPORT PROPER ERROR
6270  025234  104041                          ERROR   41              ;
6271  025236  104042                          ERROR   42              ,PARITY ERROR
6272  025240  104043                          ERROR   43              ,UNSAFE ERROR
6273  025242  104044                          ERROR   44              ,NON-I/O ERROR
6274  025244  006737  004220                  TST     RP REG+RPER1    ,DRIVE ERROR ?
6275  025250  001404                          BEQ     2$              ,BR IF NOT
6276  025252  032737  177677  004220          BIT     # C100,RP REG+RPER1  ;SEE IF ONLY 'HCE' SET
6277  025260  001406                          BEQ     4$              ;BR IF IT IS
6278  025262  104045                  2$.     ERROR   45              ,I/O ERROR
6279  025264  013746  004142          3$      MOV     DPB.B+16,-(SP)  ,STATUS WORD
6280  025270  004737  026210                  JSR     PC,LOP CK       ,SEE IF LOOP, ABORT, OR CONTINUE
6281  025274  000410                          BR      5$              ;CHECK FOR STALL
6282  025276  123727  004126  000173  4$      CMPB    @#DPB B+2,#READHD ,DOING IMPLIED SEEKS?
6283  025304  001004                          BNE     5$              ,NO--BRANCH
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6284  025306  004037  026530                  JSR     R0,@#VERIFY     ;YES--GO CHECK THE DATA
6285  025312  004134                          DPB B+10
6286  025314  000407                          BR      6$              ;ERROR DURING VERIFY
6287  025316  032737  040000  001220  5$      BIT     #SW14,@#C SWR   ;STALL?
6288  025324  001403                          BEQ     6$              ;NO--BRANCH
6289  025326  004037  026366                  JSR     R0,@#STALL      ;YES--CALL STALL ROUTINE
6290  025332  001354                           WORD   STALL1          ;STALL TIME POINTER
6291  025334  000200                  6$      RTS     R0              ;RETURN
6292
6293                                          ;THIS ROUTINE IS THE SAME AS "CALL B" EXCEPT FOR THE DPB USED
6294                                          ;CALL
6295                                          ;       FILL DPB
6296                                          ;       JSR     R0,@#CALL C
6297                                          ;       RETURN
6298
6299  025336  005037  001206          CALL C  CLR     @#$ESCAPE       ;NO ESCAPE ADDRESS
6300  025342  004037  035304                  JSR     R0,@#RP04       ;CALL RP04 DRIVER
6301  025346  004144                          DPB C
6302  025350  000772                          BR      CALL C
6303  025352  005737  004162          1$      TST     @#DPB.C+16      ;DONE?
6304  025356  001775                          BEQ     1$              ;NO--LOOP
6305  025360  100042                          BPL     4$              ;YES--BRANCH IF NO ERROR
6306  025362  012737  025454  001206          MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
6307  025370  013737  004156  001270          MOV     @#DPB.C+12,@#CYL DS ;CYLINDER
6308  025376  113737  004155  001274          MOVB    @#DPB C+11,@#TRK DS ;TRACK
6309  025404  113737  004154  001272          MOVB    @#DPB.C+10,@#SEC DS ;SECTOR
6310  025412  012746  004162                  MOV     #DPB C+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
6311  025416  004737  026250                  JSR     PC,@#ERINDX     ;FORM DISPATCH INDEX
6312  025422  062607                          ADD     (SP)+,PC        ;REPORT PROPER ERROR
6313  025424  104041                          ERROR   41              ;
6314  025426  104042                          ERROR   42              ;PARITY ERROR
6315  025430  104043                          ERROR   43              ;UNSAFE ERROR
6316  025432  104044                          ERROR   44              ;NON-I/O ERROR
6317  025434  005737  004220                  TST     RP REG+RPER1    ;DRIVE ERROR ?
6318  025440  001404                          BEQ     2$              ;BR IF NOT
6319  025442  032737  177677  004220          BIT     # C100,RP REG+RPER1  ;SEE IF ONLY 'HCE' SET
6320  025450  001406                          BEQ     4$              ;BR IF IT IS
6321  025452  104045                  2$      ERROR   45              ;I/O ERROR
6322  025454  013746  004162          3$      MOV     DPB C+16,-(SP)  ;STATUS WORD
6323  025460  004737  026210                  JSR     PC,LOP CK       ;SEE IF LOOP, ABORT, OR CONTINUE
6324  025464  000410                          BR      5$
6325  025466  123727  004146  000173  4$      CMPB    @#DPB C+2,#READHD ;DOING IMPLIED SEEK?
6326  025474  001004                          BNE     5$              ;NO--EXIT
6327  025476  004037  026530                  JSR     R0,@#VERIFY     ;YES--CHECK THE DATA
6328  025502  004154                          DPB C+10
6329  025504  000407                          BR      6$              ;ERROR DURING VERIFY
6330  025506  032737  040000  001220  5$      BIT     #SW14,@#C SWR   ;STALL?
6331  025514  001403                          BEQ     6$              ;NO--BRANCH
6332  025516  004037  026366                  JSR     R0,@#STALL      ;YES--CALL STALL ROUTINE
6333  025522  001354                           WORD   STALL1          ;STALL TIME POINTER
6334  025524  000200                  6$      RTS     R0
6335
6336
6337                                          ;THIS ROUTINE IS THE SAME AS "CALL A" EXCEPT FOR THE DPB USED AND
6338                                          ;ON AN ERROR LOCATION "ERR CT" IS EXAMINED  IF ERR CT IS EQUAL TO
6339                                          ;$ERFLG EXIT IS TO THE NEXT TEST
```

```
                                        ,CALL
                                        ,       FILL DPB
                                        ,       JSR     R0,@#DRVCAL
                                        ,       RETURN

025526  005037  001206        DRVCAL  CLR     @#$ESCAPE       ,NO ESCAPE ADDRESS
025532  005037  001334                CLR     @#WCEFLG        ,CLEAR WRITE CHECK ERROR FLAG
025536  004037  035304                JSR     R0,@#RP04       ,CALL RP04 DRIVER
025542  004164                      DTADPB
025544  000770                      BR      DRVCAL
025546  005737  004202        DRVCL1  TST     @#DTADPB+16     ,DONE
025552  001775                      BEQ     DRVCL1          ,NO--LOOP
025554  100402                      BMI     1$              ,BR IF ERRORS
025556  000137  026170              JMP     10$             ,NO ERRORS
025562                      1$
025562  012737  025636  001206        MOV     #2$,$ESCAPE     ,,ESCAPE TO 2$ ON ERROR
025570  013737  004176  001270        MOV     @#DTADPB+12,@#CYL DS ,CYLINDER
025576  113737  004175  001274        MOVB    @#DTADPB+11,@#TRK DS ,TRACK
025604  113737  004174  001272        MOVB    @#DTADPB+10,@#SEC DS ,SECTOR
025612  012746  004202                MOV     #DTADPB+16,-(SP) ,STATUS/ERROR INDICATOR ADDRESS
025616  004737  026250                JSR     PC,@#ERINDX     ,FORM DISPATCH INDEX
025622  062607                      ADD     (SP)+,PC        ,REPORT PROPER ERROR
025624  104041                      ERROR   41              ,
025626  104042                      ERROR   42              ,PARITY ERROR
025630  104043                      ERROR   43              ,UNSAFE ERROR
025632  104044                      ERROR   44              ,NON-I/O ERROR
025634  104045                      ERROR   45              ,I/O ERROR
025636  122737  000020  001102  2$      CMPB    #20,@#$TSTNM    ,TEST 20?
025644  001137                      BNE     8$              ,NO--BRANCH
025646  013746  004202                MOV     DTADPB+16,-(SP) ,STATUS WORD
025662  004737  026210                JSR     PC,LOP CK       ,SEE IF LOOP, ABORT, OR CONTINUE
025666  122737  000151  004166        CMPB    #WRCKD,@#DTADPB+2 ,DOING A WRITE CHECK?
025664  001133                      BNE     12$             ,NO--BRANCH
025666  032737  040000  004214        BIT     #BIT14,@#RP REG+10 ,IS "WCE"=1?
025674  001527                      BEQ     12$             ,NO--BRANCH
025676  032777  000020  153234        BIT     #SW04,@SWR      ,INHIBIT WRITES?
025704  001123                      BNE     12$             ,YES--BRANCH
025706  112737  000161  004166        MOVB    #WRITE,@#DTADPB+2 ,SETUP FOR A WRITE
025714  005037  001206                CLR     @#$ESCAPE       ,NO ESCAPE ADDRESS
025720  004037  035304                JSR     R0,@#RP04       ,DO THE WRITE
025724  004164                      DTADPB
025726  000240                      NOP
025730  005737  004202        3$      TST     @#DTADPB+16     ,DONE?
025734  001775                      BEQ     3$              ,NO--LOOP
025736  100026                      BPL     4$              ;YES--BRANCH IF NO ERROR
025740  012737  026144  001206        MOV     #8$,$ESCAPE     ;,ESCAPE TO 8$ ON ERROR
025746  013737  004176  001270        MOV     @#DTADPB+12,@#CYL DS ;CYLINDER
025754  113737  004175  001274        MOVB    @#DTADPB+11,@#TRK DS ;TRACK
025762  113737  004174  001272        MOVB    @#DTADPB+10,@#SEC DS ;SECTOR
025770  012746  004202                MOV     #DTADPB+16,-(SP) ,STATUS/ERROR INDICATOR ADDRESS
025774  004737  026250                JSR     PC,@#ERINDX     ,FORM DISPATCH INDEX
026000  062607                      ADD     (SP)+,PC        ,REPORT PROPER ERROR
026002  104041                      ERROR   41              ,
026004  104042                      ERROR   42              ,PARITY ERROR
026006  104043                      ERROR   43              ,UNSAFE ERROR
026010  104044                      ERROR   44              ,NON-I/O ERROR
```

```
6396  026012  104045                          ERROR   45                      ,I/O ERROR
6397  026014  112737  000151  004166  4$      MOVB    #WRCKD,@#DTADPB+2 ,COMMAND=WRITE CHECK DATA
6398  026022  004037  035304                  JSR     R0,@#RP04               ,DO THE WRITE CHECK
6399  026026  004164                          DTADPB
6400  026030  000240                          NOP
6401  026032  005737  004202          5$      TST     @#DTADPB+16             ,DONE?
6402  026036  001775                          BEQ     5$                      ,NO--LOOP
6403  026040  100410                          BMI     7$                      ,YES--BRANCH IF ERROR
6404  026042  004037  035304                  JSR     R0,@#RP04               ,DO A 2ND WRITE CHECK
6405  026046  004164                          DTADPB
6406  026050  000240                          NOP
6407  026052  005737  004202          6$      TST     @#DTADPB+16             ,DONE?
6408  026056  001775                          BEQ     6$                      ,NO--LOOP
6409  026060  100043                          BPL     10$                     ,YES--BRANCH IF NO ERROR
6410  026062  012737  000001  001334  7$      MOV     #1,@#WCEFLG             ,SET THE WRITE CHECK ERROR FLAG
6411  026070  012737  026144  001206          MOV     #8$,$ESCAPE             ,,ESCAPE TO 8$ ON ERROR
6412  026076  013737  004176  001270          MOV     @#DTADPB+12,@#CYL DS ,CYLINDER
6413  026104  113737  004175  001274          MOVB    @#DTADPB+11,@#TRK DS ;TRACK
6414  026112  113737  004174  001272          MOVB    @#DTADPB+10,@#SEC DS ,SECTOR
6415  026120  012746  004202                  MOV     #DTADPB+16,-(SP) ,STATUS/ERROR INDICATOR ADDRESS
6416  026124  004737  026250                  JSR     PC,@#ERINDX             ,FORM DISPATCH INDEX
6417  026130  062607                          ADD     (SP)+,PC                ,REPORT PROPER ERROR
6418  026132  104041                          ERROR   41                      ,
6419  026134  104042                          ERROR   42                      ,PARITY ERROR
6420  026136  104043                          ERROR   43                      ,UNSAFE ERROR
6421  026140  104044                          ERROR   44                      ,NON-I/O ERROR
6422  026142  104046                          ERROR   46                      ,FATAL WRITE CHECK
6423  026144  013746  004202          8$      MOV     DTADPB+16,-(SP) ,STATUS WORD
6424  026150  004737  026210                  JSR     PC,LOP CK               ,SEE IF LOOP, ABORT, OR CONTINUE
6425  026154  123737  001364  001103  12$     CMPB    @#ERR CT,@#$ERFLG ,GO TO NEXT TEST?
6426  026162  101002                          BHI     10$                     ,NO--BRANCH
6427  026164  013700  001252          9$      MOV     @#BYPASS,R0             ,YES--GET EXIT ADDRESS
6428  026170  032737  040000  001220  10$     BIT     #SW14,@#C SWR           ,STALL?
6429  026176  001403                          BEQ     11$                     ,NO--BRANCH
6430  026200  004037  026366                  JSR     R0,@#STALL              ,YES--CALL STALL ROUTINE
6431  026204  001356                           WORD   STALL2                  ,STALL TIME POINTER
6432  026206  000200                  11$     RTS     R0
6433
6434                                          ,THIS SUBROUTINE CHECK FOR LOOP, ABORT, OR CONTINUE SWITCHES AFTER
6435                                          ,ERRORS 41, 42, 43, 44, 45, AND 46
6436                                          ,CALL
6437                                          ,       MOV     DTA+16,-(SP)    ,STATUS WORD FROM DPB IN USE
6438                                          ,       JSR     PC,LOP CK
6439                                          ,       RETURN
6440
6441  026210  032777  001000  152722  LOP CK  BIT     #SW9,@SWR               ,LOOP ON ERROR
6442  026216  001402                          BEQ     1$                      ,ER IF NOT
6443  026220  000177  152664                  JMP     @$LPERR                 ,START AT THE LOOP ADDRESS
6444  026224  005037  001206          1$      CLR     $ESCAPE                 ,CLEAR ERROR ESCAPE FLAG
6445  026230  032766  072006  000002          BIT     #BIT14!BIT13!BIT12!BIT10!BIT02!BIT01,2(SP)  ,CHECK ERROR TYPE
6446  026236  001402                          BEQ     2$                      ,BR IF DRIVE NOT OFFLINE, UNLOADED, OR
6447                                                                          ,PERSISTENT UNSAFE OR FATAL MASSBUS PARITY
6448  026240  000137  017366                  JMP     $EOP                    ,TERMINATE DRIVE
6449  026244  012616                  2$      MOV     (SP)+,(SP)              ,ADJUST RETURN ADDRESS
6450  026246  000207                          RTS     PC
6451
```

```
                                        ;THIS ROUTINE FORMS AN INDEX THAT WILL BE USED TO DISPATCH
                                        ;TO THE PROPER ERROR CALL   THE INDEX IS FORMED BY EXAMINING
                                        ;THE STATUS/ERROR INDICATOR OF THE APPLICABLE DPB
                                        ;INDEX          STATUS/ERROR
                                        ;-----          ------------
                                        ;     0 BIT14!BIT13!BIT08!BIT01
                                        ;     2 BIT11!BIT10!BIT02
                                        ;     4 BIT12!BIT04
                                        ;     6 BIT05!BIT03!<BIT09 & COMMAND=NON-I/O>
                                        ;    10 BIT06!<BIT09 & COMMAND=I/O>
                                        ;CALL
                                        ;       JSR     @#DPB+16,-(SP)  ;ADDRESS OF STATUS/ERROR INDICATOR
                                        ;       JSR     PC,@#ERINDX     ;FORM INDEX
                                        ;       RETURN                  ;INDEX IS ON THE STACK

026250  010046                  ERINDX MOV     R0,-(SP)        ;SAVE R0
026252  010146                         MOV     R1,-(SP)        ;SAVE R1
026254  016600  000006                 MOV     6(SP),R0        ;GET STATUS/ERROR INDICATOR POINTER
026260  011037  001260                 MOV     (R0),@#SVSTAT   ;SAVE THE STATUS/ERROR INDICATOR
026264  005001                         CLR     R1              ;START INDEX AT ZERO
026266  032710                         BIT     (PC)+,(R0)      ;FORM INDEX OF 0?
026270  020402                          WORD   BIT13!BIT08!BIT01
026272  001027                         BNE     5$              ;YES--BRANCH
026274  032710                         BIT     (PC)+,(R0)      ;FORM PARITY ERROR OR PORT REQUEST INDEX (2)?
026276  006004                          WORD   BIT11!BIT10!BIT02
026300  001023                         BNE     4$              ;YES--BRANCH
026302  032710                         BIT     (PC)+,(R0)      ;FORM UNSAFE INDEX (4)?
026304  050020                          WORD   BIT14!BIT12!BIT04
026306  001017                         BNE     3$              ;YES--BRANCH
026310  032710                         BIT     (PC)+,(R0)      ;FORM NON-I/O ERROR INDEX (6)?
026312  000050                          WORD   BIT05!BIT03
026314  001013                         BNE     2$              ;YES--BRANCH
026316  032710                         BIT     (PC)+,(R0)      ;FORM I/O ERROR INDEX (10)?
026320  000100                          WORD   BIT06
026322  001007                         BNE     1$              ;YES--BRANCH
026324  032710                         BIT     (PC)+,(R0)      ;SOFTWARE TIMEOUT?
026326  001000                          WORD   BIT09
026330  001410                         BEQ     5$              ;NO--FORM INDEX OF 0
026332  122760  000150  177762         CMPB    #150,-16(R0)    ;YES--I/O?
026340  003001                         BGT     2$              ;NO--BRANCH
026342  005201                  1$     INC     R1              ;INDEX=10---ERROR=45 OR 46
026344  005201                  2$     INC     R1              ;INDEX=6---ERROR=44
026346  005201                  3$     INC     R1              ;INDEX=4---ERROR=43
026350  005201                  4$     INC     R1              ;INDEX=2---ERROR=42
026352  006301                  5$     ASL     R1              ;INDEX=0---ERROR=41
026354  010166  000006                 MOV     R1,6(SP)        ;RETURN INDEX TO USER
026360  012601                         MOV     (SP)+,R1        ;RESTORE R1
026362  012600                         MOV     (SP)+,R0        ;RESTORE R0
026364  000207                         RTS     PC              ;RETURN FROM CALL

                                        ;THIS ROUTINE WILL PROVIDE A STALL IN MILLISECONDS FOR A SPECIFIC
                                        ;AMOUNT OF TIME IF BIT13 OF C SWR = 0 OR A RANDOM AMOUNT OF TIME
                                        ;IF BIT 13 OF C SWR = 1
                                        ;STALL1 CONTAINS SPECIFIED TIME FOR TESTS 0 - 7, AND STALL2
                                        ;CONTAINS THE TIME FOR TESTS 16-21
                                        ;CALL
```

```
6508                                    ;       JSR     R0,@#STALL
6509                                    ;       TIME POINTER            ;WHERE TO FIND THE STALL TIME
6510
6511  026366  013046                    STALL   MOV     @(R0)+,-(SP)    ;PICKUP STALL TIME
6512  026370  032737  020000  001220            BIT     #SW13,@#C SWR   ;USE A RANDOM TIME?
6513  026376  001406                            BEQ     1$              ;NO--BRANCH
6514  026400  004737  023512                    JSR     PC,@#$RAND      ;YES--FORM RANDOM NUMBER
6515  026404  013716  023612                    MOV     @#$LONUM,(SP)   ;AND USE IT FOR THE STALL TIME
6516  026410  042716  177700                    BIC     #^C77,(SP)      ;BUT NEVER > 64 MILLISECONDS
6517  026414  005046                    1$      CLR     -(SP)           ;CLEAR TEMP  LOCATION
6518  026416  162766  000001  000002    2$      SUB     #1,2(SP)        ;MORE STALL REQUIRED?
6519  026424  103407                            BLO     4$              ;NO--BRANCH
6520  026426  012716  000144                    MOV     #100.,(SP)      ;STALL FOR ABOUT 1 MILLISECOND
6521  026432  005700                    3$      TST     R0              ;NOP TO KILL TIME
6522  026434  005366  000000                    DEC     0(SP)           ;COUNT
6523  026440  001374                            BNE     3$              ;LOOP IF MORE COUNTS NEEDED
6524  026442  000765                            BR      2$
6525  026444  022626                    4$      CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
6526  026446  000200                            RTS     R0              ;EXIT
6527
6528
6529                                    ;ROUTINE TO PROVIDE A 2 MS STALL AFTER A SEEK OPERATION IN THE SEEK TIMING
6530                                    ;TESTS   THIS STALL IS REQUIRED TO COMPENSATE FOR THE 'ACCESS READY' DELAY
6531                                    ;IN THE RP04   THIS STALL TIME IS NOT INCLUDED IN THE CALCULATED SEEK TIMES
6532                                    ;CALL
6533                                    ;       JSR     PC,@#TWOMS
6534                                    ;       RETURN
6535
6536  026450  013746  177776            TWOMS   MOV     @#PS,-(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
6537  026454  012737  000240  177776            MOV     #(5*32),@#PS    ;SET THE PROCESSOR PRIORITY TO 5
6538  026462  017746  152706                    MOV     @PKV,-(SP)      ;SAVE THE OLD CLOCK VECTOR ADDRESS
6539  026466  012777  026512  152700            MOV     #1$,@PKV        ;SETUP NEW VECTOR ADDRESS
6540  026474  012777  000310  152700            MOV     #200.,@PKB      ;LOAD THE CLOCK BUFFER
6541  026502  012777  000101  152670            MOV     #101,@PKCS      ;START THE CLOCK
6542  026510  000001                            WAIT                    ;WAIT FOR 2 MS
6543  026512  062706  000004            1$      ADD     #4,SP           ;INCREMENT STACK FOR RETURN
6544  026516  012677  152652                    MOV     (SP)+,@PKV      ;RESTORE OLD CLOCK VECTOR
6545  026522  012637  177776                    MOV     (SP)+,@#PS      ;RESTORE THE OLD PROCESSOR STATUS
6546  026526  000207                            RTS     PC              ;RETURN
6547
6548                                    ;ROUTINE TO SOFTWARE COMPARE HEADER ON IMPLIED SEEKS
6549                                    ;CALL
6550                                    ;       JSR     R0,@#VERIFY
6551                                    ;       ADR POINTER             ;ADDRESS OF DPB+10 (SECTOR NUMBER)
6552                                    ;       RETURN
6553
6554  026530  010146                    VERIFY  MOV     R1,-(SP)        ;SAVE R1
6555  026532  012001                            MOV     (R0)+,R1        ;GET ADDRESS OF DPB+10
6556  026534  042737  010000  047714            BIC     #FMT22,@#BUFFER ;STRIP FORMAT BIT FROM CYLINDER NUMBER
6557  026542  023761  047714  000002            CMP     @#BUFFER,2(R1)  ;CYLINDER NUMBER OK?
6558  026550  001003                            BNE     1$              ;NO--BRANCH
6559  026552  023711  047716                    CMP     @#BUFFER+2,(R1) ;YES--HOW ABOUT TRACK/SECTOR?
6560  026556  001441                            BEQ     3$              ;BRANCH IF GOOD
6561  026560  013737  047714  001262    1$      MOV     @#BUFFER,@#CYL RD ;SAVE THE EXPECTED AND THE
6562  026566  113737  047717  001264            MOVB    @#BUFFER+3,@#TRK RD ;RECIEVED CYLINDER, TRACK,
6563  026574  113737  047716  001266            MOVB    @#BUFFER+2,@#SEC RD ;AND SECTOR
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```
6564  026602  112137  001272              MOVB    (R1)+,@#SEC DS
6565  026606  112137  001274              MOVB    (R1)+,@#TRK DS
6566  026612  011137  001270              MOV     (R1),@#CYL DS
6567  026616  012737  026630  001206      MOV     #2$,$ESCAPE       ;;ESCAPE TO 2$ ON ERROR
6568  026624  005740                      TST     -(R0)             ;MAKE IT TEST PC+4
6569  026626  104012                      ERROR   12                ;REPORT THE ERROR
6570  026630  012737  000107  004106  2$  MOV     #RECAL,DPB A+2    ;LOAD RECALIBRATE ORDER CODE
6571  026636  004037  025034              JSR     R0,@#CALL A       ;GO EXECUTE THE COMMAND
6572  026642  005037  001206              CLR     $ESCAPE           ;CLEAR ERROR ESCAPE FLAG
6573  026646  032777  001000  152264      BIT     #SW9,@SWR         ;LOOP ON ERROR ?
6574  026654  001404                      BEQ     4$                ;BR IF NOT
6575  026656  000177  152226              JMP     @$LPERR           ;RETURN TO ERROR LOOP ADDRESS
6576  026662  062700  000002          3$  ADD     #2,R0             ;INCREMENT RETURN ADDRESS
6577  026666  012601                  4$  MOV     (SP)+,R1          ;RESTORE R1
6578  026670  000200                      RTS     R0                ;EXIT
6579
6580                                  ;THIS ROUTINE WILL PERFORM A "MASSBUS" INIT  FOLLOWED BY
6581                                  ;A "RECALIBRATE" ON THE DRIVE UNDER TEST
6582                                  ;NOTE  THIS ROUTINE DESTROYS R1 AND R4
6583                                  ;CALL
6584                                  ;       JSR     R0,SRCH00         ;DO A MASSBUS INIT  AND RECAL
6585                                  ;       RETURN1                   ;RETURN HERE IF NO ERROR
6586                                  ;       RETURN2                   ;RETURN HERE ON ERROR
6587
6588  026672  005001              SRCH00  CLR     R1                ;INCASE OF ERROR (TYPTIM)
6589  026674  005037  177776              CLR     @#PS
6590  026700  012777  037400  005612      MOV     #ISR,@RPVEC       ;SETUP INTERRUPT VECTOR
6591  026706  013704  034516              MOV     @#RPADR,R4        ;PICKUP ADDRESS OF RPCS1
6592  026712  012764  000040  000010      MOV     #BIT05,RPCS2(R4)  ;MASSBUS INIT
6593  026720  005037  004174              CLR     @#DTADPB+10       ;TRACK=0, SECTOR=0
6594  026724  005037  004176              CLR     @#DTADPB+12       ;CYLINDER =0
6595  026730  012737  000107  004166      MOV     #RECAL,@#DTADPB+2 ;COMMAND = RECALIBRATE
6596  026736  005037  001206              CLR     @#$ESCAPE         ;NO ESCAPE ADDRESS
6597  026742  004037  035304              JSR     R0,@#RP04         ;CALL THE DRIVER
6598  026746  004164                      DTADPB                    ;DPB POINTER
6599  026750  000440                      BR      4$                ;QUEUE IS FULL
6600  026752  005737  004202          1$  TST     DTADPB+16         ;WAIT ON DONE
6601  026756  001775                      BEQ     1$
6602  026760  100030                      BPL     3$                ;TAKE NORMAL EXIT IF NO ERROR
6603  026762  012737  027036  001206      MOV     #2$,$ESCAPE       ;;ESCAPE TO 2$ ON ERROR
6604  026770  013737  004176  001270      MOV     @#DTADPB+12,@#CYL DS ;CYLINDER
6605  026776  113737  004175  001274      MOVB    @#DTADPB+11,@#TRK DS ;TRACK
6606  027004  113737  004174  001272      MOVB    @#DTADPB+10,@#SEC DS ;SECTOR
6607  027012  012746  004202              MOV     #DTADPB+16,-(SP) ;STATUS/ERROR INDICATOR ADDRESS
6608  027016  004737  026250              JSR     PC,@#ERINDX       ;FORM DISPATCH INDEX
6609  027022  062607                      ADD     (SP)+,PC          ;REPORT PROPER ERROR
6610  027024  104041                      ERROR   41                ;
6611  027026  104042                      ERROR   42                ;PARITY ERROR
6612  027030  104043                      ERROR   43                ;UNSAFE ERROR
6613  027032  104044                      ERROR   44                ;NON-I/O ERROR
6614  027034  104045                      ERROR   45                ;I/O ERROR
6615  027036  005720              2$      TST     (R0)+             ;ADJUST FOR ERROR EXIT
6616  027040  000404                      BR      4$                ;GO TO THE EXIT
6617  027042  005064  000006      3$      CLR     RPDA(R4)          ;TRACK AND SECTOR = 0
6618  027046  005064  000034              CLR     RPCA(R4)          ;CYLINDER = 0
6619  027052  000200              4$      RTS     R0                ;RETURN
```

```
                                        ,THIS IS AN RTI WHICH IS USED BY THE TIMING TESTS & THE SERVO SETTLE DOWN TEST

027054  000002                          DORTI   RTI                             ,RETURN FROM INTERRUPT

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

027056  104412                          STRTMR  SAVREG                          ,SAVE R0-R5
027060  012700  001276                          MOV     #TIM UP,R0              ,START AT TIM UP (MINIMUM)
027064  012701  001332                          MOV     #TIM PT,R1              ,STOP AT TIM PT
027070  005020                          1$      CLR     (R0)+                   ,CLEAR
027072  020001                                  CMP     R0,R1                   ,DONE?
027074  103775                                  BLO     1$                      ,NO--BRANCH
027076  012710  047714                          MOV     #BUFFER,(R0)            ,SETUP POINTER
027102  012737  077777  001276                  MOV     # CBIT15,@#TIM UP ,SET MINIMUM TIME TO MAXIMUM
027110  012737  077777  001314                  MOV     # CBIT15,@#TIM DN ,POSITIVE NUMBER
027116  104413                                  RESREG                          ,RESTORE R0-R5
027120  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

027122  012702  001276                  COUNT   MOV     #TIM UP,R2              ,PICKUP THE "UP" POINTER
027126  005705                                  TST     R5                      ,USE IT?
027130  001402                                  BEQ     1$                      ,YES--BRANCH
027132  012702  001314                          MOV     #TIM DN,R2              ,NO--PICKUP "DOWN" POINTER
027136  027722  152242                  1$      CMP     @PKC,(R2)+              ,LESS THAN PREVIOUS LOW?
027142  002003                                  BGE     2$                      ,NO--BRANCH
027144  017762  152234  177776                  MOV     @PKC,-2(R2)             ,YES--SAVE IT
027152  027763  152226  000004          2$      CMP     @PKC,4(R3)              ,LESS THAN THE LOW LIMIT?
027160  002001                                  BGE     3$                      ,NO--BRANCH
027162  005212                                  INC     (R2)                    ,YES--COUNT IT
027164  005722                          3$      TST     (R2)+                   ,ADVANCE THE POINTER
027166  027722  152212                          CMP     @PKC,(R2)+              ,GREATER THAN PREVIOUS HIGH?
027172  003403                                  BLE     4$                      ,NO--BRANCH
027174  017762  152204  177776                  MOV     @PKC,-2(R2)             ,YES--SAVE IT
027202  027763  152176  000006          4$      CMP     @PKC,6(R3)              ,GREATER THAN THE HIGH LIMIT?
027210  003401                                  BLE     5$                      ,NO--BRANCH
027212  005212                                  INC     (R2)                    ,YES--COUNT IT
027214  005722                          5$      TST     (R2)+                   ,ADVANCE THE POINTER
027216  067722  152162                          ADD     @PKC,(R2)+              ,ADD THIS COUNT TO THE TOTAL
027222  005522                                  ADC     (R2)+
027224  005212                                  INC     (R2)                    ,COUNT THIS READING
027226  022737  056204  001332                  CMP     #BUFFER+<4*814 >,@#TIM PT ,SAVE THIS COUNT?
027234  101406                                  BLOS    6$                      ,NO--BRANCH
027236  017777  152142  152066                  MOV     @PKC,@TIM PT            ,YES--WELL SAVE IT THEN
```

