RL11,RLV11

DRIVE TEST PART 2
CZRLDB0

AH-E049B-MC
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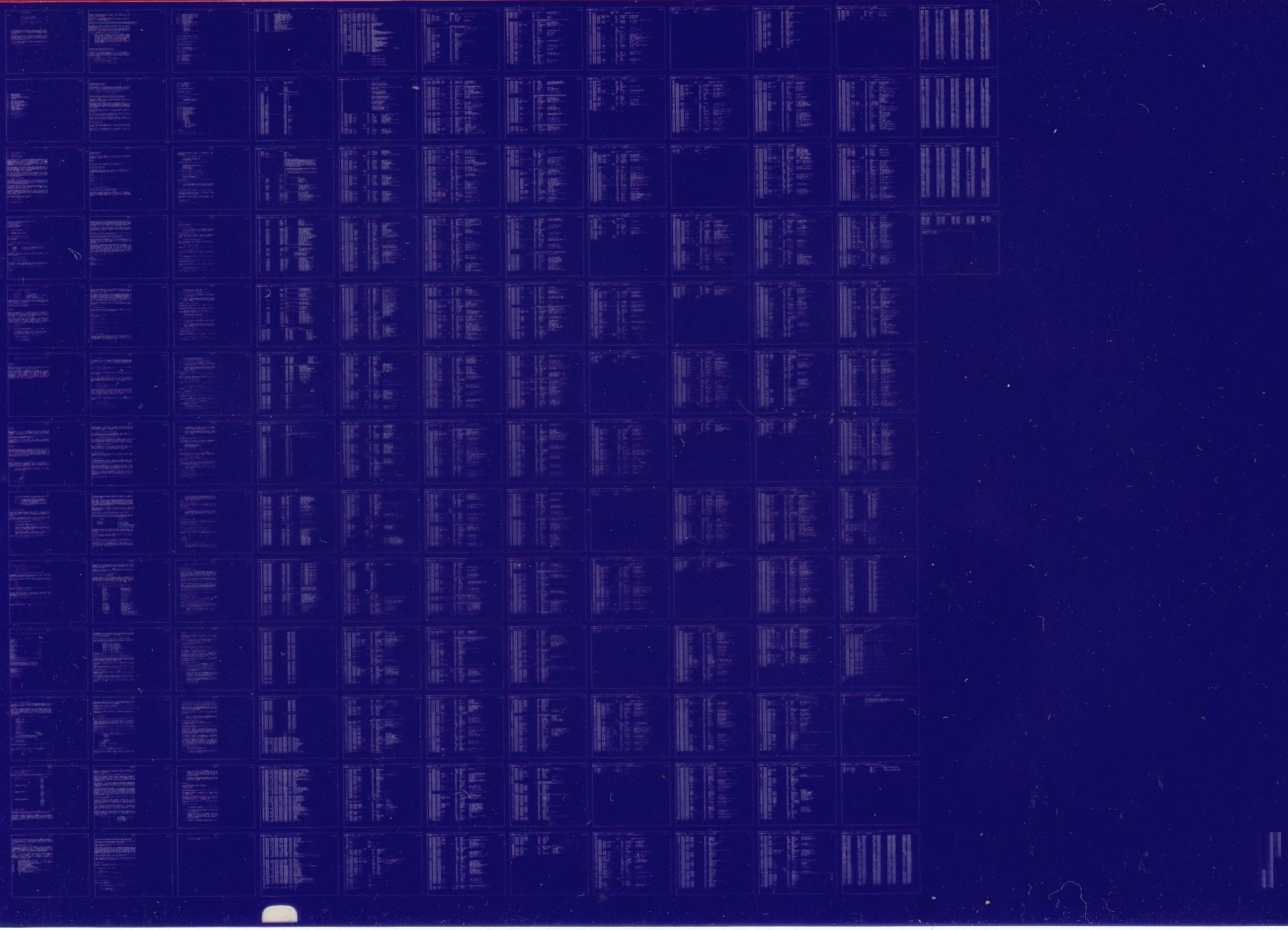

IDENTIFICATION

PRODUCT CODE: AC-E048B-MC

PRODUCT NAME: CZRLDB0 RL01 DRIVE TEST PART 2

DATE CREATED: 11-OCT-78

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: D. DEKNIS

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1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

1.1.1 STRUCTURE OF PROGRAM

THIS DIAGNOSTIC OCCUPIES 14.5K WORDS OF MEMORY AND IS COMPATIBLE WITH BOTH XXDP AND ACT. IT CAN BE RUN STANDALONE UNDER XXDP, AND CAN BE CHAINED UNDER XXDP, ACT AND APT IN ACT MODE (SEE ''CREATE CORE IMAGE'' COMMAND BELOW FOR DETAILS OF CHAINING PROCEDURE). IT IS A SINGLE PROGRAM FROM THE STANDPOINT OF THE DIAGNOSTIC USER, BUT WE HAVE INCORPORATED INTO IT A CONTROL MODULE WHICH WILL LATER BE RELEASED INDEPENDENTLY AS A DIAGNOSTIC SUPERVISOR.

WHEN THIS DIAGNOSTIC IS STARTED AT ADDRESS 200, CONTROL GOES FIRST TO THE SUPERVISOR PORTION, WHICH WILL ASK CERTAIN ''HARD CORE'' QUESTIONS ABOUT THE ENVIRONMENT. THEN IT WILL ENTER COMMAND MODE, INDICATED BY A PROMPT CHARACTER (DS B>). AT COMMAND MODE THE OPERATOR MAY ENTER ANY OF SEVERAL COMMANDS AS DESCRIBED BELOW.

THE SUPERVISOR CODING FOLLOWS IMMEDIATELY THE DIAGNOSTIC TEST CODING, BUT THE SUPERVISOR LISTING HAS BEEN SUPPRESSED FOR GENERAL DISTRIBUTION. A LIMITED DISTRIBUTION HAS BEEN MADE TO FIELD SERVICE OF THE SUPERVISOR ASSEMBLY LISTING, AND IT MAY BE CONSULTED IN EVENT OF A SOFTWARE PROBLEM.

1.1.2 DIAGNOSTIC INFORMATION

THIS PROGRAM TESTS AND EXERCISES RL01 DISK DRIVES RL11/RLV11 CONTROLLERS (4 DRIVES PER CONTROLLER). THE ENTIRE PROGRAM IS RUN ON THE FIRST DRIVE BEFORE STARTING ON THE SECOND. THE PROGRAM STARTS BY TESTING THE SIMPLEST FUNCTIONS FIRST USING THE LOGIC TESTED IN EARLIER TESTS TO TEST MORE COMPLEX FUNCTIONS.

THIS PROGRAM FIRST TESTS THE RL01 INTERFACE AND BASIC DRIVE LOGIC. IT THEN BEGINS TESTING THE SEEK OPERATIONS USING SINGLE DIFFERENCES, PROCEEDING INTO SEEKS OF GREATER DIFFERENCES. SEEK TIMING IS DONE AFTER THE SEEK LOGIC HAS BEEN TESTED.

DATA TRANSFERS ARE DONE AFTER ALL THE SEEK TESTS. THE FIRST DATA TRANSFER IS READING OF THE BAD SECTOR FILES WHICH ARE STORED AND USED LATER TO PREVENT TESTING ON BAD SECTORS. FOLLOWING DATA READ AND WRITE TESTING, THE PROGRAM TESTS FOR OVERWRITE PROBLEMS AND ADJACENT CYLINDER INTERFERENCE.

SEEK TIMING, ROTATIONAL TIMING, AND WRITE LOCK DATA PROTECTION ARE DONE IF MANUAL INTERVENTION IS REQUESTED.

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE REQUIREMENTS

PDP-11/LSI-11 PROCESSOR WITH 16K OR MORE OF MEMORY
CONSOLE DEVICE (LA30,LA36,VT50,ETC.)
RL11/RLV11 CONTROLLER(S)
1 - 8 RL01 DRIVES
1 - 8 RL01K CARTRIDGES WITH BAD SECTOR FILE
KW11P, KW11L (OPTIONAL)
LINEPRINTER(OPTIONAL)

1.2.2 SOFTWARE REQUIREMENTS

```
     CXRLDB0 RL01 DRIVE TEST PART 2
       (FORMERLY MD-11-DZRLD-A)
```

1.3 RELATED DOCUMENTS AND STANDARDS

RL01 USERS MANUAL (EK-RL01-UG-PRE)
XXDP USERS MANUAL

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

THE RL01 SUBSYSTEM SHOULD HAVE SUCCESSFULLY RUN THE FOLLOWING PROGRAMS:

```
        CZRLAB0         RL11/RLV11 RL01 CONTROLLER TEST (PART 1)
        CZRLBB0         RL11/RLV11 RL01 CONTROLLER TEST (PART 2)
        CVRLAA0         RLV11 RL01 DISKLESS TEST (RLV11 ONLY)
        CZRLCB0         RL01 DRIVE TEST (PART 1)
```

1.5 ASSUMPTIONS

THE HARDWARE OTHER THAN THE RL01 SUBSYSTEM IS ASSUMED TO WORK PROPERLY. FALSE ERRORS MAY BE REPORTED IF THE PROCESSOR, ETC., DO NOT FUNCTION PROPERLY.

2.0 OPERATING INSTRUCTIONS

2.1 HOW TO RUN THIS DIAGNOSTIC

2.1.1 THE SIX STEPS OF EXECUTION

THIS DIAGNOSTIC SHOULD BE LOADED AND STARTED USING NORMAL XXDP PROCEDURES. THE START COMMAND SHOULD NOT SPECIFY AN ADDRESS, BECAUSE THE DIAGNOSTIC HAS THE PROPER TRANSFER ADDRESS CODED INTO IT.

WHEN THIS DIAGNOSTIC IS STARTED, THE FOLLOWING STEPS WILL OCCUR:

```
***********
* STEP 1 *
***********
```

A SHORT SERIES OF ''HARDCORE QUESTIONS'' WILL BE ASKED:

QUESTION	MEANING
L-CLK (L) N ?	IS THERE AN L-CLOCK?
P-CLK (L) N ?	'' '' '' P-CLOCK?
50HZ (L) N ?	IS THE POWER 50 CYCLES (AS IN EUROPE)?
LSI (L) N ?	IS MACHINE AN LSI?
LPT (L) N ?	IS THERE A LINE PRINTER?
MEM (K) (D) 16 ?	HOW MANY K OF MEMORY ARE THERE?

THE DEFAULTS (SHOWN AFTER EACH QUESTION) CAN BE SELECTED BY HITTING CARRIAGE RETURN. IT IS POSSIBLE THAT NOT ALL OF THE QUESTIONS WILL BE ASKED: FOR EXAMPLE, IF YOU SAY ''YES'' TO THE L-CLOCK QUESTION, THE P-CLOCK QUESTION WILL NOT BE ASKED.

IF NEITHER P OR L CLOCK ARE ANSWERED YES THE OPERATOR WILL BE ASKED TO TYPE TWO CHARACTERS 4 SECONDS APART.

```
**********
* STEP 2 *
**********
```

WHEN YOU HAVE ANSWERED ALL THE HARDCORE QUESTIONS, THE DIAGNOSTIC WILL ISSUE THE PROMPT ''DS-B>''. FROM THIS POINT UNTIL THE TIME WHEN YOU RESTART XXDP, YOU WILL BE TALKING TO THE DIAGNOSTIC, NOT XXDP. WE WILL REFER TO THE PRESENCE OF THIS PROMPT AS BEING IN DIAGNOSTIC COMMAND MODE, AS OPPOSED TO XXDP COMMAND MODE.

AT THIS POINT YOU WILL ENTER A ''START'' COMMAND. THIS IS NOT THE SAME AS THE XXDP ''START'' COMMAND, WHICH YOU ALREADY ISSUED IN RESPONSE TO THE XXDP DOT PROMPT. THIS ''START'' COMMAND CAN TAKE A NUMBER OF SWITCHES AND FLAGS (ALL OPTIONAL) AND THE DETAILS OF THESE ARE SET FORTH IN ''2.3 DETAILS OF COMMANDS AND SYNTAX''. HOWEVER, IN ORDER TO USE THE PROGRAM, ALL YOU NEED TO SAY IS SOMETHING LIKE THIS:

```
STA/PASS:1/FLAGS:HOE
```

THINGS TO NOTE HERE:

1. ONLY THE FIRST THREE CHARACTERS OF THIS OR ANY COMMAND AT THE ''DS-B>'' LEVEL NEED TO BE TYPED.

2. THE ''PASS'' SWITCH SPECIFIES HOW MANY PASSES YOU DESIRE. A PASS CONSISTS OF RUNNING THE FULL DIAGNOSTIC AGAINST ALL UNITS BEING TESTED (THIS WILL BE EXPLAINED SHORTLY). ONE PASS IS SPECIFIED IN THE ABOVE EXAMPLE.

3. THE ''FLAGS'' SWITCH MAY SPECIFY ANY OF A NUMBER OF FLAGS, BUT THE MAIN USEFUL ONES ARE:

LOE	LOOP ONE ERROR
HOE	HALT ON ERROR
IER	INHIBIT ERROR PRINTOUT

THE HOE FLAG IS SPECIFIED IN THE ABOVE EXAMPLE (WE'LL SEE WHY SHORTLY).

```
***********
* STEP 3 *
***********
```

WHEN YOU HAVE TYPED IN A ''START'' COMMAND, THE DIAGNOSTIC WILL COME BACK WITH THE QUESTION ''# UNITS?'' TO WHICH YOU SHOULD RESPOND BY TYPING IN THE NUMBER OF DEVICES YOU WISH TO TEST.

A WORD OF WARNING HERE: THE NUMBER OF UNITS DEPENDS ON THE TARGET DEVICE OF THE DIAGNOSTIC. FOR EXAMPLE, IF THE DIAGNOSTIC IS DIRECTED AT A DISK DRIVE, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF DRIVES TO BE TESTED. WHEREAS IF THE DIAGNOSTIC WAS DIRECTED AT THE DISK CONTROLLER, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF CONTROLLERS. THE TARGET DEVICE OF A DIAGNOSTIC CAN ALWAYS BE DETERMINED BY INSPECTING THE ''HEADER'' STATEMENT NEAR THE BEGINNING OF THE SOURCE CODE. ONE OF THE OPERANDS OF THIS ''HEADER'' STATEMENT SHOULD BE THE DEVICE TYPE OF THE DIAGNOSTIC.

```
***********
* STEP 4 *
***********
```

WHEN YOU HAVE TYPED IN THE NUMBER OF UNITS TO BE TESTED, THE DIAGNOSTIC WILL ASK YOU THE ''HARDWARE QUESTIONS''. THE ANSWERS TO THESE QUESTIONS ARE USED TO BUILD TABLES IN CORE, CALLED ''HARDWARE P-TABLES''. ONE HARDWARE P-TABLE WILL BE BUILT FOR EACH UNIT TO BE TESTED.

THERE ARE SEVERAL HARDWARE QUESTIONS AND THE ENTIRE SERIES WILL BE POSED N TIMES, WHERE N IS THE NUMBER OF UNITS.

THIS REPRESENTS A NEW PHILOSOPHY IN DIAGNOSTIC ENGINEERING. DIAGNOSTICS IN THE FUTURE WILL NOT BE WRITTEN TO AUTOSIZE OR ASSUME STANDARD ADDRESSES: INSTEAD, THEY WILL ASK THE OPERATOR FOR ALL THE INFORMATION THEY NEED TO TEST THE DEVICE.

```
***********
* STEP 5 *
***********
```

AFTER YOU HAVE ANSWERED ALL THE HARDWARE QUESTIONS (SEC 2.5) FOR ALL THE UNITS, YOU WILL BE ASKED ''CHANGE SW?'' IF YOU WANT TO BE ASKED THE SOFTWARE QUESTIONS THAT DETERMINE THE BEHAVIOR OF THIS PROGRAM, TYPE 'Y'. IF YOU WANT TO TAKE ALL THE DEFAULTS TO THESE QUESTIONS, TYPE 'N'. IF YOU TYPE 'Y' YOU WILL BE ASKED THE SOFTWARE QUESTIONS (SEC 2.6), AND THE ANSWERS WILL BE PUT INTO THE SOFTWARE P-TABLE IN THE PROGRAM. THE SERIES OF QUESTIONS WILL BE ASKED JUST ONCE, REGARDLESS OF THE NUMBER OF UNITS TO BE TESTED.

```
***********
* STEP 6 *
***********
```

AFTER YOU HAVE ANSWERED THE SOFTWARE QUESTIONS, THE DIAGNOSTIC WILL BEGIN TO EXECUTE THE HARDWARE TEST CODE. THERE ARE SEVERAL THINGS THAT CAN HAPPEN NEXT, DEPENDING ON WHETHER A HARDWARE ERROR IS ENCOUNTERED AND ALSO ON WHAT SWITCH VALUES YOU SELECTED ON THE START COMMAND. CONSIDER THE POSSIBILITIES:

1. IF NO ERROR IS ENCOUNTERED, THEN THE DIAGNOSTIC WILL SIMPLY EXECUTE THE DESIRED NUMBER OF PASSES AND RETURN TO COMMAND MODE (PROMPT DS-B>).

2. IF AN ERROR IS ENCOUNTERED, THEN ONE OF THREE THINGS HAPPENS, DEPENDING ON THE SETTINGS OF THE HOE AND LOE FLAGS.

```
HOE SET:  THE ERROR WILL BE REPORTED ON THE CONSOLE AND
          THE DIAGNOSTIC WILL RETURN TO COMMAND MODE.
LOE SET:  THE DIAGNOSTIC WILL LOOP ENLESSLY ON THE BLOCK
          OF CODE THAT DETECTED THE ERROR.
NEITHER HOE NOR LOE SET:  THE ERROR WILL BE REPORTED ON
          THE CONSOLE AND NORMAL EXECUTION WILL RESUME
          AS IF NO ERROR HAD OCCURED.
```

2.1.2 SAMPLE RUN-THROUGH

LET'S SEE HOW ALL THIS WORKS IN A REAL SITUATION. RECALL THAT WE ENTERED THE COMMAND ''STA/PASS:1/FLAGS:HOE''. THIS WOULD BE A VERY TYPICAL WAY TO RUN THE DIAGNOSTIC. IF NO ERRORS ARE ENCOUNTERED, THE SINGLE REQUESTED PASS WILL BE EXECUTED AND THE PROMPT WILL BE REISSUED.

IF AN ERROR IS ENCOUNTERED, THE ERROR WILL BE REPORTED AND THE PROMPT WILL BE REISSUED (BECAUSE THE HOE FLAG IS SET). AT THIS POINT THERE ARE FOUR DIFFERENT WAYS YOU CAN GET THE PROGRAM GOING AGAINS:

1. ISSUE ANOTHER ''START'' COMMAND (THUS GOING THRU ALL OF STEPS 2, 3, 4, 5, AND 6 AGAIN)

2. ISSUE A ''RESTART'' COMMAND (SAME AS START COMMAND EXCEPT THAT THE HARDWARE QUESTIONS ARE NOT ASKED)

3. ISSUE A ''CONTINUE'' COMMAND (EXECUTION WILL RESUME AT THE BEGINNING OF THE PARTICULAR HARDWARE TEST (MOST DIAGNOSTICS CONSIST OF A NUMBER OF THESE) THAT IT WAS IN WHEN THE ERROR HALT OCCURED. NO QUESTIONS ASKED.

4. ISSUE A ''PROCEED'' COMMAND: EXECUTION WILL RESUME AT THE INSTRUCTION FOLLOWING THE ERROR REPORT (THIS IS A SPECIAL COMMAND AND CAN BE ISSUED ONLY AT A HALT ON ERROR).

THE MOST TYPICAL THING TO DO HERE IS TO ISSUE THE PROCEED, BUT WITH DIFFERENT FLAG SETTINGS. PROBABLY YOU WOULD WANT TO SAY

```
PRO/FLAGS:IER:LOE:HOE=0
```

THIS WILL DO THE FOLLOWING:

1. TURN ON THE IER (INHIBIT ERROR PRINTOUT) FLAG
2. TURN ON THE LOE FLAG
3. TURN OFF THE HOE FLAG
4. RESUME EXECUTION AT INSTRUCTION AFTER ERROR REPORT

THE DIAGNOSTIC WILL NOW LOOP ON THE BLOCK OF CODE THAT DETECTED AND REPORTED THE ERROR, BUT NO ERROR PRINTOUT WILL OCCUR. THUS YOU CAN STUDY THE ERROR OR SCOPE IT OR WHATEVER.

WHEN YOU'VE SEEN ENOUGH, YOU MAY HIT CONTROL/C. THIS WILL TAKE YOU OUT OF THE LOOP AND PUT YOU BACK INTO COMMAND MODE. YOU NOW HAVE THREE CHOICES:

1. START
2. RESTART
3. CONTINUE

LET'S SAY YOU'VE REPAIRED THE DEFECT FOUND ABOVE AND WANT TO FINISH RUNNING THE DIAGNOSTIC. YOU WOULD TYPE

```
          CON/FLAGS:HOE:IER=0:LOE=0
```

THIS WILL RESTORE THE FLAGS TO THEIR ORIGINAL VALUES AND RESUME EXECUTION AT THE BEGINNING OF THE HARDWARE TEST YOU WERE IN. IF THE ERROR DOES NOT RECUR, THE EXECUTION WILL FLOW RIGHT ON THRU TO THE NEXT ERROR OR TO END OF PASS.

IF AT END OF PASS YOU WANT TO RUN THE DIAGNOSTIC AGAIN, YOU HAVE TWO CHOICES:

1. START
2. RESTART

YOU WOULD CHOOSE ONE, DEPENDINC ON WHETHER YOU WANTED TO ANSWER THE HARDWARE QUESTIONS AGAIN.

THE FULL PRINT-OUT FROM THE ABOVE DIALOGUE MIGHT LOOK LIKE THIS:

```
                                                  BY
                                                  WHOM
                                                  ENTERED:
.R DZRKXX                                         O
DZRKXX                                            D
L-CLK (L) N ? Y                                   D,O
50HZ (L) N ?                                      D
LSI (L) N ?                                       D
LPT (L) N ?                                       D
MEM (K) (D) 16 ?                                  D
DS-B>STA/PASS:1/FLAGS:HOE                         D,O
# UNITS (D) ? 2                                   D,O
UNIT 1                                            D
CSR (O) ?                                         D,O
VECTOR (O) ?                                      D,O
BR LEVEL (O) ?                                    D,O
DRIVE (O) ? 0                                     D,O
UNIT 2                                            D
CSR (O) ?                                         D,O
VECTOR (O) ?                                      D,O
BR LEVEL (O) ?                                    D,O
DRIVE (O) ? 1                                     D,O
CHANGE SW (L) ? N                                 D,O
DZRKXX HARD ERR 00004 TST 003 SUB 002 PC:004130   D
ERR HLT                                           D
DS-B>PRO/FLAGS:IER:LOE:HOE=0                      D,O

*************************************************
AT THIS POINT THE DIAGNOSTIC IS LOOPING ON THE
ERROR WITHOUT PRINTING ANYTHING.  YOU CAN SCOPE
THE ERROR UNTIL YOU HAVE LOCATED IT, THEN ^C OUT
*************************************************

^C                                                O
DS-B>CON/FLAGS:HOE:IER:LOE=0                      D,O
CHANGE SW (L) ? N                                 D,O
DZRKXX EOP 1                                      D
DS-B>RESTART/PASS:1                               D,O
CHANGE SW (L) ? N                                 D,O
-------------------
-------------------
-------------------
-------------------
-------------------
```

2.2 HOW TO CREATE A CHAINABLE FILE

THE DIAGNOSTIC AS RECEIVED FROM RELEASE ENGINEERING CANNOT BE RUN IN CHAIN MODE. THA IS WHY IT BEARS THE EXTENSION 'BIN'' INSTEAD OF 'BIC''. THERE IS A WAY, HOWEVER, TO CREATE A CHAINABLE PROGRAM FROM WHAT YOU'VE GOT.

IT CONSISTS OF RUNNING THE PROGRAM WITH THE SPECIAL COMMAND ''CCI'' ISSUED WHERE YOU WOULD NORMALLY ISSUE A START COMMAND (TO THE PROMPT DS-B>. THIS COMMAND CAUSES THE DIAGNOSTIC TO GO THRU ALL THE QUESTIONS AND ANSWERS AND THEN TO HALT, JUST WHERE IT WOULD ORDINARILY BEGIN EXECUTION OF THE HARDWARE TEST CODE. AT THIS POINT YOU CAN DUMP THE PROGRAM AS IT SITS IN CORE TO THE LOAD MEDIUM, WITH THE NEW EXTENSION 'BIC''.

HERE IS A SAMPLE DIALOGUE TO ACCOMPLISH THIS:

```
        .R UPD2
        RESTART:  XXXXXX
        *CLR
        *LOAD DIAG.BIN
        XFER:200   CORE:0,60602
        *START 200
        L-CLK (L) N ?
        -------------
        -------------
        -------------
        DS-B>CCI
        # UNITS (D) ? 4
        -------------
        -------------
        -------------
        CHANGE SW (L) ? N
        PTAB END:  60632

        ***************************************
        *AT THIS POINT THE MACHINE HALTS AND*
        *YOU MUST RESTART AT ADDRESS  XXXXXX*
        ***************************************

        *HICORE 60632
        CORE:  0,60632
        *DUMP DK0: DIAG.BIC
```

THE RESULT OF DOING THIS IS THAT YOU CAN NOW BUILD AN XXDP CHAIN FILE CONTAINING THE XXDP COMMAND

```
          .R DIAG.BIC
```

AND THE DIAGNOSTIC WILL EXECUTE WITHOUT MANUAL INTERVENTION, USING THE ANSWERS THAT YOU GAVE IT WHEN YOU DID THE CCI COMMAND.

2.3 DETAILS OF COMMANDS AND SYNTAX

2.3.1 TABLE OF COMMAND VALIDITY

THERE ARE FOUR WAYS OF ENTERING DIAGNOSTIC COMMAND MODE, AND DIFFERENT SUBSETS OF THE DIAG COMMAND SET ARE AVAILABLE WITH EACH:

	HOW ENTERED	LEGAL COMMANDS
1.	OPERATOR ENTERED 'RUN DIAG'	START PRINT DISPLAY FLAGS ZFLAGS
2.	DIAGNOSTIC HAS FINISHED ALL ITS REQUESTED PASSED	START RESTART PRINT DISPLAY FLAGS ZFLAGS
3.	OPERATOR INTERRUPTED THE DIAGNOSTIC WITH CTRL/C	START RESTART CONTINUE PRINT DISPLAY FLAGS ZFLAGS
4.	AN ERROR WAS ENCOUNTERED WITH THE HOE FLAG SET SET	START RESTART CONTINUE PROCEED PRINT DISPLAY FLAGS ZFLAGS

2.3.2 COMMAND SYNTAX

```
*************************************************************************
STA(RT)/TESTS:TEST-LIST/PASS:PASS-CNT/FLAGS:FLAG-LIST/EOP:EOP-INCR
*************************************************************************
```

THE DIAGNOSTIC IN CORE IS EXECUTED IN ACCORDANCE WITH THE SWITCHES SPECIFIED. THE MESSAGE ''# UNITS?'' IS PRINTED. THE START COMMAND MAY BE ISSUED WHEN DIAGNOSTIC COMMAND MODE HAS BEEN ENTERED VIA ONE OF THE FOLLOWING: A) OPERATOR TYPED 'RUN DIAGNOSTIC'' B) DIAGNOSTIC FINISHED EXECUTING C) ERROR WAS ENCOUNTERED WITH HOE FLAG SET D) OPERATOR ENTERED CONTROL/C.

AFTER THE OPERATOR RESPONDS TO ''# UNITS?'', THE HARDWARE DIALOGUE IS INITIATED. WHEN IT IS COMPLETED, THE QUESTIONS ''CHANGE SW?'' IS ISSUED, AND THE ANSWERS, IF GIVEN, BECOME THE NEW DEFAULTS. THEREFORE IT IS NECESSARY TO RELOAD THE PROGRAM IN ORDER TO RETURN TO THE LOAD DEFAULTS.

THE SWITCH ARGUMENTS ARE AS FOLLOWS:

''TEST-LIST'' IS A SEQUENCE OF DECIMAL NUMBERS (1:2 ETC.) OR RANGES OF DECIMAL NUMBERS (1-5:8-10 ETC.) THAT SPECIFY THE TESTS TO BE EXECUTED. THE NUMBERS ARE SEPARATED BY COLONS. THE NUMBERS RANGE FROM 1 TO THE LARGEST TEST NUMBER IN THE DIAGNOSTIC. THEY MAY BE SPECIFIED IN ANY ORDER. TESTS WILL BE EXECUTED IN NUMBERICAL ORDER REGARDLESS OF THE ORDER OF SPECIFICATION. THE DEFAULT IS TO EXECUTE ALL TESTS.

''PASS-CNT'' IS A DECIMAL NUMBER INDICATING THE DESIRED NUMBER OF PASSES. A PASS IS DEFINED AS THE EXECUTION OF THE FULL DIAGNOSTIC (ALL SELECTED TESTS) AGAINST ALL UNITS SUMBITTED. THE DEFAULT IS NON-ENDING EXECUTION..B ''FLAG-LIST'' IS A SEQUENCE OF ELEMENTS OF THE FORM <FLAG>, <FLAG=1>, OR <FLAG=0>, SEPARATED BY COLONS, WHERE <FLAG> HAS ONE OF THE FOLLOWING VALUES:

```
HOE        HALT ON ERROR, CAUSING COMMAND MODE TO BE  ENTERED  WHEN  AN
           ERROR IS ENCOUNTERED
LOE        LOOP ON ERROR, CAUSING THE DIAGNOSTIC TO  LOOP  CONTINUOUSLY
           WITHIN  THE  SMALLEST  DEFINED  BLOCK  OF  CODING  (SEGMENT,
           SUBTEST, OR TEST) CONTAINING THE ERROR
IER        INHIBIT ERROR REPORTING
IBE        INHIBIT BASIC ERROR REPORTS
IXE        INHIBIT EXTENDED ERROR REPORTS
PRI        DIRECT ALL MESSAGES TO A LINE PRINTER
PNT        PRINT NUMBER OF TES BEING EXECUTED
BOE        BELL ON ERROR
UAM        RUN IN UNATTENDED MODE, BYPASSING MANUAL INTERVENTION TESTS
ISR        INHIBIT STATISTICAL REPORTS
IDU        INHIBIT DROPPING OF UNITS BY DIAGNOSTIC
```

THE FLAGS NAMED OR EQUATED TO 1 ARE SET, THOSE EQUATED TO 0 ARE CLEARED. A FLAG NOT SPECIFIED IS CLEARED. IF THE FLAGS SWITCH IS NOT GIVEN ALL FLAGS ARE CLEARED.

''EOP-INCR'' IS A DECIMAL NUMBER INDICATING HOW OFTEN (IN TERMS OF PASSES) IT IS DESIRED THAT THE END OF PASS MESSAGE BE PRINTED. THE DEFAULT IS AT THE END OF EVERY PASS.

```
***********************************************************************************
RES(TART)/TEST:TEST-LIST/PASS:PASS-CNT/FLAGS:FLAG-LIST/EOP:EOP-INCR/UNITS:UNIT-LIST
***********************************************************************************
```

THE DIAGNOSTIC IN CORE IS EXECUTED IN ACCORDANCE WITH THE SWITCHES SPECIFIED. HOWEVER, NEW P-TABLES ARE NOT BUILT. INSTEAD, THE ONES IN CORE ARE USED.
THE QUESTION ''CHANGE SW?'' IS ASKED, AND THE ANSERS IF GIVEN BECOME THE NEW DEFAULTS. THE COMMAND MAY BE ISSUED WHEN COMAND MODE HAS BEEN ENTERED VIA A) DIAGNOSTIC IS FINISHED B) HALT ON ERROR C) CONTROL/C.

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

1. ''UNIT-LIST'' IS A SEQUENCE OF LOGICAL UNIT NUMBERS RANGING FROM 1 THRU N (N = NUMBER OF UNITS BEING TESTED) SPECIFYING WHICH UNITS ARE TO BE TESTED. THE LOGICAL UNIT NUMBER DESIGNATES THE POSITION OF THE P-TABLE IN CORE, ACCORDING TO THE ORDER IN WHICH THEY WERE BUILT. THE UNITS SPECIFIED MUST NOT HAVE BEEN DROPPED BY THE OPERATOR DROP COMMAND. THE UNIT-LIST DEFAULTS TO ''ALL THAT HAVE NOT BEEN DROPPED BY OPERATOR COMMAND''. THE EFFECT OF THE UNIT-LIST LASTS UNTIL THE NEXT START (WHERE IT IS AUTOMATICALLY RESET TO ''ALL'') OR THE NEXT RESTART.

2. ALL UNSPECIFIED FLAG SETTINGS ARE UNCHANGED.

```
*******************************************
CON(TINUE)/PASS:<PASS-CNT/FLAGS:<FLAG-LIST>
*******************************************
```

COMMAND MODE MUST HAVE BEEN ENTERED DUE TO A HALT ON ERROR OR A CONTROL/C. THE EFFECT OF THE COMMAND IS TO GO TO THE BEGINNING OF THE TEST THAT WAS BEING EXECUTED WHEN THE HALT OR CONTROL/C TOOK PLACE. SOFTWARE DIALOGUE MAY OPTIONALLY BE REEXECUTED. HARDWARE PARAMETERS MAY NOT BE CHANGED.

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

1. DEFALT FOR PASS-CNT IS THE UNSATISFIED PASS-CNT FROM THE PREVIOUS START OR RESTART

2. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

```
***************************
PRO(CEED)/FLAGS:<FLAG-LIST>
***************************
```

COMMAND MODE MUST HAVE BEEN ENTERED VIA A HALT ON ERROR. THE EFFECT OF THE COMMAND IS TO BEGIN EXECUTION AT THE LOCATION FOLLOWING THE ERROR CALL. NEITHER HARDWARE NOR SOFTWARE PARAMETERS MAY BE ALTERED.

THE SWITCH ARGUMENTS ARE THE SAME AS THE START COMMAND EXCEPT:

1. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

```
*************************************************************
CCI/TEST:TEST-LIST/PASS:PASS-CNT/FLAGS:FLAG-LIST/EOP:EOP-INCR
*************************************************************
```

THE DIAGNOSTIC EXECUTES THRU ALL OPERATOR DIALOGUE AND HALTS AT THE HARDWARE TEST CODE. NOW THE OPERATOR CAN DUMP THE CORE IMAGE TO THE MEDIUM WITH A BIC EXTENSION.

THE BIC FILE MUST BE HANDLED DIFFERENTLY DEPENDING ON WHETHER IT IS RUN MANUALLY OR IN CHAIN MODE. IF RUN MANUALLY IT CAN BE INVOKED EITHER WITH A ''START'' (IN WHICH CASE IT WILL BEHAVE LIKE THE BIN FILE: THE PRE-GENERATED ANSWERS TO OPERATOR QUESTIONS WILL BE IGNORED) OR WITH A ''RESTART'' (IN WHICH CASE THE PRE-GENERATED OPERATOR ANSWERS WILL BE USED).

IF RUN IN CHAIN MODE, AUTOMATIC EXECUTION WILL COMMENCE IMMEDIATELY FROM THE XXDP COMMAND ''.R DIAG''. THE COMMAND PROMPT ''DS-B>'' WILL NOT BE ISSUED.

ANY SWITCHES SPECIFIED ON THE CCI COMMAND WILL CARRY OVER WHEN THE BIC FILE IS RUN IN CHAIN MODE (EXCEPT THAT UAM IS ALWAYS SET THERE) BUT WILL NOT CARRY OVER WHEN IT IS RUN MANUALLY.

TO DO A CCI ON A FULL SIZED DIAGNOSTIC (14.5K WORDS), A MACHINE SIZE LARGER THAN 16K IS REQUIRED. THE EXACT SIZE NEEDED DEPENDS ON WHICH UTILITY IS USED TO EXECUTE THE DIAGNOSTIC AT CCI TIME.

```
**********************
DRO(P)/UNITS:UNIT-LIST
**********************
```

THE UNITS SPECIFIED ARE DROPPED FROM TESTING UNTIL THEY ARE ADDED BACK OR UNTIL A START COMMAND IS GIVEN. A DROP CANNOT BE FOLLOWED BY A PROCEED.

THERE IS ALSO A ''DROP'' MACRO INTERNAL TO THE DIAGNOSTIC, WHICH GIVES THE FACILITY OF AUTO-DROPPING. THE DURATION OF A PROGRAM DROP, HOWEVER, IS ONLY UNTIL THE NEXT START OR RESTART.

****
ADD/UNITS:UNIT-LIST
****

THE UNITS SPECIFIED ARE ADDED BACK (THEY MUST HAVE BEEN PREVIOUSLY DROPPED BY THE DROP COMMAND) TO THE TEST SEQUENCE. AN ADD CANNOT BE FOLLOWED BY A PROCEED.

****
PRI(NT)
****

ALL STATISTICS TABLES ACCUMULATED BY THE DIAGNOSTIC ARE PRINTED. THE ISR (INHIBIT STATISTICAL REPORTING) FLAG IS CLEARED.

****
DIS(PLAY)/UNITS:<UNIT-LIST>
****

THE HARDWARE P-TABLES FOR ALL UNITS UNDER TEST ARE PRINTED OUT IN THE FORMAT IN WHICH THEY WERE ENTERED. ANY UNITS THAT WERE DROPPED BY THE OPERATOR 'DROP'' COMMAND ARE SO DESIGNATED.

****
FLA(GS)
****

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

****
ZFL(AGS)
****

ALL FLAGS ARE CLEARED.

2.4 EXTENDED P-TABLE DIALOGUE

THE FULL CAPABILITY OF THE HARDWARE DIALOGUE IS REVEALED BY THE FOLLOWING DISCUSSION OF WHAT HAPPENS INTERNALLY.

AS SOON AS THE QUESTION '# UNITS?'' IS ANSWERED (WITH THE NUMBER N, SAY) SPACE IN CORE IS ALLOCATED FOR N P-TABLES. ALL OF THE P-TABLES ARE OF THE SAME FORMAT, AND THERE IS A ONE-TO-ONE CORRESPONDENCE BETWEEN THE HARDWARE PARAMETER QUESTIONS AND THE SLOTS IN THE P-TABLE FORMAT.

ON THE FIRST TRIP THRU THE QUESTIONS, ALL OF THE SLOTS IN ALL OF THE P-TABLES ARE FILLED. IF THE OPERATOR TYPES IN LESS THAN N EXPLICIT VALUES IN RESPONSE TO A PARTICULAR QUESTION, THESE VALUES ARE PLACED IN THE P-TABLES (ONE VALUE GOING INTO THE PROPER SLOT OF EACH P-TABLE BEGINNING WITH THE FIRST P-TABLE) UNTIL THE STRING OF VALUES IS EXHAUSTED. THE LAST VALUE THAT SLOT IN THE REMAINING P-TABLES.

ON SUBSEQUENT TRIPS THRU THE QUESTIONS, THE SAME PROCESS IS CARRIED OUT, EXCEPT THAT THE EARLIEST P-TABLE NOT TO HAVE RECEIVED AN EXPLICIT VALUE IN ANY OF ITS SLOTS NOW ASSUMES THE ROLE THAT TABLE NUMBER ONE PLAYED IN THE FIRST TRIP.

THE SERIES OF QUESTIONS IS REISSUED UNTIL AT LEAST ONE QUESTION HAS RECEIVED N EXPLICIT VALUES FROM THE OPERATOR.

IN GIVING A STRING OF VALUES, COMMAS WITHOUT INTERVENING VALUES MAY BE USED TO INDICATE A REPETITION OF THE LAST NAMED VALUE.

A STRING OF VALUES MAY BE GIVEN AS A RANGE (6-10 FOR EXAMPLE). IF THE VALUES REPRESENT PURE NUMERICAL DATA, THIS SAMPLE RANGE TRANLATES TO THE STRING 6,7,8,9,10 (AN INCREMENT OF 1). IF THE VALUES ARE ADDRESSES, THE SAMPLE RANGE TRANSLATES TO THE STRING 6,8,10 (AN INCREMENT OF 2).

NOW LET US SEE HOW WE COULD USE THESE CAPABILITIES TO CONSTRUCT A SET OF P-TABLES. ASSUME THAT WE HAVE 64 UNITS, AND THAT THERE ARE THREE HARDWARE PARAMETERS FOR EACH (THREE SLOTS IN THE P-TABLE, THREE HARDWARE QUESTIONS IN THE DIALOGUE). LET THE DESIRED VALUE FOR THE FIRST PARAMETER BE THE NUMBER 75 FOR ALL 64 TABLES. LET THE DESIRED VALUE FOR THE SECOND PARAMETER BE EQUAL TO THE UNIT NUMBER (1,2,3,...,64) EXCEPT FOR UNIT 50, WHICH SOULD RECEIVE THE VALUE 49. LET THE DESIRED VALUE FOR THE THIRD PARAMETER BE THE NUMBER 76 FOR THE FIRST 20 UNITS AND THE NUMBER 77 FOR THE LAST 44 UNITS.

THE FOLLOWING DIALOGUE WOULD ACCOMPLISH THIS GOAL:

```
# UNITS (D) ? 64

UNIT 1
<QUESTION 1> ? 75
<QUESTION 2> ? 1-20
<QUESTION 3> ? 76

UNIT 21
<QUESTION 1> ?
<QUESTION 2> ? 21-49,,51-64
<QUESTION 3> ? 77
```

THE FIRST TIME THE SERIES IS ASKED, SLOT ONE RECEIVES A 75 IN ALL 64 TABLES. SLOT TWO RECEIVES THE VALUES 1,2,3,....,20 IN TABLES 1 THRU 20 AND A CONSTANT 20 IN TABLES 21 THRU 64. SLOT THREE RECEIVES A CONSTANT 76 IN ALL 64 TABLES.

THE SECOND TIME THRU THE SERIES, TABLES 21 THRU THE END ARE GOING TO BE AFFECTED (NOTE THAT THIS PIECE OF INFORMATION IS PRINTED OUT FOR THE OPERATOR IN THE FORM 'UNIT XX'' AT THE BEGINNING OF EACH SERIES). QUESTION 1 IS RESPONDED TO BY A <CR>, SO SLOT ONE STAYS A CONSTANT 75 IN TABLES 21 THRU 64, SINCE NO NEW EXLICIT VALUES ARE TYPED IN. SLOT TWO GETS THE VALUES 21,22,23,....,49 IN TABLES 21 THRU 49, AND GETS A 49 IN SLOT 50, AND GETS THE VALUES 51,52,53,....,64 IN TABLES 51 THRU 64. SLOT THREE GETS THE VALUE 77 IN TABLES 21 THRU 64.

THE DIALOGUE IS TERMINATED WHEN THE SOFTWARE RECOGNIZES THAT 64 EXPLICIT VALUES HAVE BEEN GIVEN FOR AT LEAST ON QUESTION (NAMELY QUESTION 2).

2.5 HARDWARE PARAMETERS

THE FOLLOWING QUESTIONS WILL BE ASKED ON A START COMMAND. THE VALUE LOCATED TO THE LEFT OF THE QUESTION MARK IS THE DEFAULT VALUE THAT WILL BE TAKEN ON A CARRIAGE RETURN RESPONCE.

RL11 (L) Y?

ANSWER YES(Y) IF YOU HAVE AN RL11 CONTROLLER, NO(N) IF YOU HAVE AN RLV11 CONTROLLER.

BUS ADDRESS (O) 174400?

ANSWER WITH THE BUS ADDRESS OF THE CONTROLLER.

VECTOR (O) 330?

ANSWER WITH THE INTERRUPT VECTOR OF THE CONTROLLER.

BR LEVEL (O) 5?

ANSWER WITH THE INTERRUPT PRIORITY OF THE CONTROLLER.

DRIVE (O) 0?

ANSWER WITH THE DRIVE(S) CONNECTED TO THE CONTROLLER.

2.6 SOFTWARE PARAMETERS

THE FOLLOWING QUESTIONS ARE ASKED IF REQUESTED ON A START, RESTART, OR CONTINUE. THEY ALLOW FLEXABILITY IN THE WAY THE PROGRAM BEHAVES. THE SOFTWARE PARAMETERS GIVE THE PROGRAM FLEXIBILITY IN THE WAY IT RUNS. THE PARAMETERS CAN BE MODIFIED ON A START, RESTART, OR CONTINUE BY ANSWERING (Y)ES TO THE FOLLOWING QUESTION:

```
          CHANGE S.W.  ?
```

A YES ANSWER WILL ASK THE FOLLOWING SOFTWARE PARAMETER QUESTIONS, WITH THE PRESENT DEFAULT VALUE PRINTED TO THE LEFT OF THE QUESTION MARK. (THE LAST ANSWER GIVEN IS THE DEFAULT) THE DEFAULT IS TAKEN ON A <CR>. CONTROL Z (^Z) WILL DEFAULT ALL REMAINING QUESTIONS AND START THE TEST.

```
        USE ALL CYLINDERS (N)?
```

IF ''YES'', THOSE TESTS THAT NORMALLY USE A SELECTED SET OF CYLINDERS WILL TEST EVERY CYLINDER ON THE CARTRIDGE.

```
        USE ALL SECTORS (N)?
```

IF ''YES'', THOSE TESTS THAT NORMALLY USE A SINGLE SECTOR TO TEST A GIVEN OPERATION (SUCH AS SEEK DESTINATION) WILL READ AND VERIFY EVERY SECTOR HEADER.

```
        EXECUTE MANUAL INTERVENTION TESTS (N)?
```

IF ''YES'', SEEK TIMING, ROTATIONAL TIMING, AND WRITE LOCK ERROR AND DATA PROTECTION TESTS ARE EXECUTED. THE ONLY TEST THAT ACTUALLY REQUIRES MANUAL INTERVENTION IS THE WRITE LOCK TEST AND THAT TEST WILL BYPASS AUTOMATICALLY AFTER WAITING 30 SECONDS FOR WRITE LOCK TO BE SET.

```
        LOWER SEEK LIMIT (N)?
```

IF ''YES'', THE NEXT PARAMETER IS REQUESTED.

```
        ENTER VALUE (DECIMAL) (0)?
```

THIS LIMIT IS IMPOSED ON ALL SEEK OPERATIONS SUCH THAT TESTING IS NOT DONE BELOW THAT LIMIT. IN ADDITION, SETTING THIS LIMIT (OR THE UPPER LIMIT, SEE BELOW) CAUSES THE FORWORD AND REVERSE OSCILLATING SEEK TESTS TO PERFORM DIFFERENTLY (SEE TEST DESCRIPTION). TESTS THAT REQUIRE ACCESS TO A SPECIFIC CYLINDER THAT FALLS BELOW THE SPECIFIED LIMIT WILL IGNORE THE LIMIT (SEE WRITE/READ TEST PART 1).

```
        UPPER SEEK LIMIT (N)?
```

IF ''YES'', AN UPPER CYLINDER LIMIT IS IMPOSED IN THE SAME MANNER AS THE LOWER SEEK LIMIT. A ''YES'' RESPONSE WILL CAUSE THE FOLLOWING PARAMETER REQUEST.

```
        ENTER VALUE (DECIMAL) (255)?

        USE ONLY ONE SURFACE (N)?
```

IF ''YES'', THE NEXT PARAMETER IS REQUESTED.

```
        SPECIFY SURFACE (0 OR 1) (DECIMAL) (0)?
```

WHICHEVER SURFACE IS SPECIFIED IS THE ONLY SURFACE TESTED IN THE ENTIRE PROGRAM. ANY TEST THAT IS DESIGNED TO TEST THE OTHER SURFACE IS AUTOMATICALLY BYPASSED. THE PROGRAM DOES NOT PRINT ANY INDICATION THAT A TEST IS BYPASSED IN THIS CASE.

SPECIFY ERROR LIMIT (DECIMAL) (20)?

THIS PARAMETER SPECIFIES THE MAXIMUM NUMBER OF ERRORS ALLOWED. THIS LIMIT IS ON A PER DRIVE BASIS IN A SINGLE PASS. IF THE ERROR LIMIT IS EXCEEDED, THE DRIVE IS DROPPED FROM FURTHUR TESTING.

DATA COMPARE ERROR LIMIT (DECIMAL) (20)?

THIS PARAMETER SPECIFIES THE NUMBER OF DATA COMPARE ERRORS THAT WILL BE LISTED FOR A GIVEN COMPARE OPERATION. AFTER THE LIMIT IS REACHED, THE DATA ERRORS ARE NOT PRINTED BUT THE COMPARE CONTINUES UNTIL THE END OF THE DATA FIELD. A TOTAL IS REPORTED AT THE END OF THE COMPARE.

DROP DRIVE IF NO RESPONSE (N)?

IF THIS PARAMETER IS SPECIFIED AS YES, THE PROGRAM WILL CHECK IF THE DRIVE IS READY OR IF IT WILL RESPOND TO A GET STATUS BEFORE TESTING STARTS ON THAT DRIVE. IF IT IS NOT READY AND WILL NOT RESPOND TO A GET STATUS THE DRIVE IS DROPPED AND A MESSAGE IS PRINTED.

3.0 ERROR INFORMATION

ALL ERRORS ARE PRINTED VIA CONSOLE DEVICE. THE ERROR INCLUDES ERROR NUMBER, TYPE AND PROGRAM LOCATION. ERRORS INCLUDE REGISTERS BEFORE AND AT ERROR WITH RELEVENT DATA.

3.1 ERROR REPORTING

THE OPERATION MESSAGE (LINE 4) IS GENERATED IN A DYNAMIC MANNER BASED ON THE SUBSYSTEM FUNCTION BEING EXECUTED AT THE TIME OF THE ERROR AND THE STATE OF THE FLAGS IN THE LOCATION TAGGED ''OPFLAGS''. THE POSSIBLE OPERATION MESSAGES ARE GIVEN BELOW.

SEEK - FROM (CYL NUM) DIFF (CYL DIFF) SGN (0 OR 1) HD (0 OR 1) WHERE THE VALUES ARE GIVEN IN OCTAL. THIS MESSAGE IS THE RESULT OF A SEEK OPERATION THAT WAS VERIFIED BY A READ HEADER AND THE HEAD POSITION AFTER A SEEK IS IN ERROR. (THE ACTUAL HEAD POSITION IN THIS ERROR SITUATION IS GIVEN IN THE RESULT LINE, LINE 5.)

READ DATA - IS A READ DATA OPERATION WHERE SOME FORM OF ERROR WAS DETECTED IN THE ACTUAL READ OPERATION. THIS ERROR COULD BE HARDWARE DETECTED SUCH AS DATA CRC, HEADER CRC, HEADER NOT FOUND, ETC., OR A SOFTWARE DETECTED ERROR SUCH AS DRIVE READY RESET AFTER A READ DATA COMPLETED.

READ DATA WITH DATA COMPARE - IS AN ERROR THAT WAS DETECTED AS BAD DATA IN THE BUFFER AFTER

A READ DATA OPERATION. WHEN THIS OPERATION IS REPORTED IT INDICATES THE ACTUAL READ DATA OPERATION COMPLETED WITH NO DETECTED ERRORS BUT THE DATA WAS WRONG.

READ HEADER - READ HEADER FOR 40 HEADERS - READ HEADER FOR 40 HEADERS WITH HEADER COMPARE - HAVE THE SAME GENERAL MEANING AS THE READ DATA AND READ DATA WITH DATA COMPARE. MESSAGES HAVING THE OPERATION OF READ HEADER OR READ HEADER FOR 40 HEADERS ARE THE RESULT OF ERRORS DETECTED IN THE ACTUAL OPERATION WHILE THE READ HEADER FOR 40 HEADERS WITH HEADER COMPARE INDICATES NO ERROR IN THE ACTUAL OPERATION BUT THE HEADER DATA ITSELF WAS IN ERROR.

WRITE DATA - RESET - GET STATUS - GET STATUS WITH RESET - ARE ALL BASIC OPERATIONS. AS BEFORE, THE ERROR DETECTION CAN BE EITHER HARDWARE OR SOFTWARE. THE RESULT LINE (LINE 5) WILL DEFINE THE REASON FOR THE REPORT.

LD DRV - UNLD DRV - ARE OPERATION MESSAGES THAT WILL APPEAR IN THE REPORT WHEN THE DRIVE LOAD AND UNLOAD SEQUENCE IS BEING TESTED.

ANOTHER GROUP OF OPERATION QUALIFIERS WILL BE REPORTED FOR OPERATIONS THAT FAIL IN SPECIFIC TESTS. THESE TESTS ARE THE WRITE/READ TEST PART 2, OVERWRITE TEST, AND THE ADJACENT CYLINDER INTERFERENCE TEST.

OPERATION	QUALIFIER
READ DATA WITH DATA COMPARE	FOL 0 TO CC SEEK
READ DATA	FOL 255 TO CC SEEK
WRITE DATA	FOL WRITE (NO SEEK)
READ HEADER	ADJ. CYL WRITTEN AFTER FWD SK
	ADJ. CYL WRITTEN AFTER REV SK
	SK FWD, WRT-SK REV, OVERWRT
	SK REV, WRT-SK FWD, OVERWRT

THE ABOVE OPERATIONS CAN BE REPORTED WITH ANY OF THE QUALIFIERS. THE QUALIFIERS IN THESE TESTS ARE AN ATTEMPT TO MAKE THE REPORT MORE MEANINGFUL BY PROVIDING INFORMATION ABOUT THE SEQUENCE OF OPERATIONS BEING DONE.

THE QUALIFIERS ''FOL 0 TO CC SEEK'' AND ''FOL 255 TO CC SEEK'' INDICATE THAT THE SEQUENCE OF OPERATIONS INCLUDED A SEEK OF A GIVEN DIRECTION TO THE CYLINDER WHERE THE TEST IS BEING

PERFORMED.

THE ''FOL WRITE (NO SEEK)'' QUALIFIER MEANS THAT THE OPERATION WAS DONE AFTER A WRITE WITH NO HEAD MOVEMENT BETWEEN THE WRITE AND READ.

THE QUALIFIER ''ADJ CYL WRITTEN AFTER FWD SK'' AND ''ADJ CYL WRITTEN AFTER REV SK'' WILL BE REPORTED ONLY IN THE ADJACENT CYLINDER INTERFERENCE TEST. THESE QUALIFIERS ARE USED WHEN THE ERROR OCCURS ON THE CYLINDER UNDER TEST AND DEFINE THE DIRECTION THE HEADS WERE MOVED WHEN THE ADJACENT CYLINDER WAS WRITTEN.

THE QUALIFIERS ''SK FWD, WRT-SK REV, OVERWRT'' AND ''SK REV, WRT-SK FWD, OVERWRT'' WILL BE REPORTED ONLY IN THE OVERWRITE TEST. THESE QUALIFIERS DEFINE THE DIRECTION OF HEAD MOTION BEFORE THE INITIAL WRITE AND THE OVERWRITE.

THE QUALIFIER ''ON BAD SEC FILES'' WILL BE REPORTED WITH THE WRITE DATA COMMAND IF THE PROGRAM ABORTS THAT COMMAND BECAUSE THE WRITE WOULD BE ON THE BAD SECTOR FILES.

3.1.2 SPECIFIC RESULT MESSAGES

THE RESULT MESSAGE (LINE 5) IS GENERATED DYNAMICALLY BASED ON THE EXPECTED RESULT OF THE OPERATION BEING TESTED. SINCE OPERATIONS ARE MONITORED DURING EXECUTION THE RESULT MESSAGE MAY REPORT AN ERROR DETECTED DURING THE OPERATION AS WELL AS THE ERRORS SEEN AT THE END OF THE OPERATION. ONLY THE FIRST ERROR SEEN IS REPORTED IN ALL CASES.

THE GENERAL FORMAT FOR THE RESULT LINE IS

RESULT:(VAR 1) IS (VAR 2) SB (VAR 3) (OPTIONAL QUALIFIER)

WHERE VARIABLE 1 CAN BE ONE OF THE FOLLOWING:

CONT ERR	(CONTROLLER ERROR)
DRV ERR	(DRIVE ERROR)
NON-EXSTNT MEM	(NON-EXISTANT MEMORY)
HDR CRC	(HEADER CRC ERROR)
DATA CRC	
HDR NOT FND	(HEADER NOT FOUND)
DATA LATE	
HDR NOT FND/HDR CRC/OPI	(ALL 3 BITS SET)
DRV RDY	(DRIVE READY)
SELECTED HEAD	
VOL CHK	(VOLUME CHECK)
COVER OPEN	
BRUSH HME	(BRUCH HOME)
WRT LCK	(WRITE LOCK)
HDS OUT	(HEADER OUT)
DRV SEL ERR	(DRIVE SELECT ERROR)
DRV STATE	(DRIVE STATE)
SPIN TIMEOUT	(SPINDLE TIMEOUT SPD ERROR)
WRT GAT ERR	(WRITE GATE ERROR)
SEEK TIMEOUT	(SKTO ERROR)
CUR HEAD ERR	(CURRENT IN HEAD ERROR)
WRT DAT ERR	(WRITE DATA ERROR)
OP INCOMPLETE	(OPI ERROR)
HDR/DAT ERR	(HEADER CRC OR DATA CRC ERROR BIT 11 OF CS REGISTER)
HDR NOT FND/DAT LATE	(HEADER NOT FOUND OR DATA LATE FRROR BIT 12 OF CS REGISTER)
CYL	(CYLINDER WHEN REPORTING A SEEK ERROR)

VARIABLE 2 WILL BE A VALUE THAT DEFINES WHAT THE RESULT ACTUALLY IS. THIS CAN BE A 1 OR 0 TO INDICATE A SET OF RESULT CONDITIONS, A NUMBER 0 TO 7 TO INDICATE THE DRIVE STATE, OR A NUMBER 0 TO 377 (OCTAL) TO IDENTIFY A CYLINDER NUMBER.

VARIABLE 3 DEFINES THAT THE VALUE GIVEN IS VARIABLE 2 SHOULD BE.

THE OPTIONAL QUALIFIER IS PROVIDED WHEN IT IS USEFUL TO KNOW WHEN THE ERROR WAS DETECTED IN THE OPERATION BEING PERFORMED. THIS QUALIFIER IS USED TO REPORT RESULTS SUCH AS:

```
BRUSH HME IS 1 SB 0 IN STATE 2
HEADS OUT IS 0 SB 1 IN STATE 3
DRV RDY   IS 0 SB 1 IN DATA XFER
SELECTED HEAD IS 1 SB 0 IN CYCLE UP
DRV RDY   IS 0 SB 1 IN STATE 5
DRV RDY   IS 1 SB 0 IN SEEK W/O MOTION
DRV RDY   IS 0 SB 1 IN 10MS
DRV RDY   IS 0 SB 1 IN 500MS
DRV RDY   IS 0 SB 1 IN 5SECONDS
```

THESE RESULTS, WHEN SEEN WITH THE OPERATION MESSAGE, WILL BE SELF EXPLANATORY.

OTHER RESULT MESSAGES THAT CAN BE PART OF AN ERROR REPORT ARE:

''INTERRUPT TO LATE'' WHICH INDICATES THAT THE OPERATION BEING PERFORMED DID NOT COMPLETE IN THE EXPECTED AMOUNT OF TIME. THIS RESULT CAN BE CAUSED BY THE DRIVE LOOSING READY BEFORE STARTING A READ HEADER AND THEREFORE NOT COMPLETING THE READ HEADER IN 1MS.

''FAIL TO RELOAD HEADS AFTER ERR CLEAR'' IS REPORTED WHEN AN ERROR CAUSES HEADS TO UNLOAD AND AFTER THE ERROR IS CLEARED THE HEADS DO NOT RELOAD.

''UNKN DRV STATE-NO RDY, NO ERR, HDS OUT'' IS REPORTED WHEN THE PROGRAM CANNOT DETERMINE THE DRIVE STATE OR STATUS.

''WRITE ABORTED'' IS REPORTED WHEN THE PROGRAM ABORTS A WRITE TO PROTECT THE BAD SECTOR FILES.

''COULD NOT RETRIEVE DRIVE STATUS'' IS REPORTED IF THE GET STATUS COMMAND DOES NOT COMPLETE SUCCESSFULLY WHEN THE STATUS IS REQUIRED TO REPORT AN ERROR.

''OPI SET-NO DRIVE RESPONSE'' IS REPORTED AS THE RESULT WHEN THE GET STATUS COMMAND IS TIMED OUT (OPI SETS) WHEN THAT COMMAND IS BEING USED IN THE EARLY TESTS TO CHECK THE DRIVE INTERFACE.

''NO INTERRUPT ON CMND COMPLETE'' IS REPORTED WHEN THE COMMAND SUCCESSFULLY COMPLETES BUT THE CONTROLLER HAS NOT GENERATED AN INTERRUPT.

'ERR DID NOT CLEAR'' IS REPORTED WHEN THE RESET COMMAND DOES NOT CLEAR THE CONTROLLER ERRORS. THIS IS A CONTROLER RELATED PROBLEM BUT IS REPORTED IF SEEN IN THE DRIVE TEST PROGRAMS.

'DRV ERR IS NOT CLEARED'' IS REPORTED WHEN THE GET STATUS W/RESET COMMAND DOES NOT CLEAR ALL DRIVE ERRORS.

'UNEXPECTED ERR'' IS REPORTED WHEN THE CONTROLLER SENSES AN ERROR BUT NO ERROR BITS ARE SET.

'BAD SEC FILE FMT ERR'' IS REPORTED IF THE CONTENTS OF THE FILES DO NO CORRESPOND TO THE EXPECTED FORMAT. (REFER TO DEC STANDARD 144 FOR FORMAT SPECIFICS.)