```
 6676  027244  062737  000002  001332          ADD     #2,@#TIM.PT     ,ADVANCE THE POINTER
 6677  027252  000207                  6$      RTS     PC              ,RETURN
 6678
 6679                                  ,THIS ROUTINE IS USED TO TYPE THE MINIMUM,
 6680                                  ,MAXIMUM, AND AVERAGE TIMES FOR THE TIMING TESTS
 6681                                  ,IT WILL ALSO CHECK THE TIMES TO ENSURE
 6682                                  ,THEY ARE WITHIN TOLERANCE AND IF NOT FLAG THE BAD TIMES
 6683                                  ,NOTE  THIS ROUTINE DESTROYS R2-R5
 6684                                  ,CALL
 6685                                  ,       JSR     R0,@#TYPTIM     ,GO REPORT THE TIMES
 6686                                  ,       TABLE                   ,POINT TO THE PROPER TABLE
 6687                                  ,       RETURN
 6688                                  ,
 6689                                  ,TABLE MSGADR1                  ,ADDRESS OF ASCIZ MESSAGE NUMBER 1
 6690                                  ,       MSGADR2                 ,ADDRESS OF ASCIZ MESSAGE NUMBER 2
 6691                                  ,       MIN ALLOWED             ,MINIMUM TIME ALLOWED
 6692                                  ,       MAX ALLOWED             ,MAXIMUM TIME ALLOWED
 6693
 6694  027254  012002                  TYPTIM  MOV     (R0)+,R2        ,PICKUP THE TABLE POINTER
 6695  027256  032777  000100  151654          BIT     #SW06,@SWR      ,INHIBIT TIME REPORTS?
 6696  027264  001145                          BNE     7$              ,YES--BRANCH
 6697  027266  012237  027306                  MOV     (R2)+,2$        ,ADDRESS OF MESSAGE NUMBER 1
 6698  027272  012205                          MOV     (R2)+,R5        ,ADDRESS OF MESSAGE NUMBER 2
 6699  027274  012203                          MOV     (R2)+,R3        ,PICKUP THE LOW LIMIT
 6700  027276  011202                          MOV     (R2),R2         ,AND THE HIGH LIMIT
 6701  027300  012704  001276                  MOV     #TIM.UP,R4      ,PARAMETER POINTER
 6702  027304  104401                  1$      TYPE                    ,TYPE THE MESSAGE
 6703  027306  000000                  2$       WORD   0               ,ASCIZ MESSAGE POINTER GOES HERE
 6704  027310  005764  000014                  TST     14(R4)          ,DID ANY COUNTS OCCUR?
 6705  027314  001527                          BEQ     6$              ,NO--BRANCH
 6706  027316  104401  043702                  TYPE    ,MSGMIN         ,"MIN="
 6707  027322  012446                          MOV     (R4)+,-(SP)             ;PUT (R4)+ ON THE STACK
 6708  027324  004737  023222                  JSR     PC,@#$SB2D      ,CHANGE (R4)+ TO DECIMAL ASCIZ
 6709  027330  004737  023452                  JSR     PC,@#$SUPRS     ,TYPE WITHOUT LEADING ZEROS
 6710  027334  104401  043727                  TYPE    ,MSGOUS         ,"0 US"
 6711  027340  005?24                          TST     (R4)+           ,ANY SEEKS BELOW THE LOW LIMIT
 6712  027342  001421                          BEQ     3$              ,NO--BRANCH
 6713  027344  104401  044042                  TYPE    ,MSG.SP         ,"  "
 6714  027350  016446  177776                  MOV     -2(R4),-(SP)            ,PUT -2(R4) ON THE STACK
 6715  027354  004737  023222                  JSR     PC,@#$SB2D      ,CHANGE -2(R4) TO DECIMAL ASCIZ
 6716  027360  004737  023452                  JSR     PC,@#$SUPRS     ,TYPE WITHOUT LEADING ZEROS
 6717  027364  104401  043734                  TYPE    ,MBELOW         ,"BELOW THE MINIMUM OF"
 6718  027370  010346                          MOV     R3,-(SP)                ,PUT R3 ON THE STACK
 6719  027372  004737  023222                  JSR     PC,@#$SB2D      ,CHANGE R3 TO DECIMAL ASCIZ
 6720  027376  004737  023452                  JSR     PC,@#$SUPRS     ,TYPE WITHOUT LEADING ZEROS
 6721  027402  104401  043727                  TYPE    ,MSGOUS
 6722  027406  104401  043711          3$      TYPE    ,MSGMAX         ,"MAX="
 6723  027412  012446                          MOV     (R4)+,-(SP)             ,PUT (R4)+ ON THE STACK
 6724  027414  004737  023222                  JSR     PC,@#$SB2D      ,CHANGE (R4)+ TO DECIMAL ASCIZ
 6725  027420  004737  023452                  JSR     PC,@#$SUPRS     ,TYPE WITHOUT LEADING ZEROS
 6726  027424  104401  043727                  TYPE    ,MSGOUS
 6727  027430  005724                          TST     (R4)+           ,ANY SEEKS ABOVE THE HIGH LIMIT
 6728  027432  001421                          BEQ     4$              ,NO--BRANCH
 6729  027434  104401  044042                  TYPE    ,MSG.SP         ,YES--REPORT HOW MANY
 6730  027440  016446  177776                  MOV     -2(R4),-(SP)            ,PUT -2(R4) ON THE STACK
 6731  027444  004737  023222                  JSR     PC,@#$SB2D      ,CHANGE -2(R4) TO DECIMAL ASCIZ
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6732  027450  004737  023452            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6733  027454  104401  043763            TYPE    ,MABOVE         ;"ABOVE THE MAXIMUM OF"
6734  027460  010246                    MOV     R2,-(SP)                ;PUT R2 ON THE STACK
6735  027462  004737  023222            JSR     PC,@#$S82D      ;CHANGE R2 TO DECIMAL ASCIZ
6736  027466  004737  023452            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6737  027472  104401  043727            TYPE    ,MSGOUS
6738  027476  104401  043720    4$      TYPE    ,MSGAVG         ;"AVG="
6739  027502  012446                    MOV     (R4)+,-(SP)     ;FORM THE AVERAGE
6740  027504  012446                    MOV     (R4)+,-(SP)
6741  027506  012446                    MOV     (R4)+,-(SP)
6742  027510  004737  023614            JSR     PC,@#$DIV
6743  027514  006126                    ROL     (SP)+           ;IS THE REMAINDER OVER HALF?
6744  027516  100001                    BPL     5$              ;NO--BRANCH
6745  027520  005216                    INC     (SP)            ;YES--ROUND UP
6746  027522                    5$
6747  027522  004737  023222            JSR     PC,@#$S82D      ;CHANGE  TO DECIMAL ASCIZ
6748  027526  004737  023452            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6749  027532  104401  043727            TYPE    ,MSGOUS
6750  027536  104401  044042            TYPE    ,MSG.SP
6751  027542  016446  177776            MOV     -2(R4),-(SP)            ;PUT -2(R4) ON THE STACK
6752  027546  004737  023222            JSR     PC,@#$S82D      ;CHANGE -2(R4) TO DECIMAL ASCIZ
6753  027552  004737  023452            JSR     PC,@#$SUPRS     ;TYPE WITHOUT LEADING ZEROS
6754  027556  104401  044012            TYPE    ,MSGNUM         ;"SEEKS TIMED"
6755  027562  010537  027306            MOV     R5,2$           ;NEXT MESSAGE POINTER
6756  027566  001404                    BEQ     7$              ;IF NONE EXIT
6757  027570  005005                    CLR     R5              ;NO MORE THAN 2
6758  027572  000644                    BR      1$
6759  027574  104401  044027    6$      TYPE    ,MSGNON
6760  027600  000200            7$      RTS     R0              ;EXIT
6761
6762                            ;THIS SUBROUTINE WILL INCREMENT THE TRACK
6763                            ;NUMBER (R2) BY THE AMOUNT SPECIFIED BY 'IT'
6764                            ;CALL
6765                            ;       JSR     R0,@#INCTRK
6766                            ;       RETURN1                 ;TRACK NUMBER GREATER THAN LT15
6767                            ;       RETURN2                 ;TRACK NUMBER INCREMENTED
6768
6769  027602  020237  001520    INCTRK  CMP     R2,@#LT         ;LAST TRACK COMPLETED?
6770  027606  001410                    BEQ     2$              ;YES--EXIT
6771  027610  063702  001522            ADD     @#IT,R2         ;NO--UPDATE TRACK
6772  027614  020237  001520            CMP     R2,@#LT         ;TRACK TO BIG?
6773  027620  003402                    BLE     1$              ;NO--EXIT
6774  027622  013702  001520            MOV     @#LT,R2         ;YES--SET TRACK TO LAST TRACK
6775  027626  005720            1$      TST     (R0)+           ;ADJUST FOR RETURN 2
6776  027630  000200            2$      RTS     R0              ;RETURN
6777
6778
6779                            ;THIS SUBROUTINE WILL INCREMENT THE CYLINDER
6780                            ;NUMBER (R1) BY THE AMOUNT SPECIFIED BY 'IC'
6781                            ;CALL
6782                            ;       JSR     R0,@#INCCYL
6783                            ;       RETURN1                 ;CYLINDER NUMBER GREATER THAN LC15
6784                            ;       RETURN2                 ;CYLINDER NUMBER INCREMENTED
6785
6786  027632  020137  001512    INCCYL  CMP     R1,@#LC         ;LAST CYLINDER COMPLETED?
6787  027636  001410                    BEQ     2$              ;YES--EXIT
```

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6788  027640  063701  001514                  ADD     @#IC,R1         ,NO--UPDATE CYLINDER
6789  027644  020137  001512                  CMP     R1,@#LC         ,CYLINDER TO BIG?
6790  027650  003402                          BLE     1$              ,NO--EXIT
6791  027652  013701  001512                  MOV     @#LC,R1         ,YES--SET CYLINDER TO LAST CYLINDER
6792  027656  005720                  1$      TST     (R0)+           ,ADJUST FOR RETURN 2
6793  027660  000200                  2$      RTS     R0              ,RETURN
6794
6795                                  ,THIS ROUTINE DECREMENTS THE SECTOR ADDRESS
6796                                  ,CALL
6797                                  ,       CLR     -(SP)           ,CLEAR THE STACK
6798                                  ,       JSR     PC,DECSEC       ,SUBROUTINE ENTRY
6799                                  ,       RETURN
6800
6801  027662  113766  004212  000002  DECSEC  MOVB    RP_REG+RPDA,2(SP)  ,PUT THE SECTOR ADDRESS ON THE STACK
6802  027670  005366  000002                  DEC     2(SP)           ,DECREMENT THE ADDRESS
6803  027674  100003                          BPL     1$              ,BR IF NOT CORRECTION NEEDED
6804  027676  013766  001634  000002          MOV     PRMLMT+22.,2(SP)  ,OVERFLOW OCCURED, FORCE TO MAXIMUM ADDRESS
6805  027704  000207                  1$      RTS     PC              ,RETURN
6806
6807                                  ,THIS SUBROUTINE IS USED TO FILL THE DATA BUFFER
6808                                  ,WITH ADDRESSES FROM 0 TO 21 WITH EACH ADDRESS
6809                                  ,BEING STORED IN 256 CONSECUTIVE LOCATIONS
6810                                  ,CALL
6811                                  ,       JSR     PC,@#FILBUF
6812                                  ,       RETURN
6813
6814  027706  104412                  FILBUF  SAVREG                  ,SAVE R0 - R5
6815  027710  005000                          CLR     R0              ,FIRST DISK ADDRESS
6816  027712  012701  047714                  MOV     #BUFFER,R1      ,START FILLING HERE
6817  027716  012702  000400          1$      MOV     #256.,R2        ,DO 256 WORDS
6818  027722  010021                  2$      MOV     R0,(R1)+        ,STORE
6819  027724  005302                          DEC     R2              ,MORE?
6820  027726  003375                          BGT     2$              ,YES- BRANCH
6821  027730  005200                          INC     R0              ,NO--UPDATE DISK ADDRESS
6822  027732  023700  001630                  CMP     PRMLMT+22.,R0   ,DONE?
6823  027736  103367                          BHIS    1$              ,NO--BRANCH
6824  027740  104413                          RESREG                  ,RESTORE R0 - R5
6825  027742  000207                          RTS     PC              ,RETURN
6826
6827                                  ,THIS ROUTINE WILL CLEAR THE BUFFER BY
6828                                  ,SETTING EACH WORD TO "177400"
6829                                  ,CALL
6830                                  ,       JSR     R0,@#CLRBUF
6831                                  ;       RETURN
6832
6833  027744  104412                  CLRBUF  SAVREG                  ,SAVE R0 - R5
6834  027746  012701  177400                  MOV     #177400,R1      ,WORD TO FILL BUFFER WITH
6835  027752  012702  047714                  MOV     #BUFFER,R2      ,FIRST ADDRESS OF BUFFER
6836  027756  012703  075714                  MOV     #BUFFER+<512.*22.>,R3 ,LAST ADDRESS+2 OF BUFFER
6837  027762  010122          1$.     MOV     R1,(R2)+        ,FILL WORDS 1, 9,...249,...5625
6838  027764  010122                  MOV     R1,(R2)+        ,FILL WORDS 2,10,...250,...5626
6839  027766  010122                  MOV     R1,(R2)+        ,FILL WORDS 3,11,...251,...5627
6840  027770  010122                  MOV     R1,(R2)+        ,FILL WORDS 4,12,...252,...5628
6841  027772  010122                  MOV     R1,(R2)+        ,FILL WORDS 5,13,...253,...5629
6842  027774  010122                  MOV     R1,(R2)+        ,FILL WORDS 6,14,...254,...5630
6843  027776  010122                  MOV     R1,(R2)+        ,FILL WORDS 7,15,...255,...5631
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6844  030000  010122                        MOV     R1,(R2)+        ;FILL WORDS 8,16,   256,   5632
6845  030002  020203                        CMP     R2,R3           ,DONE?
6846  030004  103766                        BLO     1$              ;NO--BRANCH
6847  030006  104413                        RESREG                  ;RESTORE R0 - R5
6848  030010  000200                        RTS     R0              ;RETURN FROM CALL
6849
6850                                  ,THIS ROUTINE IS USED TO CHECK THE DATA BUFFER
6851                                  ,FOR ADDRESSES 0 THROUGH 21 WITH EACH ADDRESS
6852                                  ,BEING STORED IN 256 CONSECUTIVE LOCATIONS
6853                                  ,CALL
6854                                  ,       JSR     R0,@#CKSCTR
6855                                  ,       RETURN
6856
6857  030012  104412                  CKSCTR  SAVREG                  ,SAVE R0 - R5
6858  030014  162706  000004                 SUB     #4,SP           ,RESERVE TEMP  STORAGE AREA
6859  030020  005001                        CLR     R1              ,FIRST SECTOR
6860  030022  012716  047714                 MOV     #BUFFER,(SP)    ,FIRST ADDRESS OF DATA BUFFER
6861  030026  005066  000002                 CLR     2(SP)           ,NO ERRORS
6862  030032  012702  000020           1$    MOV     #16 ,R2 ,LOOP COUNT (16*16=256)
6863  030036  011603                        MOV     (SP),R3         ,GET 1ST ADDRESS OF THIS SECTORS DATA
6864  030040                           2$
6865  030040  020123                        CMP     R1,(R3)+        ,WORD 1
6866  030042  001063                        BNE     7$              ,BRANCH IF BAD
6867  030044  020123                        CMP     R1,(R3)+        ,WORD 2
6868  030046  001061                        BNE     7$              ,BRANCH IF BAD
6869  030050  020123                        CMP     R1,(R3)+        ,WORD 3
6870  030052  001057                        BNE     7$              ,BRANCH IF BAD
6871  030054  020123                        CMP     R1,(R3)+        ,WORD 4
6872  030056  001055                        BNE     7$              ,BRANCH IF BAD
6873  030060  020123                        CMP     R1,(R3)+        ,WORD 5
6874  030062  001053                        BNE     7$              ,BRANCH IF BAD
6875  030064  020123                        CMP     R1,(R3)+        ;WORD 6
6876  030066  001051                        BNE     7$              ;BRANCH IF BAD
6877  030070  020123                        CMP     R1,(R3)+        ,WORD 7
6878  030072  001047                        BNE     7$              ,BRANCH IF BAD
6879  030074  020123                        CMP     R1,(R3)+        ;WORD 8
6880  030076  001045                        BNE     7$              ,BRANCH IF BAD
6881  030100  020123                        CMP     R1,(R3)+        ;WORD 9
6882  030102  001043                        BNE     7$              ,BRANCH IF BAD
6883  030104  020123                        CMP     R1,(R3)+        ;WORD 10
6884  030106  001041                        BNE     7$              ;BRANCH IF BAD
6885  030110  020123                        CMP     R1,(R3)+        ;WORD 11
6886  030112  001037                        BNE     7$              ,BRANCH IF BAD
6887  030114  020123                        CMP     R1,(R3)+        ;WORD 12
6888  030116  001035                        BNE     7$              ;BRANCH IF BAD
6889  030120  020123                        CMP     R1,(R3)+        ;WORD 13
6890  030122  001033                        BNE     7$              ,BRANCH IF BAD
6891  030124  020123                        CMP     R1,(R3)+        ,WORD 14
6892  030126  001031                        BNE     7$              ;BRANCH IF BAD
6893  030130  020123                        CMP     R1,(R3)+        ,WORD 15
6894  030132  001027                        BNE     7$              ,BRANCH IF BAD
6895  030134  020123                        CMP     R1,(R3)+        ,WORD 16
6896  030136  001025                        BNE     7$              ;BRANCH IF BAD
6897  030140  005302                        DEC     R2              ,FINISHED WITH THIS SECTORS DATA?
6898  030142  001336                        BNE     2$              ,NO--BRANCH
6899  030144  062716  001000           3$.   ADD     #512.,(SP)      ,YES--FIRST ADDRESS OF NEXT SECTOR
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6900  030150  005201                          INC     R1              ;MOVE TO NEXT SECTOR
6901  030152  023701  001630                  CMP     PRMLMT+22,R1    ;DONE?
6902  030156  103325                          BHIS    1$              ;NO--BRANCH
6903  030160  005766  000002          4$      TST     2(SP)           ;ERROR OCCUR?
6904  030164  001406                          BEQ     6$              ;NO--BRANCH
6905  030166  123737  001364  001103          CMPB    @#ERR CT,@#SERFLG ;MAX. ERROR OCCURRED?
6906  030174  101002                          BHI     6$              ;NO--BRANCH
6907  030176  013700  001252          5$      MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
6908  030202  062706  000004          6$      ADD     #4,SP           ;FREE TEMP. AREA
6909  030206  104413                          RESREG                  ;RESTORE R0 - R5
6910  030210  000200                          RTS     R0              ;RETURN FROM CALL
6911  030212  010304          7$      MOV     R3,R4           ,FORM WORD NUMBER AND
6912  030214  :61604                  SUB     (SP),R4         ,ADDRESS TO CONTINUE FROM
6913  030216  010405                  MOV     R4,R5
6914  030220  .06204                  ASR     R4              ,WORD NUMBER
6915  030222  042705  177740                  BIC     # C37,R5
6916  030226  001002                          BNE     8$              ,BRANCH IF NOT A MULTIPLE OF 16
6917  030230  012705  000040                  MOV     #40,R5          ,SET TO WORD 16
6918  030234  006305          8$      ASL     R5
6919  030236  062705  030040                  ADD     #2$,R5          ,ADDRESS
6920  030242  016337  177776  001126          MOV     -2(R3),@#$BDDAT ,SAVE BAD DATA
6921  030250  005766  000002                  TST     2(SP)           ,FIRST ERROR?
6922  030254  001015                          BNE     10$             ,NO--BRANCH
6923  030256  013737  004176  001270          MOV     @#DTADPB+12,@#CYL DS ,CYLINDER NUMBER
6924  030264  113737  004175  001274          MOVB    @#DTADPB+11,@#TRK DS ,TRACK NUMBER
6925  030272  012737  030302  001206          MOV     #9$,$ESCAPE     ,,ESCAPE TO 9$ ON ERROR
6926  030300  104021                          ERROR   21              ,REPORT THE ERROR
6927  030302  105166  000002          9$      COMB    2(SP)           ,SET ERROR SWITCH
6928  030306  000404                          BR      11$
6929  030310                          10$
6930  030310  012737  030320  001206          MOV     #11$,$ESCAPE    ,,ESCAPE TO 11$ ON ERROR
6931  030316  104022                          ERROR   22              ,REPORT THE ERROR
6932  030320  032777  001000  150612  11$     BIT     #SW09,@SWR      ,LOOP ON ERROR?
6933  030326  001323                          BNE     5$              ,YES
6934  030330  032777  000002  150602          BIT     #SW01,@SWR      ,STOP DATA COMPARE?
6935  030336  001310                          BNE     4$              ,YES--BRANCH
6936  030340  123737  001364  001103          CMPB    @#ERR.CT,@#SERFLG ,MAX. ERRORS?
6937  030346  101713                          BLOS    5$              ;YES--BRANCH
6938  030350  032777  000040  150562          BIT     #SW05,@SWR      ,REPORT ONLY 1ST ERROR PER SECTOR?
6939  030356  001272                          BNE     3$              ,YES--BRANCH
6940  030360  000115                          JMP     (R5)
6941
6942                                  ,THIS ROUTINE WILL MOVE THE 16 WORDS OF THE
6943                                  ,DESIRED PATTERN INTO THE DATA BUFFER
6944                                  ;CALL
6945                                  ;       MOV     #NX,R0          ,PATTERN NUMBER INDEX TO R0
6946                                  ;       JSR     PC,@#SETBUF
6947
6948  030362  104412          SETBUF. SAVREG                          ,SAVE R0 - R5
6949  030364  012701  047714                  MOV     #BUFFER,R1      ,FIRST ADDRESS
6950  030370  013702  004170                  MOV     @#DTADPB+4,R2   ,WORD COUNT
6951  030374  016003  003044          1$:     MOV     PAT PT(R0),R3   ;PICKUP PATTERN POINTER
6952  030400  012321                          MOV     (R3)+,(R1)+     ;MOVE WORD 1 INTO DATA BUFFER
6953  030402  012321                          MOV     (R3)+,(R1)+     ,MOVE WORD 2 INTO DATA BUFFER
6954  030404  012321                          MOV     (R3)+,(R1)+     ,MOVE WORD 3 INTO DATA BUFFER
6955  030406  012321                          MOV     (R3)+,(R1)+     ,MOVE WORD 4 INTO DATA BUFFER
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6956  030410  012321                        MOV     (R3)+,(R1)+     ,MOVE WORD 5 INTO DATA BUFFER
6957  030412  012321                        MOV     (R3)+,(R1)+     ,MOVE WORD 6 INTO DATA BUFFER
6958  030414  012321                        MOV     (R3)+,(R1)+     ,MOVE WORD 7 INTO DATA BUFFER
6959  030416  012321                        MOV     (R3)+,(R1)+     ;MOVE WORD 8 INTO DATA BUFFER
6960  030420  012321                        MOV     (R3)+,(R1)+     ;MOVE WORD 9 INTO DATA BUFFER
6961  030422  012321                        MOV     (R3)+,(R1)+     ;MOVE WORD 10 INTO DATA BUFFER
6962  030424  012321                        MOV     (R3)+,(R1)+     ;MOVE WORD 11 INTO DATA BUFFER
6963  030426  012321                        MOV     (R3)+,(R1)+     ;MOVE WORD 12 INTO DATA BUFFER
6964  030430  012321                        MOV     (R3)+,(R1)+     ;MOVE WORD 13 INTO DATA BUFFER
6965  030432  012321                        MOV     (R3)+,(R1)+     ;MOVE WORD 14 INTO DATA BUFFER
6966  030434  012321                        MOV     (R3)+,(R1)+     ;MOVE WORD 15 INTO DATA BUFFER
6967  030436  012321                        MOV     (R3)+,(R1)+     ;MOVE WORD 16 INTO DATA BUFFER
6968  030440  062702  000020                ADD     #16.,R2,DONE?
6969  030444  001353                        BNE     1$              ,NO--BRANCH
6970  030446  104413                        RESREG                  ,RESTORE R0 - R5
6971  030450  000207                        RTS     PC              ,RETURN
6972
6973                                  ,THIS ROUTINE COMPARES A 16 WORD DATA PATTERN
6974                                  ,AGAINST THE DATA BUFFER
6975                                  ,CALL
6976                                  ,       MOV     #NX,R0          ,PATTERN NUMBER INDEX TO R0
6977                                  ,       JSR     PC,@#DATCMP
6978                                  ,       RETURN
6979
6980  030452  104412                  DATCMP. SAVREG                  ;SAVE R0 - R5
6981  030454  012701  047714                  MOV     #BUFFER,R1      ,FIRST ADDRESS OF BUFFER
6982  030460  013702  004170                  MOV     @#DTADPB+4,R2   ,WORD COUNT
6983  030464  005046                        CLR     -(SP)           ,NO ERROR
6984  030466  016003  003044          1$      MOV     PAT PT(R0),R3   ,PATTERN POINTER
6985  030472                          2$
6986  030472  162321                        SUB     (R3)+,(R1)+     ,CHECK WORD 1
6987  030474  001044                        BNE     4$              ;BRANCH IF DIFFERENT
6988  030476  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 2
6989  030500  001042                        BNE     4$              ;BRANCH IF DIFFERENT
6990  030502  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 3
6991  030504  001040                        BNE     4$              ;BRANCH IF DIFFERENT
6992  030506  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 4
6993  030510  001036                        BNE     4$              ;BRANCH IF DIFFERENT
6994  030512  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 5
6995  030514  001034                        BNE     4$              ,BRANCH IF DIFFERENT
6996  030516  162321                        SUB     (R3)+,(R1)+     ,CHECK WORD 6
6997  030520  001032                        BNE     4$              ,BRANCH IF DIFFERENT
6998  030522  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 7
6999  030524  001030                        BNE     4$              ,BRANCH IF DIFFERENT
7000  030526  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 8
7001  030530  001026                        BNE     4$              ;BRANCH IF DIFFERENT
7002  030532  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 9
7003  030534  001024                        BNE     4$              ,BRANCH IF DIFFERENT
7004  030536  162321                        SUB     (R3)+,(R1)+     ,CHECK WORD 10
7005  030540  001022                        BNE     4$              ,BRANCH IF DIFFERENT
7006  030542  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 11
7007  030544  001020                        BNE     4$              ,BRANCH IF DIFFERENT
7008  030546  162321                        SUB     (R3)+,(R1)+     ,CHECK WORD 12
7009  030550  001016                        BNE     4$              ,BRANCH IF DIFFERENT
7010  030552  162321                        SUB     (R3)+,(R1)+     ,CHECK WORD 13
7011  030554  001014                        BNE     4$              ,BRANCH IF DIFFERENT
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7012  030556  162321                        SUB     (R3)+,(R1)+     ,CHECK WORD 14
7013  030560  001012                        BNE     4$              ;BRANCH IF DIFFERENT
7014  030562  162321                        SUB     (R3)+,(R1)+     ;CHECK WORD 15
7015  030564  001010                        BNE     4$              ;BRANCH IF DIFFERENT
7016  030566  162321                        SUB     (R3)+,(R1)+     ,CHECK WORD 16
7017  030570  001006                        BNE     4$              ;BRANCH IF DIFFERENT
7018  030572  062702  000020                ADD     #16.,R2         ,DONE ?
7019  030576  001333                        BNE     1$              ,NO--BRANCH
7020  030600  005726                3$      TST     (SP)+           ,YES -- CLEAN UP STACK
7021  030602  104413                        RESREG                  ,RESTORE R0 - R5
7022  030604  000207                        RTS     PC
7023  030606  010104                4$      MOV     R1,R4           ,FORM THE WORD NUMBER
7024  030610  162704  047714                SUB     #BUFFER,R4
7025  030614  006204                        ASR     R4              ,WORD NUMBER
7026  030616  010305                        MOV     R3,R5           ,FORM ADDRESS TO CONTINUE FROM
7027  030620  166005  003044                SUB     PAT PT(R0),R5
7028  030624  006305                        ASL     R5
7029  030626  062705  030472                ADD     #2$,R5          ,ADDRESS
7030  030632  064341                        ADD     -(R3),-(R1)     ,RECONSTRUCT THE BAD WORD
7031  030634  010137  001122                MOV     R1,@#$BDADR     ,SAVE THE ERROR INFORMATION
7032  030640  010337  001120                MOV     R3,@#$GDADR     ,
7033  030644  012137  001126                MOV     (R1)+,@#$BDDAT  ;
7034  030650  012337  001124                MOV     (R3)+,@#$GDDAT  ,
7035  030654  005716                        TST     (SP)            ,1ST DATA COMPARE ERROR?
7036  030656  001023                        BNE     6$              ,NO--BRANCH
7037  030660  013737  004176  001270        MOV     @#DTADPB+12,@#CYL DS ,CYLINDER
7038  030666  113737  004175  001274        MOVB    @#DTADPB+11,@#TRK DS ,TRACK
7039  030674  113737  004174  001272        MOVB    @#DTADPB+10,@#SEC DS ,SECTOR
7040  030702  016600  000026                MOV     26(SP),R0       ,GET TEST PC+4
7041  030706  012737  030716  001206        MOV     #5$,$ESCAPE     ,,ESCAPE TO 5$ ON ERROR
7042  030714  104013                        ERROR   13              ,REPORT THE ERROR
7043  030716  016600  000020        5$      MOV     20(SP),R0       ,PATTERN NUMBER INDEX
7044  030722  105116                        COMB    (SP)            ,SET THE ERROR SWITCH
7045  030724  000404                        BR      7$
7046  030726                        6$
7047  030726  012737  030736  001206        MOV     #7$,$ESCAPE     ,,ESCAPE TO 7$ ON ERROR
7048  030734  104014                        ERROR   14              ,REPORT THE ERROR
7049  030736  032777  000002  150174  7$    BIT     #SW01,@SWR      ,STOP DATA COMPARE?
7050  030744  001315                        BNE     3$              ,YES--EXIT
7051  030746  123737  001364  001103        CMPB    @#ERR CT,@#$ERFLG ,MAX  ERRORS?
7052  030754  101004                        BHI     8$              ,NO--BRANCH
7053  030756  013766  001252  000016        MOV     @#BYPASS,16(SP) ,YES--ERROR EXIT
7054  030764  000705                        BR      3$
7055  030766  000115                8$      JMP     (R5)            ,NO--CONTINUE AT NEXT WORD
7056
7057                                ,THIS ROUTINE WILL FILL THE DATA BUFFER (256*22 WORDS) WITH
7058                                ,A RANDOM PATTERN   THE FIRST TWO WORDS OF EVERY 256 WILL
7059                                ,BE THE BASE OF THE RANDOM NUMBER GENERATOR FOR THE
7060                                ,NEXT 254 WORDS
7061                                ,NOTE  THIS ROUTINE DESTROYS R1 AND R2
7062                                ,CALL
7063                                ,       JSR     R0,@#FILRAN
7064                                ,       RETURN
7065
7066  030770  012701  047714        FILRAN  MOV     #BUFFER,R1
7067  030774  013702  001630                MOV     PRMLMT+22,R2    ,MAXIMUM NUMBER OF SECTORS
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7068  031000  004037  031210          1$      JSR     R0,@#RANPAT
7069  031004  005302                          DEC     R2
7070  031006  100374                          BPL     1$
7071  031010  000200                          RTS     R0
7072
7073                                  ;THIS ROUTINE USES THE FIRST TWO WORDS OF THE
7074                                  ;READ BUFFER TO GENERATED A RANDOM PATTERN   THEN
7075                                  ;THE READ BUFFER IS COMPARED TO THE PATTERN GENERATED
7076                                  ;NOTE:  THIS ROUTINE DESTROYS R1-R4
7077                                  ;CALL
7078                                  ;       JSR     R0,@#RANCK
7079                                  ;       RETURN
7080
7081  031012  013746  023610          RANCK   MOV     @#$HINUM,-(SP)  ;SAVE THE PRESENT RANDOM NUMBER
7082  031016  013746  023612                  MOV     @#$LONUM,-(SP)
7083  031022  012702  050714                  MOV     #BUFFER+512.,R2 ;READ BUFFER ADDRESS
7084  031026  012701  051714                  MOV     #BUFFER+1024.,R1 ;RANDOM PATTERN ADDRESS
7085  031032  010103                          MOV     R1,R3           ;COPY IT INTO R3 FOR LATER USE
7086  031034  011237  023612                  MOV     (R2),@#$LONUM   ;PRIME THE RANDOM NUMBER GENERATOR
7087  031040  016237  000002  023610          MOV     2(R2),@#$HINUM
7088  031046  004037  031210                  JSR     R0,@#RANPAT     ;GENERATE A RANDOM PATTERN
7089  031052  012637  023612                  MOV     (SP)+,@#$LONUM  ;RESTORE PRESENT RANDOM NUMBER
7090  031056  012637  023610                  MOV     (SP)+,@#$HINUM
7091  031062  005046                          CLR     -(SP)           ;NO ERRORS
7092  031064  162322                  1$      SUB     (R3)+,(R2)+     ;ARE THESE TWO WORDS DIFFERENT?
7093  031066  001441                          BEQ     4$              ;NO--BRANCH
7094  031070  012737  031142  001206          MOV     #3$,$ESCAPE     ;;ESCAPE TO 3$ ON ERROR
7095  031076  064342                          ADD     -(R3),-(R2)     ;RECREATE THE BAD WORD
7096  031100  010237  001122                  MOV     R2,@#$BDADR     ;ADDRESS OF BAD DATA
7097  031104  010337  001120                  MOV     R3,@#$GDADR     ;ADDRESS OF GOOD DATA
7098  031110  012237  001126                  MOV     (R2)+,@#$BDDAT  ;BAD DATA
7099  031114  012337  001124                  MOV     (R3)+,@#$GDDAT  ;GOOD DATA
7100  031120  010204                          MOV     R2,R4           ;FORM WORD NUMBER (1 TO 256)
7101  031122  162704  050714                  SUB     #BUFFER+512,R4
7102  031126  006204                          ASR     R4
7103  031130  005716                          TST     (SP)            ;FIRST ERROR
7104  031132  001002                          BNE     2$              ;NO--BRANCH
7105  031134  105116                          COMB    (SP)            ;YES--SET ERROR SWITCH
7106  031136  104015                          ERROR   15              ;REPORT THE ERROR
7107  031140  104016                  2$      ERROR   16              ;REPORT THE ERROR
7108  031142  032777  001000  147770  3$      BIT     #SW09,@SWR      ;LOOP ON ERROR?
7109  031150  001012                          BNE     5$              ;YES--BRANCH
7110  031152  123737  001364  001103          CMPB    @#ERR CT,@#$ERFLG ;MAX. ERRORS OCCURRED?
7111  031160  101406                          BLOS    5$              ;YES--BRANCH
7112  031162  032777  000002  147750          BIT     #SW01,@SWR      ;STOP COMPARING?
7113  031170  001002                          BNE     5$              ;YES--BRANCH
7114  031172  020103                  4$      CMP     R1,R3           ;ALL DATA BEEN COMPARED?
7115  031174  101333                          BHI     1$              ;NO--BRANCH
7116  031176  005726                  5$      TST     (SP)+           ;ERROR OCCUR?
7117  031200  001402                          BEQ     6$              ;NO--BRANCH
7118  031202  013700  001252                  MOV     @#BYPASS,R0     ;TAKE ERROR EXIT
7119  031206  000200                  6$      RTS     R0              ;EXIT
7120
7121                                  ;THIS ROUTINE FILLS A 256 WORD BUFFER WITH A RANDOM
7122                                  ;PATTERN OF WHICH THE FIRST TWO WORDS ARE THE BASE
7123                                  ;OF THE PATTERN
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```
7124                                    ;CALL
7125                                    ;       MOV     #ADR,R1         ;ADDRESS OF THE BUFFER
7126                                    ;       JSR     R0,@#RANPAT
7127                                    ;       RETURN
7128
7129  031210  010246                    RANPAT  MOV     R2,-(SP)        ;SAVE R2
7130  031212  012702  000200                    MOV     #256./2,R2      ;GENERATE 256 WORDS
7131  031216  000402                            BR      2$
7132  031220  004737  023512            1$      JSR     PC,@#$RAND      ;GENERATE A RANDOM NUMBER
7133  031224  013721  023612            2$      MOV     @#$LONUM(R1)+   ;PUT LOW WORD IN BUFFER
7134  031230  013721  023610                    MOV     @#$HINUM(R1)+   ;PUT HIGH WORD IN BUFFER
7135  031234  005302                            DEC     R2              ;DONE?
7136  031236  003370                            BGT     1$              ;NO--BRANCH
7137  031240  012602                            MOV     (SP)+,R2        ;RESTORE R2
7138  031242  000200                            RTS     R0              ;EXIT
7139
7140                                    ;THIS ROUTINE GENERATES RANDOM CYLINDER, TRACK, AND SECTOR
7141                                    ;ADDRESSES AND SAVES THEN IN THE DPB (DTADPB+10 AND DTADPB+12)
7142                                    ;NOTE  THIS ROUTINE DESTROYS R1-R3
7143                                    ;CALL
7144                                    ;       JSR     R0,@#RANADR
7145                                    ;       RETURN
7146
7147  031244  004737  023512            RANADR  JSR     PC,@#$RAND      ;GENERATE A RANDOM NUMBER
7148  031250  113701  023612                    MOVB    @#$LONUM,R1     ;FORM SECTOR IN R1
7149  031254  113702  023613                    MOVB    @#$LONUM+1,R2   ;FORM TRACK IN R2
7150  031260  013703  023610                    MOV     @#$HINUM,R3     ;FORM CYLINDER IN R3
7151  031264  105701                            TSTB    R1              ;ENSURE THE SECTOR IS BETWEEN 0 AND 21
7152  031266  002403                            BLT     2$
7153  031270  123701  001630            1$      CMPB    PRMLMT+22,R1    ;CHECK MAXIMUM SECTOR ADDRESS
7154  031274  103003                            BHIS    3$
7155  031276  000241                    2$      CLC
7156  031300  106001                            RORB    R1
7157  031302  000772                            BR      1$
7158  031304  105702                    3$      TSTB    R2              ;ENSURE THE TRACK IS BETWEEN 0 AND 18
7159  031306  002403                            BLT     5$
7160  031310  122702  000023            4$      CMPB    #19.,R2
7161  031314  003003                            BGT     6$
7162  031316  000241                    5$      CLC
7163  031320  106002                            RORB    R2
7164  031322  000772                            BR      4$
7165  031324  023703  001510            6$      CMP     @#FC,R3         ;ENSURE THE CYLINDER IS BETWEEN FC AND LC
7166  031330  003413                            BLE     7$
7167  031332  000241                            CLC
7168  031334  006003                            ROR     R3
7169  031336  005503                            ADC     R3
7170  031340  001371                            BNE     6$
7171  031342  010103                            MOV     R1,R3
7172  031344  000303                            SWAB    R3
7173  031346  060203                            ADD     R2,R3
7174  031350  005203                            INC     R3
7175  031352  003364                            BGT     6$
7176  031354  005403                            NEG     R3
7177  031356  000762                            BR      6$
7178  031360  023703  001512            7$      CMP     @#LC,R3
7179  031364  002003                            BGE     8$
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7180  031366  000241                          CLC
7181  031370  006003                          ROR     R3
7182  031372  000772                          BR      7$
7183  031374  023703  001510          8$      CMP     @#FC,R3
7184  031400  003403                          BLE     9$
7185  031402  005203                          INC     R3
7186  031404  000303                          SWAB    R3
7187  031406  000764                          BR      7$
7188  031410  110137  004174          9$      MOVB    R1,@#DTADPB+10  ;SAVE SECTOR ADDRESS
7189  031414  110237  004175                  MOVB    R2,@#DTADPB+11  ;SAVE TRACK ADDRESS
7190  031420  010337  004176                  MOV     R3,@#DTADPB+12  ;SAVE CYLINDER ADDRESS
7191  031424  000200                          RTS     R0              ;RETURN
7192
7193                                  ;THIS ROUTINE IS USED TO INPUT THE "CONTROL SWITCHES"
7194                                  ;IF SWR<07>=1 THE PRESENT SETTING WILL BE TYPED AND THE NEW
7195                                  ;SETTING IS READ AND STORED
7196                                  ;NOTE  THIS ROUTINE DESTROYS R3 AND R4
7197                                  ;CALL
7198                                  ;       JSR     PC,@#GETSWR
7199                                  ;       RETURN                  ;(C SWR)=DESIRED CONTROL SWITCHES
7200
7201  031426  032777  000200  147504  GETSWR  BIT     #SW07,@SWR      ;READ CONTROL SWITCHES?
7202  031434  001430                          BEQ     2$              ;NO--BRANCH
7203  031436  104401  031444                  TYPE    ,65$            ;,TYPE ASCIZ STRING
7204  031442  000410                          BR      64$             ;,GET OVER THE ASCIZ
7205                                  ,,65$    ASCIZ  <CR><LF>/SET SWR<07>=0/
7206  031464                          64$
7207  031464  012703  043052          1$      MOV     #MSG CS,R3      ;"CONTROL SWITCHES="
7208  031470  013704  001220                  MOV     @#C SWR,R4      ;PRESENT CONTROL SWITCH SETTINGS
7209  031474  004037  031520                  JSR     R0,@#GETNUM     ;GET THE NEW SWITCH SETTINGS
7210  031500  000771                          BR      1$              ; COMMA
7211  031502  000240                          NOP                     ;PERIOD
7212  031504  013737  001220  001222          MOV     C SWR,SAVCSW    ;SAVE PREVIOUS VALUE
7213  031512  010437  001220                  MOV     R4,@#C SWR      ; DOUBLE PERIOD-SAVE NEW SWITCH SETTING
7214  031516  000207                  2$      RTS     PC              ;RETURN FROM CALL
7215
7216                                  ;THIS ROUTINE WILL TYPE AN ASCIZ MESSAGE AND THEN
7217                                  ;INPUT AN ASCIZ STRING AND CHANGE THE STRING TO OCTAL
7218                                  ;IF REQUIRED
7219                                  ;NOTE  THIS ROUTINE DESTROYS R1
7220                                  ;CALL
7221                                  ;       MOV     #ADR,R3         ;ADDRESS OF ASCIZ MESSAGE
7222                                  ;       MOV     #NUM,R4         ;OCTAL NUMBER
7223                                  ;       JSR     R0,@#GETNUM
7224                                  ;       RETURN1                 ;INPUT TERMINATED WITH A COMMA
7225                                  ;       RETURN2                 ;WITH A PERIOD
7226                                  ;       RETURN3                 ;WITH A DOUBLE PERIOD
7227                                  ;                               ;R4=INPUT NUMBER AND
7228                                  ;                               ;R2=R4*32 FOR ALL
7229                                  ;                               ;THREE RETURNS
7230
7231  031520  010337  031526          GETNUM  MOV     R3,2$           ;SAVE MESSAGE POINTER
7232  031524  104401                  1$      TYPE                    ;TYPE THE MESSAGE
7233  031526  000000                  2$       WORD   0               ;MESSAGE POINTER GOES HERE
7234  031530  010446                          MOV     R4,-(SP)        ;,SAVE R4 FOR TYPEOUT
7235  031532  104402                          TYPOC                   ;,GO TYPE--OCTAL ASCII(ALL DIGITS)
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7236  031534  104401  043076          TYPE    ,SLASH          ,' / '
7237  031540  104411                  RDLIN                   ,READ AN ASCIZ STRING
7238  031542  012601                  MOV     (SP)+,R1        ,ADDRESS OF FIRST CHARACTER
7239  031544  004037  033770          JSR     R0,@#CK CHR     ,CHECK ONE CHARACTER
7240  031550  031524                  1$                      ,ILLEGAL CHARACTER
7241  031552  031524                  1$                      ,CARRIAGE RETURN
7242  031554  031566                  3$                      ,"/"
7243  031556  031612                  7$                      ,","
7244  031560  031620                  8$                      ," "
7245  031562  031564                  11$                     ,DIGIT 0-9
7246  031564  005301          11$     DEC     R1              ,DECREMENT THE INPUT POINTER
7247  031566                  3$
7248  031566  004037  034230          JSR     R0,@#CK NUM     ,CHECK THE NUMBER
7249  031572  031524                  1$                      ,ILLEGAL INPUT
7250  031574  031606                  6$                      ,TERMINATED WITH A "," OR "CR"
7251  031576  031604                  5$                      ,TERMINATED WITH A " "
7252  031600  031602                  4$                      ,TERMINATED WITH A "  "
7253  031602  005720          4$      TST     (R0)+           ,DOUBLE PERIOD
7254  031604  005720          5$      TST     (R0)+           ,SINGLE PERIOD
7255  031606  010204          6$      MOV     R2,R4           ,COMMA--SAVE INPUT NUMBER
7256  031610  000414                  BR      10$             ,GO TO EXIT
7257  031612  105711          7$      TSTB    (R1)            ,TERMINATOR AFTER A COMMA?
7258  031614  001343                  BNE     1$              ,NO--LOOP
7259  031616  000411                  BR      10$             ,YES--EXIT
7260  031620  105711          8$      TSTB    (R1)            ,TERMINATOR AFTER A PERIOD?
7261  031622  001406                  BEQ     9$              ,YES--EXIT
7262  031624  122721  000056          CMPB    #'.,(R1)+       ,NO--DOUBLE PERIOD?
7263  031630  001335                  BNE     1$              ,NO--LOOP
7264  031632  105711                  TSTB    (R1)            ,YES--TERMINATOR?
7265  031634  001333                  BNE     1$              ,NO--LOOP
7266  031636  005720                  TST     (R0)+           ,DOUBLE PERIOD
7267  031640  005720          9$      TST     (R0)+           ,PERIOD
7268  031642  010402          10$     MOV     R4,R2           ,COMMA--POSITION THE
7269  031644  000302                  SWAB    R2              ,NUMBER IN CASE IT
7270  031646  006202                  ASR     R2              ,IS THE PRIORITY LEVEL
7271  031650  006202                  ASR     R2
7272  031652  006202                  ASR     R2
7273  031654  000200                  RTS     R0              ,EXIT
7274
7275                          ,THIS ROUTINE IS USED TO CHANGE OR MODIFY
7276                          ,THE TEST PARAMETERS   IT GIVES THE OPERATOR
7277                          ,THE CAPABILITY OF SPECIFYING WHICH DRIVES TO TEST, WHICH
7278                          ,TESTS TO RUN AND HOW MANY TIMES TO
7279                          ,REPEAT EACH TEST
7280
7281  031656  104412          GT PRM  SAVREG                  ,SAVE R0 - R5
7282  031660  005037  001232  GT PR1  CLR     DRVSEL          ,NO DRIVE SELECTED
7283  031664  104401  031672          TYPE    ,65$            ,,TYPE ASCIZ STRING
7284  031670  000406                  BR      64$             ,,GET OVER THE ASCIZ
7285                          ,,65$    ASCIZ  <CR><LF>/DRIVE(S)=/
7286  031706                  64$
7287  031706  104411                  RDLIN                   ,READ TTY
7288  031710  012601                  MOV     (SP)+,R1        ,ADDRESS OF ASCIZ STRING
7289  031712  004037  033770          JSR     R0,@#CK CHR     ,CHECK ONE CHARACTER
7290  031716  031660                  GT PR1                  ,ILLEGAL CHARACTER
7291  031720  031660                  GT PR1                  ,CARRIAGE RETURN
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031722  031660                           GT PR1                     ,"/"
031724  031660                           GT PR1                     ,","
031726  031660                           GT PR1                     ," "
031730  031732                           1$                         ,DIGIT 0-9
031732  005301                   1$      DEC     R1
031734                           2$
031734  012702  000007                   MOV     #7,R2    ,UPPER LIMIT OF INPUT
031740  004037  034044                   JSR     R0,@#CK DIG        ,CHECK THE DIGIT(S)
031744  031660                           GT PR1                     ,ILLEGAL INPUT
031746  031660                           GT PR1                     ,INPUT TO LARGE
031750  031756                           3$                         ,TERMINATED WITH A "," OR "CR"
031752  032002                           4$                         ,TERMINATED WITH A " "
031754  032002                           4$                         ,TERMINATED WITH A "  "
031756  156237  034504  001232   3$      BISB    ATABIT(R2),DRVSEL  ,SET THE DRIVE SELECTED BIT
031764  105741                           TSTB    -(R1)              ,WAS THE LINE TERMINATED?
031766  001362                           BNE     2$                 ,NO-GET THE NEXT DRIVE
031770  005037  001234                   CLR     @#TSTNMS           ,DESELECT ALL TESTS
031774  005037  001236                   CLR     TSTNMS+2
032000  000405                           BR      GTTST1             ,YES--SELECT TEST
032002  156237  034504  001232   4$      BISB    ATABIT(R2),DRVSEL  ,SET THE SELECTED DRIVE BITS
032010  104413                   GT PR2  RESREG                     ,RESTORE R0 - R5
032012  000207                           RTS     PC                 ,EXIT

032014                           GTTST1
032014  104401  032022                   TYPE    ,65$               ,,TYPE ASCIZ STRING
032020  000403                           BR      64$                ,,GET OVER THE ASCIZ
                                 ,,65$    ASCIZ  /TEST=/
032030                           64$
032030  104411                           RDLIN                      ,READ AN ASCIZ STRING
032032  012601                           MOV     (SP)+,R1           ,POINTER TO R1
032034  122711  000056                   CMPB    #' ,(R1)           ,DOUBLE PERIOD?
032040  001007                           BNE     1$                 ,NO--BRANCH
032042  122761  000056  000001           CMPB    #' ,1(R1)
032050  001003                           BNE     1$
032052  105761  000002                   TSTB    2(R1)              ,"CR"?
032056  001754                           BEQ     GT PR2             ,YES--EXIT
032060  005037  001234           1$      CLR     TSTNMS             ,NO TEST SELECTED
032064  005037  001236                   CLR     TSTNMS+2
032070  005037  001240                   CLR     OPNFLG             ,NO TESTS TO BE OPENED
032074  005037  001242                   CLR     OPNFLG+2
032100  121127  000123           GTTST2  CMPB    (R1),#'S           ,ALL SEEK TESTS?
032104  001004                           BNE     1$                 ,NO--BRANCH
032106  052737  000777  001234           BIS     #777,TSTNMS        ,YES--SELECT TESTS 0-10
032114  000552                           BR      GTTST3
032116  121127  000124           1$      CMPB    (R1),#'T           ,ALL TIMING TESTS?
032122  001004                           BNE     2$                 ,NO--BRANCH
032124  052737  036000  001234           BIS     #36000,TSTNMS      ,YES--SELECT TESTS 12-15
032132  000543                           BR      GTTST3
032134  121127  000101           2$      CMPB    (R1),#'A           ,ALL ADDRESSING TESTS?
032140  001004                           BNE     3$                 ,NO--BRANCH
032142  052737  140000  001234           BIS     #140000,TSTNMS     ,YES--SELECT TESTS 16 & 17
032150  000534                           BR      GTTST3
032152  121127  000104           3$      CMPB    (R1),#'D           ,DATA TEST?
032156  001004                           BNE     4$                 ,NO--BRANCH
032160  052737  000001  001236           BIS     #1,TSTNMS+2        ,YES--SELECT TEST 20
032166  000525                           BR      GTTST3
```

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 7348  032170  121127  000105          4$      CMPB    (R1),#'E        ,EXERCISER TEST?
 7349  032174  001004                          BNE     5$              ,NO--BRANCH
 7350  032176  052737  000002  001236          BIS     #2,TSTNMS+2     ,YES--SELECT TEST 21
 7351  032204  000516                          BR      GTTST3
 7352  032206  004037  033714          5$      JSR     R0,@#CK OCT     ,OCTAL DIGIT?
 7353  032212  000514                          BR      GTTST4          ,NO--BRANCH
 7354  032214  010205                          MOV     R2,R5           ,YES--SAVE IT
 7355  032216  005201                          INC     R1              ,MOVE TO NEXT CHARACTER
 7356  032220  004037  033714                  JSR     R0,@#CK OCT     ,OCTAL DIGIT
 7357  032224  000405                          BR      6$              ,NO--BRANCH
 7358  032226  005201                          INC     R1              ,MOVE TO NEXT CHARACTER
 7359  032230  006305                          ASL     R5              ,SCALE HIGH DIGIT
 7360  032232  006305                          ASL     R5
 7361  032234  006305                          ASL     R5
 7362  032236  060502                          ADD     R5,R2           ,COMBINE HIGH & LOW DIGITS
 7363  032240  020227  000022          6$      CMP     R2,#$TN-1       ,VALID TEST NUMBER?
 7364  032244  003263                          BGT     GTTST1          ,NO--BRANCH
 7365  032246  010237  032440                  MOV     R2,9$           ,SAVE THE TEST NUMBER
 7366  032252  010204                          MOV     R2,R4           ,CONVERT TEST NUMBER INTO AN INDEX
 7367  032254  042704  000017                  BIC     #17,R4          ,CLEAR UNWANTED BITS
 7368  032260  006204                          ASR     R4              ,SHIFT THE BITS
 7369  032262  006204                          ASR     R4              ,SHIFT THE BITS
 7370  032264  006204                          ASR     R4              ,SHIFT THE BITS
 7371  032266  006302                          ASL     R2
 7372  032270  056264  001424  001234          BIS     BITS(R2),TSTNMS(R4)  ,SELECT TEST
 7373  032276  121127  000055                  CMPB    (R1),#'-        ,TEST STRING?
 7374  032302  001060                          BNE     GTTST4          ,NO--BRANCH
 7375  032304  005201                          INC     R1              ,YES--MOVE TO NEXT CHARACTER
 7376  032306  004037  033714                  JSR     R0,@#CK OCT     ,OCTAL DIGIT?
 7377  032312  000640                          BR      GTTST1          ,NO--BRANCH
 7378  032314  010205                          MOV     R2,R5           ,YES--SAVE IT
 7379  032316  005201                          INC     R1              ,MOVE TO NEXT CHARACTER
 7380  032320  004037  033714                  JSR     R0,@#CK OCT     ,OCTAL DIGIT?
 7381  032324  000405                          BR      7$              ,NO--BRANCH
 7382  032326  005201                          INC     R1              ,YES--MOVE TO NEXT CHARACTER
 7383  032330  006305                          ASL     R5              ,SCALE HIGH DIGIT
 7384  032332  006305                          ASL     R5
 7385  032334  006305                          ASL     R5
 7386  032336  060502                          ADD     R5,R2           ,COMBINE HIGH & LOW DIGIT
 7387  032340  020227  000022          7$      CMP     R2,#$TN-1       ,VALID TEST NUMBER?
 7388  032344  003223                          BGT     GTTST1          ,NO--BRANCH
 7389  032346  023702  032440                  CMP     9$,R2           ,IS THE FIRST NUMBER OF THE
 7390                                                                  ,STRING SMALLER THAN THE LAST?
 7391  032352  002220                          BGE     GTTST1          ,NO--BRANCH
 7392  032354  010246                          MOV     R2,-(SP)        ,SAVE ENDING TEST NUMBER
 7393  032356  013702  032440                  MOV     9$,R2           ,GET STARTING TEST NUMBER
 7394  032362  012637  032440                  MOV     (SP)+,9$        ,STORE ENDING TEST NUMBER
 7395  032366  006337  032440                  ASL     9$              ,SHIFT ENDING TEST NUMBER
 7396  032372  006302                          ASL     R2              ,SHIFT TEST NUMBER
 7397  032374  010204                  8$      MOV     R2,R4           ,COPY TEST NUMBER INTO R4
 7398  032376  042704  000037                  BIC     #37,R4          ,CLEAR LOWER BITS
 7399  032402  006204                          ASR     R4              ,SHIFT THE TEST NUMBER
 7400  032404  006204                          ASR     R4              ,SHIFT THE TEST NUMBER
 7401  032406  006204                          ASR     R4              ,SHIFT THE TEST NUMBER
 7402  032410  006204                          ASR     R4              ,SHIFT THE TEST NUMBER
 7403  032412  056264  001424  001234          BIS     BITS(R2),TSTNMS(R4)  ,SELECT THE TEST
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7404  032420  062702  000002              ADD     #2,R2           ,INECREMENT THE TEST NUMBER
7405  032424  020237  032440              CMP     R2,9$           ,SEE IF FINISHED
7406  032430  101761                      BLOS    8$              ,BR IF NOT
7407  032432  162702  000002              SUB     #2,R2           ,CORRECT TEST NUMBER
7408  032436  000402                      BR      GTTST4          ,CONTINUE
7409  032440  000000              9$       WORD    0               ,STORE TEST NUMBER HERE
7410  032442  005201              GTTST3  INC     R1              ,MOVE TO NEXT CHARACTER
7411  032444  121127  000056      GTTST4  CMPB    (R1),#'         ,"PERIOD"?
7412  032450  001441                      BEQ     GTTST5          ;YES--BRANCH
7413  032452  005737  001234              TST     TSTNMS          ,ANY TEST SELECTED THIS CYCLE?
7414  032456  001005                      BNE     1$              ,BR IF YES
7415  032460  005737  001236              TST     TSTNMS+2        ,ANY TEST SELECTED THIS CYCLE ?
7416  032464  001002                      BNE     1$              ,BR IF YES
7417  032466  000137  032014              JMP     GTTST1          ,NO
7418  032472  121127  000057      1$      CMPB    (R1),#'/        ,"OPEN"?
7419  032476  001004                      BNE     2$              ,NO--BRANCH
7420  032500  056264  001424  001240      BIS     BITS(R2), OPNFLG(R4)  ;YES--SET BITS FOR TEST TO OPEN
7421  032506  000405                      BR      3$
7422  032510  121127  000054      2$      CMPB    (R1),#',        ,"COMMA"?
7423  032514  001402                      BEQ     3$              ,BR IF YES
7424  032516  000137  032014              JMP     GTTST1          ,NO
7425  032522  005201              3$      INC     R1              ,MOVE TO NEXT CHARACTER
7426  032524  105711                      TSTB    (R1)            ;"CR"?
7427  032526  001402                      BEQ     4$              ,BR IF 'CR'
7428  032530  000137  032100              JMP     GTTST2          ,NO--GO GET NEXT CHARACTER
7429  032534  005737  001240      4$      TST     OPNFLG          ,ANY TESTS TO OPEN ?
7430  032540  001042                      BNE     OPNTST          ,BR IF YES
7431  032542  005737  001242              TST     OPNFLG+2        ,ANY TESTS TO OPEN ?
7432  032546  001037                      BNE     OPNTST          ,BR IF YES
7433  032550  000137  032014              JMP     GTTST1          ,NO--START AGAIN
7434  032554  005201              GTTST5  INC     R1              ,MOVE TO NEXT CHARACTER
7435  032556  121127  000056              CMPB    (R1),#'         ,"PERIOD"?
7436  032562  001414                      BEQ     GTTST6          ,YES--BRANCH
7437  032564  105711                      TSTB    (R1)            ,"CR"?
7438  032566  001402                      BEQ     1$              ,YES--BRANCH
7439  032570  000137  032014              JMP     GTTST1
7440  032574  005737  001240      1$      TST     OPNFLG          ,ANY TESTS TO OPEN ?
7441  032600  001022                      BNE     OPNTST          ,BR IF YES
7442  032602  005737  001242              TST     OPNFLG+2        ,ANY TESTS TO OPEN ?
7443  032606  001017                      BNE     OPNTST          ,BR IF YES
7444  032610  000137  032010              JMP     GT PR2          ,NO--GO START TESTING
7445  032614  005201              GTTST6  INC     R1              ,MOVE TO NEXT CHARACTER
7446  032616  105711                      TSTB    (R1)            ,"CR"?
7447  032620  001402                      BEQ     1$              ,YES--BRANCH
7448  032622  000137  032014              JMP     GTTST1          ,NO--GO ASK FOR TEST
7449  032626  005737  001240      1$      TST     OPNFLG          ,ANY TESTS TO OPEN ?
7450  032632  001005                      BNE     OPNTST          ,BR IF YES
7451  032634  005737  001242              TST     OPNFLG+2        ,ANY TESTS TO OPEN ?
7452  032640  001002                      BNE     OPNTST          ,BR IF YES
7453  032642  000137  032010              JMP     GT PR2          ,NO--GO START TESTING
7454
7455                                  ,OPEN THE SELECTED TEST FOR CHANGES
7456
7457  032646  104412                  OPNTST  SAVREG                  ,SAVE R0 - R5
7458  032650  005027                          CLR     (PC)+           ,START WITH TEST 0
7459  032652  000000                  OPN CT   WORD    0               ,COUNT STORED HERE
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7460  032654  000411                        BR      OPN 2           ,SKIP THE INCREMENT
7461  032656  005237  032652        OPN 1.  INC     OPN.CT          ;MOVE TO THE NEXT TEST
7462  032662  022737  000022  032652        CMP     #$TN-1,OPN CT   ,TEST NUMBER TOO BIG?
7463  032670  002003                        BGE     OPN.2           ,NO--OPEN THE NEXT TEST
7464  032672  104413                        RESREG                  ,RESTORE R0 - R5
7465  032674  000137  032014                JMP     GTTST1          ,YES--GO ASK FOR MORE TESTS
7466  032700  013705  032652        OPN 2.  MOV     OPN.CT,R5       ;SETUP TO USE THE
7467  032704  006305                        ASL     R5              ;TEST NUMBER AS AN INDEX
7468  032706  013703  032652                MOV     OPN CT,R3       ,GET INDEX
7469  032712  042703  000017                BIC     #17,R3          ;CLEAR LOWER TEST BITS
7470  032716  006203                        ASR     R3              ,SHIFT TEST NUMBER
7471  032720  006203                        ASR     R3              ,SHIFT TEST NUMBER
7472  032722  006203                        ASR     R3              ,SHIFT TEST NUMBER
7473  032724  036563  001424  001240        BIT     BITS(R5),OPNFLG(R3)  ;OPEN THIS TEST?
7474  032732  001751                        BEQ     OPN.1           ,NO--MOVE TO NEXT TEST
7475  032734  104401  032742                TYPE    ,65$            ,,TYPE ASCIZ STRING
7476  032740  000404                        BR      64$             ,,GET OVER THE ASCIZ
7477                          ,,65$.  .ASCIZ  / TEST /
7478  032752                  64$
7479  032752  013746  032652                MOV     OPN CT,-(SP)    ,,SAVE OPN CT FOR TYPEOUT
7480                                                                  ,,TEST NUMBER
7481  032756  104403                        TYPOS                   ,,GO TYPE--OCTAL ASCII
7482  032760     002                         BYTE    2               ,,TYPE 2 DIGIT(S)
7483  032761     000                         BYTE    0               ,,SUPPRESS LEADING ZEROS
7484  032762  104401  001215                TYPE    ,$CRLF          ,TYPE "CR" & "LF"
7485  032766  016500  001536                MOV     PRMPT(R5),R0    ,PICKUP PARAMETER POINTER
7486  032772  011046                        MOV     (R0),-(SP)      ,SAVE THE VARIABLE INDICATOR
7487  032774  012702  001504                MOV     #PRM,R2         ,FIRST ADDRESS OF TABLE
7488  033000  000405                        BR      2$
7489  033002  006216                1$      ASR     (SP)            ,CHECK FOR A VARIABLE
7490  033004  103403                        BCS     2$              ,GO MOVE THIS ONE
7491  033006  001404                        BEQ     OPNPRM          ,DONE
7492  033010  005722                        TST     (R2)+           ,BUMP THE POINTER
7493  033012  000773                        BR      1$
7494  033014  012022                2$      MOV     (R0)+,(R2)+     ,MOVE THIS VARIABLE INTO THE
7495  033016  000771                        BR      1$              ,COMMON AREA
7496  033020  013716  001504        OPNPRM  MOV     @#PRM,(SP)      ,GET THE VARIABLE INDICATOR
7497  033024  005004                        CLR     R4              ,ZERO THE INDEX
7498  033026  006216                1$      ASR     (SP)            ,CHECK FOR A VARIABLE
7499  033030  103403                        BCS     3$              ,GO GET IT
7500  033032  001772                        BEQ     OPNPRM          ,OUT OF VARIABLES
7501  033034  005724                2$      TST     (R4)+           ,UPDATE THE INDEX
7502  033036  000773                        BR      1$
7503  033040  005764  001606        3$      TST     PRMLMT(R4)      ,IS THE MAX  MAGNITUDE NEG?
7504  033044  100456                        BMI     OPNPAT          ,YES--THEN IT IS THE PATTERN
7505  033046  104401  044042                TYPE    ,MSG SP         ,TYPE SPACES
7506  033052  016437  001636  033062        MOV     PRMMSG(R4),4$   ,TYPE THE NAME OF THIS VARIABLE
7507  033060  104401                        TYPE
7508  033062  000000                4$       WORD    0
7509  033064  104401  043050                TYPE    ,MSG.EQ         ,TYPE "="
7510  033070  016446  001506                MOV     RPT(R4),-(SP)           ,PUT RPT(R4) ON THE STACK
7511  033074  004737  023222                JSR     PC,@#$S2D       ,CHANGE RPT(R4) TO DECIMAL ASCIZ
7512  033100  004737  023452                JSR     PC,@#$SUPRS     ,TYPE WITHOUT LEADING ZEROS
7513  033104  104401  043076                TYPE    ,SLASH          ,' / '
7514  033110  104411                        RDLIN
7515  033112  012601                        MOV     (SP)+,R1        ,READ AN ASCIZ STRING
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7516  033114  004037  033770          JSR     RO,@#CK CHR     ;CHECK ONE CHARACTER
7517  033120  033040                  3$                      ;ILLEGAL CHARACTER
7518  033122  033034                  2$                      ;CARRIAGE RETURN
7519  033124  033172                  8$                      ;"/"
7520  033126  033134                  5$                      ;","
7521  033130  033142                  6$                      ;"."
7522  033132  033170                  7$                      ;DIGIT 0-9
7523  033134  105711          5$      TSTB    (R1)            ;"CR"?
7524  033136  001340                  BNE     3$              ;NO--STAY ON THIS VARIABLE
7525  033140  000735                  BR      2$              ;YES--MOVE TO NEXT VARIABLE
7526  033142  105711          6$      TSTB    (R1)            ;IS THERE A "CR" AFTER THE PERIOD?
7527  033144  001002                  BNE     64$             ;NO
7528  033146  000137  033562          JMP     OPN N2          ;YES--GO CLOSE THIS TEST
7529  033152  122721  000056  64$     CMPB    #'.,(R1)+       ;DOUBLE PERIOD?
7530  033156  001330                  BNE     3$              ;NO--GO ASK FOR THIS VARIABLE
7531  033160  105711                  TSTB    (R1)            ;YES--IS A "CR" AFTER THE DOUBLE PERIOD?
7532  033162  001326                  BNE     3$              ;NO--ASK FOR THIS VARIABLE AGAIN
7533  033164  000137  033600          JMP     OPN X2          ;YES--CLOSE ALL TEST
7534  033170  005301          7$      DEC     R1              ;BACK THE POINTER UP BY ONE
7535  033172                  8$
7536  033172  016402  001606          MOV     PRMLMT(R4),R2   ;UPPER LIMIT OF INPUT
7537  033176  004037  034044          JSR     RO,@#CK DIG     ;CHECK THE DIGIT(S)
7538  033202  033040                  3$                      ;ILLEGAL INPUT
7539  033204  033040                  3$                      ;INPUT TO LARGE
7540  033206  033214                  9$                      ;TERMINATED WITH A "," OR "CR"
7541  033210  033556                  OPN N1                  ;TERMINATED WITH A "."
7542  033212  033574                  OPN X1                  ;TERMINATED WITH A ":"
7543  033214  010264  001506  9$      MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
7544  033220  000705                  BR      2$              ;MOVE TO NEXT VARIABLE
7545  033222  104401  044042  OPNPAT  TYPE    ,MSG.SP         ;TYPE SPACES
7546  033226  104401  043044          TYPE    ,MSG PAT        ;TYPE "PAT"
7547  033232  104401  043050          TYPE    ,MSG.EQ         ;TYPE "="
7548  033236  016446  001506          MOV     RPT(R4),-(SP)   ;;SAVE RPT(R4) FOR TYPEOUT
7549  033242  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
7550  033244  104401  044043          TYPE    ,MSG SP+1       ;TYPE ONE SPACE
7551  033250  104411                  RDLIN                   ;READ ASCIZ STRING
7552  033252  012601                  MOV     (SP)+,R1        ;PICKUP POINTER
7553  033254  004037  033770          JSR     RO,@#CK CHR     ;CHECK ONE CHARACTER
7554  033260  033222                  OPNPAT                  ;ILLEGAL CHARACTER
7555  033262  033020                  OPNPRM                  ;CARRIAGE RETURN
7556  033264  033316                  3$                      ;"/"
7557  033266  033020                  OPNPRM                  ;","
7558  033270  033274                  1$                      ;"."
7559  033272  033314                  2$                      ;DIGIT 0-9
7560  033274  105711          1$      TSTB    (R1)            ;"CR" AFTER THE PERIOD?
7561  033276  001631                  BEQ     OPN N2          ;YES--GO CLOSE THIS TEST
7562  033300  122721  000056          CMPB    #'.,(R1)+       ;NO--PERIOD?
7563  033304  001346                  BNE     OPNPAT          ;NO--LOOP
7564  033306  105711                  TSTB    (R1)            ;"CR" AFTER A DOUBLE PERIOD?
7565  033310  001533                  BEQ     OPN X2          ;YES--GO START TESTING
7566  033312  000743                  BR      OPNPAT          ;NO--LOOP
7567  033314  005301          2$      DEC     R1              ;BACKUP THE ASCII POINTER
7568  033316                  3$
7569  033316  004037  034230          JSR     RO,@#CK NUM     ;CHECK THE NUMBER
7570  033322  033222                  OPNPAT                  ;ILLEGAL INPUT
7571  033324  033332                  4$                      ;TERMINATED WITH A "," OR "CR"
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7572  033326  033556                        OPN N1                  ,TERMINATED WITH A " "
7573  033330  033574                        OPN X1                  ,TERMINATED WITH A "  "
7574  033332  010264  001506          4$    MOV     R2,RPT(R4)      ,SAVE THE INPUT NUMBER
7575  033336  006002                        ROR     R2              ,OPEN PATTERN 0?
7576  033340  103227                        BCC     OPNPRM          ,NO--START AT BEGINNING OF PARAMETER TABLE
7577  033342  104412                        SAVREG                  ,SAVE R0 - R5
7578  033344  005000          OPNWDS        CLR     R0              ,START WITH WORD 0
7579  033346  012704  003104                MOV     #PAT0,R4
7580  033352                  1$
7581  033352  104401  033360                TYPE    ,65$            ,,TYPE ASCIZ STRING
7582  033356  000403                        BR      64$             ,,GET OVER THE ASCIZ
7583                          ,,65$   ASCIZ /   WD/
7584  033366                  64$
7585  033366  010046                        MOV     R0,-(SP)                ;PUT R0 ON THE STACK
7586  033370  004737  023222                JSR     PC,@#$SB2D      ,CHANGE R0 TO DECIMAL ASCIZ
7587  033374  004737  023452                JSR     PC,@#$SUPRS     ,TYPE WITHOUT LEADING ZEROS
7588  033400  104401  043050                TYPE    ,MSG.EQ         ,TYPE "="
7589  033404  011446                        MOV     (R4),-(SP)      ,,SAVE (R4) FOR TYPEOUT
7590  033406  104402                        TYPOC                   ,;GO TYPE--OCTAL ASCII(ALL DIGITS)
7591  033410  104411                        RDLIN                   ,READ ASCIZ STRING
7592  033412  012601                        MOV     (SP)+,R1        ,PICKUP THE POINTER
7593  033414  004037  033770                JSR     R0,@#CK CHR     ,CHECK ONE CHARACTER
7594  033420  033352                        1$                      ,ILLEGAL CHARACTER
7595  033422  033454                        4$                      ,CARRIAGE RETURN
7596  033424  033436                        2$                      ,"/"
7597  033426  033454                        4$                      ,","
7598  033430  033470                        5$                      ," "
7599  033432  033434                        10$                     ,DIGIT 0-9
7600  033434  005301          10$           DEC     R1              ,BACKUP THE ASCII POINTER
7601  033436                  2$
7602  033436  004037  034230                JSR     R0,@#CK NUM     ,CHECK THE NUMBER
7603  033442  033352                        1$                      ,ILLEGAL INPUT
7604  033444  033452                        3$                      ,TERMINATED WITH A "," OR "CR"
7605  033446  033510                        6$                      ,TERMINATED WITH A " "
7606  033450  033522                        8$                      ,TERMINATED WITH A "  "
7607  033452  010214          3$            MOV     R2,(R4)         ,SAVE THE INPUT
7608  033454  005724          4$            TST     (R4)+           ,MOVE TO NEXT WORD
7609  033456  005200                        INC     R0              ,INCREMENT THE COUNT
7610  033460  022700  000020                CMP     #16.,R0         ,COUNT TO LARGE?
7611  033464  003332                        BGT     1$              ,NO--BRANCH
7612  033466  000726                        BR      OPNWDS          ,YES--BRANCH
7613  033470  105711          5$            TSTB    (R1)            ,"CR" AFTER THE PERIOD?
7614  033472  001407                        BEQ     7$              ,YES--GO CLOSE THIS TEST
7615  033474  122721  000056                CMPB    #'.,(R1)+       ,NO--PERIOD?
7616  033500  001324                        BNE     1$              ,NO--BRANCH ILLEGAL INPUT STRING
7617  033502  105711                        TSTB    (R1)            ,"CR" AFTER THE "PERIOD-PERIOD"?
7618  033504  001407                        BEQ     9$              ,YES--GO START TESTING
7619  033506  000721                        BR      1$              ,NO--LOOP
7620  033510  010224          6$            MOV     R2,(R4)+        ,SAVE THE INPUT
7621  033512  004737  033534    7$          JSR     PC,@#CLSWDS     ;CLOSE THE DATA PATTERN
7622  033516  104413                        RESREG                  ,RESTORE R0 - R5
7623  033520  000420                        BR      OPN N2          ,MOVE TO NEXT TEST
7624  033522  010224          8$            MOV     R2,(R4)+        ,SAVE THE INPUT
7625  033524  004737  033534    9$          JSR     PC,@#CLSWDS     ,CLOSE THE DATA PATTERN
7626  033530  104413                        RESREG                  ;RESTORE R0 - R5
7627  033532  000422                        BR      OPN X2          ,START TESTING
```

```
7628  033534  012701  003104          CLSWDS: MOV     #PAT0,R1        ;FIRST ADDRESS OF DATA PATTERN
7629  033540  005200                  1$      INC     R0              ;COUNT THE LAST WORD THAT WAS STORED
7630  033542  022700  000017                  CMP     #15.,R0         ;END OF TABLE
7631  033546  002402                          BLT     2$              ;YES--EXIT
7632  033550  012124                          MOV     (R1)+,(R4)+     ;COPY
7633  033552  000772                          BR      1$              ;LOOP
7634  033554  000207                  2$      RTS     PC              ;RETURN
7635  033556  010264  001506          OPN N1  MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
7636  033562  005726                  OPN N2. TST     (SP)+           ;CLEAN OFF THE STACK
7637  033564  004737  033634                  JSR     PC,CLOSE        ;CLOSE THIS TEST
7638  033570  000137  032656                  JMP     OPN 1           ;GO OPEN THE NEXT TEST
7639  033574  010264  001506          OPN X1  MOV     R2,RPT(R4)      ;SAVE THIS VARIABLE
7640  033600  005726                  OPN X2  TST     (SP)+           ;CLEAN OFF THE STACK
7641  033602  004737  033634          1$      JSR     PC,CLOSE        ;CLOSE THIS TEST
7642  033606  005725                  2$      TST     (R5)+           ;UPDATE THE INDEX
7643  033610  020527  000034                  CMP     R5,#16*2        ;INDEX TO BIG?
7644  033614  002403                          BLT     3$              ;NO--BRANCH
7645  033616  104413                          RESREG                  ,RESTORE R0 - R5
7646  033620  000137  032010                  JMP     GT PR2          ,GO TO EXIT
7647  033624  036503  001424          3$      BIT     BITS(R5),R3     ,IS THIS TEST OPEN FOR CHANGE?
7648  033630  001364                          BNE     1$              ,YES--GO CLOSE IT
7649  033632  000765                          BR      2$              ;NO--MOVE TO NEXT TEST
7650  033634  104412                  CLOSE   SAVREG                  ;SAVE R0 - R5
7651  033636  012700  001504                  MOV     #PRM,R0         ;"FROM" ADDRESS
7652  033642  016501  001536                  MOV     PRMPT(R5),R1    ,"TO" ADDRESS
7653  033646  012002                          MOV     (R0)+,R2        ,"FROM" INDICATOR
7654  033650  012103                          MOV     (R1)+,R3        ,"TO" INDICATOR
7655  033652  012704  000001                  MOV     #1,R4           ,TEST BIT START A "RPT"
7656  033656  030402                  1$      BIT     R4,R2           ,PARAMETER TO BE MOVED?
7657  033660  001403                          BEQ     2$              ,NO--BRANCH
7658  033662  030403                          BIT     R4,R3           ,A PLACE TO PUT IT?
7659  033664  001404                          BEQ     3$              ,NO--BRANCH
7660  033666  011011                          MOV     (R0),(R1)       ,YES--MOVE "FROM" TO "TO"
7661  033670  030403                  2$      BIT     R4,R3           ;"TO" PARAMETER?
7662  033672  001401                          BEQ     3$              ,NO--BRANCH
7663  033674  005721                          TST     (R1)+           ,YES--UPDATE THE POINTER
7664  033676  005720                  3$      TST     (R0)+           ,UPDATE FROM POINTER
7665  033700  006304                          ASL     R4              ;POSITION THE TEST BIT
7666  033702  032704  002000                  BIT     #BIT10,R4       ,DONE?
7667  033706  001763                          BEQ     1$              ;NO--BRANCH
7668  033710  104413                          RESREG                  ,RESTORE R0 - R5
7669  033712  000207                          RTS     PC              ,RETURN
7670                                ,THIS ROUTINE IS USED TO CHECK IF AN
7671                                ,ASCII CHARACTER IS A DIGIT BETWEEN 0 AND 7
7672                                ,CALL
7673                                ,       MOV     #ADR,R1         ;ADDRESS OF ASCII CHARACTER
7674                                ,       JSR     R0,@#CK OCT     ,CHECK THE CHARACTER
7675                                ,       RETURN1                 ,CHARACTER IS NOT BETWEEN 0-7
7676                                ,       RETURN2                 ,CHARACTER IS IN R2 AS A
7677                                ,                               ,OCTAL DIGIT
7678
7679  033714  121127  000060          CK OCT. CMPB    (R1),#'0        ,LESS THAN ZERO?
7680  033720  103407                          BLO     1$              ,YES -- BRANCH
7681  033722  121127  000067                  CMPB    (R1),#'7        ,GREATER THAN SEVEN?
7682  033726  101004                          BHI     1$              ,YES -- BRANCH
7683  033730  111102                          MOVB    (R1),R2         ,GET THE CHARACTER
```

```
7684  033732  042702  177770          BIC     # C7,R2          ;STRIP AWAY THE ASCII
7685  033736  005720                  TST     (R0)+            ;ADJUST FOR RETURN
7686  033740  000200          1$.     RTS     R0               ;RETURN
7687
7688                                  ;THIS ROUTINE IS USED TO CHECK AN ASCII CHARACTER
7689                                  ;AND DETERMINE IF IT IS A DIGIT BETWEEN 0 AND 9.
7690                                  ;CALL
7691                                  ;       MOV     #ADR,R1          ;ADDRESS OF ASCII CHARACTER
7692                                  ;       JSR     R0,@#CK DEC      ;CHECK THE CHARACTER
7693                                  ;       RETURN1                  ;NOT BETWEEN 0 AND 9
7694                                  ;       RETURN2                  ;BETWEEN 0 AND 9
7695                                  ;                                ;R2 = DIGIT
7696
7697  033742  121127  000060  CK DEC  CMPB    (R1),#'0         ;LESS THAN ZERO?
7698  033746  103407                  BLO     1$               ;YES -- BRANCH
7699  033750  121127  000071          CMPB    (R1),#'9                 ;GREATER THAN NINE?
7700  033754  101004                  BHI     1$               ;YES -- BRANCH
7701  033756  111102                  MOVB    (R1),R2          ;GET THE CHARACTER
7702  033760  042702  000060          BIC     #'0,R2           ;STRIP AWAY THE ASCII
7703  033764  005720                  TST     (R0)+            ;ADJUST FOR RETURN
7704  033766  000200          1$      RTS     R0               ;RETURN
7705
7706                                  ;THIS ROUTINE WILL CHECK AN ASCII CHARACTER TO
7707                                  ;DETERMINE WHAT IT IS
7708                                  ;CALL
7709                                  ;       MOV     #ADR,R1          ;ADDRESS OF ASCII CHARACTER
7710                                  ;       JSR     R0,@#CK CHR      ;CHECK CHARACTER
7711                                  ;       RETURN  ADR1             ;UNKNOWN CHARACTER
7712                                  ;       RETURN  ADR2             ;CARRIAGE RETURN * (R1)=ADR+1
7713                                  ;       RETURN  ADR3             ;SLASH * (R1)=ADR+1
7714                                  ;       RETURN  ADR4             ;COMMA * (R1)=ADR+1
7715                                  ;       RETURN  ADR5             ;PERIOD * (R1)=ADR+1
7716                                  ;       RETURN  ADR6             ;DIGIT BETWEEN 0 AND 9
7717                                  ;                                ;R2 = DIGIT * (R1)=ADR+1
7718
7719  033770  105711          CK CHR  TSTB    (R1)             ;"CARRIAGE RETURN"?
7720  033772  001420                  BEQ     4$               ;YES -- BRANCH
7721  033774  121127  000057          CMPB    (R1),#'/         ;"SLASH"?
7722  034000  001414                  BEQ     3$               ;YES -- BRANCH
7723  034002  121127  000054          CMPB    (R1),#',         ;"COMMA"?
7724  034006  001410                  BEQ     2$               ;YES -- BRANCH
7725  034010  121127  000056          CMPB    (R1),#'          ;"PERIOD"?
7726  034014  001404                  BEQ     1$               ;YES -- BRANCH
7727  034016  004037  033742          JSR     R0,@#CK DEC      ;"DIGIT"?
7728  034022  000406                  BR      5$               ;NO -- BRANCH
7729  034024  005720                  TST     (R0)+            ;DIGIT BETWEEN 0-9
7730  034026  005720          1$:     TST     (R0)+            ;PERIOD
7731  034030  005720          2$:     TST     (R0)+            ;COMMA
7732  034032  005720          3$:     TST     (R0)+            ;SLASH
7733  034034  005720          4$:     TST     (R0)+            ;CARRIAGE RETURN
7734  034036  005201                  INC     R1               ;MOVE POINTER TO NEXT CHARACTER
7735  034040  011000          5$      MOV     (R0),R0          ;UNKNOWN CHARACTER
7736  034042  000200                  RTS     R0               ;RETURN
7737
7738                                  ;THIS ROUTINE CHECKS AN ASCII STRING FOR LEGAL
7739                                  ;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

034044  010446          CK DIG  MOV     R4,-(SP)        ;SAVE R4
034046  010346                  MOV     R3,-(SP)        ;SAVE R3
034050  010246                  MOV     R2,-(SP)        ;SAVE THE MAX  SIZE ON THE STACK
034052  005002                  CLR     R2              ;START WITH 0
034054  005003                  CLR     R3
034056  005004                  CLR     R4
034060  004037  033770          JSR     R0,@#CK CHR     ;CHECK ONE CHARACTER
034064  034214                  8$                      ;ILLEGAL CHARACTER
034066  034214                  8$                      ;CARRIAGE RETURN
034070  034214                  8$                      ;"/"
034072  034214                  8$                      ;","
034074  034214                  8$                      ;" "
034076  034100                  1$                      ;DIGIT 0-9
034100  006303          1$      ASL     R3              ;2
034102  010346                  MOV     R3,-(SP)        ;SAVE *2
034104  006303                  ASL     R3              ;4
034106  006303                  ASL     R3              ;8
034110  062603                  ADD     (SP)+,R3        ;(*8)+(*2)=*10
034112  060203                  ADD     R2,R3           ;UPDATE THE INPUT NUMBER
034114  004037  033770          JSR     R0,@#CK CHR     ;CHECK ONE CHARACTER
034120  034214                  8$                      ;ILLEGAL CHARACTER
034122  034134                  9$                      ;CARRIAGE RETURN
034124  034214                  8$                      ;"/"
034126  034142                  3$                      ;","
034130  034140                  2$                      ;" "
034132  034100                  1$                      ;DIGIT 0-9
034134  005301          9$      DEC     R1              ;BACKUP THE CHARACTER POINTER
034136  000401                  BR      3$              ;CONTINE
034140  005724          2$      TST     (R4)+           ;"PERIOD"
034142  005724          3$      TST     (R4)+           ;"COMMA" OR "CR"
034144  004037  033770          JSR     R0,@#CK CHR     ;CHECK ONE CHARACTER
034150  034214                  8$                      ;ILLEGAL CHARACTER
034152  034204                  6$                      ;CARRIAGE RETURN
034154  034214                  8$                      ;"/"
034156  034214                  8$                      ;","
034160  034164                  4$                      ;" "
034162  034174                  5$                      ;DIGIT 0-9
034164  005724          4$      TST     (R4)+           ;"PERIOD-PERIOD"
034166  105711                  TSTB    (R1)            ;"CR"?
034170  001405                  BEQ     6$              ;YES--BRANCH
034172  000410                  BR      8$
034174  126127  177776  000054  5$      CMPB    -2(R1),#',      ;WAS CHARACTER BEFORE THE DIGIT A COMMA?
034202  001004                  BNE     8$              ;NO--EXIT
034204  020316          6$      CMP     R3,(SP)         ;INPUT TO LARGE?
034206  101001                  BHI     7$              ;YES -- BRANCH
034210  060400                  ADD     R4,R0           ;ADJUST RETURN ADDRESS
```

```
7796  034212  005720                  7$      TST     (R0)+
7797  034214  010302                  8$      MOV     R3,R2           ;NUMBER TO R2
7798  034216  005726                          TST     (SP)+           ;CLEAN MAX  SIZE OFF OF STACK
7799  034220  012603                          MOV     (SP)+,R3        ;RESTORE R3
7800  034222  012604                          MOV     (SP)+,R4        ;RESTORE R4
7801  034224  011000                          MOV     (R0),R0         ;GET RETURN ADDRESS
7802  034226  000200                          RTS     R0              ;RETURN
7803
7804                                  ;THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
7805                                  ;AND FORMS AN OCTAL NUMBER IN R2
7806                                  ;CALL
7807                                  ;       MOV     #ADR,R1         ;ADDRESS OF ASCIZ STRING
7808                                  ;       JSR     R0,@#CK NUM     ;GO FORM THE NUMBER
7809                                  ;       RETURN  ADR1            ;ILLEGAL CHARACTER IN THE INPUT STRING
7810                                  ;       RETURN  ADR2            ;"COMMA" OR "CR"--R2=NUMBER
7811                                  ;       RETURN  ADR3            ;"PERIOD"--R2=NUMBER
7812                                  ;       RETURN  ADR4            ;"PERIOD-PERIOD"--R2=NUMBER
7813
7814  034230  010346                  CK NUM  MOV     R3,    -(SP)    ;SAVE R3
7815  034232  005003                          CLR     R3              ;START NUMBER AT ZERO
7816  034234  004037  033714                  JSR     R0,@#CK OCT     ;OCTAL DIGIT?
7817  034240  000440                          BR      6$              ;NO--BRANCH
7818  034242  005201                  1$      INC     R1              ;MOVE TO NEXT CHARACTER
7819  034244  006303                          ASL     R3              ;FOR THE OCTAL NUMBER IN R3
7820  034246  103435                          BCS     6$              ;DON'T LET IT GET TO BIG
7821  034250  006303                          ASL     R3
7822  034252  103433                          BCS     6$
7823  034254  006303                          ASL     R3
7824  034256  103431                          BCS     6$
7825  034260  060203                          ADD     R2,R3
7826  034262  004037  033714                  JSR     R0,@#CK OCT     ;IS THIS AN OCTAL DIGIT?
7827  034266  000401                          BR      2$              ;NO--FIND OUT WHAT IT IS
7828  034270  000764                          BR      1$              ;YES--MAKE IT PART OF THE NUMBER
7829  034272  010302                  2$      MOV     R3,R2           ;SAVE THE OCTAL NUMBER
7830  034274  005003                          CLR     R3              ;START WITH ZERO INDEX
7831  034276  004037  033770                  JSR     R0,@#CK CHR     ;CHECK ONE CHARACTER
7832  034302  034342                          6$                      ;ILLEGAL CHARACTER
7833  034304  034332                          5$                      ;CARRIAGE RETURN
7834  034306  034342                          6$                      ;"/"
7835  034310  034332                          5$                      ;","
7836  034312  034316                          3$                      ;" "
7837  034314  034342                          6$                      ;DIGIT 0-9
7838  034316  005723                  3$      TST     (R3)+           ;"PERIOD"
7839  034320  121127  000056                  CMPB    (R1),#'         ;"PERIOD-PERIOD"?
7840  034324  001002                          BNE     5$              ;NO--BRANCH
7841  034326  005201                          INC     R1              ;YES--ADVANCE THE POINTER
7842  034330  005723                  4$      TST     (R3)+           ;"PERIOD-PERIOD"
7843  034332  005723                  5$      TST     (R3)+           ;"COMMA"
7844  034334  105711                          TSTB    (R1)            ;"CR"?
7845  034336  001001                          BNE     6$              ;NO--BRANCH
7846  034340  060300                          ADD     R3,R0           ;YES--SAVE THE OCTAL NUMBER
7847  034342  012603                  6$      MOV     (SP)+,R3        ;RESTORE R3
7848  034344  011000                          MOV     (R0),R0         ;PICKUP EXIT ADDRESS
7849  034346  000200                          RTS     R0              ;RETURN
```

```
                                        ;;*****************************************************************
                                        
                                         SBTTL  SINGLE/DUAL PORT RH11/RP04/5/6 DRIVER (REV 1 0)
                                        
                                        ;COPYRIGHT (C) 1976
                                        ;DIGITAL EQUIPMENT CORP
                                        ;MAYNARD, MA 01754
                                        ;AUTHOR(S): JIM LACEY/CHUCK HESS
                                        
                                        ;;*****************************************************************
                                        
                                        ;STORAGE FOR RPDS1, RPER1, RPER2, AND RPER3 ON AN ERROR "2"
                                                ;RPERRS   = RPDS1
                                                ;RPERRS+2 = RPER1
                                                ;RPERRS+4 = RPER2
                                                ;RPERRS+6 = RPER3
                                        
034350  000000  000000  000000  RPERRS   WORD   0,0,0,0
034356  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
                                        
034360      000                 DRVACT   BYTE   0               ;DRIVE 0
034361      000                          BYTE   0               ;DRIVE 1
034362      000                          BYTE   0               ;DRIVE 2
034363      000                          BYTE   0               ;DRIVE 3
034364      000                          BYTE   0               ;DRIVE 4
034365      000                          BYTE   0               ;DRIVE 5
034366      000                          BYTE   0               ;DRIVE 6
034367      000                          BYTE   0               ;DRIVE 7
                                        
                                        ;TABLE OF DRIVE STATUS INDICATORS (DRVSTA=8 BYTES)
                                                ;DRVSTA=0 IF DRIVE IS OFFLINE OR NONEXSITE
                                                ;DRVSTA>0 IF DRIVE IS ONLINE
                                                ;DRVSTA<0 IF DRIVE IS UNSAFE
                                        
034370      000                 DRVSTA   BYTE   0               ;DRIVE 0
034371      000                          BYTE   0               ;DRIVE 1
034372      000                          BYTE   0               ;DRIVE 2
034373      000                          BYTE   0               ;DRIVE 3
034374      000                          BYTE   0               ;DRIVE 4
034375      000                          BYTE   0               ;DRIVE 5
034376      000                          BYTE   0               ;DRIVE 6
034377      000                          BYTE   0               ;DRIVE 7
                                        
                                        ;TABLE OF DRIVE TYPES (DRVTYP=8 BYTES)
                                                ;DRVTYP=0 IF DRIVE IS NONEXISTENT (DRVSTA=0, ALSO)
                                                ;DRVTYP=1 IF DRIVE IS RP04
                                                ;DRVTYP=2 IF DRIVE IS RP05
                                                ;DRVTYP=4 IF DRIVE IS RP06
                                                ;DRVTYP=-1 IF NOT RP04/5/6
                                        