3.1.3 OTHER MESSAGES

OTHER INFORMATION IS REPORTED UNDER VARIOUS CIRCUMSTANCES. THESE ARE:

'BAD SEC FILES NOT STRD. ALL SEC ASSUMED GOOD.'' THIS MESSAGE IS PRINTED WHEN A PARTICULAR TEST REQUIRES THE BAD SECTOR FILES BUT THEY HAVE NOT BEEN STORED. THIS SITUATION WILL OCCUR IF THIS TEST IS STARTED OUT OF THE NORMAL PROGRAM SEQUENCE OR IF THE BAD SECTOR FILES COULD NOT BE READ.

'ERROR LIMIT EXCEEDED-UNIT DROPPED'' IS REPORTED (WITH THE UNIT NUMBER) WHEN MORE THAN THE

SPECIFIED NUMBER OF ERRORS (DEFAULT 20) HAVE OCCURED IN ANY SINGLE PASS.

MOST ERROR REPORTS HAVE THE FOLLOWING FORMAT.

```
        (1)    PROG NAME   ERR NUM   TEST NUM   SUBTEST NUM   ERR PC
        (2)    ROUTINE TRACE SEQ (IN SEQ CALLED)
                  (ADDRESS)
                  (ADDRESS)
                       .
                       .
                  (ADDRESS)
        (3)    TEST DESCRIPTION
        (4)    OPERATION:
        (5)    RESULT:
        (6)    ADDRESS OF UNIT UNDER TEST
        (7)              RLCS     RLDA     RLBA     RLMP     CYL     HD
        (8)    OP INIT
        (9)    OP DONE
        (10)         DRIVE STATUS
        (11)                WORD NUM IS (XXXXXX) SB (YYYYYY)
        (12)    TOTAL COMPARE ERRS: (ZZZ) OF (128)
```

THE ONLY EXCEPTION TO THE ABOVE FORMAT IS PURE DATA COMPARE ERRORS (NOT DETECTED BY READ ERROR). THEN THE FORMAT DOES NOT INCLUDE LINES 5 THROUGH 10.

LINE 1 IS THE ERROR HEADER AND IS PROVIDED BY THE SUPERVISOR. THE PROGRAM IS IDENTIFIED BY NAME WITH THE NUMBER OF TEST AND SUBTEST PRESENTLY BEING EXECUTED.

THE SUBTEST NUMBER IS UNIQUE IN THIS PROGRAM IN THAT IT DOES

NOT REFER TO A PHYSICAL SUBTEST WITHIN A GIVEN TEST. RATHER IT REFLECTS THE NUMBER OF TIMES A SUBTEST HAS BEEN EXECUTED WITHIN A TEST. CONSEQUENTLY, ON A TEST THAT TESTS AN INCREMENTAL TYPE OF OPERATION (SUCH A INCREMENTAL SEEKS, READ ALL HEADERS FROM BOTH SURFACES, ETC.) THE SUBTEST WILL BE DESCRIPTIVE OF WHERE IN THE TEST THE ERROR OCCURRED.

THE ERROR P.C. IS THE PHYSICAL MEMORY LOCATION WHERE THE ERROR REPORT WAS INITIATED. SINCE MANY FUNCTIONS ARE SUBROUTINED, AND ERRORS ARE REPORTED FROM SUBROUTINES, THE ERROR P.C. IS NOT SUFFICIENT TO IDENTIFY THE LOCATION OF THE ERROR CALL AND THE ROUTINE TRACE SEQUENCE IS PROVIDED.

LINE 2 IS THE ROUTINE TRACE SEQUENCE. IF THE ERROR CALL IS INITIATED FROM WITHIN THE TEST (AS OPPOSED TO WITHIN A ROUTINE), THIS PORTION OF THE REPORT IS OMITTED. IF THE CALL IS INITIATED FROM A ROUTINE (WHICH MAY BE CALLED BY ANOTHER ROUTINE, WHICH MAY BE CALLED BY ANOTHER ROUTINE, ETC. SEVERAL LEVELS DEEP) THE ROUTINE TRACE SEQUENCE PROVIDES A TRAIL TO THE ACTUAL LOCATION WITHIN THE TEST THAT CALLED THE FIRST ROUTINE. THE FIRST ENTRY LISTED IS THE LOCATION WHERE THE FIRST ROUTINE WAS CALLED.

LINE 3 IS THE TEST DESCRIPTION AND IS ROUGHLY IDENTICAL TO THE NAME OF THE TEST BEING PERFORMED.

LINE 4 IDENTIFIES THE ACTUAL HARDWARE FUNCTION THAT IS BEING PERFORMED. ADDITIONAL INFORMATION ON THIS LINE IS DESCRIPTIVE OF SPECIFIC USE OF THE FUNCTION. FOR EXAMPLE, THE OPERATION LINE WILL READ ''READ HEADERS FOR 40 HEADERS'' WHEN ALL HEADERS ARE BEING READ FROM A TRACK.

LINE 5 IDENTIFIES THE ERROR THAT HAS BEEN DETECTED. THE CONTENT OF LINE 5 IDENTIFIES WHAT WAS BENG TESTED (SUCH AS DRIVE READY, CONTROLLER ERROR, DRIVE STATE, ETC.), WHAT IT IS AND WHAT IT SHOULD BE. LINE 5 MAY BE REPEATED IF MORE THAN ONE TESTED ITEM IS FOUND IN ERROR.

IN ADDITION LINE 5 WILL REPORT ANY HARDWARE DETECTED ERRORS SUCH AS OPERATION INCOMPLETE, HEADER CRC, ETC. IN THIS CASE THE FIRST LINE PRINTED AS RESULT WILL BE DETERMINED BY THE THREE ERROR BITS OPI, HNF/DLT, AND HCRC/DCRC. THE LINE WILL BE DETERMINED AS IN THE FOLLOWING TRUTH TABLE:

HNF/DLT	DCRC/HCRC	OPI	MESSAGE
1	1	1	HDR NOT FND/HDR CRC/OPI ERROR
0	1	1	HDR CRC ERROR
1	0	1	HDR NOT FND ERROR
0	1	0	DATA CRC ERROR
1	0	0	DATA LATE ERROR

LINE 6 IDENTIFIES THE PHYSICAL ADDRESS OF THE UNIT UNDER TEST. THIS ADDRESS IS BY UNIBUS ADDRESS OF THE CONTROLLER AND DRIVE NUMBER.

LINE 7 NAMES THE CONTROLLER REGISTERS (AND CYLINDER AND HEAD WHERE THESE ARE APPLICABLE IN THE REPORT) TO BE REPORTED.

LINE 8 PROVIDES THE CONTENTES OF CONTROLLER REGISTERS WHEN THE OPERATION WAS INITIATED.

LINE 9 PROVIDES THE CONTENTS OF THE CONTROLLER REGISTERS WHEN THE ERROR BEING REPORTED WAS DETECTED. FREQUENTLY THE REGISTER CONTENTS OF OP INIT AND OP DONE WILL BE DIFFERENT. OP INIT MAY INDICATE A SEEK WAS BEING PERFORMED BUT OP DONE MAY INDICATE THE ERROR WAS DETECTED BY A READ HEADER. THE REASON IS THAT A SEEK WAS EXECUTED AND DID NOT PROPERLY POSITION HEADS AND WHEN THE READ HEADER WAS DONE THE HEADS WERE ON THE WRONG CYLINDER.

LINE 10 IS THE DRIVE STATUS. THIS LINE IS ONLY REPORTED IF THE RLMP REGISTER DOES NOT CONTAIN THE ACTUAL DRIVE STATUS.

LINE 11 AND LINE 12 ARE REPORTED IF THE ERROR WAS DETECTED AS A COMPARE OPERATION, EITHER DATA OR HEADERS. IN ADDITION, GOOD AND BAD DATA IS REPORTED FOR ALL READ ERRORS.

3.2 ERROR HALTS

ERROR HALTS ARE SUPPORTED PER DESCRIBED IN THE PREVIOUS SECTION WITH /FLAG:HOE. THERE ARE NO OTHER HALTS.

4.0 PERFORMANCE AND PROGRESS REPORTS

4.1 PERFORMANCE REPORTS

THIS PROGRAM WILL NOT GIVE ANY PERFORMANCE REPORTS.

4.2 PROGRESS REPORTS

THIS PROGRAM WILL NOT GIVE ANY PROGRESS REPORTS.

5.0 DEVICE INFORMATION TABLES

THE RL11/RLV11 CONTROLLER HAS THE FOLLOWING FOUR(4) REGISTERS FOR CONTROL OF THE SUBSYSTEM.

```
        RLCS - CONTROL AND STATUS REGISTER (XXXXX0)
        -------------------------------------------

        BIT 15 - COMPOSITE ERROR
        BIT 14 - DRIVE ERROR
        BIT 13 - NON EXISTANT MEMORY ERROR
```

```
BIT 12 - HEADER NOT FOUND (WITH BIT 10 SET)
       - DATA LATE (WITH BIT 10 CLEAR)
BIT 11 - HEADER CRC (WITH BIT 10 SET)
       - DATA CRC (WITH BIT 10 CLEAR)
BIT 10 - OPERATION INCOMPLETE
BIT  9/8 - DRIVE SELECT (0-3)
BIT  7 - CONTROLLER READY
BIT  6 - INTERRUPT ENABLE
BIT  5 - EXTENDED BUS ADDRESS (BIT 17)
BIT  4 - EXTENDED BUS ADDRESS (BIT 16)
BIT 3-1 - FUNCTION CODE
        0 - NOP (PDP-11) MAINT (LSI-11)
        1 - WRITE CHECK
        2 - GET DRIVE STATUS
        3 - SEEK
        4 - READ HEADER
        5 - WRITE DATA
        6 - READ DATA
        7 - READ WITHOUT HEADER COMPARE

BIT  0 - DRIVE READY


RLBA - BUS ADDRESS REGISTER (XXXXX2)
------------------------------------

BITS 15-1 BUS ADDRESS OF DATA TRANSFER
BIT 0 SHOULD BE 0

RLDA - DISK ADDRESS REGISTER (XXXXX4)
-------------------------------------

FOR READ/WRITE FUNCTIONS
------------------------

BIT 15 - MUST BE ZERO(0)
BIT 14-7 - CYLINDER ADDRESS FOR TRANSFER
BIT 6 - SURFACE FOR TRANSFER
BIT 5-0 - SECTOR FOR TRANSFER (0-47)

FOR SEEK FUNCTION
-----------------

BIT 15 - MUST BE ZERO(0)
BIT 14-7 - DIFFERENCE TO NEW CYLINDER
BIT 6-5 - MUST BE ZERO(0)
BIT 4 - SURFACE
BIT 3 - MUST BE ZERO
BIT 2 - SEEK DIRECTION( 1 - IN / 0 - OUT )
BIT 1 - MUST BE ZERO
BIT 0 - MUST BE ONE(1)

FOR GET STATUS FUNCTION
-----------------------
```

```
        BIT 15-4 - IGNORED SHOULD BE ZERO
        BIT 3 - DRIVE RESET
        BIT 2 - MUST BE ZERO
        BIT 1 - MUST BE ONE
        BIT 0 - MUST BE ONE

        RLMP - MULTIPURPOSE REGISTER
        ----------------------------

        FOR READ/WRITE FUNCTION
        -----------------------

        BIT 15 - 0 - WORD COUNT(TWO'S COMPLIMENT)

        FOR READ HEADER FUNCTION
        ------------------------

        BIT 15-0 - DISK HEADER OF SECTOR (FIRST READ)
                 - ZERO WORD (SECOND READ)
                 - HEADER CRC (THIRD READ)

        FOR GET STATUS FUNCTION
        -----------------------

        HAS DRIVE STATUS

        BIT 15 - WRITE DATA ERROR
        BIT 14 - CURRENT HEAD ERROR(CHE)
        BIT 13 - WRITE LOCK STATUS(WL)
        BIT 12 - SEEK TIME OUT(SKTO)
        BIT 11 - SPIN ERROR(SPE)
        BIT 10 - WRITE GATE ERROR(WGE)
        BIT  9 - VOLUME CHECK(VC)
        BIT  8 - DRIVE SELECT ERROR(DSE)
        BIT  7 - RESERVED(0)
        BIT  6 - SURFACE
        BIT  5 - COVER OPEN
        BIT  4 - HEADS HOME
        BIT  3 - BRUSHES HOME
        BIT 2-0 -STATE BITS
                0 - LOAD STATE
                1 - SPIN UP
                2 - BRUSH CYCLE
                3 - LOAD HEADS
                4 - SEEK - TRACK COUNTING
                5 - SEEK - LINEAR MODE
                6 - UNLOAD HEADS
                7 - SPIN DOWN

6.0 TEST SUMMARIES

TEST 1  DIFFERENCE OF 1 SEEK TEST (PART 1)

        DO READ HEADER, WAIT FOR INTERRUPT.  STORE WORD 1 OF HEADER.
```

DO SEEK WITH DIFFERENCE OF 1, HEAD 0. IF CYLINDER OF STORED HEADER WORD IS NOT 255 THEN SIGN BIT 1, ELSE SIGN BIT 0. WAIT FOR INTERRUPT.

DO GET STATUS, WAIT FOR INTERRUPT. CHECK STATE IS 4. IF NOT:

DRIVE COMMAND SHIFT REGISTER BAD
DIFFERENCE REGISTER DROPPED BIT
STATE ROM FAILED

WAIT APPROX 5 MS. DO GET STATUS, WAIT FOR INTERRUPT. CHECK STATE IS 5. IF NOT:

DIFFERENCE REGISTER NOT COUNTING
COUNT PULSE NOT GENERATED (COUNT LOGIC)
SEEK ROM FAILED
FAILURE IN DC SERVO
NO TACH FEEDBACK

WAIT APPROX 5 MS LONGER. TEST DRIVE READY. IF SET:

FAILURE IN READY LATCH OR INTEGRATOR

WAIT APPROX 5 MS LONGER. TEST READY. IF RESET:

FAILURE IN INTEGRATOR
UNEXPECTED GUARD BAND DETECTED

DO SEEK WITH DIFFERENCE 1, OPPOSITE SIGN, HEAD 0. REPEAT ALL TESTS AS ABOVE.

REPEAT TEST USING HEAD 1.

NOTE: THIS TEST IS PERFORMED AT THE CYLINDER POSITION FOUND IN THE DRIVE WHEN THE TEST EXECUTES. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE.

TEST 2 DIFFERENCE OF 1 SEEK TEST (PART 2)

DO READ HEADER, WAIT FOR INTERRUPT. STORE WORD 1 OF HEADER.

DO SEEK WITH DIFFERENCE OF 1, HEAD 0. IF CYLINDER OF STORED HEADER WORD IS NOT 255 THEN SIGN BIT 1, ELSE SIGN BIT 0. WAIT FOR INTERRUPT, WAIT FOR DRIVE READY.

DO READ HEADER, WAIT FOR INTERRUPT. COMPARE CYLINDER OF THIS HEADER WITH CYLINDER OF STORED HEADER FOR DIFFERENCE OF ONE. IF NOT:

COUNT LOGIC BAD
INTERGRATOR FAILED

CHECK THAT HEADS MOVED FORWARD OR REVERSE AS EXPECTED. IF

NOT:

SEEK ROM FAILED

DO SEEK WITH DIFFERENCE OF 1, OPPOSITE SIGN, HEAD 0. REPEAT ALL TESTS AS ABOVE.

REPEAT TEST USING HEAD 1.

NOTE: THIS TEST IS PERFORMED AT THE CYLINDER POSITION FOUND IN THE DRIVE WHEN THE TEST EXECUTES. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE.

TEST 3 OUTER GUARD BAND DETECTION TEST

DO READ HEADER, WAIT FOR INTERRUPT. CHECK IF AT CYLINDER 0. IF NOT, SEEK REVERSE 1 CYLINDER AT A TIME UNTIL CYLINDER 0 IS REACHED. IF ANY REVERSE SEEK FAILS TO MOVE THE HEADS IN 10 TRIES:

DETECTION OF GUARD BAND PREMATURE.

WHEN AT CYLINDER 0, DO SEEK DIFFERENCE OF 1, SIGN 0, HEAD 0. WAIT FOR INTERRUPT, WAIT FOR READY. READY SHOULD SET IN 20MS>T>15MS. IF NOT:

FAILED TO DETECT GUARD BAND

DO READ HEADER. WAIT FOR INTERRUPT. CHECK FOR CYLINDER 0. IF NOT

FAILED TO SEEK BACK TO ZERO

DO SEEK WITH DIFFERENCE OF 1, SIGN 0, HEAD 1. DO SAME TESTS AS ABOVE WITH REGARD TO READY VS TIME AND CYLINDER FOUND IN

HEADER.

NOTE: CHOOSING A SINGLE SURFACE WILL LIMIT THE TESTING TO THAT SURFACE.

TEST 4 INCREMENTAL FORWARD SEEK HEAD 0 TEST

POSITION HEADS AT CYLINDER ''LOLIMIT'' USING SEEKS WITH DIFFERENCE OF ONE, HEAD 0.

DO SEEK WITH DIFFERENCE OF 1, SIGN 1, HEAD 0. WAIT FOR INTERRUPT, WAIT FOR DRIVE READY. CHECK READY IS SET IN 15 MS. IF NOT:

POSITIONING PROBLEM AT A SPECIFIC CYLINDER
MECHANICAL OBSTRUCTION

DO READ HEADER, WAIT FOR INTERRUPT. CHECK THAT THIS CYLINDER IS OLD CYLINDER + 1. IF NOT:

```
                DIFFERENCE REGISTER OR COUNT LOGIC FAILURE
                TRACK CROSSING DETECTION FAILURE

        REPEAT SEEKS AND READS UNTIL CYLINDER READ IS 'HILIMIT''.

        NOTE 1: IF THE 'USE ALL SECTORS'' PARAMETER  IS  SPECIFIED  AS
                'Y'',  THE  TEST  WILL  READ  AND  TEST  ALL 40 HEADERS
                (CARTRIDGE VERIFY).

        NOTE 2: TESTING WILL BE DONE BETWEEN UPPER AND LOWER  CYLINDER
                LIMITS.   CHOOSING A SINGLE SURFACE WILL LIMIT TESTING
                TO THAT  SURFACE.   THIS  TEST  WILL  BE  BYPASSED  IF
                SURFACE 1 IS CHOSEN.

TEST 5  INCREMENTAL REVERSE SEEK HEAD 0 TEST

        POSITION  HEADS  AT  CYLINDER  'HILIMIT'' USING  SEEKS  WITH
        DIFFERENCE OF 1, HEAD 0.

        DO SEEK WITH DIFFERENCE OF  1,  SIGN  0,  HEAD  0.   WAIT  FOR
        INTERRUPT, WAIT FOR DRIVE READY.  CHECK READY SET IN 15 MS:

                POSITIONING PROBLEM AT A SPECIFIC CYLINDER
        DO READ HEADER, WAIT FOR INTERRUPT. CHECK THAT THIS CYLINDER
        IS OLD CYLINDER - 1. IF NOT:

                DIFFERENCE REGISTER OR COUNT LOGIC FAILURE
                TRACK CROSSING DETECTION FAILURE

        REPEAT SEEK AND CHECKS UNTIL CYLINDER IS 'LOLIMIT''.


        NOTE:   IF THE 'USE ALL SECTORS'' PARAMETER  IS  SPECIFIED  AS
                'Y'',  THE  TEST  WILL  READ  AND  TEST  ALL 40 HEADERS
                (CARTRIDGE VERIFY).

        NOTE:   TESTING WILL BE DONE BETWEEN UPPER AND LOWER  CYLINDER
                LIMITS.   CHOOSING A SINGLE SURFACE WILL LIMIT TESTING
                TO THAT  SURFACE.   THIS  TEST  WILL  BE  BYPASSED  IF
                SURFACE 1 IS CHOSEN.

TEST 6  INCREMENTAL FORWARD SEEK HEAD 1 TEST

        POSITION  HEADS  AT  CYLINDER  'HILIMIT'' USING  SEEKS  WITH
        DIFFERENCE OF ONE, HEAD 0.

        DO SEEK WITH DIFFERENCE OF  1,  SIGN  1,  HEAD  1.   WAIT  FOR
        INTERRUPT, WAIT FOR DRIVE READY.  CHECK READY IS SET IN 15 MS.
        IF NOT:

                POSITIONING PROBLEM AT A SPECIFIC CYLINDER

        DO READ HEADER, WAIT FOR INTERRUPT.  CHECK THAT THIS  CYLINDER
        IS OLD CYLINDER + 1.  IF NOT:
```

```
        DIFFERENCE REGISTER OR COUNT LOGIC FAILURE
        TRACK CROSSING DETECTION FAILURE

REPEAT SEEKS AND READS UNTIL CYLINDER READ IS ''HILIMIT''.

NOTE 1: IF THE ''USE ALL SECTORS'' PARAMETER  IS  SPECIFIED  AS
        ''Y'',  THE  TEST  WILL  READ  AND  TEST  ALL 40 HEADERS
        (CARTRIDGE VERIFY).

NOTE 2: TESTING WILL BE DONE BETWEEN UPPER AND LOWER  CYLINDER
        LIMITS.   CHOOSING A SINGLE SURFACE WILL LIMIT TESTING
        TO THAT  SURFACE.   THIS  TEST  WILL  BE  BYPASSED  IF
        SURFACE 0 IS CHOSEN.

TEST 7  INNER GUARD BAND DETECTION TEST

        POSITION HEADS AT CYLINDER 255 USING SEEK WITH  DIFFERENCE  OF
        1, HEAD 0.

        WHEN AT CYLINDER 255, DO SEEK WITH DIFFERENCE OF  1,  SIGN  1,
        HEAD  0.   WAIT  FOR  INTERRUPT,  WAIT FOR DRIVE READY.  READY
        SHOULD SET IN 20MS>T>15MS.  IF NOT:

                FAILED TO DETECT GUARD BAND

        DO READ HEADER.  WAIT FOR INTERRUPT.  CHECK FOR CYLINDER  255.
        IF NOT:


                FAILED TO SEEK BACK TO CYLINDER 255

        DO SEEK WITH DIFFERENCE OF 1, SIGN 1, HEAD 1.  DO  SAME  TESTS
        AS ABOVE.

        NOTE:   CHOOSING A SINGLE SURFACE WILL LIMIT  THE  TESTING  TO
                THAT SURFACE.

TEST 8  INCREMENTAL REVERSE SEEK HEAD 1 TEST

        POSITION  HEADS  AT  CYLINDER  ''HILIMIT''  USING   SEEKS   WITH
        DIFFERENCE OF 1, HEAD C.

        DO SEEK WITH DIFFERENCE OF  1,  SIGN  0,  HEAD  1.   WAIT  FOR
        INTERRUPT, WAIT FOR DRIVE READY.  CHECK READY SET IN 15 MS:

                POSITIONING PROBLEM AT A SPECIFIC CYLINDER

        DO READ HEADER, WAIT FOR INTERRUPT.  CHECK THAT THIS  CYLINDER
        IS OLD CYLINDER - 1.  IF NOT:

                DIFFERENCE REGISTER OR COUNT LOGIC FAILURE
                TRACK CROSSING DETECTION FAILURE

        REPEAT SEEK AND CHECKS UNTIL CYLINDER IS ''LOLIMIT''.
```

NOTE 1: IF PROGRAM MODE 2 IS USED AND THE ''USE ALL SECTORS'' PARAMETER IS SPECIFIED AS ''Y'', THE TEST WILL READ AND TEST ALL 40 HEADERS (CARTRIDGE VERIFY).

NOTE 2: TESTING WILL BE DONE BETWEEN UPPER AND LOWER CYLINDER LIMITS. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE. THIS TEST WILL BE BYPASSED IF SURFACE 0 IS CHOSEN.

TEST 9 SEEK TESTS

POSITION HEADS AT CYLINDER ''LOLIMIT'' USING SEEKS WITH DIFFERENCE OF 1, HEAD 0.

DO READ HEADER, RECORD POSITION. DO SEEK WITH DIFFERENCE OF 2 (MAX DISTANCE AT 3 IPS), SIGN 1, HEAD 0. DO READ HEADER, CHECK NEW CYLINDER IS OLD CYLINDER + DISTANCE. IF NOT:

TRACK CROSSING DETECTION FAILURE
DIFFERENCE COUNTER FAILURE
COUNT PULSE GENERATION FAILURE
VELOCITY ROM FAILURE

REPEAT ABOVE UNTIL OLD CYLINDER + DISTANCE > 255. POSITION AT 255.

DO READ HEADER, RECORD POSITION. DO SEEK WITH DIFFERENCE OF 2 (MAX DISTANCE AT 3 IPS), SIGN 0, HEAD 0. DO READ HEADER, CHECK NEW CYLINDER IS OLD CYLINDER - DISTANCE. IF NOT:

TRACK CROSSING DETECTION FAILURE

REPEAT UNTIL OLD CYLINDER - DISTANCE < 0. REPEAT ALL OF THE ABOVE USING HEAD 1.

REPEAT ALL OF THE ABOVE TESTS USING THE FOLLOWING DISTANCES: 6, 9, 12, 17, 22, 27, 34, 41, 128, 256. THESE DISTANCES ARE SPECIFIED BECAUSE THEY REPRESENT THE MAXIMUM DISTANCE FOR EACH VELOCITY LEVEL USED IN THE DRIVE.

NOTE: TESTING WILL BE DONE BETWEEN UPPER AND LOWER CYLINDER LIMITS. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE.

TEST 10 FORWARD OSCILLATING SEEK TEST

POSITION HEADS AT CYLINDER 0.

DO OSCILLATING SEEK USING HEAD 0 (SEEK FROM 0 TO 1 TO 0, 0 TO 2 TO 0, 0 TO 3 TO 0, ...0 TO 255 TO 0). AFTER EACH SEEK READ HEADER AND VERIFY POSITION.

REPEAT TEST USING HEAD 1.

NOTE: IF EITHER CYLINDER LIMIT IS SPECIFIED, THE TEST WILL SEEK BETWEEN UPPER AND LOWER LIMITS FOR EACH SURFACE. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE. NOTE THAT LOOPING ON TEST THEN PROVIDES A FIXED DISTANCE SEEK LOOP.

TEST 11 REVERSE OSCILLATING SEEK TEST

POSITION HEADS AT CYLINDER 255. DO OSCILLATING SEEK USING HEAD 0. (SEEK FROM 255 TO 254 TO 255,255 TO 253 TO 255.....255 TO 0 TO 255.) AFTER EACH SEEK READ HEADER AND VERIFY POSITION.

REPEAT TEST USING HEAD 1.

NOTE: IF EITHER CYLINDER LIMIT IS SPECIFIED, THE TEST WILL SEEK BETWEEN UPPER AND LOWER LIMITS FOR EACH SURFACE. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE. NOTE THAT LOOPING ON TEST THEN PROVIDES A FIXED DISTANCE SEEK LOOP.

TEST 12 SEEK TIMING

POSITION HEADS AT CYLINDER 0.

DO 64 SEEKS FROM 0 TO 1 AND 1 TO 0, MEASURING THE SEEK TIME FOR EACH SEEK. AVERAGE THE SEEK TIMES (FORWARD AND REVERSE INDEPENDENTLY) AND REPORT.

REPEAT ABOVE SEEKING BETWEEN CYLINDER 127 TO 128 AND 254 TO 255.

REPEAT ABOVE SEEKING BETWEEN CYLINDER 0 TO 127 AND 128 TO 256.

REPEAT ABOVE SEEKING BETWEEN CYLINDER 0 AND 255.

THE SEEK TIMES WILL BE REPORTED AS SHOWN BELOW. THE TIME MEASURED IS FROM START OF SEEK COMMAND UNTIL INTERRUPT IS RECEIVED.

```
                INNER     MIDDLE    OUTER     EXPECTED
1 CYL FWD         X         X         X          X
1 CYL REV         X         X         X          X
128 CYL FWD       X                   X          X
128 CYL REV       X                   X          X
256 CYL FWD                 X                    X
256 CYL REV                 X                    X
```

THE X INDICATES WHERE TIME WILL BE REPORTED.

NOTE: THE ABOVE REPORT WILL BE PRINTED IN THE FIRST PASS FOR EACH DRIVE UNDER TEST IF MANUAL INTERVENTION TESTS WERE RUN. THE EXPECTED TIMES ARE FOR USER COMPARISON

ONLY. THE PROGRAM WILL NOT REPORT DEVIATION AS AN ERROR.

TEST 13 BASIC READ DATA TEST

POSITION HEADS AT CYLINDER 255.

DO READ DATA, HEAD 1. CHECK FOR ANY ERRORS AND REPORT. IF ERROR, READ SECTOR 1 THROUGH 19 UNTIL NO ERROR ON READ. REPORT ALL ERRORS BUT DO NOT INCREMENT ERROR COUNT. IF NONE CAN BE READ, SUCCESSFULLY, REPORT THAT FACTORY BAD SECTOR FILE CANNOT BE READ, INCREMENT ERROR COUNT AND PROCEED WITH READ OF SECTOR 20.

ON SECTOR WITH NO CRC ERROR, VERIFY DATA FORMAT (WORD 0 AND 1 ARE NOT 0, WORD 2 AND 3 ARE 0, LOCATE FIRST WORD OF ALL ONE'S AND THAT WORD TO WORD 127 ARE ALL ONE'S.) STORE BAD SECTOR DATA.

READ DATA, HEAD ONE, SECTOR 20. CHECK FOR ANY ERRORS AND

REPORT. IF ERROR, READ SECTOR 21 THROUGH 39 UNTIL NO ERROR ON READ. REPORT ALL ERRORS BUT DO NOT INCREMENT ERROR COUNT. IF NONE CAN BE READ SUCCESSFULLY, REPORT THAT SOFTWARE BAD SECTOR FILES CANNOT BE READ, INCREMENT ERROR COUNT AND EXIT TEST.

ON SECTOR WITH NO CRC ERROR, VERIFY DATA AS ABOVE. STORE BAD SECTOR DATA.

NOTE: IF SURFACE 0 IS SELECTED THIS TEST WILL BE BYPASSED.

TEST 14 WRITE/READ DATA TEST (PART 1)

POSITION HEADS AT CYLINDER 0

WRITE PATTERN 1 ON HEAD 0, SECTOR 0. CHECK FOR ANY ERROR.

READ HEAD 0, SECTOR 0. CHECK FOR CRC ERROR. COMPARE DATA.

REPEAT FOR OTHER DATA PATTERNS (2 THROUGH 8).

CHECK IF CYLINDER 0, TRACK 1, SECTOR 0 IS LISTED IN BAD SECTOR DATA. IF NOT, REPEAT ABOVE TEST AT CYLINDER 0, TRACK 1, SECTOR 0. IF IT IS LISTED AS BAD, LOCATE FIRST SECTOR 0, TRACK 1 THAT IS GOOD AND DO ABOVE TESTS.

NOTE: CYLINDER LIMITS ARE IGNORED, TESTING IS DONE AT CYLINDER 0. HOWEVER, CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE.

TEST 15 SPINDLE TIMING TEST

POSITION HEADS TO CYLINDER 0.

DO WRITE DATA TO CYLINDER 0, HEAD 0, SECTOR 0. WAIT FOR INTERRUPT.

DO WRITE DATA TO CYLINDER 0, HEAD 0, SECTOR 0. START TIMING. WHEN INTERRUPT OCCURS, STOP TIMING. RESULT IS SPINDLE ROTATION TIME.

REPEAT TEST 64 TIMES. REPORT THE AVERAGE AS SPINDLE ROTATION TIME. THE TIME REPORTED IS IN 100'S OR MICROSECONDS.

NOTE: THIS TEST WILL BE RUN ONLY IN THE FIRST PASS AND ONLY IF MANUAL INTERVENTION TESTS WERE RUN.

TEST 16 WRITE/READ TEST (PART 2)

CC IS CURRENT CYLINDER SELECTED FROM SET.
LET SELECTED CYLINDER SET BE AS DEFINED IN PARAGRAPH 4.3.

SEEK FORWARD TO CC. WRITE PATTERNS 1 THROUGH 8 REPEATED 5 TIMES ON HEAD 0. READ/COMPARE ALL DATA.

SEEK REVERSE TO ''LOLIMIT''. SEEK FORWARD TO CC. READ/COMPARE ALL DATA. SEEK FORWARD TO ''HILIMIT''. SEEK REVERSE TO CC. READ/COMPARE ALL DATA. REWRITE DATA PATTERNS 1 THROUGH 8 REPEATED 5 TIMES ON HEAD 0. READ COMPARE ALL DATA.

SEEK FORWARD TO ''HILIMIT''. SEEK REVERSE TO CC. READ/COMPARE ALL DATA. SEEK REVERSE TO ''LOLIMIT''. SEEK FORWARD TO CC. READ/COMPARE ALL DATA.

REPEAT ABOVE TEST FOR HEAD 1.

REPEAT ABOVE TESTS FOR ALL CYLINDERS IN SELECTED CYLINDER SET.

NOTE 1: IF ANY OF THE SECTORS IN THE SELECTED CYLINDER SET ARE LISTED AS BAD, THAT SECTOR WILL BE BYPASSED.

NOTE 2: IF THE ''USE ALL CYLINDERS'' PARAMETER IS SPECIFIED AS ''Y'', THE TEST WILL INCLUDE ALL CYLINDERS IN THE SELECTED PARAMETER SET.

NOTE 3: IN THE FIRST PASS OF THE PROGRAM THIS TEST IS EXECUTED ON ONLY 6 OF THE CYLINDERS LISTED IN THE CYLINDER SET. THOSE USED WILL BE EVERY 8TH ENTRY IN THE TABLE. ON THE SECOND AND SUBSEQUENT PASSES ALL ENTRIES IN THE SELECTED CYLINDER SET ARE USED.

NOTE 4: TESTING WILL BE DONE BETWEEN UPPER AND LOWER LIMITS. CYLINDERS IN THE CYLINDER SET BEYOND THESE LIMITS WILL NOT BE TESTED. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE.

TEST 17 WRITE LOCK ERROR AND DATA PROTECTION TEST

DO WRITE DATA PATTERN 0 AT SECTOR 0. READ DATA AND VERIFY.

ASK OPERATOR TO WRITE LOCK DRIVE. DO GET STATUS LOOP UNTIL WRITE LOCK IS SET. IF NOT SET IN 30 SECONDS, ABORT THE TEST.

WHEN WRITE LOCK IS SET, DO WRITE DATA PATTERN 1 AT SECTOR 0. REPORT FAILURE IF DRIVE ERROR DOES NOT SET OR IF ANY OTHER ERROR SETS. CLEAR ERROR AND READ DATA AT SECTOR 0. CHECK THAT DATA HAS NOT BEEN DISTURBED.

REQUEST OPERATOR TO RESET WRITE LOCK. DO GET STATUS LOOP UNTIL WRITE LOCK IS RESET. IF NOT RESET IN 30 SECONDS, REPEAT THE REQUEST.

NOTE: THIS TEST IS EXECUTED ONLY IF THE PROGRAM OPERATION MODE 2 IS SELECTED, MANUAL INTERVENTION TESTING IS REQUESTED, AND IS RUN IN FIRST PASS ONLY.

TEST 18 ADJACENT CYLINDER INTERFERENCE TEST

CC IS CURRENT CYLINDER SELECTED FROM SET
LET SELECTED CYLINDER SET BE AS DEFINED IN PARAGRAPH 4.3.
DATA PATTERN IS 155555.

SEEK FORWARD TO CYLINDER CC. WRITE PATTERN ON TRACK 0, ALL SECTORS. READ/COMPARE DATA.

SEEK FORWARD TO "HILIMIT". SEEK REVERSE TO CC-1. WRITE PATTERN. SEEK FORWARD TO "HILIMIT". SEEK REVERSE TO CC. WRITE PATTERN. (THIS HAS BRACKETED ORIGINAL WRITE WITH WRITES IN ADJACENT CYLINDERS. NOTE ADJACENT CYLINDERS WERE WRITTEN AFTER HEADS CAME ON CYLINDER IN REVERSE DIRECTION WHICH IS OPPOSITE OF CENTER CYLINDER.)

SEEK REVERSE TO "LOLIMIT". SEEK FORWARD TO CC. READ/COMPARE DATA FROM ALL SECTORS. ANY ERRORS (READ OR COMPARE) ARE ATTRIBUTED TO ADJACENT CYLINDER INTERFERENCE.

SEEK FORWARD TO "HILIMIT". SEEK REVERSE TO CC. WRITE DATA PATTERN. SEEK REVERSE TO "LOLIMIT". SEEK FORWARD TO CC-1, WRITE PATTERN. SEEK REVERSE TO "LOLIMIT", SEEK FORWARD TO CC+1, WRITE PATTERN. SEEK FORWARD TO "HILIMIT", SEEK REVERSE TO CC. READ/COMPARE DATA IN ALL SECTORS. ANY ERRORS (READ OR COMPARE) ARE ATTRIBUTED TO ADJACENT CYLINDER INTERFERENCE.

REPEAT ABOVE TESTS ON HEAD 1.

NOTE 1: IF ANY SECTOR ON A SELECTED CYLINDER IS LISTED BAD, THAT SECTOR WILL BE BYPASSED.

NOTE 2: IF THE "USE ALL CYLINDERS" PARAMETER IS SPECIFIED AS "Y", THE TEST WILL INCLUDE ALL CYLINDERS (EXCEPT 0 AND 255) IN THE SELECTED PARAMETER SET.

NOTE 3: IN THE FIRST PASS OF THE PROGRAM THIS TEST IS EXECUTED ON ONLY 3 OF THE CYLINDERS LISTED IN THE CYLINDER SET. THOSE USED WILL BE THE FIRST, TWENTYFIRST, AND FORTYFIRST ENTRIES IN THE TABLE. ON SECOND AND SUBSEQUENT PASSES EVERY FOURTH CYLINDER SET ENTRY WILL BE TESTED.

NOTE 4: TESTING WILL BE DONE BETWEEN UPPER AND LOWER LIMITS. CYLINDERS IN THE CYLINDER SET BEYOND THESE LIMITS WILL NOT BE TESTED. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE.

TEST 19 OVERWRITE TEST

CC IS CURRENT CYLINDER SELECTED FROM SET
SELECTED CYLINDER SET DEFINED IN PARAGRAPH 4.3.
PATTERN A = 125252
PATTERN B = 000000

SEEK FORWARD TO CC. WRITE DATA OF PATTERN A IN ALL SECTORS, HEAD 0. READ/COMPARE DATA.

SEEK FORWARD TO ''HILIMIT'', SEEK REVERSE TO CC. WRITE PATTERN B. SEEK REVERSE TO ''LOLIMIT'', SEEK FORWARD TO CC, READ/COMPARE DATA.

SEEK FORWARD TO ''HILIMIT'', SEEK REVERSE TO CC. WRITE DATA PATTERN A. READ/COMPARE DATA. SEEK REVERSE TO ''LOLIMIT''. SEEK FORWARD TO CC. WRITE PATTERN B. SEEK FORWARD TO ''HILIMIT'' SEEK REVERSE TO CC. READ/COMPARE DATA.

ANY FAILURES (READ OR COMPARE) ARE ATTRIBUTED TO OVERWRITE PROBLEM.

REPEAT ABOVE TESTS ON HEAD 1.

NOTE 1: IF ANY SECTOR ON A SELECTED CYLINDER IS LISTED AS BAD, THAT SECTOR WILL BE BYPASSED.

NOTE 2: IF THE ''USE ALL CYLINDERS'' PARAMETER IS SPECIFIED AS ''Y'', THE TEST WILL INCLUDE ALL CYLINDERS IN THE SELECTED PARAMETER SET.

NOTE 3: IN THE FIRST PASS OF THE PROGRAM THIS TEST IS EXECUTED ON ONLY 3 OF THE CYLINDERS LISTED IN THE CYLINDER SET. THOSE USED WILL BE THE FIRST, TWENTYFIRST, AND FORTYFIRST ENTRIES IN THE TABLE. ON SECOND AND SUBSEQUENT PASSES EVERY FOURTH CYLINDER SET ENTRY WILL BE TESTED.