```

```
 034400     000            DRVTYP  BYTE   0              ,DRIVE 0
 034401     000                    BYTE   0              ,DRIVE 1
 034402     000                    BYTE   0              ,DRIVE 2
 034403     000                    BYTE   0              ,DRIVE 3
 034404     000                    BYTE   0              ,DRIVE 4
 034405     000                    BYTE   0              ,DRIVE 5
 034406     000                    BYTE   0              ,DRIVE 6
 034407     000                    BYTE   0              ,DRIVE 7

                           ,TABLE OF DUAL PORT INITIALIZATION INDICATORS
                                   ,DPINT=0 IF INITIALIZATION IS NOT ACTIVE ON THE DRIVE
                                   ,DPINT<0 IF INITIALIZATION IS IN PROGRESS

 034410     000            DPINT   BYTE   0              ,DRIVE 0
 034411     000                    BYTE   0              ,DRIVE 1
 034412     000                    BYTE   0              ,DRIVE 2
 034413     000                    BYTE   0              ,DRIVE 3
 034414     000                    BYTE   0              ,DRIVE 4
 034415     000                    BYTE   0              ,DRIVE 5
 034416     000                    BYTE   0              ,DRIVE 6
 034417     000                    BYTE   0              ,DRIVE 7

                           ,TABLE OF PENDING DUAL PORT REQUESTS
                                   ,DPRQS=0 IF THAT A DUAL PORT REQUEST IS NOT PENDING FOR THAT DRIVE
                                   ,DPRQS<0 IF THAT A DUAL PORT REQUEST IS PENDING FOR THAT DRIVE

 034420     000            DPRQS   BYTE   0              ,DRIVE 0
 034421     000                    BYTE   0              ,DRIVE 1
 034422     000                    BYTE   0              ,DRIVE 2
 034423     000                    BYTE   0              ,DRIVE 3
 034424     000                    BYTE   0              ,DRIVE 4
 034425     000                    BYTE   0              ,DRIVE 5
 034426     000                    BYTE   0              ,DRIVE 6
 034427     000                    BYTE   0              ,DRIVE 7

                           ,TRANSFER WAIT FLAG (TRNSWT=1 WORD)
                                   ,THIS IS A ONE WORD QUEUE  IT WILL CONTAIN THE ADDRESS OF
                                   ,"DPB" OF THE I/O OPERATION

 034430  000000            TRNSWT  WORD   0

                           ,SEARCH WAIT KEYS (SRCHWT=1 WORD)
                                   ,THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
                                   ,THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
                                   ,REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE
                                   ,EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0

 034432  000000            SRCHWT  WORD   0

                           ,RP04/5/6 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
                                   ,ACTDRV=0 IF DRIVER IS INACTIVE
                                   ,ACTDRV>0 IF DRIVER IS ACTIVE

 034434     000            ACTDRV  BYTE   0

                           ,SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
```

```
                                        ;ACTSTR=0 IF SOFTWARE TIMER ROUTINE IS INACTIVE
                                        ;ACTSTR>0 IF SOFTWARE TIMER ROUTINE IS ACTIVE

034435  000                     ACTSTR  BYTE   0

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

034436  000                     ULDFLG  BYTE   0              ;DRIVE 0
034437  000                             BYTE   0              ;DRIVE 1
034440  000                             BYTE   0              ;DRIVE 2
034441  000                             BYTE   0              ;DRIVE 3
034442  000                             BYTE   0              ;DRIVE 4
034443  000                             BYTE   0              ;DRIVE 5
034444  000                             BYTE   0              ;DRIVE 6
034445  000                             BYTE   0              ;DRIVE 7

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

034446  000                     LACNT   BYTE   0              ;DRIVE 0
034447  000                             BYTE   0              ;DRIVE 1
034450  000                             BYTE   0              ;DRIVE 2
034451  000                             BYTE   0              ;DRIVE 3
034452  000                             BYTE   0              ;DRIVE 4
034453  000                             BYTE   0              ;DRIVE 5
034454  000                             BYTE   0              ;DRIVE 6
034455  000                             BYTE   0              ;DRIVE 7

                                ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
                                        ;SAVEFG <0 IF SAVE THE RH11/RP04/5/6 REGISTERS WHEN THE
                                        ;OPERATION IS COMPLETED AS PER (DPB+14)
                                        ;SAVEFG=0 IF SAVE THE RH11/RP04/5/6 REGISTERS, AS PER
                                        ;(DPB+14), AFTER AN ERROR

034456  000000                  SAVEFG  WORD   0

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

034460  000000                  SEEKFG  WORD   0

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

034462  177777                  TIMER   WORD   -1       ;DRIVE 0
034464  177777                          WORD   -1       ;DRIVE 1
034466  177777                          WORD   -1       ;DRIVE 2
034470  177777                          WORD   -1       ;DRIVE 3
034472  177777                          WORD   -1       ;DRIVE 4
034474  177777                          WORD   -1       ;DRIVE 5
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034476  177777                                 WORD    -1        ,DRIVE 6
034500  177777                                 WORD    -1        ,DRIVE 7

                                ,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

034502  177777                  DTUW    WORD    -1

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

034504     001                  ATABIT  BYTE    1         ,DRIVE 0
034505     002                          BYTE    2         ,DRIVE 1
034506     004                          BYTE    4         ,DRIVE 2
034507     010                          BYTE    10        ,DRIVE 3
034510     020                          BYTE    20        ,DRIVE 4
034511     040                          BYTE    40        ,DRIVE 5
034512     100                          BYTE    100       ,DRIVE 6
034513     200                          BYTE    200       ,DRIVE 7

                                ,RP04/5/6 TO RH11 "MASSBUS CONTROL BUS PARITY ERRORS" (MCPE) ALLOWED BEFORE
                                ,CALLING IT FATAL (MCPEMX=1 WORD)

034514  000003                  MCPEMX  WORD    3

                                ,STORAGE FOR RPADR (THE FIRST ADDRESS (776700) OF THE RH11/RP04/5/6),
                                ,RPVEC (THE VECTOR ADDRESS (254)), AND RPVEC+2 (THE BR LEVEL (5))

034516  176700                  RPADR   WORD    176700
034520  000254  000240          RPVEC   WORD    254,5*32

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

034524  000004                  MXLACT  WORD    4
                                ,MAXIMUM DELTA DELAY IS 8 SECTORS (MXDLTA=1 WORD)

034526  001000                  MXDLTA  WORD    8 *64
                                ,MINIMUM DELTA DELAY IS 2 SECTORS (MNDLTA=1 WORD)

034530  000200                  MNDLTA  WORD    2*64
                                ,MAXIMUM SEARCH FOR I/O WINDOW IS 5 SECTORS (MXWNDW=1 WORD)

034532  000005                  MXWNDW  WORD    5

                                ,DEFINITIONS OF THE RH11/RP04/5/6 ADDRESS INDEXES

        000000                  RPCS1=0                 ,CONTROL AND STATUS REGISTER #1 (DRIVE REG  00)
        000002                  RPWC=2                  ,WORD COUNT REGISTER (NOT A DRIVE REG)
        000004                  RPBA=4                  ,UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
        000006                  RPDA=6                  ,DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG  05)
        000010                  RPCS2=10                ,CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
        000012                  RPDS1=12                ,DRIVE STATUS REGISTER (DRIVE REG 01)
        000014                  RPER1=14                ,ERROR REGISTER #1 (DRIVE REG  02)
        000016                  RPAS=16                 ,ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG  04)
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 8074            000020                  RPLA=20                         ,LOOK AHEAD REGISTER (DRIVE REG. 07)
 8075            000022                  RPDB=22                         ,DATA BUFFER REGISTER (NOT A DRIVE REG )
 8076            000024                  RPMR=24                         ,MAINTAINABILITY REGISTER (DRIVE REG. 03)
 8077            000026                  RPDT=26                         ,DRIVE TYPE REGISTER (DRIVE REG. 06)
 8078            000030                  RPSN=30                         ,SERIAL NUMBER REGISTER (DRIVE REG. 10)
 8079            000032                  RPOF=32                         ,OFFSET REGISTER (DRIVE REG. 11)
 8080            000034                  RPCA=34                         ;DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG  12)
 8081            000036                  RPCC=36                         ,CURRENT CYLINDER ADDRESS REGISTER (DRIVE REG  13)
 8082            000040                  RPER2=40                        ,ERROR REGISTER #2 (DRIVE REG. 14)
 8083            000042                  RPER3=42                        ,ERROR REGISTER #3 (DRIVE REG. 15)
 8084            000044                  RPEC1=44                        ,ECC POSITION REGISTER (DRIVE REG  16)
 8085            000046                  RPEC2=46                        ;ECC PATTERN REGISTER (DRIVE REG   17)
 8086
 8087                                    ,RH11/RP04/5/6 DRIVER INITIALIZATION CODE
 8088                                            ,THIS ROUTINE WILL DETERMINE WHICH RP04/5/6 DRIVES ARE
 8089                                            ,AVAILABLE FOR TESTING AND SET THE DRVSTA INDICATOR
 8090                                            ,TO THE PROPER STATE FOR EACH DRIVE
 8091                                            ,NOTE  THIS ROUTINE CALLS DRVINT
 8092                                    ,
 8093                                    ,CALL
 8094                                    ,
 8095                                    ,       JSR     PC,RPINIT
 8096                                    ,       RETURN
 8097                                    ,
 8098                                    ,NOTE  THE 'P' OR 'L' CLOCK MUST BE STARTED
 8099                                    ,
 8100  034534  104412                    RPINIT  SAVREG                          ,SAVE R0 - R5
 8101  034536  013746  177776                    MOV     @#PS,-(SP)              ,SAVE THE PRESENT PROCESSOR STATUS
 8102  034542  012737  000240  177776            MOV     #<5*32 >,@#PS           ,CHANGE THE PRIORITY TO 5
 8103  034550  004737  042520                    JSR     PC,CLRQUE               ,CLEAR ALL REQUEST QUEUES
 8104  034554  012701  034350                    MOV     #RPERRS,R1              ,FIRST ADDRESS TO BE CLEARED
 8105  034560  012702  034460                    MOV     #SEEKFG,R2              ,LAST ADDRESS TO BE CLEARED
 8106  034564  005021                  1$        CLR     (R1)+                   ;CLEAR
 8107  034566  020102                            CMP     R1,R2                   ,ARE WE DONE?
 8108  034570  101775                            BLOS    1$                      ,BRANCH IF NO
 8109  034572  012702  034502                    MOV     #DTUW,R2                ,LAST ADDRESS
 8110  034576  012721  177777            2$      MOV     #-1,(R1)+               ,INITIALIZE
 8111  034602  020102                            CMP     R1,R2                   ,DONE?
 8112  034604  101774                            BLOS    2$                      ,LOOP IF NO
 8113  034606  005037  034370                    CLR     DRVSTA                  ,SET ALL DRIVES TO OFFLINE
 8114  034612  005037  034372                    CLR     DRVSTA+2
 8115  034616  005037  034374                    CLR     DRVSTA+4
 8116  034622  005037  034376                    CLR     DRVSTA+6
 8117  034626  013703  034520                    MOV     RPVEC,R3                ,SETUP THE RH11/RP04/5/6 VECTOR
 8118  034632  012723  037400                    MOV     #ISR,(R3)+
 8119  034636  013713  034522                    MOV     RPVEC+2,(R3)
 8120  034642  013704  034516                    MOV     RPADR,R4                ,FIRST ADDRESS OF RH11/RP04
 8121  034646  012764  000040  000010            MOV     #BIT05,RPCS2(R4)        ,MASSBUS INIT
 8122  034654  005001                            CLR     R1                      ,START WITH DRIVE 0
 8123  034656  004037  034746            3$      JSR     R0,DRVINT               ,INIT THE DRIVE
 8124  034662  000401                            BR      4$                      ,'DVA' NOT SET OR PARITY ERROR
 8125  034664  000402                            BR      5$                      ,NORMAL RETURN
 8126  034666  105061  034370            4$      CLRB    DRVSTA(R1)              ,SET DRIVE STATUS TO OFFLINE
 8127  034672  005201                  5$        INC     R1                      ,GO TO NEXT DRIVE
 8128  034674  042701  177770                    BIC     #^C7,R1                 ,MASK OUT UNUSED BITS
 8129  034700  001366                            BNE     3$                      ,BR IF MORE DRIVES TO GO
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 8130  034702  012701  000007                  MOV     #7,R1           ;START WITH DRIVE 7
 8131  034706  005037  177776                  CLR     @#PS            ,CLEAR THE PROCESSOR STATUS
 8132  034712  105761  034410          6$      TSTB    DPINT(R1)       ,WAITING FOR DRIVE TO SWITCH PORTS ?
 8133  034716  001405                          BEQ     8$              ,BR NOT WAITING
 8134  034720  004737  042154                  JSR     PC,SET IE       ,SET INTERRUPT
 8135  034724  105761  034410          7$      TSTB    DPINT(R1)       ,DRIVE SWITCHED PORTS ?
 8136  034730  001375                          BNE     7$              ,BR IF NOT
 8137  034732  005301                  8$      DEC     R1              ;GO TO THE NEXT DRIVE
 8138  034734  100366                          BPL     6$              ;CHECK NEXT DRIVE
 8139  034736  012637  177776                  MOV     (SP)+,@#PS      ,RESTORE THE PROCESSOR STATUS
 8140  034742  104413                          RESREG                  ,RESTORE R0 - R5
 8141  034744  000207                          RTS     PC              ,BYE-BYE
 8142
 8143                                  ,DRIVE INITILIZATION ROUTINE
 8144                                  ,THIS ROUTINE DETERMINES IF A DRIVE EXIST AND IF IT IS
 8145                                  ,AN RP04/5/6.  IF IT IS, A "READ-IN PRESET" IS ISSUED AND FMT22
 8146                                  ;IS SET TO A "1"  THEN MOL, DPR, DRY, AND VV ARE CHECKED TO
 8147                                  ,INSURE THEY ARE ALL ON A "1".  AND DEPENDING ON THEIR STATE,
 8148                                  ,DRVSTA IS SET TO THE PROPER CONDITION.
 8149                                  ,CALL
 8150                                  ,       MOV     #DRVNUM,R1      ,DRIVE NUMBER TO R1
 8151                                  ,       MOV     RPADR,R4        ;UNIBUS ADDRESS OF RH11/RP04/5/6 (RPCS1)
 8152                                  ,       JSR     R0,DRVINT       ,CALLED BY A JSR
 8153                                  ,       RETURN1                 ,ERROR OCCURRED (PARITY)
 8154                                  ,       RETURN2                 ,NORMAL RETURN
 8155                                  ,
 8156
 8157  034746  010546                  DRVINT  MOV     R5,-(SP)        ,SAVE R5
 8158  034750  105061  034370                  CLRB    DRVSTA(R1)      ,START DRIVE STATUS AS OFFLINE
 8159  034754  105061  034400                  CLRB    DRVTYP(R1)      ,CLEAR THE DRIVE TYPE INDICATOR
 8160  034760  105061  034436                  CLRB    ULDFLG(R1)      ;CLEAR THE UNLOAD FLAG
 8161  034764  010164  000010                  MOV     R1,RPCS2(R4)    ,SELECT A DRIVE
 8162  034770  112764  000111  000000          MOVB    #111,RPCS1(R4)  ;DO A DRIVE CLEAR COMMAND (& SEIZE DRIVE)
 8163  034776  032764  010000  000010          BIT     #BIT12,RPCS2(R4) ,NONEXISTENT DRIVE?
 8164  035004  001403                          BEQ     1$              ,NO---BRANCH
 8165  035006  004737  042154                  JSR     PC,SET IE       ,GO SET "IE" WITHOUT A "TRE"
 8166  035012  000520                          BR      6$              ,LEAVE THIS ROUTINE
 8167  035014  105061  034370          1$      CLRB    DRVSTA(R1)      ,SET DRIVE STATUS TO OFFLINE
 8168  035020  032764  004000  000000          BIT     #BIT11,RPCS1(R4)  ,SEE IF DRIVE AVAILABLE
 8169  035026  001514                          BEQ     7$              ,BR IF DRIVE NOT AVAILABLE
 8170  035030  004037  041464                  JSR     R0,RD RP        ,READ THE DRIVE TYPE REG.
 8171  035034  000026                          RPDT
 8172  035036  035300                          8$                      ,ERROR RETURN ADDRESS
 8173  035040  012605                          MOV     (SP)+,R5        ,PUT DRIVE TYPE IN R5
 8174  035042  112761  000001  034400          MOVB    #1,DRVTYP(R1)   ,SET RP04 INDICATOR
 8175  035050  022705  020020                  CMP     #2002C,R5       ,IS IT A SINGLE PORT RP04?
 8176  035054  001431                          BEQ     2$              ,BRANCH IF YES
 8177  035056  022705  024020                  CMP     #24020,R5       ,IS IT A DUAL PORT RP04?
 8178  035062  001426                          BEQ     2$              ,BR IF YES
 8179  035064  112761  000002  034400          MOVB    #2,DRVTYP(R1)   ,SET RP05 INDICATOR
 8180  035072  022705  020021                  CMP     #20021,R5       ,SINGLE PORT RP05 ?
 8181  035076  001420                          BEQ     2$              ,BR IF YES
 8182  035100  022705  024021                  CMP     #24021,R5       ,DUAL PORT RP05 ?
 8183  035104  001415                          BEQ     2$              ;BR IF YES
 8184  035106  112761  000004  034400          MOVB    #4,DRVTYP(R1)   ,SET RP06 INDICATOR
 8185  035114  022705  020022                  CMP     #20022,R5       ,SINGLE PORT RP06 ?
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8186  035120  001407                          BEQ     2$                ;BR IF YES
8187  035122  022705  024022                  CMP     #24022,R5         ,DUAL PORT RP06 ?
8188  035126  001404                          BEQ     2$                ,BR IF YES
8189  035130  112761  177777  034400          MOVB    #-1,DRVTYP(R1)    ,SET INDICATOR TO 'OTHER'
8190  035136  000446                          BR      6$                ,EXIT
8191  035140  012746  000121          2$      MOV     #121,-(SP)        ,DO A "READ-IN PRESET"
8192  035144  004037  041644                  JSR     R0,WRT RP
8193  035150  000000                          RPCS1
8194  035152  035300                          8$
8195  035154  012746  010000                  MOV     #BIT12,-(SP)      ,SET FMT22=1
8196  035160  004037  041644                  JSR     R0,WRT RP
8197  035164  000032                          RPOF
8198  035166  035300                          8$
8199  035170  004037  041464                  JSR     R0,RD RP          ,READ RPDS1
8200  035174  000012                          RPDS1
8201  035176  035300                          8$
8202  035200  012605                          MOV     (SP)+,R5          ,AND SAVE IT IN R5
8203  035202  100015                          BPL     4$                ,BRANCH IF ATA=0
8204  035204  116164  034504  000016          MOVB    ATABIT(R1),RPAS(R4) ,CLEAR ATTENTION BIT
8205  035212  004037  041464                  JSR     R0,RD RP          ,FIND OUT WHY ATA=1
8206  035216  000014                          RPER1
8207  035220  035300                          8$
8208  035222  006126                          ROL     (SP)+             ,IS IT UNSAFE?
8209  035224  100004                          BPL     4$                ,BR IF NOT
8210  035226  112761  177777  034370          MOVB    #-1,DRVSTA(R1)    ,SET UNSAFE INDICATOR
8211  035234  000407                          BR      6$                ,EXIT
8212  035236  005105                  4$      COM     R5                ,CHECK MOL, DPR, DRY, AND VV
8213  035240  042705  167077                  BIC     # C<BIT12!BIT08!BIT07!BIT06>,R5
8214  035244  001003                          BNE     6$                ,BRANCH IF MOL, DPR, DRY, OR VV IS CLEAR
8215  035246  112761  000001  034370          MOVB    #1,DRVSTA(R1)     ,SET DRIVE STATUS TO ONLINE
8216  035254  005720                  6$      TST     (R0)+             ,STEP OVER THE ERROR RETURN
8217  035256  000410                          BR      8$                ,EXIT
8218  035260  006301                  7$      ASL     R1                ,CHANGE INDEX TO ADDRESS WORDS
8219  035262  012761  003720  034462          MOV     #2000 ,TIMER(R1)  ,START 2 SEC TIMER
8220  035270  006201                          ASR     R1                ,RESTORE R1
8221  035272  105161  034410                  COMB    @PINT(R1)
8222  035276  005720                          TST     (R0)+
8223  035300  012605                  8$      MOV     (SP)+,R5          ,RESTORE R5
8224  035302  000200                          RTS     RC                ,EXIT
8225
8226                                  ,REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
8227                                  ,
8228                                  ,CALL
8229                                  ,
8230                                  ,       JSR     R0,@#RP04         ,CALL THE RP04/5/6 DRIVER
8231                                  ,       PNTADR                    ,ADDRESS OF POINTER OF DRIVES PARAMETER BLOCK
8232                                  ,       RETURN1                   ,RETURN HERE IF QUEUE IS FULL
8233                                  ,       RETURN2                   ,RETURN HERE IF REQUEST IS IN QUEUE OR THERE
8234                                                                    ,IS AN ERROR CONDITION
8235
8236  035304  013746  177776          RP04    MOV     @#PS,-(SP)        ,SAVE THE CALLING STATUS
8237  035310  013737  034522  177776          MOV     RPVEC+2,@#PS      ,DON'T ALLOW ANY RP04/5/6 INTERRUPTS
8238  035316  112737  000001  034434          MOVB    #1,ACTDRV         ,SET "ACTIVE DRIVER" FLAG
8239  035324  104412                          SAVREG                    ,SAVE R0 - R5
8240  035326  011002                          MOV     (R0),R2           ,PICKUP THE DRIVE PARAMETER BLOCK POINTER
8241  035330  005062  000016                  CLR     16(R2)            ,CLEAR THE STATUS/ERROR INDICATOR
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8242  035334  111201                          MOVB    (R2),R1         ,PICKUP THE DRIVE NUMBER
8243  035336  013704  034516                  MOV     RPADR,R4        ,UNIBUS ADDRESS OF RPCS1
8244  035342  105761  034370                  TSTB    DRVSTA(R1)      ;CHECK DRIVES STATUS
8245  035346  003014                          BGT     1$              ;BRANCH IF ONLINE
8246  035350  105761  034436                  TSTB    ULDFLG(R1)      ;UNLOAD COMMAND IN QUEUE?
8247  035354  001036                          BNE     3$              ;BRANCH IF YES
8248  035356  105761  034410                  TSTB    DPINT(R1)       ,TRYING TO INIT THE DRIVE
8249  035362  001042                          BNE     5$              ;BR IF YES
8250  035364  004037  034746                  JSR     R0,DRVINT       ,GO INIT. THE DRIVE
8251  035370  000434                          BR      4$              ,ERROR RETURN
8252  035372  105761  034370                  TSTB    DRVSTA(R1)      ;IS DRIVE STATUS ONLINE?
8253  035376  003445                          BLE     6$              ,BR IF NOT
8254  035400  105761  034420          1$      TSTB    DPRQS(R1)       ,OUTSTANDING PORT REQUEST FOR THE DRIVE ?
8255  035404  001031                          BNE     5$              ,BR IF YES
8256  035406  010164  000010                  MOV     R1,RPCS2(R4)    ,SELECT THE DRIVE
8257  035412  004037  042616                  JSR     R0,DRVQUE       ,PUT THIS REQUEST IN QUEUE
8258  035416  000460                          BR      9$              ,QUEUE IS FULL
8259  035420  122762  000103  000002          CMPB    #103,2(R2)      ,IS THIS REQ. FOR AN UNLOAD?
8260  035426  001003                          BNE     2$              ,BR IF NO
8261  035430  112761  177777  034436          MOVB    #-1,ULDFLG(R1)  ,SET THE "UNLOAD IN QUEUE" FLAG
8262  035436  105761  034360          2$.     TSTB    DRVACT(R1)      ,IS THIS DRIVE ACTIVE?
8263  035442  001043                          BNE     8$              ;BR IF YES
8264  035444  004737  035576                  JSR     PC,OPT          ,CALL THE OPTIMIZER
8265  035450  000440                          BR      8$
8266  035452  012762  120000  000016  3$      MOV     #BIT15!BIT13,16(R2) ,SET THE "UNLOAD IN QUEUE" ERROR FLAG
8267  035460  000434                          BR      8$              ,EXIT
8268  035462  004737  036706          4$.     JSR     PC,C17          ,GO HANDLE THE PARITY ERROR
8269  035466  000431                          BR      8$
8270  035470  004037  042616          5$.     JSR     R0,DRVQUE       ,PUT REQUEST IN QUEUE
8271  035474  000431                          BR      9$              ,QUEUE IS FULL
8272  035476  032714  000100                  BIT     #BIT06,(R4)     ,IS 'IE' SET ALREADY ?
8273  035502  001023                          BNE     8$              ,BR IF IT IS
8274  035504  004737  042154                  JSR     PC,SET IE       ;SET INTERRUPT
8275  035510  000420                          BR      8$              ,RETURN, REQUEST IN QUEUE
8276  035512  105761  034370          6$      TSTB    DRVSTA(R1)      ;SEE IF DRIVE OFFLINE OR UNSAFE
8277  035516  002412                          BLT     7$              ;BR IF UNSAFE
8278  035520  012762  140000  000016          MOV     #BIT15!BIT14,16(R2)  ,SET OFFLINE ERROR INDICATOR
8279  035526  105761  034400                  TSTB    DRVTYP(R1)      ,SEE IF OFFLINE OR NONEXISTENT
8280  035532  001007                          BNE     8$              ,BR IF OFFLINE
8281  035534  012762  100002  000016          MOV     #BIT15!BIT01,16(R2)  ;REPORT DRIVE NONEXISTENT
8282  035542  000403                          BR      8$              ,GO TO EXIT
8283  035544  012762  110000  000016  7$      MOV     #BIT15!BIT12,16(R2)  ;DRIVE IS UNSAFE
8284  035552  104413                  8$      RESREG                  ,RESTORE R0 - R5
8285  035554  005720                          TST     (R0)+           ,SETUP FOR NORMAL RETURN
8286  035556  000401                          BR      10$             ,FINISH UP, THEN EXIT
8287  035560  104413                  9$      RESREG                  ,RESTORE R0 - R5
8288  035562  005720                  10$     TST     (R0)+           ,CORRECT THE RETURN ADDRESS
8289  035564  105037  034434                  CLRB    ACTDRV          ,CLEAR "ACTIVE DRIVER" FLAG
8290  035570  012637  177776                  MOV     (SP)+,@#PS      ;RETURN "PS" TO USER LEVEL
8291  035574  000200                          RTS     R0              ,RETURN TO CALLER
8292
8293                                  ,OPTIMIZER-CALLED FOR A PARTICULAR DRIVE
8294                                  ;
8295                                  ;CALL
8296                                  ;       MOV     #DRVNUM,R1      ,DRIVE NUMBER TO R1
8297                                  ;       JSR     PC,OPT          ;SETUP A COMMAND
```

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8298
8299  035576  104412                    OPT     SAVREG                  ;SAVE R0 - R5
8300  035600  013746  177776                    MOV     @#PS,-(SP)      ;SAVE PROC. STATUS
8301  035604  146137  034504  034432            BICB    ATABIT(R1),SRCHWT       ;CLEAR "SEARCH WAIT" KEY
8302  035612  004737  042672                    JSR     PC,GETREQ       ;GET "DPB" POINTER OF REQUEST
8303  035616  005702                            TST     R2              ;IS THERE A REQUEST IN QUEUE?
8304  035620  001505                            BEQ     7$              ;NO--BRANCH TO EXIT
8305  035622  032764  004000  000000            BIT     #BIT11,RPCS1(R4)  ;IS DVA STILL SET ?
8306  035630  001407                            BEQ     10$             ;BR IF NOT
8307  035632  032764  000100  000012            BIT     #BIT6,RPDS1(R4)  ;IS VV SET ?
8308  035640  001003                            BNE     10$             ;BR IF IT IS
8309  035642  004037  034746          9$        JSR     R0,DRVINT       ;SEE IF DRIVE STILL ONLINE ?
8310  035646  000470                            BR      6$              ;PARITY OR 'DVA' NOT SET
8311  035650  105761  034370          10$       TSTB    DRVSTA(R1)      ;IS DRIVE ONLINE?
8312  035654  003014                            BGT     1$              ;YES--BRANCH
8313  035656  004737  042714                    JSR     PC,POPQUE       ;NO--REMOVE REQUEST FROM QUEUE
8314  035662  012762  140000  000016            MOV     #BIT15!BIT14,16(R2)  ;SET OFFLINE STATUS/ERROR INDICATOR
8315  035670  105761  034370                    TSTB    DRVSTA(R1)      ;IS DRIVE UNSAFE ?
8316  035674  100064                            BPL     8$              ;BR TO EXIT IF NOT
8317  035676  012762  110000  000016            MOV     #BIT15!BIT12,16(R2)  ;SET UNSAFE STATUS/ERROR INDICATOR
8318  035704  000460                            BR      8$              ;BRANCH TO EXIT
8319  035706  012746  000111          1$        MOV     #111,-(SP)      ;LOAD COMMAND ONTO THE STACK
8320  035712  004037  041644                    JSR     R0,WRT RP       ;LOAD THE REGISTER
8321  035716  000000                            RPCS1                   ;REGISTER INCREMENT
8322  035720  036030                            6$                      ;ERROR RETURN ADDRESS
8323  035722  032714  004000                    BIT     #BIT11,(R4)     ;DRIVE AVAILABLE ?
8324  035726  001427                            BEQ     5$              ;BR IF NOT
8325  035730  122762  000150  000002            CMPB    #150,2(R2)      ;IS THE REQUEST FOR I/O?
8326  035736  002403                            BLT     2$              ;YES--BRANCH
8327  035740  004737  036272                    JSR     PC,C14          ;CALL THE COMMAND INITIATOR
8328  035744  000440                            BR      8$              ;BRANCH TO EXIT
8329  035746  005737  034502          2$        TST     DTUW            ;DATA TRANSFER UNDERWAY?
8330  035752  002012                            BGE     4$              ;YES--GO START A SEARCH
8331  035754  005737  034460                    TST     SEEKFG          ;DO IMPLIED SEEKS?
8332  035760  100404                            BMI     3$              ;YES---BRANCH
8333  035762  004037  037242                    JSR     R0,LA           ;NO--DO LOOK AHEAD
8334  035766  000427                            BR      8$              ;RETURN HERE ON A PARITY ERROR
8335  035770  000403                            BR      4$              ;GO START A SEARCH
8336  035772  004737  036056          3$        JSR     PC,C11          ;START A DATA TRANSFER
8337  035776  000423                            BR      8$
8338  036000  004737  036164          4$        JSR     PC,C13          ;START A SEARCH
8339  036004  000420                            BR      8$              ;GO TO THE EXIT
8340  036006  112761  177777  034420  5$        MOVB    #-1,DPRQS(R1)   ;SET PORT REQUEST INDICATOR
8341  036014  010103                            MOV     R1,R3           ;SET UP TO ADDRESS WORDS
8342  036016  006303                            ASL     R3              ;CONVERT TO WORD INDEX
8343  036020  012763  023420  034462            MOV     #10000,TIMER(R3)  ;START 10 SEC TIMER
8344  036026  000402                            BR      7$              ;EXIT
8345  036030  004737  036706          6$        JSR     PC,C17          ;PROCESS THE PARITY ERROR
8346  036034  032714  000100          7$        BIT     #BIT06,(R4)     ;SEE IF 'IE' ALREADY SET
8347  036040  001002                            BNE     8$              ;BR IF SET
8348  036042  004737  042154                    JSR     PC,SET IE       ;SET "IE" WITHOUT A "TRE"
8349  036046  012637  177776          8$.       MOV     (SP)+,@#PS      ;RESTORE PROC  STATUS
8350  036052  104413                            RESREG                  ;RESTORE R0 - R5
8351  036054  000207                            RTS     PC
8352
8353                                    ;COMMAND INITIATOR
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                                        ;
                                        ;CALL
                                        ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
                                        ;       MOV     #DPB,R2         ;ADDRESS OF DPB
                                        ;       JSR     PC,C1?          ;C1?= C11,C13, OR C14
                                        ;                               ;WHERE:
                                        ;                               ;C11=DATA TRANSFER
                                        ;                               ;C12=SEARCH REQUESTED BY DATA XFER
                                        ;                               ;C14=NOT DATA TRANSFER

036056  004737  042714        C11     JSR     PC,POPQUE       ;REMOVE REQUEST FROM "DRIVES WAIT" QUEUE
036062  010237  034430                MOV     R2,TRNSWT       ;PUT REQ  IN TRANSFER WAIT QUEUE
036066  010203                        MOV     R2,R3           ;DPB ADDRESS TO R3
036070  013704  034516                MOV     RPADR,R4        ;RPCS1 ADDRESS
036074  010164  000010                MOV     R1,RPCS2(R4)    ;SELECT DRIVE
036100  062703  000004                ADD     #4,R3           ;DESIRED WORD COUNT
036104  062704  000002                ADD     #2,R4           ;RPWC ADDRESS
036110  012324                        MOV     (R3)+,(R4)+     ;LOAD WORD COUNT
036112  012324                        MOV     (R3)+,(R4)+     ;LOAD BUFFER ADDRESS
036114  012346                        MOV     (R3)+,-(SP)     ;LOAD SECTOR AND TRACK
036116  004037  041644                JSR     R0,WRT RP       ;CALL THE LOAD(WRITE) ROUTINE
036122  000006                        RPDA                    ;INDEX OF REGISTER TO LOAD
036124  036706                        C17                     ;ERROR RETURN ADDRESS
036126  012346                        MOV     (R3)+,-(SP)     ;LOAD CYLINDER ADDRESS
036130  004037  041644                JSR     R0,WRT RP
036134  000034                        RPCA
036136  036706                        C17
036140  016246  000002                MOV     2(R2),-(SP)     ;LOAD "COMMAND+GO", "A17&A16", AND "PSEL"
036144  004037  041644                JSR     R0,WRT RP
036150  000000                        RPCS1
036152  036706                        C17
036154  010137  034502                MOV     R1,DTUW         ;SET "DATA TRANSFER UNDERWAY"
036160  000137  036650                JMP     C15
036164  013704  034516        C13     MOV     RPADR,R4        ;RPCS1 ADDRESS
036170  010164  000010                MOV     R1,RPCS2(R4)    ;SELECT DRIVE
036174  016246  000012                MOV     12(R2),-(SP)    ;DESIRED CYLINDER ADDRESS
036200  004037  041644                JSR     R0,WRT RP
036204  000034                        RPCA
036206  036706                        C17
036210  116203  000010                MOVB    10(R2),R3       ;PICKUP SECTOR ADDRESS
036214  163703  034532                SUB     MXWNDW,R3       ;BACKUP BY MAX  SEARCH FOR I/O WINDOW
036220  002002                        BGE     1$
036222  062703  000026                ADD     #22 ,R3
036226  010346                1$      MOV     R3,-(SP)        ;COMBINE THE ADJUSTED SECTOR WITH
036230  116266  000011  000001        MOVB    11(R2),1(SP)    ;THE DESIRED TRACK
036236  004037  041644                JSR     R0,WRT.RP       ;LOAD DESIRED TRACK & SECTOR
036242  000006                        RPDA
036244  036706                        C17
036246  012746  000131                MOV     #131,-(SP)      ;START A SEARCH
036252  004037  041644                JSR     R0,WRT RP
036256  000000                        RPCS1
036260  036706                        C17
036262  156137  034504  034432        BISB    ATABIT(R1),SRCHWT       ;SET "SEARCH WAIT" KEY
036270  000567                        BR      C15
036272  013704  034516        C14     MOV     RPADR,R4        ;RPCS1 ADDRESS
036276  010164  000010                MOV     R1,RPCS2(R4)    ;SELECT DRIVE
```