NOTE 4: TESTING WILL BE DONE BETWEEN UPPER AND LOWER LIMITS. CYLINDERS IN THE CYLINDER SET BEYOND THESE LIMITS WILL

```
NOT BE TESTED.  CHOOSING A SINGLE SURFACE  WILL  LIMIT
TESTING TO THAT SURFACE.
```

```
                                          .NLIST  CND,MD,ME
                                          .ENABL  ABS,AMA
                002000                    .=2000

        002000                            SVC
                000001                    SVCTST=1
                000001                    SVCSUB=1
                000001                    SVCBGL=1
                000000                    SVCINS=0
                000000                    SVCTAG=0
        002000                            POINTER BGNSW,BGNSFT,BGNDU

        002000                    BGNMOD  MDHEDR
        002000                    HEADER  CZRLD,B,0,30000,30000,300,RL01
   (4)  002000     103                    .ASCII  /C/
   (4)  002001     132                    .ASCII  /Z/
   (4)  002002     122                    .ASCII  /R/
   (4)  002003     114                    .ASCII  /L/
   (4)  002004     104                    .ASCII  /D/
   (6)  002005     000                    .BYTE    0
   (6)  002006     000                    .BYTE    0
   (5)  002007     000                    .BYTE    0
   (4)  002010     102                    .ASCII   /B/
   (4)  002011     060                    .ASCII   /0/
   (4)  002012  000000                    .WORD    0
   (4)  002014  000300                    .WORD    300
   (4)  002016  037604                    .WORD    L$HARD
   (4)  002020  037730                    .WORD    L$SOFT
   (4)  002022  013356                    .WORD    L$HW
   (4)  002024  013372                    .WORD    L$SW
   (4)  002026  040514                    .WORD    L$LAST
   (4)  002030  000000                    .WORD    0
   (4)  002032  000000                    .WORD    0
   (4)  002034  000000                    .WORD    0
   (4)  002036  000000                    .WORD    0
   (4)  002040  013410                    .WORD    L$DISPATCH
   (4)  002042  000000                    .WORD    0
   (4)  002044  000000                    .WORD    0
   (4)  002046  000000                    .WORD    0
   (4)  002050     002                    .BYTE    C$REVISION
   (3)  002051     002                    .BYTE    C$EDIT
   (4)  002052  030000                    .WORD    30000
   (4)  002054  030000                    .WORD    30000
   (4)  002056  000000                    .WORD    0
   (5)  002060  000000                    .WORD    0
   (4)  002062  000000                    .WORD    0
   (4)  002064  002114                    .WORD    L$DVTYP
   (4)  002066  000000                    .WORD    0
   (4)  002070  002112                    .WORD    L$DR
   (4)  002072  002112                    .WORD    L$DRST
   (4)  002074  000000                    .WORD    0
   (4)  002076  014564                    .WORD    L$DU
   (5)  002100  000014                    .WORD    14
   (4)  002102  000000                    .WORD    0
   (4)  002104  013456                    .WORD    L$INIT
   (4)  002106  014444                    .WORD    L$CLEAN
```

```
002110                          ENDMOD
002110                                  DEVREG
002110  000000                          .WORD   0
002112  000001                          .BLKW
002114                                  DEVTYP  <RL01>
002114  046122  030460  000             .ASCIZ  /RL01/
        002122                          .EVEN

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002122                          BGNMOD  GLBEQAT

002122                          EQUALS
                                ;       OFFSETS FOR HARDWARE P-TABLE
        000000                  CSR     =0                      ;BUS ADDRESS
        000002                  VECT    =2                      ;VECTOR ADDRESS
        000004                  PRIOR   =4                      ;PRIORITY
        000006                  DRSB    =6                      ;DRIVE SELECT BIT
        000010                  CNT     =10                     ;CONTROLLER TYPE

                                ;       OFFSET FOR SOFTWARE P-TABLE
        000000                  MISWI   =0                      ;SOFTWARE PARAMETERS SWITCHES
        000002                  LOLIM   =2                      ;CYLINDER LOWER LIMIT
        000004                  HILIM   =4                      ;CYLINDER HIGH LIMIT
        000006                  HEAD    =6                      ;SELECTED HEAD FOR RUNNING TESTS
        000010                  ERLIM   =10                     ;ERROR LIMIT
        000012                  DCLIM   =12                     ;DATA COMPARE ERROR LIMIT

                                ;       BIT ASSIGNMENT FOR SOFTWARE P-TABLE SWITCHES
        000001                  ALLCYL  =BIT00                  ;USE ALL CYLINDERS
        000002                  ALLSEC  =BIT01                  ;USE ALL SECTORS
        000004                  DRSELT  =BIT02                  ;EXECUTE DRIVE SELECT TEST
        000010                  HDALIGN =BIT03                  ;EXECUTE HEAD ALIGNMENT TEST
        000020                  AUTOSZ  =BIT04                  ;AUTO SIZE FOR DRIVE-DROP IF NO RESPONSE
        010000                  HEADLM  =BIT12                  ;HEAD LIMIT SPECIFIED FLAG
        020000                  HICYL   =BIT13                  ;HI LIMIT SPECIFIED FLAG
        040000                  LOCYL   =BIT14                  ;LO LIMIT SPECIFIED
        100000                  MITEST  =BIT15                  ;EXECUTE MANUAL INTERVENTION TESTS

                                ;       SUBSYSTEM FUNCTIONS
        000102                  CKDATA  =102                    ;WRITE CHECK
        000104                  GTSTAT  =104                            ;GET STATUS
        000106                  SEEK    =106                            ;SEEK
        000110                  RDHEAD  =110                            ;READ HEADER
        000112                  WTDATA  =112                            ;WRITE DATA
        000114                  RDDATA  =114                            ;READ DATA
        000116                  RDNOHR  =116                            ;READ DATA, IGNORE HEADERS
        000100                  NOOP    =100                            ;NO OPERATION

                                ;       OPERATION FLAGS
        007777                  COMPOP  =7777                           ;COMPOSITE OPERATION FLAGS
        000002                  HDRCMP  =BIT01                          ;HEADER COMPARE OPERATION
        000001                  DATACMP =BIT00                          ;DATA COMPARE OPERATION
        000004                  CYLUP   =BIT02                          ;CYCLE UP OPERATION
        000010                  ULOAD   =BIT03                          ;UNLOAD OPERATION
        000020                  INOUTS  =BIT04                          ;IN-OUT SEEK OPERATION
        000040                  OUTINS  =BIT05                          ;OUT-IN SEEK OPERATION
        000100                  FOLWRT  =BIT06                          ;FOLLOWING WRITE OPERATION
        000200                  REVSKS  =BIT07                          ;REV SEEK SEQ (ADJ INTERFERENCE)
        000400                  FWDSKS  =BIT08                          ;FWD SEEK SEQ (ADJ INTERFERENCE)
        001000                  REVSKO  =BIT09                          ;REV SEEK SEQ (OVERWRITE)
        002000                  FWDSKO  =BIT10                          ;FWD SEEK SEQ (OVERWRITE)
        004000                  BADADD  =BIT11                          ;BAD DISK ADDRESS
        010000                  SEEKOP  =BIT12                          ;SEEK OPERATION
        020000                  RORWOP  =BIT13                          ;READ OR WRITE OPERATION
        040000                  RELDWT  =BIT14                          ;RELOAD WAIT
        100000                  HDR40   =BIT15                          ;40 HEADER OPERATION
        003760                  MQUALS  =OUTINS!INOUTS!FOLWRT!REVSKS!FWDSKS!REVSKO!FWDSKO
                                                                        ;MESSAGE QUALIFIER BITS

                                ;       ERROR FLAGS FROM SUBROUTINES
        000001                  TOSLOW  =BIT00                          ;OPERATION TOOK TO LONG
        000002                  NOIRPT  =BIT01                          ;NO INTERRUPT FROM OPERATION
        000004                  CONHNG  =BIT02                          ;CONTROLLER HUNG
        000010                  NOCLR   =BIT03                          ;BAD CONTROLLER CLEAR

        000000                  RLCS    =0                  ;CONTROL AND STATUS REGISTER
        000002                  RLBA    =2                  ;BUS ADDRESS REGISTER
        000004                  RLDA    =4                  ;DISK ADDRESS REGISTER
        000006                  RLMP    =6                  ;MULTI-PURPOSE REGISTER

                                ;       REGISTER BIT DEFINITIONS - CONTROL STATUS REGISTER
        000000                  RLCSR   =0                              ;CONTROL AND STATUS REGISTER
        100000                  ANYERR  =100000                         ;ANY ERROR BIT
        040000                  DRVERR  =40000                          ;DRIVE ERROR BIT
        020000                  NXMERR  =20000                          ;NON-EXISTANT MEMORY ERROR
        010000                  DLTERR  =10000                          ;DATA LATE ERROR
        010000                  HNFERR  =10000                          ;HEADER NOT FOUND ERROR
        004000                  DCKERR  =4000                           ;DATA CHECK ERROR
        004000                  HCRCERR =4000                           ;HEADER CHECK ERROR
        002000                  OPIERR  =2000                           ;OPERATION INCOMPLETE ERROR
        001400                  DSMSK   =1400                           ;DRIVE SELECT MASK
        000200                  CRDYMSK =200                            ;CONTROLLER READY MASK
        000100                  INTEBL  =100                            ;INTERRUPT ENABLE MASK
        000060                  BAMSK   =60                             ;BUS ADDRESS UPPER MASK
        000001                  DRDYMSK =1                              ;DRIVE READY MASK

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                                        ;       REGISTER BIT DEFINITIONS - DISK ADDRESS FOR DATA XFER
                000077                  SAMSK   =77                             ;SECTOR ADDRESS MASK
                000100                  HSMSK   =100                            ;HEAD SELECT MASK
                077600                  CAMSK   =77600                          ;CYLINDER ADDRESS MASK

                                        ;       REGISTER BIT DEFINITIONS - DISK ADDRESS FOR SEEK
                000001                  MBSET0  =1                              ;MUST BE SET, BIT 0
                000004                  DIRBIT  =4                              ;DIRECTION BIT
                000020                  HDSEL   =20                             ;HEAD SELECT BIT
                077600                  DIRMSK  =77600                          ;CYLINDER DIFFERENCE MASK

                                        ;       REGISTER BIT DEFINITIONS - DISK ADDRESS FOR GET STATUS
                000003                  GETSTAT =3                              ;GET STATUS SETUP
                000010                  DRSET   =10                             ;DRIVE RESET MASK

                                        ;       REGISTER BIT DEFINITIONS - MP FOR DATA XFER
                017777                  WCMSK   =17777                          ;WORD COUNT MASK
                160000                  WCRNG   =160000                         ;WORD COUNT RANGE MASK

                                        ;       REGISTER BIT DEFINITIONS - MP FOR READ HEADER
                077600                  HDCYL   =077600                         ;CYLINDER MASK
                000077                  HDSEC   =77                             ;SECTOR MASK
                000100                  HDHSEL  =100                            ;HEAD SELECT MASK

                                        ;       REGISTER BIT DEFINITIONS - MP FOR GET STATUS
                000007                  STAMSK  =7                              ;STATE MASK
                000010                  BHSTAT  =10                             ;BRUSH HOME STATUS
                000020                  HOSTAT  =20                             ;HEADS OUT STATUS
                000040                  COSTAT  =40                             ;COVER OPEN STATUS
                000100                  HSSTAT  =100                            ;HEAD SELECT STATUS
                000400                  DSESTAT =400                            ;DRIVE SELECT ERROR STATUS
                001000                  VCSTAT  =1000                           ;VOLUME CHECK STATUS
                002000                  WGESTAT =2000                           ;WRITE GATE ERROR STATUS
                004000                  SPDSTAT =4000                           ;SPIN ERROR STATUS
                010000                  STOSTAT =10000                          ;SEEK TIMEOUT ERROR STATUS
                020000                  WLSTAT  =20000                          ;WRITE LOCK STATUS
                040000                  HCESTAT =40000                          ;HEAD CURRENT ERROR STATUS
                100000                  WDESTAT =100000                         ;WRITE DATA ERROR STATUS

        002122                          ENDMOD
        002122                          BGNMOD  GLBDAT

                                        ;       TABLE OF OPERATION MESSAGES
        002122  000000                  OPMSGS: .WORD   0                       ;FILLER
        002124  005002                          .WORD   MWRCHK                  ;MESSAGE FOR WRITE CHECK
        002126  005032                          .WORD   MGTSTA                  ;            GET STATUS
        002130  004744                          .WORD   MSEEK                   ;            SEEK
        002132  004765                          .WORD   MREADH                  ;            READ HEADER
        002134  005016                          .WORD   MWRITE                  ;            WRITE DATA
        002136  004752                          .WORD   MREAD                   ;            READ DATA
        002140  005127                          .WORD   MWRSET                  ;            WITH RESET
        002142  005046                          .WORD   MDATCP                  ;            WITH DATA COMPARE
        002144  005071                          .WORD   MHDRCP                  ;            WITH HEADER COMPARE
        002146  005204                          .WORD   MCYLUP                  ;            LOAD HEADS
        002150  005173                          .WORD   MULOAD                  ;            UNLOAD HEADS
        002152  005235                          .WORD   MINOUT                  ;               IN-OUT SEQ
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002154  005214                  .WORD   MOUTIN          ;                       OUT-IN SEQ
002156  005260                  .WORD   MFOLWRT         ;                       FOLLOWING WRITE
002160  005304                  .WORD   MREVSK          ;                       REV SEEK
002162  005337                  .WORD   MFWDSK          ;                       FWD SEEK
002164  005426                  .WORD   MRESKO          ;                       REV SEEK
002166  005372                  .WORD   MFWSKO          ;                       FWD SEEK
002170  005462                  .WORD   MBADAD          ;                       BAD DISK ADD FOR WRITE
002172  005113                  .WORD   M40HDR          ;                    40 HEADER OPERATION


                        ;       TABLE OF RESULT NAME MESSAGE ADDRESSES
002174  007554          RESTBL: .WORD   MCERR           ;CONTROLLER ERROR
002176  007665                  .WORD   MDRERR          ;DRIVE ERROR
002200  010114                  .WORD   MNEERR          ;NON-EXISTANT MEMORY ERROR
002202  010066                  .WORD   MFLERR          ;HEADER NOT FOUND-DATA LATE
002204  010051                  .WORD   MHDERR          ;HEADER OR DATA ERROR
002206  010032                  .WORD   MOPERR          ;OPERATION INCOMPLETE
002210  010141                  .WORD   MNDRST          ;NO DRIVE STATUS AVAILABLE
002212  000000                  .WORD   0
002214  010015                  .WORD   MWDERR          ;WRITE DATA ERROR
002216  007777                  .WORD   MHCERR          ;HEAD CURRENT ERROR
002220  000000                  .WORD   0
002222  007761                  .WORD   MSTERR          ;SEEK TIMEOUT ERROR
002224  007726                  .WORD   MSPERR          ;SPINDLE ERROR
002226  007744                  .WORD   MWGERR          ;WRITE GATE ERROR
002230  000000                  .WORD   0
002232  007676                  .WORD   MDSERR          ;DRIVE SELECT ERROR


                        ;       PATTERN TABLE
002234  004466          PATTBL: .WORD   PAT1
002236  004470                  .WORD   PAT2
002240  004530                  .WORD   PAT3
002242  004570                  .WORD   PAT4
002244  004630                  .WORD   PAT5
002246  004636                  .WORD   PAT6
002250  004676                  .WORD   PAT7
002252  004700                  .WORD   PAT8
002254  004740                  .WORD   PAT9
002256  004742                  .WORD   PAT10



                        ;       SUBROUTINE CALLING STACK
002260  000000          SUBSTK: .WORD   0               ;STACK IS 12 WORDS LONG
002262  000000                  .WORD   0
002264  000000                  .WORD   0
002266  000000                  .WORD   0
002270  000000                  .WORD   0
002272  000000                  .WORD   0
002274  000000                  .WORD   0
002276  000000                  .WORD   0
002300  000000                  .WORD   0
002302  000000                  .WORD   0

002304  000002          T25TBL: .WORD   2               ;TABLE OF DIFFERENCES TO BE USED
002306  000006                  .WORD   6               ;IN TEST 25
002310  000011                  .WORD   9.
002312  000014                  .WORD   12.
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002314  000021                    .WORD   17.
002316  000026                    .WORD   22.
002320  000033                    .WORD   27.
002322  000042                    .WORD   34.
002324  000051                    .WORD   41.
002326  000200                    .WORD   128.
002330  000377                    .WORD   255.

                          ;       TABLE TO BE USED IN TEST 33 AND 34 TO BUILD AND STORE THE
                          ;       CYLINDERS TO BE USED IN THE TEST.
002332  000010            T33TBL: .BLKW   10

002352     002            CYLTBL: .BYTE   2                       ;TABLE OF DEFAULT CYLINDERS
002353     007                    .BYTE   7.
002354     016                    .BYTE   14.
002355     024                    .BYTE   20.
002356     033                    .BYTE   27.
002357     041                    .BYTE   33.
002360     046                    .BYTE   38.
002361     055                    .BYTE   45.
002362     064                    .BYTE   52.
002363     072                    .BYTE   58.
002364     101                    .BYTE   65.
002365     110                    .BYTE   72.
002366     115                    .BYTE   77.
002367     124                    .BYTE   84.
002370     133                    .BYTE   91.
002371     141                    .BYTE   97.
002372     146                    .BYTE   102.
002373     154                    .BYTE   108.
002374     161                    .BYTE   113.
002375     170                    .BYTE   120.
002376     177                    .BYTE   127.
002377     206                    .BYTE   134.
002400     213                    .BYTE   139.
002401     222                    .BYTE   146.
002402     230                    .BYTE   152.
002403     235                    .BYTE   157.
002404     244                    .BYTE   164.
002405     252                    .BYTE   170.
002406     261                    .BYTE   177.
002407     270                    .BYTE   184.
002410     275                    .BYTE   189.
002411     303                    .BYTE   195.
002412     312                    .BYTE   202.
002413     317                    .BYTE   207.
002414     326                    .BYTE   214.
002415     334                    .BYTE   220.
002416     343                    .BYTE   227.
002417     352                    .BYTE   234.
002420     361                    .BYTE   241.
002421     367                    .BYTE   247.
002422     375                    .BYTE   253.
002423     000                    .BYTE   0

002424  000000            SSINDX: .WORD   0                       ;SUBROUTINE STACK INDEX POINTER
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                                ;       OPERATIONAL FLAGS
002426  000000                  OPFLAG: .WORD   0               ;OPERATION FLAGS
002430  000000                  DONE:   .WORD   0               ;OPERATION COMPLETE FLAG
002432  000000                  HADONE: .WORD   0               ;HEAD ALIGNMENT DONE FLAG
002434  000000                  ERHEAD: .WORD   0               ;ADDRESS OF ERROR HEADER
002436  000000                  MORECE: .WORD   0               ;MORE THAN 1 COMPARE ERROR
002440  000000                  ERRSWI: .WORD   0               ;ERROR RETURN SWITCH
002442  000000                  BSFLAG: .WORD   0               ;BAD SECTOR FLAGS
002444  000000                  WRTSWI: .WORD   0               ;WRITE SWITCH
002446  000000                  TBLSTR: .WORD   0               ;TABLE STORAGE

002450  000000                  RLBAS:  .WORD   0               ;RL11 BASE ADDRESS
002452  000000                  RLVEC:  .WORD   0               ;RL11 VECTOR ADDRESS
002454  000000                  RLDRV:  .WORD   0               ;DRIVE NUMBER UNDER TEST

002456  000000                  L.CS:   .WORD   0               ;CONTROLLER REGISTER STORAGE
002460  000000                  L.BA:   .WORD   0               ;BEFORE OPERATION
002462  000000                  L.DA:   .WORD   0
002464  000000                  L.MP:   .WORD   0
002466  000000                  T.CS:   .WORD   0               ;CONTROLLER REGISTER STORAGE
002470  000000                  T.BA:   .WORD   0               ;   AFTER OPERATION
002472  000000                  T.DA:   .WORD   0
002474                          T.MP:
002474  000000                  HDWRD1: .WORD   0               ;HEADER WORD STORAGE
002476  000000                  HDWRD2: .WORD   0
002500  000000                  HDWRD3: .WORD   0

002502  000000                  T.STAT: .WORD   0               ;DRIVE STATE STORAGE

002504  000000                  RESPARM:        .WORD   0       ;PARAM BLOCK FOR REASON REPORT
002506  000000                          .WORD   0
002510  000000                          .WORD   0
002512  000000                          .WORD   0
002514  000000                          .WORD   0

002516  000000                  DRVCNT: .WORD   0               ;DRIVE COUNT FOR DRIVES UNDER TEST
002520  000000                  DIFAUG: .WORD   0               ;DIFFERENCE AUGMENT FOR SEEK
002522  000000                  OLDCYL: .WORD   0               ;OLD CYLINDER
002524  000000                  NEWCYL: .WORD   0               ;NEW CYLINDER
002526  000000                  CURCYL: .WORD   0               ;CURRENT CYLINDER
002530  000000                  DESDIF: .WORD   0               ;DESIRED DIFFERENCE
002532  000000                  DESSGN: .WORD   0               ;DESIRED SIGN
002534  000000                  DESHD:  .WORD   0               ;DESIRED HEAD
002536  000000                  DESSEC: .WORD   0               ;DESIRED SECTOR
002540  000000                  TEMP0:  .WORD   0               ;TEMPORARY STORAGE
002542  000000                  TEMP1:  .WORD   0               ;TEMPORARY STARAGE
002544  000000                  TEMP2:  .WORD   0               ;TEMPORARY STORAGE
002546  000000                  TEMP3:  .WORD   0               ;TEMPORARY STORAGE
002550  000000                  TEMP4:  .WORD   0               ;TEMPORARY STORAGE
002552  000000                  TEMP5:  .WORD   0               ;TEMPORARY STORAGE
002554  000000                  TEMP6:  .WORD   0               ;TEMPORARY STORAGE
002556  000000                  TEMP7:  .WORD   0               ;TEMPORARY STORAGE
002560  000000                  TEMP8:  .WORD   0               ;TEMPORARY STORAGE

                                ;       TIMER STORAGE
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002562  000000          OFIN:    .WORD   0              ;ONE CYLINDER FORWARD INNER
002564  000000          OFINU:   .WORD   0              ;        UPPER
002566  000000          OFMID:   .WORD   0              ;ONE CYLINDER FORWARD MIDDLE
002570  000000          OFMIDU:  .WORD   0              ;        UPPER
002572  000000          OFOUT:   .WORD   0              ;ONE CYLINDER FORWARD OUTER
002574  000000          OFOUTU:  .WORD   0              ;        UPPER
002576  000000          ORIN:    .WORD   0              ;ONE CYLINDER REVERSE INNER
002600  000000          ORINU:   .WORD   0              ;        UPPER
002602  000000          ORMID:   .WORD   0              ;ONE CYLINDER REVERSE MIDDLE
002604  000000          ORMIDU:  .WORD   0              ;        UPPER
002606  000000          OROUT:   .WORD   0              ;ONE CYLINDER REVERSE OUTER
002610  000000          OROUTU:  .WORD   0              ;        UPPER
002612  000000          HFIN:    .WORD   0              ;128 CYLINDER FORWARD INNER
002614  000000          HFINU:   .WORD   0              ;        UPPER
002616  000000          HFOUT:   .WORD   0              ;128 CYLINDER FORWARD OUTER
002620  000000          HFOUTU:  .WORD   0              ;        UPPER
002622  000000          HRIN:    .WORD   0              ;128 CYLINDER REVERSE INNER
002624  000000          HRINU:   .WORD   0              ;        UPPER
002626  000000          HROUT:   .WORD   0              ;128 CYLINDER REVERSE OUTER
002630  000000          HROUTU:  .WORD   0              ;        UPPER
002632  000000          AFMID:   .WORD   0              ;256 CYLINDER FORWARD
002634  000000          AFMIDU:  .WORD   0              ;        UPPER
002636  000000          ARMID:   .WORD   0              ;256 CYLINDER REVERSE
002640  000000          ARMIDU:  .WORD   0              ;        UPPER

002642  000226          EXOCYL:  .WORD   150.           ;EXPECTED TIME ONE CYLINDER
002644  001046          EXHCYL:  .WORD   550.           ;EXPECTED TIME 128 CYLINDER
002646  001750          EXACYL:  .WORD   1000.          ;EXPECTED TIME 256 CYLINDER
002650  000372          EXROT:   .WORD   250.           ;EXPECTED ROTATION TIME
002652  000004          ERRVEC:  .WORD   4              ;ERROR VECTOR USED WHEN AUTO SIZING

                        ;       MISCELLANEOUS COUNTERS
002654  000000          PASCNT:  .WORD   0              ;PASS COUNTER (LOCAL TO A TEST)
002656  000000          COUNT:   .WORD   0              ;A COUNTER (LOCAL TO A TEST)
002660  000000          ERRPOINT: .WORD  0              ;ERROR POINTER
002662  000100          ERRCNT:  .BLKW   64.            ;STORAGE FOR ERROR COUNTERS
003062  000000          PASNUM:  .WORD   0              ;PASS NUMBER FOR PROGRAM
003064  000000          PSETNM:  .WORD   0              ;COUNTER FOR PARAMETER SET NUMBER IN USE
003066     000          LOCERR:  .BYTE   0              ;LOCAL ERROR COUNTER
003067     000          NOERCT:  .BYTE   0              ;INHIBIT ERROR COUNTING FLAG
003070  000000          TRPFLG:  .WORD   0              ;HARDWARE TRAP OCCURANCE
003072  000000          PWRFLG:  .WORD   0              ;POWER FAILURE OCCURANCE


                        ;       BAD SECTOR TABLES AND POINTERS
003074  000000          BSFVAL:  .WORD   0              ;BAD SECTORS FILES VALID FLAG

003076  000076          SBSFIL:  .BLKW   76             ;SOFTWARE BAD SECTOR FILE
003272  000076          FBSFIL:  .BLKW   76             ;FACTORY BAD SECTOR FILE

003466  000200          IBUFF:   .BLKW   200            ;INPUT BUFFER
004066  000200          OBUFF:   .BLKW   200            ;OUTPUT BUFFER

004466  000000          PAT1:    .WORD   0              ;PATTERN 1 (ALL ZEROS)
004470  177772          PAT2:    .WORD   177772
004472  177777                   .WORD   177777
004474  177777                   .WORD   177777
```

```
004476  052525                           .WORD    052525
004500  052525                           .WORD    052525
004502  052525                           .WORD    052525
004504  177777                           .WORD    177777
004506  177777                           .WORD    177777
004510  052525                           .WORD    052525
004512  052525                           .WORD    052525
004514  177777                           .WORD    177777
004516  052525                           .WORD    052525
004520  177252                           .WORD    177252
004522  177252                           .WORD    177252
004524  172765                           .WORD    172765
004526  172765                           .WORD    172765

004530  000003                 PAT3:     .WORD    000003
004532  000000                           .WORD    000000
004534  000000                           .WORD    000000
004536  177777                           .WORD    177777
004540  177777                           .WORD    177777
004542  177777                           .WORD    177777
004544  000000                           .WORD    000000
004546  000000                           .WORD    000000
004550  177777                           .WORD    177777
004552  177777                           .WORD    177777
004554  000000                           .WORD    000000
004556  177777                           .WORD    177777
004560  000000                           .WORD    000000
004562  177777                           .WORD    177777
004564  000000                           .WORD    000000
004566  177777                           .WORD    177777

004570  025252                 PAT4:     .WORD    025252
004572  052525                           .WORD    052525
004574  052525                           .WORD    052525
004576  125252                           .WORD    125252
004600  125252                           .WORD    125252
004602  125252                           .WORD    125252
004604  052525                           .WORD    052525
004606  052525                           .WORD    052525
004610  125252                           .WORD    125252
004612  125252                           .WORD    125252
004614  052525                           .WORD    052525
004616  125252                           .WORD    125252
004620  052525                           .WORD    052525
004622  125252                           .WORD    125252
004624  052525                           .WORD    052525
004626  125252                           .WORD    125252

004630  155555                 PAT5:     .WORD    155555
004632  133333                           .WORD    133333
004634  066666                           .WORD    066666

004636  121105                 PAT6:     .WORD    121105
004640  150442                           .WORD    150442
004642  064221                           .WORD    064221
004644  132110                           .WORD    132110
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004646  055044                                  .WORD   055044
004650  026442                                  .WORD   026442
004652  013211                                  .WORD   013211
004654  105504                                  .WORD   105504
004656  042642                                  .WORD   042642
004660  021321                                  .WORD   021321
004662  110550                                  .WORD   110550
004664  044264                                  .WORD   044264
004666  022132                                  .WORD   022132
004670  011055                                  .WORD   011055
004672  104426                                  .WORD   104426
004674  042213                                  .WORD   042213

004676  177777                         PAT7:    .WORD   177777

004700  045513                         PAT8:    .WORD   045513
004702  122645                                  .WORD   122645
004704  151322                                  .WORD   151322
004706  064551                                  .WORD   064551
004710  132264                                  .WORD   132264
004712  055132                                  .WORD   055132
004714  026455                                  .WORD   026455
004716  113226                                  .WORD   113226
004720  045513                                  .WORD   045513
004722  122645                                  .WORD   122645
004724  151322                                  .WORD   151322
004726  064551                                  .WORD   064551
004730  132264                                  .WORD   132264
004732  055132                                  .WORD   055132
004734  026455                                  .WORD   026455
004736  113226                                  .WORD   113226

004740  125252                         PAT9:    .WORD   125252

004742  155555                         PAT10:   .WORD   155555

004744                                 ENDMOD

004744                                 BGNMOD   GLBTXT
004744  042523  045505  000040         MSEEK:   .ASCIZ  /SEEK /
004752  042522  042101  042040         MREAD:   .ASCIZ  /READ DATA /
004765     122  040505  020104         MREADH:  .ASCIZ  /READ HEADER /
005002  051127  052111  020105         MWRCHK:  .ASCIZ  /WRITE CHECK/
005016  051127  052111  020105         MWRITE:  .ASCIZ  /WRITE DATA /
005032  042507  020124  052123         MGTSTA:  .ASCIZ  /GET STATUS /
005046  044527  044124  042040         MDATCP:  .ASCIZ  /WITH DATA COMPARE /
005071     127  052111  020110         MHDRCP:  .ASCIZ  /WITH HDR COMPARE /
005113     106  051117  032040         M40HDR:  .ASCIZ  /FOR 40 HDRS/
005127     127  052111  020110         MWRSET:  .ASCIZ  /WITH RESET /
005143     117  042520  040522         MOPER:   .ASCIZ  /OPERATION: /
005157     122  051505  046125         MRSLT:   .ASCIZ  /RESULT:     /
005173     125  046116  020104         MULOAD:  .ASCIZ  /UNLD DRV/
005204  042114  042040  053122         MCYLUP:  .ASCIZ  /LD DRV /
005214  047506  020114  020060         MOUTIN:  .ASCIZ  /FOL 0 TO CC SEEK/
005235     106  046117  031040         MINOUT:  .ASCIZ  /FOL 255 TO CC SEEK/
005260  047506  020114  051127         MFOLWRT:         .ASCIZ  /FOL WRITE (NO SEEK)/
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  524  005304  042101  020112  054503  MREVSK: .ASCIZ  /ADJ CYL WRTTN AFTER REV SK/
  525  005337     101  045104  041440  MFWDSK: .ASCIZ  /ADJ CYL WRTTN AFTER FWD SK/
  526  005372  045523  043040  042127  MFWSKO: .ASCIZ  /SK FWD,WRT - SK REV,OVERWRT/
  527  005426  045523  051040  053105  MRESKO: .ASCIZ  /SK REV,WRT - SK FWD,OVERWRT/
  528  005462  047117  041040  042101  MBADAD: .ASCIZ  /ON BAD SEC FILES/
  529  005503     103  047101  052047  MBADSF: .ASCIZ  /CAN'T GET BAD SEC FILES/
  530  005533     102  042101  051440  MFMTER: .ASCIZ  /BAD SEC FILE FMT ERR/
  531  005560  047524  046440  047101  MTMBS:  .ASCIZ  /TO MANY BAD SEC FOR PROG CAPACITY/
  532  005622  052502  020123  042101  BASADD: .ASCIZ  /BUS ADD=/
  533  005633     104  053122  000075  DRVNAM: .ASCIZ  /DRV=/
  534  005640  051104  053111  020105  DRVNAV: .ASCIZ  /DRIVE UNAVAILABLE FOR TEST/
  535  005673     104  053122  042040  NOPWR:  .ASCIZ  /DRV DID NOT REC'R FROM PWR FAIL/
  536  005733     122  041514  000123  CSNAM:  .ASCIZ  /RLCS/
  537  005740  046122  040502     000  BANAM:  .ASCIZ  /RLBA/
  538  005745     122  042114  000101  DANAM:  .ASCIZ  /RLDA/
  539  005752  046122  050115     000  MPNAM:  .ASCIZ  /RLMP/
  540  005757     117  020120  047111  LAB1:   .ASCIZ  /OP INIT = /
  541  005772  050117  042040  047117  LAB2:   .ASCIZ  /OP DONE = /
  542  006005     127  051117  020104  MWORD:  .ASCIZ  /WORD /
  543  006013     111  052116  050122  MTOSLOW:        .ASCIZ  /INTRPT TO LATE/
  544  006032  050117  020111  042523  MDRRES: .ASCIZ  /OPI SET-NO DRV RESPONSE/
  545  006062  047516  044440  052116  MNOINT: .ASCIZ  /NO INTRPT ON CMND COMPLETE/
  546  006115     103  052116  051114  MCONHNG:        .ASCIZ  /CNTLR HUNG (NO RDY)/
  547  006141     105  051122  042040  MNOCLR: .ASCIZ  /ERR DID NOT CLR/
  548  006161     126  046117  041440  VCNRST: .ASCIZ  /VOL CHK NOT RSET/
  549  006202  047125  050130  052103  UNXERR: .ASCIZ  /UNXPCTED ERR/
  550  006217     040  042524  052123  TSTLAB: .ASCIZ  / TEST/
  565  006225                          P2T01E:
  566  006225     104  043111  020106  P2T02E: .ASCIZ  /DIFF OF 1 SEEK/
  567  006244  052517  020124  051107  P2T03E: .ASCIZ  /OUT GRD BAND DETECT/
  568  006270  047111  020103  042523  P2T04E: .ASCIZ  /INC SEEK FWD HD 0/
  569  006312  047111  020103  042523  P2T05E: .ASCIZ  /INC SEEK REV HD 0/
  570  006334  047111  020103  042523  P2T06E: .ASCIZ  /INC SEEK FWD HD 1/
  571  006356  047111  020116  051107  P2T07E: .ASCIZ  /INN GRD BAND DETECT/
  572  006402  047111  020103  042523  P2T08E: .ASCIZ  /INC SEEK REV HD 1/
  573  006424  042523  045505     000  P2T09E: .ASCIZ  /SEEK/
  574  006431     106  042127  047440  P2T10E: .ASCIZ  /FWD OSC SEEK/
  575  006446  042522  020126  051517  P2T11E: .ASCIZ  /REV OSC SEEK/
  576  006463     123  042505  020113  P2T12E: .ASCIZ  /SEEK TIMING/
  577  006477     102  051501  041511  P2T13E: .ASCIZ  /BASIC READ DATA/
  578  006517     127  052122  051057  P2T14E: .ASCIZ  &WRT/READ DATA (P1)&
  579  006542  050123  047111  046104  P2T15E: .ASCIZ  /SPINDLE ROTATION TIMING/
  580  006572  051127  027524  042522  P2T16E: .ASCIZ  &WRT/READ DATA (P2)&
  581  006615     127  052122  046040  P2T17E: .ASCIZ  /WRT LCK ERR AND DATA PROTECTION/
  582  006655     101  045104  041440  P2T18E: .ASCIZ  /ADJ CYL INTERFERENCE/
  583  006702  053117  051105  051127  P2T19E: .ASCIZ  /OVERWRITE/
  584  006714  042523  045505  052040  SKTMES: .ASCIZ  /SEEK TIMES /
  585  006730  050123  047111  046104  SRTMES: .ASCIZ  /SPINDLE ROTATION TIME /
  586  006757     050  052123  052101  VALDES: .ASCIZ  /(STATED IN 100'S OF MICRO SEC)/
  587  007016  050101  051120  054117  MAPROX: .ASCIZ  /APPROX /
  588  007026  047111  042516  000122  LABIN:  .ASCIZ  /INNER/
  589  007034  044515  042104  042514  LABMID: .ASCIZ  /MIDDLE/
  590  007043     117  052125  051105  LABOUT: .ASCIZ  /OUTER/
  591  007051     105  050130  041505  LABEXP: .ASCIZ  /EXPECTED/
  592  007062  030060  020061  054503  LABOCF: .ASCIZ  /001 CYL FWD/
  593  007076  030060  020061  054503  LABOCR: .ASCIZ  /001 CYL REV/
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007112  031061  020070  054503  LABHCF: .ASCIZ  /128 CYL FWD/
007126  031061  020070  054503  LABHCR: .ASCIZ  /128 CYL REV/
007142  032462  020065  054503  LABACF: .ASCIZ  /255 CYL FWD/
007156  032462  020065  054503  LABACR: .ASCIZ  /255 CYL REV/
007172  042110  020123  040506  HDMOVF: .ASCIZ  /HDS FAILED TO MOVE IN 10 TRIES/
007231     122  051505  052105  OPR12:  .ASCIZ  /RESET WRT LCK /
007250  047117  000040          OPR1A:  .ASCIZ  /ON /
007254  047117  042040  053122  OPR1B:  .ASCIZ  /ON DRV /
007264  047125  042504  020122  UNDTST: .ASCIZ  /UNDER TEST/
007277     123  052105  053440  OPR004: .ASCIZ  /SET WRT LCK /
007314  044504  043106  000040  DIFWD:  .ASCIZ  /DIFF /
007322  043523  020116     000  SGNWD:  .ASCIZ  /SGN /
007327     110  020104     000  HDWD:   .ASCIZ  /HD /
007333     123  041505  000040  SECWD:  .ASCIZ  /SEC /
007340  054503  020114     000  CYLWD:  .ASCIZ  /CYL /
007345     106  047522  020115  FRMWD:  .ASCIZ  /FROM /
007353     040  054502  040520  BYPSNM: .ASCIZ  / BYPASSED /
007366  047522  052125  047111  SEQMES: .ASCIZ  /ROUTINE TRACE SEQ (IN SEQ CALLED):/
007431     104  053122  051440  STAMES: .ASCIZ  /DRV STAT/
007442  040502  020104  042523  BSNSTR: .ASCIZ  /BAD SEC FILES NOT STRD. ALL SEC ASSUMED GOOD./
007520  047524  020124  047503  TCERR:  .ASCIZ  /TOT COMPARE ERRS: /

                                ;       RESULT NAMES
007543     104  053122  051040  MDRDY:  .ASCIZ  /DRV RDY /
007554  047503  052116  042440  MCERR:  .ASCIZ  /CONT ERR /
007566  042110  020122  051103  MHCRC:  .ASCIZ  /HDR CRC/
007576  040504  040524  041440  MDCRC:  .ASCIZ  /DATA CRC/
007607     110  051104  047040  MHNF:   .ASCIZ  /HDR NOT FND/
007623     104  052101  020101  MDLT:   .ASCIZ  /DATA LATE/
007635     110  051104  047040  MHFCRC: .ASCIZ  &HDR NOT FND/HDR CRC/OPI&
007665     104  053122  042440  MDRERR: .ASCIZ  /DRV ERR /
007676  051104  020126  042523  MDSERR: .ASCIZ  /DRV SEL ERR /
007713     104  053122  051440  MDRVST: .ASCIZ  /DRV STATE /
007726  050123  047111  052040  MSPERR: .ASCIZ  /SPIN TIMEOUT /
007/44  051127  020124  040507  MWGERR: .ASCIZ  /WRT GAT ERR /
007761     123  042505  020113  MSTERR: .ASCIZ  /SEEK TIMEOUT /
007777     110  040505  020104  MHCERR: .ASCIZ  /HEAD CUR ERR /
010015     127  052122  042040  MWDERR: .ASCIZ  /WRT DAT ERR /
010032  050117  044440  041516  MOPERR: .ASCIZ  /OP INCOMPLETE /
010051     110  051104  042057  MHDERR: .ASCIZ  &HDR/DAT ERR &
010066  042110  020122  047516  MFLERR: .ASCIZ  &HDR NOT FND/DAT LATE &
010114  047516  026516  054105  MNEERR: .ASCIZ  /NON-EXSTNT MEM /
010134  054503  020114     000  MCYLOC: .ASCIZ  /CYL /
010141     103  052517  042114  MNDRST: .ASCIZ  /COULD NOT RETRIEVE DRIVE STATUS/
010201     125  045516  020116  MUNDEF: .ASCIZ  /UNKN DRV STATE-NO RDY,NO ERR,HDS OUT/
010246  040506  046111  052040  MRLFAL: .ASCIZ  /FAIL TO RELD HDS AFTER ERR CLEAR/
010307     127  044522  042524  MWRTAB: .ASCIZ  /WRITE ABORTED/
010325     040  051105  020122  MEXERS: .ASCIZ  / ERR LIMIT EXCEEDED - UNIT DROPPED/
010370  042440  051122  051117  MERRS:  .ASCIZ  / ERROR/
010377     207  177777     000  BELL:   .ASCIZ  <207><377><377>

                                ;       RESULT SETTINGS
010403     111  020123     000  RESE3:  .ASCIZ  /IS /
010407     040  041123  000040  RESE4:  .ASCIZ  / SB /

                                ;       RESULT CONDITIONS
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010414  044440  020116     000  RESE5:   .ASCIZ   / IN /
010421     040  043117  000040  RESE6:   .ASCIZ   / OF /
010426  052123  052101  020105  STATE2:  .ASCIZ   /STATE 2/
010436  052123  052101  020105  STATE3:  .ASCIZ   /STATE 3/
010446  052123  052101  020105  STATE5:  .ASCIZ   /STATE 5/
010456  044506  051522  020124  C10MS:   .ASCIZ   /FIRST 3 MS/
010471     065  030060  051515  C500MS:  .ASCIZ   /500MS/
010477     103  041531  042514  CCYLUP:  .ASCIZ   /CYCLE UP/
010510  040504  040524  054040  CAFDT:   .ASCIZ   /DATA XFER/
010522  020065  042523  042103  C5SEC:   .ASCIZ   /5 SECDS/

010532  047045  052045  047045  FMTOP1:  .ASCIZ   /%N%T%N%T%T%06%S%T%01%N/
010561     045  022516  022524  FMTOP2:  .ASCIZ   /%N%T%01%S1%T%01%N/
010603     045  022516  022524  FMTOP3:  .ASCIZ   /%N%T%01%S1%T%T%N/
010624  052045  052045     000  FMT1:    .ASCIZ   /%T%T/
010631     045  022516  022524  FMT1.1:  .ASCIZ   /%N%T%T/
010640  052045     000          FMT2:    .ASCIZ   /%T/
010643     045  000116          FMT3:    .ASCIZ   /%N/
010646  047045  052045  052045  FMT4:    .ASCIZ   /%N%T%T%N/
010657     045  022516  022524  FMT5:    .ASCIZ   /%N%T%06%S1%T%01/
010677     045  022516  030523  FMT6:    .ASCIZ   /%N%S11%T%S4%T%S4%T%S4%T%S4%T%S2%T/
010741     045  022516  022524  FMT7:    .ASCIZ   /%N%T%06%S2%06%S2%06%S2%06%S3%03%S2%01%N/
011011     045  022516  022524  FMT8:    .ASCIZ   /%N%T%06%S2%06%S2%06%S2%06/
011043     045  022516  000124  FMT9:    .ASCIZ   /%N%T/
011050  052045  047445  000061  FMT11:   .ASCIZ   /%T%01/
011056  052045  047445  000063  FMT12:   .ASCIZ   /%T%03/
011064  047045  051445  030461  FMT13:   .ASCIZ   /%N%S11%T%03%S1%T%03%S1%T%01%S1%T%01/
011130  047045  052045  052045  FMT14:   .ASCIZ   /%N%T%T%D3%S1%T%06%S1%T%06/
011162  047045  051445  030461  FMT15:   .ASCIZ   /%N%S11%T%D3%S1%T%06%S1%T%06/
011216  047045  051445  022465  FMT16:   .ASCIZ   /%N%S5%06/
011227     045  030523  022460  FMT17:   .ASCIZ   /%S10%T%N%S11%06%N/
011251     045  022516  030523  FMT18:   .ASCIZ   /%N%S13%T%S5%T%S4%T%S5%T%N/
011303     045  022524  031123  FMT19:   .ASCIZ   /%T%S2%D6%S4%D6%S4%D6%S4%D6%N/
011340  052045  051445  022462  FMT20:   .ASCIZ   /%T%S2%D6%S14%D6%S4%D6%N/
011370  052045  051445  031061  FMT21:   .ASCIZ   /%T%S12%D6%S14%D6%N/
011413     045  022516  030523  FMT22:   .ASCIZ   /%N%S11%T%03%S1%T%01%S1%T%02/
011447     045  022524  022524  FMT23:   .ASCIZ   /%T%T%T%01%N/
011463     045  022516  000124  FMT24:   .ASCIZ   /%N%T/
011470  047045  042045  022462  FMT25:   .ASCIZ   /%N%D2%T/
011500  047045  051445  022461  FMT26:   .ASCIZ   /%N%S1%T%D4%T%T%D3%N/
011524  047045  052045  042045  FMT27:   .ASCIZ   /%N%T%D3%T%D3%N/
011543     045  022516  022524  FMT28:   .ASCIZ   /%N%T%T%T/
011554                          ENDMOD

011554                          BGNMOD   GLBERR
                                ;        ERR1     R3 POINTS TO RESULT MESSAGE
                                ;                 RESULT: (R3)

                                ;        ERR2     R3 POINTS TO RESULT NAME
                                ;                 RESULT: (R3) IS 1 SB 0

                                ;        ERR3     R3 POINTS TO RESULT NAME
                                ;                 RESULT: (R3) IS 0 SB 1

                                ;        ERR4     R3 POINTS TO RESULT NAME
                                ;                 R4 POINTS TO RESULT CONDITIONS
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                                  ;                 RESULT: (R3) IS 1 SB 0 (R4)

                                  ;       ERR5      R3 POINTS TO RESULT NAME
                                  ;                 R4 POINTS TO RESULT CONDITIONS
                                  ;                 RESULT: (R3) IS 0 SB 1 (R4)

                                  ;       ERR6      RESULT ROUTINE DETERMINES WHICH ERROR(S) ARE SET AND
                                  ;                 REPORTS ALL
                                  ;                 RESULT: "ERROR" IS 1 SB 0

                                  ;       ERR7      DRIVE STATE ERROR REPORT
                                  ;                 R3 CONTAINS EXPECTED STATE
                                  ;                 T.STAT CONTAINS BAD STATE
                                  ;                 RESULT: DRIVE STATE IS (T.STAT) SB (R3)

                                  ;       ERR8      HEAD POSITIONING ERROR REPORT
                                  ;                 NEWCYL CONTAINS EXPECTED CYLINDER
                                  ;                 HDWRD1 CONTAINS BAD CYLINDER
                                  ;                 RESULT: CYLINDER IS (HDWRD1) SB (NEWCYL)

                                  ;       ERR9      UTILITY RESULT REPORT
                                  ;                 R3 POINTS TO RESULT NAME
                                  ;                 R4 POINTS TO VALUE 1
                                  ;                 R5 POINTS TO VALUE 2
                                  ;                 RESULT: (R3-NAME) IS (R4-VALUE 1) SB (R5-VALUE 2)

                                  ;       ERR10     COMPARE ERROR REPORT
                                  ;                 R3 CONTAINS THE BAD WORD NUMBER
                                  ;                 R4 POINTS TO BAD WORD
                                  ;                 R5 POINTS TO GOOD WORD
                                  ;                 RESULT: WORD (R3) IS (R4) SB (R5)


    011554                        BGNMSG  ERR1
    011554  105737  003067                TSTB      NOERCT            ;TEST IF ERROR COUNTING INHIBITED
    011560  001002                        BNE       1$                ;YES - SKIP
    011562  005277  171072                INC       @ERRPOINT         ;ELSE BUMP ERROR COUNT
    011566  010146                1$:     MOV       R1,-(SP)          ;STORE R1
    011570  004737  023244                JSR       PC,RPTOP          ;REPORT OPERATION
    011574  012721  000001                MOV       #1,(R1)+          ;SET PARAM NUMBER
    011600  010321                        MOV       R3,(R1)+          ;INSERT MESSAGE ADDRESS POINTER
    011602  004737  024032                JSR       PC,RPTRES         ;REPORT RESULTS
    011606  004737  024240                JSR       PC,RPTREM         ;REPORT REMAINDER
    011612  012601                        MOV       (SP)+,R1          ;RESTORE R1
    011614  004737  014634                JSR       PC,CKERLM         ;GO CHECK IF ERROR COUNT EXCEEDED
    011620                        ENDMSG
(3) 011620                        L10000:
(3) 011620  104023                        EMT       C$MSG

    011622                        BGNMSG  ERR2
    011622  005277  171032                INC       @ERRPOINT         ;BUMP ERROR COUNT
    011626  010146                        MOV       R1,-(SP)          ;STORE R1
    011630  004737  023244                JSR       PC,RPTOP          ;REPORT OPERATION
    011634  012721  000003                MOV       #3,(R1)+          ;SET PARAM NUMBER
    011640  010321                        MOV       R3,(R1)+          ;INSERT NAME ADD POINTER
    011642  012721  000001                MOV       #1,(R1)+          ;SET IS VALUE
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 792  011646  005021                    CLR     (R1)+               ;SET SB VALUE
 793  011650  004737  024032            JSR     PC,RPTRES           ;REPORT RESULTS
 794  011654  004737  024240            JSR     PC,RPTREM           ;REPORT REMAINDER
 795  011660  012601                    MOV     (SP)+,R1            ;RESTORE R1
 796  011662  004737  014634            JSR     PC,CKERLM           ;GO CHECK IF ERROR COUNT EXCEEDED
 797  011666                    ENDMSG
 (3)  011666                    L10001:
 (3)  011666  104023                    EMT     C$MSG
 798
 799  011670                    BGNMSG  ERR3
 800  011670  005277  170764            INC     @ERRPOINT           ;BUMP ERROR COUNT
 801  011674  010146                    MOV     R1,-(SP)            ;STORE R1
 802  011676  004737  023244            JSR     PC,RPTOP            ;REPORT OPERATION
 803  011702  012721  000003            MOV     #3,(R1)+            ;SET PARAM NUMBER
 804  011706  010321                    MOV     R3,(R1)+            ;INSERT NAME ADD POINTER
 805  011710  005021                    CLR     (R1)+               ;SET IS VALUE
 806  011712  012721  000001            MOV     #1,(R1)+            ;SET SB VALUE
 807  011716  004737  024032            JSR     PC,RPTRES           ;REPORT RESULTS
 808  011722  004737  024240            JSR     PC,RPTREM           ;REPORT REMAINDER
 809  011726  012601                    MOV     (SP)+,R1            ;RESTORE R1
 810  011730  004737  014634            JSR     PC,CKERLM           ;GO CHECK IF ERROR COUNT EXCEEDED
 811  011734                    ENDMSG
 (3)  011734                    L10002:
 (3)  011734  104023                    EMT     C$MSG
 812
 813  011736                    BGNMSG  ERR4
 814  011736  005277  170716            INC     @ERRPOINT           ;BUMP ERROR COUNT
 815  011742  010146                    MOV     R1,-(SP)            ;STORE R1
 816  011744  004737  023244            JSR     PC,RPTOP            ;REPORT OPERATION
 817  011750  012721  000004            MOV     #4,(R1)+            ;SET PARAM NUMBER
 818  011754  010321                    MOV     R3,(R1)+            ;INSERT NAME ADD POINTER
 819  011756  012721  000001            MOV     #1,(R1)+            ;SET IS VALUE
 820  011762  005021                    CLR     (R1)+               ;SET SB VALUE
 821  011764  010411                    MOV     R4,(R1)             ;INSERT ADD OF CONDITION POINTER
 822  011766  004737  024032            JSR     PC,RPTRES           ;REPORT RESULTS
 823  011772  004737  024240            JSR     PC,RPTREM           ;REPORT REMAINDER
 824  011776  012601                    MOV     (SP)+,R1            ;RESTORE R1
 825  012000  004737  014634            JSR     PC,CKERLM           ;GO CHECK IF ERROR COUNT EXCEEDED
 826  012004                    ENDMSG
 (3)  012004                    L10003:
 (3)  012004  104023                    EMT     C$MSG
 827
 828  012006                    BGNMSG  ERR5
 829  012006  005277  170646            INC     @ERRPOINT           ;BUMP ERROR COUNT
 830  012012  010146                    MOV     R1,-(SP)            ;STORE R1
 831  012014  004737  023244            JSR     PC,RPTOP            ;REPORT OPERATION
 832  012020  012721  000004            MOV     #4,(R1)+            ;SET PARAM NUMBER
 833  012024  010321                    MOV     R3,(R1)+            ;INSERT NAME ADD POINTER
 834  012026  005021                    CLR     (R1)+               ;SET IS VALUE
 835  012030  012721  000001            MOV     #1,(R1)+            ;SET SB VALUE
 836  012034  010411                    MOV     R4,(R1)             ;INSERT ADD OF CONDITION POINTER
 837  012036  004737  024032            JSR     PC,RPTRES           ;REPORT RESULTS
 838  012042  004737  024240            JSR     PC,RPTREM           ;REPORT REMAINDER
 839  012046  012601                    MOV     (SP)+,R1            ;RESTORE R1
 840  012050  004737  014634            JSR     PC,CKERLM           ;GO CHECK IF ERROR COUNT EXCEEDED
 841  012054                    ENDMSG
 (3)  012054                              L10004:
 (3)  012054  104023                              EMT     C$MSG
 842
 843  012056                              BGNMSG  ERR6
 844  012056  105737  003067                      TSTB    NOERCT              ;TEST IF ERROR COUNTING INHIBITED
 845  012062  001002                              BNE     17$                 ;YES - SKIP
 846  012064  005277  170570                      INC     @ERRPOINT           ;ELSE BUMP ERROR COUNT
 847  012070  010146                      17$:    MOV     R1,-(SP)            ;STORE R1
 848  012072  010346                              MOV     R3,-(SP)            ;STORE R3
 849  012074  010446                              MOV     R4,-(SP)            ;STORE R4
 850  012076  010546                              MOV     R5,-(SP)            ;STORE R5
 851  012100  004737  023244                      JSR     PC,RPTOP            ;REPORT OPERATION
 852  012104  012721  000003                      MOV     #3,(R1)+            ;SET PARAM NUMBER
 853  012110  012761  000001  000002              MOV     #1,2(R1)            ;INSERT IS VALUE
 854  012116  005037  002546                      CLR     TEMP3               ;CLEAR FOR STATUS STORAGE
 855  012122  013703  002466                      MOV     T.CS,R3             ;GET T.CS
 856  012126  042703  177761                      BIC     #177761,R3          ;AND CLEAR ALL BUT FUNCTION
 857  012132  022703  000004                      CMP     #4,R3               ;CHECK IF IT WAS GET STATUS
 858  012136  001432                              BEQ     1$                  ;YES - STATUS IS IN T.MP, SKIP
 859  012140  012762  000003  000004              MOV     #GETSTAT,RLDA(R2) ;ELSE DO GET STATUS
 860  012146  012703  000004                      MOV     #4,R3
 861  012152  053703  002454                      BIS     RLDRV,R3
 862  012156  010362  000000                      MOV     R3,RLCS(R2)
 863  012162                                      WAITUS  #10.                ;WAIT FOR CONTROLLER READY
 (3)  012162  012700  000012                      MOV     #10.,R0
 (3)  012166  104027                              EMT     C$WTU
 864  012170  032762  000200  000000              BIT     #CRDYMSK,RLCS(R2)       ;TEST IF READY
 865  012176  001003                              BNE     10$                 ;YES - SKIP
 866  012200  012703  001000              9$:     MOV     #BIT9,R3            ;ELSE SET NO DRIVE STATUS BIT
 867  012204  000413                              BR      2$                  ;IN MESSAGE WORD AND SKIP
 868  012206  016203  000006              10$:    MOV     RLMP(R2),R3         ;STORE STATUS FOR REPORT
 869  012212  010337  002546                      MOV     R3,TEMP3
 870  012216  113703  002547                      MOVB    TEMP3+1,R3          ;GET ERROR BITS IN PROPER POSITION
 871  012222  000402                              BR      13$
 872  012224  113703  002475              1$:     MOVB    T.MP+1,R3           ;GET ERROR BITS FROM MP REG
 873  012230  042703  177442              13$:    BIC     #177442,R3          ;CLEAR UNUSED BITS
 874  012234  013704  002466              2$:     MOV     T.CS,R4             ;GET ERROR BITS FROM CS REG
 875  012240  042704  001777                      BIC     #1777,R4            ;CLEAR UNUSED BITS
 876  012244  050403                              BIS     R4,R3               ;MAKE ONE WORD OF POSSIBLE ERRORS
 877  012246  032703  002000                      BIT     #OPIERR,R3          ;TEST IF OPI SET
 878  012252  001442                              BEQ     115$                ;NO - SKIP
 879  012254  032703  010000                      BIT     #HNFERR,R3          ;TEST IF HDR NOT FOUND ERROR
 880  012260  001026                              BNE     107$                ;YES - SKIP
 881  012262  032703  004000                      BIT     #HCRCERR,R3         ;TEST IF HDR CRC ERR
 882  012266  001020                              BNE     105$                ;YES - SKIP
 883  012270  012704  010032                      MOV     #MOPERR,R4          ;SET OPI ALONE MESSAGE
 884  012274                              100$:   PRINTB  #FMT28,#MRSLT,R4,#MERRS ;REPORT ERROR
 (10) 012274  012746  010370                      MOV     #MERRS,-(SP)
 (9)  012300  010446                              MOV     R4,-(SP)
 (8)  012302  012746  005157                      MOV     #MRSLT,-(SP)
 (7)  012306  012746  011543                      MOV     #FMT28,-(SP)
 (6)  012312  012746  000004                      MOV     #4,-(SP)
 (3)  012316  010600                              MOV     SP,R0
 (4)  012320  104014                              EMT     C$PNTB
 (4)  012322  062706  000012                      ADD     #12,SP
 885  012326  000430                              BR      120$                ;SKIP
 886  012330  012704  007566           105$:  MOV     #MHCRC,R4        ;HDR CRC MESSAGE
 887  012334  000757                          BR      100$
 888  012336  032703  004000           107$:  BIT     #HCRCERR,R3      ;TEST IF HCRC WITH HDR NOT FND
 889  012342  001003                          BNE     109$             ;YES - SKIP
 890  012344  012704  007607                  MOV     #MHNF,R4         ;MESSAGE HEADER NOT FOUND
 891  012350  000751                          BR      100$
 892  012352  012704  007635           109$:  MOV     #MHFCRC,R4       ;HNF AND HCRC MESSAGE
 893  012356  000746                          BR      100$             ;SKIP
 894  012360  032703  004000           115$:  BIT     #DCKERR,R3       ;TEST IF DATA CHECK SET, NOT OPI
 895  012364  001403                          BEQ     118$             ;NO - SKIP
 896  012366  012704  007576                  MOV     #MDCRC,R4        ;SET MESSAGE DATA CHECK
 897  012372  000740                          BR      100$             ;SKIP
 898  012374  032703  010000           118$:  BIT     #DLTERR,R3       ;TEST IF DATA LATE ERROR
 899  012400  001403                          BEQ     120$             ;NO - SKIP
 900  012402  012704  007623                  MOV     #MDLT,R4         ;SET MESSAGE DATA LATE
 901  012406  000732                          BR      100$             ;SKIP
 902  012410  012705  100000           120$:  MOV     #BIT15,R5        ;SET BIT POINTER FOR TEST
 903  012414  005004                          CLR     R4               ;CLEAR R4 FOR TABLE COUNT
 904  012416  030503                   3$:    BIT     R5,R3            ;TEST IF BIT IS SET
 905  012420  001005                          BNE     6$               ;YES - SKIP TO REPORT
 906  012422  005724                   4$:    TST     (R4)+            ;ELSE BUMP TABLE POINTER
 907  012424  000241                          CLC                      ;CLEAR CARRY
 908  012426  006005                          ROR     R5               ;SHIFT BIT POINTER TO NEXT BIT
 909  012430  001372                          BNE     3$               ;LOOP IF NOT 0
 910  012432  000405                          BR      7$               ;ELSE REPORT REMAINDER
 911  012434  016411  002174           6$:    MOV     RESTBL(R4),(R1)  ;INSERT NAME ADDRESS
 912  012440  004737  024032                  JSR     PC,RPTRES        ;REPORT RESULTS
 913  012444  000766                          BR      4$               ;GET NEXT BIT
 914  012446  004737  024240           7$:    JSR     PC,RPTREM        ;REPORT REMAINDER
 915  012452  005737  002546                  TST     TEMP3            ;TEST IF ANY NEW STATUS
 916  012456  001414                          BEQ     15$              ;NO - SKIP
 917  012460                                  PRINTB  #FMT17,#STAMES,TEMP3
 (9)  012460  013746  002546                  MOV     TEMP3,-(SP)
 (8)  012464  012746  007431                  MOV     #STAMES,-(SP)
 (7)  012470  012746  011227                  MOV     #FMT17,-(SP)
 (6)  012474  012746  000003                  MOV     #3,-(SP)
 (3)  012500  010600                          MOV     SP,R0
 (4)  012502  104014                          EMT     C$PNTB
 (4)  012504  062706  000010                  ADD     #10,SP
 918  012510  032737  004000  002466   15$:   BIT     #DCKERR,T.CS     ;TEST IF DATA CHECK ERROR
 919  012516  001453                          BEQ     25$              ;NO - SKIP
 920  012520  032737  002000  002466          BIT     #OPIERR,T.CS     ;TEST IF OPI SET
 921  012526  001047                          BNE     25$              ;YES - SKIP
 922  012530  005037  002436                  CLR     MORECE           ;CLEAR COMPARE ERROR COUNT
 923  012534  012701  000200                  MOV     #128.,R1         ;SET COMPARE LENGTH
 924  012540  012703  000001                  MOV     #1,R3            ;SET WORD COUNT
 925  012544  012705  004066                  MOV     #OBUFF,R5        ;SET GOOD WORD POINTER
 926  012550  012704  003466                  MOV     #IBUFF,R4        ;SET TEST WORD POINTER
 927  012554  021514                   18$:   CMP     (R5),(R4)        ;CHECK WORD
 928  012556  001427                          BEQ     19$              ;GOOD - SKIP
 929  012560  023727  002436  000012          CMP     MORECE,#10.      ;TEST IF COMPARE LIMIT REACHED
 930  012566  003021                          BGT     20$              ;YES - SKIP
 931  012570                                  PRINTB  #FMT15,#MWORD,R3,#RESE3,(R4),#RESE4,(R5)
(13)  012570  011546                          MOV     (R5),-(SP)
(12)  012572  012746  010407                  MOV     #RESE4,-(SP)
(11)  012576  011446                          MOV     (R4),-(SP)
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   (10) 012600  012746  010403                 MOV     #RESE3,-(SP)
   (9)  012604  010346                         MOV     R3,-(SP)
   (8)  012606  012746  006005                 MOV     #MWORD,-(SP)
   (7)  012612  012746  011162                 MOV     #FMT15,-(SP)
   (6)  012616  012746  000007                 MOV     #7,-(SP)
   (3)  012622  010600                         MOV     SP,R0
   (4)  012624  104014                         EMT     C$PNTB
   (4)  012626  062706  000020                 ADD     #20,SP
   932  012632  005237  002436         20$:    INC     MORECE                  ;BUMP ERROR COUNTER
   933  012636  022524                 19$:    CMP     (R5)+,(R4)+             ;BUMP POINTERS
   934  012640  005203                         INC     R3                      ;BUMP COUNTER
   935  012642  005301                         DEC     R1                      ;DEC LENGTH COUNT
   936  012644  001343                         BNE     18$                     ;LOOP IF NOT DONE
   937  012646  005737  002436         25$:    TST     MORECE                  ;TEST IF ANY COMPARE ERRORS
   938  012652  001421                         BEQ     27$                     ;NO - SKIP
   939  012654  012701  000200                 MOV     #128.,R1                ;SET COMPARE LENGTH
   940  012660                                 PRINTB  #FMT27,#TCERR,MORECE,#RESE6,R1
   (11) 012660  010146                         MOV     R1,-(SP)
   (10) 012662  012746  010421                 MOV     #RESE6,-(SP)
   (9)  012666  013746  002436                 MOV     MORECE,-(SP)
   (8)  012672  012746  007520                 MOV     #TCERR,-(SP)
   (7)  012676  012746  011524                 MOV     #FMT27,-(SP)
   (6)  012702  012746  000005                 MOV     #5,-(SP)
   (3)  012706  010600                         MOV     SP,R0
   (4)  012710  104014                         EMT     C$PNTB
   (4)  012712  062706  000014                 ADD     #14,SP
   941  012716  012605                 27$:    MOV     (SP)+,R5                ;RESTORE R5, 4, 3, 1
   942  012720  012604                         MOV     (SP)+,R4
   943  012722  012603                         MOV     (SP)+,R3
   944  012724  012601                         MOV     (SP)+,R1
   945  012726  004737  014634                 JSR     PC,CKERLM               ;GO CHECK IF ERROR COUNT EXCEEDED
   946  012732                         ENDMSG
   (3)  012732                         L10005:
   (3)  012732  104023                         EMT     C$MSG
   947
   948  012734                         BGNMSG  ERR7
   949  012734  005277  167720                 INC     @ERRPOINT               ;BUMP ERROR COUNT
   950  012740  010146                         MOV     R1,-(SP)                ;STORE R1
   951  012742  004737  023244                 JSR     PC,RPTOP                ;REPORT OPERATION
   952  012746  012721  000003                 MOV     #3,(R1)+                ;SET PARAM NUMBER
   953  012752  012721  007713                 MOV     #MDRVST,(R1)+           ;INSERT NAME ADD POINTER
   954  012756  013721  002502                 MOV     T.STAT,(R1)+            ;INSERT IS VALUE
   955  012762  010311                         MOV     R3,(R1) ;INSERT SB VALUE
   956  012764  004737  024032                 JSR     PC,RPTRES               ;REPORT RESULTS
   957  012770  004737  024240                 JSR     PC,RPTREM               ;REPORT REMAINDER
   958  012774  012601                         MOV     (SP)+,R1                ;RESTORE R1
   959  012776  004737  014634                 JSR     PC,CKERLM               ;GO CHECK IF ERROR COUNT EXCEEDED
   960  013002                         ENDMSG
   (3)  013002                         L10006:
   (3)  013002  104023                         EMT     C$MSG
   961
   962  013004                         BGNMSG  ERR8
   963  013004  005277  167650                 INC     @ERRPOINT               ;BUMP ERROR COUNT
   964  013010  010146                         MOV     R1,-(SP)                ;STORE R1
   965  013012  010346                         MOV     R3,-(SP)                ;STORE R3
   966  013014  004737  023244                 JSR     PC,RPTOP                ;REPORT OPERATION
   967  013020  012721  000003                    MOV     #3,(R1)+            ;SET PARAM NUMBER
   968  013024  012721  010134                    MOV     #MCYLOC,(R1)+       ;INSERT NAME ADD POINTER
   969  013030  013711  002474                    MOV     HDWRD1,(R1)         ;GET HEADER WORD
   970  013034  012703  000007                    MOV     #7,R3               ;SET SHIFT COUNT
   971  013040  000241                    3$:     CLC
   972  013042  006011                            ROR     (R1)                ;ALIGN CHAR FOR PRINTING
   973  013044  005303                            DEC     R3                  ;  AS IS VALUE
   974  013046  001374                            BNE     3$
   975  013050  005721                            TST     (R1)+               ;BUMP PARAM POINTER
   976  013052  013711  002524                    MOV     NEWCYL,(R1)         ;INSERT SB VALUE
   977  013056  004737  024032                    JSR     PC,RPTRES           ;REPORT RESULTS
   978  013062  004737  024240                    JSR     PC,RPTREM           ;REPORT REMAINDER
   979  013066  012603                            MOV     (SP)+,R3            ;RESTORE R3
   980  013070  012601                            MOV     (SP)+,R1            ;RESTORE R1
   981  013072  004737  014634                    JSR     PC,CKERLM           ;GO CHECK IF ERROR COUNT EXCEEDED
   982  013076                            ENDMSG
   (3)  013076                            L10007:
   (3)  013076  104023                            EMT     C$MSG
   983
   984  013100                            BGNMSG  ERR9
   985  013100  005277  167554                    INC     @ERRPOINT           ;BUMP ERROR COUNT
   986  013104  010146                            MOV     R1,-(SP)            ;STORE R1
   987  013106  004737  023244                    JSR     PC,RPTOP            ;REPORT OPERATION
   988  013112  012721  000003                    MOV     #3,(R1)+            ;SET PARAM NUMBER
   989  013116  010321                            MOV     R3,(R1)+            ;INSERT NAME ADD POINTER
   990  013120  010421                            MOV     R4,(R1)+            ;SET IS VALUE
   991  013122  010521                            MOV     R5,(R1)+            ;SET SB VALUE
   992  013124  004737  024032                    JSR     PC,RPTRES           ;REPORT RESULTS
   993  013130  004737  024240                    JSR     PC,RPTREM           ;REPORT REMAINDER
   994  013134  012601                            MOV     (SP)+,R1            ;RESTORE R1
   995  013136  004737  014634                    JSR     PC,CKERLM           ;GO CHECK IF ERROR COUNT EXCEEDED
   996  013142                            ENDMSG
   (3)  013142                            L10010:
   (3)  013142  104023                            EMT     C$MSG
   997  013144                            BGNMSG  ERR10
   998  013144  010146                            MOV     R1,-(SP)            ;STORE R1
   999  013146  005737  002436                    TST     MORECE              ;TEST IF 2ND BAD LINE
  1000  013152  001051                            BNE     3$                  ;YES - SKIP
  1001  013154  005277  167500                    INC     @ERRPOINT           ;BUMP ERROR COUNT
  1002  013160  004737  023244                    JSR     PC,RPTOP            ;REPORT OPERATION
  1003  013164                                    PRINTB  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1> ;REPORT ID
  (11)  013164  005046                            CLR     -(SP)
  (11)  013166  153716  002455                    BISB    RLDRV+1,(SP)
  (10)  013172  012746  005633                    MOV     #DRVNAM,-(SP)
   (9)  013176  013746  002450                    MOV     RLBAS,-(SP)
   (8)  013202  012746  005622                    MOV     #BASADD,-(SP)
   (7)  013206  012746  010657                    MOV     #FMT5,-(SP)
   (6)  013212  012746  000005                    MOV     #5,-(SP)
   (3)  013216  010600                            MOV     SP,R0
   (4)  013220  104014                            EMT     C$PNTB
   (4)  013222  062706  000014                    ADD     #14,SP
  1004  013226                                    PRINTB  #FMT14,#MRSLT,#MWORD,R3,#RESE3,(R4),#RESE4,(R5)
  (14)  013226  011546                            MOV     (R5),-(SP)
  (13)  013230  012746  010407                    MOV     #RESE4,-(SP)
  (12)  013234  011446                            MOV     (R4),-(SP)
  (11)  013236  012746  010403                    MOV     #RESE3,-(SP)
  (10) 013242  010346                    MOV     R3,-(SP)
   (9) 013244  012746  006005            MOV     #MWORD,-(SP)
   (8) 013250  012746  005157            MOV     #MRSLT,-(SP)
   (7) 013254  012746  011130            MOV     #FMT14,-(SP)
   (6) 013260  012746  000010            MOV     #10,-(SP)
   (3) 013264  010600                    MOV     SP,R0
   (4) 013266  104014                    EMT     C$PNTB
   (4) 013270  062706  000022            ADD     #22,SP
  1005 013274  000421                    BR      4$
  1006 013276                    3$:     PRINTB  #FMT15,#MWORD,R3,#RESE3,(R4),#RESE4,(R5) ;REPORT DATA
  (13) 013276  011546                    MOV     (R5),-(SP)
  (12) 013300  012746  010407            MOV     #RESE4,-(SP)
  (11) 013304  011446                    MOV     (R4),-(SP)
  (10) 013306  012746  010403            MOV     #RESE3,-(SP)
   (9) 013312  010346                    MOV     R3,-(SP)
   (8) 013314  012746  006005            MOV     #MWORD,-(SP)
   (7) 013320  012746  011162            MOV     #FMT15,-(SP)
   (6) 013324  012746  000007            MOV     #7,-(SP)
   (3) 013330  010600                    MOV     SP,R0
   (4) 013332  104014                    EMT     C$PNTB
   (4) 013334  062706  000020            ADD     #20,SP
  1007 013340  005237  002436    4$:     INC     MORECE          ;INC COMPARE ERROR COUNT
  1008 013344  012601                    MOV     (SP)+,R1        ;RESTORE R1
  1009 013346  004737  014634            JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
  1010 013352                    ENDMSG
   (3) 013352                    L10011:
   (3) 013352  104023                    EMT     C$MSG
  1011 013354                    ENDMOD
  1012                                   .EVEN
  1013
  1014 013354                    BGNMOD  HPTCODE
  1015 013354                    BGNHW
   (3) 013354  000005                    .WORD   L10012-L$HW/2
  1016 013356  174400                    .WORD   174400          ;CSR BASE ADDRESS DEFAULT
  1017 013360  000160                    .WORD   160             ;VECTOR DEFAULT
  1018 013362  000240                    .WORD   240             ;PRIORITY DEFAULT
  1019 013364  000000                    .WORD   0               ;DRIVE NUMBER DEFAULT
  1020 013366  000001                    .WORD   1               ;RL11 CONTROLLER
  1021 013370                    ENDHW
   (3) 013370                    L10012:
  1022 013370                    ENDMOD
  1023
  1024 013370                    BGNMOD  SPTCODE
  1025 013370                    BGNSW
   (3) 013370  000006                    .WORD   L10013-L$SW/2
  1026 013372  000000            MISWIW: .WORD   0               ;BIT 0 = USE ALL CYLINDERS
  1027                                                           ;BIT 1 = USE ALL SECTORS
  1028                                                           ;BIT 2 = EXECUTE DRIVE SELECT TEST
  1029                                                           ;BIT 3 = EXECUTE HEAD ALIGNMENT
  1030                                                           ;BIT 4 = DROP DRIVE IF NO RESPONSE
  1031                                                           ;BIT 12 = HEAD SELECT SUPPLIED FLAG
  1032                                                           ;BIT 13 = HILIMIT SPECIFIED FLAG
  1033                                                           ;BIT 14 = LO LIMIT SPECIFIED FLAG
  1034                                                           ;BIT 15 = DO MANUAL INTERVENTION
  1035 013374  000000            LOLIMW: .WORD   0
  1036 013376  000377            HILIMW: .WORD   255.
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 1037  013400  000000                    HEADW:  .WORD   0
 1038  013402  000024                    ERLIMW: .WORD   20.             ;ERROR LIMIT
 1039  013404  000012                    DCLIMW: .WORD   10.             ;COMPARE ERROR LIMIT
 1040  013406                            ENDSW
  (3)  013406                            L10013:
 1041  013406                            ENDMOD
 1042
 1043  013406                            BGNMOD  DSPCODE
 1048  013406                            DISPATCH        19
  (4)  013406  000023                            .WORD   19
  (6)  013410  024524                            .WORD   T1
  (6)  013412  025046                            .WORD   T2
  (6)  013414  025336                            .WORD   T3
  (6)  013416  025550                            .WORD   T4
  (6)  013420  025760                            .WORD   T5
  (6)  013422  026170                            .WORD   T6
  (6)  013424  026414                            .WORD   T7
  (6)  013426  026614                            .WORD   T8
  (6)  013430  027042                            .WORD   T9
  (6)  013432  027336                            .WORD   T10
  (6)  013434  027634                            .WORD   T11
  (6)  013436  030132                            .WORD   T12
  (6)  013440  031700                            .WORD   T13
  (6)  013442  032410                            .WORD   T14
  (6)  013444  032624                            .WORD   T15
  (6)  013446  033350                            .WORD   T16
  (6)  013450  034372                            .WORD   T17
  (6)  013452  035364                            .WORD   T18
  (6)  013454  036474                            .WORD   T19
 1050  013456                            ENDMOD
 1051
 1052  013456                            BGNMOD  INITCODE
 1053  013456                            BGNINIT
 1054  013456                                    SETPRI  #340
  (3)  013456  012700  000340                    MOV     #340,R0
  (3)  013462  104041                            EMT     C$SPRI
 1055  013464                                    MANUAL                  ;CHECK IF MANUAL INTERVENTION ALLOWED
  (3)  013464  104051                            EMT     C$MANI
 1056  013466                                    BCOMPLETE       1$      ;YES - SKIP
  (2)  013466  103403                            BCS     1$
 1057  013470  042737  100014  013372            BIC     #MITEST!DRSELT!HDALIGN,MISWIW ;CLEAR ALL MANUAL
 1058                                                                    ; INTERVENTION FLAGS
 1059  013476  005037  002424            1$:     CLR     SSINDX          ;CLEAR SUBROUTINE STACK INDEX
 1060  013502                                    READEF  #EF.PWR         ;POWER FAILURE
  (3)  013502  012700  000034                    MOV     #EF.PWR,R0
  (3)  013506  104050                            EMT     C$REFG
 1061  013510                                    BNCOMPLETE  4$          ;NO, GO CHECK NEW PASS
  (2)  013510  103004                            BCC     4$
 1062  013512  013737  002012  003072            MOV     L$UNIT,PWRFLG   ;SET POWER FAIL FLAG
 1063  013520  000531                            BR      PWCON           ;GO SERVICE POWER FAIL
 1064  013522                            4$:     READEF  #EF.START       ;CHECK IF START
  (3)  013522  012700  000040                    MOV     #EF.START,R0
  (3)  013526  104050                            EMT     C$REFG
 1065  013530                                    BNCOMPLETE      RESTART ;NO - SKIP
  (2)  013530  103043                            BCC     RESTART
 1066                                    ;       ON START INITIALIZE TO START AT FIRST DRIVE, CLEAR INTERNAL
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  1067                                          ;       PASS COUNT, AND ERROR COUNT.
  1068  013532  013737  002012  002516                  MOV     L$UNIT,DRVCNT   ;SET UP UNIT COUNT
  1069  013540  005037  003062                  RSTRT:  CLR     PASNUM          ;CLEAR PASS NUMBER
  1070  013544  012700  002662                          MOV     #ERRCNT,R0
  1071  013550  012701  000100                          MOV     #64.,R1         ;GET A COUNT
  1072  013554  005020                          1$:     CLR     (R0)+           ;CLEAR A ERROR COUNTER STORAGE AREA
  1073  013556  005301                                  DEC     R1
  1074  013560  001375                                  BNE     1$              ;LOOP TILL ALL CLEARED
  1075  013562  012737  002660  002660                  MOV     #ERRCNT-2,ERRPOINT ;INIT ERROR POINTER
  1076  013570  012737  177777  003064                  MOV     #-1,PSETNM      ;SET PARAM SELECT TO INITIAL VALUE
  1077  013576  012737  177777  002432                  MOV     #-1,HADONE      ;PRESET HEAD ALIGN DONE FLAG
  1078  013604  032737  020000  013372                  BIT     #HICYL,MISWIW   ;TEST IF HI LIMIT SET
  1079  013612  001003                                  BNE     3$              ;YES - SKIP
  1080  013614  012737  000377  013376                  MOV     #377,HILIMW     ;ELSE INIT HILIMIT
  1081  013622  032737  040000  013372          3$:     BIT     #LOCYL,MISWIW   ;TEST IF LO LIMIT SET
  1082  013630  001002                                  BNE     5$              ;YES - SKIP
  1083  013632  005037  013374                          CLR     LOLIMW          ;ELSE CLEAR LO LIMIT
  1084  013636  000432                          5$:     BR      SETDON
  1085  013640                                  RESTART:
  1086  013640                                          READEF  #EF.RESTART     ;CHECK IF RESTART
   (3)  013640  012700  000037                          MOV     #EF.RESTART,R0
   (3)  013644  104050                                  EMT     C$REFG
  1087  013646                                          BCOMPLETE       RSTRT   ;NO - SKIP
   (2)  013646  103734                                  BCS     RSTRT
  1088  013650                                  CONTINUE:
  1089  013650                                          READEF  #EF.CONTINUE    ;TEST IF CONTINUE
   (3)  013650  012700  000036                          MOV     #EF.CONTINUE,R0
   (3)  013654  104050                                  EMT     C$REFG
  1090  013656                                          BCOMPLETE       PWCON
   (2)  013656  103452                                  BCS     PWCON
  1091                                          ;       ON CONTINUE PICK UP UNIT LAST UNDER TEST
  1092  013660                                          READEF  #EF.NEW         ;CHECK IF STARTING NEW PASS
   (3)  013660  012700  000035                          MOV     #EF.NEW,R0
   (3)  013664  104050                                  EMT     C$REFG
  1093  013666                                          BCOMPLETE       PASNEW
   (2)  013666  103403                                  BCS     PASNEW
  1094  013670                                  NXTPAS:
  1095  013670  005737  002516                          TST     DRVCNT          ;TEST IF ALL UNITS CHECKED
  1096  013674  001013                                  BNE     SETDON          ;NO - SKIP
  1097  013676  005237  003062                  PASNEW: INC     PASNUM          ;ELSE BUMP PASS COUNT
  1098  013702  012737  002660  002660                  MOV     #ERRCNT-2,ERRPOINT ;INIT THE ERROR POINTER
  1099  013710  013737  002012  002516                  MOV     L$UNIT,DRVCNT   ;GET ALL DRIVES
  1100  013716  012737  177777  003064                  MOV     #-1,PSETNM      ;SET PARAM SELECT TO INITIAL
  1101  013724  005237  003064                  SETDON: INC     PSETNM          ;NEXT SET OF PARAMETERS
  1102  013730  005337  002516                          DEC     DRVCNT          ;DOWN COUNT DRIVE TOTAL
  1103  013734  062737  000002  002660                  ADD     #2,ERRPOINT     ;UFDATE THE ERROR POINTER
  1104  013742  013700  003064                          MOV     PSETNM,R0       ;SET UP TO GET PARAMETERS
  1105  013746  012702  002450                          MOV     #RLBAS,R2
  1106  013752                                          GPHARD  R0,R1
   (3)  013752  104042                                  EMT     C$GPHRD
   (3)  013754  010001                                  MOV     R0,R1
  1107  013756                                          BCOMPLETE       7$      ;SKIP IF GOOD PARAM
   (2)  013756  103406                                  BCS     7$
  1108  013760  005737  003072                          TST     PWRFLG          ;RECENT POWER FAILURE
  1109  013764  001741                                  BEQ     NXTPAS  ;NO
  1110  013766  005337  003072                          DEC     PWRFLG          ;ACCOUNT FOR DRIVE
```

```
 1111  013772  000736                            BR      NXTPAS
 1112  013774  012122                    7$:     MOV     (R1)+,(R2)+      ;STORE PARAMETERS CSR
 1113  013776  012122                            MOV     (R1)+,(R2)+      ;                 VECTOR
 1114  014000  005721                            TST     (R1)+            ;BUMP PAST PRIORITY
 1115  014002  012122                            MOV     (R1)+,(R2)+      ;                 DRIVE
 1116
 1117  014004                            PWCON:  SETVEC  RLVEC,#INTHLR,#340        ;SET UP VECTOR
  (7)  014004  012746  000340                    MOV     #340,-(SP)
  (6)  014010  012746  014576                    MOV     #INTHLR,-(SP)
  (5)  014014  013746  002452                    MOV     RLVEC,-(SP)
  (4)  014020  012746  000003                    MOV     #3,-(SP)
  (3)  014024  104037                            EMT     C$SVEC
  (2)  014026  062706  000010                    ADD     #10,SP
 1118  014032                                    SETPRI  #0               ;SET PRIORITY
  (3)  014032  012700  000000                    MOV     #0,R0
  (3)  014036  104041                            EMT     C$SPRI
 1119  014040  013702  002450                    MOV     RLBAS,R2         ;SET RL BASE ADDRESS POINTER
 1120
 1121
 1122
 1123                                    ;       CHECK IF DOING AUTO SIZE AND DROP DRIVE IF NOT READY AND
 1124                                    ;       ERROR SETS ON GET STATUS.
 1125  014044  005737  003062                    TST     PASNUM           ;TEST IF PASS 0
 1126  014050  001135                            BNE     22$              ;NO - SKIP
 1127  014052  032737  000020  013372            BIT     #AUTOSZ,MISWIW   ;TEST IF DOING AUTO SIZE
 1128  014060  001531                            BEQ     22$              ;NO - SKIP
 1129                                    ;CHECK IF UNIBUS ADDRESS IS THERE BEFORE WE CHECK DRIVE READY
 1130  014062  005037  003070                    CLR     TRPFLG           ;TRAP OCCURANCE
 1131  014066                                    SETVEC  ERRVEC,#TRPHAN,#340       ;SET TRAP VECTOR
  (7)  014066  012746  000340                    MOV     #340,-(SP)
  (6)  014072  012746  014570                    MOV     #TRPHAN,-(SP)
  (5)  014076  013746  002652                    MOV     ERRVEC,-(SP)
  (4)  014102  012746  000003                    MOV     #3,-(SP)
  (3)  014106  104037                            EMT     C$SVEC
  (2)  014110  062706  000010                    ADD     #10,SP
 1132  014114  005762  000000                    TST     RLCS(R2)         ;ACCESS BUS
 1133  014120  005737  003070                    TST     TRPFLG           ;TRAP OCCUR??
 1134  014124  001032                            BNE     5$               ;YES, DON'T INVESTIGATE FURTHER
 1135  014126  013705  002454                    MOV     RLDRV,R5         ;GET DRIVE NUMBER
 1136  014132  052705  000200                    BIS     #CRDYMSK,R5      ;INSERT CONT READY
 1137  014136  010562  000000                    MOV     R5,RLCS(R2)      ;LOAD IN DRIVE NUMBER
 1138  014142  032762  000001  000000            BIT     #DRDYMSK,RLCS(R2)  ;CHECK IF DRIVE IS READY
 1139  014150  001072                            BNE     20$              ;YES - GO DO TEST
 1140  014152  012762  000003  000004            MOV     #GETSTAT,RLDA(R2)  ;ELSE INSERT GET STATUS
 1141  014160  052705  000004                    BIS     #4,R5            ;LOAD R5 WITH GET STATUS FUNCTION
 1142  014164  042705  000200                    BIC     #CRDYMSK,R5      ;CLEAR CONTROLLER READY
 1143  014170  010562  000000                    MOV     R5,RLCS(R2)      ;LOAD CS REG
 1144  014174                                    WAITMS  #4               ;WAIT 4 MS
  (3)  014174  012700  000004                    MOV     #4,R0
  (3)  014200  104026                            EMT     C$WTM
 1145  014202  032762  002000  000000            BIT     #OPIERR,RLCS(R2);TEST IF OPI SET
 1146  014210  001452                            BEQ     20$              ;NO - SKIP
 1147  014212                            5$:     CLRVEC  ERRVEC
  (3)  014212  013700  002652                    MOV     ERRVEC,R0
  (3)  014216  104036                            EMT     C$CVEC
 1148  014220                                    PRINTF  #FMT24,#DRVNAV
```

```
    (8) 014220  012746  005640                      MOV     #DRVNAV,-(SP)
    (7) 014224  012746  011463                      MOV     #FMT24,-(SP)
    (6) 014230  012746  000002                      MOV     #2,-(SP)
    (3) 014234  010600                              MOV     SP,R0
    (4) 014236  104017                              EMT     C$PNTF
    (4) 014240  062706  000006                      ADD     #6,SP
   1149 014244                              10$:    PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
   (11) 014244  005046                              CLR     -(SP)
   (11) 014246  153716  002455                      BISB    RLDRV+1,(SP)
   (10) 014252  012746  005633                      MOV     #DRVNAM,-(SP)
    (9) 014256  013746  002450                      MOV     RLBAS,-(SP)
    (8) 014262  012746  005622                      MOV     #BASADD,-(SP)
    (7) 014266  012746  010657                      MOV     #FMT5,-(SP)
    (6) 014272  012746  000005                      MOV     #5,-(SP)
    (3) 014276  010600                              MOV     SP,R0
    (4) 014300  104017                              EMT     C$PNTF
    (4) 014302  062706  000014                      ADD     #14,SP
   1150 014306                                      PRINTF  #FMT3
    (7) 014306  012746  010643                      MOV     #FMT3,-(SP)
    (6) 014312  012746  000001                      MOV     #1,-(SP)
    (3) 014316  010600                              MOV     SP,R0
    (4) 014320  104017                              EMT     C$PNTF
    (4) 014322  062706  000004                      ADD     #4,SP
   1151 014326                                      DODU    PSETNM          ;DROP DRIVE
    (3) 014326  013700  003064                      MOV     PSETNM,R0
    (3) 014332  104053                              EMT     C$DODU
   1152 014334                                      DOCLN
    (3) 014334  104044                              EMT     C$DCLN
   1153 014336                              20$:    CLRVEC  ERRVEC
    (3) 014336  013700  002652                      MOV     ERRVEC,R0
    (3) 014342  104036                              EMT     C$CVEC
   1154 014344                              22$:
   1165                                     ;CHECK IF POWER FAILURE WAIT IS NEEDED
   1166
   1167 014344  005737  003072              4$:     TST     PWRFLG          ;NEEDED???
   1168 014350  001434                              BEQ     8$              ;NO, SKIP
   1169
   1170 014352  013705  002454                      MOV     RLDRV,R5        ;DRIVE SELECT
   1171 014356  052705  000200                      BIS     #CRDYMSK,R5     ;SET CRDY
   1172 014362  010562  000000                      MOV     R5,RLCS(R2)     ;SELECT DRIVE
   1173 014366  012701  000074                      MOV     #60.,R1         ;SIXTY SECOND TIMER
   1174 014372  032762  000001  000000      9$:     BIT     #DRDYMSK,RLCS(R2)       ;DRIVE UP YET
   1175 014400  001020                              BNE     8$              ;YES START TEST
   1176
   1177 014402                                      WAITMS  #10.            ;WAIT A SECOND
    (3) 014402  012700  000012                      MOV     #10.,R0
    (3) 014406  104026                              EMT     C$WTM
   1178 014410  005301                              DEC     R1              ;SIXTY GONE BY
   1179 014412  001367                              BNE     9$              ;NO
   1180 014414                                      PRINTF  #FMT24,#NOPWR
    (8) 014414  012746  005673                      MOV     #NOPWR,-(SP)
    (7) 014420  012746  011463                      MOV     #FMT24,-(SP)
    (6) 014424  012746  000002                      MOV     #2,-(SP)
    (3) 014430  010600                              MOV     SP,R0
    (4) 014432  104017                              EMT     C$PNTF
    (4) 014434  062706  000006                      ADD     #6,SP
```

```
 1181  014440  000701                            BR      10$
 1182
 1183  014442                            8$:
 1184
 1185  014442                            ENDINIT
  (3)  014442                            L10014:
  (3)  014442  104011                            EMT     C$INIT
 1186  014444                            ENDMOD
 1187
 1188  014444                            BGNMOD  CLNCODE
 1189  014444                            BGNCLN
 1190
 1191  014444                                    SETVEC  ERRVEC,#TRPHAN,#340
  (7)  014444  012746  000340                    MOV     #340,-(SP)
  (6)  014450  012746  014570                    MOV     #TRPHAN,-(SP)
  (5)  014454  013746  002652                    MOV     ERRVEC,-(SP)
  (4)  014460  012746  000003                    MOV     #3,-(SP)
  (3)  014464  104037                            EMT     C$SVEC
  (2)  014466  062706  000010                    ADD     #10,SP
 1192
 1193  014472                                    SETPRI #7                ;SET PRORITY TO 7
  (3)  014472  012700  000007                    MOV     #7,R0
  (3)  014476  104041                            EMT     C$SPRI
 1194  014500  032762  000200  000000    2$:     BIT     #CRDYMSK,RLCS(R2)        ;TEST IF CONTROLLER READY
 1195  014506  001407                            BEQ     3$               ;NO LOOP UNTIL READY
 1196  014510  053762  002454  000000            BIS     RLDRV,RLCS(R2)   ;SET DRIVE NUMBER
 1197  014516  032762  000001  000000            BIT     #DRDYMSK,RLCS(R2)        ;TEST IF DRIVE BUSY
 1198  014524  001003                            BNE     5$               ;NO - SKIP
 1199  014526                            3$:     WAITMS  #3               ;WAIT 300 MS
  (3)  014526  012700  000003                    MOV     #3,R0
  (3)  014532  104026                            EMT     C$WTM
 1200  014534                            5$:     CLRVEC  RLVEC            ;RELEASE VEC
  (3)  014534  013700  002452                    MOV     RLVEC,R0
  (3)  014540  104036                            EMT     C$CVEC
 1201  014542  005737  003072                    TST     PWRFLG  ;PWR FAIL SET
 1202  014546  001402                            BEQ     7$               ;NO
 1203  014550  005337  003072                    DEC     PWRFLG
 1204  014554                            7$:     CLRVEC  ERRVEC
  (3)  014554  013700  002652                    MOV     ERRVEC,R0
  (3)  014560  104036                            EMT     C$CVEC
 1205  014562                            ENDCLN
  (3)  014562                            L10015:
  (3)  014562  104012                            EMT     C$CLEAN
 1206
 1207  014564                            BGNDU
 1208  014564  000240                            NOP
 1209  014566                            ENDDU
  (3)  014566                            L10016:
  (3)  014566  104055                            EMT     C$DU
 1210
 1211  014570                            ENDMOD
 1212  014570                            BGNMOD  GLBSUB
 1213
 1214  014570  005237  003070            TRPHAN: INC     TRPFLG
 1215  014574  000002                            RTI
 1216
 1217  014576                                BGNSRV  INTHLR
 1218                                        ;       INTERRUPT HANDLER. ABORTS WAIT TIMER AND STORES ALL RL11 REGS
 1219  014576                                        ABORTWAIT
  (3)  014576  104021                                EMT     C$ABRT
 1220  014600  012237  002466                        MOV     (R2)+,T.CS      ;STORE RL REGISTERS
 1221  014604  012237  002470                        MOV     (R2)+,T.BA
 1222  014610  012237  002472                        MOV     (R2)+,T.DA
 1223  014614  011237  002474                        MOV     (R2),T.MP
 1224  014620  012737  177777  002430                MOV     #-1,DONE        ;SET DONE FLAG
 1225  014626  013702  002450                        MOV     RLBAS,R2        ;RESTORE R2
 1226  014632                                ENDSRV
  (3)  014632                                L10017:
  (2)  014632  000002                                RTI
 1227
 1228                                        ;       ERROR LIMIT CHECKING ROUTINE
 1229                                        ;       DROPS DRIVE IF ERROR LIMIT EXCEEDED
 1230  014634  027737  166020  013402        CKERLM: CMP     @ERRPOINT,ERLIMW         ;TEST IF ERROR LIMIT EXCEEDED
 1231  014642  002453                                BLT     1$              ;NO - SKIP
 1232  014644                                        INLOOP                  ;CHECK IF IN ERROR LOOP
  (3)  014644  104020                                EMT     C$INLP
 1233  014646                                        BCOMPLETE       1$      ;YES - SKIP
  (2)  014646  103451                                BCS     1$
 1234  014650                                        PRINTF  #FMT25,ERLIMW,#MEXERS
  (9)  014650  012746  010325                        MOV     #MEXERS,-(SP)
  (8)  014654  013746  013402                        MOV     ERLIMW,-(SP)
  (7)  014660  012746  011470                        MOV     #FMT25,-(SP)
  (6)  014664  012746  000003                        MOV     #3,-(SP)
  (3)  014670  010600                                MOV     SP,R0
  (4)  014672  104017                                EMT     C$PNTF
  (4)  014674  062706  000010                        ADD     #10,SP
 1235  014700                                        PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
 (11)  014700  005046                                CLR     -(SP)
 (11)  014702  153716  002455                        BISB    RLDRV+1,(SP)
 (10)  014706  012746  005633                        MOV     #DRVNAM,-(SP)
  (9)  014712  013746  002450                        MOV     RLBAS,-(SP)
  (8)  014716  012746  005622                        MOV     #BASADD,-(SP)
  (7)  014722  012746  010657                        MOV     #FMT5,-(SP)
  (6)  014726  012746  000005                        MOV     #5,-(SP)
  (3)  014732  010600                                MOV     SP,R0
  (4)  014734  104017                                EMT     C$PNTF
  (4)  014736  062706  000014                        ADD     #14,SP
 1236  014742                                        PRINTF  #FMT3
  (7)  014742  012746  010643                        MOV     #FMT3,-(SP)
  (6)  014746  012746  000001                        MOV     #1,-(SP)
  (3)  014752  010600                                MOV     SP,R0
  (4)  014754  104017                                EMT     C$PNTF
  (4)  014756  062706  000004                        ADD     #4,SP
 1237  014762                                        DODU    PSETNM          ;DROP DRIVE
  (3)  014762  013700  003064                        MOV     PSETNM,R0
  (3)  014766  104053                                EMT     C$DODU
 1238  014770                                        DOCLN                   ;GO TO CLEAN UP
  (3)  014770  104044                                EMT     C$DCLN
 1239  014772  000207                        1$:     RTS     PC
 1240
 1241                                        ;       READ AND STORE ALL RL11 REGISTERS
 1242  014774  016237  000000  002466        READRL: MOV     RLCSR(R2),T.CS  ;GET CS REG
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015002 016237 000002 002470           MOV    RLBA(R2),T.BA     ;GET BUS ADDRESS REG
015010 016237 000004 002472           MOV    RLDA(R2),T.DA     ;GET DISK ADDRESS
015016 016237 000006 002474           MOV    RLMP(R2),T.MP     ;GET MULTI-PURPOSE REG
015024 000207                         RTS    PC                ;RETURN

                            ;         WAIT FOR CONTROLLER TIMEOUT TO FORCE INTERRUPT ROUTINE
015026 011646               WAITIN:   MOV    (SP),-(SP)        ;MAKE ROOM FOR ERROR POINTER
015030 005066 000002                  CLR    2(SP)             ;CLEAR FOR POINTER
015034 032762 000200 000000           BIT    #CRDYMSK,RLCSR(R2)        ;TEST IF CONTROLLER READY
015042 001420                         BEQ    4$                ;NO - SKIP TO WAIT
015044 004737 014774                  JSR    PC,READRL         ;READ ALL RL REGS
015050 005737 002430                  TST    DONE              ;TEST IF INTERRUPT OCCURRED
015054 001433                         BEQ    5$                ;NO - GO SET NO INTERRUPT ERR FLAG
015056 012766 006013 000002 1$:       MOV    #MTOSLOW,2(SP)    ;ELSE SET TO SLOW ERROR POINTER
015064 032737 002000 002466           BIT    #OPIERR,T.CS      ;TEST IF OPI SET
015072 001403                         BEQ    2$                ;NO - SKIP
015074 012766 006032 000002           MOV    #MDRRES,2(SP)     ;SET MESSAGE FOR NO DRIVE RESPONSE
015102 000207               2$:       RTS    PC                ;RETURN
015104                      4$:       WAITMS #3                ;WAIT 300 MS FOR TIMEOUT
(3) 015104 012700 000003              MOV    #3,R0
(3) 015110 104026                     EMT    C$WTM
015112 032762 000200 000000           BIT    #CRDYMSK,RLCS(R2)         ;TEST IF READY NOW SET
015120 001006                         BNE    3$                ;YES - SKIP
015122 004737 014774                  JSR    PC,READRL         ;READ RL REGS
015126 012766 006115 000002           MOV    #MCONHNG,2(SP)    ;SET MESSAGE FOR CONTROLLER HUNG
015134 000762                         BR     2$                ;SKIP
015136 005737 002430        3$:       TST    DONE              ;ELSE CHECK IF INTERRUPT OCCURRED
015142 001345                         BNE    1$                ;YES - SKIP TO SET TO SLOW
015144 004737 014774        5$:       JSR    PC,READRL         ;READ RL REGS
015150 012766 006062 000002           MOV    #MNOINT,2(SP)     ;ELSE SET NO INTERRUPT FLAG
015156 000751                         BR     2$                ;GO TO RETURN

                            ;         OPERATION AND TEST INITIALIZE ROUTINE
015160 005037 002426        TSTINT:   CLR    OPFLAG            ;CLEAR OPERATION FLAGS
015164 105037 003067                  CLRB   NOERCT            ;RESET INHIBIT ERROR COUNTING
015170 005037 002436                  CLR    MORECE            ;RESET MORE COMPARE ERRORS
015174 000207                         RTS    PC

                            ;         GET STATUS AND GET STATUS WITH RESET ROUTINE
015176 013746 002550        GSTATR:   MOV    TEMP4,-(SP)       ;STORE TEMP4
015202 012737 000013 002550           MOV    #GETSTAT!DRSET,TEMP4      ;SET FOR RESET
015210 000412                         BR     GSTATG
015212 013746 002550        GSTATC:   MOV    TEMP4,-(SP)       ;STORE TEMP4
015216 012737 000003 002550           MOV    #GETSTAT,TEMP4    ;SET FOR NO RESET
015224 000404                         BR     GSTATG
015226 013746 002550        GSTAT:    MOV    TEMP4,-(SP)       ;STORE TEMP4
015232 005037 002550                  CLR    TEMP4             ;SET FOR SAVE L. AND T. REGS
015236 010346               GSTATG:   MOV    R3,-(SP)          ;STORE R3
015240 013703 002424                  MOV    SSINDX,R3         ;GET SUBROUTINE INDEX
015244 005723                         TST    (R3)+             ;BUMP IT FOR NEXT ENTRY
015246 016663 000004 002260           MOV    4(SP),SUBSTK(R3)  ;INSERT THIS CALL
015254 162763 000004 002260           SUB    #4,SUBSTK(R3)     ;ADJUST IT TO CALLING LOCATION
015262 010337 002424                  MOV    R3,SSINDX         ;STORE IT BACK
015266 010046                         MOV    R0,-(SP)          ;STORE R0
015270 010146                         MOV    R1,-(SP)          ;STORE R1
015272 012737 000002 002440           MOV    #2,ERRSWI         ;SET FOR NO ERROR RETURN
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      015300  032737  000010  002550          BIT     #DRSET,TEMP4       ;TEST IF DRIVE RESET
      015306  001453                          BEQ     11$                ;NO - SKIP
      015310  032762  040000  000000          BIT     #DRVERR,RLCS(R2)   ;TEST IF DRIVE ERROR SET
      015316  001403                          BEQ     49$                ;NO - SKIP
      015320                                  WAITMS  #3                 ;WAIT FOR 300 MS FOR DRIVE TO SETTLE
 (3)  015320  012700  000003                  MOV     #3,R0
 (3)  015324  104026                          EMT     C$WTM
      015326  012701  000062          49$:    MOV     #50.,R1            ;SET WAIT FOR 5 SEC
      015332  004737  015226          50$:    JSR     PC,GSTAT           ;GET DRIVE STATUS
      015336  015772                                  3$
      015340  032737  000001  002466          BIT     #DRDYMSK,T.CS      ;TEST IF DRIVE READY
      015346  001051                          BNE     5$                 ;YES - GO DO CLEAR
      015350  032737  000020  002474          BIT     #HOSTAT,T.MP       ;ELSE TEST IF HEADS OUT
      015356  001010                          BNE     51$                ;YES - BYPASS RELOAD WAIT FLAG SETTING
      015360  032737  144000  002474          BIT     #SPDSTAT!HCESTAT!WDESTAT,T.MP ;TEST IF DRIVE HAS ERROR
                                                                                     ;THAT CAUSED HEADS TO
                                                                                     ;UNLOAD
      015366  001441                          BEQ     5$                 ;NO - SKIP
      015370  052737  040000  002426          BIS     #RELDWT,OPFLAG     ;ELSE SET WAIT FLAG
      015376  000435                          BR      5$                 ;SKIP TO CLEAR
      015400  032737  040000  002466  51$:    BIT     #DRVERR,T.CS       ;TEST IF DRIVE ERROR NOW
      015406  001031                          BNE     5$                 ;YES - SKIP TO CLEAR
      015410                                  WAITMS  #1                 ;WAIT FOR DRIVE TO GET ERROR, RDY, OR HO
 (3)  015410  012700  000001                  MOV     #1,R0
 (3)  015414  104026                          EMT     C$WTM
      015416  005301                          DEC     R1                 ;DEC WAIT COUNTER
      015420  001344                          BNE     50$                ;IF NOT DONE, LOOP
      015422  012703  010201                  MOV     #MUNDEF,R3         ;MESSAGE FOR UNDEFINED STATE
      015426                                  ERRHRD  10001.,,ERR1
 (3)  015426  104443                          TRAP    T$ERCODE
 (5)  015430  023421                          .WORD   10001
 (5)  015432  011554                          .WORD   ERR1
      015434  000554                          BR      14$                ;EXIT
      015436  005737  002550          11$:    TST     TEMP4              ;TEST IF SAVE REGISTERS
      015442  001013                          BNE     5$                 ;NO SKIP
      015444  012701  000004                  MOV     #4,R1              ;SET SAVE COUNT
      015450  012703  002466                  MOV     #L.MP+2,R3         ;SET ADDRESS OF FIRST SAVE
      015454  014346                  8$:     MOV     -(R3),-(SP)        ;PUT REG ON STACK
      015456  005301                          DEC     R1                 ;DEC COUNT
      015460  001375                          BNE     8$                 ;LOOP UNTIL ALL SAVED
      015462  012737  000003  002462          MOV     #GETSTAT,L.DA      ;SET FOR GET STATUS
      015470  000403                          BR      6$                 ;SKIP
      015472  013737  002550  002462  5$:     MOV     TEMP4,L.DA         ;INSERT PRESET FOR STATUS
      015500                          6$:
      015500  005037  002430                  CLR     DONE               ;CLEAR INTERRUPT FLAG
      015504  013737  002454  002456          MOV     RLDRV,L.CS         ;SET UP TO GET STATUS
      015512  042737  002000  002456          BIC     #BIT10,L.CS        ;CLEAR FOR DRIVE 4 - 7 SPEC'D
      015520  052737  000104  002456          BIS     #GTSTAT,L.CS
      015526  013762  002462  000004          MOV     L.DA,RLDA(R2)      ;LOAD RL REGS
      015534  013762  002456  000000          MOV     L.CS,RLCSR(R2)     ;LOAD CS REG
      015542                                  WAITUS  #1                 ;WAIT 100 US FOR INTERRUPT
 (3)  015542  012700  000001                  MOV     #1,R0
 (3)  015546  104027                          EMT     C$WTU
      015550  005737  002430                  TST     DONE               ;CHECK IF INTERRUPT OCCURRED
      015554  001476                          BEQ     1$                 ;NO - SKIP
      015556  013737  002474  002502  4$:     MOV     T.MP,T.STAT        ;STORE MP REGISTER
 1344  015564  042737  177770  002502          BIC     #^C<STAMSK>,T.STAT ;CLEAR ALL BUT STATE
 1345  015572  032737  000010  002462          BIT     #DRSET,L.DA        ;TEST IF RESET WAS SPECIFIED
 1346  015600  001474                          BEQ     3$                 ;NO - SKIP TO EXIT
 1347  015602  032737  040000  002426          BIT     #RELDWT,OPFLAG     ;TEST IF RELOAD WAIT FLAG SET
 1348  015610  001424                          BEQ     12$                ;NO - SKIP
 1349  015612  012701  001130                  MOV     #600.,R1           ;SET WAIT COUNT FOR 60 SECONDS
 1350  015616  032762  000001  000000  13$:    BIT     #DRDYMSK,RLCS(R2)  ;TEST IF DRIVE NOW READY
 1351  015624  001016                          BNE     12$                ;YES - SKIP
 1352  015626                                  WAITMS  #1                 ;CALL WAIT
  (3)  015626  012700  000001                  MOV     #1,R0
  (3)  015632  104026                          EMT     C$WTM
 1353  015634  005301                          DEC     R1                 ;DEC COUNT
 1354  015636  001367                          BNE     13$                ;LOOP IF NOT 0
 1355  015640  004737  015226                  JSR     PC,GSTAT           ;GET DRIVE STATUS
 1356  015644  015772                          3$                         ;ERROR RETURN
 1357  015646  012703  010246                  MOV     #MRLFAL,R3         ;SET RESULT MESSAGE POINTER
 1358  015652                                  ERRHRD  10003.,,ERR1
  (3)  015652  104443                          TRAP    T$ERCODE
  (5)  015654  023423                          .WORD   10003
  (5)  015656  011554                          .WORD   ERR1
 1359  015660  000442                          BR      14$                ;GO TO EXIT
 1360  015662                          12$:    WAITUS  #10.               ;WAIT FOR 1MS
  (3)  015662  012700  000012                  MOV     #10.,R0
  (3)  015666  104027                          EMT     C$WTU
 1361  015670  004737  015226                  JSR     PC,GSTAT           ;GET DRIVE STATUS
 1362  015674  015772                          3$
 1363  015676  032737  100000  002466          BIT     #ANYERR,T.CS       ;TEST IF ANY ERROR
 1364  015704  001432                          BEQ     3$                 ;NO - SKIP
 1365  015706  032737  001000  002474          BIT     #VCSTAT,T.MP       ;CHECK IF VOLUME CHECK RESET
 1366  015714  001403                          BEQ     7$                 ;YES SKIP
 1367  015716  012703  006161                  MOV     #VCNRST,R3         ;SET REASON POINTER
 1368  015722  000416                          BR      2$                 ;EXIT
 1369  015724  032737  040000  002466  7$:     BIT     #DRVERR,T.CS       ;CHECK IF DRIVE ERROR
 1370  015732  001404                          BEQ     9$                 ;NO - SKIP
 1371  015734                                  ERRHRD  10004.,,ERR6
  (3)  015734  104443                          TRAP    T$ERCODE
  (5)  015736  023424                          .WORD   10004
  (5)  015740  012056                          .WORD   ERR6
 1372  015742  000411                          BR      14$                ;EXIT
 1373  015744  012703  006202          9$:     MOV     #UNXERR,R3         ;SET REASON POINTER
 1374  015750  000403                          BR      2$                 ;EXIT
 1375  015752  004737  015026          1$:     JSR     PC,WAITIN          ;WAIT FOR INTERRUPT
 1376  015756  012603                          MOV     (SP)+,R3           ;STORE REASON POINTER FOR RETURN
 1377  015760                          2$:     ERRHRD  10002.,,ERR1
  (3)  015760  104443                          TRAP    T$ERCODE
  (5)  015762  023422                          .WORD   10002
  (5)  015764  011554                          .WORD   ERR1
 1378  015766  005037  002440          14$:    CLR     ERRSWI             ;CLEAR FOR ERROR RETURN
 1379  015772  005737  002550          3$:     TST     TEMP4              ;TEST IF REGISTERS WERE SAVED
 1380  015776  001007                          BNE     22$                ;NO - SKIP
 1381  016000  012703  002456                  MOV     #L.CS,R3           ;SET POINTER TO RESTORE
 1382  016004  012701  000004                  MOV     #4,R1              ;SET REGISTER COUNT
 1383  016010  012623                  20$:    MOV     (SP)+,(R3)+        ;RESTORE REG
 1384  016012  005301                          DEC     R1                 ;DEC COUNT
 1385  016014  001375                          BNE     20$                ;LOOP UNTIL ALL ARE RESTORED
 1386  016016  162737  000002  002424  22$:    SUB     #2,SSINDX          ;REMOVE ENTRY FROM SUBROUT STACK
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016024  012601                          MOV     (SP)+,R1            ;RESTORE R1
016026  012600                          MOV     (SP)+,R0
016030  012603                          MOV     (SP)+,R3            ;RESTORE R3
016032  012637  002550                  MOV     (SP)+,TEMP4         ;RESTORE TEMP4
016036  005737  002440                  TST     ERRSWI              ;TEST IF ERROR RETURN
016042  001403                          BEQ     99$                 ;YES - SKIP
016044  063716  002440                  ADD     ERRSWI,(SP)         ;ADD IN ERROR RETURN
016050  000207                          RTS     PC
016052  017616  000000          99$:    MOV     @(SP),(SP)          ;SET ERROR RETURN ADDRESS
016056  000207                          RTS     PC


                                ;       SEEK ROUTINE
016060  012737  177777  002542  XSEEKT: MOV     #-1,TEMP1           ;SET SPECIAL TIMING SEEK FLAG
016066  000402                          BR      XSEEK1
016070  005037  002542          XSEEK:  CLR     TEMP1               ;CLEAR SPECIAL SEEK FOR TIMING FLAG
016074  010346                  XSEEK1: MOV     R3,-(SP)            ;STORE R3
016076  013703  002424                  MOV     SSINDX,R3           ;GET SUBROUTINE INDEX
016102  005723                          TST     (R3)+               ;BUMP IT FOR NEXT ENTRY
016104  016663  000002  002260          MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
016112  162763  000004  002260          SUB     #4,SUBSTK(R3)       ;ADJUST IT TO CALLING LOCATION
016120  010337  002424                  MOV     R3,SSINDX           ;STORE IT BACK
016124  010046                          MOV     R0,-(SP)
016126  010146                          MOV     R1,-(SP)
016130  010546                          MOV     R5,-(SP)            ;STORE REG
016132  012737  000002  002440          MOV     #2,ERRSWI           ;SET FOR NO ERROR RETURN
016140  005037  002520                  CLR     DIFAUG              ;CLEAR DIFFERENCE AUGMENT (FOR SEEKING
                                                                    ;   PAST GUARD BAND)
016144  004737  021116                  JSR     PC,GETPOS           ;GET PRESENT POSITION
016150  016530                          65$
016152  013737  002526  002522          MOV     CURCYL,OLDCYL       ;MOVE CURRENT TO OLD CYLINDER
016160  023727  002524  000377          CMP     NEWCYL,#255.        ;TEST IF NEW IS GREATER THAN 255
016166  003412                          BLE     3$                  ;NO - SKIP
016170  162737  000377  002524          SUB     #255.,NEWCYL        ;ELSE SUBTRACT 255.
016176  013737  002524  002520          MOV     NEWCYL,DIFAUG       ;STORE DIFFERENCE AS AUGMENT
016204  012737  000377  002524          MOV     #255.,NEWCYL        ;SET NEWCYL AS 255.
016212  000412                          BR      6$                  ;SKIP
016214  005737  002524          3$:     TST     NEWCYL              ;TEST IF NEWCYL HAS NEGATIVE VALUE
016220  100007                          BPL     6$                  ;NO - SKIP
016222  005437  002524                  NEG     NEWCYL              ;ELSE MAKE IT POSITIVE
016226  013737  002524  002520          MOV     NEWCYL,DIFAUG       ;AND STORE IT AS AUGMENT
016234  005037  002524                  CLR     NEWCYL              ;AND SET NEWCYL TO 0
016240  013705  002526          6$:     MOV     CURCYL,R5           ;COMPUTE DIFFERENCE AND NEW CYLINDER
016244  163705  002524                  SUB     NEWCYL,R5           ;SUB NEWCYL FROM CURCYL
016250  100005                          BPL     13$                 ;IF DIFF IS POSITIVE - SKIP(REV SEEK)
016252  012737  000001  002532          MOV     #1,DESSGN           ;ELSE SET SIGN FOR FORWARD
016260  005405                          NEG     R5                  ;MAKE DIFFERENCE POSITIVE
016262  000402                          BR      14$                 ;SKIP
016264  005037  002532          13$:    CLR     DESSGN              ;SET SIGN FOR REVERSE
016270  010537  002530          14$:    MOV     R5,DESDIF           ;STORE DIFFERENCE
016274  005737  002520                  TST     DIFAUG              ;IS THERE A DIFFERENCE AUGMENT
016300  001412                          BEQ     18$                 ;NO - SKIP
016302  023727  002524  000377          CMP     NEWCYL,#255.        ;CHECK IF NEW CYL IS 255.
016310  001003                          BNE     17$                 ;NO - SKIP
016312  012737  000001  002532          MOV     #1,DESSGN           ;ELSE FORCE SIGN FOR FORWARD
                                                                    ;(INNER GUARD BAND)
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      016320  063737  002520  002530  17$:    ADD     DIFAUG,DESDIF     ;ADD ANY AUGMENT TO DIFFERENCE
      016326                          18$:
      016326  012705  002456                  MOV     #L.CS,R5          ;GET L REG ADDRESS
      016332  012715  000106                  MOV     #SEEK,(R5)        ;SET FOR SEEK
      016336  053715  002454                  BIS     RLDRV,(R5)        ;INSERT DRIVE NUMBER
      016342  042725  002000                  BIC     #BIT10,(R5)+      ;CLEAR IF DRIVE 4 - 7 SPEC'D
      016346  005025                          CLR     (R5)+             ;CLEAR BUS ADDRESS
      016350  013715  002530                  MOV     DESDIF,(R5)       ;LOAD DIFFERENCE
      016354  012700  000007                  MOV     #7,R0             ;SET TO SHIFT DIFFERENCE
      016360  006315                  21$:    ASL     (R5)
      016362  005300                          DEC     R0
      016364  001375                          BNE     21$               ;LOOP UNTIL ALIGNED
      016366  005737  002532                  TST     DESSGN            ;TEST SIGN
      016372  001402                          BEQ     23$               ;SKIP IF 0
      016374  052715  000004                  BIS     #DIRBIT,(R5)      ;ELSE INSERT SIGN
      016400  005737  002534          23$:    TST     DESHD             ;TEST IF HEAD 0
      016404  001402                          BEQ     25$               ;YES - SKIP
      016406  052715  000020                  BIS     #HDSEL,(R5)       ;ELSE SET HEAD BIT
      016412  052725  000001          25$:    BIS     #MBSET0,(R5)+     ;INSERT MARKER BIT
      016416  004737  017130                  JSR     PC,RDYCHK         ;CHECK IF DRIVE READY
      016422  016530                                  65$
      016424  005037  002430                  CLR     DONE              ;CLEAR INTERRUPT FLAG
      016430  005737  002542                  TST     TEMP1             ;CHECK IF SPECIAL SEEK FLAG SET
      016434  001035                          BNE     65$               ;YES - SKIP, DO NOT START SEEK
      016436  014562  000004                  MOV     -(R5),RLDA(R2)    ;LOAD RL REGISTERS
      016442  014562  000002                  MOV     -(R5),RLBA(R2)
      016446  014562  000000                  MOV     -(R5),RLCS(R2)
      016452                          30$:    WAITUS  #10.
 (3)  016452  012700  000012                  MOV     #10.,R0
 (3)  016456  104027                          EMT     C$WTU
      016460  005737  002430                  TST     DONE              ;TEST IF INTERRUPT DONE
      016464  001011                          BNE     32$               ;YES - SKIP
      016466  004737  015026                  JSR     PC,WAITIN         ;GO WAIT FOR INTERRUPT
      016472  012603                          MOV     (SP)+,R3          ;GET RESULT MESSAGE POINTER
      016474                                  ERRHRD  10005.,,ERR1
 (3)  016474  104443                          TRAP    T$ERCODE
 (5)  016476  023425                          .WORD   10005
 (5)  016500  011554                          .WORD   ERR1
      016502  005037  002440                  CLR     ERRSWI            ;CLEAR FOR ERROR ERROR RETURN
      016506  000410                          BR      65$
      016510  005737  002466          32$:    TST     T.CS              ;TEST IF ANY ERROR
      016514  100005                          BPL     65$               ;NO - SKIP
      016516                                  ERRHRD  10006.,,ERR6
 (3)  016516  104443                          TRAP    T$ERCODE
 (5)  016520  023426                          .WORD   10006
 (5)  016522  012056                          .WORD   ERR6
      016524  005037  002440                  CLR     ERRSWI            ;CLEAR FOR ERROR ERROR RETURN
      016530  162737  000002  002424  65$:    SUB     #2,SSINDX         ;REMOVE ENTRY FROM SUBROUT STACK
      016536  012605                          MOV     (SP)+,R5          ;RESTORE REGISTER
      016540  012601                          MOV     (SP)+,R1
      016542  012600                          MOV     (SP)+,R0
      016544  012603                          MOV     (SP)+,R3          ;RESTORE R3
      016546  005737  002440                  TST     ERRSWI            ;TEST IF ERROR RETURN
      016552  001403                          BEQ     99$               ;YES - SKIP
      016554  063716  002440                  ADD     ERRSWI,(SP)       ;ADD IN ERROR RETURN
      016560  000207                          RTS     PC
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  1492  016562  017616  000000          99$:    MOV     @(SP),(SP)       ;SET ERROR RETURN ADDRESS
  1493  016566  000207                          RTS     PC
  1494
  1552
  1554                                  ;       POSITION HEADS ROUTINE. POSITIONS HEADS USING 1 CYLINDER SEEKS
  1555                                  ;       TO CYLINDER SPECIFIED IN R5 BY THE CALLING ROUTINE
  1556  016570  010346                  POSHDS: MOV     R3,-(SP)         ;SAVE REGS
  1557  016572  013703  002424                  MOV     SSINDX,R3        ;GET SUBROUTINE INDEX
  1558  016576  005723                          TST     (R3)+            ;BUMP IT FOR NEXT ENTRY
  1559  016600  016663  000002  002260          MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
  1560  016606  162763  000004  002260          SUB     #4,SUBSTK(R3)    ;ADJUST IT TO CALLING LOCATION
  1561  016614  010337  002424                  MOV     R3,SSINDX        ;STORE IT BACK
  1562  016620  010346                          MOV     R3,-(SP)
  1563  016622  010446                          MOV     R4,-(SP)
  1564  016624  012737  000002  002440          MOV     #2,ERRSWI        ;SET FOR NO ERROR RETURN
  1565  016632  004737  021116                  JSR     PC,GETPOS        ;GET CURRENT POSITION
  1566  016636  017072                          PH65$
  1567  016640  012704  000012                  MOV     #10.,R4          ;SET RETRY COUNT
  1568  016644                          BGNSEG
   (3)  016644  104004                          EMT     C$BSEG
  1569  016646                          1$:     INLOOP                   ;CHECK IF IN ERROR LOOP
   (3)  016646  104020                          EMT     C$INLP
  1570  016650                                  BNCOMPLETE      5$       ;NO - SKIP
   (2)  016650  103012                          BCC     5$
  1571  016652  004737  021116                  JSR     PC,GETPOS        ;ELSE GET POSITION
  1572  016656  017070                          60$
  1573  016660  023737  002526  002524          CMP     CURCYL,NEWCYL    ;CHECK IF AT INTENDED POSITION
  1574  016666  001017                          BNE     8$               ;NO - SKIP
  1575  016670  004737  017454                  JSR     PC,ONSWAP        ;SWAP OLDCYL AND NEWCYL
  1576  016674  000414                          BR      8$               ;SKIP
  1577  016676  013737  002526  002522  5$:     MOV     CURCYL,OLDCYL    ;IN NOT LOOPING, STORE CURCYL AS OLDCYL
  1578  016704  023705  002526                  CMP     CURCYL,R5        ;CHECK IF HDS AT FINAL POSITION
  1579  016710  001467                          BEQ     60$              ;YES - GO TO EXIT
  1580  016712  003003                          BGT     7$               ;IF CURCYL > FINAL POSITION - SKIP
  1581  016714  005237  002524                  INC     NEWCYL           ;ELSE BUMP NEWCYL (MOVE HDS IN)
  1582  016720  000402                          BR      8$               ;SKIP
  1583  016722  005337  002524          7$:     DEC     NEWCYL           ;DEC NEWCYL (MOVE HDS OUT)
  1584  016726  004737  016070          8$:     JSR     PC,XSEEK         ;DO SEEK
  1585  016732  017070                          60$
  1586  016734  012701  005670                  MOV     #3000.,R1        ;SET WAIT COUNT 300 MS
  1587  016740  004737  020650                  JSR     PC,RDYWAIT       ;WAIT FOR DRIVE READY
  1588  016744  017070                          60$
  1589  016746  005737  002466                  TST     T.CS             ;TEST IF ANY ERROR
  1590  016752  100006                          BPL     10$              ;NO - SKIP
  1591  016754                                  ERRHRD  10008.,,ERR6
   (3)  016754  104443                          TRAP    T$ERCODE
   (5)  016756  023430                          .WORD   10008
   (5)  016760  012056                          .WORD   ERR6
  1592  016762  005037  002440                  CLR     ERRSWI           ;CLEAR FOR ERROR ERROR RETURN
  1593  016766  000440                          BR      60$
  1594  016770  004737  021116          10$:    JSR     PC,GETPOS        ;GET POSITION
  1595  016774  017070                          60$
  1596  016776  023737  002526  002524          CMP     CURCYL,NEWCYL    ;CHECK IF ARRIVED AT DESIRED PLACE
  1597  017004  001003                          BNE     15$              ;NO - SKIP
  1598  017006  012704  000012          14$:    MOV     #10.,R4          ;ELSE INIT RETRY COUNT
  1599  017012  000715                          BR      1$               ;GO DO NEXT SEEK
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 1600  017014  005737  002532           15$:     TST     DESSGN              ;TEST IF GOING IN
 1601  017020  001016                            BNE     17$                 ;YES - SKIP
 1602  017022  023737  002526  002524            CMP     CURCYL,NEWCYL       ;CHECK IF HEADS DID NOT MOVE IN
 1603  017030  003366                            BGT     14$                 ;YES - SKIP
 1604  017032  005304                   16$:     DEC     R4                  ;DEC RETRY COUNT
 1605  017034  001334                            BNE     8$                  ;DO ANOTHER SEEK IF NOT 0
 1606  017036  012703  007172                    MOV     #HDMOVF,R3          ;ELSE SET RESULT MESSAGE POINTER
 1607  017042                                    ERRHRD  10009.,,ERR1
  (3)  017042  104443                            TRAP    T$ERCODE
  (5)  017044  023431                            .WORD   10009
  (5)  017046  011554                            .WORD   ERR1
 1608  017050  005037  002440                    CLR     ERRSWI              ;CLEAR FOR ERROR ERROR RETURN
 1609  017054  000405                            BR      60$
 1610  017056  023737  002526  002524  17$:     CMP     CURCYL,NEWCYL       ;HDS SHOULD MOVE OUT, CHK THEY DID
 1611  017064  002750                            BLT     14$                 ;YES - SKIP
 1612  017066  000761                            BR      16$                 ;ELSE GO DEC AND RETRY
 1613  017070                          20$:
 1614  017070                          60$:
 1615  017070                          ENDSEG
  (3)  017070                          10000$:
  (3)  017070  104005                            EMT     C$ESEG
 1616  017072  162737  000002  002424  PH65$:   SUB     #2,SSINDX           ;REMOVE ENTRY FROM SUBROUT STACK
 1617  017100  012604                            MOV     (SP)+,R4            ;RESTORE REGISTERS
 1618  017102  012600                            MOV     (SP)+,R0
 1619  017104  012603                            MOV     (SP)+,R3
 1620  017106  005737  002440                    TST     ERRSWI              ;TEST IF ERROR RETURN
 1621  017112  001403                            BEQ     99$                 ;YES - SKIP
 1622  017114  063716  002440                    ADD     ERRSWI,(SP)         ;ADD IN ERROR RETURN
 1623  017120  000207                            RTS     PC
 1624  017122  017616  000000          99$:     MOV     @(SP),(SP)          ;SET ERROR RETURN ADDRESS
 1625  017126  000207                            RTS     PC
 1626
 1628                                  ;        DRIVE READY TEST ROUTINE. CHECKS DEIVE IS READY. IF NOT, WAIT
 1629                                  ;        500MS FOR READY TO SET.
 1630  017130  010346                  RDYCHK:  MOV     R3,-(SP)            ;STORE REGS
 1631  017132  013703  002424                    MOV     SSINDX,R3           ;GET SUBROUTINE INDEX
 1632  017136  005723                            TST     (R3)+               ;BUMP IT FOR NEXT ENTRY
 1633  017140  016663  000002  002260            MOV     2(SP),SUBSTK(R3)    ;INSERT THIS CALL
 1634  017146  162763  000004  002260            SUB     #4,SUBSTK(R3)       ;ADJUST IT TO CALLING LOCATION
 1635  017154  010337  002424                    MOV     R3,SSINDX           ;STORE IT BACK
 1636  017160  010046                            MOV     R0,-(SP)
 1637  017162  010146                            MOV     R1,-(SP)
 1638  017164  010446                            MOV     R4,-(SP)
 1639  017166  012737  000002  002440            MOV     #2,ERRSWI           ;SET FOR NO ERROR RETURN
 1640  017174  012701  011610                    MOV     #5000.,R1           ;SET WAIT COUNT
 1641  017200  004737  015226          1$:      JSR     PC,GSTAT            ;GET DRIVE STATUS
 1642  017204  017324                            4$
 1643  017206  032737  000001  002466            BIT     #DRDYMSK,T.CS       ;TEST IF DRIVE READY
 1644  017214  001045                            BNE     5$                  ;YES - EXIT
 1645. 017216                                    WAITUS  #1
  (3)  017216  012700  000001                    MOV     #1,R0
  (3)  017222  104027                            EMT     C$WTU
 1646  017224  005301                            DEC     R1                  ;DEC WAIT COUNT
 1647  017226  001364                            BNE     1$                  ;LOOP IF NOT 0
 1648  017230  012703  007543                    MOV     #NDRDY,R3           ;SET RESULT MESSAGE POINTER
 1649  017234  012704  010471                    MOV     #C500MS,R4          ;SET CONDITION MESSAGE POINTER
 1650  017240                                     ERRHRD  10010.,,ERR5
  (3)  017240  104443                             TRAP    T$ERCODE
  (5)  017242  023432                             .WORD   10010
  (5)  017244  012006                             .WORD   ERR5
 1651  017246  012701  000062                     MOV     #50.,R1           ;SET WAIT COUNT FOR 5 SECONDS
 1652  017252  004737  015226           2$:       JSR     PC,GSTAT          ;GET DRIVE STATUS
 1653  017256  017324                             4$
 1654  017260  032737  000001  002466             BIT     #DRDYMSK,T.CS     ;TEST IF DRIVE READY
 1655  017266  001005                             BNE     3$                ;YES - SKIP
 1656  017270                                     WAITMS  #1                ;WAIT FOR 100MS
  (3)  017270  012700  000001                     MOV     #1,R0
  (3)  017274  104026                             EMT     C$WTM
 1657  017276  005301                             DEC     R1                ;DEC WAIT COUNTER
 1658  017300  001364                             BNE     2$                ;LOOP UNTIL TIME DONE
 1659  017302  032737  100000  002466   3$:       BIT     #ANYERR,T.CS      ;TEST IF ANYERR SET
 1660  017310  001405                             BEQ     4$                ;NO - SKIP
 1661  017312                                     ERRHRD  10011.,,ERR6      ;REPORT ALL ERRORS
  (3)  017312  104443                             TRAP    T$ERCODE
  (5)  017314  023433                             .WORD   10011
  (5)  017316  012056                             .WORD   ERR6
 1662  017320  005337  002662                     DEC     ERRCNT            ;REDUCE ERROR COUNT FOR DUAL ERRORS
 1663  017324  005037  002440           4$:       CLR     ERRSWI            ;CLEAR FOR ERROR RETURN
 1664  017330  162737  000002  002424   5$:       SUB     #2,SSINDX         ;REMOVE ENTRY FROM SUBROUT STACK
 1665  017336  012604                             MOV     (SP)+,R4          ;RESTORE REGS
 1666  017340  012601                             MOV     (SP)+,R1
 1667  017342  012600                             MOV     (SP)+,R0
 1668  017344  012603                             MOV     (SP)+,R3
 1669  017346  005737  002440                     TST     ERRSWI            ;TEST IF ERROR RETURN
 1670  017352  001403                             BEQ     99$               ;YES - SKIP
 1671  017354  063716  002440                     ADD     ERRSWI,(SP)       ;ADD IN ERROR RETURN
 1672  017360  000207                             RTS     PC
 1673  017362  017616  000000           99$:      MOV     @(SP),(SP)        ;SET ERROR RETURN ADDRESS
 1674  017366  000207                             RTS     PC
 1675
 1677                                   ;         CHOSE HEAD ROUTINE. PICKS HEAD 0 UNLESS SPECIFIC HEAD IS
 1678                                   ;         SELECTED BY SOFTWARE PARAMETER.
 1679  017370  005037  002534           CHOSHD:   CLR     DESHD             ;CLEAR TO HEAD 0
 1680  017374  032737  010000  013372             BIT     #HEADLM,MISWIW    ;TEST IF HEAD SPECIFIED
 1681  017402  001403                             BEQ     1$                ;NO - SKIP
 1682  017404  013737  013400  002534             MOV     HEADW,DESHD       ;INSERT SPECIFIED HEAD
 1683  017412  000207                   1$:       RTS     PC
 1684
 1685                                   ;         SWAP HEAD ROUTINE. CHANGES SELECTED HEAD TO HEAD 1
 1686                                   ;         UNLESS HEAD 0 SPECIFICALLY SELECTED BY SOFTWARE PARAMETER.
 1687  017414  032737  010000  013372   SWAPHD:   BIT     #HEADLM,MISWIW    ;TEST IF HEAD SPECIFIED
 1688  017422  001011                             BNE     2$                ;YES - TAKE ABORT EXIT
 1689  017424  005737  002534                     TST     DESHD             ;TEST IF HEAD ONE USED
 1690  017430  001006                             BNE     2$                ;YES - TAKE ABORT EXIT
 1691  017432  012737  000001  002534             MOV     #1,DESHD          ;ELSE SET FOR HEAD ONE
 1692  017440  062716  000002                     ADD     #2,(SP)           ;BUMP PAST ABORT RETURN
 1693  017444  000207                             RTS     PC                ;RETURN
 1694  017446  017616  000000           2$:       MOV     @(SP),(SP)        ;GET ABORT DESTINATION
 1695  017452  000207                   3$:       RTS     PC
 1696
 1697                                   ;         SWAP OLD CYLINDER AND NEW CYLINDER ROUTINE.
 1698  017454  010046                   ONSWAP:   MOV     R0,-(SP)          ;STORE R0
```

```
  1699  017456  013700  002522                    MOV     OLDCYL,R0         ;MOVE OLD TO R0
  1700  017462  013737  002524  002522            MOV     NEWCYL,OLDCYL     ;MOVE NEW TO OLD
  1701  017470  010037  002524                    MOV     R0,NEWCYL         ;PUT OLD IN NEW
  1702  017474  012600                            MOV     (SP)+,R0          ;RESTORE R0
  1703  017476  000207                            RTS     PC
  1704
  1705                                    ;       BAD SECTOR FILES VALID CHECK ROUTINE. CHECKS IF BAD SECTOR
  1706                                    ;       FILES HAVE BEEN READ AND STORED. IF NOT, REPORT AND FORCE
  1707                                    ;       FORCE FILES TO LOOK LIKE ALL SECTORS OK.
  1708  017500  005737  003074            CKBSVD: TST     BSFVAL            ;TEST IF BAD SECTORS STORED
  1709  017504  001051                            BNE     5$                ;YES - EXIT
  1710  017506                                    PRINTF  #FMT9,#BSNSTR     ;REPORT
   (8)  017506  012746  007442                    MOV     #BSNSTR,-(SP)
   (7)  017512  012746  011043                    MOV     #FMT9,-(SP)
   (6)  017516  012746  000002                    MOV     #2,-(SP)
   (3)  017522  010600                            MOV     SP,R0
   (4)  017524  104017                            EMT     C$PNTF
   (4)  017526  062706  000006                    ADD     #6,SP
  1711  017532                                    PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
  (11)  017532  005046                            CLR     -(SP)
  (11)  017534  153716  002455                    BISB    RLDRV+1,(SP)
  (10)  017540  012746  005633                    MOV     #DRVNAM,-(SP)
   (9)  017544  013746  002450                    MOV     RLBAS,-(SP)
   (8)  017550  012746  005622                    MOV     #BASADD,-(SP)
   (7)  017554  012746  010657                    MOV     #FMT5,-(SP)
   (6)  017560  012746  000005                    MOV     #5,-(SP)
   (3)  017564  010600                            MOV     SP,R0
   (4)  017566  104017                            EMT     C$PNTF
   (4)  017570  062706  000014                    ADD     #14,SP
  1712  017574                                    PRINTF  #FMT3
   (7)  017574  012746  010643                    MOV     #FMT3,-(SP)
   (6)  017600  012746  000001                    MOV     #1,-(SP)
   (3)  017604  010600                            MOV     SP,R0
   (4)  017606  104017                            EMT     C$PNTF
   (4)  017610  062706  000004                    ADD     #4,SP
  1713  017614  012737  177777  003076            MOV     #-1,SBSFIL        ;FORCE FILES TO NO ENTRIES
  1714  017622  012737  177777  003272            MOV     #-1,FBSFIL
  1715  017630  000207                    5$:     RTS     PC
  1716
  1718                                    ;       READ HEADERS ROUTINE.
  1719  017632  012737  000001  002550    XRDHDC: MOV     #1,TEMP4          ;SET FLAG TO BYPASS REG STORAGE
  1720  017640  000402                            BR      XRDHDG            ;GO DO IT
  1721  017642  005037  002550            XRDHD:  CLR     TEMP4             ;SET FLAG TO SAVE T. AMD L. REGS
  1722  017646  010346                    XRDHDG: MOV     R3,-(SP)          ;STORE REGISTERS
  1723  017650  013703  002424                    MOV     SSINDX,R3         ;GET SUBROUTINE INDEX
  1724  017654  005723                            TST     (R3)+             ;BUMP IT FOR NEXT ENTRY
  1725  017656  016663  000002  002260            MOV     2(SP),SUBSTK(R3)  ;INSERT THIS CALL
  1726  017664  162763  000004  002260            SUB     #4,SUBSTK(R3)     ;ADJUST IT TO CALLING LOCATION
  1727  017672  010337  002424                    MOV     R3,SSINDX         ;STORE IT BACK
  1728  017676  010046                            MOV     R0,-(SP)
  1729  017700  010146                            MOV     R1,-(SP)
  1730  017702  010446                            MOV     R4,-(SP)
  1731  017704  012737  000002  002440            MOV     #2,ERRSWI         ;SET FOR NO ERROR RETURN
  1732  017712  005737  002550                    TST     TEMP4             ;TEST IF REGISTERS TO BE SAVED
  1733  017716  001007                            BNE     2$                ;NO - SKIP
  1734  017720  012703  002466                    MOV     #L.MP+2,R3        ;SET POINTER FOR REGS
  1735  017724  012701  000004                    MOV     #4,R1             ;SET COUNT
  1736  017730  014346                    1$:     MOV     -(R3),-(SP)       ;SAVE REGISTER
  1737  017732  005301                            DEC     R1                ;DEC COUNT
  1738  017734  001375                            BNE     1$                ;LOOP UNTIL ALL ARE SAVED
  1739  017736  004737  017130            2$:     JSR     PC,RDYCHK         ;CHECK DRIVE READY
  1740  017742  020176                            65$
  1741  017744  005037  002430                    CLR     DONE              ;CLEAR INTERRUPT FLAG
  1742  017750  012701  002456                    MOV     #L.CS,R1          ;GET ADDRESS OF LOAD REGS
  1743  017754  013711  002454                    MOV     RLDRV,(R1)        ;LOAD DRIVE NUMBER
  1744  017760  042711  002000                    BIC     #BIT10,(R1)       ;CLEAR FOR DRIVE 4 - 7 SPEC'D
  1745  017764  052721  000110                    BIS     #RDHEAD,(R1)+     ;INSERT COMMAND
  1746  017770  005021                            CLR     (R1)+             ;CLEAR BA
  1747  017772  005021                            CLR     (R1)+             ;CLEAR DA
  1748  017774  014162  000004                    MOV     -(R1),RLDA(R2)    ;LOAD RL11 REGS
  1749  020000  014162  000002                    MOV     -(R1),RLBA(R2)
  1750  020004  014162  000000                    MOV     -(R1),RLCSR(R2)
  1751  020010                            3$:     WAITUS  #10.              ;WAIT 1MS FOR INTERRUPT
   (3)  020010  012700  000012                    MOV     #10.,R0
   (3)  020014  104027                            EMT     C$WTU
  1752  020016  005737  002430                    TST     DONE              ;TEST IN INTERRUPT FLAG SET
  1753  020022  001455                            BEQ     14$               ;NO - SKIP
  1754  020024  032737  000001  002466    5$:     BIT     #DRDYMSK,T.CS     ;TEST IF DRIVE READY
  1755  020032  001033                            BNE     10$               ;YES - SKIP
  1756  020034  012703  007543                    MOV     #MDRDY,R3         ;SET NO READY MESSAGE
  1757  020040  012704  010510                    MOV     #CAFDT,R4         ;CONDITION OF AFTER DATA XFER
  1758  020044                                    ERRHRD  10017.,,ERR5
   (3)  020044  104443                            TRAP    T$ERCODE
   (5)  020046  023441                            .WORD   10017
   (5)  020050  012006                            .WORD   ERR5
  1759  020052  012701  000062                    MOV     #50.,R1           ;SET WAIT COUNT FOR 5 SECONDS
  1760  020056  004737  015226            4$:     JSR     PC,GSTAT          ;GET STATUS
  1761  020062  020172                            60$
  1762  020064  032737  000001  002466            BIT     #DRDYMSK,T.CS     ;TEST IF DRIVE HAS COME READY
  1763  020072  001403                            BEQ     11$               ;NO - SKIP
  1764  020074  005037  002440                    CLR     ERRSWI            ;CLEAR ERROR SWITCH
  1765  020100  000410                            BR      10$               ;SKIP
  1766  020102  005301                    11$:    DEC     R1                ;DEC WAIT COUNT
  1767  020104  001364                            BNE     4$                ;LOOP UNTIL TIME DONE
  1768  020106  012704  010522                    MOV     #C5SEC,R4         ;SET CONDITION AFTER 5 SECONDS
  1769  020112                                    ERRHRD  10014.,,ERR5
   (3)  020112  104443                            TRAP    T$ERCODE
   (5)  020114  023436                            .WORD   10014
   (5)  020116  012006                            .WORD   ERR5
  1770  020120  000424                            BR      60$               ;EXIT
  1771  020122  005737  002466            10$:    TST     T.CS              ;CHECK FOR ANY ERRORS
  1772  020126  100004                            BPL     12$               ;NO - SKIP
  1773  020130                                    ERRHRD  10016.,,ERR6      ;REPORT ALL ERRORS
   (3)  020130  104443                            TRAP    T$ERCODE
   (5)  020132  023440                            .WORD   10016
   (5)  020134  012056                            .WORD   ERR6
  1774  020136  000415                            BR      60$
  1775  020140  012701  002476            12$:    MOV     #HDWRD2,R1        ;GET POINTER
  1776  020144  016221  000006                    MOV     RLMP(R2),(R1)+    ;STORE LAST TWO HEADER WORDS
  1777  020150  016221  000006                    MOV     RLMP(R2),(R1)+
  1778  020154  000410                            BR      65$               ;EXIT
  1779  020156  004737  015026            14$:    JSR     PC,WAITIN         ;WAIT FOR INTERRUPT
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     020162  012603                          MOV     (SP)+,R3            ;GET RESULTS
     020164                                  ERRHRD  10015.,,ERR1        ;REPORT
(3)  020164  104443                          TRAP    T$ERCODE
(5)  020166  023437                          .WORD   10015
(5)  020170  011554                          .WORD   ERR1
     020172  005037  002440          60$:    CLR     ERRSWI              ;CLEAR FOR ERROR ERROR RETURN
     020176  005737  002550          65$:    TST     TEMP4               ;TEST IF REGISTERS WERE SAVED
     020202  001007                          BNE     22$                 ;NO - SKIP
     020204  012703  002456                  MOV     #L.CS,R3            ;SET POINTER TO RESTORE REGS
     020210  012701  000004                  MOV     #4,R1               ;SET COUNT
     020214  012623                  20$:    MOV     (SP)+,(R3)+         ;RESTORE REGISTER
     020216  005301                          DEC     R1                  ;DEC COUNT
     020220  001375                          BNE     20$                 ;LOOP UNTIL ALL ARE RESTORED
     020222  162737  000002  002424  22$:    SUB     #2,SSINDX           ;REMOVE ENTRY FROM SUBROUT STACK
     020230  012604                          MOV     (SP)+,R4            ;RESTORE REGS
     020232  012601                          MOV     (SP)+,R1
     020234  012600                          MOV     (SP)+,R0
     020236  012603                          MOV     (SP)+,R3
     020240  005737  002440                  TST     ERRSWI              ;TEST IF ERROR RETURN
     020244  001403                          BEQ     99$                 ;YES - SKIP
     020246  063716  002440                  ADD     ERRSWI,(SP)         ;ADD IN ERROR RETURN
     020252  000207                          RTS     PC
     020254  017616  000000          99$:    MOV     @(SP),(SP)          ;SET ERROR RETURN ADDRESS
     020260  000207                          RTS     PC

                                     ;       VERIFY HEADERS ROUTINE. COMPARES 40 HEADERS FOR CONTENT AND
                                     ;       SEQUENCE.
     020262  010346                  VERHDR: MOV     R3,-(SP)            ;STORE REGS
     020264  013703  002424                  MOV     SSINDX,R3           ;GET SUBROUTINE INDEX
     020270  005723                          TST     (R3)+               ;BUMP IT FOR NEXT ENTRY
     020272  016663  000002  002260          MOV     2(SP),SUBSTK(R3)    ;INSERT THIS CALL
     020300  162763  000004  002260          SUB     #4,SUBSTK(R3)       ;ADJUST IT TO CALLING LOCATION
     020306  010337  002424                  MOV     R3,SSINDX           ;STORE IT BACK
     020312  010046                          MOV     R0,-(SP)
     020314  010146                          MOV     R1,-(SP)
     020316  010446                          MOV     R4,-(SP)
     020320  010546                          MOV     R5,-(SP)
     020322  012737  000002  002440          MOV     #2,ERRSWI           ;SET FOR NO ERROR RETURN
     020330  052737  000002  002426          BIS     #HDRCMP,OPFLAG      ;SET HEADER COMPARE FLAG
     020336  005037  002436                  CLR     MORECE              ;CLEAR MORE ERRORS FLAG
     020342  012704  003466                  MOV     #IBUFF,R4           ;SET POINTER TO HEADERS
     020346  012705  002540                  MOV     #TEMP0,R5           ;SET POINTER TO WORK AREA
     020352  005003                          CLR     R3                  ;CLEAR FOR WORD COUNTER
     020354  011415                          MOV     (R4),(R5)           ;MOVE HDR WORD TO WORK AREA
     020356  011401                          MOV     (R4),R1             ;PUT WORD IN REG 1
     020360  042701  100177                  BIC     #^CHDCYL,R1         ;CLEAR ALL BUT CYLINDER
     020364  012700  000007                  MOV     #7,R0               ;SET SHIFT COUNT
     020370  006201                  3$:     ASR     R1                  ;SHIFT
     020372  005300                          DEC     R0                  ;DEC
     020374  001375                          BNE     3$                  ;LOOP
     020376  020137  002524                  CMP     R1,NEWCYL           ;CHECK IF CYLINDER PART GOOD
     020402  001406                          BEQ     4$                  ;YES - SKIP
     020404                                  ERRHRD  10018.,,ERR10       ;REPORT ERROR
(3)  020404  104443                          TRAP    T$ERCODE
(5)  020406  023442                          .WORD   10018
(5)  020410  013144                          .WORD   ERR10
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 1831 020412 005037 002440                CLR     ERRSWI          ;CLEAR FOR ERROR ERROR RETURN
 1832 020416 000454                       BR      65$
 1833 020420 012701 000050        4$:     MOV     #40.,R1         ;SET HEADER COUNT
 1834 020424 042715 100100                BIC     #BIT15!HDHSEL,(R5)      ;CLEAR HEAD SELECT AND 0 BIT
 1835 020430 005737 002534                TST     DESHD           ;ARE WE USING HD 0?
 1836 020434 001402                       BEQ     5$              ;YES - SKIP
 1837 020436 052715 000100                BIS     #HDHSEL,(R5)    ;INSERT HEAD BIT
 1838 020442 005065 000002        5$:     CLR     2(R5)           ;CLEAR 2ND WORD OF WORK AREA
 1839 020446 021524               6$:     CMP     (R5),(R4)+      ;TEST FIRST WORD OK
 1840 020450 001407                       BEQ     8$              ;YES - SKIP
 1841 020452 005744                       TST     -(R4)           ;ELSE SET POINTER FOR ERROR
 1842 020454                              ERRHRD  10018.,,ERR10   ;REPORT
  (3) 020454 104443                       TRAP    T$ERCODE
  (5) 020456 023442                       .WORD   10018
  (5) 020460 013144                       .WORD   ERR10
 1843 020462 005037 002440                CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
 1844 020466 005724                       TST     (R4)+           ;RESET POINTER
 1845 020470 005203               8$:     INC     R3              ;BUMP WORD COUNTER
 1846 020472 005724                       TST     (R4)+           ;TEST 2ND WORD IS 0
 1847 020474 001407                       BEQ     12$             ;YES - SKIP
 1848 020476 022544                       CMP     (R5)+,-(R4)     ;ADJUST POINTERS FOR REPORT
 1849 020500                              ERRHRD  10018.,,ERR10   ;REPORT
  (3) 020500 104443                       TRAP    T$ERCODE
  (5) 020502 023442                       .WORD   10018
  (5) 020504 013144                       .WORD   ERR10
 1850 020506 005037 002440                CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
 1851 020512 024524                       CMP     -(R5),(R4)+     ;RESET POINTERS
 1852 020514 005724               12$:    TST     (R4)+           ;BUMP PAST ECC WORD
 1853 020516 005203                       INC     R3              ;BUMP WORD COUNTER
 1854 020520 005215                       INC     (R5)            ;BUMP SECTOR OF EXPECTED HEADER
 1855 020522 011500                       MOV     (R5),R0         ;MOVE EXPECTED HDR TO R0
 1856 020524 042700 177700                BIC     #^CHDSEC,R0     ;CLEAR ALL BUT SECTOR
 1857 020530 022700 000050                CMP     #40.,R0         ;TEST IF AT SECTOR 40
 1858 020534 001002                       BNE     15$             ;NO - SKIP
 1859 020536 042715 000077                BIC     #HDSEC,(R5)     ;CLEAR SECTOR TO 0
 1860 020542 005203               15$:    INC     R3              ;BUMP HDR WORD COUNTER
 1861 020544 005301                       DEC     R1              ;DEC HEADER COUNT
 1862 020546 001337                       BNE     6$              ;LOOP IF NOT YET DONE
 1863 020550 162737 000002 002424 65$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
 1864 020556 012605                       MOV     (SP)+,R5        ;RESTORE REGISTERS
 1865 020560 012604                       MOV     (SP)+,R4
 1866 020562 012601                       MOV     (SP)+,R1
 1867 020564 012600                       MOV     (SP)+,R0
 1868 020566 012603                       MOV     (SP)+,R3
 1869 020570 005737 002440                TST     ERRSWI          ;TEST IF ERROR RETURN
 1870 020574 001403                       BEQ     99$             ;YES - SKIP
 1871 020576 063716 002440                ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
 1872 020602 000207                       RTS     PC
 1873 020604 017616 000000        99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
 1874 020610 000207                       RTS     PC
 1875
 1877                             ;       POSITION HEAD BIT FROM HEADER OR MULTIPURPOSE REGISTER TO LSB.
 1878 020612 013705 002474        POSHW1: MOV     HDWRD1,R5       ;START FOR POSITION HD BIT IN WD 1
 1879 020616 000402                       BR      POSHD0          ;SKIP
 1880 020620 013705 002474        POSHSB: MOV     T.MP,R5 ;START FOR POSITION HD BIT IN MP
 1881 020624 010146                POSHD0: MOV     R1,-(SP)        ;STORE R1
 1882 020626 042705 177677             BIC     #^CHSSTAT,R5      ;CLEAR ALL BUT HEAD SEL BIT
 1883 020632 012701 000006             MOV     #6,R1             ;SET SHIFT COUNT
 1884 020636 006205             1$:    ASR     R5                ;SHIFT FOR RIGHT JUSTIFY
 1885 020640 005301                    DEC     R1
 1886 020642 001375                    BNE     1$
 1887 020644 012601                    MOV     (SP)+,R1          ;RESTORE R1
 1888 020646 000207                    RTS     PC                ;RETURN
 1889
 1890                           ;      WAIT FOR READY ROUTINE. DURATION OF WAIT PASSED TO THE ROUTINE
 1891                           ;      FROM THE CALLING ROUTINE IN R1.
 1892 020650 010346             RDYWAIT:       MOV     R3,-(SP)          ;STORE R3
 1893 020652 013703 002424             MOV     SSINDX,R3         ;GET SUBROUTINE INDEX
 1894 020656 005723                    TST     (R3)+             ;BUMP IT FOR NEXT ENTRY
 1895 020660 016663 000002 002260      MOV     2(SP),SUBSTK(R3)  ;INSERT THIS CALL
 1896 020666 162763 000004 002260      SUB     #4,SUBSTK(R3)     ;ADJUST IT TO CALLING LOCATION
 1897 020674 010337 002424             MOV     R3,SSINDX         ;STORE IT BACK
 1898 020700 010046                    MOV     R0,-(SP)
 1899 020702 010146                    MOV     R1,-(SP)
 1900 020704 010446                    MOV     R4,-(SP)
 1901 020706 012737 000002 002440      MOV     #2,ERRSWI         ;SET FOR NO ERROR RETURN
 1902 020714 004737 015226      5$:    JSR     PC,GSTAT          ;GET DRIVE STATUS
 1903 020720 021052                    10$
 1904 020722 032737 000001 002466      BIT     #DRDYMSK,T.CS     ;CHECK IF READY
 1905 020730 001052                    BNE     9$                ;YES - SKIP
 1906 020732 005301                    DEC     R1                ;DEC WAIT COUNT
 1907 020734 001404                    BEQ     7$                ;SKIP IF 0
 1908 020736                           WAITUS  #1
  (3) 020736 012700 000001             MOV     #1,R0
  (3) 020742 104027                    EMT     C$WTU
 1909 020744 000763                    BR      5$
 1910 020746 012703 007543      7$:    MOV     #MDRDY,R3         ;SET NAME MESSAGE PTR
 1911 020752                           ERRHRD  10020.,,ERR3      ;REPORT READY ERROR
  (3) 020752 104443                    TRAP    T$ERCODE
  (5) 020754 023444                    .WORD   10020
  (5) 020756 011670                    .WORD   ERR3
 1912 020760 012701 000062             MOV     #50.,R1           ;SET WAIT COUNT FOR 5 SECONDS
 1913 020764 004737 015226      6$:    JSR     PC,GSTAT          ;GET DRIVE STATUS
 1914 020770 021052                    10$
 1915 020772 032737 000001 002466      BIT     #DRDYMSK,T.CS     ;TEST IF DRIVE READY
 1916 021000 001013                    BNE     8$                ;YES - SKIP
 1917 021002                           WAITMS  #1                ;WAIT 100 MS
  (3) 021002 012700 000001             MOV     #1,R0
  (3) 021006 104026                    EMT     C$WTM
 1918 021010 005301                    DEC     R1                ;DEC WAIT COUNT
 1919 021012 001364                    BNE     6$                ;LOOP UNTIL TIME DONE
 1920 021014 012704 010522             MOV     #C5SEC,R4         ;SET CONDITION AFTER 5 SECDS
 1921 021020                           ERRHRD  10021.,,ERR5
  (3) 021020 104443                    TRAP    T$ERCODE
  (5) 021022 023445                    .WORD   10021
  (5) 021024 012006                    .WORD   ERR5
 1922 021026 000407                    BR      11$               ;EXIT
 1923 021030 032737 100000 002466 8$:  BIT     #ANYERR,T.CS      ;TEST IF ANY ERROR SET
 1924 021036 001405                    BEQ     10$               ;NO - SKIP
 1925 021040                           ERRHRD  10022.,,ERR6      ;REPORT ALL ERRORS
  (3) 021040 104443                    TRAP    T$ERCODE
  (5) 021042 023446                    .WORD   10022
```

```
021044  012056                              .WORD   ERR6
021046  005337  002662              11$:    DEC     ERRCNT          ;DEC FOR DOUBLE ERROR REPORT
021052  005037  002440              10$:    CLR     ERRSWI          ;CLEAR FOR ERROR ERROR RETURN
021056  162737  000002  002424      9$:     SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
021064  012604                              MOV     (SP)+,R4        ;RESTORE REGISTERS
021066  012601                              MOV     (SP)+,R1
021070  012600                              MOV     (SP)+,R0
021072  012603                              MOV     (SP)+,R3        ;RESTORE R3
021074  005737  002440                      TST     ERRSWI          ;TEST IF ERROR RETURN
021100  001403                              BEQ     99$             ;YES - SKIP
021102  063716  002440                      ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
021106  000207                              RTS     PC
021110  017616  000000              99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
021114  000207                              RTS     PC

                                    ;       GET POSITION ROUTINE. READS A HEADER FROM CURRENT CYLINDER
                                    ;       (WHERE IT IS PRESENTLY POSITIONED) AND STORES CYLINDER
                                    ;       NUMBER IN CURCYL.
021116  010346                      GETPOS: MOV     R3,-(SP)        ;STORE REGISTERS
021120  013703  002424                      MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
021124  005723                              TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
021126  016663  000002  002260              MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
021134  162763  000004  002260              SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
021142  010337  002424                      MOV     R3,SSINDX       ;STORE IT BACK
021146  010046                              MOV     R0,-(SP)
021150  010546                              MOV     R5,-(SP)
021152  004737  017642                      JSR     PC,XRDHD        ;DO READ HEADER
021156  021206                              65$
021160  013703  002474                      MOV     HDWRD1,R3       ;GET HEADER WORD
021164  042703  100177                      BIC     #^CHDCYL,R3     ;CLEAR ALL BUT CYLINDER
021170  012705  000007                      MOV     #7,R5           ;SET SHIFT COUNT
021174  006203                      4$:     ASR     R3              ;SHIFT TO RIGHT JUSTIFY
021176  005305                              DEC     R5
021200  001375                              BNE     4$
021202  010337  002526                      MOV     R3,CURCYL       ;STORE AS CURRENT CYLINDER
021206  162737  000002  002424      65$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
021214  012605                              MOV     (SP)+,R5        ;RESTORE REGISTERS
021216  012600                              MOV     (SP)+,R0
021220  012603                              MOV     (SP)+,R3
021222  005737  002440                      TST     ERRSWI          ;TEST IF ERROR RETURN
021226  001403                              BEQ     99$             ;YES - SKIP
021230  063716  002440                      ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
021234  000207                              RTS     PC
021236  017616  000000              99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
021242  000207                              RTS     PC

                                    ;       VERIFY POSITION ROUTINE. READS A HEADER (USING GETPOS) AND
                                    ;       CHECKS HEADS ARE POSITIONED AT NEW CYLINDER (CURCYL = NEWCYL).
021244  010346                      VERPOS: MOV     R3,-(SP)        ;STORE R3
021246  013703  002424                      MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
021252  005723                              TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
021254  016663  000002  002260              MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
021262  162763  000004  002260              SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
021270  010337  002424                      MOV     R3,SSINDX       ;STORE IT BACK

021274  012737  000002  002440              MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
```

```
021302  004737  021116                    JSR     PC,GETPOS          ;GET POSITION
021306  021332                            65$
021310  023737  002524  002526            CMP     NEWCYL,CURCYL      ;CHECK IF CURRENT CYL IS NEW CYL
021316  001405                            BEQ     1$                 ;YES - SKIP
021320                                    ERRHRD  10022.,,ERR8
021320  104443                            TRAP    T$ERCODE
021322  023446                            .WORD   10022
021324  013004                            .WORD   ERR8
021326  005037  002440                    CLR     ERRSWI             ;CLEAR FOR ERROR ERROR RETURN
021332                           1$:
021332  162737  000002  002424   65$:     SUB     #2,SSINDX          ;REMOVE ENTRY FROM SUBROUT STACK
021340  012603                            MOV     (SP)+,R3           ;RESTORE R3
021342  005737  002440                    TST     ERRSWI             ;TEST IF ERROR RETURN
021346  001403                            BEQ     99$                ;YES - SKIP
021350  063716  002440                    ADD     ERRSWI,(SP)        ;ADD IN ERROR RETURN
021354  000207                            RTS     PC
021356  017616  000000           99$:     MOV     @(SP),(SP)         ;SET ERROR RETURN ADDRESS
021362  000207                            RTS     PC

                                 ;        READ ALL HEADERS ROUTINE. 40 HEADERS ARE READ AND STORED
                                 ;        IN IBUFF.
021364  010346                   RDALHD:  MOV     R3,-(SP)           ;STORE REGISTERS
021366  013703  002424                    MOV     SSINDX,R3          ;GET SUBROUTINE INDEX
021372  005723                            TST     (R3)+              ;BUMP IT FOR NEXT ENTRY
021374  016663  000002  002260            MOV     2(SP),SUBSTK(R3)  ;INSERT THIS CALL
021402  162763  000004  002260            SUB     #4,SUBSTK(R3)     ;ADJUST IT TO CALLING LOCATION
021410  010337  002424                    MOV     R3,SSINDX          ;STORE IT BACK
021414  010046                            MOV     R0,-(SP)
021416  010146                            MOV     R1,-(SP)
021420  010446                            MOV     R4,-(SP)
021422  012737  000002  002440            MOV     #2,ERRSWI          ;SET FOR NO ERROR RETURN
021430  012701  000050                    MOV     #40.,R1            ;SET HEADER COUNT
021434  052737  100000  002426            BIS     #HDR40,OPFLAG      ;SET 40 HDR OP FLAG
021442  012703  003466                    MOV     #IBUFF,R3          ;SET POINTER TO STORE HDRS
021446  013704  002450                    MOV     RLBAS,R4           ;GET BASE ADDRESS
021452  062704  000006                    ADD     #RLMP,R4           ;MAKE IT POINT TO MP REG
021456  012737  000010  002456            MOV     #10,L.CS           ;LOAD FOR READ HEADER, NO INTERRUPT
021464  053737  002454  002456            BIS     RLDRV,L.CS         ;INSERT DRIVE NUMBER
021472  042737  002000  002456            BIC     #BIT10,L.CS        ;CLEAR FOR DRIVE 4 - 7 SPEC'D
021500  005037  002460                    CLR     L.BA               ;CLEAR BA
021504  005037  002462                    CLR     L.DA               ;CLEAR DA
021510  005737  002534                    TST     DESHD              ;TEST IF HEAD 0
021514  001403                            BEQ     3$                 ;YES - SKIP
021516  052737  000020  002462            BIS     #HDSEL,L.DA        ;ELSE INSERT HEAD 0
021524  013762  002462  000004   3$:      MOV     L.DA,RLDA(R2)      ;LOAD RLDA REG
021532  013762  002460  000002            MOV     L.BA,RLBA(R2)      ;LOAD RLBA
021540  032762  000200  000000            BIT     #CRDYMSK,RLCS(R2)         ;TEST IF CONTROLLER READY
021546  001003                            BNE     6$                 ;YES - SKIP
021550  004737  017130                    JSR     PC,RDYCHK          ;ELSE CHECK READY
021554  021666                            65$
021556  013762  002456  000000   6$:      MOV     L.CS,RLCS(R2)      ;LOAD RLCS REG
021564  012700  077777                    MOV     #77777,R0          ;SET COUNT FOR WAIT
021570  032762  000200  000000   7$:      BIT     #CRDYMSK,RLCS(R2) ;CHECK THAT OPERATION COMPLETED
021576  001015                            BNE     8$                 ;YES - SKIP
021600  005300                            DEC     RC                 ;DEC COUNT
021602  001372                            BNE     7$                 ;SKIP IF NOT YET 0
```