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8410  036302  116203  000002              MOVB    2(R2),R3        ;PICKUP THE REQUESTED COMMAND
8411  036306  122703  000131              CMPB    #131,R3         ,IS IT A SEARCH COMMAND?
8412  036312  001007                      BNE     1$              ,BRANCH IF NO
8413  036314  016246  000010              MOV     10(R2),-(SP)    ,LOAD DESIRED TRACK & SECTOR
8414  036320  004037  041644              JSR     R0,WRT RP
8415  036324  000006                      RPDA
8416  036326  036706                      C17
8417  036330  000403                      BR      2$              ,GO LOAD CYLINDER
8418  036332  122703  000105      1$      CMPB    #105,R3         ,IS IT A SEEK COMMAND
8419  036336  001007                      BNE     3$              ,BRANCH IF NO
8420  036340  016246  000012      2$      MOV     12(R2),-(SP)    ,LOAD DESIRED CYLINDER
8421  036344  004037  041644              JSR     R0,WRT RP
8422  036350  000034                      RPCA
8423  036352  036706                      C17
8424  036354  000546                      BR      C16
8425  036356  122703  000115      3$      CMPB    #115,R3         ,IS IT AN "OFFSET" COMMAND?
8426  036362  001013                      BNE     4$              ,BR IF NO
8427  036364  004037  041464              JSR     R0,RD RP        ,MERGE THE OFFSET VALUE INTO RPOF
8428  036370  000032                      RPOF                    ,BUT DON'T CHANGE THE UPPER
8429  036372  036706                      C17
8430  036374  116216  000001              MOVB    1(R2),(SP)      ,BYTE WHEN LOADING THE
8431  036400  004037  041644              JSR     R0,WRT RP       ,REGISTER (RPOF)
8432  036404  000032                      RPOF
8433  036406  036706                      C17
8434  036410  000530                      BR      C16             ,GO START THE COMMAND
8435  036412  122703  000107      4$      CMPB    #107,R3         ,IS IT A "RECALIBRATE" COMMAND?
8436  036416  001525                      BEQ     C16             ,BRANCH IF YES
8437  036420  122703  000117              CMPB    #117,R3         ,IS IT A RETURN TO CENTER?
8438  036424  001522                      BEQ     C16             ,BRANCH IF YES
8439  036426  122703  000103              CMPB    #103,R3         ,IS IT AN "UNLOAD" COMMAND?
8440  036432  001016                      BNE     5$              ,BRANCH IF NO
8441  036434  112761  000001  034360      MOVB    #1,DRVACT(R1)   ,SET THE DRIVE ACTIVE INDICATOR
8442  036442  105061  034370              CLRB    DRVSTA(R1)      ,PUT DRIVE STATUS TO OFFLINE
8443  036446  112761  000001  034436      MOVB    #1,ULDFLG(R1)   ,SET "UNLOAD IN PROGRESS" FLAG
8444  036454  010346                      MOV     R3,-(SP)        ,START THE "UNLOAD" COMMAND
8445  036456  004037  041644              JSR     R0,WRT RP
8446  036462  000000                      RPCS1
8447  036464  036706                      C17
8448  036466  000207                      RTS     PC              ,RETURN TO USER
8449  036470  122703  000143      5$.     CMPB    #143,R3         ,IS IT A "SET FORMAT" COMMAND?
8450  036474  001014                      BNE     6$              ,BRANCH IF NO
8451  036476  004037  041464              JSR     R0,RD RP        ,READ THE OFFSET REGISTER
8452  036502  000032                      RPOF
8453  036504  036706                      C17
8454  036506  116266  000001  000001      MOVB    1(R2),1(SP)     ,COMBINE "FMT22","ECI", AND "HCI"
8455  036514  004037  041644              JSR     R0,WRT RP       ,LOAD "FMT22", "ECI", AND/OR "HCI"
8456  036520  000032                      RPOF
8457  036522  036706                      C17
8458  036524  000436                      BR      12$
8459  036526  122703  000141      6$:     CMPB    #141,R3         ,IS IT A "GET REGISTER" COMMAND?
8460  036532  001023                      BNE     10$             ,BRANCH IF NO
8461  036534  016203  000006      7$.     MOV     6(R2),R3        ,POINTS TO 1ST ADDRESS OF WHERE
8462                                                              ,TO PUT THE REGISTER(S)
8463  036540  116237  000010  036556      MOVB    10(R2),9$       ,INIT. THE INDEX FOR THE FIRST REG
8464  036546  116205  000011              MOVB    11(R2),R5       ;INDEX OF LAST REG  TO MOVE
8465  036552  004037  041464      8$      JSR     R0,RD RP        ,READ RP04/5/6 REGISTER
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8466  036556  000000                    9$      RPCS1                   ,INDEX OF REG. TO READ
8467  036560  036706                            C17
8468  036562  012623                            MOV     (SP)+,(R3)+     ,GET THE CONTENTS OF RH11/RP04/5/6 REG
8469  036564  023705  036556                    CMP     9$,R5           ;LAST REG. BEEN READ?
8470  036570  001414                            BEQ     12$             ,GET OUT IF YES
8471  036572  062737  000002  036556            ADD     #2,9$           ,INCREASE THE INDEX BY 2
8472  036600  000764                            BR      8$              ,LOOP--MORE TO READ
8473  036602  122703  000145            10$     CMPB    #145,R3         ,IS IT A "SELECT DRIVE" COMMAND?
8474  036606  001405                            BEQ     12$             ;BRANCH IF YES
8475  036610  010346                    11$     MOV     R3,-(SP)        ,LOAD THE COMMAND
8476  036612  004037  041644                    JSR     R0,WRT RP
8477  036616  000000                            RPCS1
8478  036620  036706                            C17
8479  036622  004737  042714            12$     JSR     PC,POPQUE       ,REMOVE REQ  FROM QUEUE
8480  036626  052762  000200  000016            BIS     #BIT07,16(R2)   ,SET THE "DONE" BIT
8481  036634  005737  034456                    TST     SAVEFG          ,SAVE THE RH11/RP04/5/6 REGISTERS?
8482  036640  100002                            BPL     13$             ,BRANCH IF NO
8483  036642  004737  042036                    JSR     PC,SVRH11       ,YES--GO SAVE THE REGISTERS
8484  036646  000207                    13$     RTS     PC              ,RETURN TO USER
8485  036650  006301                    C15     ASL     R1
8486  036652  012761  001750  034462            MOV     #1000 ,TIMER(R1)        ,SET A ONE SECOND TIMER
8487  036660  006201                            ASR     R1
8488  036662  112761  000001  034360            MOVB    #1,DRVACT(R1)   ,SET THE DRIVE ACTIVE
8489  036670  000207                            RTS     PC              ,RETURN TO THE USER
8490  036672  010346                    C16     MOV     R3,-(SP)        ,LOAD THE COMMAND
8491  036674  004037  041644                    JSR     R0,WRT RP
8492  036700  000000                            RPCS1
8493  036702  036706                            C17
8494  036704  000761                            BR      C15
8495  036706  032764  010000  000010    C17     BIT     #BIT12,RPCS2(R4)  ,DRIVE NON-EXISTENT ?
8496  036714  001034                            BNE     C18             ,BR IF YES
8497  036716  005702                    1$      TST     R2              ,ANYTHING IN QUEUE ?
8498  036720  001405                            BEQ     C17B            ,BR IF NOT
8499  036722  012762  104000  000016            MOV     #BIT15!BIT11,16(R2)     ,SET "PARITY" ERROR INDICATOR
8500  036730  004737  042036                    JSR     PC,SVRH11       ,GO SAVE THE RH11/RP04/5/6 REGISTERS
8501  036734  012746  000111            C17B    MOV     #111,-(SP)      ,DO A "DRIVE CLEAR"
8502  036740  004037  041644                    JSR     R0,WRT RP
8503  036744  000000                            RPCS1
8504  036746  037006                            C18
8505  036750  004737  042576                    JSR     PC,EMPTYQ       ,EMPTY THE QUEUE
8506  036754  105061  034436                    CLRB    ULDFLG(R1)      ,CLEAR THE UNLOAD IN QUEUE FLAG
8507  036760  105061  034360                    CLRB    DRVACT(R1)      ,DRIVE IS IDLE
8508  036764  020137  034502                    CMP     R1,DTUW         ,IF THIS DRIVE HAD AN I/O REQUEST
8509  036770  001006                            BNE     1$              ,IN PROGRESS CLEAR ALL OF THE FLAGS
8510  036772  005037  034430                    CLR     TRNSWT
8511  036776  012737  177777  034502            MOV     #-1,DTUW
8512  037004  000207                    1$      RTS     PC
8513  037006  104412                    C18     SAVREG                  ,SAVE R0 - R5
8514  037010  032764  010000  000010            BIT     #BIT12,RPCS2(R4)  ,IS 'NED' SET ?
8515  037016  001002                            BNE     1$              ,BR IF YES
8516  037020  005001                            CLR     R1
8517  037022  005003                            CLR     R3
8518  037024  105761  034360            1$      TSTB    DRVACT(R1)      ,DRIVE ACTIVE?
8519  037030  001443                            BEQ     5$              ,BRANCH IF NO
8520  037032  013702  034430                    MOV     TRNSWT,R2       ,GET THE "TRANSFER WAIT" QUEUE
8521  037036  020137  034502                    CMP     R1,DTUW         ,DID THIS DRIVE HAVE AN I/O IN PROGRESS?
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8522  037042  001402                        BEQ     2$                ,BRANCH IF YES
8523  037044  004737  042672                JSR     PC,GETREQ         ,GET THE DPB POINTER
8524  037050  005702              2$        TST     R2                ,QUEUE ENTRY FOR DRIVE ?
8525  037052  001415                        BEQ     4$                ,BR IF NOT
8526  037054  032764  010000  000010        BIT     #BIT12,RPCS2(R4)  ;'NED' SET ?
8527  037062  001404                        BEQ     3$                ,BR IF NOT
8528  037064  012762  100002  000016        MOV     #BIT15!BIT01,16(R2)  ,SET 'DRIVE NON-EXISTENT' INDICATOR
8529  037072  000405                        BR      4$                ,CONTINUE
8530  037074  012762  102000  000016  3$    MOV     #BIT15!BIT10,16(R2) ,SET "NON-CLEARABLE PARITY" ERROR INDICATOR
8531  037102  004737  042036                JSR     PC,SVRH11         ,SAVE RH11/RP04/5/6 REGISTERS
8532  037106  012763  177777  034462  4$    MOV     #-1,TIMER(R3)     ,STOP THE TIMER
8533  037114  105061  034360                CLRB    DRVACT(R1)        ,SET "DRIVE ACTIVE" TO IDLE
8534  037120  020137  034502                CMP     R1,DTUW           ;IS THIS DRIVE SETUP FOR A TRANSFER
8535  037124  001005                        BNE     5$                ,BR IF NOT
8536  037126  012737  177777  034502        MOV     #-1,DTUW          ,RESET THE INDICATOR
8537  037134  005037  034430                CLR     TRNSWT            ,CLEAR THE TRANSFER QUEUE
8538  037140  105061  034436          5$    CLRB    ULDFLG(R1)        ,CLEAR UNLOAD FLAG
8539  037144  032764  010000  000010        BIT     #BIT12,RPCS2(R4)  ,'NED' SET ?
8540  037152  001021                        BNE     6$                ,BR IF YES
8541  037154  005201                        INC     R1                ,MOVE TO THE NEXT DRIVE
8542  037156  062703  000002                ADD     #2,R3
8543  037162  042701  177770                BIC     # C7,R1
8544  037166  001316                        BNE     1$                ,BRANCH IF MORE DRIVES
8545  037170  012737  177777  034502        MOV     #-1,DTUW          ,NO DATA TRANSFERS UNDERWAY
8546  037176  005037  034430                CLR     TRNSWT            ,CLEAR THE 'TRANSFER WAIT' QUEUE
8547  037202  004737  042520                JSR     PC,CLRQUE         ,CLEAR ALL OF THE REQUEST QUEUES
8548  037206  012764  000040  000010        MOV     #BIT05,RPCS2(R4) ,DO A MASSBUS INIT
8549  037214  000406                        BR      7$                ,CONTINUE
8550  037216  004737  042576          6$    JSR     PC,EMPTYQ         ,CLEAR THE DRIVE'S QUEUE
8551  037222  105061  034370                CLRB    DRVSTA(R1)        ,SET DRIVE TO OFFLINE
8552  037226  105061  034400                CLRB    DRVTYP(R1)        ,CLEAR THE DRIVE TYPE INDICATOR
8553  037232  004737  042154          7$    JSR     PC,SET IE         ,SET "IE" WITHOUT "TRE"
8554  037236  104413                        RESREG                    ,RESTORE R0 - R5
8555  037240  000207                        RTS     PC                ,RETURN
8556
8557                                  ,LOOK AHEAD ROUTINE
8558                                  ;
8559                                  ,CALL
8560                                  ,       MOV     #DRVNUM,R1        ,DRIVE NUMBER
8561                                  ,       MOV     #DPB,R2           ,POINT TO DPB
8562                                  ,       JSR     R0,LA             ,GO CHECK THE WINDOW
8563                                  ,       RETURN1                   ,ERROR RETURN
8564                                  ,       RETURN2                   ,START A SEARCH
8565                                  ,       RETURN3                   ,START A DATA TRANSFER
8566
8567  037242  013704  034516          LA      MOV     RPADR,R4          ,GET RPCS1'S ADDRESS
8568  037246  010164  000010                  MOV     R1,RPCS2(R4)      ,SELECT DRIVE
8569  037252  004037  041464                  JSR     R0,RD RP          ,READ CURRENT CYLINDER
8570  037256  000036                        RPCC
8571  037260  037372                        4$                        ,ERROR RETURN ADDRESS
8572  037262  022662  000012                CMP     (SP)+,12(R2)      ,IS CURRENT CYLINDER=DESIRED
8573                                                                  ,CYLINDER?
8574  037266  001037                        BNE     3$                ,EXIT IF NO
8575  037270  105261  034446                INCB    LACNT(R1)         ,INCREMENT THE LOOK AHEAD COUNT
8576  037274  126137  034446  034524        CMPB    LACNT(R1),MXLACT  ,EXCEED MAX?
8577  037302  003026                        BGT     2$                ,BRANCH IF YES
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8578  037304  116203  000010            MOVB    10(R2),R3       ;GET DESIRED SECTOR ADDRESS AND
8579  037310  000303                    SWAB    R3              ;MULT  BY 64--ALIGN WITH
8580  037312  006203                    ASR     R3              ;LOOK AHEAD REGISTER
8581  037314  006203                    ASR     R3
8582  037316  012737  000340  177776    MOV     #340,@#PS       ;PRIORITY LEVEL '7"
8583  037324  004037  041464            JSR     R0,RD RP        ;READ LOOK AHEAD REGISTER
8584  037330  000020                    RPLA
8585  037332  037372                    4$
8586  037334  162603                    SUB     (SP)+,R3        ;CALCULATE THE DELTA
8587  037336  002002                    BGE     1$
8588  037340  062703  002600            ADD     #(22.*64.),R3   ;MAKE THE DELTA POSITIVE
8589  037344  023703  034526    1$      CMP     MXDLTA,R3       ;CHECK THE DELTA TO SEE
8590  037350  002406                    BLT     3$              ;IF IT IS WITHIN THE
8591  037352  023703  034530            CMP     MNDLTA,R3       ;WINDOW---IF YES, ZERO
8592  037356  002003                    BGE     3$              ;THE LOOK AHEAD COUNT
8593  037360  105061  034446    2$      CLRB    LACNT(R1)       ;AND TAKE THE I/O EXIT
8594  037364  005720                    TST     (R0)+
8595  037366  005720            3$      TST     (R0)+           ;ADJUST THE RETURN ADDRESS
8596  037370  000402                    BR      5$              ;EXIT
8597  037372  004737  036706    4$      JSR     PC,C17          ;PROCESS THE ERROR
8598  037376  000200            5$      RTS     R0              ;RETURN
8599
8600                            ;INTERRUPT SERVICE ROUTINE
8601
8602  037400  112737  000001  034434  ISR     MOVB    #1,ACTDRV       ;SET "ACTIVE DRIVER" FLAG
8603  037406  104412                    SAVREG                  ;SAVE R0 - R5
8604  037410  013704  034516            MOV     RPADR,R4        ;ADDRESS OF RHSCS1
8605  037414  013701  034502            MOV     DTUW,R1         ;GET "DATA TRANSFER UNDERWAY" INDICATOR
8606  037420  002403                    BLT     1$              ;BRANCH IF NO DATA TRANSFER UNDERWAY
8607  037422  004737  037444            JSR     PC,TD           ;CALL TRANSFER DONE
8608  037426  000402                    BR      2$              ;EXIT
8609  037430  004737  037604    1$      JSR     PC,SC           ;CALL SPECIAL CONDITIONS
8610  037434  104413            2$      RESREG                  ;RESTORE R0 - R5
8611  037436  105037  034434            CLRB    ACTDRV          ;CLEAR "ACTIVE DRIVER" FLAG
8612  037442  000002                    RTI                     ;RETURN
8613
8614                            ;TRANSFER DONE ROUTINE
8615
8616  037444  105061  034360    TD      CLRB    DRVACT(R1)      ;SET DRIVE ACTIVE INDICATOR TO IDLE
8617  037450  012737  177777  034502    MOV     #-1,DTUW        ;NO DATA TRANSFERS UNDERWAY
8618  037456  006301                    ASL     R1
8619  037460  012761  177777  034462    MOV     #-1,TIMER(R1)   ;CANCEL TIMEOUT
8620  037466  006201                    ASR     R1
8621  037470  013702  034430            MOV     TRNSWT,R2       ;GET "DPB" ADDRESS FROM THE
8622  037474  005037  034430            CLR     TRNSWT          ;TRANSFER WAIT QUEUE--CLEAR QUEUE
8623  037500  052762  000200  000016    BIS     #BIT07,16(R2)   ;SET DONE
8624  037506  010164  000010            MOV     R1,RPCS2(R4)    ;SELECT THE DRIVE
8625  037512  004037  041464            JSR     R0,RD RP        ;TRANSFER ERROR(TRE=1)?
8626  037516  000000                    RPCS1
8627  037520  036706                    C17
8628  037522  006126                    ROL     (SP)+
8629  037524  100413                    BMI     3$              ;BR IF YES
8630  037526  005737  034456            TST     SAVEFG          ;SAVE THE RH11/RP04/5/6 REGISTERS?
8631  037532  100002                    BPL     1$              ;BRANCH IF NO
8632  037534  004737  042036            JSR     PC,SVRH11       ;YES--SAVE THE REGISTERS
8633  037540  004737  035576    1$      JSR     PC,OPT          ;CALL OPTIMIZER
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8634  037544  000417                        BR      SC              ,CHECK OTHER DRIVES
8635  037546  012714  000113          2$    MOV     #113,(R4)       ,RELEASE THE DRIVE
8636  037552  000414                        BR      SC              ,CHECK FOR OTHER DRIVES
8637  037554  052762  100100  000016  3$    BIS     #BIT15!BIT06,16(R2) ,SET DATA ERROR FLAG
8638  037562  004737  042576                JSR     PC,EMPTYQ       ,EMPTY THE "DRIVE'S WAIT" QUEUE
8639  037566  004737  042036                JSR     PC,SVRH11       ,SAVE THE RH11/RP04/5/6 REGISTERS
8640  037572  012714  040111                MOV     #40111,(R4)     ,ISSUE A "DRIVE CLEAR"
8641  037576  012714  000113                MOV     #113,(R4)       ,ISSUE A RELEASE TO THE DRIVE
8642  037602  000400                        BR      SC              ,CHECK FOR OTHER DRIVES
8643
8644                                  ,SPECIAL CONDITION ROUTINE
8645
8646  037604  116403  000016          SC    MOVB    RPAS(R4),R3     ,READ "RPAS"
8647  037610  001014                        BNE     2$              ,BRANCH IF ANY 'ATA' BITS SET
8648  037612  004037  041464                JSR     R0,RD RP        ,READ CONTROL AND STATUS REGISTER
8649  037616  000000                        RPCS1
8650  037620  037006                        CI8
8651  037622  106126                        ROLB    (SP)+           ,IS "IE"=1?
8652  037624  100405                        BMI     1$              ,YES, NO DRIVES TO CHECK
8653  037626  004037  042756                JSR     R0,ES SAV       ,SAVE THE ADDRESS IN '$ESCAPE'
8654  037632  104001                        ERROR   1               ,REPORT AN ILLEGAL INTERRUPT
8655  037634  004737  042154                JSR     PC,SET IE       ,SET INTERRUPT ENABLE
8656  037640  000207                  1$    RTS     PC              ,RETURN
8657  037642  005046                  2$    CLR     -(SP)           ,PROCESS ALL DRIVES THAT HAVE
8658  037644  110316                        MOVB    R3,(SP)         ,AN "ATA"=1
8659  037646  012703  000001                MOV     #1,R3
8660  037652  005001                        CLR     R1
8661  037654  030316                  SC3   BIT     R3,(SP)         ,ATA=1?
8662  037656  001005                        BNE     SC5             ,YES--BRANCH
8663  037660  005201                  SC4   INC     P1              ,MOVE TO THE NEXT DRIVE
8664  037662  106303                        ASLB    R3
8665  037664  001373                        BNE     SC3             ,BRANCH IF MORE TO CHECK?
8666  037666  005726                        TST     (SP)+           ,CLEAN OFF THE STACK
8667  037670  000207                        RTS     PC              ,RETURN TO USER
8668  037672  105761  034410          SC5   TSTB    DPINT(R1)       ,INITIALIZING THE DRIVE ?
8669  037676  001402                        BEQ     1$              ,BR IF NOT
8670  037700  000137  040576                JMP     SC13            ,PROCESS THE DRIVE
8671  037704  105761  034420          1$    TSTB    DPRQS(R1)       ,PORT REQUEST OUTSTANDING ?
8672  037710  001402                        BEQ     2$              ,BR IF NOT
8673  037712  000137  040576                JMP     SC13            ,START THE OUTSTANDING COMMAND
8674  037716  105761  034370          2$.   TSTB    DRVSTA(R1)      ,CHECK THE DRIVE STATUS
8675  037722  003025                        BGT     5$              ,BRANCH IF ONLINE
8676  037724  105761  034436                TSTB    ULDFLG(R1)      ,UNLOAD IN PROGRESS?
8677  037730  003422                        BLE     5$              ,BRANCH IF NOT
8678  037732  004737  042672                JSR     PC,GETREQ       ,GET DPB POINTER
8679  037736  004737  042036                JSR     PC,SVRH11       ;SAVE THE RH11/RP04/5/6 REGISTERS
8680  037742  004737  040526                JSR     PC,SC12         ;SAVE RPDS1, RPER1, RPER2, AND RPER3
8681                                                                ,ALSO DO A DRIVE INIT (DRVINT)
8682  037746  105761  034370                TSTB    DRVSTA(R1)      ,DID DRIVE COME ONLINE?
8683  037752  003416                        BLE     6$              ,NO---BRANCH
8684  037754  032737  040000  034350        BIT     #BIT14,RPERRS   ,WAS THERE AN ERROR?
8685  037762  001002                        BNE     3$              ,BR IF ERROR
8686  037764  000137  040436                JMP     SC11            ,NO ERROR
8687  037770  013705  034352          3$    MOV     RPERRS+2,R5     ,YES -- PICKUP RPER1 AND
8688  037774  000502                        BR      SC6A            ,GO PROCESS THE ERR
8689  037776  105761  034360          5$    TSTB    DRVACT(R1)      ,DRIVE ACTIVE WITH COMMAND OR ERROR RECOVERY ?
```

```
8690  040002  001033                        BNE     SC6             ,BR IF EITHER
8691  040004  004737  040526                JSR     PC,SC12         ,SAVE RPDS1, RPER1, RPER2, AND RPER3
8692                                                                  ,ALSO DO A DRVINT
8693  040010  105761  034410          6$    TSTB    DPINT(R1)       ,TRYING TO INIT THE DRIVE ?
8694  040014  001321                        BNE     SC4             ,BR IF YES, CHECK ON MORE DRIVES
8695  040016  105761  034370                TSTB    DRVSTA(R1)      ,CHECK ON DRIVE'S STATUS
8696  040022  100412                        BMI     7$              ,BR IF UNSAFE
8697  040024  032737  020000  034356        BIT     #BIT13,RPERRS+6 ,ADDRESS PLUG CHANGED ?
8698  040032  001013                        BNE     8$              ;BR IF YES
8699  040034  012746  000113                MOV     #113,-(SP)      ,RELEASE COMMAND
8700  040040  004037  041644                JSR     R0,WRT RP       ,WRITE THE COMMAND INTO RPCS1
8701  040044  000000                        RPCS1                   ,REGISTER INDEX
8702  040046  040406                        SC8                     ,PARITY EXIT ADDRESS
8703  040050  011605                7$      MOV     (SP),R5         ,PICKUP (RPAS) BEFORE THE ERROR CALL
8704  040052  004037  042756                JSR     R0,ES SAV       ,SAVE THE ADDRESS IN '$ESCAPE'
8705  040056  104002                        ERROR   2               ,REPORT THE UNEXPECTED ATTENTION
8706  040060  000677                        BR      SC4             ,GO CHECK FOR MORE ATA'S
8707  040062                          8$
8708  040062  004037  042756                JSR     R0,ES SAV       ,SAVE THE ADDRESS IN '$ESCAPE'
8709  040066  104005                        ERROR   5               ,REPORT THE ADDRESS PLUG CHANGE
8710  040070  000673                        BR      SC4             ,CHECK FOR MORE DRIVES
8711  040072  006301                SC6     ASL     R1              ,SETUP TO ADDRESS WORDS
8712  040074  012761  177777  034462        MOV     #-1,TIMER(R1)   ,STOP THE TIMER
8713  040102  006201                        ASR     R1              ,RESTORE THE DRIVE ADDRESS
8714  040104  004737  042672                JSR     PC,GETREQ       ,GET THE DPB POINTER FROM THE QUEUE
8715  040110  010164  000010                MOV     R1,RPCS2(R4)    ,SELECT DRIVE
8716  040114  004037  041464                JSR     R0,RD RP        ,READ THE RP04'S STATUS REG
8717  040120  000012                        RPDS1
8718  040122  040406                        SC8
8719  040124  011605                        MOV     (SP),R5         ,AND PUT IT IN R5
8720  040126  006126                        ROL     (SP)+           ,WAS THERE AN ERROR?
8721  040130  100407                        BMI     1$              ,BR IF ERROR
8722  040132  105761  034360                TSTB    DRVACT(R1)      ,CHECK DRIVE'S STATE
8723  040136  003137                        BGT     SC11            ,BR IF DRIVE ACTIVE WITH ORDER
8724  040140  052762  100210  000016        BIS     #BIT15!BIT07!BIT03,16(R2)  ,INFORM USER OF ERROR RECOVER COMPLETION
8725  040146  000470                        BR      SC7
8726  040150  004037  041464          1$    JSR     R0,RD RP        ,READ ERROR REGISTER #1
8727  040154  000014                        RPER1
8728  040156  040406                        SC8
8729  040160  012605                        MOV     (SP)+,R5        ,AND SAVE IT IN R5
8730  040162  004737  042036                JSR     PC,SVRH11       ,SAVE RH11/RP04/5/6 REGISTERS
8731  040166  012746  000111                MOV     #111,-(SP)      ,ISSUE A DRIVE CLEAR
8732  040172  004037  041644                JSR     R0,WRT RP
8733  040176  000000                        RPCS1
8734  040200  040406                        SC8
8735  040202  006105                SC6A    ROL     R5              ,WAS "UNSAFE" CONDITION =1?
8736  040204  100406                        BMI     1$              ,BRANCH IF YES
8737  040206  005702                        TST     R2              ,ANYTHING IN QUEUE ?
8738  040210  001447                        BEQ     SC7             ,BR IF NOT
8739  040212  052762  100240  000016        BIS     #BIT15!BIT07!BIT05,16(R2)       ,INFORM USER OF ERROR
8740  040220  000443                        BR      SC7
8741  040222  004037  041464          1$    JSR     R0,RD RP        ,READ DRIVE STATUS REG  #1
8742  040226  000012                        RPDS1
8743  040230  040406                        SC8
8744  040232  011605                        MOV     (SP),R5         ,SAVE RPDS1 IN R5
8745  040234  006126                        ROL     (SP)+           ,"ERR"=1?
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8746  040236  100011                          BPL     2$              ,BR IF NO--UNSAFE CLEARED
8747  040240  112761  177777  034370          MOVB    #-1,DRVSTA(R1)  ,DRIVE IS UNSAFE
8748  040246  004737  042036                  JSR     PC,SVRH11       ,SAVE RH11/RP04/5/6 REGISTERS
8749  040252  052762  110000  000016          BIS     #BIT15!BIT12,16(R2)     ,INFORM USER OF UNSAFE ERROR
8750  040260  000423                          BR      SC7
8751  040262  032705  010000          2$      BIT     #BIT12,R5       ,"MOL" = 1 ?
8752  040266  001015                          BNE     3$              ,BR IF YES
8753  040270  112761  177777  034360          MOVB    #-1,DRVACT(R1)  ,ACTIVE ERROR RECOVER
8754  040276  112761  000001  034370          MOVB    #1,DRVSTA(R1)   ,ONLINE
8755  040304  006301                          ASL     R1
8756  040306  012761  072460  034462          MOV     #30000,TIMER(R1) ,START 30 SECOND TIMER
8757  040314  006201                          ASR     R1
8758  040316  000137  037660                  JMP     SC4
8759  040322  052762  100220  000016  3$      BIS     #BIT15!BIT07!BIT04,16(R2)       ,INFORM USER OF ERROR
8760  040330  105061  034360          SC7     CLRB    DRVACT(R1)      ,DRIVE IS IDLE
8761  040334  004737  042576                  JSR     PC,EMPTYQ       ,DUMP THE QUEUE
8762  040340  105761  034436                  TSTB    ULDFLG(R1)      ,UNLOAD IN PROGRESS OR QUEUE?
8763  040344  003002                          BGT     1$              ,BR IF NOT
8764  040346  105061  034436                  CLRB    ULDFLG(R1)      ,CLEAR UNLOAD FLAG
8765  040352  116164  034504  000016  1$      MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR ATTENTION BIT
8766  040360  105761  034370                  TSTB    DRVSTA(R1)      ,IS THE DRIVE UNSAFE ?
8767  040364  100406                          BMI     2$              ,BR IF IT IS
8768  040366  012746  000113                  MOV     #113,-(SP)      ,RELEASE COMMAND
8769  040372  004037  041644                  JSR     R0,WRT RP       ,WRITE THE COMMAND INTO RPCS1
8770  040376  000000                          RPCS1                   ,REGISTER INDEX
8771  040400  040406                          SC8                     ,PARITY EXIT ADDRESS
8772  040402  000137  037660          2$      JMP     SC4             ,CHECK FOR MORE DRIVES
8773  040406  105761  034360          SC8     TSTB    DRVACT(R1)      ,IS DRIVE IDLE?
8774  040412  001405                          BEQ     1$              ,YES--BRANCH
8775  040414  004737  042672                  JSR     PC,GETREQ       ,GET DPB POINTER
8776  040420  004737  036706                  JSR     PC,C17          ,PROCESS THE PARITY ERROR
8777  040424  000402                          BR      2$              ,CONTINUE
8778  040426  004737  036734          1$      JSR     PC,C17B         ,PROCESS THE UNCORRECTABLE PARITY ERROR
8779  040432  000137  037660          2$      JMP     SC4             ,CHECK MORE DRIVES
8780  040436  105761  034436          SC11    TSTB    ULDFLG(R1)      ,"UNLOAD IN PROGRESS"?
8781  040442  003402                          BLE     1$              ,BRANCH IF NO
8782  040444  105061  034436                  CLRB    ULDFLG(R1)      ,CLEAR UNLOAD FLAG
8783  040450  105061  034360          1$      CLRB    DRVACT(R1)      ,SET DRIVE IDLE
8784  040454  136137  034504  034432          BITB    ATABIT(R1),SRCHWT       ,DOING A SEARCH OPERATION FOR
8785                                                                          ,AN I/O COMMAND?
8786  040462  001012                          BNE     2$              ,BRANCH IF YES
8787  040464  004737  042714                  JSR     PC,POPQUE       ,REMOVE REQUEST FROM QUEUE
8788  040470  052762  000200  000016          BIS     #BIT07,16(R2)   ,SET "DONE" BIT
8789  040476  005737  034456                  TST     SAVEFG          ,SAVE THE REGISTERS?
8790  040502  100002                          BPL     2$              ,BRANCH IF NO
8791  040504  004737  042036                  JSR     PC,SVRH11       ,YES--SAVE ALL OF THE RH11/RP04/5/6 REG'S
8792  040510  116164  034504  000016  2$      MOVB    ATABIT(R1),RPAS(R4)  ,CLEAR ATTENTION BIT
8793  040516  004737  035576                  JSR     PC,OPT          ,START A REQUEST
8794  040522  000137  037660                  JMP     SC4             ,CHECK FOR MORE DRIVES
8795  040526  010164  000010          SC12    MOV     R1,RPCS2(R4)    ,SELECT DRIVE
8796  040532  016437  000012  034350          MOV     RPDS1(R4),RPERRS        ,SAVE THE FOUR REGISTERS THAT
8797  040540  016437  000014  034352          MOV     RPER1(R4),RPERRS+2      ,WILL TELL US SOMETHING
8798  040546  016437  000040  034354          MOV     RPER2(R4),RPERRS+4
8799  040554  016437  000042  034356          MOV     RPER3(R4),RPERRS+6
8800  040562  004037  034746                  JSR     R0,DRVINT       ,INIT  THE STATE OF THE DRIVE
8801  040566  000401                          BR      1$              ,TAKE ERROR EXIT
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8802  040570  000207                          RTS     PC              ,RETURN
8803  040572  005726                  1$      TST     (SP)+           ,POP PC OFF OF THE STACK
8804  040574  000704                          BR      SC8             ,PROCESS THE PARITY ERROR
8805  040576  006301                  SC13    ASL     R1              ,SETUP TO ADDRESS WORDS
8806  040600  012761  177777  034462          MOV     #-1,TIMER(R1)   ,STOP THE TIMER
8807  040606  006201                          ASR     R1              ,
8808  040610  010164  000010                  MOV     R1,RPCS2(R4)    ,SELECT THE DRIVE
8809  040614  116164  034504  000016          MOVB    ATABIT(R1),RPAS(R4)  ;CLEAR THE ATTENTION BIT
8810  040622  032714  004000                  BIT     #BIT11,(R4)     ,DRIVE AVAILABLE ?
8811  040626  001006                          BNE     1$              ,BR IF AVAILABLE
8812  040630  006301                          ASL     R1
8813  040632  012761  023420  034462          MOV     #10000,TIMER(R1)  ,START 10 SEC TIMER AGAIN
8814  040640  006201                          ASR     R1
8815  040642  000433                          BR      3$              ,EXIT
8816  040644  105761  034410          1$      TSTB    DPINT(R1)       ,INITIALIZING THE DRIVE ?
8817  040650  001424                          BEQ     2$              ,BR IF NOT
8818  040652  105061  034410                  CLRB    DPINT(R1)       ,CLEAR THE INIT INDICATOR
8819  040656  004037  034746                  JSR     R0,DRVINT       ,GO INIT THE DRIVE
8820  041662  000240                          NOP                     ,DUMMY PARITY ERROR RETURN
8821  041664  105761  034370                  TSTB    DRVSTA(R1)      ,DRIVE ONLINE ?
8822  041670  003014                          BGT     2$              ,BR IF YES -- START ORDER
8823  041672  005702                          TST     R2              ;QUEUE ENTRY FOR THE DRIVE
8824  041674  001416                          BEQ     3$              ,BR IF NOT
8825  041676  004737  042672                  JSR     PC,GETREQ       ,GET DPB ADDRESS
8826  040702  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)  ,INFORM USER THAT DRIVE OFFLINE
8827  040710  004737  042036                  JSR     PC,SVRH11       ,SAVE THE REGISTERS
8828  040714  004737  042576                  JSR     PC,EMPTYQ       ,EMPTY THE REQUEST QUEUE
8829  040720  000404                          BR      3$
8830  040722  105061  034420          2$      CLRB    DPRQS(R1)       ,CLEAR THE PORT REQUEST INDICATOR
8831  040726  004737  035576                  JSR     PC,OPT          ,START THE PENDING REQUEST
8832  040732  000137  037660          3$      JMP     SC4             ,PROCESS OTHER DRIVES
8833
8834                                  ,RP04/5/6 TIMER ROUTINE
8835                                  ,CALL
8836                                  ,       MOV     #TIME,-(SP)     ,ELASPED TIME IN MILLISECONDS ON THE STACK
8837                                  ,       JSR     PC,RPTMR        ,CALL RP04/5/6 TIME ROUTINE
8838
8839  040736  005737  034434          RPTMR   TST     ACTDRV          ,CHECK "ACTDRV & ACTSTR"
8840  040742  001030                          BNE     4$              ,IF NON ZERO EXIT
8841  040744  112737  000001  034435          MOVB    #1,ACTSTR       ,SET "ACTSTR"
8842  040752  104412                          SAVREG                  ,SAVE R0 - R5
8843  040754  005001                          CLR     R1              ,START WITH DRIVE 0
8844  040756  005003                          CLR     R3
8845  040760  005763  034462          1$      TST     TIMER(R3)       ,IS THE TIMER RUNNING?
8846  040764  002407                          BLT     2$              ,BRANCH IF NO
8847  040766  166663  000002  034462          SUB     2(SP),TIMER(R3) ,COUNT THE INTERVAL
8848  040774  003003                          BGT     2$              ,BR IF NO SOFTWARE TIMEOUT
8849  040776  004737  041030                  JSR     PC,STO          ,CALL SOFTWARE TIMEOUT ROUTINE
8850  041002  000405                          BR      3$              ,GO TO THE EXIT
8851  041004  006201                  2$      INC     R1              ,MOVE TO NEXT DRIVE
8852  041006  005723                          TST     (R3)+
8853  041010  022701  000010                  CMP     #8,R1           ,OUT OF DRIVES?
8854  041014  003361                          BGT     1$              ,BRANCH IF NO
8855  041016  104413                  3$      RESREG                  ,RESTORE R0 - R5
8856  041020  105037  034435                  CLRB    ACTSTR          ,ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
8857  041024  012616                  4$      MOV     (SP)+,(SP)      ,ADJUST THE STACK
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 8858  041026  000207                          RTS     PC              ,RETURN
 8859
 8860                                  ,SOFTWARE TIMEOUT ROUTINE
 8861                                  ,
 8862                                  ,NOTE   THIS ROUTINE MUST BE ENTERED AT PRIORITY 6
 8863                                  ,       OR GREATER
 8864                                  ,
 8865                                  ,CALL   STO
 8866                                  ,       MOV     #DRVNUM,R1      ,DRIVE NUMBER
 8867                                  ,       JSR     PC,STO          ,CALL
 8868                                  ,       RETURN
 8869
 8870  041030  010146                  STO     MOV     R1,-(SP)        ,SAVE R1
 8871  041032  010346                          MOV     R3,-(SP)        ,SAVE R3
 8872  041034  013704  034516                  MOV     RPADR,R4        ,GET ADDRESS OF "RPCS1"
 8873  041040  010164  000010                  MOV     R1,RPCS2(R4)    ,SELECT THE DRIVE
 8874  041044  004037  041464                  JSR     R0,RD RP        ,READ "DRIVE STATUS REG"
 8875  041050  000012                          RPDS1
 8876  041052  041352                          STO5
 8877  041054  105726                          TSTB    (SP)+           ,IS "DRY"=1?
 8878  041056  100477                          BMI     STO2            ,BR IF YES
 8879  041060  105761  034410          STO1.   TSTB    DPINT(R1)       ,TRYING TO INTIALIZE THE DRIVE ?
 8880  041064  001074                          BNE     STO2            ,BR IF YES
 8881  041066  105761  034420                  TSTB    DPRQS(R1)       ,OUTSTANDING PORT REQUEST FOR THE DRIVE ?
 8882  041072  001071                          BNE     STO2            ,BR IF YES
 8883  041074  013702  034430                  MOV     TRNSWT,R2       ,PICKUP TRANSFER WAIT QUEUE
 8884  041100  020137  034502                  CMP     R1,DTUW         ,TRANSFER UNDERWAY ON THIS DRIVE?
 8885  041104  001402                          BEQ     1$              ,BRANCH IF YES
 8886  041106  004737  042672                  JSR     PC,GETREQ       ,GET DPB ADDRESS
 8887  041112  052762  101000  000016  1$      BIS     #BIT15!BIT09,16(R2) ,SET THE ERROR FLAGS
 8888  041120  004737  042036                  JSR     PC,SVRH11       ,SAVE RH11/RP04/5/6 REGISTERS
 8889  041124  012764  000040  000010          MOV     #BIT05,RPCS2(R4) ,"INIT" THE MASS BUS
 8890  041132  105061  034360                  CLRB    DRVACT(R1)      ,DRIVE IS IDLE
 8891  041136  105061  034436                  CLRB    ULDFLG(R1)      ,CLEAR THE UNLOAD FLAG
 8892  041142  005001                          CLR     R1              ,START WITH DRIVE 0
 8893  041144  005003                          CLR     R3
 8894  041146  004037  034746          2$      JSR     R0,DRVINT       ,INIT  THIS DRIVE
 8895  041152  000477                          BR      STO5            ,PARITY ERROR RETURN
 8896  041154  105761  034360                  TSTB    DRVACT(R1)      ,DRIVE IDLE BEFORE THE INIT ?
 8897  041160  001414                          BEQ     4$              ,YES--BRANCH
 8898  041162  013702  034430                  MOV     TRNSWT,R2       ,GET TRANSFER WAIT QUEUE
 8899  041166  023701  034502                  CMP     DTUW,R1         ,WAS THERE I/O ON THIS DRIVE?
 8900  041172  001402                          BEQ     3$              ,YES--BRANCH
 8901  041174  004737  042672                  JSR     PC,GETREQ       ,GET THE DPB POINTER FROM QUEUE
 8902  041200  052762  100400  000016  3$      BIS     #BIT15!BIT08,16(R2) ;INFORM USER OF INIT
 8903  041206  105061  034360                  CLRB    DRVACT(R1)      ,SET DRIVE ACTIVE TO IDLE
 8904  041212  105061  034436          4$      CLRB    ULDFLG(R1)      ,NO UNLOAD
 8905  041216  012763  177777  034462          MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 8906  041224  005723                          TST     (R3)+           ,UPDATE THE INDEX
 8907  041226  005201                          INC     R1              ,INCREMENT THE DRIVE NUMBER
 8908  041230  022701  000010                  CMP     #8 ,R1          ,LAST DRIVE BEEN CHECKED?
 8909  041234  003344                          BGT     2$              ,NO--LOOP
 8910  041236  012737  177777  034502          MOV     #-1,DTUW        ,NO DATA TRANSFERS UNDERWAY
 8911  041244  005037  034430                  CLR     TRNSWT          ,CLEAR TRANSFER WAIT QUEUE
 8912  041250  004737  042520                  JSR     PC,CLRQUE       ,CLEAR ALL REQUEST QUEUES
 8913  041254  000500                          BR      STO9            ,EXIT
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 8914  041256  116405  000016          ST02    MOVB    RPAS(R4),R5     ;READ ATTENTION REG
 8915  041262  136105  034504                  BITB    ATABIT(R1),R5   ;IS ATTENTION FOR THIS DRIVE UP ?
 8916  041266  001017                          BNE     ST03            ;YES--BRANCH
 8917  041270  105761  034410                  TSTB    DPINT(R1)       ;TRYING TO INTIALIZE THE DRIVE ?
 8918  041274  001031                          BNE     ST06            ;BR IF YES - DRIVE NOT ONLINE
 8919  041276  105761  034420                  TSTB    DPRQS(R1)       ;OUTSTANDING PORT REQUEST FOR THE DRIVE ?
 8920  041302  001045                          BNE     ST07            ;BR IF YES - NO RESPONSE TO REQUEST
 8921  041304  020137  034502                  CMP     R1,DTUW         ;DATA TRANSFER UNDERWAY FOR THIS DRIVE
 8922  041310  001263                          BNE     ST01            ;BR IF NO
 8923  041312  004037  041464                  JSR     R0,RD RP        ;YES--CHECK "RDY"
 8924  041316  000000                          RPCS1
 8925  041320  041352                          ST05
 8926  041322  105726                          TSTB    (SP)+
 8927  041324  100255                          BPL     ST01            ;BR IF "RDY"=0
 8928  041326  105761  034410          ST03    TSTB    DPINT(R1)       ;INITIALIZING THE DRIVE ?
 8929  041332  001003                          BNE     1$              ;BR IF INIT PENDING
 8930  041334  105761  034420                  TSTB    DPRQS(R1)       ;PORT REQUEST PENDING ?
 8931  041340  001446                          BEQ     ST09            ;BR IF NOT
 8932  041342  012763  177777  034462  1$      MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 8933  041350  000442                          BR      ST09            ;EXIT
 8934  041352  004737  037006          ST05.   JSR     PC,C18          ;GO HANDLE THE PARITY ERROR
 8935  041356  000437                          BR      ST09
 8936  041360  105061  034410          ST06    CLRB    DPINT(R1)       ;CLEAR THE INITIALIZE INDICATOR
 8937  041364  105061  034370                  CLRB    DRVSTA(R1)      ;SET UNIT OFFLINE
 8938  041370  012763  177777  034462          MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 8939  041376  004737  042672                  JSR     PC,GETREQ       ;GET THE DPB ADDRESS
 8940  041402  005702                          TST     R2              ;REQUEST IN QUEUE ?
 8941  041404  001424                          BEQ     ST09            ;BR IF NOT
 8942  041406  052762  140000  000016          BIS     #BIT15!BIT14,16(R2)  ;INFORM THE USER DRIVE NOT AVAILABLE
 8943  041414  000414                          BR      ST08            ;FINISH
 8944  041416  012763  177777  034462  ST07    MOV     #-1,TIMER(R3)   ;STOP THE TIMER
 8945  041424  105061  034420                  CLRB    DPRQS(R1)       ;CLEAR PORT REQUEST INDICATOR
 8946  041430  004737  042672                  JSR     PC,GETREQ       ;GET DPB ADDRESS
 8947  041434  005702                          TST     R2              ;QUEUE ENTRY FOR DRIVE ?
 8948  041436  001407                          BEQ     ST09            ;BR IF NONE
 8949  041440  012762  100004  000016          MOV     #BIT15!BIT2,16(R2)  ;INFORM USER OF PORT REQUEST ERROR
 8950  041446  004737  042576          ST08.   JSR     PC,EMPTYQ       ;CLEAR THE QUEUE FOR THE DRIVE
 8951  041452  004737  042036                  JSR     PC,SVRH11       ;SAVE THE REGISTERS
 8952  041456  012603                  ST09:   MOV     (SP)+,R3        ;RESTORE R3
 8953  041460  012601                          MOV     (SP)+,R1        ;RESTORE R1
 8954  041462  000207                          RTS     PC              ;RETURN
 8955
 8956                                  ;ROUTINE TO READ A RH11/RP04/5/6 REGISTER
 8957                                  ;
 8958                                  ;CALL
 8959                                  ;       JSR     R0,RD RP        ;GO READ A REGISTER
 8960                                  ;       INDEX                   ;REG. INDEX FROM BASE
 8961                                  ;       ERRADR                  ;ERROR ADDRESS--PROCESS ERROR STARTING
 8962                                  ;                               ;AT THIS ADDRESS
 8963                                  ;       RETURN                  ;CONTENTS OF REG. IS ON THE STACK
 8964                                  ;
 8965  041464  013737  034514  041632  RD.RP:  MOV     MCPEMX,RD RP2   ;MAX. RETRYS ALLOWED
 8966  041472  011646                  RD.RP1: MOV     (SP),-(SP)      ;SAVE R0 FOR RETURN
 8967  041474  013737  034516  041510          MOV     RPADR,RD.ADR    ;FORM THE DESIRED ADDRESS
 8968  041502  062037  041510                  ADD     (R0)+,RD.ADR    ;USING THE BASE AND THE INDEX
 8969  041506  013727                          MOV     @(PC)+,(PC)+    ;READ THE DESIRED REGISTER OF THE RP04
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 8970  041510  000000                  RD ADR:  .WORD   0               ;ADDRESS IS FORMED HERE
 8971  041512  000000                  RD WRD.  .WORD   0               ;REG. CONTENTS PUT HERE
 8972  041514  013766  041512  000002          MOV     RD WRD,2(SP)     ;RETURN IT TO THE USER
 8973  041522  013746  034516                  MOV     RPADR,-(SP)      ;PUT THE ADDRESS ON THE STACK
 8974  041526  062716  000010                  ADD     #RPCS2,(SP)      ;FORM THE ADDRESS OF RPCS2
 8975  041532  032736  010000                  BIT     #BIT12,@(SP)+    ;CHECK THE 'NED' BIT
 8976  041536  001037                          BNE     RD RP3           ;BR IF DRIVE NON-EXISTENT
 8977  041540  017746  172752                  MOV     @RPADR,-(SP)     ;READ RPCS1
 8978  041544  032716  020000                  BIT     #BIT13,(SP)      ;DID MCPE SET?
 8979  041550  001002                          BNE     1$               ;BRANCH IF YES
 8980  041552  022620                          CMP     (SP)+,(R0)+      ;ADJUST FOR RETURN
 8981  041554  000432                          BR      RD RP4           ;EXIT
 8982  041556                          1$
 8983  041556  004037  042756                  JSR     R0,ES SAV         SAVE THE ADDRESS IN '$ESCAPE'
 8984  041562  104003                          ERROR   3                ;REPORT "MCPE" ERROR
 8985  041564  005737  034502                  TST     DTUW             ;DATA TRANSFER UNDERWAY?
 8986  041570  100405                          BMI     2$               ;NO--BRANCH
 8987  041572  032716  040000                  BIT     #BIT14,(SP)      ;NO--"TRE"=1?
 8988  041576  001402                          BEQ     2$               ;NO--BRANCH
 8989  041600  005726                          TST     (SP)+            ;YES--CLEAN OFF THE STACK AND
 8990  041602  000415                          BR      RD RP3           ;TAKE THE FATAL ERROR EXIT
 8991  041604  052716  040000          2$      BIS     #BIT14,(SP)      ;CLEAR "MCPE" BY SENDING A "1" TO "TRE"
 8992  041610  000316                          SWAB    (SP)             ;POSITION BEFORE WRITING
 8993  041612  013737  034516  041626          MOV     RPADR,3$         ;FORM ADDRESS OF HIGH BYTE
 8994  041620  005237  041626                  INC     3$
 8995  041624  112637                          MOVB    (SP)+,@(PC)+     ;WRITE THE HIGH BYTE OF RPCS1
 8996  041626  000000                  3$       .WORD   0               ;ADDRESS STORAGE
 8997  041630  005327                          DEC     (PC)+            ;EXCEEDED MAX. RETRYS
 8998  041632  000003                  RD RP2   .WORD   3
 8999  041634  002324                          BGE     RD RP1           ;BRANCH IF NO
 9000  041636  011000                  RD RP3:  MOV     (R0),R0          ;FATAL ERROR EXIT
 9001  041640  012616                          MOV     (SP)+,(SP)
 9002  041642  000200                  RD RP4   RTS     R0
 9003
 9004                                  ;ROUTINE TO WRITE A REGISTER
 9005                                  ;
 9006                                  ;CALL
 9007                                  ;       MOV     DATA,-(SP)       ;DATA TO BE LOADED ON THE STACK
 9008                                  ;       JSR     R0,WRT RP        ;CALL THE ROUTINE TO LOAD(WRITE) THE REG
 9009                                  ;       INDEX                    ;INDEX OF THE REGISTER TO BE LOADED
 9010                                  ;       ERRADR                   ;ADDRESS TO RETURN TO ON AN ERROR
 9011                                  ;       RETURN                   ;ERROR FREE RETURN
 9012
 9013  041644  013737  034514  042020  WRT RP  MOV     MCPEMX,WRT R2    ;MAX RETRYS ALLOWED
 9014  041652  016637  000002  041732          MOV     2(SP),WRT WD     ;SAVE THE WORD TO WRITE
 9015  041660  012616                          MOV     (SP)+,(SP)       ;ADJUST THE STACK
 9016  041662  012037  041734                  MOV     (R0)+,WRT AD     ;GET INDEX OF REGISTER TO BE WRITTEN
 9017  041666  001015                          BNE     1$               ;BRANCH IF NOT RPCS1
 9018  041670  122737  000150  041732          CMPB    #150,WRT WD      ;IS THE COMMAND FOR DATA TRANSFERS?
 9019  041676  002411                          BLT     1$               ;YES--DON'T GET THE OLD A16 & A17, & PSEL
 9020  041700  004037  041464                  JSR     R0,RD RP         ;NO---COMBINE A16&A17, & PSEL WITH
 9021  041704  000000                          RPCS1                    ;THE COMMAND BEFORE SENDING IT TO
 9022  041706  042026                          WRT R3                   ;THE RH11/RP04
 9023  041710  000316                          SWAB    (SP)
 9024  041712  042716  177770                  BIC     #^C7,(SP)
 9025  041716  112637  041733                  MOVB    (SP)+,WRT WD+1
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 9026  041722  063737  034516  041734  1$       ADD     RPADR,WRT AD    ;FORM THE ADDRESS OF THE DISK REG
 9027  041730  012737                   WRT R1.  MOV     (PC)+,@(PC)+    ;LOAD THE DESIRED REG
 9028  041732  000000                   WRT WD    WORD   0               ;WORD TO WRITE GOES HERE
 9029  041734  000000                   WRT AD:   WORD   0               ;ADDRESS IS FORMED HERE
 9030  041736  013746  034516                    MOV     RPADR,-(SP)     ,PUT THE ADDRESS ON THE STACK
 9031  041742  062716  000010                    ADD     #RPCS2,(SP)     ,FORM THE ADDRESS OF RPCS2
 9032  041746  032736  010000                    BIT     #BIT12,@(SP)+   ;CHECK THE 'NED' BIT
 9033  041752  001025                            BNE     WRT R3          ,BR IF DRIVE NON-EXISTENT
 9034  041754  004037  041464                    JSR     R0,RD RP        ,CHECK FOR PARITY ERROR ON WRITE
 9035  041760  000014                            RPER1
 9036  041762  042026                            WRT R3
 9037  041764  032726  000010                    BIT     #BIT03,(SP)+
 9038  041770  001420                            BEQ     WRT R4          ,BRANCH IF "PAR=0"
 9039  041772  016037  177776  042004            MOV     -2(R0),1$       ,PICKUP THE INDEX
 9040  042000  004037  041464                    JSR     R0,RD RP        ;READ THE REG
 9041  042004  000000                   1$        WORD   0               ,REG. INDEX
 9042  042006  042026                            WRT R3                  ,RETURN TO THIS ADDRESS ON ERROR
 9043  042010  004037  042756                    JSR     R0,ES SAV       ,SAVE THE ADDRESS IN '$ESCAPE'
 9044  042014  104004                            ERROR   4               ,REPORT THE PARITY ON WRITE ERROR
 9045  042016  005327                            DEC     (PC)+           ;DECREMENT THE ERROR COUNT
 9046  042020  000003                   WRT R2    WORD   3               ;RETRY COUNTER
 9047  042022  002342                            BGE     WRT R1          ,TRY AGAIN IF NOT FINISHED
 9048  042024  005726                            TST     (SP)+           ,CLEAN OFF THE STACK
 9049  042026  011000                   WRT R3.  MOV     (R0),R0         ,TAKE THE "PARITY ON WRITE" ERROR EXIT
 9050  042030  000401                            BR      WRT R5          ,EXIT
 9051  042032  005720                   WRT R4   TST     (R0)+           ,ADJUST FOR ERROR FREE EXIT
 9052  042034  000200                   WRT R5   RTS     R0
 9053
 9054                                   ,ROUTINE TO SAVE THE RH11/RP04/5/6 REGISTERS AS PER DPB+14
 9055                                   ,
 9056                                   ,CALL
 9057                                   ,        MOV     #DPBNUM,R2      ,DPB POINTER TO R2
 9058                                   ,        JSR     PC,SVRH11       ,SAVE THE DRIVES REG'S
 9059
 9060  042036  104412                   SVRH11   SAVREG                  ,SAVE R0 - R5
 9061  042040  005702                            TST     R2              ,QUEUE ENTRY FOR THE DRIVE ?
 9062  042042  001430                            BEQ     4$              ,BR IF NONE
 9063  042044  013704  034516                    MOV     RPADR,R4
 9064  042050  111264  000010                    MOVB    (R2),RPCS2(R4)  ,SELECT DRIVE
 9065  042054  016203  000014                    MOV     14(R2),R3       ,GET THE ERROR TABLE POINTER
 9066  042060  001433                            BEQ     6$              ,EXIT IF NO ADDRESS
 9067  042062  005037  042116                    CLR     3$              ;COUNTER & POINTER
 9068  042066  023727  042116  000022  1$       CMP     3$,#RPDB        ;REACHED THE BUFFER REGISTER ?
 9069  042074  001006                            BNE     2$              ,BR IF NOT
 9070  042076  032764  000200  000010            BIT     #BIT07,RPCS2(R4)  ,'OR' SET ?
 9071  042104  001002                            BNE     2$              ,BR IF SET
 9072  042106  005023                            CLR     (R3)+           ,STORE RPDB AS ZEROES
 9073  042110  000405                            BR      4$              ,CONTINUE
 9074  042112  004037  041464           2$       JSR     R0,RD.RP        ,READ THE SELECTED REGISTER
 9075  042116  000000                   3$        WORD   0               ,REGISTER INDEX
 9076  042120  042144                            5$                      ;ERROR RETURN ADDRESS
 9077  042122  012623                            MOV     (SP)+,(R3)+     ;STORE THE REGISTER CONTENTS
 9078  042124  023727  042116  000046  4$       CMP     3$,#RPEC2       ,REACHED THE END ?
 9079  042132  001406                            BEQ     6$              ,BR IF YES
 9080  042134  062737  000002  042116            ADD     #2,3$           ,INCREMENT THE REGISTER INDEX
 9081  042142  000751                            BR      1$              ,CONTINUE READING THE REGISTERS
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 9082  042144  004737  036706          5$.     JSR     PC,C17          ;PROCESS THE UNCORRECTABLE PARITY ERROR
 9083  042150  104413                  6$      RESREG                  ;RESTORE R0 - R5
 9084  042152  000207                          RTS     PC              ;RETURN
 9085
 9086                                  ;ROUTINE TO SET THE INTERRUPT WITHOUT GETTING A "TRE"
 9087                                  ;CALL
 9088                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
 9089                                  ;       JSR     PC,SET.IE       ;SET "IE"
 9090                                  ;       RETURN
 9091
 9092  042154  010446                  SET IE  MOV     R4,-(SP)        ;SAVE R4
 9093  042156  013704  034516                  MOV     RPADR,R4        ;PICKUP ADDRESS OF RPCS1
 9094  042162  010164  000010                  MOV     R1,RPCS2(R4)    ;SELECT DRIVE
 9095  042166  011446                          MOV     (R4),-(SP)      ;READ RPCS1
 9096  042170  052716  040000                  BIS     #BIT14,(SP)     ;SET THE "TRE" BIT OF THE WORD READ
 9097  042174  000316                          SWAB    (SP)            ;ADJUST FOR DATO
 9098  042176  112714  000100                  MOVB    #BIT06,(R4)     ;SET "IE"
 9099  042202  032764  010000  000010          BIT     #BIT12,RPCS2(R4) ;IS "NED"=1?
 9100  042210  001002                          BNE     1$              ;YES--CLEAR "TRE"
 9101  042212  005726                          TST     (SP)+           ;CLEAN OFF THE STACK
 9102  042214  000402                          BR      2$
 9103  042216  112664  000001          1$      MOVB    (SP)+,1(R4)     ;CLEAR "TRE"
 9104  042222  012604                  2$.     MOV     (SP)+,R4        ;RESTORE R4
 9105  042224  000207                          RTS     PC              ;RETURN TO CALLER
 9106
 9107                                  ;QUEUE COUNT
 9108  042226      000                 QCNT      BYTE  0               ;DRIVE 0
 9109  042227      000                         BYTE    0               ;DRIVE 1
 9110  042230      000                         BYTE    0               ;DRIVE 2
 9111  042231      000                         BYTE    0               ;DRIVE 3
 9112  042232      000                         BYTE    0               ;DRIVE 4
 9113  042233      000                         BYTE    0               ;DRIVE 5
 9114  042234      000                         BYTE    0               ;DRIVE 6
 9115  042235      000                         BYTE    0               ;DRIVE 7
 9116
 9117                                  ;QUEUE INPUT POINTERS
 9118
 9119  042236  042320                  QINPT   .WORD   QDRV0           ;DRIVE 0
 9120  042240  042340                          .WORD   QDRV1           ;DRIVE 1
 9121  042242  042360                          .WORD   QDRV2           ;DRIVE 2
 9122  042244  042400                          WORD    QDRV3           ;DRIVE 3
 9123  042246  042420                          WORD    QDRV4           ;DRIVE 4
 9124  042250  042440                          .WORD   QDRV5           ;DRIVE 5
 9125  042252  042460                          .WORD   QDRV6           ;DRIVE 6
 9126  042254  042500                          WORD    QDRV7           ;DRIVE 7
 9127
 9128                                  ;QUEUE OUTPUT POINTERS
 9129
 9130  042256  042320                  QOUTPT. .WORD   QDRV0           ;DRIVE 0
 9131  042260  042340                          WORD    QDRV1           ;DRIVE 1
 9132  042262  042360                          .WORD   QDRV2           ;DRIVE 2
 9133  042264  042400                          WORD    QDRV3           ;DRIVE 3
 9134  042266  042420                          .WORD   QDRV4           ;DRIVE 4
 9135  042270  042440                          .WORD   QDRV5           ;DRIVE 5
 9136  042272  042460                          WORD    QDRV6           ;DRIVE 6
 9137  042274  042500                          WORD    QDRV7           ;DRIVE 7
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 9138
 9139  042276  042320                QSTART  WORD   QDRV0          ,DRIVE 0 START ADDRESS
 9140  042300  042340                QSTOP   WORD   QDRV1          ,DRIVE 0 STOP ADDRESS & DRIVE 1 START ADDRESS
 9141  042302  042360                        WORD   QDRV2          ,STOP DRIVE 1--START DRIVE 2
 9142  042304  042400                        WORD   QDRV3          ,STOP DRIVE 2--START DRIVE 3
 9143  042306  042420                        WORD   QDRV4          ,STOP DRIVE 3--START DRIVE 4
 9144  042310  042440                        WORD   QDRV5          ,STOP DRIVE 4--START DRIVE 5
 9145  042312  042460                        WORD   QDRV6          ,STOP DRIVE 5--START DRIVE 6
 9146  042314  042500                        WORD   QDRV7          ,STOP DRIVE 6--START DRIVE 7
 9147  042316  042520                        WORD   QTERM          ,STOP DRIVE 7
 9148
 9149                                ,DRIVE REQUEST QUEUES
 9150
 9151  042320  000010                QDRV0   BLKW   10
 9152  042340  000010                QDRV1   BLKW   10
 9153  042360  000010                QDRV2.  BLKW   10
 9154  042400  000010                QDRV3.  BLKW   10
 9155  042420  000010                QDRV4   BLKW   10
 9156  042440  000010                QDRV5   BLKW   10
 9157  042460  000010                QDRV6   BLKW   10
 9158  042500  000010                QDRV7   BLKW   10
 9159          042520                QTERM=
 9160
 9161                                ,ROUTINE TO CLEAR ALL OF THE REQUEST QUEUES
 9162                                ,
 9163                                ;CALL
 9164                                ,       JSR    PC,CLRQUE
 9165
 9166  042520  104412                CLRQUE  SAVREG                ,SAVE R0 - R5
 9167  042522  012702  042226                MOV    #QCNT,R2       ,ZERO THE QUEUE COUNTS
 9168  042526  005022                        CLR    (R2)+          ,DRIVES 0 & 1
 9169  042530  005022                        CLR    (R2)+          ,DRIVES 2 & 3
 9170  042532  005022                        CLR    (R2)+          ,DRIVES 4 & 5
 9171  042534  005022                        CLR    (R2)+          ,DRIVES 6 & 7
 9172  042536  012703  000010                MOV    #8 ,R3         ,MOVE THE STARTING
 9173  042542  012701  042276                MOV    #QSTART,R1     ,ADDRESS OF THE QUEUE INTO
 9174  042546  012122                1$      MOV    (R1)+,(R2)+    ,THE QUEUE INPUT POINTER
 9175  042550  005303                        DEC    R3
 9176  042552  001375                        BNE    1$
 9177  042554  012703  000010                MOV    #8 ,R3         ,MOVE THE STARTING ADDRESS
 9178  042560  012701  042276                MOV    #QSTART,R1     ,OF THE QUEUE INTO THE
 9179  042564  012122                2$      MOV    (R1)+,(R2)+    ,QUEUE OUTPUT POINTER
 9180  042566  005303                        DEC    R3
 9181  042570  001375                        BNE    2$
 9182  042572  104413                        RESREG                ,RESTORE R0 - R5
 9183  042574  000207                        RTS    PC
 9184
 9185                                ,EMPTY THE QUEUE SPECIFIED BY R1
 9186                                ;
 9187                                ;CALL
 9188                                ;       MOV    DRVNUM,R1      ,DRIVE NUMBER TO R1
 9189                                ,       JSR    PC,EMPTYQ
 9190
 9191  042576  105061  042226        EMPTYQ: CLRB   QCNT(R1)       ,CLEAR NUMBER OF ITEMS IN QUEUE
 9192  042602  006301                        ASL    R1
 9193  042604  016161  042236  042256        MOV    QINPT(R1),QOUTPT(R1) ,SET OUTPUT QUEUE POINTER=INPUT POINTER
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9194  042612  006201                          MOV     R1
9195  042614  000207                          RTS     PC
9196
9197                                  ;ROUTINE TO PUT A REQUEST IN QUEUE
9198                                  ;
9199                                  ;CALL
9200                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER
9201                                  ;       MOV     #DPB,R2         ;ADDRESS OF PARAMETER BLOCK
9202                                  ;       JSR     R0,DRVQUE       ;GO PUT REQUEST IN QUEUE
9203                                  ;       RETURN1                 ;RETURN HERE IF QUEUE IS FULL
9204                                  ;       RETURN2                 ;RETURN HERE IF REQUEST IS IN QUEUE
9205
9206  042616  122761  000010  042226  DRVQUE: CMPB    #10,QCNT(R1)    ;IS QUEUE FULL?
9207  042624  001421                          BEQ     2$              ;BR IF YES-TAKE RETURN1
9208  042626  105261  042226                  INCB    QCNT(R1)        ;INCREMENT QUEUE COUNT
9209  042632  006301                          ASL     R1
9210  042634  010271  042236                  MOV     R2,@QINPT(R1)   ;PUT THIS REQUEST IN QUEUE
9211  042640  062761  000002  042236          ADD     #2,QINPT(R1)    ;UPDATE THE QUEUE POINTER
9212  042646  026161  042236  042300          CMP     QINPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER
9213  042654  001003                          BNE     1$              ;BRANCH IF NO
9214  042656  016161  042276  042236          MOV     QSTART(R1),QINPT(R1) ;YES--RESET POINTER
9215  042664  006201                  1$      ASR     R1
9216  042666  005720                          TST     (R0)+           ;TAKE RETURN 2
9217  042670  000200                  2$      RTS     R0              ;RETURN TO USER
9218
9219                                  ;ROUTINE TO GET THE "DPB" ADDRESS OF NEXT REQUEST IN QUEUE
9220                                  ;
9221                                  ;CALL
9222                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
9223                                  ;       JSR     PC,GETREQ       ;GO GET THE REQUEST
9224                                  ;       RETURN                  ;R2="DPB" ADDRESS OF THE REQUEST
9225                                  ;                               ;R2=0 IF NO REQUEST IN QUEUE
9226
9227  042672  005002                  GETREQ  CLR     R2
9228  042674  105761  042226                  TSTB    QCNT(R1)        ;IS THERE ANY REQUEST IN QUEUE?
9229  042700  001404                          BEQ     2$              ;NO---BRANCH
9230  042702  006301                  1$      ASL     R1
9231  042704  017102  042256                  MOV     @QOUTPT(R1),R2  ;PICKUP "DPB" POINTER FOR THIS DRIVE
9232  042710  006201                          ASR     R1
9233  042712  000207                  2$      RTS     PC              ;RETURN TO USER
9234
9235                                  ;ROUTINE TO "POP" THE REQUEST FROM QUEUE
9236                                  ;
9237                                  ;CALL
9238                                  ;       MOV     #DRVNUM,R1      ;DRIVE NUMBER TO R1
9239                                  ;       JSR     PC,POPQUE       ;CALL TO REMOVE REQUEST
9240                                  ;       RETURN                  ;R2=ADDRESS OF DPB REMOVED
9241
9242  042714  105361  042226          POPQUE  DECB    QCNT(R1)        ;DECREMENT QUEUE COUNT
9243  042720  006301                          ASL     R1
9244  042722  017102  042256                  MOV     @QOUTPT(R1),R2  ;GET THE "DPB" POINTER
9245  042726  062761  000002  042256          ADD     #2,QOUTPT(R1)   ;UPDATE THE QUEUE POINTER
9246  042734  026161  042256  042300          CMP     QOUTPT(R1),QSTOP(R1) ;TIME TO RESET THE POINTER?
9247  042742  001003                          BNE     1$              ;NO--BRANCH TO EXIT
9248  042744  016161  042276  042256          MOV     QSTART(R1),QOUTPT(R1) ;YES--RESET THE POINTER
9249  042752  006201                  1$      ASR     R1
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                                        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

042756  012037  042772          ES SAV  MOV     (R0)+,1$        ;GET THE ERROR CALL
042762  013746  001206                  MOV     $ESCAPE,-(SP)   ;SAVE THE ADDRESS IN '$ESCAPE'
042766  005037  001206                  CLR     $ESCAPE         ;CLEAR THE ESCAPE RETURN
042772  000000                  1$       WORD   0               ;THE ERROR CALL IS MOVED HERE
042774  012637  001206                  MOV     (SP)+,$ESCAPE   ;RESTORE THE ESCAPE ADDRESS
043000  000200                          RTS     R0              ;RETURN


                                 SBTTL  ASCIZ MESSAGES

043002  000122                  MSG R   .ASCIZ  /R/
043004  041506     000          MSG.FC  .ASCIZ  /FC/
043007     114  000103          MSG LC.  ASCIZ  /LC/
043012  041506  000047          MSGFCP:  ASCIZ  /FC'/
043016  041514  000047          MSGLCP.  ASCIZ  /LC'/
043022  041511     000          MSG IC. .ASCIZ  /IC/
043025     106  000124          MSG FT: .ASCIZ  /FT/
043030  052114     000          MSG.LT: .ASCIZ  /LT/
043033     111  000124          MSG IT: .ASCIZ  /IT/
043036  051506     000          MSG.FS. .ASCIZ  /FS/
043041     114  000123          MSG.LS: .ASCIZ  /LS/
043044  040520  000124          MSG PAT·         ASCIZ  /PAT/
043050  000075                  MSG EQ·  ASCIZ  /=/
043052  005015  047503  052116  MSG CS   ASCIZ  <CR><LF>/CONTROL SWITCHES=/
043060  047522  020114  053523
043066  052111  044103  051505
043074  000075
043076  027440  000040          SLASH    ASCIZ  @ / @
043102  047125  052111  051440  SYSTAT   ASCIZ  /UNIT STATUS /<CR><LF><LF>
043110  040524  052524  035123
043116  005015  000012
043122  051104  053111  000105  UNTMSG   ASCIZ  /DRIVE/
043130  047440  043106  044514  UNTOFF   ASCIZ  / OFFLINE/
043136  042516     000
043141     040  047117  044514  UNTON    ASCIZ  / ONLINE/
043146  042516     000
043151     040  047516  020124  NOTPRS   ASCIZ  / NOT PRESENT/
043156  051120  051505  047105
043164  000124
043166  052440  051516  043101  NOTSAF. .ASCIZ  / UNSAFE/
043174  000105
043176  047040  052117  051040  NOTRP·  .ASCIZ  @ NOT RP04/5/6@
043204  030120  027464  027465
043212  000066
043214  050122  032060     000  RP04B.  .ASCIZ  /RP04/
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 9306  043221     122  030120  000065  RP05:    .ASCIZ  /RP05/
 9307  043226  050122  033060     000  RP06:    .ASCIZ  /RP06/
 9308  043233     015  042012  044522  DRIVES:  .ASCIZ  <CR><LF>/DRIVE(S) TO BE TESTED /
 9309  043240  042526  051450  020051
 9310  043246  047524  041040  020105
 9311  043254  042524  052123  042105
 9312  043262  000040
 9313  043264  047516  042516     000  NONE:    .ASCIZ  /NONE/
 9314  043271     054     000          COMMA    .ASCIZ  /,/
 9315  043273     015  047012  020117  NOCLOK:  .ASCIZ  <CR><LF>/NO KW11-P CLOCK, TIMING TESTS WILL NOT BE PERFORMED/
 9316  043300  053513  030461  050055
 9317  043306  041440  047514  045503
 9318  043314  020054  044524  044515
 9319  043322  043516  052040  051505
 9320  043330  051524  053440  046111
 9321  043336  020114  047516  020124
 9322  043344  042502  050040  051105
 9323  043352  047506  046522  042105
 9324  043360     000
 9325  043361     015  005012  042524  TESTNG:  .ASCIZ  <CR><LF><LF>/TESTING DRIVE /
 9326  043366  052123  047111  020107
 9327  043374  051104  053111  020105
 9328  043402     000
 9329  043403     123  051105  040511  SERIAL.  .ASCIZ  /SERIAL NUMBER /
 9330  043410  020114  052516  041115
 9331  043416  051105  000040
 9332
 9333  043422  005015  051012  052117  MSG7:    .ASCIZ  <CR><LF><LF>/ROTATIONAL SPEED TIMES/
 9334  043430  052101  047511  040516
 9335  043436  020114  050123  042505
 9336  043444  020104  044524  042515
 9337  043452  000123
 9338  043454  005015  047412  042516  MSG10A:  .ASCIZ  <CR><LF><LF>/ONE CYLINDER SEEK TIMES/<CR><LF>/ * FORWARD/
 9339  043462  041440  046131  047111
 9340  043470  042504  020122  042523
 9341  043476  046505  052040  046511
 9342  043504  051505  005015  025040
 9343  043512  043040  051117  040527
 9344  043520  042122     000
 9345  043523     015  020012  020052  MSG10B.  .ASCIZ  <CR><LF>/ * REVERSE/
 9346  043530  042522  042526  051522
 9347  043536  000105
 9348  043540  005015  040412  041503  MSG11A   ASCIZ  <CR><LF><LF>/ACCESS TIME MEASURMENT/<CR><LF>/ * FORWARD/
 9349  043546  051505  020123  044524
 9350  043554  042515  046440  040505
 9351  043562  052523  046522  047105
 9352  043570  006524  020012  020052
 9353  043576  047506  053522  051101
 9354  043604  000104
 9356  043606  005015  025040  051040  MSG11B.  ASCIZ  <CR><LF>/ * REVERSE/
 9356  043614  053105  051105  042523
 9357  043622     000
 9358  043623     015  005012  040515  MSG12A:  ASCIZ  <CR><LF><LF>/MAXIMUM SEEK TIMES/<CR><LF>/ * FORWARD/
 9359  043630  044530  052515  020115
 9360  043636  042523  045505  052040
 9361  043644  046511  051505  005015
```

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 9362  043652  025040  043040  051117
 9363  043660  040527  042122     000
 9364  043665     015  020012  020052  MSG12B   ASCIZ  <CR><LF>/ * REVERSE/
 9365  043672  042522  042526  051522
 9366  043700  000105
 9367
 9368  043702  005015  044515  036516  MSGMIN   ASCIZ  <CR><LF>/MIN=/
 9369  043710     000
 9370  043711     015  046412  054101  MSGMAX   ASCIZ  <CR><LF>/MAX=/
 9371  043716  000075
 9372  043720  005015  053101  036507  MSGAVG   ASCIZ  <CR><LF>/AVG=/
 9373  043726     000
 9374  043727     060  052440  070123  MSGOUS.  ASCIZ  /0 US/
 9375  043734  041040  046105  040517  MBELOW   .ASCIZ  / BELOW THE MINIMUM OF /
 9376  043742  052040  042510  044440
 9377  043750  047111  046511  046525
 9378  043756  047440  020106     000
 9379  043763     040  041101  053117  MABOVE   ASCIZ  / ABOVE THE MAXIMUM OF /
 9380  043770  020105  044124  020105
 9381  043776  040515  044530  052515
 9382  044004  020115  043117  000040
 9383  044012  051440  042505  051513  MSGNUM   ASCIZ  / SEEKS TIMED/
 9384  044020  052040  046511  042105
 9385  044026     000
 9386  044027     040  047516  020124  MSGNON   ASCIZ  / NOT TIMED/
 9387  044034  044524  042515  000104
 9388  044042  020040     000          MSG SP   ASCIZ  /  /              ,TWO (2) SPACES
 9389
 9390                                   SBTTL  ERROR HEADER (EM) MESSAGES
 9391
 9392  044045     122  030510  020061  EM1      ASCIZ  /RH11 INTERRUPT OCCURRED (RPAS = 0)/
 9393  044052  047111  042524  051122
 9394  044060  050125  020124  041517
 9395  044066  052503  051122  042105
 9396  044074  024040  050122  051501
 9397  044102  036440  030040  000051
 9398  044110  047125  064105  042520  EM2      ASCIZ  /UNEXPECTED ATTENTION OCCURRED/
 9399  044116  052103  042105  040440
 9400  044124  052124  047106  044524
 9401  044132  047117  047440  041503
 9402  044140  051125  042522  000104
 9403  044146  040515  051523  052502  EM3      ASCIZ  /MASSBUS PARITY ERROR(MCPE=1)/
 9404  044154  020123  040520  044522
 9405  044162  064524  042440  051122
 9406  044170  051117  046450  050103
 9407  044176  036506  024461     000
 9408  044203     115  051501  041123  EM4      ASCIZ  /MASSBUS PARITY ERROR(PAR=1)/
 9409  044210  051525  050040  051101
 9410  044216  052111  020131  051105
 9411  044224  047522  024122  040520
 9412  044232  036622  024461     000
 9413  044237     101  042104  042522  EM5      ASCIZ  /ADDRESS PLUG CHANGE BIT SET/
 9414  044244  051523  050040  052514
 9415  044252  020107  044103  047101
 9416  044260  042507  041040  052111
 9417  044266  051440  052105     000
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 9418  044273     122  030510  027461  EM10    ASCIZ  "RH11/RP04/5/6 FAILED TO RESPOND TO ADDRESSING"
 9419  044300  050122  032060  032457
 9420  044306  033057  043040  044501
 9421  044314  042514  020104  047524
 9422  044322  051040  051505  047520
 9423  044330  042116  052040  020117
 9424  044336  042101  051104  051505
 9425  044344  044523  043516     000
 9426  044351     104  044522  042526  EM11    ASCIZ  /DRIVE SELECTED IS NOT ONLINE/
 9427  044356  051440  046105  041505
 9428  044364  042524  020104  051511
 9429  044372  047040  052117  047440
 9430  044400  046116  047111  000105
 9431  044406  046511  051120  050117  EM12    ASCIZ  /IMPROPER HEADER DATA/
 9432  044414  051105  044040  040505
 9433  044422  042504  020122  040504
 9434  044430  040524     000
 9435  044433     104  052101  020101  EM13    ASCIZ  /DATA COMPARE FAILURE/
 9436  044440  047503  050115  051101
 9437  044446  020105  040506  046111
 9438  044454  051125  000105
 9439  044460  044504  045523  042440  EM17    ASCIZ  /DISK ERROR IN TIMING TEST/
 9440  044466  051122  051117  044440
 9441  044474  020116  044524  044515
 9442  044502  043516  052040  051505
 9443  044510  000124
 9444  044512  046103  041517  020113  EM20    ASCIZ  /CLOCK (KW11-P) OVERFLOW IN TIMING TEST/
 9445  044520  046450  030527  026461
 9446  044526  024520  047440  042526
 9447  044534  043122  047514  020127
 9448  044542  047111  052040  046511
 9449  044550  047111  020107  042524
 9450  044556  052123     000
 9451  044561     104  051511  020113  EM23    ASCIZ  /DISK ERROR DURING SEEK/
 9452  044566  051105  047522  020122
 9453  044574  052504  044522  043516
 9454  044602  051440  042505  000113
 9455  044610  042523  045505  047040  EM24    ASCIZ  /SEEK NOT COMPLETE WITHIN 120 MS/
 9456  044616  052117  041440  046517
 9457  044624  046120  052105  020105
 9458  044632  044527  044124  047111
 9459  044640  030440  030062  046440
 9460  044646  000123
 9461  044650  044122  030461  051057  EM41    ASCIZ  "RH11/RP04/5/6 ERROR"
 9462  044656  030120  027464  027465
 9463  044664  020066  051105  047522
 9464  044672  000122
 9465  044674  040506  040524  020114  EM46    ASCIZ  /FATAL WRITE CHECK ERROR/
 9466  044702  051127  052111  020105
 9467  044710  044103  041505  020113
 9468  044716  051105  047522  000122
 9469
 9470                                  .SBTTL  STATUS/ERROR INDICATOR MESSAGES
 9471
 9472  044724  043117  046106  047111  MSGB14  ASCIZ  /OFFLINE OR UNSAFE DRIVE REQUESTED/
 9473  044732  020105  051117  052440
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 9474  044740  051516  043101  020105
 9475  044746  051104  053111  020105
 9476  044754  042522  052521  051505
 9477  044762  042524  000104
 9478  044766  047125  047514  042101  MSGB13   ASCIZ  /UNLOADED DRIVE REQUESTED/
 9479  044774  042105  042040  044522
 9480  045002  042526  051040  050505
 9481  045010  042525  052123  042105
 9482  045016     000
 9483  045017     120  051105  044523  MSGB12   ASCIZ  /PERSISTENT UNSAFE/
 9484  045024  052123  047105  020124
 9485  045032  047125  040523  042506
 9486  045040     000
 9487  045041     120  051101  052111  MSGB11   ASCIZ  /PARITY ERROR OCCURRED/
 9488  045046  020131  051105  047522
 9489  045054  020122  041517  052503
 9490  045062  051122  042105     000
 9491  045067     106  052101  046101  MSGB10   ASCIZ  /FATAL PARITY ERROR/
 9492  045074  050040  051101  052111
 9493  045102  020131  051105  047522
 9494  045110  000122
 9495  045112  047523  052106  040527  MSGB09   ASCIZ  /SOFTWARE TIMEOUT ON THIS DRIVE/
 9496  045120  042522  052040  046511
 9497  045126  047505  052125  047440
 9498  045134  020116  044124  051511
 9499  045142  042040  044522  042526
 9500  045150     000
 9501  045151     123  043117  053524  MSGB08   ASCIZ  /SOFTWARE TIMEOUT ON ANOTHER DRIVE/
 9502  045156  051101  020105  044524
 9503  045164  042515  052517  020124
 9504  045172  047117  040440  047516
 9505  045200  044124  051105  042040
 9506  045206  044522  042526     000
 9507  045213     106  051122  051117  MSGB06   ASCIZ  "ERROR OCCURRED DURING I/O OPERATION"
 9508  045220  047440  041503  051125
 9509  045226  042522  020104  052504
 9510  045234  044522  043516  044440
 9511  045242  047457  047440  042520
 9512  045250  040522  044524  047117
 9513  045256     000
 9514  045257     106  051122  051117  MSGB05   ASCIZ  "ERROR OCCURRED DURING NON-I/O OPERATION"
 9515  045264  047440  041503  051125
 9516  045272  042522  020104  052504
 9517  045300  044522  043516  047040
 9518  045306  047117  044455  047457
 9519  045314  047440  042520  040522
 9520  045322  044524  047117     000
 9521  045327     126  051516  043101  MSGB04   ASCIZ  /UNSAFE OCCURRED/
 9522  045334  020106  041517  052503
 9523  045342  051122  042105     000
 9524  045347     101  052126  046517  MSGB03.  .ASCIZ  /AUTOMATIC RECALIBRATE SEQUENCE OCCURRED/
 9525  045354  052101  041511  051040
 9526  045362  041506  046101  041111
 9527  045370  040522  042524  051440
 9528  045376  050505  042525  041516
 9529  045404  020105  041517  052503
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 9530  045412  051122  042105     000
 9531  045417     104  044522  042526  MSGB02   ASCIZ  /DRIVE HAS NOT RESPONDED TO PORT REQUEST/
 9532  045424  044040  051501  047040
 9533  045432  052117  051040  051505
 9534  045440  047520  042116  042105
 9535  045446  052040  020117  047520
 9536  045454  052122  051040  050505
 9537  045462  042525  052123     000
 9538  045467     104  044522  042526  MSGB01   ASCIZ  /DRIVE HAS BECOME NON-EXISTENT/
 9539  045474  044040  051501  041040
 9540  045502  041505  046517  020105
 9541  045510  047516  026516  054105
 9542  045516  051511  042524  052116
 9543  045524     000
 9544
 9545                            SBTTL  DATA HEADER (DT) MESSAGES
 9546
 9547  045525     105  051122  050040  DH1      ASCIZ  /ERR PC  RPAS/
 9548  045532  020103  051040  040520
 9549  045540  000123
 9550  045542  051105  020122  041520  DH2      ASCIZ  /ERR PC  DRIVE   RPAS    RPDS1   RPER1   RPER2   RPER3/
 9551  045560  020040  051104  053111
 9552  045566  020105  020040  050122
 9553  045564  051501  020040  020040
 9554  045572  050122  051504  020061
 9555  045600  020040  050122  051105
 9556  045606  020061  020040  050122
 9557  045614  051105  020062  020040
 9558  045622  050122  051105  000063
 9559  045630  042524  052123  020040  DH3      ASCIZ  /TEST    ERR PC  ADDRESS DATA/
 9560  045636  020040  051105  020122
 9561  045644  041520  020040  042101
 9562  045652  051104  051505  020123
 9563  045660  040504  040524     000
 9564  045665     124  051505  020124  DH4      ASCIZ  /TEST    ERR PC  ADDRESS GDDATA  BDDATA/
 9565  045672  020040  042440  051122
 9566  045700  060040  020103  040440
 9567  045706  042104  042522  051523
 9568  045714  043440  042104  052101
 9569  045722  020101  041040  042104
 9570  045730  052101  000101
 9571  045734  050122  051503  020061  DH10     ASCIZ  /RPCS1   ERR PC/
 9572  045742  020040  051105  020122
 9573  045750  041520     000
 9574  045753     104  044522  042526  DH11.    .ASCIZ  /DRIVE   ERR PC/
 9575  045760  020040  042440  051122
 9576  045766  060040  000103
 9577  045772  042524  052123  020040  DH12.    .ASCIZ  /TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK   SECTOR/
 9578  046000  020040  051105  020122
 9579  046006  041520  020040  051524
 9580  046014  020124  041520  020040
 9581  046022  051104  053111  020105
 9582  046030  020040  054503  047114
 9583  046036  051104  020040  051124
 9584  046044  041501  020113  020040
 9585  046052  042523  052103  051117
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 9586  046060     000
 9587  046061     107  041504  046131  DH12A    ASCIZ  /GDCYL   GDTRK   GDSCTR  BDCYL   BDTRK   BDSCTR/
 9588  046066  020040  043440  052104
 9589  046074  045522  020040  043440
 9590  046102  051504  052103  020122
 9591  046110  041040  041504  046131
 9592  046116  020040  041040  052104
 9593  046124  045522  020040  041040
 9594  046132  051504  052103  000122
 9595  046140  042107  040504  020124  DH13A    ASCIZ  /GDDAT   BDDAT   WRDCNT  GDADR   BDADR/
 9596  046146  020040  042102  040504
 9597  046154  020124  020040  051127
 9598  046162  041504  052116  020040
 9599  046170  042107  042101  020122
 9600  046176  020040  042102  042101
 9601  046204  000122
 9602  046206  042524  052123  020040  DH17     ASCIZ  /TEST    ERR PC  DRIVE   RPCS1   RPDS1   RPER1   RPER2   RPER3/
 9603  046214  020040  051105  020122
 9604  046222  041520  020040  051104
 9605  046230  063111  020105  020040
 9606  046236  060122  051503  020061
 9607  046244  020040  060122  051504
 9608  046252  020061  020040  060122
 9609  046260  051105  020061  020040
 9610  046266  060122  051105  020062
 9611  046274  020040  060122  051105
 9612  046302  000063
 9613  046304  042524  052123  020040  DH21     ASCIZ  /TEST    ERR PC  TST PC  DRIVE   CYLNDR  TRACK/
 9614  046312  020040  051105  020122
 9615  046320  041520  020040  051524
 9616  046326  020124  041520  020040
 9617  046334  051104  063111  020105
 9618  046342  020040  064503  047114
 9619  046350  051104  020040  051124
 9620  046356  041501  000113
 9621  046362  042107  040504  020124  DH21A    ASCIZ  /GDDAT   BDDAT   WRDCNT  SECTOR/
 9622  046370  020040  042102  040504
 9623  046376  020124  020040  051127
 9624  046404  041504  052116  020040
 9625  046412  042523  052103  051117
 9626  046420     000
 9627  046421     124  051505  020124  DH23     ASCIZ  /TEST    ERR PC  DRIVE   CYLNDR  RPCS1   RPCS2   RPDS1/
 9628  046426  020040  042440  051122
 9629  046434  060040  020103  042040
 9630  046442  044522  042526  020040
 9631  046450  041440  046131  042116
 9632  046456  020122  061040  041520
 9633  046464  030523  020040  051040
 9634  046472  041520  031123  020040
 9635  046500  061040  042120  030523
 9636  046506     000
 9637  046507     122  042520  030522  DH23A.   .ASCIZ  /RPER1   RPER2   RPER3   RPCA    RPCC/
 9638  046514  020040  061040  042520
 9639  046522  031122  020040  051040
 9640  046530  042520  031522  020040
 9641  046536  051040  041520  020101
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 9642  046544  020040  051040  041520
 9643  046552  000103
 9644  046554  042524  052123  020040  DH41    ASCIZ  /TEST   ERR PC  TST PC  DRIVE/
 9645  046562  020040  051105  020122
 9646  046570  041520  020040  051524
 9647  046576  020124  041520  020040
 9648  046604  051104  053111  000105
 9649  046612  042524  052123  020040  DH42    ASCIZ  /TEST   ERR PC  TST PC  DRIVE   RPCS1   RPCS2   RPDS1/
 9650  046620  020040  051105  020122
 9651  046626  041520  020040  051524
 9652  046634  020124  041520  020040
 9653  046642  051104  053111  020105
 9654  046650  020040  050122  051503
 9655  046656  020061  020040  050122
 9656  046664  051503  020062  020040
 9657  046672  050122  051504  000061
 9658  046700  050122  051105  020061  DH43A   ASCIZ  /RPER1  RPER2  RPER3/
 9659  046706  020040  050122  051105
 9660  046714  020062  020040  050122
 9661  046722  051105  000063
 9662  046726  050122  051503  020061  DH44A   ASCIZ  /RPCS1  RPCS2  RPDS1  RPCC    RPCA    RPDA/
 9663  046734  020040  050122  051503
 9664  046742  020062  020040  050122
 9665  046750  051504  020061  020040
 9666  046756  050122  041503  020040
 9667  046764  020040  050122  040503
 9668  046772  020040  020040  050122
 9669  047000  040504     000
 9670  047003     122  042520  030522  DH44B   ASCIZ  /RPER1  RPER2  RPER3/
 9671  047010  020040  051040  042520
 9672  047016  031122  020040  051040
 9673  047024  042520  031522     000
 9674  047031     122  042520  030522  DH45A   ASCIZ  /RPER1  RPER2  RPER3  RPWC    RPBA    RPDB/
 9675  047036  020040  051040  042520
 9676  047044  031122  020040  051040
 9677  047052  042520  031522  020040
 9678  047060  051040  053520  020103
 9679  047066  020040  051040  041120
 9680  047074  020101  020040  051040
 9681  047102  042120  000102
 9682
 9683
 9684                                  EVEN
 9685
 9686                                  .SBTTL  DATA TABLE (DT)
 9687
 9688  047106  001116  001170          DT1:    .WORD   $ERRPC,$REG3
 9689  047112  001116  001164  001170  DT2:    .WORD   $ERRPC,$REG1,$REG3,RPERRS,RPERRS+2,RPERRS+4,RPERRS+6
 9690  047120  034350  034352  034354
 9691  047126  034356
 9692  047130  001176  001116  041510  DT3:    .WORD   $TMPO,$ERRPC,RD.ADR,RD WRD
 9693  047136  041512
 9694  047140  001176  001116  041734  DT4.     WORD   $TMPO,$ERRPC,WRT.ADR,WRT WD,RD.WRD
 9695  047146  041732  041512
 9696  047152  001176  001116  001164  DT5·     WORD   $TMPO,$ERRPC,$REG1,$REG5,RPERRS,RPERRS+2,RPERRS+4,RPERRS+6
 9697  047160  001174  034350  034352
```

```
 9698  047166  034354  034356
 9699  047172  001366  001116          DT10     WORD   P.H ADR,$ERRPC
 9700  047176  001166  001116          DT11     WORD   $REG2,$ERRPC
 9701  047202  001176  001116  001162  DT12     WORD   $TMPO,$ERRPC,$REGO,CHKDRV,CYL. DS,TRK DS,SEC DS
 9702  047210  001254  001270  001274
 9703  047216  001272
 9704  047220  001270  001274  001272  DT12A    WORD   CYL DS,TRK DS,SEC DS,CYL RD,TRK RD,SEC RD
 9705  047226  001262  001264  001266
 9706  047234  001176  001116  001162  DT13     WORD   $TMPO,$ERRPC,$REGO,CHKDRV,CYL DS,TRK DS,SEC DS
 9707  047242  001254  001270  001274
 9708  047250  001272
 9709  047252  001124  001126  001172  DT13A    WORD   $GDDAT,$BDDAT,$REG4,$GDADR,$BDADR
 9710  047260  001120  001122
 9711  047264  001176  001116  001254  DT17     WORD   $TMPO,$ERRPC,CHKDRV,RP REG,RP REG+12,RP REG+14,RP REG+40,RP REG+42
 9712  047272  004204  004216  004220
 9713  047300  004244  004246
 9714  047304  001176  001116  001162  DT21     WORD   $TMPO,$ERRPC,$REGO,CHKDRV,CYL DS,TRK DS
 9715  047312  001254  001270  001274
 9716  047320  001164  001126  001172  DT21A    WORD   $REG1,$BDDAT,$REG4,$REG1
 9717  047326  001164
 9718  047330  001176  001116  001254  DT23:    .WORD  $TMPO,$ERRPC,CHKDRV,CYL DS,RP REG,RP REG+10,RP REG+12
 9719  047336  001270  004204  004214
 9720  047344  004216
 9721  047346  004220  004244  004246  DT23A:   .WORD  RP. REG+14,RP REG+40,RP REG+42,RP REG+34,RP REG+36
 9722  047354  004240  004242
 9723  047360  001176  001116  001162  DT41     .WORD  $TMPO,$ERRPC,$REGO,CHKDRV
 9724  047366  001254
 9725  047370  001176  001116  001162  DT42     .WORD  $TMPO,$ERRPC,$REGO,CHKDRV,RP REG,RP REG+10,RP REG+12
 9726  047376  001254  004204  004214
 9727  047404  004216
 9728  047406  001176  001116  001162  DT43.    .WORD  $TMPO,$ERRPC,$REGO,CHKDRV,RP REG,RP REG+10,RP REG+12
 9729  047414  001254  004204  004214
 9730  047422  004216
 9731  047424  004220  004244  004246  DT43A:   .WORD  RP. REG+14,RP REG+40,RP REG+42
 9732  047432  001176  001116  001162  DT44:    .WORD  $TMPO,$ERRPC,$REGO,CHKDRV,CYL. DS,TRK DS,SEC DS
 9733  047440  001254  001270  001274
 9734  047446  001272
 9735  047450  004204  004214  004216  DT44A:   .WORD  RP REG,RP. REG+10,RP. REG+12,RP. REG+36,RP. REG+34,RP REG+06
 9736  047456  004242  004240  004212
 9737  047464  004220  004244  004246  DT44B:   .WORD  RP REG+14,RP. REG+40,RP REG+42
 9738  047472  001176  001116  001162  DT45:    .WORD  $TMPO,$ERRPC,$REGO,CHKDRV,CYL. DS,TRK. DS,SEC. DS
 9739  047500  001254  001270  001274
 9740  047506  001272
 9741  047510  004204  004214  004216  DT45A:   .WORD  RP. REG,RP. REG+10,RP. REG+12,RP. REG+36,RP. REG+34,RP. REG+06
 9742  047516  004242  004240  004212
 9743  047524  004220  004244  004246  DT45B:   .WORD  RP. REG+14,RP. REG+40,RP REG+42,RP. REG+2,RP. REG+4,RP. REG+22
 9744  047532  004206  004210  004226
 9745
 9746                                   SBTTL  DATA FORMAT (DF) TABLE
 9747
 9748  047540  000001                   DF1.     .WORD  1              ;NUMBER OF DATA HEADERS
 9749  047542     002                             BYTE   2              ;NUMBER OF WORDS IN DATA TABLE
 9750  047543     000                             .BYTE  0              ;ALL 3 NUMBERS ARE OCTAL
 9751
 9752  047544  000001                   DF2       WORD   1
 9753  047546     007                             BYTE   7
```

```
 9754  047547  000                     BYTE   0
 9755
 9756  047550  000001          DF3     WORD   1
 9757  047552  004                     BYTE   4
 9758  047553  000                     BYTE   0
 9759
 9760  047554  000001          DF4     WORD   1
 9761  047556  005                     BYTE   5
 9762  047557  000                     BYTE   0
 9763
 9764  047560  000001          DF10    WORD   1
 9765  047562  002                     BYTE   2
 9766  047563  000                     BYTE   0
 9767
 9768  047564  000001          DF11    WORD   1
 9769  047566  002                     BYTE   2
 9770  047567  000                     BYTE   0
 9771
 9772  047570  000002          DF12    WORD   2              ;2 DH'S TO BE TYPED
 9773  047572  007                     BYTE   7              ;7 DATA WORDS FOLLOW THE 1ST DH
 9774  047573  160                     BYTE   160            ;WORDS 1-4 ARE OCTAL 5-7 ARE DECIMAL
 9775  047574  046061                  WORD   DH12A          ;ADDRESS OF 2ND DH
 9776  047576  006                     BYTE   6              ;6 DATA WORDS FOLLOW THE 2ND DH
 9777  047577  000                     BYTE   0              ;ALL WORDS ARE OCTAL
 9778
 9779  047600  000002          DF13    WORD   2
 9780  047602  007                     BYTE   7
 9781  047603  160                     BYTE   160
 9782  047604  046140                  WORD   DH13A
 9783  047606  005                     BYTE   5
 9784  047607  004                     BYTE   4              ;WORD 3 IS DECIMAL
 9785
 9786  047610  000000          DF14    WORD   0
 9787  047612  005                     BYTE   5
 9788  047613  004                     BYTE   4              ;WORD 3 IS DECIMAL
 9789
 9790  047614  000001          DF17    WORD   1
 9791  047616  010                     BYTE    D8
 9792  047617  000                     BYTE   0
 9793
 9794  047620  000002          DF21    WORD   2
 9795  047622  006                     BYTE   6
 9796  047623  060                     BYTE   60
 9797  047624  046362                  WORD   DH21A
 9798  047626  004                     BYTE   4
 9799  047627  014                     BYTE   14
 9800
 9801  047630  000000          DF22    WORD   0
 9802  047632  004                     BYTE   4
 9803  047633  014                     BYTE   14
 9804
 9805  047634  000002          DF23.   WORD   2
 9806  047636  007                     BYTE   7
 9807  047637  010                     BYTE   10             ;WORD 4 IS DECIMAL
 9808  047640  046507                  WORD   DH23A
 9809  047642  005                     BYTE   5
```

```
 9810  047643     000                          BYTE   0
 9811
 9812
 9813  047644  000001                DF41      WORD   1
 9814  047646     004                          BYTE   4
 9815  047647     000                          BYTE   0
 9816
 9817  047650  000001                DF42      WORD   1
 9818  047652     007                          BYTE   7
 9819  047653     000                          BYTE   0
 9820
 9821  047654  000002                DF43      WORD   2
 9822  047656     007                          BYTE   7
 9823  047657     000                          BYTE   0
 9824  047660  046700                          WORD   DH43A
 9825  047662     003                          BYTE   3
 9826  047663     000                          BYTE   0
 9827
 9828  047664  000003                DF44      WORD   3
 9829  047666     007                          BYTE   7
 9830  047667     160                          BYTE   160
 9831  047670  046726                          WORD   DH44A
 9832  047672     006                          BYTE   6
 9833  047673     000                          BYTE   0
 9834  047674  047003                          WORD   DH44B
 9835  047676     003                          BYTE   3
 9836  047677     000                          BYTE   0
 9837
 9838  047700  000003                DF45      WORD   3
 9839  047702     007                          BYTE   7
 9840  047703     160                          BYTE   160
 9841  047704  046726                          WORD   DH44A
 9842  047706     006                          BYTE   6
 9843  047707     000                          BYTE   0
 9844  047710  047031                          WORD   DH45A
 9845  047712     006                          BYTE   6
 9846  047713     000                          BYTE   0
 9847
 9848                                 EVEN
 9849          047714                 BUFFER=
 9850
 9851  047714  005015  041412  051132 TITLE:   ASCII  <CR><LF><LF>/CZRJAC/<CR><LF>
 9852  047722  040512  006503     012
 9853  047727     122  030120  027464          ASCIZ  @RP04/5/6 MECHANICAL & READ-WRITE TEST@<CR><LF><LF>
 9854  047734  027465  020066  042515
 9855  047742  044103  047101  041511
 9856  047750  046101  023040  051040
 9857  047756  040606  026604  051127
 9858  047764  052111  020106  042524
 9859  047772  052123  006015  000012
 9860  050000  005015  047524  052040 LOADRV   ASCII  <CR><LF>/TO TEST DRIVE 0 REPLACE THE 'XXDP  PACK ON DRIVE 0/<CR><LF>
 9861  050006  051506  020124  051104
 9862  050014  053111  020105  020060
 9863  050022  042522  046120  041501
 9864  050030  020105  044124  020105
 9865  050036  054047  042130  023520
```