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  2036  021604  004737  014774                  JSR     PC,READRL       ;ELSE GET ALL REGISTERS
  2037  021610  004737  015026                  JSR     PC,WAITIN       ;ELSE WAIT FOR TIMEOUT
  2038  021614  012603                          MOV     (SP)+,R3        ;GET RESULT MESSAGE POINTER
  2039  021616                                  ERRHRD  10025.,,ERR1
   (3)  021616  104443                          TRAP    T$ERCODE
   (5)  021620  023451                          .WORD   10025
   (5)  021622  011554                          .WORD   ERR1
  2040  021624  005037  002440                  CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
  2041  021630  000416                          BR      65$
  2042  021632  005737  002466          8$:     TST     T.CS            ;TEST FOR ANY ERRORS
  2043  021636  100006                          BPL     12$             ;NO - SKIP
  2044  021640                                  ERRHRD  10026.,,ERR6
   (3)  021640  104443                          TRAP    T$ERCODE
   (5)  021642  023452                          .WORD   10026
   (5)  021644  012056                          .WORD   ERR6
  2045  021646  005037  002440                  CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
  2046  021652  000405                          BR      65$
  2047  021654  011423                  12$:    MOV     (R4),(R3)+      ;STORE HEADER WORDS
  2048  021656  011423                          MOV     (R4),(R3)+
  2049  021660  011423                          MOV     (R4),(R3)+
  2050  021662  005301                          DEC     R1              ;DEC HEADER COUNT
  2051  021664  001334                          BNE     6$
  2052  021666  162737  000002  002424  65$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
  2053  021674  012604                          MOV     (SP)+,R4        ;RESTORE REGISTERS
  2054  021676  012601                          MOV     (SP)+,R1
  2055  021700  012600                          MOV     (SP)+,R0
  2056  021702  012603                          MOV     (SP)+,R3
  2057  021704  005737  002440                  TST     ERRSWI          ;TEST IF ERROR RETURN
  2058  021710  001403                          BEQ     99$             ;YES - SKIP
  2059  021712  063716  002440                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
  2060  021716  000207                          RTS     PC
  2061  021720  017616  000000          99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
  2062  021724  000207                          RTS     PC
  2063
  2064
  2066                                  ;       GENERATE DATA ROUTINE. PATTERN TO BE GENERATED IS GIVEN
  2067                                  ;       IN THE WORD FOLLOWING THE CALL. 128 WORDS ARE GENERATED
  2068                                  ;       IN OBUFF.
  2069  021726  010146                  DATGEN: MOV     R1,-(SP)        ;STORE REGISTERS
  2070  021730  010346                          MOV     R3,-(SP)
  2071  021732  010446                          MOV     R4,-(SP)
  2072  021734  012701  004066                  MOV     #OBUFF,R1       ;SET POINTER TO OBUFF
  2073  021740  012504                          MOV     (R5)+,R4        ;GET DATA PATTERN SELECTOR
  2074  021742  006304                          ASL     R4              ;ADJUST IT FOR INDEXING
  2075  021744  016403  002234                  MOV     PATTBL(R4),R3   ;GET ADDRESS OF PATTERN
  2076  021750  011321                          MOV     (R3),(R1)+      ;MOVE FIRST PATTERN WORD
  2077  021752  001421                          BEQ     5$              ;SKIP IF PATTERN IS 0
  2078  021754  021327  177777                  CMP     (R3),#-1        ;CHECK IF PATTERN IS ALL 1'S
  2079  021760  001416                          BEQ     5$              ;YES - SKIP
  2080  021762  020427  000010                  CMP     R4,#8.          ;TEST IF PATTERN 5
  2081  021766  001403                          BEQ     3$              ;YES - SKIP
  2082  021770  020427  000020                  CMP     R4,#16.         ;CHECK IF PATTERN 9 OR 10
  2083  021774  002413                          BLT     6$              ;NO - SKIP
  2084  021776  005723                  3$:     TST     (R3)+           ;BUMP SOURCE POINTER
  2085  022000  012321                          MOV     (R3)+,(R1)+     ;MOVE TWO MORE WORDS FORM SOURCE
  2086  022002  012321                          MOV     (R3)+,(R1)+
2087  022004  012704  000015                   MOV     #13.,R4           ;SET COUNT
2088  022010  012703  004066                   MOV     #OBUFF,R3         ;RESET POINTER
2089  022014  000406                           BR      8$
2090  022016  012703  004066          5$:      MOV     #OBUFF,R3         ;ELSE SET OBUFF AS PATTERN SOURCE
2091  022022  000401                           BR      7$                ;GO TO FILL
2092  022024  005723                  6$:      TST     (R3)+             ;BUMP SOURCE POINTER
2093  022026  012704  000017          7$:      MOV     #15.,R4           ;SET MOVE COUNT
2094  022032  012321                  8$:      MOV     (R3)+,(R1)+       ;MOVE 15 WORDS INTO BUFFER
2095  022034  005304                           DEC     R4
2096  022036  001375                           BNE     8$
2097  022040  012703  004066                   MOV     #OBUFF,R3         ;SET SOURCE TO TOP OF OBUFF
2098  022044  012704  000160                   MOV     #112.,R4          ;SET COUNT FOR REST OF BUFFER
2099  022050  012321                  10$:     MOV     (R3)+,(R1)+       ;REPEAT PATTERN IN BUFFER
2100  022052  005304                           DEC     R4
2101  022054  001375                           BNE     10$
2102  022056  012604                           MOV     (SP)+,R4          ;RESTORE REGISTERS
2103  022060  012603                           MOV     (SP)+,R3
2104  022062  012601                           MOV     (SP)+,R1
2105  022064  000205                           RTS     R5                ;RETURN
2106
2107                                  ;        DATA COMPARE ROUTINE. COMPARES THE CONTENTS OF IBUFF AND OBUFF.
2108                                  ;        ERROR REPORTING IS LIMITED BY SOFTWARE PARAMETER.
2109  022066  010346                  DATCOM:  MOV     R3,-(SP)          ;STORE R3
2110  022070  013703  002424                   MOV     SSINDX,R3         ;GET SUBROUTINE STACK INDEX
2111  022074  005723                           TST     (R3)+             ;BUMP INDEX TO NEXT ENTRY
2112  022076  016663  000002  002260           MOV     2(SP),SUBSTK(R3)  ;INSERT THIS CALL
2113  022104  162763  000004  002260           SUB     #4,SUBSTK(R3)     ;ADJUST IT TO CALLING LOCATION
2114  022112  010337  002424                   MOV     R3,SSINDX         ;STORE IT BACK
2115  022116  010146                           MOV     R1,-(SP)          ;STORE OTHER REGISTERS
2116  022120  010446                           MOV     R4,-(SP)
2117  022122  010546                           MOV     R5,-(SP)
2118  022124  052737  000001  002426           BIS     #DATACMP,OPFLAG   ;SET DATA COMPARE FLAG
2119  022132  005037  002436                   CLR     MORECE            ;CLEAR MORE ERROR FLAG
2120  022136  012705  004066                   MOV     #OBUFF,R5         ;SET POINTERS TO DATA FOR COMPARE
2121  022142  012704  003466                   MOV     #IBUFF,R4
2122  022146  012703  000001                   MOV     #1,R3             ;SET WORD COUNTER
2123  022152  012701  000200                   MOV     #128.,R1          ;SET COMPARE COUNT
2124  022156  022425                  5$:      CMP     (R4)+,(R5)+       ;COMPARE DATA
2125  022160  001052                           BNE     10$               ;ERROR - SKIP TO REPORT
2126  022162  005203                  7$:      INC     R3                ;BUMP WORD COUNT
2127  022164  005301                           DEC     R1                ;DEC COMPARE COUNT
2128  022166  001373                           BNE     5$                ;LOOP IF NOT 0
2129  022170  042737  000001  002426  9$:      BIC     #DATACMP,OPFLAG   ;CLEAR DATA COMPARE FLAG
2130  022176  005737  002440                   TST     ERRSWI            ;TEST IF ANY COMPARE ERRORS
2131  022202  001021                           BNE     15$               ;NO - SKIP
2132  022204  012701  000200                   MOV     #128.,R1          ;SET REPORT VALUE
2133  022210                                   PRINTB  #FMT27,#TCERR,MORECE,#RESE6,R1
 (11) 022210  010146                           MOV     R1,-(SP)
 (10) 022212  012746  010421                   MOV     #RESE6,-(SP)
  (9) 022216  013746  002436                   MOV     MORECE,-(SP)
  (8) 022222  012746  007520                   MOV     #TCERR,-(SP)
  (7) 022226  012746  011524                   MOV     #FMT27,-(SP)
  (6) 022232  012746  000005                   MOV     #5,-(SP)
  (3) 022236  010600                           MOV     SP,R0
  (4) 022240  104014                           EMT     C$PNTB
  (4) 022242  062706  000014                   ADD     #14,SP
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      022246  162737  000002  002424  15$:      SUB     #2,SSINDX         ;REMOVE ENTRY FROM SUBROUT STACK
      022254  012605                            MOV     (SP)+,R5          ;RESTORE REGS
      022256  012604                            MOV     (SP)+,R4
      022260  012601                            MOV     (SP)+,R1
      022262  012603                            MOV     (SP)+,R3
      022264  005737  002440                    TST     ERRSWI            ;TEST IF ERROR RETURN
      022270  001403                            BEQ     99$               ;YES - SKIP
      022272  063716  002440                    ADD     ERRSWI,(SP)       ;ADD IN ERROR RETURN
      022276  000207                            RTS     PC
      022300  017616  000000          99$:      MOV     @(SP),(SP)        ;SET ERROR RETURN ADDRESS
      022304  000207                            RTS     PC
      022306  023737  002436  013404  10$:      CMP     MORECE,DCLIMW     ;TEST IF COMPARE ERRORS LIMIT EXCEEDED
      022314  002010                            BGE     13$               ;YES - SKIP
      022316  024445                            CMP     -(R4),-(R5)       ;SET PTRS BACK TO ERROR WORDS
      022320                                    ERRHRD  10035.,,ERR10     ;REPORT ERROR
 (3)  022320  104443                            TRAP    T$ERCODE
 (5)  022322  023463                            .WORD   10035
 (5)  022324  013144                            .WORD   ERR10
      022326  005037  002440                    CLR     ERRSWI            ;CLEAR ERROR SWITCH
      022332  022425                            CMP     (R4)+,(R5)+       ;BUMP PTRS PAST ERROR WORDS
      022334  000712                            BR      7$                ;DO NEXT COMPARE
      022336  005237  002436          13$:      INC     MORECE            ;BUMP ERROR COUNTER
      022342  000707                            BR      7$                ;DO NEXT COMPARE