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 9866  050044  050040  041501  020113
 9867  050052  047117  042040  044522
 9868  050060  042526  030040  005015
 9869  050066  044527  044124  040440          ASCII  /WITH ANOTHER PACK, CLEAR MEMORY LOCATION 40, AND RESTART/<CR><LF>
 9870  050074  047516  044124  051105
 9871  050102  050040  041501  026113
 9872  050110  041440  042514  051101
 9873  050116  046440  046505  051117
 9874  050124  020131  047514  040503
 9875  050132  044524  047117  032040
 9876  050140  026060  040440  042116
 9877  050146  051040  051505  040524
 9878  050154  052122  005015
 9879  050160  044124  020105  051120          ASCIZ  /THE PROGRAM/<CR><LF>
 9880  050166  043517  040522  006515
 9881  050174  000012
 9882  050176  005015  054523  052123  NOLOAD  ASCIZ  <CR><LF>/SYSTEM HAS 16K MEMORY, 'XXDP' LOADER WILL BE OVERWRITTEN/<CR><L
 9883  050204  046505  044040  051501
 9884  050212  030440  045466  046440
 9885  050220  046505  051117  026131
 9886  050226  023440  054130  050104
 9887  050234  020047  047514  042101
 9888  050242  051105  053440  046111
 9889  050250  020114  042502  047440
 9890  050256  042526  053522  044522
 9891  050264  052124  047105  005015
 9892  050272  000012
 9893
 9894                                  EVEN
 9895
 9896                                  SBTTL  ROUTINE TO SIZE MEMORY
 9897
 9898                                  ;;*****************************************************************
 9899                                  ;*CALL
 9900                                  ;*      JSR     PC,$SIZE
 9901                                  ;*      RETURN
 9902                                  ;*$LSTAD WILL CONTAIN THE LAST AVAILABLE MEMORY LOCATION
 9903
 9904  050274  010046                  $SIZE   MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
 9905  050276  010146                          MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
 9906  050300  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE PRESENT ERROR VECTOR PS & PC
 9907  050304  013746  000006                  MOV     @#ERRVEC+2,-(SP)
 9908  050310  010600                          MOV     SP,R0           ;;SAVE THE STACK POINTER
 9909                                  ;;SET THE ERRVEC PS TO THE PRESENT PS
 9910  050312  104400                          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
 9911  050314  012637  000006                  MOV     (SP)+,@#ERRVEC+2        ;;SAVE THE PSW IN @#ERRVEC+2
 9912  050320  012737  050340  000004          MOV     #2$,@#ERRVEC    ;;SET FOR TIMEOUT
 9913  050326  012701  020000                  MOV     #20000,R1       ;;FIRST ADDRESS
 9914  050332  005711                  1$      TST     (R1)            ;;TEST THIS ADDRESS
 9915  050334  005721                          TST     (R1)+           ;;STEP TO NEXT ADDRESS
 9916  050336  000775                          BR      1$              ;;TRY ANOTHER
 9917  050340  162701  000002          2$      SUB     #2,R1           ;;DROP BACK
 9918  050344  010006                          MOV     R0,SP           ;;RESTORE THE STACK
 9919  050346  012637  000006                  MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
 9920  050352  012637  000004                  MOV     (SP)+,@#ERRVEC
 9921  050356  010137  050370                  MOV     R1,$LSTAD       ;;LAST ADDRESS
```

```
 9922  050362  012601                          MOV     (SP)+,R1        ;;RESTORE R1
 9923  050364  012600                          MOV     (SP)+,R0        ;;RESTORE R0
 9924  050366  000207                          RTS     PC
 9925  050370  000000                  $LSTAD: .WORD   0               ;;CONTAINS THE LAST ADDRESS
 9926
 9927                                  ;;*****************************************************************
 9928                                   SBTTL  GETADR - GET BUS ADDRESS AND VECTOR ADDRESS
 9929                                  ;THIS ROUTINE IS USED TO ENSURE THE BUS ADDRESS
 9930                                  ;OF THE RH11/RP04 IS SETUP TO READ THE PROPER VALUE.
 9931                                  ;IT WILL ALSO READ THE ADDRESS FROM THE TTY IF
 9932                                  ;REQUIRED
 9933                                  ;NOTE:  THIS ROUTINE DESTROYS R0-R4
 9934                                  ;CALL
 9935                                  ;
 9936                                  ;       JSR     PC,@#GETADR
 9937                                  ;       RETURN
 9938
 9939  050372  005737  001226          GETADR: TST     @#BUSADR        ;INPUT FROM TTY REQUESTED?
 9940  050376  001433                          BEQ     7$              ;NO--BRANCH
 9941  050400  005037  001226                  CLR     @#BUSADR        ;YES--CLEAR THE REQUEST FLAG
 9942  050404  012700  001366          1$      MOV     #RHADR,R0       ;FIRST ADDRESS
 9943  050410  012703  050560                  MOV     #MRPCS1,R3      ;"RPCS1="
 9944  050414  011004                          MOV     (R0),R4         ;PRESENT RPCS1 ADDRESS
 9945  050416  004737  050602                  JSR     PC,CLRBF        ;CLEAR INPUT BUFFER
 9946  050422  004037  031520                  JSR     R0,@#GETNUM     ;GET NEW RPCS1
 9947  050426  000402                          BR      2$              ;COMMA
 9948  050430  000765                          BR      1$              ;PERIOD
 9949  050432  000414                          BR      5$              ;DOUBLE PERIOD
 9950  050434  010420                  2$      MOV     R4,(R0)+        ;SAVE NEW RPCS1
 9951  050436  012703  050571                  MOV     #MRHVEC,R3      ;"RHVEC="
 9952  050442  011004                          MOV     (R0),R4         ;PRESENT RH11 VECTOR ADDRESS
 9953  050444  004737  050602                  JSR     PC,CLRBF        ;CLEAR INPUT BUFFER
 9954  050450  004037  031520                  JSR     R0,@#GETNUM     ;GET NEW RHVEC
 9955  050454  000402                          BR      3$              ;COMMA
 9956  050456  000752                          BR      1$              ;PERIOD
 9957  050460  000401                          BR      5$              ;DOUBLE PERIOD
 9958  050462  010420                  3$      MOV     R4,(R0)+        ;SAVE NEW RHVEC
 9959  050464  010410                  5$      MOV     R4,(R0)         ;SAVE INPUT
 9960  050466  013701  000004          7$      MOV     @#ERRVEC,R1     ;SAVE THE ERROR VECTOR
 9961  050472  012737  050526  000004          MOV     #8$,@#ERRVEC    ;SETUP FOR TRAP
 9962  050500  005777  130662                  TST     @RHADR          ;CHECK FOR RH11/RP04
 9963  050504  010137  000004                  MOV     R1,@#ERRVEC     ;RESTORE ERROR VECTOR
 9964  050510  012700  001366                  MOV     #RHADR,R0       ;FIRST ADDRESS OF NEW PARAMETERS
 9965  050514  012701  034516                  MOV     #RPADR,R1       ;FIRST ADDRESS OF WHERE TO PUT THEM
 9966  050520  012021                          MOV     (R0)+,(R1)+     ;BUS ADDRESS
 9967  050522  012021                          MOV     (R0)+,(R1)+     ;VECTOR ADDRESS
 9968  050524  000207                          RTS     PC              ;RETURN
 9969  050526  010137  000004          8$:     MOV     R1,@#ERRVEC     ;RESTORE ERROR VECTOR
 9970  050532  022626                          CMP     (SP)+,(SP)+     ;CLEAN OFF THE STACK
 9971  050534  104010                          ERROR   10              ;REPORT THE ERROR
 9972  050536  005737  000042                  TST     @#42            ;IS THERE A MONITOR?
 9973  050542  001720                          BEQ     1$              ;NO--GO ASK FOR ADDRESS
 9974  050544  005037  001232                  CLR     @#DRVSEL        ;YES--NO DRIVES SELECTED
 9975  050550  005037  017542                  CLR     @#SEOPCT        ;NO PASSES
 9976  050554  000137  017366                  JMP     @#SEOP          ;GO TO END OF PROGRAM
 9977
```

```
 9978  050560  005015  050122  051503  MRPCS1: .ASCIZ  <CR><LF>/RPCS1=/
 9979  050566  036461     000
 9980  050571     015  051012  053110  MRHVEC: .ASCIZ  <CR><LF>/RHVEC=/
 9981  050576  041505  000075
 9982                                  ;*****************************************
 9983                                  ;ROUTINE TO CLEAR INPUT BUFFER FOR NEW CS1 AND VEC
 9984                                  ;
 9985                                  ;
 9986  050602  010046                  CLRBF:  MOV     R0,-(SP)        ;SAVE R0
 9987  050604  010146                          MOV     R1,-(SP)
 9988  050606  012701  000010                  MOV     #10,R1          ;COUNT 10 LOCATIONS
 9989  050612  012700  022522                  MOV     #$TTYIN,R0      ;START ADR OF INPUT BUF
 9990  050616  005020                     1$:  CLR     (R0)+
 9991  050620  005301                          DEC     R1
 9992  050622  001375                          BNE     1$
 9993  050624  012601                          MOV     (SP)+,R1
 9994  050626  012600                          MOV     (SP)+,R0        ;RESTORE R0
 9995  050630  000207                          RTS     PC
 9996          000001                  .END
```

```
ABS    = 000200          1807#
ACL    = 000040          1841#   1850#
ACTDRV  034434           7959#   8238*   8289*   8602*   8611*   8839
ACTSTR  034435           7965#   8841*   8856*
ACU    = 100000          1796#
AOE    = 001000          1713#
ATA    = 100000          1700#
ATABIT  034504           3286    7305    7311    8031#   8204    8301    8406    8765    8784    8792    8809    8915
AT0    = 000001          1733#
AT1    = 000002          1734#
AT2    = 000004          1735#
AT3    = 000010          1736#
AT4    = 000020          1737#
AT5    = 000040          1738#
AT6    = 000100          1739#
AT7    = 000200          1740#
A16    = 000400          1631#
A17    = 001000          1632#
BAI    = 000010          1649#
BITS    001424           2014#   3447    3481    3519    3562    3602    3682    3725    3775    3875    4032    4098    4202
                         4292    4390    4504    4575    4704    4750    4824    4913    7372    7403    7420    7473    7647
BIT0   = 000001          1606#
BIT00  = 000001          1596#   1606    2014    2030    3257    3274    3296    3349    6119
BIT01  = 000002          1595#   1605    2015    2031    3260    6445    6473    8281    8528
BIT02  = 000004          1594#   1604    2016    2032    6182    6445    6476
BIT03  = 000010          1593#   1603    2017    2033    6482    8724    9037
BIT04  = 000020          1592#   1602    2018    2034    6479    8759
BIT05  = 000040          1591#   1601    2019    2035    3918    3934    4010    4140    4154    4169    4174    4239    4263
                         4268    4327    4345    4362    4367    4425    4443    4460    4465    6482    6592    8121    8548
                         8739    8889
BIT06  = 000100          1590#   1600    2020    2036    6485    8213    8272    8346    8637    9098
BIT07  = 000200          1589#   1599    2021    2037    8213    8480    8623    8724    8739    8759    8788    9070
BIT08  = 000400          1588#   1598    2022    6473    8213    8902
BIT09  = 001000          1587#   1597    2023    5040    5665    6488    8887
BIT1   = 000002          1605#
BIT10  = 002000          1586#   2024    5024    6131    6445    6476    7666    8530
BIT11  = 004000          1585#   2025    5672    6476    8168    8305    8323    8499    8810
BIT12  = 010000          1584#   2026    6445    6479    8163    8195    8213    8283    8317    8495    8514    8526    8539
                         8749    8751    8975    9032    9099
BIT13  = 020000          1583#   2027    5031    6445    6473    8266    8697    8978
BIT14  = 040000          1582#   2028    3929    4135    4149    4234    4322    4340    4420    4438    5647    6373    6445
                         6479    8278    8314    8684    8826    8942    8987    8991    9096
BIT15  = 100000          1581#   2029    6637    6638    8266    8278    8281    8283    8314    8317    8499    8528    8530
                         8637    8724    8739    8749    8759    8826    8887    8902    8942    8949
BIT2   = 000004          1604#   8949
BIT3   = 000010          1603#
BIT4   = 000020          1602#
BIT5   = 000040          1601#
BIT6   = 000100          1600#   8307
BIT7   = 000200          1599#
BIT8   = 000400          1598#
BIT9   = 001000          1597#
BPTVEC= 000014           1613#
BUFFER= 047714           2671    2695    2719    2743    3895    4522    4537    4550    4593    4603    4617    4738    4840
                         4864    4872    4880    4886    4894    6556*   6557    6559    6561    6562    6563    6636    6673
                         6816    6835    6836    6860    6949    6981    7024    7066    7083    7084    7101    9849#
```

```
BUSADR  001226          1951#   3132*   3134*   3137*   3139*   9939    9941*
BYPASS  001252          1960#   3347*   3461*   3497*   3532*   3575*   3615*   3695*   3738*   3789*   3902*   4049*   4514*
                        4585*   4739*   4835*   6427    6907    7053    7118
CALL.A  025034          3353    3355    3464    3808    4927    4932    6225#   6228    6571
CALL.B  025146          3465    3501    3537    3545    3579    3584    3625    3631    3647    3653    3701    3703    3747
                        3749    3751    3753    3755    3757    3830    4053    6256#   6259
CALL C  025336          3500    4052    6299#   6302
CHKDRV  001254          1961#   3326*   3331*   3336    4958    6170    9701    9706    9711    9714    9718    9723    9725
                        9728    9732    9738
C11     036056          8336    8364#
C13     036164          8338    8387#
C14     036272          8327    8408#
C15     036650          8386    8407    8485#   8494
C16     036672          8424    8434    8436    8438    8490#
C17     036706          8268    8345    8376    8380    8384    8392    8401    8405    8416    8423    8429    8433    8447
                        8453    8457    8467    8478    8493    8495#   8597    8627    8776    9082
C17B    036734          8498    8501#   8778
C18     037006          8496    8504    8513#   8650    8934
CKSCTR  030012          4536    6857#
CKSWR = 104407          5014    5039    5646    5776#
CK.CHR  033770          7239    7289    7516    7553    7593    7719#   7756    7769    7780    7831
CK DEC  033742          7697#   7727
CK.DIG  034044          7299    7537    7750#
CK.NUM  034230          7248    7569    7602    7814#
CK.OCT  033714          7352    7356    7376    7380    7679#   7816    7826
CLKSTA  001244          1956#   3318    3907    3937    4108    4212    4302    4400    6049*   6051*   6057*
CLOSE   033634          7637    7641    7650#
CLR   = 000040          1651#
CLRBF   050602          9945    9953    9986#
CLRBUF  027744          4533    6833#
CLRQUE  042520          3901    8103    8547    8912    9166#
CLSWDS  033534          7621    7625    7628#
CNTRLC  001224          1950#   3135*   3140*   3226    3270
COMMA   043271          3314    9314#
COUNT   027122          4158    4243    4332    4350    4430    4448    6652#
CR    = 000015          1521#   1946#   4951    4982    5219    5229    7206    7286    9283    9289    9308    9315    9325
                        9333    9338    9345    9348    9355    9358    9364    9368    9370    9372    9851    9853    9860
                        9869    9879    9882    9978    9980
CRLF  = 000200          1522#   5190    5229
CSF   = 000002          1783#   1801#
CSU   = 000010          1785#   1803#
CYL.DS  001270          1968#   3921*   6233*   6264*   6307*   6356*   6386*   6412*   6566*   6604*   6923*   7037*   9701
                        9704    9706    9714    9718    9732    9738
CYL.RD  001262          1965#   6561*   9704
C.SWR   001220          1948#   3273    3276    3291    3349    3617    4122    4178    4842    6064    6074    6084    6119
                        6209    6287    6330    6428    6512    7208    7212    7213*
DATCMP  030452          4790    6980#
DCK   = 100000          1719#
DCL   = 000100          1842#   1851#
DCU   = 000001          1848#
DDISP = 177570          1528#   1919    3168
DECSEC  027662          6801#
DECSK   007066          3544#   3548
DELTA   001350          1989#   3893*   3983*   3984*   3985    3987*   3996
DE1   = 000040          1690#
DFF20 = 000002          1686#
```

```
DFLT    001664          2106#   6108
DF1     047540          2832    9748#
DF10    047560          2896    9764#
DF11    047564          2906    9768#
DF12    047570          2919    9772#
DF13    047600          2932    2953    9779#
DF14    047610          2940    2961    9786#
DF17    047614          2971    2981    9790#
DF2     047544          2842    2872    9752#
DF21    047620          2994    9794#
DF22    047630          3002    9801#
DF23    047634          3014    3026    9805#
DF3     047550          2852    9756#
DF4     047554          2862    9760#
DF41    047644          3059    9813#
DF42    047650          3069    9817#
DF43    047654          3081    9821#
DF44    047664          3096    9828#
DF45    047700          3111    3126    9838#
DH1     045525          2830    9547#
DH10    045734          2894    9571#
DH11    045753          2904    9574#
DH12    045772          2917    2930    2951    3094    3109    3124    9577#
DH12A   046061          9587#   9775
DH13A   046140          9595#   9782
DH17    046206          2969    2979    9602#
DH2     045542          2840    2870    9550#
DH21    046304          2992    9613#
DH21A   046362          9621#   9797
DH23    046421          3012    3024    9627#
DH23A   046507          9637#   9808
DH3     045630          2850    9559#
DH4     045665          2860    9564#
DH41    046554          3057    9644#
DH42    046612          3067    3079    9649#
DH43A   046700          9658#   9824
DH44A   046726          9662#   9831    9841
DH44B   047003          9670#   9834
DH45A   047031          9674#   9844
DIGB  = 000004          1687#
DISPLA  001142          1919#   3168*   3176*   3454*   3488*   3526*   3569*   3609*   3689*   3732*   3782*   3882*   4039*
                        4105*   4209*   4299*   4397*   4511*   4582*   4711*   4831*   4920*   5023*   5686*
DISPRE  000174          1486#   3176
DLT   = 100000          1661#
DL64  = 000020          1689#
DMD   = 000001          1723#
DORTI   027054          3916    4129    4227    4315    4413    6623#
DPB.A   004104          2666#   3342*   3348*   3351*   3352*   3354*   3457*   3786*   3804*   3811    3887*   3890*   3899
                        3920    3921    3931    3992*   3999*   4001    4003    4007    4925*   4926*   4930*   4931*   6227
                        6229    6233    6234    6235    6236    6244    6570*
DPB.B   004124          2690#   3343*   3458*   3459*   3460*   3491*   3493*   3495*   3530*   3531*   3533*   3538*   3539
                        3541*   3546*   3547    3573*   3574*   3576*   3583*   3613*   3614*   3624*   3630*   3646*   3652*
                        3693*   3694*   3700*   3702*   3736*   3737*   3746*   3748*   3750*   3752*   3754*   3756*   3785*
                        3787*   3792*   3802*   3804    3831*   3832    3834*   4043*   4045*   4047*   4058*   4059    6211*
                        6214*   6258    6260    6264    6265    6266    6267    6279    6282    6285
DPB.C   004144          2714#   3344*   3492*   3494*   3496*   4044*   4046*   4048*   4054*   4055    4057*   6212*   6215*
```

```
                    6301   6303   6307   6308   6309   6310   6322   6325   6328
DPINT   034410      7919#  8132   8135   8221*  8248   8668   8693   8816   8818*  8879   8917   8928   8936*
DPR   = 000400      1693#
DPRQS   034420      7932#  8254   8340*  8671   8830*  8881   8919   8930   8945*
DRIVES  043233      3297   9308#
DRQ   = 004000      1756#
DRVACT  034360      3970*  7876#  8262   8441*  8488*  8507*  8518   8533*  8616*  8689   8722   8753*  8760*
                    8773   8783*  8890*  8896   8903*
DRVCAL  025526      4526   4530   4535   4545   4552   4598   4609   4625   4631   4771   4777   4787   4849
                    4869   4875   4883   4889   4897   6345#  6349
DRVCLR= 000111      1869#  3963
DRVCL1  025546      3976   6350#  6351
DRVINT  034746      8123   8157#  8250   8309   8800   8819   8894
DRVMSK  001256      1962#  3327*  3328   3332*  3340
DRVOK   006122      3329   3336#
DRVQUE  042616      8257   8270   9206#
DRVSEL  001232      1953#  3281*  3286*  3296*  3300   3323   3328   3340*  4952   7282*  7305*  7311*  9974*
DRVSTA  034370      3240   3284   3337   7890#  8113*  8114*  8115*  8116*  8126*  8158*  8167*  8210*  8215*
                    8244   8252   8276   8311   8315   8442*  8551*  8674   8682   8695   8747*  8754*  8766
                    8821   8937*
DRVTYP  034400      3243   3257   3260   6182   7906#  8159*  8174*  8179*  8184*  8189*  8279   8552*
DRY   = 000200      1692#
DSWR  = 177570      1527#  1918   3167
DTADPB  004164      2738#  3345*  3820*  3823   3826*  3828*  3888*  3889*  3891*  3894*  3895*  3953*  3956
                    3959*  3961*  3962   3967*  3968   3974   4001   4003*  4138   4141   4152   4155   4167
                    4170   4175   4222*  4223*  4229   4237   4240   4247*  4248   4252*  4253   4261   4264
                    4269   4325   4328   4343   4346   4360   4363   4368   4423   4426   4441   4444   4458
                    4461   4466   4518*  4519*  4520*  4521*  4522*  4525*  4527*  4534*  4541*  4542*  4543*
                    4544*  4548*  4549*  4550*  4551*  4589*  4590*  4591*  4592*  4593*  4597*  4599*  4603*
                    4607*  4608*  4610*  4615*  4617*  4620*  4624*  4626*  4627*  4630*  4632   4737*  4738*
                    4753*  4754*  4755*  4760*  4770*  4776*  4786*  4838*  4839*  4840*  4841*  4845*  4850*
                    4851   4853*  4854   4856*  4861   4862   4863*  4865*  4871*  4872*  4877*  4878*  4879*
                    4880*  4885*  4886*  4891*  4892*  4893*  4894*  6348   6350   6356   6357   6358   6359
                    6369   6371   6377*  6380   6382   6386   6387   6388   6389   6397*  6399   6401   6405
                    6407   6412   6413   6414   6415   6423   6593*  6594*  6595*  6598   6600   6604   6605
                    6606   6607   6923   6924   6950   6982   7037   7038   7039   7188*  7189*  7190*
DTE   = 010000      1716#
DTSY  = 000200      1729#
DTUW    034502      3969*  8025#  8109   8329   8385*  8508   8511*  8521   8534   8536*  8545*  8605   8617*
                    8884   8899   8910*  8921   8985
DT00  = 000001      1747#
DT01  = 000002      1748#
DT02  = 000004      1749#
DT03  = 000010      1750#
DT04  = 000020      1751#
DT05  = 000040      1752#
DT06  = 000100      1753#
DT07  = 000200      1754#
DT08  = 000400      1755#
DT1     047106      2831   9688#
DT10    047172      2895   9699#
DT11    047176      2905   9700#
DT12    047202      2918   9701#
DT12A   047220      9704#
DT13    047234      2931   2952   9706#
DT13A   047252      2939   2960   9709#
```

```
DT17    047264          2970    2980    9711#
DT2     047112          2841    2871    9689#
DT21    047304          2993    9714#
DT21A   047320          3001    9716#
DT23    047330          3013    3025    9718#
DT23A   047346          9721#
DT3     047130          2851    9692#
DT4     047140          2861    9694#
DT41    047360          3058    9723#
DT42    047370          3068    9725#
DT43    047406          3080    9728#
DT43A   047424          9731#
DT44    047432          3095    9732#
DT44A   047450          9735#
DT44B   047464          9737#
DT45    047472          3110    3125    9738#
DT45A   047510          9741#
DT45B   047524          9743#
DT5     047152          9696#
DVA   = 004000          1681#
ECH   = 000100          1710#
ECI   = 004000          1824#
EMPTYQ  042576          8505    8550    8638    8761    8828    8950    9191#
EMTVEC= 000030          1616#   3152*   3153*
EM1     044045          2829    9392#
EM10    044273          2893    9418#
EM11    044351          2903    9426#
EM12    044406          2916    9431#
EM13    044433          2929    2950    2991    9435#
EM17    044460          2968    9439#
EM2     044110          2839    9398#
EM20    044512          2978    9444#
EM23    044561          3011    9451#
EM24    044610          3023    9455#
EM3     044146          2849    9403#
EM4     044203          2859    9408#
EM41    044650          3056    3066    3078    3093    3108    9461#
EM46    044674          3123    9465#
EM5     044237          2869    9413#
ERINDX  026250          6237    6268    6311    6360    6390    6416    6467#   6608
ERR   = 040000          1699#
ERRVEC= 000004          1609#   3165    3166*   3177*   5652    5653*   5655*   5658*   6018*   6019*   6024*   6044    9906
                        9907    9911*   9912*   9919*   9920*   9960    9961*   9963*   9969*
ERR.CT  001364          1995#   3381    4513    4584    4713    4833    6425    6905    6936    7051    7110
ES.SAV  042756          8653    8704    8708    8983    9043    9260#
EXIT0   006514          3461    3466#
EXIT1   006672          3497    3502#
EXIT10  012022          3902    3982    4013    4015#
EXIT11  012242          4049    4061#
EXIT12  013000          4114    4119    4182    4186#
EXIT13  013444          4218    4220    4274#
EXIT14  014162          4308    4310    4373#
EXIT15  014700          4406    4408    4471#
EXIT16  015276          4514    4557#
EXIT17  015716          4585    4637#
EXIT2   007110          3532    3549#
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EXIT20  016436          4739    4748    4794#
EXIT21  017214          4835    4898#
EXIT22  017364          4935#
EXIT3   007304          3575    3588#
EXIT4   007672          3615    3665#
EXIT5   010072          3695    3707    3710#
EXIT6   010336          3738    3745    3760#
EXIT7   010716          3789    3833    3835#
EXT1  = 000001          1763#
EXT10 = 000010          1766#
EXT2  = 000002          1764#
EXT20 = 000020          1767#
EXT4  = 000004          1765#
EXT40 = 000040          1768#
FC      001510          2043#   3495    3533    3547    3576    3620    3630    3663    3696    3708    3739    3792    3793
                        3800    3890    3891    3892    3989    4047    4048    4057    4115    4222    4335    4433    4518
                        4590    4742    4838    4930    7165    7183
FEN   = 000200          1789#
FER   = 000020          1708#
FILBUF  027706          4517    4588    6814#
FILRAN  030770          4844    7066#
FMT22 = 010000          1825#   1889#   3348    6556
FS      001524          2049#   3458    3491    3530    3573    3613    3693    3736    4043    4044    4116    4591    4718
                        4732    4737
FT      001516          2046#   3459    3493    3531    3574    3614    3694    3737    3785    3834    3889    4045    4046
                        4117    4519    4752
F1    = 000002          1676#
F2    = 000004          1677#
F3    = 000010          1678#
F4    = 000020          1679#
F5    = 000040          1680#
GETADR  050372          3215    9939#
GETNUM  031520          7209    7231#   9946    9954
GETREG= 000141          1882#
GETREQ  042672          8302    8523    8678    8714    8775    8825    8886    8901    8939    8946    9227#
GETSWR  031426          3220    7201#
GNS   = ****** U        1485    4950    4956    4964    4981    5096    5113    5768    5769    5770    5771    5772    5774
                        5776    5777    5778    5779    5780    7205    7285    7318    7477    7583
GO    = 000001          1675#
GRV   = 000010          1688#
GTSWR = 104406          3209    5774#
GTTST1  032014          7310    7315#   7364    7377    7388    7391    7417    7424    7433    7439    7448    7465
GTTST2  032100          7332#   7428
GTTST3  032442          7335    7339    7343    7347    7351    7410#
GTTST4  032444          7353    7374    7408    7411#
GTTST5  032554          7412    7434#
GTTST6  032614          7436    7445#
GT.PRM  031656          3278    7281#
GT.PR1  031660          7282#   7290    7291    7292    7293    7294    7300    7301
GT.PR2  032010          7312#   7327    7444    7453    7646
HCE   = 000200          1711#
HCI   = 002000          1823#
HCRC  = 000400          1712#
HT    = 000011          1519#   5188    5229
IAE   = 002000          1714#
IC      001514          2045#   3538    3546    3580    3640    3662    3704    3705    3758    3893    3980    3985    3987
```