                                      ;         WRITE AND READ DATA ROUTINE.
      022344  012737  177777  002542  XWRITT:   MOV     #-1,TEMP1         ;SET SPECIAL WRITE FOR TIMING FLAG
      022352  000402                            BR      XWRIT1
      022354  005037  002542          XWRITE:   CLR     TEMP1             ;CLEAR SPECIAL WRITE FLAG
      022360  012737  000112  002556  XWRIT1:   MOV     #WTDATA,TEMP7     ;SET FOR WRITE
      022366  022737  000377  002526            CMP     #255.,CURCYL      ;TEST IF CYLINDER 255 (BAD SEC)
      022374  001006                            BNE     1$                ;NO - SKIP
      022376  005737  002534                    TST     DESHD             ;TEST IF HEAD 1 (BAD SECTOR FILES)
      022402  001403                            BEQ     1$                ;NO - SKIP
      022404  052737  004000  002426            BIS     #BADADD,OPFLAG    ;SET BAD ADDRESS FLAG
      022412  000403                  1$:       BR      XREADG            ;SKIP TO EXECUTE
      022414  012737  000114  002556  XREAD:    MOV     #RDDATA,TEMP7     ;SET FOR READ
      022422  010346                  XREADG:   MOV     R3,-(SP)          ;STORE R3
      022424  013703  002424                    MOV     SSINDX,R3         ;SET SUBROUTINE INDEX
      022430  005723                            TST     (R3)+             ;BUMP TO NEXT STACK ENTRY
      022432  016663  000002  002260            MOV     2(SP),SUBSTK(R3)  ;INSERT THIS CALL
      022440  162763  000004  002260            SUB     #4,SUBSTK(R3)     ;ADJUST TO POINT TO CALL
      022446  010337  002424                    MOV     R3,SSINDX         ;STORE IT BACK
      022452  010046                            MOV     R0,-(SP)
      022454  010146                            MOV     R1,-(SP)          ;STORE OTHER REGISTERS
      022456  010446                            MOV     R4,-(SP)
      022460  004737  017130                    JSR     PC,RDYCHK         ;CHECK IF DRIVE READY
      022464  023034                            65$
      022466  012703  002456                    MOV     #L.CS,R3          ;GET ADDRESS OF LOAD REGS
      022472  013713  002556                    MOV     TEMP7,(R3)        ;SET COMMAND
      022476  053713  002454                    BIS     RLDRV,(R3)        ;INSERT DRIVE NUMBER
      022502  042713  002000                    BIC     #BIT10,(R3)       ;CLEAR FOR DRIVE 4 - 7 SPEC'D
      022506  032723  000004                    BIT     #BIT2,(R3)+       ;TEST IF WRITE DATA
      022512  001403                            BEQ     3$                ;YES - SKIP
      022514  012723  003466                    MOV     #IBUFF,(R3)+      ;ELSE SET BA FOR READ
      022520  000402                            BR      4$
      022522  012723  004066          3$:       MOV     #OBUFF,(R3)+      ;SET BA FOR WRITE
 2187  022526  013713  002526          4$:    MOV     CURCYL,(R3)       ;GET CURRENT CYLINDER
 2188  022532  012704  000007                 MOV     #7,R4             ;ALIGN IT IN DA
 2189  022536  006313                  5$:    ASL     (R3)
 2190  022540  005304                         DEC     R4
 2191  022542  001375                         BNE     5$
 2192  022544  005737  002534                 TST     DESHD             ;TEST IF HEAD 0
 2193  022550  001402                         BEQ     7$                ;YES - SKIP
 2194  022552  052713  000100                 BIS     #HSMSK,(R3)       ;SET FOR HEAD 1
 2195  022556  053723  002536          7$:    BIS     DESSEC,(R3)+      ;INSERT DESIRED SECTOR
 2196  022562  012713  177600                 MOV     #177600,(R3)      ;INSERT WORD COUNT
 2197  022566  005737  002542                 TST     TEMP1             ;CHECK IF SPECIAL WRITE FOR TIMING
 2198  022572  001402                         BEQ     8$                ;NO - SKIP
 2199  022574  012713  177777                 MOV     #177777,(R3)      ;ELSE SET FOR 1 WORD TRANSFER
 2200  022600  032737  004000  002426  8$:    BIT     #BADADD,OPFLAG    ;TEST IF BAD ADDRESS FLAG SET
 2201  022606  001413                         BEQ     2$                ;NO - SKIP
 2202  022610  042737  173777  002426         BIC     #^CBADADD,OPFLAG  ;CLEAR ALL BUT THIS FLAG
 2203  022616  012703  010307                 MOV     #MWRTAB,R3        ;SET RESULT MESSAGE POINTER
 2204  022622                                 ERRHRD  10032.,,ERR1
  (3)  022622  104443                         TRAP    T$ERCODE
  (5)  022624  023460                         .WORD   10032
  (5)  022626  011554                         .WORD   ERR1
 2205  022630  005037  002426                 CLR     OPFLAG            ;CLEAR ALL FLAGS
 2206  022634  000475                         BR      64$
 2207  022636  005037  002430          2$:    CLR     DONE              ;CLEAR INTERRUPT FLAG
 2208  022642  005737  002542                 TST     TEMP1             ;CHECK IF SPECIAL WRITE FLAG SET
 2209  022646  001072                         BNE     65$               ;YES - DO NOT START WRITE
 2210  022650  011362  000006                 MOV     (R3),RLMP(R2)     ;LOAD RL REGS
 2211  022654  014362  000004                 MOV     -(R3),RLDA(R2)
 2212  022660  014362  000002                 MOV     -(R3),RLBA(R2)
 2213  022664  014362  000000                 MOV     -(R3),RLCS(R2)
 2214  022670                          10$:   WAITUS  #3000.            ;WAIT 300MS FOR INTERRUPT
  (3)  022670  012700  005670                 MOV     #3000.,R0
  (3)  022674  104027                         EMT     C$WTU
 2215  022676  005737  002430                 TST     DONE              ;CHECK IF INTERRUPT
 2216  022702  001007                         BNE     14$               ;YES - SKIP
 2217  022704  004737  015026                 JSR     PC,WAITIN         ;WAIT FOR INTERRUPT
 2218  022710  012603                         MOV     (SP)+,R3          ;GET RESULT MESSAGE
 2219  022712                                 ERRHRD  10030.,,ERR1
  (3)  022712  104443                         TRAP    T$ERCODE
  (5)  022714  023456                         .WORD   10030
  (5)  022716  011554                         .WORD   ERR1
 2220  022720  000443                         BR      64$
 2221  022722  032737  000001  002466  14$:   BIT     #DRDYMSK,T.CS     ;TEST IF DRIVE READY
 2222  022730  001031                         BNE     20$               ;YES - SKIP
 2223  022732  012703  007543                 MOV     #MDRDY,R3         ;SET RESULT MESSAGE
 2224  022736  012704  010510                 MOV     #CAFDT,R4         ;CONDITION AFTER DATA XFER
 2225  022742                                 ERRHRD  10032.,,ERR5
  (3)  022742  104443                         TRAP    T$ERCODE
  (5)  022744  023460                         .WORD   10032
  (5)  022746  012006                         .WORD   ERR5
 2226  022750  012701  000062                 MOV     #50.,R1           ;SET WAIT COUNT FOR 5 SECDS
 2227  022754  004737  015226          17$:   JSR     PC,GSTAT          ;GET DRIVE STATUS
 2228  022760  023030                                 64$
 2229  022762  032737  000001  002466         BIT     #DRDYMSK,T.CS     ;TEST IF DRIVE READY NOW
 2230  022770  001011                         BNE     20$               ;YES - SKIP
 2231  022772  005301                         DEC     R1                ;DEC WAIT COUNT
 2232  022774  001367                          BNE     17$                  ;LOOP IF NOT TIME DONE
 2233  022776  012704  010522                  MOV     #C5SEC,R4            ;SET CONDITION 5 SECONDS
 2234  023002                                  ERRHRD  10033.,,ERR5
  (3)  023002  104443                          TRAP    T$ERCODE
  (5)  023004  023461                          .WORD   10033
  (5)  023006  012006                          .WORD   ERR5
 2235  023010  005037  002440                  CLR     ERRSWI               ;CLEAR ERROR SWITCH
 2236  023014  005737  002466          20$:    TST     T.CS                 ;CHECK IF ANY ERROR
 2237  023020  100005                          BPL     65$                  ;NO - SKIP
 2238  023022                                  ERRHRD  10031.,,ERR6
  (3)  023022  104443                          TRAP    T$ERCODE
  (5)  023024  023457                          .WORD   10031
  (5)  023026  012056                          .WORD   ERR6
 2239  023030  005037  002440          64$:    CLR     ERRSWI               ;CLEAR ERROR SWITCH
 2240  023034  162737  000002  002424  65$:    SUB     #2,SSINDX            ;REMOVE ENTRY FROM SUBROUT STACK
 2241  023042  012604                          MOV     (SP)+,R4             ;RESTORE REGISTERS
 2242  023044  012601                          MOV     (SP)+,R1
 2243  023046  012600                          MOV     (SP)+,R0
 2244  023050  012603                          MOV     (SP)+,R3
 2245  023052  005737  002440                  TST     ERRSWI               ;TEST IF ERROR RETURN
 2246  023056  001403                          BEQ     99$                  ;YES - SKIP
 2247  023060  063716  002440                  ADD     ERRSWI,(SP)          ;ELSE ADD IN ERROR RETURN
 2248  023064  000207                          RTS     PC
 2249  023066  017616  000000          99$:    MOV     @(SP),(SP)           ;ADJUST FOR ERROR RETURN
 2250  023072  000207                          RTS     PC
 2251
 2252                                  ;       BAD SECTOR CHECK ROUTINE. CHECKS IF SECTOR SPECIFIED IN CURCYL,
 2253                                  ;       DESHD, AND DESSEC IS LISTED AS BAD IN THE BAD SECTOR FILES.
 2254  023074  010046                  BSCHK:  MOV     R0,-(SP)             ;STORE REGISTERS
 2255  023076  010146                          MOV     R1,-(SP)
 2256  023100  010346                          MOV     R3,-(SP)
 2257  023102  005037  002442                  CLR     BSFLAG               ;CLEAR FLAG
 2258  023106  012703  003272                  MOV     #FBSFIL,R3           ;GET POINTER TO FACTORY FILE
 2259  023112  022713  177777                  CMP     #-1,(R3)             ;CHECK IF ALL ONES
 2260  023116  001005                          BNE     4$                   ;NO SKIP TO TEST
 2261  023120  012703  003076          2$:     MOV     #SBSFIL,R3           ;ELSE SET POINTER TO SOFTWARE FILE
 2262  023124  022713  177777                  CMP     #-1,(R3)             ;CHECK IF ALL ONES
 2263  023130  001431                          BEQ     20$                  ;YES - EXIT
 2264  023132  013700  002524          4$:     MOV     NEWCYL,R0            ;BUILD HEADER OF ADDRESS IN QUESTION
 2265  023136  012701  000007                  MOV     #7,R1                ;POSITION CYLINDER
 2266  023142  006300                  5$:     ASL     R0
 2267  023144  005301                          DEC     R1
 2268  023146  001375                          BNE     5$
 2269  023150  005737  002534                  TST     DESHD                ;CHECK IF HEAD 0
 2270  023154  001402                          BEQ     7$                   ;YES - SKIP
 2271  023156  052700  000100                  BIS     #BIT6,R0             ;INSERT HEAD 1
 2272  023162  053700  002536          7$:     BIS     DESSEC,R0            ;INSERT SECTOR
 2273  023166  022300                  8$:     CMP     (R3)+,R0             ;CHECK THIS WORD IN FILE
 2274  023170  001402                          BEQ     12$                  ;YES - EXIT,ERROR
 2275  023172  101005                          BHI     15$                  ;EXIT- NO ERROR
 2276  023174  000774                          BR      8$
 2277  023176  012737  000001  002442  12$:    MOV     #1,BSFLAG            ;SET ERROR FLAG
 2278  023204  000403                          BR      20$                  ;GO TO EXIT
 2279  023206  020327  003272          15$:    CMP     R3,#FBSFIL           ;DONE BOTH FILES?
 2280  023212  003342                          BGT     2$                   ;NO GO DO SOFTWARE FILE
 2281  023214  012603                  20$:    MOV     (SP)+,R3             ;ELSE RESTORE REGISTERS
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2282  023216  012601                          MOV     (SP)+,R1
2283  023220  012600                          MOV     (SP)+,R0
2284  023222  005737  002442                  TST     BSFLAG             ;CHECK IF ERROR
2285  023226  001003                          BNE     99$                ;YES - SKIP
2286  023230  062716  000002                  ADD     #2,(SP)            ;ELSE BUMP ERROR RETURN
2287  023234  000207                          RTS     PC
2288  023236  017616  000000          99$:    MOV     @(SP),(SP)         ;SET FOR ERROR RETURN
2289  023242  000207                          RTS     PC
2290
2292                                  ;       REPORT OPERATION ROUTINE. PRINTS SUBROUTINE TRACE SEQUENCE AND
2293                                  ;       OPERATION BEING PERFORMED PORTION OF ALL
2294                                  ;       ERROR MESSAGES.
2295  023244  010446                  RPTOP:  MOV     R4,-(SP)
2296  023246  005737  002424                  TST     SSINDX             ;TEST SUBROUTINE INDEX 0
2297  023252  001433                          BEQ     1$                 ;SKIP IF 0
2298  023254  012704  000002                  MOV     #2,R4              ;SET INDEXER TO FIRST ENTRY
2299  023260                                  PRINTB  #FMT9,#SEQMES      ;PRINT 'SUBROUTINE CALL SEQ''
 (8)  023260  012746  007366                  MOV     #SEQMES,-(SP)
 (7)  023264  012746  011043                  MOV     #FMT9,-(SP)
 (6)  023270  012746  000002                  MOV     #2,-(SP)
 (3)  023274  010600                          MOV     SP,R0
 (4)  023276  104014                          EMT     C$PNTB
 (4)  023300  062706  000006                  ADD     #6,SP
2300  023304                          3$:     PRINTB  #FMT16,SUBSTK(R4)          ;PRINT CALLING LOCATION
 (8)  023304  016446  002260                  MOV     SUBSTK(R4),-(SP)
 (7)  023310  012746  011216                  MOV     #FMT16,-(SP)
 (6)  023314  012746  000002                  MOV     #2,-(SP)
 (3)  023320  010600                          MOV     SP,R0
 (4)  023322  104014                          EMT     C$PNTB
 (4)  023324  062706  000006                  ADD     #6,SP
2301  023330  062704  000002                  ADD     #2,R4              ;BUMP INDEX
2302  023334  020437  002424                  CMP     R4,SSINDX          ;CHECK IF ALL PRINTED
2303  023340  003761                          BLE     3$                 ;LOOP IF NOT ALL PRINTED YET
2304  023342                          1$:     PRINTB  #FMT4,ERHEAD,#TSTLAB       ;PRINT ERROR HEADER
 (9)  023342  012746  006217                  MOV     #TSTLAB,-(SP)
 (8)  023346  013746  002434                  MOV     ERHEAD,-(SP)
 (7)  023352  012746  010646                  MOV     #FMT4,-(SP)
 (6)  023356  012746  000003                  MOV     #3,-(SP)
 (3)  023362  010600                          MOV     SP,R0
 (4)  023364  104014                          EMT     C$PNTB
 (4)  023366  062706  000010                  ADD     #10,SP
2305  023372  042737  030000  002426          BIC     #SEEKOP!RORWOP,OPFLAG    ;CLEAR SK & RD OR WRT FLAG
2306  023400  013701  002456                  MOV     L.CS,R1            ;GET COMMAND EXECUTED
2307  023404  042701  177741                  BIC     #177741,R1         ;STRIP ALL BUT FUNCTION CODE
2308  023410  022701  000006                  CMP     #6,R1   ;TEST IF SEEK OPERATION
2309  023414  001003                          BNE     2$                 ;NO - SKIP
2310  023416  052737  010000  002426          BIS     #SEEKOP,OPFLAG     ;ELSE SET SEEK FLAG
2311  023424  022701  000012          2$:     CMP     #12,R1             ;TEST IF WRITE
2312  023430  001003                          BNE     20$                ;NO - SKIP
2313  023432  052737  020000  002426          BIS     #RORWOP,OPFLAG     ;SET RD OR WRT FLAG
2314  023440  022701  000014          20$:    CMP     #14,R1             ;TEST IF READ
2315  023444  001003                          BNE     22$                ;NO - SKIP
2316  023446  052737  020000  002426          BIS     #RORWOP,OPFLAG     ;SET RD OR WRT FLAG
2317  023454                          22$:    PRINTB  #FMT1,#MOPER,OPMSGS(R1) ;PRINT OPERATION
 (9)  023454  016146  002122                  MOV     OPMSGS(R1),-(SP)
 (8)  023460  012746  005143                  MOV     #MOPER,-(SP)
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    (7)  023464  012746  010624                     MOV     #FMT1,-(SP)
    (6)  023470  012746  000003                     MOV     #3,-(SP)
    (3)  023474  010600                             MOV     SP,R0
    (4)  023476  104014                             EMT     C$PNTB
    (4)  023500  062706  000010                     ADD     #10,SP
   2318  023504  020127  000004                     CMP     R1,#4              ;CHECK IF GET STATUS
   2319  023510  001007                             BNE     4$                 ;NO - SKIP
   2320  023512  032737  000010  002462             BIT     #DRSET,L.DA        ;TEST IF RESET INCLUDED
   2321  023520  001403                             BEQ     4$                 ;NO - SKIP
   2322  023522  012701  000016                     MOV     #16,R1             ;SET TO PRINT WITH RESET
   2323  023526  000436                             BR      9$
   2324  023530  032737  007777  002426  4$:        BIT     #COMPOP,OPFLAG     ;TEST IF ANY OTHER OPERATION
   2325  023536  001424                             BEQ     8$                 ;NO - SKIP
   2326  023540  013704  002426                     MOV     OPFLAG,R4          ;SET UP TO DETERMINE WHICH ONE
   2327  023544  012701  000020                     MOV     #20,R1             ;PRESET THE POINTER
   2328  023550  032704  000001          5$:        BIT     #BIT00,R4          ;CHECK THE BIT
   2329  023554  001003                             BNE     6$                 ;IF SET - SKIP
   2330  023556  005721                             TST     (R1)+              ;BUMP POINTER
   2331  023560  006204                             ASR     R4
   2332  023562  000772                             BR      5$
   2333  023564                          6$:        PRINTB  #FMT2,OPMSGS(R1)
    (8)  023564  016146  002122                     MOV     OPMSGS(R1),-(SP)
    (7)  023570  012746  010640                     MOV     #FMT2,-(SP)
    (6)  023574  012746  000002                     MOV     #2,-(SP)
    (3)  023600  010600                             MOV     SP,R0
    (4)  023602  104014                             EMT     C$PNTB
    (4)  023604  062706  000006                     ADD     #6,SP
   2334  023610  032737  100000  002426  8$:        BIT     #HDR40,OPFLAG      ;TEST IF 40 HEADER OPERATION
   2335  023616  001415                             BEQ     10$                ;NO - SKIP
   2336  023620  012701  000050                     MOV     #50,R1             ;ELSE PRINT IT
   2337  023624                          9$:        PRINTB  #FMT2,OPMSGS(R1)
    (8)  023624  016146  002122                     MOV     OPMSGS(R1),-(SP)
    (7)  023630  012746  010640                     MOV     #FMT2,-(SP)
    (6)  023634  012746  000002                     MOV     #2,-(SP)
    (3)  023640  010600                             MOV     SP,R0
    (4)  023642  104014                             EMT     C$PNTB
    (4)  023644  062706  000006                     ADD     #6,SP
   2338  023650  000434                             BR      15$                ;SKIP
   2339  023652  032737  010000  002426  10$:       BIT     #SEEKOP,OPFLAG     ;TEST IF SEEK
   2340  023660  001430                             BEQ     15$                ;NO - SKIP
   2341  023662                                     PRINTB  #FMT13,#FRMWD,OLDCYL,#DIFWD,DESDIF,#SGNWD,DESSGN,#HDWD,DESHD
   (15)  023662  013746  002534                     MOV     DESHD,-(SP)
   (14)  023666  012746  007327                     MOV     #HDWD,-(SP)
   (13)  023672  013746  002532                     MOV     DESSGN,-(SP)
   (12)  023676  012746  007322                     MOV     #SGNWD,-(SP)
   (11)  023702  013746  002530                     MOV     DESDIF,-(SP)
   (10)  023706  012746  007314                     MOV     #DIFWD,-(SP)
    (9)  023712  013746  002522                     MOV     OLDCYL,-(SP)
    (8)  023716  012746  007345                     MOV     #FRMWD,-(SP)
    (7)  023722  012746  011064                     MOV     #FMT13,-(SP)
    (6)  023726  012746  000011                     MOV     #11,-(SP)
    (3)  023732  010600                             MOV     SP,R0
    (4)  023734  104014                             EMT     C$PNTB
    (4)  023736  062706  000024                     ADD     #24,SP
   2342  023742  032737  020000  002426  15$:       BIT     #RDRWOP,OPFLAG     ;TEST IF READ OR WRITE SET
   2343  023750  001424                             BEQ     17$                ;NO - SKIP
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  2344  023752                                  PRINTB  #FMT22,#CYLWD,CURCYL,#HDWD,DESHD,#SECWD,DESSEC
   (13) 023752  013746  002536                  MOV     DESSEC,-(SP)
   (12) 023756  012746  007333                  MOV     #SECWD,-(SP)
   (11) 023762  013746  002534                  MOV     DESHD,-(SP)
   (10) 023766  012746  007327                  MOV     #HDWD,-(SP)
    (9) 023772  013746  002526                  MOV     CURCYL,-(SP)
    (8) 023776  012746  007340                  MOV     #CYLWD,-(SP)
    (7) 024002  012746  011413                  MOV     #FMT22,-(SP)
    (6) 024006  012746  000007                  MOV     #7,-(SP)
    (3) 024012  010600                          MOV     SP,R0
    (4) 024014  104014                          EMT     C$PNTB
    (4) 024016  062706  000020                  ADD     #20,SP
  2345  024022  004737  024474        17$:      JSR     PC,CLRPARM      ;CLEAR PARAM TABLE
  2346  024026  012604                          MOV     (SP)+,R4        ;RESTORE R4
  2347  024030  000207                          RTS     PC
  2348
  2349                                ;         REPORT REASON ROUTINE
  2350                                ;         PRINTS REASON PORTION FOR ALL ERROR REPORTS.
  2351  024032  010146                RPTRES:   MOV     R1,-(SP)        ;STORE R1
  2352  024034  010346                          MOV     R3,-(SP)        ;STORE R3
  2353  024036  010446                          MOV     R4,-(SP)        ;STORE R4
  2354  024040  012701  002504                  MOV     #RESPARM,R1     ;GET START OF PARAM
  2355  024044  012103                          MOV     (R1)+,R3        ;GET NUMBER OF PARAM
  2356  024046                                  PRINTB  #FMT1.1,#MRSLT,(R1)     ;PRINT NAME
    (9) 024046  011146                          MOV     (R1),-(SP)
    (8) 024050  012746  005157                  MOV     #MRSLT,-(SP)
    (7) 024054  012746  010631                  MOV     #FMT1.1,-(SP)
    (6) 024060  012746  000003                  MOV     #3,-(SP)
    (3) 024064  010600                          MOV     SP,R0
    (4) 024066  104014                          EMT     C$PNTB
    (4) 024070  062706  000010                  ADD     #10,SP
  2357  024074  021127  010141                  CMP     (R1),#MNDRST    ;TEST IF MESSAGE IS NO DRV STATUS
  2358  024100  001453                          BEQ     6$              ;YES - SKIP REST OF REPORT
  2359  024102  012704  011050                  MOV     #FMT11,R4       ;PRISET FOR FORMAT 11
  2360  024106  022127  010134                  CMP     (R1)+,#MCYLOC   ;CHECK IF REPORTING CYLINDER LOC
  2361  024112  001002                          BNE     3$              ;NO - SKIP
  2362  024114  012704  011056                  MOV     #FMT12,R4       ;ELSE CHANGE TO FORMAT 12
  2363  024120  005303                3$:       DEC     R3              ;DEC PARAM COUNT
  2364  024122  001442                          BEQ     6$              ;IF 0 - EXIT
  2365  024124                                  PRINTB  R4,#RESE3,(R1)+ ;REPORT IS VALUE
    (9) 024124  012146                          MOV     (R1)+,-(SP)
    (8) 024126  012746  010403                  MOV     #RESE3,-(SP)
    (7) 024132  010446                          MOV     R4,-(SP)
    (6) 024134  012746  000003                  MOV     #3,-(SP)
    (3) 024140  010600                          MOV     SP,R0
    (4) 024142  104014                          EMT     C$PNTB
    (4) 024144  062706  000010                  ADD     #10,SP
  2366  024150                                  PRINTB  R4,#RESE4,(R1)+ ;REPORT SB VALUE
    (9) 024150  012146                          MOV     (R1)+,-(SP)
    (8) 024152  012746  010407                  MOV     #RESE4,-(SP)
    (7) 024156  010446                          MOV     R4,-(SP)
    (6) 024160  012746  000003                  MOV     #3,-(SP)
    (3) 024164  010600                          MOV     SP,R0
    (4) 024166  104014                          EMT     C$PNTB
    (4) 024170  062706  000010                  ADD     #10,SP
  2367  024174  162703  000002                  SUB     #2,R3           ;DEC PARAM COUNT
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 2368  024200  001413                     BEQ     6$                  ;IF 0 - EXIT
 2369  024202                             PRINTB  #FMT1,#RESE5,(R1)+  ;REPORT CONDITION
  (9)  024202  012146                     MOV     (R1)+,-(SP)
  (8)  024204  012746  010414             MOV     #RESE5,-(SP)
  (7)  024210  012746  010624             MOV     #FMT1,-(SP)
  (6)  024214  012746  000003             MOV     #3,-(SP)
  (3)  024220  010600                     MOV     SP,R0
  (4)  024222  104014                     EMT     C$PNTB
  (4)  024224  062706  000010             ADD     #10,SP
 2370  024230  012604            6$:      MOV     (SP)+,R4            ;RESTORE REGS
 2371  024232  012603                     MOV     (SP)+,R3
 2372  024234  012601                     MOV     (SP)+,R1
 2373  024236  000207                     RTS     PC                  ;RETURN
 2374
 2375                            ;        REPORT PHYSICAL ADDRESS OF DEVICE UNDER TEST
 2376                            ;        AND ALL REGISTER CONTENTS.
 2377  024240                    RPTREM:  PRINTB  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
 (11)  024240  005046                     CLR     -(SP)
 (11)  024242  153716  002455             BISB    RLDRV+1,(SP)
 (10)  024246  012746  005633             MOV     #DRVNAM,-(SP)
  (9)  024252  013746  002450             MOV     RLBAS,-(SP)
  (8)  024256  012746  005622             MOV     #BASADD,-(SP)
  (7)  024262  012746  010657             MOV     #FMT5,-(SP)
  (6)  024266  012746  000005             MOV     #5,-(SP)
  (3)  024272  010600                     MOV     SP,R0
  (4)  024274  104014                     EMT     C$PNTB
  (4)  024276  062706  000014             ADD     #14,SP
 2378                            ;        REPORT RL11 REGISTERS
 2379  024302                             PRINTB  #FMT6,#CSNAM,#DANAM,#BANAM,#MPNAM,#CYLWD,#HDWD
 (13)  024302  012746  007327             MOV     #HDWD,-(SP)
 (12)  024306  012746  007340             MOV     #CYLWD,-(SP)
 (11)  024312  012746  005752             MOV     #MPNAM,-(SP)
 (10)  024316  012746  005740             MOV     #BANAM,-(SP)
  (9)  024322  012746  005745             MOV     #DANAM,-(SP)
  (8)  024326  012746  005733             MOV     #CSNAM,-(SP)
  (7)  024332  012746  010677             MOV     #FMT6,-(SP)
  (6)  024336  012746  000007             MOV     #7,-(SP)
  (3)  024342  010600                     MOV     SP,R0
  (4)  024344  104014                     EMT     C$PNTB
  (4)  024346  062706  000020             ADD     #20,SP
 2380  024352                             PRINTB  #FMT8,#LAB1,L.CS,L.DA,L.BA,L.MP
 (12)  024352  013746  002464             MOV     L.MP,-(SP)
 (11)  024356  013746  002460             MOV     L.BA,-(SP)
 (10)  024362  013746  002462             MOV     L.DA,-(SP)
  (9)  024366  013746  002456             MOV     L.CS,-(SP)
  (8)  024372  012746  005757             MOV     #LAB1,-(SP)
  (7)  024376  012746  011011             MOV     #FMT8,-(SP)
  (6)  024402  012746  000006             MOV     #6,-(SP)
  (3)  024406  010600                     MOV     SP,R0
  (4)  024410  104014                     EMT     C$PNTB
  (4)  024412  062706  000016             ADD     #16,SP
 2381  024416                             PRINTB  #FMT7,#LAB2,T.CS,T.DA,T.BA,T.MP,CURCYL,DESHD
 (14)  024416  013746  002534             MOV     DESHD,-(SP)
 (13)  024422  013746  002526             MOV     CURCYL,-(SP)
 (12)  024426  013746  002474             MOV     T.MP,-(SP)
 (11)  024432  013746  002470             MOV     T.BA,-(SP)
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   (10) 024436  013746  002472                 MOV     T.DA,-(SP)
    (9) 024442  013746  002466                 MOV     T.CS,-(SP)
    (8) 024446  012746  005772                 MOV     #LAB2,-(SP)
    (7) 024452  012746  010741                 MOV     #FMT7,-(SP)
    (6) 024456  012746  000010                 MOV     #10,-(SP)
    (3) 024462  010600                         MOV     SP,R0
    (4) 024464  104014                         EMT     C$PNTB
    (4) 024466  062706  000022                 ADD     #22,SP
   2382 024472  000207                         RTS     PC
   2383
   2384                                ;       CLEAR PARAMETER BLOCK FOR REPORTING
   2385 024474  010546                 CLRPARM:        MOV     R5,-(SP)        ;STORE R5
   2386 024476  012701  002504                 MOV     #RESPARM,R1     ;GET ADDRESS OF BLOCK
   2387 024502  012705  000005                 MOV     #5,R5           ;SET COUNT
   2388 024506  005021                 2$:     CLR     (R1)+           ;CLEAR WORD
   2389 024510  005305                         DEC     R5              ;DEC COUNT
   2390 024512  001375                         BNE     2$              ;LOOP UNTIL 0
   2391 024514  012701  002504                 MOV     #RESPARM,R1     ;RESET POINTER
   2392 024520  012605                         MOV     (SP)+,R5        ;RESTORE R5
   2393 024522  000207                         RTS     PC
   2394
   2395 024524                         ENDMOD
   2396
```

```
 2398  024524                             BGNMOD  HRDWTST
 2399                                     .SBTTL  *TEST 1              **DIFFERENCE OF 1 SEEK (PART 1)
 2400  024524                             BGNTST                       ;TEST 1
  (3)  024524                                                                                    T1::
 2401  024524  012737  006225  002434             MOV     #P2T01E,ERHEAD  ;SET ERROR HEADER
 2402  024532  012737  000004  002540             MOV     #4,TEMP0        ;SET PASS COUNT
 2403  024540  004737  015160                     JSR     PC,TSTINT       ;INITIALIZE TEST
 2404  024544  004737  015176                     JSR     PC,GSTATR       ;GET STATUS
 2405  024550  025044                             T1765$
 2406  024552  012737  177777  002544             MOV     #-1,TEMP2       ;SET -1 INTO DIFF AUGMENT FOR -1 SEEK
 2407  024560  012704  002526                     MOV     #CURCYL,R4      ;SET POINTERS
 2408  024564  012705  002524                     MOV     #NEWCYL,R5
 2409  024570  004737  017370                     JSR     PC,CHOSHD       ;GO CHOSE HEAD
 2410  024574                             T172$:
 2411  024574                             BGNSUB
  (3)  024574                                                                                    T1.1:
  (3)  024574  104002                             EMT     C$BSUB
 2412  024576  004737  021116                     JSR     PC,GETPOS       ;GET POSITION
 2413  024602  025002                             60$
 2414  024604                                     INLOOP                  ;CHECK IF IN ERROR LOOP
  (3)  024604  104020                             EMT     C$INLP
 2415  024606                                     BNCOMPLETE      3$      ;NO - SKIP
  (2)  024606  103005                             BCC     3$
 2416  024610  021415                             CMP     (R4),(R5)       ;CHECK IF CURRENT = NEW
 2417  024612  001005                             BNE     4$              ;NO - SKIP
 2418  024614  004737  017454                     JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW
 2419  024620  000421                             BR      9$              ;SKIP TO SEEK
 2420  024622  005437  002544             3$:     NEG     TEMP2           ;CHANGE DIFF AUGMENT FOR OPPOSITE DIR
 2421  024626  011415                     4$:     MOV     (R4),(R5)       ;MOV     CURRENT INTO OLD
 2422  024630  022714  000377                     CMP     #255.,(R4)      ;CHECK IF CURRENT AT 255
 2423  024634  001004                             BNE     7$              ;NO - SKIP
 2424  024636  012737  177777  002544             MOV     #-1,TEMP2       ;AT MAX CYL, MAKE NEXT SEEK REV
 2425  024644  000405                             BR      8$              ;SKIP
 2426  024646  005714                     7$:     TST     (R4)            ;TEST IF CURRENT AT 0
 2427  024650  001003                             BNE     8$              ;NO - SKIP
 2428  024652  012737  000001  002544             MOV     #1,TEMP2        ;AT CYL 0, MAKE NEXT SEEK FWRD
 2429  024660  063715  002544             8$:     ADD     TEMP2,(R5)      ;ADD DIFF TO NEW CYL (+1 OR -1)
 2430  024664  004737  016070             9$:     JSR     PC,XSEEK        ;DO SEEK
 2431  024670  025002                             60$
 2432  024672  004737  015226                     JSR     PC,GSTAT        ;GET STATUS
 2433  024676  025002                             60$
 2434
 2435  024700  012703  000004                     MOV     #4,R3           ;SET EXPECTED STATE
 2436  024704  020337  002502                     CMP     R3,T.STAT       ;CHECK IF STATE COUNT
 2437  024710  001404                             BEQ     10$             ;YES-SKIP
 2438  024712                                     ERRHRD  101.,,ERR7      ;REPORT STATE ERROR
  (3)  024712  104443                             TRAP    T$ERCODE
  (5)  024714  000145                             .WORD   101
  (5)  024716  012734                             .WORD   ERR7
 2439  024720  000423                             BR      16$             ;EXIT TEST
 2440  024722  012703  000005             10$:    MOV     #5,R3           ;SET EXPECTED STATE
 2441  024726  012701  000062                     MOV     #50.,R1         ;SET WAIT COUNT FOR 5 MS
 2442  024732  004737  015226             12$:    JSR     PC,GSTAT        ;GET STATUS
 2443  024736  025002                             60$
 2444  024740  020337  002502                     CMP     R3,T.STAT       ;IS STATE 5?
 2445  024744  001411                             BEQ     16$             ;YES-SKIP
```

```
  2446  024746  005301                               DEC     R1                ;DEC WAIT COUNT
  2447  024750  001404                               BEQ     14$               ;SKIP IF 0
  2448  024752                                       WAITUS  #1
   (3)  024752  012700  000001                       MOV     #1,R0
   (3)  024756  104027                               EMT     C$WTU
  2449  024760  000764                               BR      12$
  2450  024762                               14$:    ERRHRD  102.,,ERR7        ;REPORT STATE ERROR
   (3)  024762  104443                               TRAP    T$ERCODE
   (5)  024764  000146                               .WORD   102
   (5)  024766  012734                               .WORD   ERR7
  2451  024770  012701  000062               16$:    MOV     #50.,R1           ;SET WAIT COUNT FOR 5 MS
  2452  024774  004737  020650                       JSR     PC,RDYWAIT        ;GO WAIT FOR DRIVE READY
  2453  025000  025002                               60$
  2454  025002  012737  000002  002440       60$:    MOV     #2,ERRSWI         ;INIT ERROR SWITCH
  2455  025010                               ENDSUB
   (3)  025010                               L10021:
   (3)  025010  104003                               EMT     C$ESUB
  2456  025012                                       ESCAPE  TST               ;EXIT TEST IF ERROR
   (3)  025012  104010                               EMT     C$ESCAPE
   (3)  025014  000030                               .WORD   L10020-.
  2457  025016  005337  002540                       DEC     TEMPO             ;DEC PASS COUNT
  2458  025022  001410                               BEQ     24$               ;SKIP IF 0-DONE
  2459
  2460  025024  032737  000001  002540               BIT     #BIT0,TEMPO       ;TEST IF PASS=2
  2461  025032  001003                               BNE     23$               ;NO-SKIP
  2462  025034  004737  017414                       JSR     PC,SWAPHD         ;GO SWAP TO HEAD 1 OR END TEST
  2463  025040  025044                               24$                       ;ABORT RETURN
  2464  025042  000654                       23$:    BR      T172$
  2465  025044                               24$:
  2466  025044                               T1765$:
  2467  025044                               ENDTST
   (3)  025044                               L10020:
   (3)  025044  104001                               EMT     C$ETST
```

```
                                             .SBTTL  *TEST 2          **DIFFERENCE OF 1 SEEK (PART 2)
      025046                                 BGNTST                   ;TEST 2
(3)   025046                                                                                  T2::
      025046  012737  006225  002434                 MOV     #P2T02E,ERHEAD  ;SET ERROR HEADER
      025054  012737  000004  002540                 MOV     #4,TEMP0        ;SET PASS COUNT
      025062  004737  015160                         JSR     PC,TSTINT       ;INITIALIZE TEST
      025066  004737  015176                         JSR     PC,GSTATR       ;GET STATUS, CLEAR DRIVE
      025072  025334                                 T1865$
      025074  004737  017370                         JSR     PC,CHOSHD       ;GO CHOSE HEAD
      025100  012737  177777  002544                 MOV     #-1,TEMP2       ;SET DIFF AUGMENT TO -1 (REVERSE)
      025106  012703  002524                         MOV     #NEWCYL,R3      ;GET ADDRESSES
      025112  012704  002526                         MOV     #CURCYL,R4
      025116  012705  002522                         MOV     #OLDCYL,R5
      025122                                 T187$:
      025122                                 BGNSUB
(3)   025122                                                                                  T2.1:
(3)   025122  104002                                 EMT     C$BSUB
      025124  004737  021116                         JSR     PC,GETPOS       ;GET CURRENT POSITION
      025130  025272                                 60$
      025132                                         INLOOP                  ;CHECK IF IN ERROR LOOP
(3)   025132  104020                                 EMT     C$INLP
      025134                                         BNCOMPLETE      3$      ;NO - SKIP
(2)   025134  103005                                 BCC     3$
      025136  021413                                 CMP     (R4),(R3)       ;CHECK IF CURRENT = NEW
      025140  001005                                 BNE     4$              ;NO - SKIP
      025142  004737  017454                         JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW
      025146  000421                                 BR      9$              ;SKIP TO SEEK
      025150  005437  002544                 3$:     NEG     TEMP2           ;CHANGE DIFF AUGMENT FOR OPPOSITE DIR
      025154  011413                         4$:     MOV     (R4),(R3)       ;MOV CURRENT INTO NEW
      025156  022714  000377                         CMP     #255.,(R4)      ;CHECK IF CURRENT AT 255
      025162  001004                                 BNE     7$              ;NO - SKIP
      025164  012737  177777  002544                 MOV     #-1,TEMP2       ;AT MAX CYL, ,AKE NEXT SEEK REV
      025172  000405                                 BR      8$              ;SKIP
      025174  005714                         7$:     TST     (R4)            ;TEST IF CURRENT AT 0
      025176  001003                                 BNE     8$              ;NO - SKIP
      025200  012737  000001  002544                 MOV     #1,TEMP2        ;AT CYL 0, MAKE NEXT SEEK FWRD
      025206  063713  002544                 8$:     ADD     TEMP2,(R3)      ;ADD DIFF TO NEW CYL (+1 OR -1)
      025212  004737  016070                 9$:     JSR     PC,XSEEK        ;DO SEEK
      025216  025272                                 60$
      025220  012701  000226                         MOV     #150.,R1        ;SET WAIT COUNT FOR 15 MS
      025224  004737  020650                         JSR     PC,RDYWAIT      ;WAIT FOR READY
      025230  025272                                 60$
      025232  004737  021116                         JSR     PC,GETPOS       ;STORE POSITION
      025236  025272                                 60$
      025240  011501                                 MOV     (R5),R1         ;GET OLD POSITION
      025242  161401                                 SUB     (R4),R1         ;SUBTRACT FROM NEW POINTER (FORWARD)
      025244  005737  002532                         TST     DESSGN          ;CHECK IF SIGN FORWARD
      025250  001402                                 BEQ     10$             ;YES-SKIP, ELSE SUB FOR SEEK REVERSE
      025252  011401                                 MOV     (R4),R1         ;GET NEW CYLINDER
      025254  161501                                 SUB     (R5),R1         ;SUBTRACT FROM OLD CYL
      025256  022701  000001                 10$:    CMP     #1,R1           ;CHECK IF RESULT IS DIFFERENCE OF 1
      025262  001403                                 BEQ     12$             ;YES-SKIP
      025264                                         ERRHRD  201.,,ERR8      ;ELSE REPORT ERROR
(3)   025264  104443                                 TRAP    T$ERCODE
```

```
 (5)  025266  000311                                .WORD   201
 (5)  025270  013004                                .WORD   ERR8
      025272                              12$:
      025272  012737  000002  002440      60$:      MOV     #2,ERRSWI          ;INIT ERROR SWITCH
      025300                              ENDSUB
 (3)  025300                              L10023:
 (3)  025300  104003                                EMT     C$ESUB
      025302                                        ESCAPE  TST                ;EXIT TEST IF ERROR
 (3)  025302  104010                                EMT     C$ESCAPE
 (3)  025304  000030                                .WORD   L10022-.
      025306  005337  002540                        DEC     TEMP0              ;DEC PASS COUNT
      025312  001410                                BEQ     30$                ;EXIT IF DONE

      025314  032737  000001  002540                BIT     #BIT0,TEMP0        ;TEST IF PASS 1 OR 3
      025322  001003                                BNE     20$                ;YES-SKIP
      025324  004737  017414                        JSR     PC,SWAPHD          ;GO SWAP TO HEAD 1 OR END TEST
      025330  025334                                30$                        ;ABORT RETURN
      025332  000673                      20$:      BR      T187$              ;LOOP
      025334                              30$:
      025334                              T1865$:
      025334                              ENDTST
 (3)  025334                              L10022:
 (3)  025334  104001                                EMT     C$ETST
```

```
                                                .SBTTL  *TEST 3          **OUTER GUARD BAND DETECTION
        025336                                  BGNTST                   ;TEST 3
  (3)   025336                                                                                  T3::
        025336  012737  006244  002434                  MOV     #P2T03E,ERHEAD  ;SET ERROR HEADER
        025344  004737  015160                          JSR     PC,TSTINT       ;INITIALIZE TEST
        025350  004737  015176                          JSR     PC,GSTATR       ;CLEAR DRIVE
        025354  025546                                  T1965$
        025356  004737  017370                          JSR     PC,CHOSHD       ;GO CHOSE HEAD
        025362  005005                          T197$:  CLR     R5              ;CLEAR FOR POSITION TO 0
        025364  004737  016570                          JSR     PC,POSHDS       ;POSITION HEADS
        025370  025546                                  T1965$
        025372                                  BGNSUB
  (3)   025372                                                                                  T3.1:
  (3)   025372  104002                                  EMT     C$BSUB
        025374  012737  177777  002524                  MOV     #-1,NEWCYL      ;SET FOR GUARD BAND SEEK
        025402  004737  016070                          JSR     PC,XSEEK        ;DO SEEK
        025406  025522                                  60$
        025410  012701  000003                          MOV     #3.,R1          ;SET WAIT COUNT FOR 3MS
        025414  032762  000001  000000          8$:     BIT     #DRDYMSK,RLCS(R2)  ;TEST IF DRIVE READY
        025422  001413                                  BEQ     9$              ;NO-SKIP
        025424  004737  015226                          JSR     PC,GSTAT        ;GET DRIVE STATUS
        025430  025522                                  60$
        025432  012703  007543                          MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
        025436  012704  010456                          MOV     #C10MS,R4       ;SET CONDITION MESSAGE PTR
        025442                                          ERRHRD  301.,,ERR4      ;REPORT READY ERROR
  (3)   025442  104443                                  TRAP    T$ERCODE
  (5)   025444  000455                                  .WORD   301
  (5)   025446  011736                                  .WORD   ERR4
        025450  000424                                  BR      60$             ;EXIT TEST
        025452  005301                          9$:     DEC     R1              ;DEC WAIT COUNT
        025454  001404                                  BEQ     12$             ;SKIP IF 0
        025456                                          WAITUS  #10.
  (3)   025456  012700  000012                          MOV     #10.,R0
  (3)   025462  104027                                  EMT     C$WTU
        025464  000753                                  BR      8$              ;LOOP
        025466  012701  000226                  12$:    MOV     #150.,R1        ;SET WAIT COUNT FOR 15 MS
        025472  004737  020650                          JSR     PC,RDYWAIT      ;WAIT FOR READY & REPORT IF NOT READY
        025476  025522                                  60$

        025500  004737  021116                          JSR     PC,GETPOS       ;GET POSITION
        025504  025522                                  60$
        025506  005737  002526                          TST     CURCYL          ;CHECK IF HEADS STILL AT 0
        025512  001403                                  BEQ     15$             ;YES-SKIP
        025514                                          ERRHRD  302.,,ERR8      ;ELSE REPORT CYLINDER ERROR
  (3)   025514  104443                                  TRAP    T$ERCODE
  (5)   025516  000456                                  .WORD   302
  (5)   025520  013004                                  .WORD   ERR8
        025522                                  15$:
        025522  012737  000002  002440          60$:    MOV     #2,ERRSWI       ;INIT ERROR SWITCH
        025530                                  ENDSUB
  (3)   025530                                  L10025:
  (3)   025530  104003                                  EMT     C$ESUB
        025532                                          ESCAPE  TST             ;EXIT TEST IF ERROR
  (3)   025532  104010                                  EMT     C$ESCAPE
  (3)  025534  000012                        .WORD    L10024-.
 2577  025536  004737  017414                JSR      PC,SWAPHD         ;GO SWAP TO HEAD 1 OR END TEST
 2578  025542  025546                        17$                        ;ABORT RETURN
 2579  025544  000706                        BR       T197$             ;REDO TEST
 2580  025546                        17$:
 2581  025546                        T1965$:
 2582  025546                        ENDTST
  (3)  025546                        L10024:
  (3)  025546  104001                        EMT      C$ETST
 2584
 2585
 2586                                          .SBTTL   *TEST 4            **INCREMENTAL FORWARD SEEK HEAD 0
 2587    025550                                BGNTST                      ;TEST 4
  (3)    025550                                                                                            T4::
 2588    025550  012737  006270  002434                 MOV      #P2T04E,ERHEAD   ;SET ERROR HEADER
 2589    025556  004737  015160                         JSR      PC,TSTINT        ;INITIALIZE TEST
 2590    025562  004737  015176                         JSR      PC,GSTATR        ;CLEAR DRIVE
 2591    025566  025756                                 T2065$
 2592    025570  004737  017370                         JSR      PC,CHOSHD        ;GO CHOSE HEAD
 2593    025574  005737  002534                         TST      DESHD            ;TEST IF THIS IS HEAD 0
 2594    025600  001402                                 BEQ      2$               ;YES - SKIP
 2595    025602                                         EXIT     TST              ;ELSE EXIT TEST
  (3)    025602  104032                                 EMT      C$EXIT
  (3)    025604  000152                                 .WORD    L10026-.
 2596    025606  013705  013374                2$:      MOV      LOLIMW,R5        ;CLEAR TO POSITION HEADS TO LOLIMIT
 2597    025612  004737  016570                         JSR      PC,POSHDS        ;POSITION HEADS
 2598    025616  025756                                 T2065$
 2599    025620                                BGNSUB
  (3)    025620                                                                                            T4.1:
  (3)    025620  104002                                 EMT      C$BSUB
 2600    025622  004737  021116                T206$:   JSR      PC,GETPOS        ;GET POSITION
 2601    025626  025746                                 60$
 2602    025630                                         INLOOP                    ;CHECK IF IN ERROR LOOP
  (3)    025630  104020                                 EMT      C$INLP
 2603    025632                                         BNCOMPLETE        5$      ;NO - SKIP
  (2)    025632  103007                                 BCC      5$
 2604    025634  023737  002526  002524                 CMP      CURCYL,NEWCYL    ;CHECK IF POSITIONED AT DESIRED LOC
 2605    025642  001003                                 BNE      5$               ;NO - SKIP
 2606    025644  004737  017454                         JSR      PC,ONSWAP        ;ELSE SWAP NEW AND OLD CYLINDERS
 2607    025650  000405                                 BR       7$               ;SKIP
 2608    025652  013737  002526  002524        5$:      MOV      CURCYL,NEWCYL    ;PLACE CURRENT INTO NEW
 2609    025660  005237  002524                         INC      NEWCYL           ;BUMP FOR ONE CYLINDER SEEK
 2610    025664                                7$:
 2611    025664  004737  016070                         JSR      PC,XSEEK         ;DO SEEK
 2612    025670  025746                                 60$
 2613    025672  012701  000226                         MOV      #150.,R1         ;SET WAIT TIME 15 MS
 2614    025676  004737  020650                         JSR      PC,RDYWAIT       ;WAIT FOR READY
 2615    025702  025746                                 60$
 2616
 2617    025704  004737  021244                         JSR      PC,VERPOS        ;GO VERIFY POSITON
 2618    025710  025746                                 60$
 2619
 2620    025712  032737  000002  013372                 BIT      #ALLSEC,MISWIW   ;TEST IF CHECK ALL SECTORS
 2621    025720  001406                                 BEQ      11$              ;NO-SKIP
 2622    025722  004737  021364                         JSR      PC,RDALHD        ;GO READ ALL HEADERS
 2623    025726  025746                                 60$
 2624    025730  004737  020262                         JSR      PC,VERHDR        ;GO VERIFY HEADER
 2625    025734  025746                                 60$
 2626    025736                                11$:
 2627    025736  023737  013376  002524                 CMP      HILIMW,NEWCYL    ;CHECK IF HILIMIT REACHED
 2628    025744  103726                                 BLO      T206$            ;NO-LOOP
 2629    025746  012737  000002  002440        60$:     MOV      #2,ERRSWI        ;INIT ERROR SWITCH
 2630    025754                                ENDSUB
  (3)    025754                                L10027:
  (3)    025754  104003                                 EMT      C$ESUB
 2631  025756                      T2065$:
 2632  025756                      ENDTST
  (3)  025756                      L10026:
  (3)  025756  104001                      EMT     C$ETST
 2634
 2635
 2636                                           .SBTTL  *TEST 5           **INCREMENTAL REVERSE SEEK HEAD 0
 2637   025760                                  BGNTST                    ;TEST 5
  (3)   025760                                                                                         T5::
 2638   025760  012737  006312  002434                  MOV     #P2T05E,ERHEAD  ;SET ERROR HEADER
 2639   025766  004737  015160                          JSR     PC,TSTINT       ;INITIALIZE TEST
 2640   025772  004737  015176                          JSR     PC,GSTATR       ;CLEAR DRIVE
 2641   025776  026166                                  T2165$
 2642   026000  004737  017370                          JSR     PC,CHOSHD       ;GO CHOSE HEAD
 2643   026004  005737  002534                          TST     DESHD           ;TEST IF HEAD 0 SELECTED
 2644   026010  001402                                  BEQ     2$              ;YES - SKIP
 2645   026012                                          EXIT    TST             ;ELSE EXIT TEST
  (3)   026012  104032                                  EMT     C$EXIT
  (3)   026014  000152                                  .WORD   L10030-.
 2646   026016  013705  013376                  2$:     MOV     HILIMW,R5       ;SET TO POSITION HDS TO HILIMIT
 2647   026022  004737  016570                          JSR     PC,POSHDS       ;POSITION HEADS
 2648   026026  026166                                  T2165$
 2649   026030                                  BGNSUB
  (3)   026030                                                                                         T5.1:
  (3)   026030  104002                                  EMT     C$BSUB
 2650   026032  004737  021116                  T216$:  JSR     PC,GETPOS       ;GET POSITION
 2651   026036  026156                                  60$
 2652   026040                                          INLOOP                  ;CHECK IF IN ERROR LOOP
  (3)   026040  104020                                  EMT     C$INLP
 2653   026042                                          BNCOMPLETE      5$      ;NO - SKIP
  (2)   026042  103007                                  BCC     5$
 2654   026044  023737  002526  002524                  CMP     CURCYL,NEWCYL   ;CHECK IF POSITIONED AT DES LOC
 2655   026052  001003                                  BNE     5$              ;NO - SKIP
 2656   026054  004737  017454                          JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW CYLINDERS
 2657   026060  000405                                  BR      7$              ;SKIP
 2658   026062  013737  002526  002524          5$:     MOV     CURCYL,NEWCYL   ;PUT CURRENT INTO NEW
 2659   026070  005337  002524                          DEC     NEWCYL          ;DEC FOR ONE CYLINDER REVERSE SEEK
 2660   026074  004737  016070                  7$:     JSR     PC,XSEEK        ;SEEK TO IT
 2661   026100  026156                                  60$
 2662   026102  012701  000226                          MOV     #150.,R1        ;SET WAIT FOR 15 MS
 2663   026106  004737  020650                          JSR     PC,RDYWAIT      ;WAIT FOR READY
 2664   026112  026156                                  60$
 2665
 2666   026114  004737  021244                          JSR     PC,VERPOS       ;VERIFY POSITION
 2667   026120  026156                                  60$
 2668
 2669   026122  032737  000002  002426                  BIT     #ALLSEC,OPFLAG  ;TEST IF USE ALL SECTORS
 2670   026130  001406                                  BEQ     11$             ;NO-SKIP
 2671   026132  004737  021364                          JSR     PC,RDALHD       ;ELSE READ ALL THE HDRS
 2672   026136  026156                                  60$
 2673   026140  004737  020262                          JSR     PC,VERHDR       ;VERIFY THE HEADERS
 2674   026144  026156                                  60$
 2675   026146                                  11$:
 2676   026146  023737  013374  002524                  CMP     LOLIMW,NEWCYL   ;CHECK IF REACHED LOLIMIT
 2677   026154  103726                                  BLO     T216$           ;NO - LOOP
 2678   026156  012737  000002  002440          60$:    MOV     #2,ERRSWI       ;INIT ERROR SWITCH
 2679   026164                                  ENDSUB
  (3)   026164                                  L10031:
  (3)   026164  104003                                  EMT     C$ESUB
 2680   026166                                  T2165$:
  2681  026166                          ENDTST
   (3)  026166                          L10030:
   (3)  026166  104001                          EMT     C$ETST
```

```



                                         .SBTTL  *TEST 6           **INCREMENTAL FORWARD SEEK HEAD 1
      026170                             BGNTST                    ;TEST 6
 (3)  026170                                                                                    T6::
      026170  012737  006334  002434            MOV     #P2T06E,ERHEAD  ;SET ERROR HEADER
      026176  004737  015160                    JSR     PC,TSTINT       ;INITIALIZE TEST
      026202  004737  015176                    JSR     PC,GSTATR       ;CLEAR DRIVE
      026206  026412                            T2265$
      026210  005037  002534                    CLR     DESHD           ;SET HEAD TO 0
      026214  013705  013374                    MOV     LOLIMW,R5       ;CLEAR FOR POSITION HDS TO LOLIMIT
      026220  004737  016570                    JSR     PC,POSHDS       ;POSITION HDS
      026224  026412                            T2265$
      026226  012737  000001  002534            MOV     #1,DESHD        ;SET TO HEAD 1
      026234  032737  010000  013372            BIT     #HEADLM,MISWIW  ;TEST IF HEAD SPECIFIED
      026242  001405                            BEQ     2$              ;NO - SKIP
      026244  005737  013400                    TST     HEADW           ;TEST IF IT IS HEAD 0
      026250  001002                            BNE     2$              ;NO - SKIP
      026252                                    EXIT    TST             ;ELSE EXIT TEST
 (3)  026252  104032                            EMT     C$EXIT
 (3)  026254  000136                            .WORD   L10032-.
      026256                             2$:
      026256                             BGNSUB
 (3)  026256                                                                                    T6.1:
 (3)  026256  104002                            EMT     C$BSUB
      026260  004737  021116             T227$: JSR     PC,GETPOS       ;GET CURRENT POSITION
      026264                                    INLOOP                  ;CHECK IF IN ERROR LOOP
 (3)  026264  104020                            EMT     C$INLP
      026266                                    BNCOMPLETE 5$           ;NO - SKIP
 (2)  026266  103007                            BCC     5$
      026270  023737  002526  002524            CMP     CURCYL,NEWCYL   ;CHECK IF AT DESIRED LOCATION
      026276  001003                            BNE     5$              ;NO - SKIP
      026300  004737  017454                    JSR     PC,ONSWAP       ;SWAP OLD AND NEW CYLINDER
      026304  000405                            BR      7$              ;SKIP
      026306  013737  002526  002524     5$:    MOV     CURCYL,NEWCYL   ;MOVE CURRENT INTO NEW
      026314  005237  002524                    INC     NEWCYL          ;BUMP NEWCYL FOR ONE CYL FWRD SEEK
      026320                             7$:
      026320  004737  016070                    JSR     PC,XSEEK        ;DO SEEK
      026324  026402                            60$
      026326  012701  000226                    MOV     #150.,R1        ;SET WAIT COUNT 15 MS
      026332  004737  020650                    JSR     PC,RDYWAIT      ;WAIT FOR READY
      026336  026402                            60$
      026340  004737  021244                    JSR     PC,VERPOS       ;VERIFY POSITION IS CORRECT
      026344  026402                            60$

      026346  032737  000002  013372            BIT     #ALLSEC,MISWIW  ;CHECK IF USE ALL SECTORS
      026354  001406                            BEQ     9$              ;NO-SKIP
      026356  004737  021364                    JSR     PC,RDALHD       ;ELSE READ ALL HEADERS
      026362  026402                            60$
      026364  004737  020262                    JSR     PC,VERHDR       ;VERIFY HEADERS
      026370  026402                            60$
      026372                             9$:
      026372  023737  013376  002524            CMP     HILIMW,NEWCYL   ;CHECK IF DONE
      026400  101327                            BHI     T227$           ;NO - LOOP
      026402  012737  000002  002440     60$:   MOV     #2,ERRSWI       ;INIT ERROR SWITCH
      026410                             ENDSUB
```

```
    (3)  026410                    L10033:
    (3)  026410  104003                    EMT     C$ESUB
   2732  026412                    T2265$:
   2733  026412                    ENDTST
    (3)  026412                    L10032:
    (3)  026412  104001                    EMT     C$ETST
```

```



                                  .SBTTL   *TEST 7           **INNER GUARD BAND DETECTION
      026414                      BGNTST                     ;TEST 7
 (3)  026414                                                                                 T7::
      026414 012737 006356 002434          MOV      #P2T07E,ERHEAD  ;SET ERROR HEADER
      026422 004737 015160                 JSR      PC,TSTINT       ;INITIALIZE TEST
      026426 004737 015176                 JSR      PC,GSTATR       ;CLEAR DRIVE
      026432 026612                        T2365$
      026434 004737 017370                 JSR      PC,CHOSHD       ;GO CHOSE HEAD
      026440 012705 000377        T233$:   MOV      #255.,R5        ;SET FOR POSITION TO 255.
      026444 004737 016570                 JSR      PC,POSHDS       ;POSITION HEADS
      026450 026612                        T2365$
      026452                      BGNSUB
 (3)  026452                                                                                 T7.1:
 (3)  026452 104002                        EMT      C$BSUB
      026454 012737 000400 002524          MOV      #256.,NEWCYL    ;SET FOR INNER GUARD BAND SEEK
      026462 004737 016070                 JSR      PC,XSEEK        ;DO IT
      026466 026566                        60$
      026470 012701 000003                 MOV      #3.,R1          ;SET WAIT COUNT 3 MS

      026474 032762 000001 000000 7$:      BIT      #DRDYMSK,RLCS(R2) ;CHECK IF READY
      026502 001413                        BEQ      9$              ;NO-SKIP
      026504 004737 015226                 JSR      PC,GSTAT        ;GET DRIVE STATUS
      026510 026566                        60$
      026512 012703 007543                 MOV      #MDRDY,R3       ;SET NAME MESSAGE PTR
      026516 012704 010456                 MOV      #C10MS,R4       ;SET CONDITION MESSAGE PTR
      026522                               ERRHRD   701.,,ERR4      ;REPORT READY ERROR
 (3)  026522 104443                        TRAP     T$ERCODE
 (5)  026524 001275                        .WORD    701
 (5)  026526 011736                        .WORD    ERR4
      026530 000416                        BR       60$             ;EXIT TEST
      026532 005301                9$:     DEC      R1              ;DEC WAIT COUNT
      026534 001404                        BEQ      11$             ;SKIP IF 0
      026536                               WAITUS   #10.            ;WAIT 100 US
 (3)  026536 012700 000012                 MOV      #10.,R0
 (3)  026542 104027                        EMT      C$WTU
      026544 000753                        BR       7$              ;LOOP
      026546 012701 000226        11$:     MOV      #150.,R1                ;SET WAIT COUNT 15 MS
      026552 004737 020650                 JSR      PC,RDYWAIT      ;GO WAIT FOR READY
      026556 026566                        60$

      026560 004737 021244                 JSR      PC,VERPOS       ;GO VERIFY POSITION IS 255
      026564 026566                        60$
      026566 012737 000002 002440 60$:     MOV      #2,ERRSWI       ;INIT ERROR SWITCH
      026574                      ENDSUB
 (3)  026574                      L10035:
 (3)  026574 104003                        EMT      C$ESUB
      026576                               ESCAPE   TST             ;EXIT TEST IF ERROR
 (3)  026576 104010                        EMT      C$ESCAPE
 (3)  026600 000012                        .WORD    L10034-.
      026602 004737 017414                 JSR      PC,SWAPHD       ;GO SWAP TO HEAD 1 OR END TEST
      026606 026612                        15$                      ;ABORT RETURN
      026610 000713                        BR       T233$           ;REPEAT THE TESTS
      026612                      15$:
      026612                      T2365$:
```

```
  2779  026612                             ENDTST
   (3)  026612                             L10034:
   (3)  026612  104001                             EMT     C$ETST
```

```
 2781
 2782
 2783                                          .SBTTL  *TEST 8          **INCREMENTAL REVERSE SEEK HEAD 1
 2784  026614                                  BGNTST                   ;TEST 8
  (3)  026614                                                                                  T8::
 2785  026614  012737  006402  002434                  MOV     #P2T08E,ERHEAD  ;SET ERROR HEADER
 2786  026622  004737  015160                          JSR     PC,TSTINT       ;INITIALIZE TEST
 2787  026626  004737  015176                          JSR     PC,GSTATR       ;GET STATUS & CLEAR
 2788  026632  027040                                  T2465$
 2789  026634  005037  002534                          CLR     DESHD           ;SET TO HEAD 0
 2790  026640  013705  013376                          MOV     HILIMW,R5       ;SET TO POSITION HDS AT HILIMIT
 2791  026644  004737  016570                          JSR     PC,POSHDS       ;POSITION HDS
 2792  026650  027040                                  T2465$
 2793  026652  012737  000001  002534                  MOV     #1,DESHD        ;SET TO SELECT HD 1
 2794  026660  032737  010000  013372                  BIT     #HEADLM,MISWIW  ;TEST IF HEAD SPECIFIED
 2795  026666  001405                                  BEQ     2$              ;NO - SKIP
 2796  026670  005737  013400                          TST     HEADW           ;TEST IF HEAD SPECIFIED IS 0
 2797  026674  001002                                  BNE     2$              ;NO - SKIP
 2798  026676                                          EXIT    TST             ;ESLE EXIT TEST
  (3)  026676  104032                                  EMT     C$EXIT
  (3)  026700  000140                                  .WORD   L10036-.
 2799  026702                                  2$:
 2800  026702                                  BGNSUB
  (3)  026702                                                                                  T8.1:
  (3)  026702  104002                                  EMT     C$BSUB
 2801  026704  004737  021116                  T247$:  JSR     PC,GETPOS       ;GET CURRENT POSITION
 2802  026710  027030                                  60$
 2803  026712                                          INLOOP                  ;CHECK IF IN ERROR LOOP
  (3)  026712  104020                                  EMT     C$INLP
 2804  026714                                          BNCOMPLETE      5$      ;NO - SKIP
  (2)  026714  103007                                  BCC     5$
 2805  026716  023737  002526  002524                  CMP     CURCYL,NEWCYL   ;CHECK IF POSITIONED AT DESIRED LOC
 2806  026724  001003                                  BNE     5$              ;NO - SKIP
 2807  026726  004737  017454                          JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW CYLINDER
 2808  026732  000405                                  BR      7$              ;SKIP
 2809  026734  013737  002526  002524  5$:             MOV     CURCYL,NEWCYL   ;MOV CUR TO NEW
 2810  026742  005337  002524                          DEC     NEWCYL          ;DEC NEWCYL FOR 1 CYL REV SEEK
 2811  026746  004737  016070          7$:             JSR     PC,XSEEK        ;DO SEEK
 2812  026752  027030                                  60$
 2813  026754  012701  000226                          MOV     #150.,R1                ;SET WAIT FOR 15 MS
 2814  026760  004737  020650                          JSR     PC,RDYWAIT      ;WAIT FOR READY
 2815  026766  027030                                  60$
 2816  026766  004737  021244                          JSR     PC,VERPOS       ;VERIFY POSITION
 2817  026772  027030                                  60$
 2818  026774  032737  000002  013372                  BIT     #ALLSEC,MISWIW  ;TEST IF ALL SECTORS
 2819  027002  001406                                  BEQ     9$              ;NO-EXIT
 2820  027004  004737  021364                          JSR     PC,RDALHD       ;READ ALL HEADERS
 2821  027010  027030                                  60$
 2822  027012  004737  020262                          JSR     PC,VERHDR       ;VERIFY HEADER
 2823  027016  027030                                  60$
 2824  027020                                  9$:
 2825  027020  023737  013374  002524                  CMP     LOLIMW,NEWCYL   ;CHECK IF AT LOLIMIT
 2826  027026  103726                                  BLO     T247$           ;NO - LOOP
 2827  027030  012737  000002  002440  60$:            MOV     #2,ERRSWI       ;INIT ERROR SWITCH
 2828  027036                                  ENDSUB
  (3)  027036                                  L10037:
   (3)  027036  104003                       EMT     C$ESUB
  2829  027040                     T2465$:
  2830  027040                     ENDTST
   (3)  027040                     L10036:
   (3)  027040  104001                       EMT     C$ETST
```

```
                                              .SBTTL   *TEST 9            **SEEK TESTS
      027042                                  BGNTST              ;TEST 9
 (3)  027042                                                                                   T9::
      027042  012737  006424  002434                   MOV      #P2T09E,ERHEAD   ;SET ERROR HEADER
      027050  004737  015160                           JSR      PC,TSTINT        ;INITIALIZE TEST
      027054  004737  015176                           JSR      PC,GSTATR        ;CLEAR DRIVE
      027060  027334                                   T2565$
      027062  004737  017370                           JSR      PC,CHOSHD        ;GO CHOSE HEAD
      027066  013705  013374                           MOV      LOLIMW,R5        ;SET TO POSTION HEADS TO LOLIMIT
      027072  004737  016570                           JSR      PC,POSHDS        ;POSITION HDS TO LOWLIMIT
      027076  027334                                   T2565$
      027100  004737  021116                  T256$:   JSR      PC,GETPOS        ;GET CURRENT POSITION
      027104  027334                                   T2565$
      027106  013737  002526  002524                   MOV      CURCYL,NEWCYL    ;PUT CURRENT INTO NEW
      027114  012704  002304                           MOV      #T25TBL,R4       ;SET POINTER TO TABLE OF SEEK DIFF
      027120  012405                          T258$:   MOV      (R4)+,R5         ;PUT FIRST IN R5
      027122  013701  013376                           MOV      HILIMW,R1        ;GET HILIMIT
      027126  163701  013374                           SUB      LOLIMW,R1        ;SUBTRACT LOLIMIT
      027132  021401                                   CMP      (R4),R1          ;CHECK IF NEW DIFFERENCE IS IN BOUNDS
      027134  101073                                   BHI      T2517$$          ;NO - SKIP TEST
      027136  060537  002524                  T257$:   ADD      R5,NEWCYL        ;ADD TO PRESENT POSITION
      027142  023737  002524  013374                   CMP      NEWCYL,LOLIMW    ;CHECK IF AT OR PAST LOLIMIT
      027150  002004                                   BGE      9$               ;NO - SKIP
      027152  013737  013374  002524                   MOV      LOLIMW,NEWCYL    ;ELSE SET TO LOLIMIT
      027160  000407                                   BR       11$
      027162  023737  002524  013376  9$:              CMP      NEWCYL,HILIMW    ;CHECK IF AT HILIMIT OR GREATER
      027170  003403                                   BLE      11$              ;NO - SKIP
      027172  013737  013376  002524                   MOV      HILIMW,NEWCYL    ;ELSE SET FOR HILIMIT
      027200                                  11$:
      027200                                  BGNSUB
 (3)  027200                                                                                   T9.1:
 (3)  027200  104002                                   EMT      C$BSUB
      027202                                           INLOOP                    ;CHECK IF IN ERROR LOOP
 (3)  027202  104020                                   EMT      C$INLP
      027204                                           BNCOMPLETE        13$     ;NO - SKIP
 (2)  027204  103011                                   BCC      13$
      027206  004737  021116                           JSR      PC,GETPOS        ;GET CURRENT POSITION
      027212  027256                                   60$
      027214  023737  002526  002524                   CMP      CURCYL,NEWCYL    ;CHECK IF HEADS AT DESIRED POSITION
      027222  001002                                   BNE      13$              ;NO - SKIP
      027224  004737  017454                           JSR      PC,ONSWAP        ;ELSE SWAP CURRENT AND NEW CYLINDERS
      027230  004737  016070                  13$:     JSR      PC,XSEEK         ;DO SEEK
      027234  027256                                   60$
      027236  012701  005670                           MOV      #3000.,R1        ;SET WAIT COUNT
      027242  004737  020650                           JSR      PC,RDYWAIT       ;WAIT FOR READY
      027246  027256                                   60$
      027250  004737  021244                           JSR      PC,VERPOS        ;VERIFY POSITION
      027254  027256                                   60$
      027256  012737  000002  002440  60$:             MOV      #2,ERRSWI        ;INITIALIZE ERROR SWITCH
      027264                                  ENDSUB
 (3)  027264                                  L10041:
 (3)  027264  104003                                   EMT      C$ESUB
      027266                                           ESCAPE   TST              ;EXIT TEST IF ERROR
 (3)  027266  104010                                   EMT      C$ESCAPE
 (3)  027270  000044                                   .WORD    L10040-.
      027272  023737  013376  002524                   CMP      HILIMW,NEWCYL    ;CHECK IF SEEK WAS TO HILIMIT
```

```
       027300  001002                             BNE     15$                ;NO - SKIP
       027302  005405                             NEG     R5                 ;ELSE SET R5 TO REPEAT DIFF IN REVERSE
       027304  000714                             BR      T257$
       027306  023737  013374  002524   15$:      CMP     LOLIMW,NEWCYL      ;TEST IF LAST SEEK WAS TO LOLIMIT
       027314  001310                             BNE     T257$              ;NO - GO DO SEEK TEST
       027316  021427  000377                     CMP     (R4),#255.         ;CHECK IF ALL TABLE DIFF USED
       027322  001276                             BNE     T258$              ;NO - SKIP
       027324  004737  017414           T2517$:   JSR     PC,SWAPHD          ;GO SWAP TO HEAD 1 OR END TEST
       027330  027334                             T2565$                     ;ABORT RETURN
       027332  000662                             BR      T256$              ;REPEAT TEST HEAD 1
       027334                           T2565$:
       027334                           ENDTST
  (3)  027334                           L10040:
  (3)  027334  104001                             EMT     C$ETST
```