```
                        4054    4058    6788
IE      = 000100        1629#
ILF     = 000001        1704#
ILR     = 000002        1705#
INCCYL  027632          4747    6786#
INCSK   007024          3536#   3540
INCTRK  027602          4791    6769#
IOTVEC= 000020          1614#   3150*   3151*
IR      = 000100        1652#
ISR     037400          3936    4177    4271    4370    4468    6590    8118    8602#
IT      001522          2048#   6771
ITEMP1  004546          3049#   5080
IXE     = 004000        1793#   1811#
KIPARO= ***** U         9902
LA      037242          8333    8567#
LACNT   034446          7984#   8575*   8576    8593*
LC      001512          2044#   3460    3496    3539    3541    3586    3641    3643    3652    3697    3706    3740    3793
                        3798    3981    3983    3989    4055    4059    4248    4317    4415    4756    4854    4925    6786
                        6789    6791    7178
LDCMD   024770          3346    6209#
LF      = 000012        1520#   1947#   4951    4982    5223    5229    7206    7286    9283    9289    9308    9315    9325
                        9333    9338    9345    9348    9355    9358    9364    9368    9370    9372    9851    9853    9860
                        9869    9879    9882    9978    9980
LKS     001412          2007#   6056    6088*
LKV     001406          2006#   3913    3914    6086*   6087*
LOADRV  050000          3194    9860#
LODFLT  024354          3277    3280    6101#
LODPRM  024612          3452    3486    3524    3567    3607    3687    3730    3780    3880    4037    4103    4207    4297
                        4395    4509    4580    4709    4829    4918    6159#
LOP CK  026210          6245    6280    6323    6370    6424    6441#
LPB     001422          2011#   5020
LPS     001420          2010#   5019    6020
LPTAVL  001230          1952#   5017    6017*   6021*
LP AVL  024034          3217    6017#
LS      001526          2050#   3492    4717
LST     = 002000        1695#
LT      001520          2047#   3494    3832    6769    6772    6774
MABOVE  043763          6733    9379#
MBELOW  043734          6717    9375#
MCLK    = 000002        1724#
MCPE    = 020000        1634#
MCPEMX  034514          8043#   8965    9013
MHS     = 001000        1791#   1809#
MINX    = 000004        1725#
MNOLTA  034530          8059#   8591
MOH     = 020000        1757#
MOL     = 010000        1697#
MPE     = 000400        1654#
MRD     = 000020        1727#
MRHVEC  060671          9951    9980#
MRPCS1  060560          9943    9978#
MSE     = 000020        1786#
MSGAVG  043720          6738    9372#
MSGB01  045467          2800    9538#
MSGB02  045417          2799    9531#
MSGB03  045347          2798    9524#
```

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MSGB04  045327          2797    9521#
MSGB05  045257          2796    9514#
MSGB06  045213          2795    9507#
MSGB08  045151          2794    9501#
MSGB09  045112          2793    9495#
MSGB10  045067          2792    9491#
MSGB11  045041          2791    9487#
MSGB12  045017          2790    9483#
MSGB13  044766          2789    9478#
MSGB14  044724          2788    9472#
MSGFCP  043012          2095    9273#
MSGLCP  043016          2096    9274#
MSGMAX  043711          6722    9370#
MSGMIN  043702          6706    9368#
MSGNON  044027          6759    9386#
MSGNUM  044012          6754    9383#
MSG. CS 043052          7207    9283#
MSG. EQ 043050          7509    7547    7588    9282#
MSG. FC 043004          2093    9271#
MSG. FS 043036          2101    9279#
MSG. FT 043025          2098    9276#
MSG. IC 043022          2097    9275#
MSG. IT 043033          2100    9278#
MSG. LC 043007          2094    9272#
MSG. LS 043041          2102    9280#
MSG. LT 043030          2099    9277#
MSG. PA 043044          7546    9281#
MSG. R  043002          2092    9270#
MSG. SP 044042          3238    3239    3255    3361    5108    5140    5147    5154    6713    6729    6750    7505    7545
                        7550    9388#
MSGOUS  043727          6710    6721    6726    6737    6749    9374#
MSG10A  043454          2358    9338#
MSG10B  043523          2359    9345#
MSG11A  043540          2363    9348#
MSG11B  043606          2364    9355#
MSG12A  043623          2368    9358#
MSG12B  043665          2369    9364#
MSG7    043422          2348    2353    9333#
MSTCK = 000010          1726#
MWR   = 000040          1728#
MXDLTA  034526          8056#   8589
MXF   = 001000          1655#
MXLACT  034524          8053#   8576
MXSTAL  001362          1994#   3637    3659
MXWNDW  034532          8062#   8394
NBA   = 100000          1759#
NC1     001532          2052#   3892    3980*   3981    3984    3992
NC2     001534          2053#
NED   = 010000          1658#
NEM   = 004000          1657#
NHS   = 002000          1792#   1810#
NOCLOK  043273          3322    9315#
NOLOAD  050176          3201    9882#
NONE    043264          3302    9313#
NOOP  = 000101          1865#
NOTPRS  043151          3248    9297#
```

```
NOTRP   043176            3246    9302#
NOTSAF  043166            3252    9300#
OCYL  = 100000            1844#   1854#
OFFSET= 000115            1871#
OFREV = 000200            1822#
OF100 = 000004            1818#
OF200 = 000010            1819#
OF25  = 000001            1816#
OF400 = 000020            1820#
OF50  = 000002            1817#
OF800 = 000040            1821#
OPE   = 020000            1852#
OPI   = 020000            1717#
OPNFLG  001240            1955#   7330*   7331*   7420*   7429    7431    7440    7442    7449    7451    7473
OPNPAT  033222            7504    7545#   7554    7563    7566    7570
OPNPRM  033020            7491    7496#   7500    7555    7557    7576
OPNTST  032646            7430    7432    7441    7443    7450    7452    7457#
OPNWDS  033344            7578#   7612
OPN.CT  032652            7459#   7461*   7462    7466    7468    7479
OPN.N1  033556            7541    7572    7635#
OPN.N2  033562            7528    7561    7623    7636#
OPN.X1  033574            7542    7573    7639#
OPN.X2  033600            7533    7565    7627    7640#
OPN.1   032656            7461#   7474    7638
OPN.2   032700            7460    7463    7466#
OPT     035576            8264    8299#   8633    8793    8831
OR    = 000200            1653#
PACK  = 000123            1874#
PAR   = 000010            1707#
PAT     001530            2051#   4750
PAT.PT  003044            2373#   6951    6984    7027
PAT0    003104            2373    2392#   6115    7579    7628
PAT1    003144            2374    2409#
PAT10   003604            2383    2562#
PAT11   003644            2384    2579#
PAT12   003704            2385    2596#
PAT13   003744            2386    2613#
PAT14   004004            2387    2630#
PAT15   004044            2388    2647#
PAT2    003204            2375    2426#
PAT3    003244            2376    2443#
PAT4    003304            2377    2460#
PAT5    003344            2378    2477#
PAT6    003404            2379    2494#
PAT7    003444            2380    2511#
PAT8    003504            2381    2528#   6114
PAT9    003544            2382    2545#   6117
PGE   = 002000            1656#
PGM   = 001000            1694#
PIP   = 020000            1698#
PIRQ  = 177772            1526#
PIRQVE= 000240            1620#
PKB     001402            2004#   4130*   4144*   4228*   4316*   4334*   4414*   4432*   6078*   6540*
PKC     001404            2005#   6656    6658    6659    6663    6665    6666    6670    6675
PKCS    001400            2003#   4131*   4134*   4146*   4148*   4162*   4231*   4233*   4256*   4319*   4321*   4337*   4339*
                          4355*   4417*   4419*   4435*   4437*   4453*   6050    6079*   6541*
```

```
PKV     001374          2002#   3910    3911    4128#   4226#   4314#   4412#   6076#   6077#   6538    6539#   6544#
PLU   = 020000          1795#   1812#
POPQUE  042714          8313    8364    8479    8787    9242#
PRM     001504          2041#   6168    6172#   6185#   6188#   7487    7496    7651
PRMLMT  001606          2078#   3821    3954    4555    4720    4731    6121#   6122#   6125#   6126#   6142    6144    6804
                        6822    6901    7067    7153    7503    7536
PRMMSG  001636          2092#   7506
PRMPT   001536          2056#   6128    6167    7485    7652
PRM0    002330          2056    2161#   6109
PRM1    002344          2057    2169#
PRM10   002544          2064    2247#
PRM11   002564          2065    2257#
PRM12   002606          2066    2268#
PRM13   002622          2067    2276#
PRM14   002636          2068    2284#
PRM15   002652          2069    2292#
PRM16   002666          2070    2300#
PRM17   002700          2071    2307#
PRM2    002372          2058    2182#
PRM20   002712          2072    2314#
PRM21   002744          2073    2329#
PRM22   002760          2074    2337#
PRM3    002414          2059    2193#
PRM4    002436          2060    2204#
PRM5    002460          2061    2215#
PRM6    002502          2062    2226#
PRM7    002524          2063    2237#
PR0   = 000000          1543#
PR1   = 000040          1544#
PR2   = 000100          1545#
PR3   = 000140          1546#
PR4   = 000200          1547#
PR5   = 000240          1548#
PR6   = 000300          1549#
PR7   = 000340          1550#   3228    3906    3928
PS    = 177776          1523#   1524    3218#   3228#   3269#   3906#   3923#   3928#   3975#   4163#   4257#   4356#   4454#
                        6536    6537#   6545#   6589#   8101    8102#   8131#   8139#   8236    8237#   8290#   8300    8349#
                        8582#
PSEL  = 002000          1633#
PSU   = 000001          1838#
PSW   = 177776          1524#
PTRN15  002742          2326#
PWRVEC= 000024          1615#
QCNT    042226          9108#   9167    9191#   9206    9208#   9228    9242#
QDRV0   042320          9119    9130    9139    9151#
QDRV1   042340          9120    9131    9140    9152#
QDRV2   042360          9121    9132    9141    9153#
QDRV3   042400          9122    9133    9142    9154#
QDRV4   042420          9123    9134    9143    9155#
QDRV5   042440          9124    9135    9144    9156#
QDRV6   042460          9125    9136    9145    9157#
QDRV7   042500          9126    9137    9146    9158#
QINPT   042236          9119#   9193    9210#   9211#   9212    9214#
QOUTPT  042256          9130#   9193#   9231    9244    9245#   9246    9248#
QSTART  042276          9139#   9173    9178    9214    9248
QSTOP   042300          9140#   9212    9246
```

```
QTERM = 042520          9147    9159#
RAMADR  031244          4860    4870    4884    7147#
RAMCK   031012          4876    4890    7081#
RAMPAT  031210          4866    7068    7088    7129#
RAM   = 000020          1804#
RDCHR = 104410          5576    5777#
RDLIN = 104411          5778#   7237    7287    7320    7514    7551    7591
RDY   = 000200          1630#
RD ADR  041510          8967#   8968#   8970#   9692
RD RP   041464          8170    8199    8205    8427    8451    8465    8569    8583    8625    8648    8716    8726    8741
                        8874    8923    8965#   9020    9034    9040    9074
RD RP1  041506          8969#   8999
RD RP2  041632          8965#   8998#
RD RP3  041636          8976    8990    9000#
RD RP4  041642          8981    9002#
RD WRD  041512          8971#   8972    9692    9694
READ  = 000171          1880#   4534    4786    4871    4885
READMD= 000173          1881#   3787    6211    6212    6282    6325
READIN= 000121          1873#
RECAL = 000107          1868#   3354    3457    6570    6595
RELEAS= 000113          1870#
RESREG= 104413          4142    4156    4171    4241    4265    4329    4347    4364    4427    4445    4462    5156    5780#
                        5840    6639    6824    6847    6909    6970    7021    7312    7464    7622    7626    7645    7668
                        8140    8284    8287    8350    8554    8610    8855    9083    9182
RESTAR  006102          3330#   3341    4993
RESVEC= 000010          1610#
RHVEC   001370          2001#
RH ADR  001366          2000#   9699    9942    9962    9964
RMR   = 000004          1706#
RPADR   034516          3788    3900    6591    8048#   8120    8243    8367    8387    8408    8567    8604    8872    8967
                        8973    8977    8993    9026    9030    9063    9093    9965
RPAS  = 000016          8073#   8204*   8646    8765*   8792*   8809*   8914
RPBA  = 000004          3965*   8068#
RPCA  = 000034          3920*   4115*   4229*   4317*   4335*   4415*   4433*   6618*   8080#   8379    8391    8422
RPCC  = 000036          8081#   8570
RPCS1 = 000000          3922*   3963*   3974*   4318*   4336*   4416*   4434*   8066#   8162*   8168    8193    8305    8321
                        8383    8404    8446    8466    8477    8492    8503    8626    8649    8701    8733    8770    8924
                        9021
RPCS2 = 000010          3811*   3918*   3919*   3934*   3935*   3944*   4010*   4011*   4140*   4141*   4154*   4155*   4169*
                        4170*   4174*   4175*   4239*   4240*   4263*   4264*   4268*   4269*   4327*   4328*   4345*   4346*
                        4362*   4363*   4367*   4368*   4425*   4426*   4443*   4444*   4460*   4461*   4465*   4466*   6592*
                        8070#   8121*   8161*   8163    8256*   8368*   8388*   8409*   8495    8514    8526    8539    8548*
                        8568*   8624*   8715*   8795*   8808*   8873*   8889*   8974    9031    9064*   9070    9094*   9099
RPDA  = 000006          3966*   4118*   6617*   6801    8069#   8375    8400    8415
RPDB  = 000022          8075#   9068
RPDS1 = 000012          3924    3929    4135    4149    4234    4322    4340    4420    4438    8071#   8200    8307    8717
                        8742    8796    8875
RPDT  = 000026          8077#   8171
RPEC1 = 000044          8084#
RPEC2 = 000046          8085#   9078
RPERRS  034360          7868#   8104    8684    8687    8697    8796*   8797*   8798*   8799*   9689    9696
RPER1 = 000014          6274    6276    6317    6319    8072#   8206    8727    8797    9035
RPER2 = 000040          8082#   8798
RPER3 = 000042          8083#   8799
RPINIT  034534          3222    8100#
RPLA  = 000020          3812    3945    8074#   8584
```

```
RPMR   = 000024          8076#
RPOF   = 000032          8079#   8197    8428    8432    8452    8456
RPSN   = 000030          8078#
RPT      001506          2042#   3455    3489    3527    3570    3610    3690    3733    3783    3883    4040    4106    4210
                         4300    4398    4512    4583    4712    4832    4921    7510    7543#   7548    7574#   7635#   7639#
RPTMR    040736          6092    8839#
RPVEC    034520          3916#   3936#   4129#   4177#   4227#   4271#   4315#   4370#   4413#   4468#   6590#   8049#   8117
                         8119    8237
RPWC   = 000002          3964#   8067#
RP REG   004204          2678    2702    2726    2750    2766#   3364    6274    6276    6317    6319    6373    6801    9711
                         9718    9721    9725    9728    9731    9735    9737    9741    9743
RP04     035304          6226    6257    6300    6347    6379    6398    6404    6597    8236#
RP04B    043214          3256    9305#
RP05     043221          3259    9306#
RP06     043226          3262    9307#
RSTRT1   006046          3319    3321    3323#   3333
RSTRT2   006072          3328#   3334
RTC    = 000117          1872#
SAVCSW   001222          1949#   3272    3276#   7212#
SAVEFG   034456          3223#   7999#   8481    8630    8789
SAVREG=  104412          4137    4151    4166    4236    4260    4324    4342    4359    4422    4440    4457    5065    5779#
                         5814    6630    6814    6833    6857    6948    6980    7281    7457    7577    7650    8100    8239
                         8299    8513    8603    8842    9060    9166
SC       037604          8609    8634    8636    8642    8646#
SCTRWC=  177400          1888#   4542    4592    4856
SC1    = 000100          1769#
SC10   = 001000          1772#
SC11     040436          8686    8723    8780#
SC12     040526          8680    8691    8795#
SC13     040576          8670    8673    8805#
SC2    = 000200          1770#
SC20   = 002000          1773#
SC3      037654          8661#   8665
SC4      037660          8663#   8694    8706    8710    8758    8772    8779    8794    8832
SC5      037672          8662    8668#
SC6      040072          8690    8711#
SC6A     040202          8688    8735#
SC7      040330          8725    8738    8740    8750    8760#
SC8      040406          8702    8718    8728    8734    8743    8771    8773#   8804
SEARCH=  000131          1875#   4132    4145
SEC.DS   001272          1969#   6235#   6266#   6309#   6358#   6388#   6414#   6564#   6606#   7039#   9701    9704    9706
                         9732    9738
SEC RD   001266          1967#   6563#   9704
SEEK   = 000105          1867#   3786    3887    3922    4230    4318    4336    4416    4434    4926    4931    6214    6215
SEEKFG   034460          3290#   3293#   8007#   8105    8331
SEKCNT   001346          1988#   3977    3979#   3988#
SEKTMR   001344          1987#   3917#   4005#
SELDRV=  000145          1884#
SERIAL   043403          3362    9329#
SETBUF   030362          3897    4765    6948#
SETFOR=  000143          1883#   3352    3354    3457    3786    3887    4926    4931
SETVEC   005336          3222#
SET.IE   042154          8134    8165    8274    8348    8553    8655    9092#
SKI    = 040000          1843#   1853#
SLASH    043076          7236    7513    9288#
SRCHWT   034432          7953#   8301#   8406#   8784
```

```
SRCHOO  026672          4112    4216    4306    4404    6588#
SRTDRV  005572          3227    3270#
SRTINT  005304          3214    3216#
SRVCLK  024342          6076    6086    6091#
STACK = 001100          1514#   3148    3330    3463    3499    3535    3543    3578    3582    3623    3645    3699    3743
                        3791    3807    3810    3905    3943    4050    4125    4221    4311    4409    4516    4524    4529
                        4532    4540    4547    4587    4596    4606    4623    4629    4740    4769    4775    4785    4847
                        4859    4868    4874    4882    4888    4896    4924
STALL   026366          3628    3634    3650    3656    4928    4933    6289    6332    6430    6511#
STALLO  001336          1985#   3621*   3629    3635    3636*   3637    3639*   3651    3657    3658*   3659    3661*
STALL1  001354          1991#   6290    6333
STALL2  001356          1992#   6431
STALL3  001360          1993#   4929    4934
START   004672          3136    3141#
START1  004636          1503    3134#
START2  004660          1505    3139#   3325    5417    5500
START3  004626          1507    3132#
START4  004650          1509    3137#
STATBL  004254          2788#   5092
STKLMT= 177774          1525#
ST0     041030          8849    8870#
ST01    041060          8879#   8922    8927
ST02    041256          8878    8880    8882    8914#
ST03    041326          8916    8928#
ST05    041352          8876    8895    8925    8934#
ST06    041360          8918    8936#
ST07    041416          8920    8944#
ST08    041446          8943    8950#
ST09    041456          8913    8931    8933    8935    8941    8948    8952#
STRTMR  027056          4127    4225    4313    4411    6630#
STRT1A  004642          3133    3135#
STRT2A  004664          3138    3140#
ST.CLK  024076          3221    4176    4270    4369    4467    6043#
ST.LCL  024306          6058    6083#
ST.PCL  024244          6052    6073#
SVADR   001340          1986#   4861*   4862*   4877    4878    4891    4892
SVRH11  042036          3932    4008    4139    4153    4168    4238    4262    4326    4344    4361    4424    4442    4459
                        8483    8500    8531    8632    8639    8679    8730    8748    8791    8827    8888    8951    9060#
SVSTAT  001260          1963#   5089    6470*
SWR     001140          1918#   3146    3167*   3169    3175*   3207    4761    4766    4772    4780    4782    4788    5015
                        5024    5031    5036    5040    5420    5459    5514*   5647    5665    5672    6375    6441    6573
                        6695    6932    6934    6938    7049    7108    7112    7201
SWREG   000176          1487#   3175    3207    5420    5459    5482
SW0   = 000001          1578#
SW00  = 000001          1568#   1578    4780
SW01  = 000002          1567#   1577    4788    6934    7049    7112
SW02  = 000004          1566#   1576    4782
SW03  = 000010          1565#   1575    4763    4772
SW04  = 000020          1564#   1574    4763    4766    6375
SW05  = 000040          1563#   1573    6074    6084    6938
SW06  = 000100          1562#   1572    4122    4178    6064    6695
SW07  = 000200          1561#   1571    6209    7201
SW08  = 000400          1560#   1570    3291    5015
SW09  = 001000          1559#   1569    6932    7108
SW1   = 000002          1577#
SW10  = 002000          1558#
```

```
SW11   = 004000          1557#
SW12   = 010000          1556#   3617
SW13   = 020000          1555#   6512
SW14   = 040000          1554#   6287    6330    6428
SW15   = 100000          1553#   4842
SW2    = 000004          1576#
SW3    = 000010          1575#
SW4    = 000020          1574#
SW5    = 000040          1573#
SW6    = 000100          1572#
SW7    = 000200          1571#
SW8    = 000400          1570#
SW9    = 001000          1569#   6441    6573
SYSTAT   043102          3231    9289#
TAP    = 040000          1758#
TBITVE = 000014          1611#
TD       037444          8607    8616#
TDF    = 000040          1787#   1805#
TESTNG   043361          3356    9325#
TEST0    006500          3453    3462    3463#
TEST1    006656          3487    3498    3499#
TEST10   011126          3881    3903#   3991    4004
TEST11   012164          4038    4050#
TEST12   012432          4123    4125#
TEST13   013126          4221#
TEST14   013572          4311#
TEST15   014310          4409#
TEST16   014776          4510    4515    4516#
TEST17   015374          4581    4586    4587#
TEST2    007004          3525    3533#
TEST20   016122          4710    4740#
TEST21   016710          4830    4857    4858    4859#
TEST22   017304          4919    4923    4924#
TEST3    007222          3568    3576#
TEST4    007432          3608    3618    3620#
TEST5    010004          3688    3696#
TEST6    010204          3731    3739#
TEST7    010462          3781    3790    3791#
TICKMS   001246          1958#   6066*   6069*   6091
TICKUS   001250          1959#   6067*   6070*
TIMER    034462          3972*   8012#   8219*   8343*   8486*   8532*   8619*   8712*   8756*   8806*   8813*   8845    8847*
                         8905*   8932*   8938*   8944*
TIM.DN   001314          1977#   6638*   6655
TIM.PT   001332          1983#   6632    6673    6675*   6676*
TIM.UP   001276          1971#   6631    6637*   6652    6701
TITLE    047714          3189    9851#
TKVEC  = 000060          1618#   5397*   5398*
TPB      001416          2009#   3184    5051
TPS      001414          2008#   3183    5050
TPVEC  = 000064          1619#
TRAPVE = 000034          1617#   3154*   3155*
TRCKMC   001352          1990#   4521    4549    4839    6123*   6127*
TRE    = 040000          1635#
TRK.DS   001274          1970#   6234*   6265*   6308*   6357*   6387*   6413*   6565*   6605*   6924*   7038*   9701    9704
                         9706    9714    9732    9738
TRK.RD   001264          1966#   6562*   9704
```

```
TRK1   = 004000          1774#
TRK10  = 040000          1777#
TRK2   = 010000          1775#
TRK20  = 100000          1778#
TRK4   = 020000          1776#
TRNSWT   034430          3968*   7945#   8365*   8510*   8520    9537*   8546*   8621    8622*   8883    8898    8911*
TRTVEC= 000014           1612#
TSTNMS   001234          1954#   3320    3447    3481    3519    3562    3602    3682    3725    3775    3875    4032    4098
                         4202    4292    4390    4504    4575    4704    4824    4913    6106*   6107*   7308*   7309*   7328*
                         7329*   7334*   7338*   7342*   7346*   7350*   7372*   7403*   7413    7415
TST0     006354          3445#
TST1     006516          3449    3479#
TST10    010720          3777    3873#
TST10A   011364          3938    3941#
TST10B   011756          3915    4005#
TST11    012024          3877    4030#
TST12    012244          4034    4096#   4104
TST13    013002          4100    4110    4200#   4208
TST14    013446          4204    4214    4290#   4298
TST15    014164          4294    4304    4388#   4396
TST16    014702          4392    4402    4502#
TST17    015300          4506    4573#
TST2     006674          3483    3517#
TST20    015720          4577    4702#
TST21    016440          4706    4822#
TST22    017216          4826    4911#
TST3     007112          3521    3560#
TST4     007306          3564    3600#
TST5     007674          3604    3680#
TST6     010074          3684    3723#
TST7     010340          3727    3773#
TUF    = 000100          1788#   1806#
TWOMS    026450          4244    4333    4351    4431    4449    6536#
TYPDS  = 104405          5137    5772#
TYPE   = 104401          3189    3194    3201    3216    3230    3231    3238    3239    3246    3248    3250    3252    3254
                         3255    3263    3265    3297    3302    3314    3322    3356    3361    3362    3377    3380    4948
                         4954    4962    4979    4983    5026    5034    5084    5085    5094    5103    5104    5108    5111
                         5117    5118    5127    5140    5144    5147    5149    5151    5154    5193    5290    5366    5414
                         5426    5480    5481    5484    5495    5505    5516    5535    5583    5589    5594    5598    5603
                         5604    5606    5609    5613    5768#   5882    6702    6706    6710    6713    6717    6721    6722
                         6726    6729    6733    6737    6738    6749    6750    6754    6759    7203    7232    7236    7283
                         7316    7475    7484    7505    7507    7509    7513    7545    7546    7547    7550    7581    7588
TYPERR   020056          5033    5064#
TYPOC  = 104402          4967    5133    5483    5769#   7235    7549    7590
TYPON  = 104404          5771#
TYPOS  = 104403          3235    3309    3358    4959    5770#   7481
TYPTIM   027254          4180    4184    4272    4371    4469    6694#
T10      003014          2358#   4219    4273
T11      003024          2363#   4309    4372
T12      003034          2368#   4407    4470
T7A      002774          2348#   4121    4181
T7B      003004          2353#   4124    4185
ULDFLG   034436          7972#   8160*   8246    8261*   8443*   8506*   8538*   8676    8762    8764*   8780    8782*   8891*
                         8904*
UNLOAD= 000103           1866#
UNS    = 040000          1718#
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UNTOFF  043130          3250    9293#
UNTON   043141          3254    9295#
UPE     = 020000        1659#
US1     = 000001        1646#
US2     = 000002        1647#
US4     = 000004        1648#
UWR     = 000010        1840#
VERIFY  026530          6284    6327    6554#
VUF     = 000002        1835#
VU30    = 010000        1794#
VV      = 000100        1691#
WA0     = 000002        1849#
WCE     = 040000        1660#
WCEFLG  001334          1984#   4741#   4778    6346#   6410#
WCF     = 000040        1709#
WCU     = 000001        1782#   1800#
WLE     = 004000        1715#
WRCKD   = 000151        1876#   4527    4548    4607    4630    4776    4879    4893    6371    6397
WRCKHD= 000153          1877#
WRITE   = 000161        1878#   3888    4525    4541    4589    4624    4770    4841    4863    6377
WRL     = 004000        1696#
WRTHD   = 000163        1879#
WRT AD  041734          9016#   9026#   9029#   9694
WRT.RP  041644          8192    8196    8320    8374    8378    8382    8390    8399    8403    8414    8421    8431    8445
                        8455    8476    8491    8502    8700    8732    8769    9013#
WRT R1  041730          9027#   9047
WRT.R2  042020          9013#   9046#
WRT.R3  042026          9022    9033    9036    9042    9049#
WRT.R4  042032          9038    9051#
WRT.R5  042034          9050    9052#
WRT.WD  041732          9014#   9018    9025#   9028#   9694
WRU     = 000400        1790#   1808#
WSU     = 000004        1784#   1802#
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$BDADR  001122          1910#   7031#   7096#   9709
$BDDAT  001126          1912#   6920#   7033#   7098#   9709    9716
$BELL   001210          1941#   3181    5026    5053    5426    5623
$CHARC  020660          5195#   5205#   5212    5221#   5226#
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$CMTAG  001100          1896#   3143    3144    3152    3158    3159
$CM1    = 000006        1930#   1931#   1932#   1933#   1934#   1935#   1936#
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$CM4    = 000003        1936#   1937#   1938#   1939#
$CNTLC  022546          5414    5495    5623#
$CNTLB  022560          5480    5625#
$CNTLU  022553          5505    5598    5624#
$CRLF   001215          1943#   3216    3230    3265    3380    5034    5053    5084    5103    5117    5127    5144    5151
                        5194    5229    5516    5603    5623    7484
$DBLK   021326          5332    5366    5374#
$DB2D   023256          5795    5814#
$DECVL  023436          5816    5862#
$DIV    023614          3801    3998    5950#   6742
$DORGN  017626          4975    4985    4991#
$DTBL   021316          5335    5370#
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$EOP    017366            3304    3347    4915    4947#   6448    9976
$EOPCT  017542            3317#   4974#   4978    9975#
$ERFLG  001103            1901#   5021#   5053    5637    5661    5663    5669#   5690    6425    6905    6936    7051    7110
$ERMAX  001115            1907#   3160#   3381#   3456#   3490#   3528#   3571#   3611#   3691#   3734#   3784#   3884#   4041#
                          4107#   4211#   4301#   4399#   4513#   4584#   4713#   4833#   4922#   5663    5685#   5690
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                          9706    9711    9714    9718    9723    9725    9728    9732    9738
$ERRTB  004306            2815#   5080    5081
$ERTTL  001112            1905#   4966    4968#   5027#   5053
$ESCAP  001206            1940#   3159#   4119#   4220#   4310#   4408#   5043    5045    5053    5684#   6225#   6232#   6256#
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$FILLC  001156            1926#   5198    5229
$FILLS  001155            1925#   5229
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$GODAT  001124            1911#   7034#   7099#   9709
$GET42  017606            4984#
$GTSWR  021724            5481#   5774
$HD     =  000000         1436
$HINUM  023610            3156#   3796    3994    4836#   5904    5912    5917#   5922#   7081    7087#   7090#   7134    7150
$ICNT   001104            1902#   3219#   5676#   5677    5679#   5689
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$ITEMB  001114            1906#   5030#   5053    5073
$LF     001216            1944#   5053    5229    5613    5623
$LONUM  023612            3157#   4837#   5903    5910    5916#   5923#   6515    7082    7086#   7089#   7133    7148    7149
$LPADR  001106            1903#   3161#   3462#   3498#   3529#   3572#   3612#   3692#   3735#   3790#   3885#   4042#   4111#
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                          4710#   4768#   4774#   4784#   4830#   4846#   4858#   4867#   4873#   4881#   4887#   4895#   4919#
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$MSWR   022565            5481    5626#
$MXCNT  023040            5680    5689#
$NULL   001154            1924#   5200    5229
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                          3714    3762#   3764    3838#   3840    4017#   4019    4084#   4086    4189#   4191    4277#   4279
                          4375#   4377    4489#   4491    4559#   4561    4640#   4642    4797#   4799    4902#   4904
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$OMODE  021110            5257#   5261#   5266    5269#   5280#   5306#
$OVER   023024            5648    5668    5678    5686#
$PASS   001100            1899#   4971#   4972#   4994    5674    5690
$QUES   001214            1942#   5053    5229    5535    5606    5623
$RAND   023512            3795    3993    5899#   6514    7132    7147
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$RDLIN  022266            5571#   5778
$RDOCT=  ******  U        5779
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$REG1   001164          1931#   5068*   9689    9696    9716
$REG2   001166          1932#   5069*   9700
$REG3   001170          1933#   5070*   9688    9689
$REG4   001172          1934#   5071*   9709    9716
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$RESRE  023100          5724#   5780
$RTNAD  017630          4993#
$R2A  = ******  U       5781
$SAVRE  023042          5708#   5779
$SB2D   023222          5793#   6708    6715    6719    6724    6731    6735    6747    6752    7511    7586
$SCOPE  022610          3150    5645#
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                        5047    5418    5423    5424    5454    5630    5646
$SIZE   050274          3198    9904#
$STUP = 177777          3132#
$SUPRS  023452          5874#   6709    6716    6720    6725    6732    6736    6748    6753    7512    7587
$SVLAD  022776          5656    5681#
$SVPC = 000200          1493#   1498
$SWR  = 167000          1426#   1436    1464    1465    1466    1467    1468    1469    1891#   1939    1940    1941    3158
                        3159    3161    3162    3457    3491    3529    3572    3612    3692    3735    3785    3885    4042
                        4108    4212    4302    4400    4514    4585    4714    4834    4923    4944    4970    4986    4992
                        4994    5005    5006    5007    5008    5009    5024    5031    5036    5040    5053    5638    5639
                        5640    5641    5642    5647    5659    5661    5662    5663    5670    5671    5672    5683    5686
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$SWRMK= 000000          5642
$TIMES  001204          1939#   3158*   3455*   3489*   3527*   3570*   3610*   3690*   3733*   3783*   3883*   4040*   4106*
                        4210*   4300*   4398*   4512*   4583*   4712*   4832*   4921*   4970*   5670*   5677    5680*   5689
$TKB    001146          1921#   5379    5399    5410    5435    5463    5490
$TKCNT  021336          5380#   5394*   5424    5441*   5555    5557*
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$TKQEN= 021346          5384#   5449    5560
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$TMP2   001202          1938#
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                        3775    3784    3785#   3838    3873    3875    3884    3885#   4017    4030    4032    4041    4042#
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                        4834#   4902    4911    4913    4922    4923#   7363    7387    7462
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$TPFLG  001157          1927#   5176    5229
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$TRAP   023136          3154    5745#
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$TYPEC  020614          5197    5204    5211    5216#   5217    5521
$TYPEX  020662          5222    5224    5227#
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$TYPON  020724          5259    5262#   5771
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$XTSTR  022622          5650#
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$OFILL  021107          5256#   5260#   5270    5305#
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CKCHR	3128#	7239	7289	7516	7553	7593	7756	7769	7780	7831					
CKDIG	3128#	7297	7535												
CKNUM	3128#	7247	7568	7601											
COMMEN	1#	1621#	3385	3420	4066	4475									
COMND	3128#	3354	3457	3786	3886	4926	4931								
DO	3128#	3353	3355	3464	3465	3500	3501	3537	3545	3579	3584	3625	3631	3647	3653
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DODTA	3126#	4526	4530	4535	4545	4552	4598	4609	4625	4631	4771	4777	4787	4848	4869
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DRV.IN	3128#	4173	4267	4366	4464										
ENDCOM	1#	1621#	3413	3431	4079	4484									
ENDPAS	3128#	4979													
ERRCAL	7851#	8653	8704	8707	8982	9043									
ERREND	3128#	5047													
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	6362	6363	6364	6365	6366	6392	6393	6394	6395	6396	6418	6419	6420	6421	6422
	6569	6610	6611	6612	6613	6614	6926	6931	7042	7048	7106	7107	8654	8705	8709
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ER NDX	3128#	6233	6264	6307	6356	6386	6412	6604							
ESCAPE	1#	1621#	4119	4220	4310	4408	6232	6263	6306	6354	6385	6411	6567	6603	6925
	6929	7041	7046	7094											
GETPRI	1#	1621#	5950	9910											
GETSWR	1#	1426#	1621#	3204											
LOOP	3128#	3534	3542	3577	3581	3622	3644	3698	3742	3805	3809	3903	3941	4523	4528
	4531	4539	4546	4595	4605	4622	4628	4768	4774	4784	4846	4867	4873	4881	4887
	4895														
MORETA	1891#	1946													
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	4559#	4561	4640#	4642	4797#	4799	4902#	4904							
MULT	1#	1621#													
NEWTST	1#	1621#	3436	3468	3504	3551	3590	3667	3712	3762	3838	4017	4084	4189	4277
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POP	1#	1621#	5361	5729	5918	6001	6146	6195							
PUSH	1#	1621#	5320	5709	5899	5953	6101	6159							
REPORT	1#	1621#	3128#	4180	4183	4272	4371	4469							
RP04.D	2#	7851													
SAV.RH	3128#	4137	4151	4166	4236	4260	4324	4342	4359	4422	4440	4457			
SCOPE	1516#	3466	3502	3549	3588	3665	3710	3760	3835	4015	4061	4186	4274	4373	4471
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SETPRI	1#	1621#	5551												
SETTRA	5760#	5769	5770	5771	5772	5774	5776	5777	5778	5779	5780				
SETUP	1#	1621#	3142												
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	4503	4574	4703	4823	4912										
SKIP	1#	1621#													
SLASH	1#	1621#													
SPACE	1621#														
STARS	1#	1491	1621#	1625	1667	1671	1862	1893	1945	3030	3436	3444	3468	3478	3504
	3516	3551	3559	3590	3599	3667	3679	3712	3722	3762	3772	3838	3872	4017	4029
	4084	4095	4189	4199	4277	4289	4375	4387	4489	4501	4559	4572	4640	4701	4797
	4821	4902	4910	4941	5001	5054	5161	5232	5310	5378	5454	5469	5540	5564	5634

```
        5693    5739    5784    5803    5866    5890    5927    7850    7860    9898    9927
SWRSU      1#   1621#   3163#
TRMTRP  5760#
TYPBIN     1#   1621#
TYPB2D  3128#   6707    6714    6718    6723    6730    6734    6746    6751    7510    7585
TYPDEC     1#   1621#   5135
TYPEND  3128#   4948
TYPNAM     1#   1621#
TYPNUM     1#   1621#
TYPOCS     1#   1621#   3232    3308    3357    4958    7479
TYPOCT     1#   1621#   4966    5132    5482    7234    7548    7589
TYPTXT     1#   1621#   4948    4954    4962    4979    5094    5111    7203    7283    7315    7475    7580
$$CMRE  1891#   1930    1931    1932    1933    1934    1935
$$CMTM  1891#   1936    1937    1938
$$ESCA     1#   1621#
$$NEWT     1#   1621#   3436    3468    3504    3551    3590    3667    3712    3762    3838    4017    4084    4189    4277
        4375    4489    4559    4640    4797    4902
$$SET   5760#   5769    5770    5771    5772    5774    5776    5777    5778    5779    5780
$$SKIP     1#   1621#
.EQUAT     1#   1426#   1511
.HEADE     1#   1426#
.KT11      1#
 SETUP     1#   1426#   3132
.SWRHI     1#   1426#   1460
.SWRLO  1470#   1471    1472    1473    1474    1475    1476    1477
.$ACT1     1#   1426#   1489
.$APTB     1#
.$APTH     1#
.$APTY     1#
.$ASTA     1#
.$CATC     1#   1426#   1479
.$CMTA     1#   1426#   1891
.$DB2D     1#   1426#   5801
.$DB2O     1#
.$DIV      1#   1426#   5925
.$EOP      1#   1426#   4939
.$ERRO     1#   1426#   4999
.$ERRT     1#
.$MULT     1#
.$POWE     1#
.$RAND     1#   1426#   5888
.$RDDE     1#   1426#
.$RDOC     1#   1426#
.$READ     1#   1426#   5376
.$R2RZ     1#
.$SAVE     1#   1426#   5691
.$SB2D     1#   1426#   5782
.$SB2O     1#
.$SCOP     1#   1426#   5632
.$SIZE     1#   1426#   9896
.$SUPR     1#   1426#   5864
.$TRAP     1#   1426#   5737
.$TYPB     1#
.$TYPD     1#   1426#   5308
.$TYPE     1#   1426#   5159
.$TYPO     1#   1426#   5230
```

```
$40CA       1#
1170        1#


  ABS   050632      000


ERRORS DETECTED   0

DSKZ.CZRJAC BIN,DSKZ CZRJAC LST/CRF/SOL=DSKZ CZRJAC SML,DSKZ CZRJAC 010,DSKZ CZRJAC P11
RUN-TIME   27 37 3 SECONDS
RUN-TIME RATIO  315/68=4 5
CORE USED   52K  (103 PAGES)
```