```
 2892                                           .SBTTL  *TEST 10          **FORWARD OSCILLATING SEEK
 2893  027336                                   BGNTST           ;TEST 10
  (3)  027336                                                                                    T10::
 2894  027336  012737  006431  002434                  MOV     #P2T10E,ERHEAD  ;SET ERROR HEADER
 2895  027344  004737  015160                          JSR     PC,TSTINT       ;INITIALIZE TEST
 2896  027350  004737  015176                          JSR     PC,GSTATR       ;CLEAR DRIVE
 2897  027354  027632                                  T2665$
 2898  027356  004737  017370                          JSR     PC,CHOSHD       ;GO CHOSE HEAD
 2899  027362  012705  000001                  T266$:  MOV     #1,R5           ;LOAD R5 FOR FIRST SEEK
 2900  027366  032737  020000  013372                  BIT     #HICYL,MISWIW   ;TEST IF HI CYLINDER SPECED
 2901  027374  001402                                  BEQ     2$              ;NO - SKIP
 2902  027376  013705  013376                          MOV     HILIMW,R5       ;ELSE SET UPPER LIMIT
 2903  027402  005037  002524                  2$:     CLR     NEWCYL          ;SET TO SEEK TO CYL 0
 2904  027406  032737  040000  013372                  BIT     #LOCYL,MISWIW   ;CHECK IF LO CYL SPEC'D
 2905  027414  001403                                  BEQ     5$              ;NO - SKIP
 2906  027416  013737  013374  002524                  MOV     LOLIMW,NEWCYL   ;ELSE SET LOWER LIMIT
 2907  027424  004737  016070                  5$:     JSR     PC,XSEEK        ;DO SEEK
 2908  027430  027632                                  T2665$
 2909  027432  012701  005670                          MOV     #3000.,R1       ;SET WAIT COUNT FOR 120 MS
 2910  027436  004737  020650                          JSR     PC,RDYWAIT      ;WAIT FOR READY
 2911  027442  027632                                  T2665$
 2912  027444  004737  021116                  T267$:  JSR     PC,GETPOS       ;GET HEAD POSITION
 2913  027450  027632                                  T2665$
 2914  027452  010537  002524                          MOV     R5,NEWCYL       ;LOAD NEW CYLINDER INTO NEWCYL
 2915  027456                                  BGNSUB
  (3)  027456                                                                                    T10.1:
  (3)  027456  104002                                  EMT     C$BSUB
 2916  027460                                          INLOOP                  ;CHECK IF IN ERROR LOOP
  (3)  027460  104020                                  EMT     C$INLP
 2917  027462                                          BNCOMPLETE      18$     ;NO - SKIP
  (2)  027462  103011                                  BCC     18$
 2918  027464  004737  021116                          JSR     PC,GETPOS       ;GET POSITION
 2919  027470  027566                                  60$
 2920  027472  023737  002526  002524                  CMP     CURCYL,NEWCYL   ;CHECK IF HEADS AT DESIRED LOC
 2921  027500  001002                                  BNE     18$             ;NO - SKIP
 2922  027502  004737  017454                          JSR     PC,ONSWAP               ;SWAP OLD AND NEW
 2923  027506  004737  016070                  18$:    JSR     PC,XSEEK        ;DO SEEK
 2924  027512  027566                                  60$
 2925  027514  012701  005670                          MOV     #3000.,R1       ;SET WAIT COUNT 120 MS
 2926  027520  004737  020650                          JSR     PC,RDYWAIT      ;WAIT FOR READY
 2927  027524  027566                                  60$
 2928  027526  004737  021244                          JSR     PC,VERPOS       ;VERIFY HEAD POSITION
 2929  027532  027566                                  60$
 2930  027534  005737  002532                          TST     DESSGN          ;TEST IF JUST SEEK REV
 2931  027540  001412                                  BEQ     60$             ;YES - SKIP
 2932  027542  005037  002524                          CLR     NEWCYL          ;ELSE SET TO SEEK TO 0
 2933  027546  032737  040000  013372                  BIT     #LOCYL,MISWIW   ;CHECK IF LO LIMIT SPEC'D
 2934  027554  001754                                  BEQ     18$             ;NO - SKIP
 2935  027556  013737  013374  002524                  MOV     LOLIMW,NEWCYL   ;ELSE SET LOW LIMIT FOR SEEK
 2936  027564  000750                                  BR      18$
 2937  027566  012737  000002  002440          60$:    MOV     #2,ERRSWI       ;INIT ERROR SWITCH
 2938  027574                                  ENDSUB
  (3)  027574                                  L10043:
  (3)  027574  104003                                  EMT     C$ESUB
 2939  027576                                          ESCAPE  TST             ;EXIT TEST IF ERROR
  (3)  027576  104010                                  EMT     C$ESCAPE
 (3)  027600  000032                          .WORD   L10042-.
      027602  032737  020000  013372          BIT     #HICYL,MISWIW    ;TEST IF UPPER LIMIT SPEC'D
      027610  001004                          BNE     20$              ;YES - SKIP
      027612  005205                          INC     R5               ;BUMP R5
      027614  020527  000400                  CMP     R5,#256.         ;ALL CYLINDERS DONE
      027620  001311                          BNE     T267$            ;NO - GO DO NEXT CYLINDER
      027622  004737  017414          20$:    JSR     PC,SWAPHD        ;GO SWAP TO HEAD 1 OR END TEST
      027626  027632                          T2665$                   ;ABORT RETURN
      027630  000654                          BR      T266$            ;GO DO TESTS
      027632                          T2665$:
      027632                          ENDTST
 (3)  027632                          L10042:
 (3)  027632  104001                          EMT     C$ETST
 2951                                                  .SBTTL  *TEST 11          **REVERSE OSCILLATING SEEK
 2952  027634                                          BGNTST                    ;TEST 11
  (3)  027634                                                                                              T11::
 2953  027634  012737  006446  002434                          MOV     #P2T11E,ERHEAD  ;SET ERROR HEADER
 2954  027642  004737  015160                                  JSR     PC,TSTINT       ;INITIALIZE TEST
 2955  027646  004737  015176                                  JSR     PC,GSTATR       ;CLEAR DRIVE
 2956  027652  030130                                          T2765$
 2957  027654  004737  017370                                  JSR     PC,CHOSHD       ;GO CHOSE HEAD
 2958  027660  012737  000377  002524  T275$:  MOV     #255.,NEWCYL    ;SEEK OUT TO 255.
 2959  027666  032737  020000  013372          BIT     #HICYL,MISWIW   ;TEST IF UPPER LIMIT SPEC'D
 2960  027674  001403                                  BEQ     2$              ;NO - SKIP
 2961  027676  013737  013376  002524          MOV     HILIMW,NEWCYL   ;ELSE SET UPPER LIMIT
 2962  027704  012705  000376          2$:     MOV     #254.,R5        ;SET R5 FOR FIRST SEEKS
 2963  027710  032737  040000  013372          BIT     #LOCYL,MISWIW   ;CHECK IF LO LIMIT SPEC'D
 2964  027716  001402                                  BEQ     5$              ;NO - SKIP
 2965  027720  013705  013374                          MOV     LOLIMW,R5       ;SET LOWER LIMIT
 2966  027724  004737  016070          5$:     JSR     PC,XSEEK        ;DO SEEK
 2967  027730  030130                                  T2765$
 2968  027732  012701  005670                          MOV     #3000.,R1       ;SET WAIT TO 120 MS
 2969  027736  004737  020650                          JSR     PC,RDYWAIT      ;WAIT FOR DRIVE READY
 2970  027742  030130                                  T2765$
 2971  027744  004737  021116          T276$:  JSR     PC,GETPOS       ;GET POSITION
 2972  027750  030130                                  T2765$
 2973  027752  010537  002524                          MOV     R5,NEWCYL       ;SET FOR NEXT SEEK
 2974  027756                                  BGNSUB
  (3)  027756                                                                                      T11.1:
  (3)  027756  104002                                  EMT     C$BSUB
 2975  027760                                          INLOOP                  ;CHECK IF IN ERROR LOOP
  (3)  027760  104020                                  EMT     C$INLP
 2976  027762                                          BNCOMPLETE      18$     ;NO - SKIP
  (2)  027762  103011                                  BCC     18$
 2977  027764  004737  021116                          JSR     PC,GETPOS       ;ELSE GET POSITION
 2978  027770  030070                                  60$
 2979  027772  023737  002526  002524          CMP     CURCYL,NEWCYL   ;CHECK IF AT DESIRED CYL
 2980  030000  001002                                  BNE     18$             ;NO - SKIP
 2981  030002  004737  017454                          JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW CYL
 2982  030006  004737  016070          18$:    JSR     PC,XSEEK        ;DO SEEK
 2983  030012  030070                                  60$
 2984  030014  012701  005670                          MOV     #3000.,R1       ;SET WAIT FOR 120 MS
 2985  030020  004737  020650                          JSR     PC,RDYWAIT      ;WAIT FOR READY
 2986  030024  030070                                  60$
 2987  030026  004737  021244                          JSR     PC,VERPOS       ;VERIFY POSITION
 2988  030032  030070                                  60$
 2989  030034  005737  002532                          TST     DESSGN          ;CHECK IF JUST SEEK FWD
 2990  030040  001013                                  BNE     60$             ;YES - SKIP
 2991  030042  012737  000377  002524          MOV     #255.,NEWCYL    ;ELSE SEEK TO TO 255
 2992  030050  032737  020000  013372          BIT     #HICYL,MISWIW   ;TEST IF HILIMIT SPEC'D
 2993  030056  001753                                  BEQ     18$             ;NO - SKIP
 2994  030060  013737  013376  002524          MOV     HILIMW,NEWCYL   ;SET TO UPPER LIMIT
 2995  030066  000747                                  BR      18$
 2996  030070  012737  000002  002440  60$:    MOV     #2,ERRSWI       ;INIT ERROR SWITCH
 2997  030076                                  ENDSUB
  (3)  030076                                  L10045:
  (3)  030076  104003                                  EMT     C$ESUB
 2998  030100                                          ESCAPE  TST             ;EXIT TEST IF ERROR
  (3)  030100  104010                                  EMT     C$ESCAPE
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   (3)  030102  000026                           .WORD    L10044-.
  2999  030104  032737  040000  013372           BIT      #LOCYL,MISWIW    ;TEST IF LOLIMIT SPEC'D
  3000  030112  001002                           BNE      20$              ;YES - SKIP
  3001  030114  005305                           DEC      R5               ;DEC CYLINDER COUNT
  3002  030116  100312                           BPL      T276$            ;IF STILL POSITIVE, DO SEEKS AGAIN
  3003  030120  004737  017414          20$:     JSR      PC,SWAPHD        ;GO SWAP TO HEAD 1 OR END TEST
  3004  030124  030130                           T2765$                    ;ABORT RETURN
  3005  030126  000654                           BR       T275$            ;LOOP AGAIN
  3006  030130                          T2765$:
  3007  030130                          ENDTST
   (3)  030130                          L10044:
   (3)  030130  104001                           EMT      C$ETST
  3009                                            .SBTTL  *TEST 12          **SEEK TIMING
  3010  030132                                    BGNTST                    ;TEST 12
   (3)  030132                                                                                    T12::
  3011  030132  012737  006463  002434                  MOV     #P2T12E,ERHEAD  ;SET ERROR HEADER
  3012  030140  005737  003062                          TST     PASNUM          ;TEST IF PASS 0
  3013  030144  001003                                  BNE     2$              ;NO - SKIP
  3014  030146  005737  013372                          TST     MISWIW          ;TEST IF MANUAL TESTS WERE RUN
  3015  030152  100402                                  BMI     1$              ;YES - SKIP
  3016  030154  000137  031676                  2$:     JMP     65$             ;ELSE EXIT TEST
  3017  030160  004737  015160                  1$:     JSR     PC,TSTINT       ;INITIALIZE TEST
  3018  030164  004737  015176                          JSR     PC,GSTATR       ;CLEAR DRIVE
  3019  030170  031676                                  65$
  3020  030172  012700  002562                          MOV     #OFIN,R0        ;GET ADDRESS OF 1ST TIME VALUE
  3021  030176  012701  000030                          MOV     #24.,R1         ;SET COUNT FOR CLEAR
  3022  030202  005020                          4$:     CLR     (R0)+           ;CLEAR TIMER STORAGE
  3023  030204  005301                                  DEC     R1
  3024  030206  001375                                  BNE     4$
  3025  030210  005037  002654                          CLR     PASCNT          ;CLEAR PASS COUNTER
  3026  030214  005037  002524                          CLR     NEWCYL          ;POSITION HEADS AT 0
  3027  030220  004737  016070                          JSR     PC,XSEEK        ;DO SEEK
  3028  030224  031676                                  65$
  3029  030226  012701  005670                          MOV     #3000.,R1       ;SET WAIT FOR 300 MS
  3030  030232  004737  020650                          JSR     PC,RDYWAIT      ;WAIT FOR READY
  3031  030236  031676                                  65$
  3032  030240  004737  021244                          JSR     PC,VERPOS       ;VERIFY POSITION
  3033  030244  031676                                  65$
  3034  030246  004737  017370                          JSR     PC,CHOSHD       ;GO CHOSE HEAD
  3035  030252  012700  002572                          MOV     #OFOUT,R0       ;SET PTRS FOR 1 CYL FWD OUTER TIMER
  3036  030256  012701  002574                          MOV     #OFOUTU,R1
  3037  030262  012703  002606                          MOV     #OROUT,R3
  3038  030266  012704  002610                          MOV     #OROUTU,R4
  3039  030272  012737  000001  002524                  MOV     #1,NEWCYL       ;SET NEWCYL TO CYL 1
  3040  030300  012737  000200  002656          8$:     MOV     #128.,COUNT     ;SET COUNTER FOR SEEK LOOP
  3041  030306  012737  000110  002560                  MOV     #RDHEAD,TEMP8   ;BUILD READ HEADER COMMAND
  3042  030314  053737  002454  002560                  BIS     RLDRV,TEMP8
  3043  030322  042737  002000  002560                  BIC     #BIT10,TEMP8
  3044  030330  004737  016060                  9$:     JSR     PC,XSEEKT       ;DO SEEK BUILD BUT DO NOT START
  3045  030334  031676                                  65$
  3046  030336  013762  002462  000004                  MOV     L.DA,RLDA(R2)   ;LOAD RL REGISTERS
  3047  030344  013762  002456  000000                  MOV     L.CS,RLCS(R2)
  3048  030352  010046                                  MOV     R0,-(SP)        ;STORE R0
  3049  030354                                          WAITUS  #10.            ;WAIT FOR INTERRUPT
   (3)  030354  012700  000012                          MOV     #10.,R0
   (3)  030360  104027                                  EMT     C$WTU
  3050  030362  005737  002430                          TST     DONE            ;TEST IF INTERRUPT
  3051  030366  001010                                  BNE     17$             ;YES - SKIP
  3052  030370  004737  015026                          JSR     PC,WAITIN       ;WAIT FOR INTERRUPT
  3053  030374  012603                                  MOV     (SP)+,R3        ;GET MESSAGE POINTER
  3054  030376                                          ERRHRD  1201.,,ERR1
   (3)  030376  104443                                  TRAP    T$ERCODE
   (5)  030400  002261                                  .WORD   1201
   (5)  030402  011554                                  .WORD   ERR1
  3055  030404  000137  031676                          JMP     65$
  3056  030410  005737  002466                  17$:    TST     T.CS            ;CHECK IF ANY ERRORS
  3057  030414  100005                                  BPL     14$             ;NO - SKIP
  3058  030416                                          ERRHRD  1202.,,ERR6
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     (3)  030416  104443                          TRAP    T$ERCODE
     (5)  030420  002262                          .WORD   1202
     (5)  030422  012056                          .WORD   ERR6
    3059  030424  000137  031676                  JMP     65$
    3060  030430  005037  002430          14$:    CLR     DONE             ;CLEAR INTERRUPT FLAG
    3061  030434  013762  002560  000000          MOV     TEMP8,RLCS(R2)   ;LOAD RL REGISTER
    3062  030442                                  WAITUS  #2000.           ;WAIT FOR INTERRUPT
     (3)  030442  012700  003720                  MOV     #2000.,R0
     (3)  030446  104027                          EMT     C$WTU
    3063  030450                                  GETTIM  R5               ;GET TIME USED
     (3)  030450  104052                          EMT     C$GTIM
     (3)  030452  010005                          MOV     R0,R5
    3064  030454  012600                          MOV     (SP)+,R0         ;RESTORE R0
    3065  030456  013737  002560  002456          MOV     TEMP8,L.CS       ;SET IF ERROR TO REPORT
    3066  030464  004737  021244                  JSR     PC,VERPOS        ;VERIFY POSITION
    3067  030470  031676                          65$
    3068  030472  005737  002532                  TST     DESSGN           ;CHECK WHICH SEEK DIRECTION
    3069  030476  001403                          BEQ     15$              ;REVERSE - SKIP
    3070  030500  060510                          ADD     R5,(R0)          ;ADD TO FORWARD TOTAL
    3071  030502  005511                          ADC     (R1)             ;ADD IN OVERFLOW
    3072  030504  000402                          BR      16$              ;SKIP
    3073  030506  060513                  15$:    ADD     R5,(R3)          ;ADD TO REVERSE TOTAL
    3074  030510  005514                          ADC     (R4)             ;ADD IN OVERFLOW
    3075  030512  005337  002656          16$:    DEC     COUNT            ;DEC SEEK COUNT
    3076  030516  001403                          BEQ     18$              ;SKIP IF 0
    3077  030520  004737  017454                  JSR     PC,ONSWAP        ;ELSE SWAP OLD AND NEW CYL
    3078  030524  000701                          BR      9$               ;REDO SEEK LOOP
    3079  030526  162710  000470          18$:    SUB     #312.,(R0)       ;SUB CONSTANT FOR READ HEADER TIME
    3080  030532  162713  000470                  SUB     #312.,(R3)
    3081  030536  012705  000006                  MOV     #6,R5            ;SET SHIFT COUNT TO DIVIDE BY 64
    3082  030542  000241                  10$:    CLC                      ;DIVIDE BOTH TOTALS BY 64
    3083  030544  006011                          ROR     (R1)
    3084  030546  006010                          ROR     (R0)
    3085  030550  000241                          CLC
    3086  030552  006014                          ROR     (R4)
    3087  030554  006013                          ROR     (R3)
    3088  030556  005305                          DEC     R5
    3089  030560  001370                          BNE     10$
    3090  030562  005237  002654                  INC     PASCNT           ;BUMP PASS COUNT
    3091  030566  022737  000001  002654          CMP     #1,PASCNT        ;TEST IF PASS 1
    3092  030574  001033                          BNE     24$              ;NO - SKIP
    3093  030576  012737  000177  002524          MOV     #127.,NEWCYL     ;ELSE SET TO POSITION HDS TO 127
    3094  030604  004737  016070                  JSR     PC,XSEEK         ;DO SEEK
    3095  030610  031676                          65$
    3096  030612  012701  005670                  MOV     #3000.,R1        ;SET WAIT COUNT FOR 300 MS
    3097  030616  004737  020650                  JSR     PC,RDYWAIT       ;WAIT FOR READY
    3098  030622  031676                          65$
    3099  030624  004737  021244                  JSR     PC,VERPOS        ;VERIFY POSITION
    3100  030630  031676                          65$
    3101  030632  012700  002566                  MOV     #OFMID,R0        ;SET PTRS FOR TIMING 1 CYL SK AT 127
    3102  030636  012701  002570                  MOV     #OFMIDU,R1
    3103  030642  012703  002602                  MOV     #ORMID,R3
    3104  030646  012704  002604                  MOV     #ORMIDU,R4
    3105  030652  012737  000200  002524          MOV     #128.,NEWCYL     ;SET NEWCYL TO 128
    3106  030660  000137  030300                  JMP     8$               ;DO SEEK LOOP
    3107  030664  022737  000002  002654  24$:    CMP     #2,PASCNT        ;TEST IF PASS 2
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030672  001033                          BNE     28$             ;NO - SKIP
030674  012737  000376  002524          MOV     #254.,NEWCYL    ;SET UP TO TIME 1 CYL SEEK AT INNER
030702  004737  016070                  JSR     PC,XSEEK        ;  LIMIT
030706  031676                          65$
030710  012701  005670                  MOV     #3000.,R1       ;SET WAIT COUNT FOR 300 MS
030714  004737  020650                  JSR     PC,RDYWAIT      ;WAIT FOR READY
030720  031676                          65$
030722  004737  021244                  JSR     PC,VERPOS       ;VERIFY POSITION
030726  031676                          65$
030730  012700  002562                  MOV     #OFIN,R0        ;SET POINTERS
030734  012701  002564                  MOV     #OFINU,R1
030740  012703  002576                  MOV     #ORIN,R3
030744  012704  002600                  MOV     #ORINU,R4
030750  012737  000377  002524          MOV     #255.,NEWCYL    ;LOAD NEW CYLINDER
030756  000137  030300                  JMP     8$              ;DO SEEK LOOP
030762  022737  000003  002654  28$:    CMP     #3,PASCNT       ;TEST IF PASS 3
030770  001031                          BNE     32$             ;NO - SKIP
030772  005037  002524                  CLR     NEWCYL          ;ELSE SET UP TO TIME 128 CYL SEEK
030776  004737  016070                  JSR     PC,XSEEK        ;  AT OUTER LIMIT
031002  031676                          65$
031004  012701  005670                  MOV     #3000.,R1       ;SET WAIT COUNT FOR 300 MS
031010  004737  020650                  JSR     PC,RDYWAIT      ;WAIT FOR DRIVE READY
031014  031676                          65$
031016  004737  021244                  JSR     PC,VERPOS       ;VERIFY POSITION
031022  031676                          65$
031024  012700  002616                  MOV     #HFOUT,R0       ;SET POINTERS
031030  012701  002620                  MOV     #HFOUTU,R1
031034  012703  002626                  MOV     #HROUT,R3
031040  012704  002620                  MOV     #HFOUTU,R4
031044  012737  000177  002524          MOV     #127.,NEWCYL    ;LOAD NEWCYL FOR 128 CYL SEEK
031052  000472                          BR      39$
031054  022737  000004  002654  32$:    CMP     #4,PASCNT       ;TEST IF PASS 4
031062  001032                          BNE     36$             ;NO - SKIP
031064  012737  000200  002524          MOV     #128.,NEWCYL    ;ELSE SET UP TO TIME 128 CYL SEEK
031072  004737  016070                  JSR     PC,XSEEK        ; AT INNER LIMIT
031076  031676                          65$
031100  012701  005670                  MOV     #3000.,R1       ;SET WAIT COUNT FOR 300 MS
031104  004737  020650                  JSR     PC,RDYWAIT      ;WAIT FOR READY
031110  031676                          65$
031112  004737  021244                  JSR     PC,VERPOS       ;VERIFY POSITION
031116  031676                          65$
031120  012700  002612                  MOV     #HFIN,R0        ;SET POINTERS
031124  012701  002614                  MOV     #HFINU,R1
031130  012703  002622                  MOV     #HRIN,R3
031134  012704  002624                  MOV     #HRINU,R4
031140  012737  000377  002524          MOV     #255.,NEWCYL    ;SET NEWCYL TO 255 FOR 128 CYL SEEK
031146  000434                          BR      39$             ;DO TIMING LOOP
031150  022737  000005  002654  36$:    CMP     #5,PASCNT       ;TEST IF PASS 5
031156  001032                          BNE     40$             ;NO - SKIP
031160  005037  002524                  CLR     NEWCYL          ;ELSE SET UP TO TIME 256 CYL SEEK
031164  004737  016070                  JSR     PC,XSEEK        ;  OVER ALL SURFACE
031170  031676                          65$
031172  012701  005670                  MOV     #3000.,R1       ;SET WAIT COUNT FOR 300 MS
031176  004737  020650                  JSR     PC,RDYWAIT      ;WAIT FOR DRIVE READY
031202  031676                          65$
031204  004737  021244                  JSR     PC,VERPOS       ;VERIFY POSITION
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 3164   031210  031676                             65$
 3165   031212  012700  002632                     MOV     #AFMID,R0         ;SET POINTERS
 3166   031216  012701  002634                     MOV     #AFMIDU,R1
 3167   031222  012703  002636                     MOV     #ARMID,R3
 3168   031226  012704  002640                     MOV     #ARMIDU,R4
 3169   031232  012737  000377  002524             MOV     #255.,NEWCYL      ;SET NEWCYL
 3170   031240  000137  030300          39$:       JMP     8$
 3171   031244                          40$:       PRINTF  #FMT1.1,#SKTMES,#VALDES
   (9)  031244  012746  006757                     MOV     #VALDES,-(SP)
   (8)  031250  012746  006714                     MOV     #SKTMES,-(SP)
   (7)  031254  012746  010631                     MOV     #FMT1.1,-(SP)
   (6)  031260  012746  000003                     MOV     #3,-(SP)
   (3)  031264  010600                             MOV     SP,R0
   (4)  031266  104017                             EMT     C$PNTF
   (4)  031270  062706  000010                     ADD     #10,SP
 3172   031274                                     PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
  (11)  031274  005046                             CLR     -(SP)
  (11)  031276  153716  002455                     BISB    RLDRV+1,(SP)
  (10)  031302  012746  005633                     MOV     #DRVNAM,-(SP)
   (9)  031306  013746  002450                     MOV     RLBAS,-(SP)
   (8)  031312  012746  005622                     MOV     #BASADD,-(SP)
   (7)  031316  012746  010657                     MOV     #FMT5,-(SP)
   (6)  031322  012746  000005                     MOV     #5,-(SP)
   (3)  031326  010600                             MOV     SP,R0
   (4)  031330  104017                             EMT     C$PNTF
   (4)  031332  062706  000014                     ADD     #14,SP
 3173   031336                                     PRINTF  #FMT18,#LABIN,#LABMID,#LABOUT,#LABEXP
  (11)  031336  012746  007051                     MOV     #LABEXP,-(SP)
  (10)  031342  012746  007043                     MOV     #LABOUT,-(SP)
   (9)  031346  012746  007034                     MOV     #LABMID,-(SP)
   (8)  031352  012746  007026                     MOV     #LABIN,-(SP)
   (7)  031356  012746  011251                     MOV     #FMT18,-(SP)
   (6)  031362  012746  000005                     MOV     #5,-(SP)
   (3)  031366  010600                             MOV     SP,R0
   (4)  031370  104017                             EMT     C$PNTF
   (4)  031372  062706  000014                     ADD     #14,SP
 3174   031376                                     PRINTF  #FMT19,#LABOCF,OFIN,OFMID,OFOUT,EXOCYL
  (12)  031376  013746  002642                     MOV     EXOCYL,-(SP)
  (11)  031402  013746  002572                     MOV     OFOUT,-(SP)
  (10)  031406  013746  002566                     MOV     OFMID,-(SP)
   (9)  031412  013746  002562                     MOV     OFIN,-(SP)
   (8)  031416  012746  007062                     MOV     #LABOCF,-(SP)
   (7)  031422  012746  011303                     MOV     #FMT19,-(SP)
   (6)  031426  012746  000006                     MOV     #6,-(SP)
   (3)  031432  010600                             MOV     SP,R0
   (4)  031434  104017                             EMT     C$PNTF
   (4)  031436  062706  000016                     ADD     #16,SP
 3175   031442                                     PRINTF  #FMT19,#LABOCR,ORIN,ORMID,OROUT,EXOCYL
  (12)  031442  013746  002642                     MOV     EXOCYL,-(SP)
  (11)  031446  013746  002606                     MOV     OROUT,-(SP)
  (10)  031452  013746  002602                     MOV     ORMID,-(SP)
   (9)  031456  013746  002576                     MOV     ORIN,-(SP)
   (8)  031462  012746  007076                     MOV     #LABOCR,-(SP)
   (7)  031466  012746  011303                     MOV     #FMT19,-(SP)
   (6)  031472  012746  000006                     MOV     #6,-(SP)
   (3)  031476  010600                             MOV     SP,R0
   (4)  031500  104017                               EMT     C$PNTF
   (4)  031502  062706  000016                       ADD     #16,SP
  3176  031506                                       PRINTF  #FMT20,#LABHCF,HFIN,HFOUT,EXHCYL
  (11)  031506  013746  002644                       MOV     EXHCYL,-(SP)
  (10)  031512  013746  002616                       MOV     HFOUT,-(SP)
   (9)  031516  013746  002612                       MOV     HFIN,-(SP)
   (8)  031522  012746  007112                       MOV     #LABHCF,-(SP)
   (7)  031526  012746  011340                       MOV     #FMT20,-(SP)
   (6)  031532  012746  000005                       MOV     #5,-(SP)
   (3)  031536  010600                               MOV     SP,R0
   (4)  031540  104017                               EMT     C$PNTF
   (4)  031542  062706  000014                       ADD     #14,SP
  3177  031546                                       PRINTF  #FMT20,#LABHCR,HRIN,HROUT,EXHCYL
  (11)  031546  013746  002644                       MOV     EXHCYL,-(SP)
  (10)  031552  013746  002626                       MOV     HROUT,-(SP)
   (9)  031556  013746  002622                       MOV     HRIN,-(SP)
   (8)  031562  012746  007126                       MOV     #LABHCR,-(SP)
   (7)  031566  012746  011340                       MOV     #FMT20,-(SP)
   (6)  031572  012746  000005                       MOV     #5,-(SP)
   (3)  031576  010600                               MOV     SP,R0
   (4)  031600  104017                               EMT     C$PNTF
   (4)  031602  062706  000014                       ADD     #14,SP
  3178  031606                                       PRINTF  #FMT21,#LABACF,AFMID,EXACYL
  (10)  031606  013746  002646                       MOV     EXACYL,-(SP)
   (9)  031612  013746  002632                       MOV     AFMID,-(SP)
   (8)  031616  012746  007142                       MOV     #LABACF,-(SP)
   (7)  031622  012746  011370                       MOV     #FMT21,-(SP)
   (6)  031626  012746  000004                       MOV     #4,-(SP)
   (3)  031632  010600                               MOV     SP,R0
   (4)  031634  104017                               EMT     C$PNTF
   (4)  031636  062706  000012                       ADD     #12,SP
  3179  031642                                       PRINTF  #FMT21,#LABACR,ARMID,EXACYL
  (10)  031642  013746  002646                       MOV     EXACYL,-(SP)
   (9)  031646  013746  002636                       MOV     ARMID,-(SP)
   (8)  031652  012746  007156                       MOV     #LABACR,-(SP)
   (7)  031656  012746  011370                       MOV     #FMT21,-(SP)
   (6)  031662  012746  000004                       MOV     #4,-(SP)
   (3)  031666  010600                               MOV     SP,R0
   (4)  031670  104017                               EMT     C$PNTF
   (4)  031672  062706  000012                       ADD     #12,SP
  3180  031676                               65$:
  3181  031676                               ENDTST
   (3)  031676                               L10046:
   (3)  031676  104001                               EMT     C$ETST
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 3183                                        .SBTTL  *TEST 13          **BASIC READ DATA (BAD SECTOR FILE)
 3184  031700                                BGNTST                  ;TEST 13
  (3)  031700                                                                                   T13::
 3185  031700  012737  006477  002434                 MOV     #P2T13E,ERHEAD  ;SET ERROR HEADER
 3186  031706  004737  015160                         JSR     PC,TSTINT       ;INITIALIZE TEST
 3187  031712  004737  015176                         JSR     PC,GSTATR       ;CLEAR DRIVE
 3188  031716  032360                                 65$
 3189  031720  012737  000001  002534                 MOV     #1,DESHD        ;SET TO HEAD 1
 3190  031726  032737  010000  013372                 BIT     #HEADLM,MISWIW  ;TEST IF HEAD SPEC'D
 3191  031734  001405                                 BEQ     2$              ;NO - SKIP
 3192  031736  005737  013400                         TST     HEADW           ;TEST IF HEAD 0
 3193  031742  001002                                 BNE     2$              ;NO - SKIP
 3194  031744                                         EXIT    TST             ;ELSE EXIT TEST
  (3)  031744  104032                                 EMT     C$EXIT
  (3)  031746  000440                                 .WORD   L10047-.
 3195  031750  012737  000377  002524  2$:            MOV     #255.,NEWCYL    ;POSITION HEADS AT 255
 3196  031756  004737  016070                         JSR     PC,XSEEK        ;DO SEEK
 3197  031762  032360                                 65$
 3198  031764  012701  005670                         MOV     #3000.,R1       ;SET WAIT COUNT FOR 300 MS
 3199  031770  004737  020650                         JSR     PC,RDYWAIT      ;WAIT FOR INTERRUPT
 3200  031774  032360                                 65$
 3201  031776  004737  021244                         JSR     PC,VERPOS       ;VERIFY POSITION
 3202  032002  032360                                 65$
 3203  032004  005037  002536                         CLR     DESSEC          ;SET FOR SECTOR 0
 3204  032010  012737  003272  002552                 MOV     #FBSFIL,TEMP5   ;SET TEMP STORAGE FOR FACTORY BS FILE
 3205  032016  012737  000020  002554                 MOV     #16.,TEMP6      ;SET MAX SECTOR COUNT
 3206  032024  112737  000001  003067                 MOVB    #1,NOERCT       ;SET FOR NO ERROR COUNTING
 3207  032032  105037  003066                         CLRB    LOCERR          ;CLEAR LOCAL ERROR COUNTER
 3208  032036  005037  002546          4$:            CLR     TEMP3           ;CLEAR ONES DETECTED FLAG
 3209  032042  013701  002552                         MOV     TEMP5,R1        ;INIT POINTERS
 3210  032046  013700  002554                         MOV     TEMP6,R0
 3211  032052  012703  003466                         MOV     #IBUFF,R3
 3212  032056  012737  000002  002440                 MOV     #2,ERRSWI       ;INIT ERROR SWITCH
 3213  032064  004737  022414                         JSR     PC,XREAD        ;DO READ
 3214  032070  032242                                 39$
 3215  032072  005723                                 TST     (R3)+           ;TEST IF WORD 0 NOT NEG
 3216  032074  100515                                 BMI     45$             ;YES, BAD FMT ERROR
 3217  032076  005723                                 TST     (R3)+           ;ELSE TEST WORD 1 NOT NEG
 3218  032100  100513                                 BMI     45$             ;YES - BAD FMT ERROR REPORT
 3219  032102  005723                  7$:            TST     (R3)+           ;TEST WORD 2 IS 0
 3220  032104  001111                                 BNE     45$             ;NO - SKIP TO FMT ERROR RPT
 3221  032106  005723                                 TST     (R3)+           ;TEST WORD 3 IS 0
 3222  032110  001107                                 BNE     45$             ;NO - SKIP TO FMT ERROR RPT
 3223  032112  021327  177777          8$:            CMP     (R3),#-1        ;TEST IF NEXT WORD IS ALL 1'S
 3224  032116  001004                                 BNE     10$             ;NO  - SKIP
 3225  032120  012737  000001  002546                 MOV     #1,TEMP3        ;ELSE SET 1'S DETECTED FLAG
 3226  032126  000403                                 BR      11$             ;SKIP
 3227  032130  005737  002546          10$:           TST     TEMP3           ;TEST IF ONES HAVE BEEN DETECTED
 3228  032134  001075                                 BNE     45$             ;YES - SKIP TO FMT ERROR RPT
 3229  032136  012311                  11$:           MOV     (R3)+,(R1)      ;STORE CYLINDER WORD
 3230  032140  012705  000007                         MOV     #7,R5           ;ALIGN IT TO LOOK LIKE HEADER
 3231  032144  006311                  12$:           ASL     (R1)
 3232  032146  005305                                 DEC     R5
 3233  032150  001375                                 BNE     12$
 3234  032152  032713  000400                         BIT     #BIT8,(R3)      ;TEST IF HEAD 1
 3235  032156  001402                                 BEQ     15$             ;NO - SKIP
```

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  3236  032160  052711  000100                   BIS     #BIT6,(R1)          ;INSERT HEAD BIT
  3237  032164  042713  177400          15$:     BIC     #177400,(R3)        ;CLEAR ALL BUT SECTOR
  3238  032170  052321                           BIS     (R3)+,(R1)+         ;INSERT SECTOR NUMBER
  3239  032172  020327  004066                   CMP     R3,#IBUFF+256.      ;CHECK IF IBUFF EMPTY
  3240  032176  001345                           BNE     8$                  ;NO GET NEXT CYLINDER
  3241  032200  005737  002546                   TST     TEMP3               ;ELSE TEST IF 1'S DETECTED
  3242  032204  001457                           BEQ     48$                 ;TO MANY ERRORS - REPORT
  3243  032206  022737  000044  002554           CMP     #36.,TEMP6          ;CHECK IF SOFTWARE BAD READ
  3244  032214  001461                           BEQ     65$                 ;YES - SKIP
  3245  032216  012737  003076  002552  37$:     MOV     #SBSFIL,TEMP5       ;ELSE CHANGE POINTERS
  3246  032224  012737  000044  002554           MOV     #36.,TEMP6          ;       MAX SECTOR NUMBER
  3247  032232  012737  000024  002536           MOV     #20.,DESSEC         ;       SECTOR NUMBER START
  3248  032240  000676                           BR      4$                  ;DO READ
  3249  032242  005237  003066          39$:     INC     LOCERR              ;BUMP LOCAL ERROR COUNTER
  3250  032246  012777  177777  150276  40$:     MOV     #-1,@TEMP5          ;MOV   1'S INTO FILE STORAGE
  3251  032254                                   INLOOP                      ;CHECK IF IN ERROR LOOP
   (3)  032254  104020                           EMT     C$INLP
  3252  032256                                   BCOMPLETE       4$                  ;YES - GO DO READ
   (2)  032256  103667                           BCS     4$
  3253  032260  023737  002536  002554  41$:     CMP     DESSEC,TEMP6        ;CHECK IF ALL SECTORS READ
  3254  032266  001014                           BNE     43$                 ;NO - SKIP
  3255  032270  012703  005503                   MOV     #MBADSF,R3          ;SET RESULT MESSAGE POINTER
  3256  032274  005237  003066                   INC     LOCERR              ;BUMP LOCAL ERROR COUNTER
  3257  032300                                   ERRHRD  1301.,,ERR1
   (3)  032300  104443                           TRAP    T$ERCODE
   (5)  032302  002425                           .WORD   1301
   (5)  032304  011554                           .WORD   ERR1
  3258  032306  022737  003076  002552           CMP     #SBSFIL,TEMP5       ;TEST IF SOFTWARE FILES CHECKED
  3259  032314  001421                           BEQ     65$                 ;YES - EXIT
  3260  032316  000737                           BR      37$                 ;ELSE GO CHECK SOFTWARE FILES
  3261  032320  062737  000004  002536  43$:     ADD     #4,DESSEC           ;BUMP TO NEXT SECTOR
  3262  032326  000643                           BR      4$                  ;GO DO READ
  3263  032330  012703  005533          45$:     MOV     #MFMTER,R3          ;SET RESULT MESSAGE POINTER
  3264  032334                                   ERRHRD  1302.,,ERR1
   (3)  032334  104443                           TRAP    T$ERCODE
   (5)  032336  002426                           .WORD   1302
   (5)  032340  011554                           .WORD   ERR1
  3265  032342  000737                           BR      39$                 ;GO CHECK FOR LOOP
  3266  032344  012703  005560          48$:     MOV     #MTMBS,R3           ;SET RESULT MESSAGE PTR
  3267  032350                                   ERRHRD  1303.,,ERR1
   (3)  032350  104443                           TRAP    T$ERCODE
   (5)  032352  002427                           .WORD   1303
   (5)  032354  011554                           .WORD   ERR1
  3268  032356  000733                           BR      40$                 ;GO CHECK FOR LOOP
  3269  032360  012737  000002  002440  65$:     MOV     #2,ERRSWI           ;INIT ERROR SWITCH
  3270  032366  012737  000001  003074           MOV     #1,BSFVAL           ;SET BAD SECTOR FILES VALID FLAG
  3271  032374  105737  003066                   TSTB    LOCERR              ;TEST IF LOCAL ERRORS
  3272  032400  001402                           BEQ     66$                 ;NO - SKIP
  3273  032402  005237  002662                   INC     ERRCNT              ;ELSE BUMP ERROR COUNT
  3274  032406                          66$:
  3275  032406                          ENDTST
   (3)  032406                          L10047:
   (3)  032406  104001                           EMT     C$ETST
```

```
 3277                                  .SBTTL   *TEST 14          **WRITE/READ DATA (PART 1)
 3278  032410                          BGNTST            ;TEST 14
  (3)  032410                                                                                T14::
 3279  032410  012737  006517  002434           MOV     #P2T14E,ERHEAD    ;SET ERROR HEADER
 3280  032416  004737  017500                   JSR     PC,CKBSVD         ;GO CHECK IF BAD SECTOR FILES VALID
 3281  032422  004737  015160                   JSR     PC,TSTINT         ;INITIALIZE TEST
 3282  032426  004737  015176                   JSR     PC,GSTATR         ;CLEAR DRIVE
 3283  032432  032622                           T3065$
 3284  032434  004737  017370                   JSR     PC,CHOSHD         ;GO CHOSE HEAD
 3285  032440  005037  002536                   CLR     DESSEC            ;         SECTOR 0
 3286  032444  005037  002524                   CLR     NEWCYL            ;         CYLINDER 0
 3287  032450  005037  032514                   CLR     T310$             ;CLEAR PATTERN SELECT
 3288  032454  004737  016070          T306$:   JSR     PC,XSEEK          ;POSITION HEADS
 3289  032460  032622                           T3065$
 3290  032462  012701  005670                   MOV     #3000.,R1         ;SET WAIT COUNT FOR 300 MS
 3291  032466  004737  020650                   JSR     PC,RDYWAIT        ;WAIT FOR READY
 3292  032472  032622                           T3065$
 3293  032474  004737  021244                   JSR     PC,VERPOS         ;VERIFY POSITION
 3294  032500  032622                           T3065$
 3295  032502  005037  032514                   CLR     T310$             ;CLEAR PATTERN SELECTOR
 3296  032506                          T307$:
 3297  032506                          BGNSUB
  (3)  032506                                                                                T14.1:
  (3)  032506  104002                           EMT     C$BSUB
 3298  032510  004537  021726                   JSR     R5,DATGEN         ;GENERATE DATA
 3299  032514  000000                  T310$:   .WORD   0                 ;PATTERN SELECT WORD
 3300  032516  004737  022354                   JSR     PC,XWRITE         ;DO WRITE DATA
 3301  032522  032540                           60$
 3302  032524  004737  022414                   JSR     PC,XREAD          ;DO READ DATA
 3303  032530  032540                           60$
 3304  032532  004737  022066                   JSR     PC,DATCOM         ;COMPARE DATA
 3305  032536  032540                           60$
 3306  032540  012737  000002  002440  60$:     MOV     #2,ERRSWI         ;INIT ERROR SWITCH
 3307  032546                          ENDSUB
  (3)  032546                          L10051:
  (3)  032546  104003                           EMT     C$ESUB
 3308  032550                                   ESCAPE  TST               ;EXIT TEST IF ERROR
  (3)  032550  104010                           EMT     C$ESCAPE
  (3)  032552  000050                           .WORD   L10050-.
 3309  032554  022737  000010  032514           CMP     #8.,T310$         ;WAS DATA PAT 8 USED?
 3310  032562  001403                           BEQ     10$               ;YES - SKIP
 3311  032564  005237  032514                   INC     T310$             ;ELSE BUMP TO NEXT PATTERN
 3312  032570  000746                           BR      T307$             ;DO TEST WITH NEW PATTERN
 3313  032572  004737  017414          10$:     JSR     PC,SWAPHD         ;GO SWAP TO HEAD 1 OR END TEST
 3314  032576  032622                           T3065$                    ;ABORT RETURN
 3315  032600  005037  032514                   CLR     T310$             ;SET PATTERN SELECT TO 0
 3316  032604  004737  023074          11$:     JSR     PC,BSCHK          ;CHECK IF SECTOR BAD
 3317  032610  032614                           13$                       ;YES RETURN - SKIP TO 13$
 3318  032612  000720                           BR      T306$             ;NO RETURN - DO TEST THIS SECTOR
 3319  032614  005237  002524          13$:     INC     NEWCYL            ;BUMP TO NEXT CYLINDER
 3320  032620  000771                           BR      11$               ;CHECK IF THIS ONE BAD
 3321  032622                          T3065$:
 3322  032622                          ENDTST
  (3)  032622                          L10050:
  (3)  032622  104001                           EMT     C$ETST
 3323
 3325                                          .SBTTL  *TEST 15         **SPINDLE TIMING TEST
 3326   032624                                 BGNTST          ;TEST 15
  (3)   032624                                                                           T15::
 3327   032624  012737  006542  002434                 MOV     #P2T15E,ERHEAD    ;SET ERROR HEADER
 3328   032632  005737  003062                         TST     PASNUM            ;TEST IF PASS 0
 3329   032636  001003                                 BNE     2$                ;NO - SKIP
 3330   032640  005737  013372                         TST     MISWIW            ;TEST IF MANUAL TESTS WERE RUN
 3331   032644  100402                                 BMI     1$                ;YES - SKIP
 3332   032646                                 2$:     EXIT    TST               ;ELSE SKIP TEST
  (3)   032646  104032                                 EMT     C$EXIT
  (3)   032650  000476                                 .WORD   L10052-.
 3333   032652  005003                         1$:     CLR     R3                ;CLEAR FOR TIMING STORAGE
 3334   032654  005004                                 CLR     R4
 3335   032656  004737  015160                         JSR     PC,TSTINT         ;INITIALIZE TEST
 3336   032662  004737  015176                         JSR     PC,GSTATR         ;CLEAR DRIVE
 3337   032666  033340                                 60$
 3338   032670  004537  021726                         JSR     R5,DATGEN         ;GENERATE DATA
 3339   032674  000000                                 0                         ;PATTERN 0
 3340   032676  005037  002536                         CLR     DESSEC            ;CLEAR TO SECTOR 0
 3341   032702  004737  017370                         JSR     PC,CHOSHD         ;GO SELECT HEAD
 3342   032706  013737  013374  002524                 MOV     LOLIMW,NEWCYL     ;SET FOR CYLINDER
 3343   032714  004737  016070                         JSR     PC,XSEEK          ;DO SEEK
 3344   032720  033340                                 60$
 3345   032722  012701  005670                         MOV     #3000.,R1         ;SET WAIT FOR 300 MS
 3346   032726  004737  020650                         JSR     PC,RDYWAIT        ;WAIT FOR READY
 3347   032732  033340                                 60$
 3348   032734  004737  021244                         JSR     PC,VERPOS         ;VERIFY POSITION
 3349   032740  033340                                 60$
 3350   032742  012701  000100                         MOV     #64.,R1 ;SET LOOP COUNTER
 3351   032746  012705  002464                 5$:     MOV     #L.MP,R5          ;SET A POINTER
 3352   032752  004737  022344                         JSR     PC,XWRITT         ;DO FIRST WRITE
 3353   032756  033340                                 60$
 3354   032760  011562  000006                         MOV     (R5),RLMP(R2)     ;LOAD RL REGISTERS
 3355   032764  014562  000004                         MOV     -(R5),RLDA(R2)
 3356   032770  014562  000002                         MOV     -(R5),RLBA(R2)
 3357   032774  014562  000000                         MOV     -(R5),RLCS(R2)
 3358   033000                                         WAITUS  #3000.
  (3)   033000  012700  005670                         MOV     #3000.,R0
  (3)   033004  104027                                 EMT     C$WTU
 3359   033006  005737  002430                         TST     DONE              ;TEST IF INTERRUPT
 3360   033012  001010                                 BNE     6$                ;YES - SKIP
 3361   033014  004737  015026                         JSR     PC,WAITIN         ;ELSE WAIT FOR TIMEOUT
 3362   033020  012603                                 MOV     (SP)+,R3          ;GET MESSAGE POINTER
 3363   033022                                         ERRHRD  1501.,,ERR1
  (3)   033022  104443                                 TRAP    T$ERCODE
  (5)   033024  002735                                 .WORD   1501
  (5)   033026  011554                                 .WORD   ERR1
 3364   033030  000137  033340                         JMP     60$
 3365   033034  005737  002466                 6$:     TST     T.CS              ;TEST IF ANY ERRORS
 3366   033040  100005                                 BPL     4$                ;NO - SKIP
 3367   033042                                         ERRHRD  1502.,,ERR6
  (3)   033042  104443                                 TRAP    T$ERCODE
  (5)   033044  002736                                 .WORD   1502
  (5)   033046  012056                                 .WORD   ERR6
 3368   033050  000137  033340                         JMP     60$
 3369   033054  012705  002464                 4$:     MOV     #L.MP,R5          ;SET POINTER TO RL LOAD REGS
 3370  033060  005037  002430          CLR     DONE                    ;CLEAR INTERRUPT INDICATOR
 3371  033064  011562  000006          MOV     (R5),RLMP(R2)           ;LOAD RL REGISTERS FOR 2ND WRITE
 3372  033070  014562  000004          MOV     -(R5),RLDA(R2)
 3373  033074  014562  000002          MOV     -(R5),RLBA(R2)
 3374  033100  014562  000000          MOV     -(R5),RLCS(R2)
 3375  033104                          WAITUS  #3000.                  ;WAIT FOR INTERRUPT
  (3)  033104  012700  005670          MOV     #3000.,R0
  (3)  033110  104027                  EMT     C$WTU
 3376  033112                          GETTIM  R0                      ;GET TIME WAITED
  (3)  033112  104052                  EMT     C$GTIM
 3377  033114  005737  002430          TST     DONE                    ;TEST IN INTERRUPT OCCURRED
 3378  033120  001007                  BNE     7$                      ;YES - SKIP
 3379  033122  004737  015026          JSR     PC,WAITIN               ;GO WAIT FOR INTERRUPT
 3380  033126  012603                  MOV     (SP)+,R3                ;GET MESSAGE POINTER
 3381  033130                          ERRHRD  1503.,,ERR1             ;REPORT
  (3)  033130  104443                  TRAP    T$ERCODE
  (5)  033132  002737                  .WORD   1503
  (5)  033134  011554                  .WORD   ERR1
 3382  033136  000500                  BR      60$
 3383  033140  005737  002466  7$:     TST     T.CS                    ;TEST IN ANY ERROR
 3384  033144  100004                  BPL     8$                      ;NO - SKIP
 3385  033146                          ERRHRD  1504.,,ERR6             ;REPORT ERRORS
  (3)  033146  104443                  TRAP    T$ERCODE
  (5)  033150  002740                  .WORD   1504
  (5)  033152  012056                  .WORD   ERR6
 3386  033154  000471                  BR      60$
 3387  033156  060003          8$:     ADD     R0,R3                   ;ADD IN TIME USED
 3388  033160  005504                  ADC     R4                      ;DOUBLE PRECISSION
 3389  033162  005301                  DEC     R1                      ;DEC LOOP COUNTER
 3390  033164  001270                  BNE     5$                      ;LOOP UNTIL 0
 3391  033166  012701  000006          MOV     #6,R1                   ;SET DIVIDE COUNT
 3392  033172  000241          10$:    CLC                             ;CLEAR CARRY FOR DIVIDE
 3393  033174  006004                  ROR     R4                      ;DIVIDE SUM BY 100(8)
 3394  033176  006003                  ROR     R3
 3395  033200  005301                  DEC     R1                      ;DEC DIVIDE COUNT
 3396  033202  001373                  BNE     10$                     ;LOOP UNTIL DONE
 3397  033204                          PRINTF  #FMT1.1,#SRTMES,#VALDES
  (9)  033204  012746  006757          MOV     #VALDES,-(SP)
  (8)  033210  012746  006730          MOV     #SRTMES,-(SP)
  (7)  033214  012746  010631          MOV     #FMT1.1,-(SP)
  (6)  033220  012746  000003          MOV     #3,-(SP)
  (3)  033224  010600                  MOV     SP,R0
  (4)  033226  104017                  EMT     C$PNTF
  (4)  033230  062706  000010          ADD     #10,SP
 3398  033234                          PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
 (11)  033234  005046                  CLR     -(SP)
 (11)  033236  153716  002455          BISB    RLDRV+1,(SP)
 (10)  033242  012746  005633          MOV     #DRVNAM,-(SP)
  (9)  033246  013746  002450          MOV     RLBAS,-(SP)
  (8)  033252  012746  005622          MOV     #BASADD,-(SP)
  (7)  033256  012746  010657          MOV     #FMT5,-(SP)
  (6)  033262  012746  000005          MOV     #5,-(SP)
  (3)  033266  010600                  MOV     SP,R0
  (4)  033270  104017                  EMT     C$PNTF
  (4)  033272  062706  000014          ADD     #14,SP
 3399  033276                          PRINTF  #FMT26,#RESE3,R3,#RESE4,#MAPROX,EXROT
```

```
   (12) 033276  013746  002650                   MOV     EXROT,-(SP)
   (11) 033302  012746  007016                   MOV     #MAPROX,-(SP)
   (10) 033306  012746  010407                   MOV     #RESE4,-(SP)
    (9) 033312  010346                           MOV     R3,-(SP)
    (8) 033314  012746  010403                   MOV     #RESE3,-(SP)
    (7) 033320  012746  011500                   MOV     #FMT26,-(SP)
    (6) 033324  012746  000006                   MOV     #6,-(SP)
    (3) 033330  010600                           MOV     SP,R0
    (4) 033332  104017                           EMT     C$PNTF
    (4) 033334  062706  000016                   ADD     #16,SP
   3400 033340  012737  000002  002440  60$:     MOV     #2,ERRSWI        ;INITIALIZE ERROR SWITCH
   3401 033346                          ENDTST
    (3) 033346                          L10052:
    (3) 033346  104001                           EMT     C$ETST
   3402
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 3404                                          .SBTTL  *TEST 16          **WRITE/READ DATA (PART 2)
 3405  033350                                  BGNTST                    ;TEST 16
  (3)  033350                                                                                    T16::
 3406  033350  012737  006572  002434                  MOV     #P2T16E,ERHEAD  ;SET ERROR HEADER
 3407  033356  004737  017500                          JSR     PC,CKBSVD       ;GO CHECK IF BAD SECTOR FILES VALID
 3408  033362  004737  015160                          JSR     PC,TSTINT       ;INITIALIZE TEST
 3409  033366  004737  015176                          JSR     PC,GSTATR       ;CLEAR DRIVE
 3410  033372  034370                                  T3165$
 3411  033374  005037  002654                          CLR     PASCNT          ;CLEAR PASS TO 0
 3412  033400  012705  177777                          MOV     #-1,R5          ;SET R5
 3413  033404  005737  003062                          TST     PASNUM          ;TEST IF FIRST PASS (QUICK VERIFY)
 3414  033410  001006                                  BNE     1$              ;NO - SKIP
 3415  033412  032737  000001  013372                  BIT     #ALLCYL,MISWIW  ;TEST IF USE ALL CYLINDERS
 3416  033420  001002                                  BNE     1$              ;YES - SKIP
 3417  033422  012705  177770                          MOV     #-8.,R5         ;ELSE SET R5 TO NEG 8
 3418  033426                                  1$:
 3419  033426  012701  002332                          MOV     #T33TBL,R1      ;GET ADDRESS OF WORK TABLE
 3420  033432  012703  000010                          MOV     #10,R3          ;SET CLEAR COUNT
 3421  033436  013721  013374                  2$:     MOV     LOLIMW,(R1)+    ;CLEAR LOCATIONS TO LO LIMIT
 3422  033442  005303                                  DEC     R3              ;DEC COUNT
 3423  033444  001374                                  BNE     2$              ;LOOP UNTIL 0
 3424  033446  113737  013376  002336                  MOVB    HILIMW,T33TBL+4 ;INSERT HILIMIT
 3425  033454  113737  013376  002340                  MOVB    HILIMW,T33TBL+6 ;INTO APPROPRIATE LOCATIONS
 3426  033462  113737  013376  002342                  MOVB    HILIMW,T33TBL+10
 3427  033470  005205                          T3100$: INC     R5              ;BUMP R5
 3428  033472  032737  000001  013372                  BIT     #ALLCYL,MISWIW  ;TEST IF USE ALL CYLINDERS
 3429  033500  001017                                  BNE     5$              ;YES - SKIP
 3430  033502  005737  003062                          TST     PASNUM          ;TEST IF FIRST PASS (QUICK VERIFY)
 3431  033506  001002                                  BNE     3$              ;NO - SKIP
 3432  033510  062705  000007                          ADD     #7,R5           ;ELSE BUMP CYLINDER POINTER BY 7
 3433  033514  020527  000051                  3$:     CMP     R5,#41.         ;TEST IF PAST TABLE
 3434  033520  103005                                  BHIS    4$              ;YES - GO TO EXIT
 3435
 3436  033522  116503  002352                          MOVB    CYLTBL(R5),R3   ;GET NEXT TABLE ENTRY
 3437  033526  042703  177400                          BIC     #177400,R3      ;CLEAR UPPER BYTE
 3438  033532  001006                                  BNE     8$              ;SKIP IF NOT 0
 3439  033534  000137  034370                  4$:     JMP     T3165$          ;EXIT TEST
 3440  033540  022705  000377                  5$:     CMP     #255.,R5        ;TEST IF ALL CYLINDERS USED
 3441  033544  001773                                  BEQ     4$              ;YES - EXIT TEST
 3442  033546  010503                                  MOV     R5,R3           ;USE R5 AS NEXT CYLINDER
 3443  033550  020337  013374                  8$:     CMP     R3,LOLIMW       ;CHECK IF LOWER THAN LOLIMIT
 3444  033554  103745                                  BLO     T3100$          ;YES - SKIP
 3445  033556  020337  013376                          CMP     R3,HILIMW       ;CHECK IF HIGHER THAN HILIMIT
 3446  033562  101342                                  BHI     T3100$          ;YES - SKIP
 3447  033564  012704  002332                          MOV     #T33TBL,R4      ;GET ADDRESS OF SEEK TABLE
 3448  033570  110364  000001                          MOVB    R3,1(R4)        ;INSERT CC IN APPROPRIATE TABLE
 3449  033574  110364  000003                          MOVB    R3,3(R4)        ; LOCATIONS FOR TEST SEEK SEQUENCE
 3450  033600  110364  000005                          MOVB    R3,5(R4)
 3451  033604  110364  000007                          MOVB    R3,7(R4)
 3452  033610  110364  000011                          MOVB    R3,11(R4)
 3453  033614  110364  000013                          MOVB    R3,13(R4)
 3454  033620  010437  002446                          MOV     R4,TBLSTR       ;STORE TABLE ADDRESS
 3455  033624  004737  017370                          JSR     PC,CHOSHD       ;GO CHOSE HEAD
 3456  033630                                  T3101$:
 3457  033630                                  BGNSUB
  (3)  033630                                                                                    T16.1:
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  (3)  033630  104002                          EMT     C$BSUB
  3458 033632  042737  003760  002426          BIC     #MQUALS,OPFLAG   ;CLEAR ALL MESSAGE QUALIFIERS
  3459 033640  005737  002654                  TST     PASCNT           ;TEST IF PASS 0
  3460 033644  001414                          BEQ     11$              ;YES - SKIP
  3461 033646  023727  002654  000003          CMP     PASCNT,#3        ;TEST IF PASS 3
  3462 033654  001404                          BEQ     10$              ;YES - SKIP
  3463 033656  002407                          BLT     11$              ;CHECK IF LESS THAN 3, IF YES CLEAR TO 0
  3464 033660  012737  000003  002654          MOV     #3,PASCNT        ;ELSE SET TO 3
  3465 033666  052737  000020  002426  10$:    BIS     #INOUTS,OPFLAG   ;SET MESSAGE QUAL
  3466 033674  000405                          BR      12$              ;SKIP
  3467 033676  005037  002654          11$:    CLR     PASCNT           ;SET PASS COUNT TO 0
  3468 033702  052737  000040  002426          BIS     #OUTINS,OPFLAG   ;SET MESSAGE QUAL
  3469 033710  012737  000003  002444  12$:    MOV     #3,WRTSWI        ;SET READ AND WRITE SWITCH
  3470 033716  013704  002446                  MOV     TBLSTR,R4        ;GET STORED TABLE ADDRESS
  3471 033722  005037  002536          15$:    CLR     DESSEC           ;CLEAR TO SECTOR 0
  3472 033726  112437  002524                  MOVB    (R4)+,NEWCYL     ;GET NEXT TABLE ENTRY
  3473 033732  004737  016070                  JSR     PC,XSEEK         ;DO SEEK
  3474 033736  034302                          60$
  3475 033740  012701  005670                  MOV     #3000.,R1        ;SET WAIT COUNT FOR 300 MS
  3476 033744  004737  020650                  JSR     PC,RDYWAIT       ;WAIT FOR READY
  3477 033750  034302                          60$
  3478 033752  112437  002524                  MOVB    (R4)+,NEWCYL     ;GET NEXT TABLE ENTRY
  3479 033756  004737  016070                  JSR     PC,XSEEK         ;DO SEEK
  3480 033762  034302                          60$
  3481 033764  012701  005670                  MOV     #3000.,R1        ;SET WAIT COUNT FOR 300 MS
  3482 033770  004737  020650                  JSR     PC,RDYWAIT       ;WAIT FOR READY
  3483 033774  034302                          60$
  3484 033776  004737  021244                  JSR     PC,VERPOS        ;VERIFY POSITION
  3485 034002  034302                          60$
  3486 034004  004737  023074          16$:    JSR     PC,BSCHK         ;CHECK FOR BAD SECTOR
  3487 034010  034142                          32$                      ;''YES'' RETURN
  3488 034012  013737  002536  034032          MOV     DESSEC,25$       ;SET DATA PATTERN = TO SECTOR NUMBER
  3489 034020  042737  177770  034032          BIC     #177770,25$      ;CLEAR ALL BUT LSD
  3490 034026  004537  021726                  JSR     R5,DATGEN        ;GO GENERATE DATA
  3491 034032  000000                  25$:    .WORD   0
  3492 034034  032737  000001  002444          BIT     #BIT0,WRTSWI     ;TEST IF WRITE THIS PASS
  3493 034042  001425                          BEQ     29$              ;NO - SKIP
  3494 034044  004737  022354                  JSR     PC,XWRITE        ;DO WRITE
  3495 034050  034302                          60$
  3496 034052  005237  002536                  INC     DESSEC           ;INC SECTOR
  3497 034056  022737  000050  002536          CMP     #40.,DESSEC      ;TEST IF ALL SECTORS USED
  3498 034064  001347                          BNE     16$              ;NO - SKIP
  3499 034066  042737  000060  002426          BIC     #INOUTS!OUTINS,OPFLAG ;CLEAR QUALIFIERS
  3500 034074  042737  000001  002444          BIC     #BIT0,WRTSWI     ;CLEAR WRITE REQUIRED SWITCH
  3501 034102  052737  000100  002426          BIS     #FOLWRT,OPFLAG   ;SET FOLLOWING WRITE QUALIFIER
  3502 034110  005037  002536                  CLR     DESSEC           ;CLEAR TO SECTOR 0
  3503 034114  000733                          BR      16$              ;SKIP
  3504 034116  032737  000002  002444  29$:    BIT     #BIT1,WRTSWI     ;TEST IF READ THIS PASS
  3505 034124  001414                          BEQ     33$              ;NO - SKIP
  3506 034126  004737  022414          31$:    JSR     PC,XREAD         ;ELSE DO READ
  3507 034132  034302                          60$
  3508 034134  004737  022066                  JSR     PC,DATCOM        ;COMPARE DATA
  3509 034140  034302                          60$
  3510 034142  005237  002536          32$:    INC     DESSEC           ;BUMP SECTOR
  3511 034146  022737  000050  002536          CMP     #40.,DESSEC      ;TEST IF ALL SECTORS USED
  3512 034154  001313                          BNE     16$              ;NO - LOOP
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 3513  034156  005037  002536          33$:    CLR     DESSEC            ;CLEAR DESIRED SECTOR
 3514  034162  005037  002444                  CLR     WRTSWI            ;CLEAR WRITE/READ SWITCH
 3515  034166  005237  002654                  INC     PASCNT            ;BUMP PASS COUNT
 3516  034172  042737  003760  002426          BIC     #MQUALS,OPFLAG    ;CLEAR ALL QUALIFIERS
 3517  034200  023727  002654  000003          CMP     PASCNT,#3         ;TEST IS PASS 3
 3518  034206  001435                          BEQ     60$               ;YES - SKIP
 3519  034210  023727  002654  000006          CMP     PASCNT,#6         ;TEST IF PASS 6
 3520  034216  001431                          BEQ     60$               ;YES - SKIP
 3521  034220  012737  000002  002444          MOV     #BIT1,WRTSWI      ;SET READ REQUIRED BIT
 3522  034226  023727  002654  000001          CMP     PASCNT,#1         ;TEST IF PASS 1
 3523  034234  001415                          BEQ     40$               ;YES - SKIP
 3524  034236  023727  002654  000005          CMP     PASCNT,#5         ;TEST IF PASS 4
 3525  034244  001411                          BEQ     40$               ;YES - SKIP
 3526  034246  000404                          BR      39$               ;SKIP
 3527  034250  052737  002000  002426  37$:    BIS     #FWDSKO,OPFLAG    ;SET FWD QUALIFIER
 3528  034256  000407                          BR      36$               ;GO DO NEXT PASS
 3529  034260  052737  000020  002426  39$:    BIS     #INOUTS,OPFLAG    ;SET QUALIFIER
 3530  034266  000403                          BR      36$               ;SKIP
 3531  034270  052737  000040  002426  40$:    BIS     #OUTINS,OPFLAG    ;SET MESSAGE QUALIFIER
 3532  034276  000137  033722          36$:    JMP     15$               ;GO DO NEXT PASS
 3533  034302  012737  000002  002440  60$:    MOV     #2,ERRSWI         ;INIT ERROR SWITCH
 3534  034310                          ENDSUB
  (3)  034310                          L10054:
  (3)  034310  104003                          EMT     C$ESUB
 3535  034312                                  ESCAPE  TST               ;EXIT TEST IF ERROR
  (3)  034312  104010                          EMT     C$ESCAPE
  (3)  034314  000054                          .WORD   L10053-.
 3536  034316  012737  000003  002444          MOV     #3,WRTSWI         ;SET FOR READ AND WRITE REQ.
 3537  034324  023727  002654  000003          CMP     PASCNT,#3         ;TEST IF PASS 3
 3538  034332  001004                          BNE     45$               ;NO - SKIP
 3539  034334  012737  002340  002446          MOV     #T33TBL+6,TBLSTR  ;STORE MID POINT IN TABLE
 3540  034342  000410                          BR      48$               ;GO START PASS 4
 3541  034344  005037  002654          45$:    CLR     PASCNT            ;CLEAR TO PASS 0
 3542  034350  004737  017414                  JSR     PC,SWAPHD         ;GO SWAP TO HEAD 1 OR END TEST
 3543  034354  033470                          T3100$                    ;ABORT RETURN
 3544  034356  012737  002332  002446          MOV     #T33TBL,TBLSTR    ;STORE START OF TABLE
 3545  034364  000137  033630          48$:    JMP     T3101$            ;GO DO HEAD 1
 3546  034370                          T3165$:
 3547  034370                          ENDTST
  (3)  034370                          L10053:
  (3)  034370  104001                          EMT     C$ETST
 3549                                      .SBTTL  *TEST 17          **WRITE LOCK ERROR AND DATA PROTECTION
 3550  034372                              BGNTST                    ;TEST 17
  (3)  034372                                                                                  T17::
 3551  034372  005737  003062                      TST     PASNUM            ;TEST IF FIRST PASS
 3552  034376  001003                              BNE     2$                ;NO - SKIP
 3553  034400  005737  013372                      TST     MISWIW            ;TEST IF RUN MANUAL INTERVENTION
 3554  034404  100402                              BMI     3$                ;YES - SKIP
 3555  034406  000137  035362              2$:     JMP     T3265$            ;EXIT TST
 3556  034412                              3$:
 3557  034412                                      BGNSUB
  (3)  034412                                                                                  T17.1:
  (3)  034412  104002                              EMT     C$BSUB
 3558  034414  012737  006615  002434              MOV     #P2T17E,ERHEAD    ;SET ERROR HEADER
 3559  034422  004737  015160                      JSR     PC,TSTINT         ;INITIALIZE TEST
 3560  034426  004737  015176                      JSR     PC,GSTATR         ;CLEAR DRIVE
 3561  034432  035234                              60$
 3562  034434  005037  002534                      CLR     DESHD             ;SET TO HEAD 0
 3563  034440  005037  002536                      CLR     DESSEC            ;SET TO SECTOR 0
 3564  034444  005037  002524                      CLR     NEWCYL            ;CLEAR TO CYLINDER 0
 3565  034450  004737  016070                      JSR     PC,XSEEK          ;DO SEEK
 3566  034454  035234                              60$
 3567  034456  012701  005670                      MOV     #3000.,R1         ;SET WAIT FOR 300 MS
 3568  034462  004737  020650                      JSR     PC,RDYWAIT        ;WAIT FOR READY
 3569  034466  035234                              60$
 3570  034470  004737  021244                      JSR     PC,VERPOS         ;VERIFY POSITION
 3571  034474  035234                              60$
 3572  034476  032737  020000  002474              BIT     #WLSTAT,T.MP      ;TEST IF WRITE LOCK SET
 3573  034504  001114                              BNE     7$                ;YES - SKIP
 3574  034506  004537  021726                      JSR     R5,DATGEN         ;GENERATE DATA
 3575  034512  000007                              7                         ;PATTERN 7
 3576  034514  004737  022354                      JSR     PC,XWRITE         ;WRITE DATA
 3577  034520  035234                              60$
 3578  034522  004737  022414                      JSR     PC,XREAD          ;READ DATA
 3579  034526  035234                              60$
 3580  034530  004737  022066                      JSR     PC,DATCOM         ;CHECK DATA
 3581  034534  035234                              60$
 3582  034536                                      PRINTF  #FMTOP1,#OPR004,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1> ;REQUEST SET WR
 (13)  034536  005046                              CLR     -(SP)
 (13)  034540  153716  002455                      BISB    RLDRV+1,(SP)
 (12)  034544  012746  005633                      MOV     #DRVNAM,-(SP)
 (11)  034550  013746  002450                      MOV     RLBAS,-(SP)
 (10)  034554  012746  005622                      MOV     #BASADD,-(SP)
  (9)  034560  012746  007250                      MOV     #OPR1A,-(SP)
  (8)  034564  012746  007277                      MOV     #OPR004,-(SP)
  (7)  034570  012746  010532                      MOV     #FMTOP1,-(SP)
  (6)  034574  012746  000007                      MOV     #7,-(SP)
  (3)  034600  010600                              MOV     SP,R0
  (4)  034602  104017                              EMT     C$PNTF
  (4)  034604  062706  000020                      ADD     #20,SP
 3583  034610  012701  000006                      MOV     #6.,R1            ;SET WAIT COUNT FOR 30 SECONDS
 3584  034614                              5$:     WAITMS  #50.              ;CALL WAIT
  (3)  034614  012700  000062                      MOV     #50.,R0
  (3)  034620  104026                              EMT     C$WTM
 3585  034622  004737  015176                      JSR     PC,GSTATR         ;GET STATUS
 3586  034626  035234                              60$
 3587  034630  032737  020000  002474              BIT     #WLSTAT,T.MP      ;CHECK IF WRITE LOCK SET
 3588  034636  001037                      BNE     7$                  ;YES - SKIP
 3589  034640                              PRINTF  #FMT2,#BELL         ;RING BELL
  (8)  034640  012746  010377              MOV     #BELL,-(SP)
  (7)  034644  012746  010640              MOV     #FMT2,-(SP)
  (6)  034650  012746  000002              MOV     #2,-(SP)
  (3)  034654  010600                      MOV     SP,R0
  (4)  034656  104017                      EMT     C$PNTF
  (4)  034660  062706  000006              ADD     #6,SP
 3590  034664  005301                      DEC     R1                  ;DEC COUNT
 3591  034666  001352                      BNE     5$                  ;SKIP IF NOT 0
 3592  034670                              PRINTF  #FMT23,#P2T17E,#BYPSNM,#OPR1A,<B,RLDRV+1> ;RPT BYPASSED
 (11)  034670  005046                      CLR     -(SP)
 (11)  034672  153716  002455              BISB    RLDRV+1,(SP)
 (10)  034676  012746  007250              MOV     #OPR1A,-(SP)
  (9)  034702  012746  007353              MOV     #BYPSNM,-(SP)
  (8)  034706  012746  006615              MOV     #P2T17E,-(SP)
  (7)  034712  012746  011447              MOV     #FMT23,-(SP)
  (6)  034716  012746  000005              MOV     #5,-(SP)
  (3)  034722  010600                      MOV     SP,R0
  (4)  034724  104017                      EMT     C$PNTF
  (4)  034726  062706  000014              ADD     #14,SP
 3593  034732                              EXIT    TST
  (3)  034732  104032                      EMT     C$EXIT
  (3)  034734  000426                      .WORD   L10055-.
 3594  034736  004537  021726       7$:    JSR     R5,DATGEN           ;GENERATE DATA
 3595  034742  000001                      1                           ;PATTERN 1
 3596  034744  012705  002456              MOV     #L.CS,R5            ;GET ADDRESS OF L REGS
 3597  034750  012715  000112              MOV     #WTDATA,(R5)        ;LOAD WRITE COMMAND
 3598  034754  053715  002454              BIS     RLDRV,(R5)          ;INSERT DRIVE NUMBER
 3599  034760  042725  002000              BIC     #BIT10,(R5)+        ;CLEAR FOR DRIVE 4 - 7 SPEC'D
 3600  034764  012725  004066              MOV     #OBUFF,(R5)+        ;LOAD BUS ADDRESS
 3601  034770  005025                      CLR     (R5)+               ;CYL 0, HD 0, SECTOR 0
 3602  034772  012725  177600              MOV     #177600,(R5)+       ;128 WORDS
 3603  034776  012701  000454              MOV     #300.,R1            ;SET WAIT COUNT FOR 30 MS
 3604  035002  005037  002430              CLR     DONE                ;CLEAR INTERRUPT FLAG
 3605  035006  014562  000006              MOV     -(R5),RLMP(R2)      ;LOAD RL REGS
 3606  035012  014562  000004              MOV     -(R5),RLDA(R2)
 3607  035016  014562  000002              MOV     -(R5),RLBA(R2)
 3608  035022  014562  000000              MOV     -(R5),RLCS(R2)
 3609  035026                      10$:    WAITUS  #1
  (3)  035026  012700  000001              MOV     #1,R0
  (3)  035032  104027                      EMT     C$WTU
 3610  035034  005737  002430              TST     DONE                ;CHECK IF INTERRUPT
 3611  035040  001012                      BNE     14$                 ;YES - SKIP
 3612  035042  005301                      DEC     R1                  ;DEC WAIT COUNT
 3613  035044  001370                      BNE     10$                 ;LOOP IF NOT 0
 3614  035046  004737  015026              JSR     PC,WAITIN           ;WAIT FOR INTERRUPT
 3615  035052  012603                      MOV     (SP)+,R3            ;GET RESULT MESSAGE
 3616  035054                              ERRHRD  1701.,,ERR1
  (3)  035054  104443                      TRAP    T$ERCODE
  (5)  035056  003245                      .WORD   1701
  (5)  035060  011554                      .WORD   ERR1
 3617  035062                              EXIT    SUB
  (3)  035062  104032                      EMT     C$EXIT
  (3)  035064  000156                      .WORD   L10056-.
 3618  035066  004737  015226      14$:    JSR     PC,GSTAT            ;GET STATUS
 3619  035072  035234                        60$
 3620  035074  032737  040000  002466        BIT     #DRVERR,T.CS        ;TEST IF ANY ERROR SET
 3621  035102  001005                        BNE     15$                 ;YES - SKIP
 3622  035104  012703  007665                MOV     #MDRERR,R3          ;SET RESULT MESSAGE POINTER
 3623  035110                                ERRHRD  1702.,,ERR3         ;REPORT ERROR NOT SET
  (3)  035110  104443                        TRAP    T$ERCODE
  (5)  035112  003246                        .WORD   1702
  (5)  035114  011670                        .WORD   ERR3
 3624  035116  032737  002000  002474  15$:  BIT     #WGESTAT,T.MP       ;TEST IF WGE SET
 3625  035124  001005                        BNE     18$                 ;YES - SKIP
 3626  035126  012703  007744                MOV     #MWGERR,R3          ;SET MESSAGE FOR WGE NOT SET
 3627  035132                                ERRHRD  1704.,,ERR3
  (3)  035132  104443                        TRAP    T$ERCODE
  (5)  035134  003250                        .WORD   1704
  (5)  035136  011670                        .WORD   ERR3
 3628  035140  042737  040000  002466  18$:  BIC     #DRVERR,T.CS        ;CLEAR DRIVE ERROR BIT
 3629  035146  042737  002000  002474        BIC     #WGESTAT,T.MP       ;CLEAR WGE BIT
 3630  035154  032737  157400  002474        BIT     #157400,T.MP        ;TEST IF ANY OTHER ERRORS
 3631  035162  001004                        BNE     16$                 ;YES - GO REPORT
 3632  035164  032737  036000  002466        BIT     #36000,T.CS         ;TEST ANY ERRORS IN CS REG
 3633  035172  001404                        BEQ     17$                 ;NO - SKIP
 3634  035174                          16$:  ERRHRD  1703.,,ERR6         ;REPORT ERRORS
  (3)  035174  104443                        TRAP    T$ERCODE
  (5)  035176  003247                        .WORD   1703
  (5)  035200  012056                        .WORD   ERR6
 3635  035202  000414                        BR      60$                 ;EXIT TEST
 3636  035204  004737  015176          17$:  JSR     PC,GSTATR           ;GET STATUS AND RESET ERROR
 3637  035210  035234                        60$
 3638  035212  004537  021726                JSR     R5,DATGEN           ;GO GENERATE DATA
 3639  035216  000007                        7                           ;PATTERN 7
 3640  035220  004737  022414                JSR     PC,XREAD            ;READ DATA
 3641  035224  035234                        60$
 3642  035226  004737  022066                JSR     PC,DATCOM           ;COMPARE DATA
 3643  035232  035234                        60$
 3644  035234  012737  000002  002440  60$:  MOV     #2,ERRSWI           ;INIT ERROR SWITCH
 3645  035242                          ENDSUB
  (3)  035242                          L10056:
  (3)  035242  104003                        EMT     C$ESUB
 3646  035244  012737  000002  002440  T3204$: MOV   #2,ERRSWI           ;INIT ERROR SWITCH
 3647  035252                                PRINTF  #FMTOP1,#OPR12,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1> ;REQ RESET WRT L
 (13)  035252  005046                        CLR     -(SP)
 (13)  035254  153716  002455                BISB    RLDRV+1,(SP)
 (12)  035260  012746  005633                MOV     #DRVNAM,-(SP)
 (11)  035264  013746  002450                MOV     RLBAS,-(SP)
 (10)  035270  012746  005622                MOV     #BASADD,-(SP)
  (9)  035274  012746  007250                MOV     #OPR1A,-(SP)
  (8)  035300  012746  007231                MOV     #OPR12,-(SP)
  (7)  035304  012746  010532                MOV     #FMTOP1,-(SP)
  (6)  035310  012746  000007                MOV     #7,-(SP)
  (3)  035314  010600                        MOV     SP,R0
  (4)  035316  104017                        EMT     C$PNTF
  (4)  035320  062706  000020                ADD     #20,SP
 3648  035324  012701  000454                MOV     #300.,R1            ;SET WAIT FOR 30 SEC
 3649  035330                          16$:  WAITMS  #1
  (3)  035330  012700  000001                MOV     #1,R0
  (3)  035334  104026                        EMT     C$WTM
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      035336  004737  015176                  JSR     PC,GSTATR       ;GET STATUS
      035342  035244                          T3204$
      035344  032737  020000  002474          BIT     #WLSTAT,T.MP    ;CHECK IF WRITE LOCK RESET
      035352  001403                          BEQ     T3265$
      035354  005301                          DEC     R1              ;DEC WAIT COUNT
      035356  001364                          BNE     16$             ;LOOP IF NOT 0
      035360  000731                          BR      T3204$          ;ELSE REPEAT MESSAGE
      035362                          T3265$:
      035362                          ENDTST
 (3)  035362                          L10055:
 (3)  035362  104001                          EMT     C$ETST
 3661                                   .SBTTL  *TEST 18            **ADJACENT CYLINDER INTERFERENCE
 3662   035364                          BGNTST                      ;TEST 18
  (3)   035364                                                                              T18::
 3663   035364  012737  006655  002434          MOV     #P2T18E,ERHEAD  ;SET ERROR HEADER
 3664   035372  004737  017500                  JSR     PC,CKBSVD       ;GO CHECK IF BAD SECTOR FILES VALID
 3665   035376  004737  015160                  JSR     PC,TSTINT       ;INITIALIZE TEST
 3666   035402  004737  015176                  JSR     PC,GSTATR       ;CLEAR DRIVE
 3667   035406  036472                          T3365$
 3668   035410  005037  002654                  CLR     PASCNT          ;CLEAR PASS TO 0
 3669   035414  012705  177777                  MOV     #-1,R5          ;SET R5
 3670   035420  005737  003062                  TST     PASNUM          ;TEST IF FIRST PASS (QUICK VERIFY)
 3671   035424  001007                          BNE     1$              ;NO - SKIP
 3672   035426  032737  000001  013372          BIT     #ALLCYL,MISWIW  ;TEST IF USE ALL CYLINDERS
 3673   035434  001003                          BNE     1$              ;YES - SKIP
 3674   035436  012705  177754                  MOV     #-20.,R5                ;ELSE SET R5 TO NEG 20
 3675   035442  000402                          BR      9$              ;SKIP
 3676   035444  012705  177774          1$:     MOV     #-4,R5          ;ELSE SET FOR NEG 4
 3677   035450  012701  002332          9$:     MOV     #T33TBL,R1      ;GET ADDRESS OF WORK TABLE
 3678   035454  012703  000010                  MOV     #10,R3          ;SET CLEAR COUNT
 3679   035460  013721  013374          2$:     MOV     LOLIMW,(R1)+    ;CLEAR LOCATIONS TO LOLIMIT
 3680   035464  005303                          DEC     R3              ;DEC COUNT
 3681   035466  001374                          BNE     2$              ;LOOP UNTIL 0
 3682   035470  004537  021726                  JSR     R5,DATGEN       ;GO GENERATE DATA
 3683   035474  000011                          9.                      ;PATTERN 9
 3684   035476  113737  013376  002334          MOVB    HILIMW,T33TBL+2 ;INSERT HILIMIT
 3685   035504  113737  013376  002336          MOVB    HILIMW,T33TBL+4 ;INTO APPROPRIATE LOCATIONS
 3686   035512  113737  013376  002342          MOVB    HILIMW,T33TBL+10
 3687   035520  113737  013376  002350          MOVB    HILIMW,T33TBL+16
 3688   035526  005205                  T3300$: INC     R5              ;BUMP R5
 3689   035530  032737  000001  013372          BIT     #ALLCYL,MISWIW  ;TEST IF USE ALL CYLINDERS
 3690   035536  001022                          BNE     5$              ;YES - SKIP
 3691   035540  005737  003062                  TST     PASNUM          ;TEST IF FIRST PASS (QUICK VERIFY)
 3692   035544  001403                          BEQ     3$              ;NO - SKIP
 3693   035546  062705  000003                  ADD     #3,R5           ;ELSE BUMP CYLINDER POINTER BY 3
 3694   035552  000402                          BR      6$              ;SKIP
 3695   035554  062705  000023          3$:     ADD     #19.,R5         ;BUMP TO NEXT ENTRY
 3696   035560  020527  000051          6$:     CMP     R5,#41.         ;CHECK IF PAST TABLE
 3697   035564  103005                          BHIS    4$              ;YES - SKIP TO EXIT
 3698   035566  116503  002352                  MOVB    CYLTBL(R5),R3   ;GET NEXT TABLE ENTRY
 3699   035572  042703  177400                  BIC     #177400,R3      ;CLEAR UPPER BYTE
 3700   035576  001011                          BNE     8$              ;SKIP IF NOT 0
 3701   035600  000137  036472          4$:     JMP     T3365$          ;EXIT TEST
 3702   035604  005705                  5$:     TST     R5              ;TEST IF R5 0
 3703   035606  001001                          BNE     7$              ;NO - SKIP
 3704   035610  005205                          INC     R5              ;ELSE BUMP R5 AGAIN
 3705   035612  022705  000377          7$:     CMP     #255.,R5        ;TEST IF ALL CYLINDERS USED
 3706   035616  001770                          BEQ     4$              ;YES - EXIT TEST
 3707   035620  010503                          MOV     R5,R3           ;USE R5 AS NEXT CYLINDER
 3708   035622  020337  013374          8$:     CMP     R3,LOLIMW       ;CHECK IF LOWER THAN LOLIMIT
 3709   035626  103737                          BLO     T3300$          ;YES - SKIP
 3710   035630  020337  013376                  CMP     R3,HILIMW       ;CHECK IF HIGHER THAN HILIMIT
 3711   035634  101334                          BHI     T3300$          ;YES - SKIP
 3712   035636  012704  002332                  MOV     #T33TBL,R4      ;GET ADDRESS OF SEEK TABLE
 3713   035642  110364  000001                  MOVB    R3,1(R4)        ;INSERT CC IN APPROPRIATE TABLE
 3714   035646  110364  000007                  MOVB    R3,7(R4)
 3715   035652  110364  000011                  MOVB    R3,11(R4)
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      035656  110364  000017                  MOVB    R3,17(R4)
      035662  005203                          INC     R3                ;BUMP R3 TO CC+1
      035664  110364  000005                  MOVB    R3,5(R4)          ;INSERT AS NEEDED
      035670  110364  000015                  MOVB    R3,15(R4)
      035674  162703  000002                  SUB     #2,R3             ;SET R3 TO CC-1
      035700  110364  000003                  MOVB    R3,3(R4)          ;INSERT AS NEEDED
      035704  110364  000013                  MOVB    R3,13(R4)
      035710  010437  002446                  MOV     R4,TBLSTR         ;STORE TABLE ADDRESS
      035714  004737  017370                  JSR     PC,CHOSHD         ;GO CHOSE HEAD
      035720                          T3301$:
      035720                          BGNSUB
 (3)  035720                                                                             T18.1:
 (3)  035720  104002                          EMT     C$BSUB
      035722  042737  003760  002426          BIC     #MQUALS,OPFLAG    ;CLEAR ALL MESSAGE QUALIFIERS
      035730  005737  002654                  TST     PASCNT            ;TEST IF PASS 0
      035734  001414                          BEQ     11$               ;YES - SKIP
      035736  023727  002654  000004          CMP     PASCNT,#4         ;TEST IF PASS 4
      035744  001404                          BEQ     10$               ;YES - SKIP
      035746  002407                          BLT     11$               ;CHECK IF LESS THAN 4, IF YES CLEAR TO 0
      035750  012737  000004  002654          MOV     #4,PASCNT         ;ELSE SET TO 4
      035756  052737  000020  002426  10$:    BIS     #INOUTS,OPFLAG    ;SET MESSAGE QUAL
      035764  000405                          BR      12$               ;SKIP
      035766  005037  002654          11$:    CLR     PASCNT            ;SET PASS COUNT TO 0
      035772  052737  000040  002426          BIS     #OUTINS,OPFLAG    ;SET MESSAGE QUAL
      036000  012737  000003  002444  12$:    MOV     #3,WRTSWI         ;SET READ AND WRITE SWITCH
      036006  013704  002446                  MOV     TBLSTR,R4         ;GET STORED TABLE ADDRESS
      036012  005037  002536          15$:    CLR     DESSEC            ;CLEAR TO SECTOR 0
      036016  112437  002524                  MOVB    (R4)+,NEWCYL      ;GET NEXT TABLE ENTRY
      036022  004737  016070                  JSR     PC,XSEEK          ;DO SEEK
      036026  036404                          60$
      036030  012701  005670                  MOV     #3000.,R1         ;SET WAIT COUNT FOR 300 MS
      036034  004737  020650                  JSR     PC,RDYWAIT        ;WAIT FOR READY
      036040  036404                          60$
      036042  112437  002524                  MOVB    (R4)+,NEWCYL      ;GET NEXT TABLE ENTRY
      036046  004737  016070                  JSR     PC,XSEEK          ;DO SEEK
      036052  036404                          60$
      036054  012701  005670                  MOV     #3000.,R1         ;SET WAIT COUNT FOR 300 MS
      036060  004737  020650                  JSR     PC,RDYWAIT        ;WAIT FOR READY
      036064  036404                          60$
      036066  004737  021244                  JSR     PC,VERPOS         ;VERIFY POSITION
      036072  036404                          60$
      036074  004737  023074          16$:    JSR     PC,BSCHK          ;CHECK FOR BAD SECTOR
      036100  036210                          32$                       ;"YES" RETURN
      036102  032737  000001  002444          BIT     #BIT0,WRTSWI      ;TEST IF WRITE THIS PASS
      036110  001425                          BEQ     29$               ;NO - SKIP
      036112  004737  022354                  JSR     PC,XWRITE         ;DO WRITE
      036116  036404                          60$
      036120  005237  002536                  INC     DESSEC            ;INC SECTOR
      036124  022737  000050  002536          CMP     #40.,DESSEC       ;TEST IF ALL SECTORS USED
      036132  001360                          BNE     16$               ;NO - SKIP
      036134  042737  000060  002426          BIC     #INOUTS!OUTINS,OPFLAG ;CLEAR QUALIFIERS
      036142  042737  000001  002444          BIC     #BIT0,WRTSWI      ;CLEAR WRITE REQUIRED SWITCH
      036150  052737  000100  002426          BIS     #FOLWRT,OPFLAG    ;SET FOLLOWING WRITE QUALIFIER
      036156  005037  002536                  CLR     DESSEC            ;CLEAR TO SECTOR 0
      036162  000744                          BR      16$               ;SKIP
      036164  032737  000002  002444  29$:    BIT     #BIT1,WRTSWI      ;TEST IF READ THIS PASS
      036172  001414                              BEQ     33$               ;NO - SKIP
      036174  004737  022414          31$:        JSR     PC,XREAD          ;ELSE DO READ
      036200  036404                              60$
      036202  004737  022066                      JSR     PC,DATCOM         ;COMPARE DATA
      036206  036404                              60$
      036210  005237  002536          32$:        INC     DESSEC            ;BUMP SECTOR
      036214  022737  000050  002536              CMP     #40.,DESSEC       ;TEST IF ALL SECTORS USED
      036222  001324                              BNE     16$               ;NO - LOOP
      036224  005037  002536          33$:        CLR     DESSEC            ;CLEAR DESIRED SECTOR
      036230  005037  002444                      CLR     WRTSWI            ;CLEAR WRITE/READ SWITCH
      036234  005237  002654                      INC     PASCNT            ;BUMP PASS COUNT
      036240  042737  003760  002426              BIC     #MQUALS,OPFLAG    ;CLEAR ALL QUALIFIERS
      036246  023727  002654  000004              CMP     PASCNT,#4         ;TEST IS PASS 4
      036254  001453                              BEQ     60$               ;YES - SKIP
      036256  023727  002654  000010              CMP     PASCNT,#8.        ;TEST IF PASS 8.
      036264  001447                              BEQ     60$               ;YES - SKIP
      036266  023727  002654  000003              CMP     PASCNT,#3         ;TEST IF PASS 3
      036274  001430                              BEQ     39$               ;YES - SKIP
      036276  023727  002654  000007              CMP     PASCNT,#7         ;TEST IF PASS 7
      036304  001430                              BEQ     40$               ;YES - SKIP
      036306  012737  000001  002444              MOV     #BIT0,WRTSWI      ;SET WRITE REQUIRED
      036314  023727  002654  000001              CMP     PASCNT,#1         ;TEST IF PASS 1
      036322  001411                              BEQ     37$               ;YES - SKIP
      036324  023727  002654  000002              CMP     PASCNT,#2         ;TEST IF PASS 2
      036332  001405                              BEQ     37$               ;YES - SKIP
      036334  052737  000040  002426              BIS     #OUTINS,OPFLAG    ;SET MESSAGE QUALIFIER
      036342  000137  036012          36$:        JMP     15$               ;GO DO NEXT PASS
      036346  052737  000020  002426  37$:        BIS     #INOUTS,OPFLAG    ;SET MESSAGE QUALIFIER
      036354  000772                              BR      36$
      036356  052737  000200  002426  39$:        BIS     #REVSKS,OPFLAG    ;SET MESSAGE QUALIFIER
      036364  000403                              BR      41$
      036366  052737  000400  002426  40$:        BIS     #FWDSKS,OPFLAG    ;SET MESSAGE QUALIFIER
      036374  012737  000002  002444  41$:        MOV     #BIT1,WRTSWI      ;SET READ REQUIRED
      036402  000757                              BR      36$
      036404  012737  000002  002440  60$:        MOV     #2,ERRSWI         ;INIT ERROR SWITCH
      036412                          ENDSUB
 (3)  036412                          L10060:
 (3)  036412  104003                              EMT     C$ESUB
      036414                                      ESCAPE  TST               ;EXIT TEST IF ERROR
 (3)  036414  104010                              EMT     C$ESCAPE
 (3)  036416  000054                              .WORD   L10057-.
      036420  012737  000003  002444              MOV     #3,WRTSWI         ;SET FOR READ AND WRITE REQ.
      036426  023727  002654  000004              CMP     PASCNT,#4         ;TEST IF PASS 4
      036434  001004                              BNE     45$               ;NO - SKIP
      036436  012737  002342  002446              MOV     #T33TBL+10,TBLSTR ;STORE MID POINT IN TABLE
      036444  000410                              BR      48$               ;GO START PASS 4
      036446  005037  002654          45$:        CLR     PASCNT            ;CLEAR TO PASS 0
      036452  004737  017414                      JSR     PC,SWAPHD         ;GO SWAP TO HEAD 1 OR END TEST
      036456  035526                              T3300$                    ;ABORT RETURN
      036460  012737  002332  002446              MOV     #T33TBL,TBLSTR    ;STORE START OF TABLE
      036466  000137  035720          48$:        JMP     T3301$            ;GO DO HEAD 1
      036472                          T3365$:
      036472                          ENDTST
 (3)  036472                          L10057:
 (3)  036472  104001                              EMT     C$ETST
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                                          .SBTTL  *TEST 19          **OVERWRITE
036474                                    BGNTST                    ;TEST 19
(3)  036474                                                                              T19::
036474  012737  006702  002434                    MOV     #P2T19E,ERHEAD  ;SET ERROR HEADER
036502  004737  017500                            JSR     PC,CKBSVD       ;GO CHECK IF BAD SECTOR FILES VALID
036506  004737  015160                            JSR     PC,TSTINT       ;INITIALIZE TEST
036512  004737  015176                            JSR     PC,GSTATR       ;CLEAR DRIVE
036516  037600                                    T3465$
036520  005037  002654                            CLR     PASCNT          ;CLEAR PASS TO 0
036524  012705  177777                            MOV     #-1,R5          ;SET R5
036530  005737  003062                            TST     PASNUM          ;TEST IF FIRST PASS (QUICK VERIFY)
036534  001007                                    BNE     1$              ;NO - SKIP
036536  032737  000001  013372                    BIT     #ALLCYL,MISWIW  ;TEST IF USE ALL CYLINDERS
036544  001003                                    BNE     1$              ;YES - SKIP
036546  012705  177754                            MOV     #-20.,R5        ;ELSE SET R5 TO NEG 20
036552  000402                                    BR      9$              ;SKIP
036554  012705  177774                    1$:     MOV     #-4,R5          ;SET FOR NEXT ENTRY
036560  012701  002332                    9$:     MOV     #T33TBL,R1      ;GET ADDRESS OF WORK TABLE
036564  012703  000010                            MOV     #10,R3          ;SET CLEAR COUNT
036570  013721  013374                    2$:     MOV     LOLIMW,(R1)+    ;CLEAR LOCATIONS TO LOLIMIT
036574  005303                                    DEC     R3              ;DEC COUNT
036576  001374                                    BNE     2$              ;LOOP UNTIL 0
036600  113737  013376  002334                    MOVB    HILIMW,T33TBL+2 ;INSERT HILIMIT
036606  113737  013376  002340                    MOVB    HILIMW,T33TBL+6 ;INTO APPROPRIATE LOCATIONS
036614  113737  013376  002344                    MOVB    HILIMW,T33TBL+12
036622  005205                            T3400$: INC     R5              ;BUMP R5
036624  032737  000001  013372                    BIT     #ALLCYL,MISWIW  ;TEST IF USE ALL CYLINDERS
036632  001022                                    BNE     5$              ;YES - SKIP
036634  005737  003062                            TST     PASNUM          ;TEST IF FIRST PASS (QUICK VERIFY)
036640  001003                                    BNE     3$              ;NO - SKIP
036642  062705  000023                            ADD     #19.,R5         ;ELSE BUMP CYLINDER POINTER BY 19
036646  000402                                    BR      6$              ;SKIP
036650  062705  000003                    3$:     ADD     #3,R5           ;BUMP CYLINDER POINTER BY 3
036654  020527  000051                    6$:     CMP     R5,#41.         ;TEST IF PAST VALID TABLE
036660  103005                                    BHIS    4$              ;YES - SKIP
036662  116503  002352                            MOVB    CYLTBL(R5),R3   ;GET NEXT TABLE ENTRY
036666  042703  177400                            BIC     #177400,R3      ;CLEAR UPPER BYTE
036672  001011                                    BNE     8$              ;SKIP IF NOT 0
036674  000137  037600                    4$:     JMP     T3465$          ;EXIT TEST
036700  005705                            5$:     TST     R5              ;TEST IF R5 0
036702  001001                                    BNE     7$              ;NO - SKIP
036704  005205                                    INC     R5              ;ELSE BUMP R5 AGAIN
036706  022705  000377                    7$:     CMP     #255.,R5        ;TEST IF ALL CYLINDERS USED
036712  001770                                    BEQ     4$              ;YES - EXIT TEST
036714  010503                                    MOV     R5,R3           ;USE R5 AS NEXT CYLINDER
036716  020337  013374                    8$:     CMP     R3,LOLIMW       ;TEST IF PAST LO LIMIT
036722  103737                                    BLO     T3400$          ;YES - SKIP
036724  020337  013376                            CMP     R3,HILIMW       ;TEST IF PAST HILIMIT
036730  101334                                    BHI     T3400$          ;YES - SKIP
036732  012704  002332                            MOV     #T33TBL,R4      ;GET ADDRESS OF SEEK TABLE
036736  110364  000001                            MOVB    R3,1(R4)        ;INSERT CC IN APPROPRIATE TABLE
036742  110364  000003                            MOVB    R3,3(R4)        ; LOCATIONS FOR TEST SEEK SEQUENCE
036746  110364  000005                            MOVB    R3,5(R4)
036752  110364  000007                            MOVB    R3,7(R4)
036756  110364  000011                            MOVB    R3,11(R4)
036762  110364  000013                            MOVB    R3,13(R4)
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 3875  036766  010437  002446                    MOV     R4,TBLSTR          ;STORE TABLE ADDRESS
 3876  036772  004737  017370                    JSR     PC,CHOSHD          ;GO CHOSE HEAD
 3877  036776                           T3401$:
 3878  036776                           BGNSUB
  (3)  036776                                                                                      T19.1:
  (3)  036776  104002                            EMT     C$BSUB
 3879  037000  042737  003760  002426            BIC     #MQUALS,OPFLAG     ;CLEAR ALL MESSAGE QUALIFIERS
 3880  037006  005737  002654                    TST     PASCNT             ;TEST IF PASS 0
 3881  037012  001414                            BEQ     11$                ;YES - SKIP
 3882  037014  023727  002654  000003            CMP     PASCNT,#3          ;TEST IF PASS 3
 3883  037022  001404                            BEQ     10$                ;YES - SKIP
 3884  037024  002407                            BLT     11$                ;CHECK IF LESS THAN 3, IF YES CLEAR TO 0
 3885  037026  012737  000003  002654            MOV     #3,PASCNT          ;ELSE SET TO 3
 3886  037034  052737  000020  002426  10$:      BIS     #INOUTS,OPFLAG     ;SET MESSAGE QUAL
 3887  037042  000405                            BR      12$                ;SKIP
 3888  037044  005037  002654          11$:      CLR     PASCNT             ;SET PASS COUNT TO 0
 3889  037050  052737  000040  002426            BIS     #OUTINS,OPFLAG     ;SET MESSAGE QUAL
 3890  037056  012737  000003  002444  12$:      MOV     #3,WRTSWI          ;SET READ AND WRITE SWITCH
 3891  037064  013704  002446                    MOV     TBLSTR,R4          ;GET STORED TABLE ADDRESS
 3892  037070  005037  002536          15$:      CLR     DESSEC             ;CLEAR TO SECTOR 0
 3893  037074  112437  002524                    MOVB    (R4)+,NEWCYL       ;GET NEXT TABLE ENTRY
 3894  037100  004737  016070                    JSR     PC,XSEEK           ;DO SEEK
 3895  037104  037512                            60$
 3896  037106  012701  005670                    MOV     #3000.,R1          ;SET WAIT COUNT FOR 300 MS
 3897  037112  004737  020650                    JSR     PC,RDYWAIT         ;WAIT FOR READY
 3898  037116  037512                            60$
 3899  037120  112437  002524                    MOVB    (R4)+,NEWCYL       ;GET NEXT TABLE ENTRY
 3900  037124  004737  016070                    JSR     PC,XSEEK           ;DO SEEK
 3901  037130  037512                            60$
 3902  037132  012701  005670                    MOV     #3000.,R1          ;SET WAIT COUNT FOR 300 MS
 3903  037136  004737  020650                    JSR     PC,RDYWAIT         ;WAIT FOR READY
 3904  037142  037512                            60$
 3905  037144  004737  021244                    JSR     PC,VERPOS          ;VERIFY POSITION
 3906  037150  037512                            60$
 3907  037152  004737  023074          16$:      JSR     PC,BSCHK           ;CHECK FOR BAD SECTOR
 3908  037156  037326                            32$                        ;"YES" RETURN
 3909  037160  005737  002654                    TST     PASCNT             ;TEST IF PASS 0
 3910  037164  001407                            BEQ     17$                ;YES - SKIP
 3911  037166  022737  000003  002654            CMP     #3,PASCNT          ;TEST IF PASS 3
 3912  037174  001403                            BEQ     17$                ;YES - SKIP
 3913  037176  005037  037216                    CLR     25$                ;ELSE CLEAR DATA PATTERN SELECTOR
 3914  037202  000403                            BR      18$
 3915  037204  012737  000010  037216  17$:      MOV     #8.,25$            ;SET DATA PATTERN SELECTOR TO 8
 3916  037212  004537  021726          18$:      JSR     R5,DATGEN          ;GO GENERATE DATA
 3917  037216  000000                  25$:      .WORD   0
 3918  037220  032737  000001  002444            BIT     #BIT0,WRTSWI       ;TEST IF WRITE THIS PASS
 3919  037226  001425                            BEQ     29$                ;NO - SKIP
 3920  037230  004737  022354                    JSR     PC,XWRITE          ;DO WRITE
 3921  037234  037512                            60$
 3922  037236  005237  002536                    INC     DESSEC             ;INC SECTOR
 3923  037242  022737  000050  002536            CMP     #40.,DESSEC        ;TEST IF ALL SECTORS USED
 3924  037250  001340                            BNE     16$                ;NO - SKIP
 3925  037252  042737  000060  002426            BIC     #INOUTS!OUTINS,OPFLAG ;CLEAR QUALIFIERS
 3926  037260  042737  000001  002444            BIC     #BIT0,WRTSWI       ;CLEAR WRITE REQUIRED SWITCH
 3927  037266  052737  000100  002426            BIS     #FOLWRT,OPFLAG     ;SET FOLLOWING WRITE QUALIFIER
 3928  037274  005037  002536                    CLR     DESSEC             ;CLEAR TO SECTOR 0
 3929  037300  000724                           BR      16$                     ;SKIP
 3930  037302  032737  000002  002444   29$:    BIT     #BIT1,WRTSWI            ;TEST IF READ THIS PASS
 3931  037310  001414                           BEQ     33$                     ;NO - SKIP
 3932  037312  004737  022414           31$:    JSR     PC,XREAD                ;ELSE DO READ
 3933  037316  037512                           60$
 3934  037320  004737  022066                   JSR     PC,DATCOM               ;COMPARE DATA
 3935  037324  037512                           60$
 3936  037326  005237  002536           32$:    INC     DESSEC                  ;BUMP SECTOR
 3937  037332  022737  000050  002536           CMP     #40.,DESSEC             ;TEST IF ALL SECTORS USED
 3938  037340  001304                           BNE     16$                     ;NO - LOOP
 3939  037342  005037  002536           33$:    CLR     DESSEC                  ;CLEAR DESIRED SECTOR
 3940  037346  005037  002444                   CLR     WRTSWI                  ;CLEAR WRITE/READ SWITCH
 3941  037352  005237  002654                   INC     PASCNT                  ;BUMP PASS COUNT
 3942  037356  042737  003760  002426           BIC     #MQUALS,OPFLAG          ;CLEAR ALL QUALIFIERS
 3943  037364  023727  002654  000003           CMP     PASCNT,#3               ;TEST IS PASS 3
 3944  037372  001447                           BEQ     60$                     ;YES - SKIP
 3945  037374  023727  002654  000006           CMP     PASCNT,#6               ;TEST IF PASS 6
 3946  037402  001443                           BEQ     60$                     ;YES - SKIP
 3947  037404  023727  002654  000001           CMP     PASCNT,#1               ;TEST IF PASS 1
 3948  037412  001424                           BEQ     39$                     ;YES - SKIP
 3949  037414  023727  002654  000004           CMP     PASCNT,#4               ;TEST IF PASS 4
 3950  037422  001424                           BEQ     40$                     ;YES - SKIP
 3951  037424  012737  000002  002444           MOV     #BIT1,WRTSWI            ;SET WRITE REQUIRED BIT
 3952  037432  023727  002654  000002           CMP     PASCNT,#2               ;TEST IF PASS 2
 3953  037440  001405                           BEQ     37$                     ;YES - SKIP
 3954  037442  052737  001000  002426           BIS     #REVSKO,OPFLAG          ;SET REVERSE QUALIFIER
 3955  037450  000137  037070           36$:    JMP     15$                     ;GO DO NEXT PASS
 3956  037454  052737  002000  002426   37$:    BIS     #FWDSKO,OPFLAG          ;SET FWD QUALIFIER
 3957  037462  000772                           BR      36$                     ;GO DO NEXT PASS
 3958  037464  052737  000020  002426   39$:    BIS     #INOUTS,OPFLAG          ;SET QUALIFIER
 3959  037472  000403                           BR      41$                     ;SKIP
 3960  037474  052737  000040  002426   40$:    BIS     #OUTINS,OPFLAG          ;SET MESSAGE QUALIFIER
 3961  037502  012737  000001  002444   41$:    MOV     #BIT0,WRTSWI            ;SET WRITE REQUIRED BIT
 3962  037510  000757                           BR      36$                     ;GO DO NEXT PASS
 3963  037512  012737  000002  002440   60$:    MOV     #2,ERRSWI               ;INIT ERROR SWITCH
 3964  037520                                  ENDSUB
  (3)  037520                                  L10062:
  (3)  037520  104003                           EMT     C$ESUB
 3965  037522                                   ESCAPE  TST                     ;EXIT TEST IF ERROR
  (3)  037522  104010                           EMT     C$ESCAPE
  (3)  037524  000054                           .WORD   L10061-.
 3966  037526  012737  000003  002444           MOV     #3,WRTSWI               ;SET FOR READ AND WRITE REQ.
 3967  037534  023727  002654  000003           CMP     PASCNT,#3               ;TEST IF PASS 3
 3968  037542  001004                           BNE     45$                     ;NO - SKIP
 3969  037544  012737  002340  002446           MOV     #T33TBL+6,TBLSTR ;STORE MID POINT IN TABLE
 3970  037552  000410                           BR      48$                     ;GO START PASS 4
 3971  037554  005037  002654           45$:    CLR     PASCNT                  ;CLEAR TO PASS 0
 3972  037560  004737  017414                   JSR     PC,SWAPHD               ;GO SWAP TO HEAD ONE OR ABORT TEST
 3973  037564  036622                           T3400$                          ;ABORT RETURN
 3974  037566  012737  002332  002446           MOV     #T33TBL,TBLSTR          ;STORE START OF TABLE
 3975  037574  000137  036776           48$:    JMP     T3401$                  ;GO DO HEAD 1
 3976  037600                                  T3465$:
 3977  037600                                  ENDTST
  (3)  037600                                  L10061:
  (3)  037600  104001                           EMT     C$ETST
 3978  037602                                  ENDMOD
```

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  3980  037602                             BGNMOD  HRDPRM
  3981  037602                             BGNHRD
   (3)  037602  000025                             .WORD L10063-L$HARD/2
  3982  037604                             GPRML   CNTYPE,CNT,1,YES
   (4)  037604  004130                             .WORD   T$CODE
   (4)  037606  037720                             .WORD   CNTYPE
   (4)  037610  000001                             .WORD   1
  3983  037612                             GPRMA   CSRMSG,CSR,0,160000,177776,YES
   (4)  037612  000031                             .WORD   T$CODE
   (4)  037614  037656                             .WORD   CSRMSG
   (4)  037616  160000                             .WORD   T$LOLIM
   (4)  037620  177776                             .WORD   T$HILIM
  3984  037622                             GPRMA   VECMSG,VECT,0,0,776,YES
   (4)  037622  001031                             .WORD   T$CODE
   (4)  037624  037672                             .WORD   VECMSG
   (4)  037626  000000                             .WORD   T$LOLIM
   (4)  037630  000776                             .WORD   T$HILIM
  3985  037632                             GPRMD   BRMSG,PRIOR,0,340,0,7,YES
   (4)  037632  002032                             .WORD   T$CODE
   (4)  037634  037701                             .WORD   BRMSG
   (4)  037636  000340                             .WORD   340
   (4)  037640  000000                             .WORD   T$LOLIM
   (4)  037642  000007                             .WORD   T$HILIM
  3986  037644                             GPRMD   DRMSG,DRSB,0,3400,0,7,YES
   (4)  037644  003032                             .WORD   T$CODE
   (4)  037646  037712                             .WORD   DRMSG
   (4)  037650  003400                             .WORD   3400
   (4)  037652  000000                             .WORD   T$LOLIM
   (4)  037654  000007                             .WORD   T$HILIM
  3987
  3988  037656                             ENDHRD
   (2)                                             .EVEN
   (3)  037656                             L10063:
  3989
  3990  037656  052502  020123  042101    CSRMSG: .ASCIZ  /BUS ADDRESS/
        037664  051104  051505  000123
  3991  037672  042526  052103  051117    VECMSG: .ASCIZ  /VECTOR/
        037700     000
  3992  037701     102  020122  042514    BRMSG:  .ASCIZ  /BR LEVEL/
        037706  042526  000114
  3993  037712  051104  053111  000105    DRMSG:  .ASCIZ  /DRIVE/
  3994  037720  046122  030461     000    CNTYPE: .ASCIZ  /RL11/
  3995  037725                             ENDMOD
  3996          037726                             .EVEN
  3997
  3998  037726                             BGNMOD  SFTPRM
  3999  037726                             BGNSFT
   (3)  037726  000061                             .WORD L10064-L$SOFT/2
  4000
  4002  037730                             GPRML   CYLQ,MISWI,1,YES
   (4)  037730  000130                             .WORD   T$CODE
   (4)  037732  040072                             .WORD   CYLQ
   (4)  037734  000001                             .WORD   1
  4003  037736                             GPRML   SECQ,MISWI,2,YES
   (4)  037736  000130                             .WORD   T$CODE
   (4)  037740  040114                             .WORD   SECQ
```

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     (4)  037742  000002                             .WORD     2
    4009  037744                          GPRML      MANQ,MISWI,100000,YES
     (4)  037744  000130                             .WORD     T$CODE
     (4)  037746  040134                             .WORD     MANQ
     (4)  037750  100000                             .WORD     100000
    4010
    4012  037752                          GPRML      LOLIMQ,MISWI,40000,YES
     (4)  037752  000130                             .WORD     T$CODE
     (4)  037754  040176                             .WORD     LOLIMQ
     (4)  037756  040000                             .WORD     40000
    4013  037760                                     XFERF     1$
     (5)  037760  006044                             .WORD     T$CODE
    4014  037762                                     GPRMD     LIMVAL,LOLIM,D,255.,0,253.,YES
     (4)  037762  001052                             .WORD     T$CODE
     (4)  037764  040217                             .WORD     LIMVAL
     (4)  037766  000377                             .WORD     255.
     (4)  037770  000000                             .WORD     T$LOLIM
     (4)  037772  000375                             .WORD     T$HILIM
    4015  037774                          1$:        GPRML     HILIMQ,MISWI,20000,YES
     (4)  037774  000130                             .WORD     T$CODE
     (4)  037776  040233                             .WORD     HILIMQ
     (4)  040000  020000                             .WORD     20000
    4016  040002                                     XFERF     2$
     (5)  040002  006044                             .WORD     T$CODE
    4017  040004                                     GPRMD     LIMVAL,HILIM,D,255.,0,255.,YES
     (4)  040004  002052                             .WORD     T$CODE
     (4)  040006  040217                             .WORD     LIMVAL
     (4)  040010  000377                             .WORD     255.
     (4)  040012  000000                             .WORD     T$LOLIM
     (4)  040014  000377                             .WORD     T$HILIM
    4018  040016                          2$:        GPRML     HEADQ,MISWI,10000,YES
     (4)  040016  000130                             .WORD     T$CODE
     (4)  040020  040254                             .WORD     HEADQ
     (4)  040022  010000                             .WORD     10000
    4019  040024                                     XFERF     3$
     (5)  040024  006044                             .WORD     T$CODE
    4020  040026                                     GPRMD     HEADV,HEAD,D,17,0,1,YES
     (4)  040026  003052                             .WORD     T$CODE
     (4)  040030  040301                             .WORD     HEADV
     (4)  040032  000017                             .WORD     17
     (4)  040034  000000                             .WORD     T$LOLIM
     (4)  040036  000001                             .WORD     T$HILIM
    4022  040040                          3$:        GPRMD     ERLIMQ,ERLIM,D,377,0,377,YES
     (4)  040040  004052                             .WORD     T$CODE
     (4)  040042  040332                             .WORD     ERLIMQ
     (4)  040044  000377                             .WORD     377
     (4)  040046  000000                             .WORD     T$LOLIM
     (4)  040050  000377                             .WORD     T$HILIM
    4024  040052                                     GPRMD     DCLIMQ,DCLIM,D,377,1,377,YES
     (4)  040052  005052                             .WORD     T$CODE
     (4)  040054  040410                             .WORD     DCLIMQ
     (4)  040056  000377                             .WORD     377
     (4)  040060  000001                             .WORD     T$LOLIM
     (4)  040062  000377                             .WORD     T$HILIM
    4026  040064                          GPRML      AUTOQ,MISWI,20,YES
     (4)  040064  000130                             .WORD     T$CODE
```

```
   (4)  040066  040356                                  .WORD   AUTOQ
   (4)  040070  000020                                  .WORD   20
  4027  040072                              ENDSFT
   (2)                                                  .EVEN
   (3)  040072                              L10064:
  4028
  4030  040072  051525  020105  046101      CYLQ:       .ASCIZ  /USE ALL CYLINDERS/
        040100  020114  054503  044514
        040106  042116  051105  000123
  4031  040114  051525  020105  046101      SECQ:       .ASCIZ  /USE ALL SECTORS/
        040122  020114  042523  052103
        040130  051117  000123
  4037  040134  054105  041505  052125      MANQ:       .ASCIZ  /EXECUTE MANUAL INTERVENTION TESTS/
        040142  020105  040515  052516
        040150  046101  044440  052116
        040156  051105  042526  052116
        040164  047511  020116  042524
        040172  052123  000123
  4039  040176  047514  042527  020122      LOLIMQ:     .ASCIZ  /LOWER SEEK LIMIT/
        040204  042523  045505  046040
        040212  046511  052111     000
  4040  040217     105  052116  051105      LIMVAL:     .ASCIZ  /ENTER VALUE/
        040224  053040  046101  042525
        040232     000
  4041  040233     125  050120  051105      HILIMQ:     .ASCIZ  /UPPER SEEK LIMIT/
        040240  051440  042505  020113
        040246  044514  044515  000124
  4042  040254  051525  020105  047117      HEADQ:      .ASCIZ  /USE ONLY ONE SURFACE/
        040262  054514  047440  042516
        040270  051440  051125  040506
        040276  042503     000
  4043  040301     123  042520  044503      HEADV:      .ASCIZ  /SPECIFY SURFACE (0 OR 1)/
        040306  054506  051440  051125
        040314  040506  042503  024040
        040322  020060  051117  030440
        040330  000051
  4045  040332  050123  041505  043111      ERLIMQ:     .ASCIZ  /SPECIFY ERROR LIMIT/
        040340  020131  051105  047522
        040346  020122  044514  044515
        040354  000124
  4046  040356  051104  050117  042040      AUTOQ:      .ASCIZ  /DROP DRIVE IF NO RESPONSE/
        040364  044522  042526  044440
        040372  020106  047516  051040
        040400  051505  047520  051516
        040406  000105
  4048  040410  040504  040524  041440      DCLIMQ:     .ASCIZ  /DATA COMPARE ERROR LIMIT/
        040416  046517  040520  042522
        040424  042440  051122  051117
        040432  046040  046511  052111
        040440     000
  4050          040442                                  .EVEN
  4051  040442                              ENDMOD
  4052
  4063
  4065
  4066          040514                      .=40514
```

```
 4067
 4068                                  ;AREA RESERVED AS PATCH AREA FOR DIAGNOSTIC
 4069                                  ;.=40514 WAS SELECTED AS ''LASTAD'' TO PROVIDE APT TO LSI-11 COMPATIBILITY.
 4070                                  ;BIT 7 OF ''LASTAD'' MUST BE CLEARED TO ACHIEVE A VALID MAILBOX ADDRESS
 4071                                  ;WHEN RUNNING ON THE LSI-11 UNDER APT.
 4073
 4074  040514                          LASTAD
  (2)                                          .EVEN
  (3)  040514                          L$LAST::
```

```
  4076                                            .SBTTL  DIAGNOSTIC SUPERVISOR -- LOW CORE SET UP
 14947  071310  000000                            .WORD   0                   ;SPACE FOR USER POOL POINTER
 14948  071312  000000                            .WORD   0                   ;SIZE
 14949  071314  000000                            .WORD   0                   ;CHECKSUM (NOT CURRENTLY USED)
 14950  071316  000000                            .WORD   0                   ;SIZE OF H.W. PTAB. ALLOCATION
 14951          071322                            END.SUPV=.+2
 14952          000200                            .END 200
```

```
ABOFLA  041040 G    BIT7  = 000200 G    CONHNG= 000004      C$KWON= 000034      DRSELT= 000004
ABOPAS  040756 G    BIT8  = 000400 G    CONTCL  067672 G    C$LOOP= 000100      DRSET = 000010
ABO.FM  043320      BIT9  = 001000 G    CONTIN  013650      C$MANI= 000051      DRVCNT  002516
AFMID   002632      BLD.HW  046202      COSTAT= 000040      C$MSG = 000023      DRVERR= 040000
AFMIDU  002634      BLOCK   063614      COUNT   002656      C$PNTB= 000014      DRVNAM  005633
AFSI    040546 G    BRMSG   037701      CRDYMS= 000200      C$PNTF= 000017      DRVNAV  005640
ALLCYL= 000001      BSCHK   023074      CRLF    060172      C$PNTS= 000016      DSESTA= 000400
ALLOC   061460      BSFLAG  002442      CSNAM   005733      C$PNTX= 000015      DSMSK = 001400
ALLSEC= 000002      BSFVAL  003074      CSR   = 000000      C$POIN= 000040      DSPCOD  013406 G
ANYERR= 100000      BSNSTR  007442      CSRMSG  037656      C$QIO = 000377      DUNIT.  040762 G
APT.ER  042450      BYPSNM  007353      CURCYL  002526      C$RDBU= 000007      DVC.FT  054042
ARMID   002636      B$AAB   047604      CURR.S  040522 G    C$REFG= 000050      D$AAG   054746
ARMIDU  002640      B$AAF   047516      CURR.T  040524 G    C$REQT= 000045      D$AAH   054764
ASSEMB= 000010      CAFDT   010510      CYLQ    040072      C$RESE= 000033      D$AAI   057532
AUTOQ   040356      CALLPC= 000022      CYLTBL  002352      C$REVI= 000002      D$AAJ   057536
AUTOSZ= 000020      CALLPS= 000024      CYLUP = 000004      C$RPT = 000025      D$AAK   057554
A$AAV   045316      CALLSP= 000026      CYLWD   007340      C$SEFG= 000047      D$AAL   057572
A$AAW   045332      CALLTC= 000030      C$AAD   053062      C$SPRI= 000041      D$AAM   057602
A$AAX   045344      CAL.CL  066202      C$AAE   053074      C$SVEC= 000037      EF.CON= 000036 G
A$AAY   045352      CAL.TI  066240 G    C$AAK   054072      C$TPRI= 000013      EF.NEW= 000035 G
A$AAZ   045366      CAMSK = 077600      C$AAL   054236      C$UNBU= 000031      EF.PWR= 000034 G
A$ABA   045376      CCYLUP  010477      C$ABRT= 000021      C$WTM = 000026      EF.RES= 000037 G
BADADD= 004000      CHKLUP  047620      C$ADR = 000020      C$WTU = 000027      EF.STA= 000040 G
BAMSK = 000060      CHKSTR  062022      C$AU  = 000054      C10MS   010456      EF01  = 000001 G
BANAM   005740      CHKTTY  060110      C$BRK = 000022      C5SEC   010522      EF02  = 000002 G
BASADD  005622      CHK.MA  045760      C$BSEG= 000004      C500MS  010471      EF03  = 000003 G
BELL    010377      CHK.PC  053110      C$BSUB= 000002      DANAM   005745      EF04  = 000004 G
BGN.SU= 040514      CHK.SW  042150      C$BUFF= 000030      DATACM= 000001      EF05  = 000005 G
BHSTAT= 000010      CHOSHD  017370      C$CEFG= 000046      DATCOM  022066      EF06  = 000006 G
BINMSG  057770      CHRCNT  061342      C$CLEA= 000012      DATGEN  021726      EF07  = 000007 G
BIT0  = 000001 G    CH.FLA  045466      C$CLP1= 000006      DCKERR= 004000      EF08  = 000010 G
BIT00 = 000001 G    CH.PAS  045504      C$CVEC= 000036      DCLIM = 000012      EF09  = 000011 G
BIT01 = 000002 G    CKBSVD  017500      C$DCLN= 000044      DCLIMQ  040410      EF10  = 000012 G
BIT02 = 000004 G    CKDATA= 000102      C$DODU= 000053      DCLIMW  013404      EF11  = 000013 G
BIT03 = 000010 G    CKERLM  014634      C$DRPT= 000024      DECMSG  060004      EF12  = 000014 G
BIT04 = 000020 G    CLEAR.  047102      C$DU  = 000055      DESDIF  002530      EF13  = 000015 G
BIT05 = 000040 G    CLKACC  040754 G    C$EDIT= 000002      DESHD   002534      EF14  = 000016 G
BIT06 = 000100 G    CLKBFR  066204      C$ERDF= 000002      DESSEC  002536      EF15  = 000017 G
BIT07 = 000200 G    CLKCNT  040752 G    C$ERHR= 000003      DESSGN  002532      EF16  = 000020 G
BIT08 = 000400 G    CLKJUM  066610 G    C$ERSF= 000001      DEV.CO  040526 G    EMT.TR  041044 G
BIT09 = 001000 G    CLKRES  067612 G    C$ERSO= 000004      DIAGMC= 000000      END.OF  047070
BIT1  = 000002 G    CLKSER  067746 G    C$ESCA= 000010      DIAG.T  041046 G    END.SU= 071322
BIT10 = 002000 G    CLKSON  041012 G    C$ESEG= 000005      DIFAUG  002520      ENVIRO  040566 G
BIT11 = 004000 G    CLK.SE  045562      C$ESUB= 000003      DIFWD   007314      EOP.CH  067770 G
BIT12 = 010000 G    CLNCOD  014444 G    C$ETST= 000001      DIRBIT= 000004      EOP.FM  043334
BIT13 = 020000 G    CLRPAR  024474      C$EXIT= 000032      DIRMSK= 077600      EOP.IN  045500
BIT14 = 040000 G    CLR.MA  046036      C$GMAN= 000043      DLTERR= 010000      ERHEAD  002434
BIT15 = 100000 G    CNT   = 000010      C$GPHR= 000042      DONE    002430      ERLIM = 000010
BIT2  = 000004 G    CNTYPE  037720      C$GPRI- 000040      DPDVD   070456 G    ERLIMQ  040332
BIT3  = 000010 G    CNVT    064260      C$GTIM= 000052      DPMUL   070344 G    ERLIMW  013402
BIT4  = 000020 G    COMMAN  040564 G    C$INIT= 000011      DRDYMS= 000001      ERRCNT  002662
BIT5  = 000040 G    COMMTA  064074      C$INLP= 000020      DRMSG   037712      ERRFOR  054314
BIT6  = 000100 G    COMPOP= 007777      C$KWOF= 000035      DRSB  = 000006      ERRHAN  053114
```

```
ERRPOI  002660      FMT26   011500      G$EXCP= 000400      HNFERR= 010000      LABOCF  007062
ERRSWI  002440      FMT27   011524      G$HILI= 000002      HOLDSP= 000020      LABOCR  007076
ERRVEC  002652      FMT28   011543      G$LOLI= 000001      HOSTAT= 000020      LABOUT  007043
ERR.HR  054052      FMT3    010643      G$NO  = 000000      HPTCOD  013354 G    LAB1    005757
ERR.NU  040516 G    FMT4    010646      G$OFFS= 000400      HRDPRM  037602 G    LAB2    005772
ERR.SF  054056      FMT5    010657      G$OFSI= 000376      HRDWTS  024524 G    LIMVAL  040217
ERR1    011554 G    FMT6    010677      G$PRMA= 000001      HRIN    002622      LINE.F  041042 G
ERR1FO  054400      FMT7    010741      G$PRMD= 000002      HRINU   002624      LOAD.F  045502
ERR10   013144 G    FMT8    011011      G$PRML= 000000      HROUT   002626      LOCERR  003066
ERR2    011622 G    FMT9    011043      G$RADA= 000140      HROUTU  002630      LOCYL = 040000
ERR3    011670 G    FOLWRT= 000100      G$RADB= 000000      HSMSK = 000100      LOGMSG  060012
ERR4    011736 G    FORM.T  054410      G$RADD= 000040      HSSTAT= 000100      LOLIM = 000002
ERR5    012006 G    FREE    061716      G$RADF= 000200      HW.ADR  040550 G    LOLIMQ  040176
ERR6    012056 G    FRMWD   007345      G$RADL= 000120      H$AAB   064606      LOLIMW  013374
ERR7    012734 G    FWDSKO= 002000      G$RADO= 000020      IBUFF   003466      LPBFR   040622 G
ERR8    013004 G    FWDSKS= 000400      G$RADT= 000100      INJNIT  040772 G    LPCNTR  040620 G
ERR9    013100 G    F$AU  = 000015      G$XFER= 000004      INITCO  013456 G    LPT.AD  045144
ESC.PC  053106      F$BGN = 000040      G$YES = 000010      INITIA  060020      LPT.RE  045140
EV.COU  040520 G    F$CLEA= 000007      HADONE  002432      INIT.M  046104      LSI.RE  045134
EXACYL  002646      F$DU  = 000016      HCESTA= 040000      INIT.R  040606 G    LUP     066106
EXHCYL  002644      F$END = 000041      HCORED  045256      INOUTS= 000020      LUP.AD  053112
EXOCYL  002642      F$HARD= 000004      HCOREQ  045166      INPUTA  060746      L$APT   002036 G
EXROT   002650      F$HW  = 000013      HCORET  041002 G    INTEBL= 000100      L$AUT   002074 G
FBSFIL  003272      F$INIT= 000006      HCRCER= 004000      INTFOR  054244      L$CCP   002106 G
FILL    060640      F$JMP = 000050      HC.ADR  040552 G    INTHLR  014576 G    L$CLEA  014444 G
FILL.C  000204 G    F$MOD = 000000      HC.DEF  040544 G    INVAL.  045052      L$CO    002032 G
FLAGS   040560 G    F$MSG = 000011      HC.DIA  040542 G    INVINT  054102      L$DEPO  002011 G
FLAGS1  040562 G    F$PWR = 000017      HDALIG= 000010      INV.SW  042104      L$DESC  002102 G
FLAGTA  064012      F$RPT = 000012      HDCYL = 077600      IN.SUF  047054      L$DEVP  002064 G
FLAG.I  045546      F$SEG = 000003      HDHSEL= 000100      I$AU  = 000041      L$DISP  013410 G
FLA.SE  063760      F$SOFT= 000005      HDMOVF  007172      I$CLN = 000041      L$DR    002112 G
FLG.MA  045506      F$SRV = 000010      HDRCMP= 000002      I$DU  = 000041      L$DRCT  002070 G
FMTOP1  010532      F$SUB = 000002      HDR40 = 100000      I$HRD = 000041      L$DRS   002072 G
FMTOP2  010561      F$SW  = 000014      HDSEC = 000077      I$INIT= 000041      L$DRST  002112 G
FMTOP3  010603      F$TEST= 000001      HDSEL = 000020      I$MOD = 000041      L$DTP   002040 G
FMT1    010624      GARBAG  061344      HDWD    007327      I$MSG = 000041      L$DU    014564 G
FMT1.1  010631      GETCHR  060050      HDWRD1  002474      I$PWR = 000041      L$DUT   002076 G
FMT11   011050      GETCMN  063434      HDWRD2  002476      I$RPT = 000041      L$DVTY  002114 G
FMT12   011056      GETPAR  055126      HDWRD3  002500      I$SEG = 000041      L$EF    002056 G
FMT13   011064      GETPOS  021116      HEAD  = 000006      I$SFT = 000041      L$EFLG  002034 G
FMT14   011130      GETSTA= 000003      HEADLM= 010000      I$SRV = 000041      L$EXP1  002042 G
FMT15   011162      GETSWI  062430      HEADQ   040254      I$SUB = 000041      L$EXP2  002044 G
FMT16   011216      GET.TW  062200      HEADV   040301      I$TST = 000041      L$EXP3  002046 G
FMT17   011227      GLBDAT  002122 G    HEADW   013400      J$JMP = 000167      L$HARD  037604 G
FMT18   011251      GLBEQA  002122 G    HERTZ.  045126      KBPTR   040624 G    L$HPCP  002016 G
FMT19   011303      GLBERR  011554 G    HFIN    002612      KBUF    040626 G    L$HPTP  002022 G
FMT2    010640      GLBSUB  014570 G    HFINU   002614      LABACF  007142      L$HW    013356 G
FMT20   011340      GLBTXT  004744 G    HFOUT   002616      LABACR  007156      L$ICP   002104 G
FMT21   011370      GSTAT   015226      HFOUTU  002620      LABEXP  007051      L$INIT  013456 G
FMT22   011413      GSTATC  015212      HICYL = 020000      LABHCF  007112      L$LADP  002026 G
FMT23   011447      GSTATG  015236      HILIM = 000004      LABHCR  007126      L$LAST  040514 G
FMT24   011463      GSTATR  015176      HILIMQ  040233      LABIN   007026      L$MREV  002050 G
FMT25   011470      GTSTAT= 000104      HILIMW  013376      LABMID  007034      L$NAME  002000 G
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L$REPP  002066 G    L10043  027574      MHCRC   007566      NOPWR   005673      PAT1    004466
L$REV   002010 G    L10044  030130      MHDERR  010051      NO.CLK  045102      PAT10   004742
L$SOFT  037730 G    L10045  030076      MHDRCP  005071      NO.FLA  063772      PAT2    004470
L$SPC   002062 G    L10046  031676      MHFCRC  007635      NO.LPT  061310      PAT3    004530
L$SPCP  002020 G    L10047  032406      MHNF    007607      NO.PTA  045306      PAT4    004570
L$SPTP  002024 G    L10050  032622      MINOUT  005235      NR    = 000000      PAT5    004630
L$STA   002030 G    L10051  032546      MIN.IN  040572 G    NUMBIN  054434      PAT6    004636
L$SW    013372 G    L10052  033346      MIN.US  040574 G    NUM.LA  054602      PAT7    004676
L$TIML  002014 G    L10053  034370      MISWI = 000000      NUM.NO  040556 G    PAT8    004700
L$TIMU  002054 G    L10054  034310      MISWIW  013372      NUM.UN  041164      PAT9    004740
L$TIM1  002052 G    L10055  035362      MITEST= 100000      NUNITS  047572      PH65$   017072
L$TSTI  002100 G    L10056  035242      MNDRST  010141      NXMERR= 020000      POSHDS  016570
L$UNIT  002012 G    L10057  036472      MNEERR  010114      NXTFOR  064252      POSHDO  020624
L.BA    002460      L10060  036412      MNOCLR  006141      NXTPAS  013670      POSHSB  020620
L.CLK.  045112      L10061  037600      MNOINT  006062      OBUFF   004066      POSHW1  020612
L.CS    002456      L10062  037520      MODR    070256 G    OCTMSG  057776      PRINTC  061320
L.DA    002462      L10063  037656      MOPER   005143      OFIN    002562      PRINTF  064626
L.MP    002464      L10064  040072      MOPERR  010032      OFINU   002564      PRIOR = 000004
L10000  011620      MAJ.IN  040576 G    MORECE  002436      OFMID   002566      PRI00 = 000000 G
L10001  011666      MAJ.LO  066206      MOUTIN  005214      OFMIDU  002570      PRI01 = 000040 G
L10002  011734      MAJ.US  040600 G    MPNAM   005752      OFOUT   002572      PRI02 = 000100 G
L10003  012004      MANQ    040134      MQUALS= 003760      OFOUTU  002574      PRI03 = 000140 G
L10004  012054      MAN.TI  001244      MREAD   004752      OLDCYL  002522      PRI04 = 000200 G
L10005  012732      MAPROX  007016      MREADH  004765      ONSWAP  017454      PRI05 = 000240 G
L10006  013002      MAP16   070714 G    MRESKO  005426      OPFLAG  002426      PRI06 = 000300 G
L10007  013076      MASK.B  047616      MREVSK  005304      OPIERR= 002000      PRI07 = 000340 G
L10010  013142      MASK.W  047614      MRLFAL  010246      OPMSGS  002122      PRNTST  061210
L10011  013352      MBADAD  005462      MRSLT   005157      OPR004  007277      PRO.CM  045460
L10012  013370      MBADSF  005503      MSEEK   004744      OPR1A   007250      PSETNM  003064
L10013  013406      MBSET0= 000001      MSG.AD  040540 G    OPR1B   007254      PTAB.S  041000 G
L10014  014442      MCERR   007554      MSG.TY  040514 G    OPR12   007231      PUTCHR  060024
L10015  014562      MCONHN  006115      MSPERR  007726      ORIN    002576      PWCON   014004
L10016  014566      MCYLOC  010134      MSTERR  007761      ORINU   002600      PWRFLG  003072
L10017  014632      MCYLUP  005204      MTMBS   005560      ORMID   002602      PWR.FA  071150 G
L10020  025044      MDATCP  005046      MTOSLO  006013      ORMIDU  002604      PWR.FL  040604 G
L10021  025010      MDCRC   007576      MUL     070212 G    OROUT   002606      PWR.MS  071276
L10022  025334      MDHEDR  002000 G    MULOAD  005173      OROUTU  002610      PWR.SA  071272
L10023  025300      MDLT    007623      MUNDEF  010201      OUTINS= 000040      PWR.UP  071274
L10024  025546      MDRDY   007543      MWDERR  010015      O$APTS= 000000      P.CLK.  045120
L10025  025530      MDRERR  007665      MWGERR  007744      O$AU  = 000000      P2T01E  006225
L10026  025756      MDRRES  006032      MWORD   006005      O$BGNR= 000000      P2T02E  006225
L10027  025754      MDRVST  007713      MWRCHK  005002      O$BGNS= 000001      P2T03E  006244
L10030  026166      MDSERR  007676      MWRITE  005016      O$DU  = 000001      P2T04E  006270
L10031  026164      MEM.SI  045154      MWRSET  005127      O$GNSW= 000001      P2T05E  006312
L10032  026412      MERRS   010370      MWRTAB  010307      O$POIN= 000001      P2T06E  006334
L10033  026410      MEXERS  010325      M40HDR  005113      PARSES  063506      P2T07E  006356
L10034  026612      MFLERR  010066      NEWCYL  002524      PART2 = 000000      P2T08E  006402
L10035  026574      MFMTER  005533      NEWPRI  067736 G    PAR.LA  057474      P2T09E  006424
L10036  027040      MFOLWR  005260      NEXTAR  064176      PASCNT  002654      P2T10E  006431
L10037  027036      MFWDSK  005337      NOCLR = 000010      PASNEW  013676      P2T11E  006446
L10040  027334      MFWSKO  005372      NOERCT  003067      PASNUM  003062      P2T12E  006463
L10041  027264      MGTSTA  005032      NOIRPT= 000002      PASS.C  040530 G    P2T13E  006477
L10042  027632      MHCERR  007777      NOOP  = 000100      PATTBL  002234      P2T14E  006517
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P2T15E  006542      SET.MA  045672      TERMLI  064000      T$$SRV= 010017      T2665$  027632
P2T16E  006572      SFTPRM  037726 G    TERMTA  057762      T$$SUB= 010062      T267$   027444
P2T17E  006615      SGNWD   007322      TEST.M  045420      T$$SW = 010013      T275$   027660
P2T18E  006655      SHIFT   070776 G    TIMFLG  040750 G    T$$TES= 010061      T276$   027744
P2T19E  006702      SKTMES  006714      TIM.CO  040602 G    T.BA    002470      T2765$  030130
RDALHD  021364      SPDSTA= 004000      TIM.OP  054406      T.CS    002466      T3      025336 G
RDDATA= 000114      SPEC.U  045406      TOO.MA  057742      T.DA    002472      T3.1    025372
RDHEAD= 000110      SPTCOD  013370 G    TOSLOW= 000001      T.MP    002474      T306$   032454
RDNOHR= 000116      SPV.SE  000400      TRPFLG  003070      T.STAT  002502      T3065$  032622
RDYCHK  017130      SRTMES  006730      TRPHAN  014570      T1      024524 G    T307$   032506
RDYWAI  020650      SSINDX  002424      TSTINT  015160      T1.1    024574      T310$   032514
READRL  014774      STAMES  007431      TSTLAB  006217      T10     027336 G    T3100$  033470
READ.P  066210 G    STAMSK= 000007      TST.AB  047730      T10.1   027456      T3101$  033630
REGBAC  070700 G    STARTC  067666 G    TST.TO  042132      T11     027634 G    T3165$  034370
REGSAV  070664 G    STATE2  010426      TYPEC   060336      T11.1   027756      T3204$  035244
RELDWT= 040000      STATE3  010436      TYPEPC  054232      T12     030132 G    T3265$  035362
REQN.P  040570 G    STATE5  010446      TYPFLA  063654      T13     031700 G    T33TBL  002332
REQN.T  045462      STOSTA= 010000      TYPLIN  060234      T14     032410 G    T3300$  035526
RESE3   010403      STRCHR  060700      TYPNUM  057616      T14.1   032506      T3301$  035720
RESE4   010407      STRT.T  045464      TYPSTR  060254      T15     032624 G    T3365$  036472
RESE5   010414      ST.SET  042316      TYP.ER  054062      T16     033350 G    T3400$  036622
RESE6   010421      SUBSTK  002260      TY.UNI  047074      T16.1   033630      T3401$  036776
RESPAR  002504      SUNIT.  045470      T$ARGC= 000007      T17     034372 G    T3465$  037600
RESTAR  013640      SUPERV  043352      T$CODE= 000130      T17.1   034412      T4      025550 G
RESTBL  002174      SUPFLA  040760 G    T$ERCO= 000043      T172$   024574      T4.1    025620
REVSKO= 001000      SUPV.T  041132 G    T$ERRN= 003247      T1765$  025044      T5      025760 G
REVSKS= 000200      SUP.PR  042070      T$EXCP= 000000      T18     035364 G    T5.1    026030
RE.SET  042252      SVCBGL= 000001      T$FLAG= 000040      T18.1   035720      T6      026170 G
RLBA  = 000002      SVCGBL= 000000      T$HILI= 000377      T1865$  025334      T6.1    026256
RLBAS   002450      SVCHAN  050006      T$LOLI= 000001      T187$   025122      T7      026414 G
RLCS  = 000000      SVCINS= 000000      T$LSYM= 010000      T19     036474 G    T7.1    026452
RLCSR = 000000      SVCSUB= 000001      T$NEST= 177777      T19.1   036776      T8      026614 G
RLDA  = 000004      SVCTAG= 000000      T$NSK0= 000000      T1965$  025546      T8.1    026702
RLDRV   002454      SVCTST= 000001      T$NSK1= 000005      T197$   025362      T9      027042 G
RLMP  = 000006      SWAPHD  017414      T$NSK2= 000002      T2      025046 G    T9.1    027200
RLVEC   002452      SWCHAN  045300      T$SAVL= 177777      T2.1    025122      ULOAD = 000010
RORWOP= 020000      SWITCH  064152      T$SEGL= 177777      T206$   025622      UNDTST  007264
RPTOP   023244      SW.ADR  040554 G    T$SEK0= 010000      T2065$  025756      UNIT.D  040532 G
RPTREM  024240      SW.PTA  045264      T$SUBN= 000001      T216$   026032      UNI.MA  045410
RPTRES  024032      SYS.FT  054032      T$TAGL= 177777      T2165$  026166      UNXERR  006202
RSTACK  070140 G    S$LSYM= 010000      T$TAGN= 010065      T2265$  026412      USER.P  040774 G
RSTRT   013540      TBLSTR  002446      T$TEMP= 000000      T227$   026260      USER.T  040776 G
SAMSK = 000077      TCERR   007520      T$TEST= 000023      T233$   026440      VALDES  006757
SAVEDO= 042450      TEMP0   002540      T$TSTM= 177777      T2365$  026612      VALID.  041234
SBSFIL  003076      TEMP1   002542      T$TSTS= 000001      T2465$  027040      VAL.LA  042054
SEARCH  062146      TEMP2   002544      T$$CLE= 010015      T247$   026704      VAL.SW  045520
SECQ    040114      TEMP3   002546      T$$DU = 010016      T25TBL  002304      VCNRST  006161
SECWD   007333      TEMP4   002550      T$$HAR= 010063      T2517$  027324      VCSTAT= 001000
SEEK  = 000106      TEMP5   002552      T$$HW - 010012      T256$   027100      VECMSG  037672
SEEKOP= 010000      TEMP6   002554      T$$INI= 010014      T2565$  027334      VECT  = 000002
SEGSTA  041014 G    TEMP7   002556      T$$MSG= 010011      T257$   027136      VERHDR  020262
SEQMES  007366      TEMP8   002560      T$$SEG= 010000      T258$   027120      VERPOS  021244
SETDON  013724      TERMI   066176      T$$SOF= 010064      T266$   027362      WAITIN  015026
```

```
WCMSK = 017777          XEQSUB  070012 G        XRDHDC  017632          XTIMST  066720          $BREG   045560
WCRNG = 160000          XEQ.CL  047534          XRDHDG  017646          XWRITE  022354          $ENDAD  067776 G
WDESTA= 100000          XEQ.CM  045044          XREAD   022414          XWRITT  022344          $SAV2   071042 G
WGESTA= 002000          XEQ.IN  047216          XREADG  022422          XWRIT1  022360          $SAV3   071056 G
WIDTH   055002          XEQ.LA  043306          XSEEK   016070          XXDP.D  045064          $SAV4   071074 G
WLSTAT= 020000          XEQ.OP  047310          XSEEKT  016060          X$ALWA= 000000          $SAV5   071114 G
WRTSWI  002444          XEQ.PR  042510          XSEEK1  016074          X$FALS= 000040          .     = 071320
WTDATA= 000112          XEQ.TE  047354          XTIME   066676 G        X$OFFS= 000400
XEQDIA  070024 G        XRDHD   017642          XTIMEN  067522          X$TRUE= 000020

. ABS.  071320     000

 ERRORS DETECTED:  0

 DSKZ:CZRLDB,DSKZ:CZRLDB/EQ:PART2=CZRLDB/ML,CZRLDB.PT1,CZRLDB.P11,CZRLDB.PT2,CZRLDB.SUP
 RUN-TIME: 49 48 1 SECONDS
 RUN-TIME RATIO: 206/99=2.0
 CORE USED:  17K  (33 PAGES)
```