RL11,RLV11,
RL01,RL02

DRIVE TEST 1
CZRLIDO

AH-F118D-MC
FICHE 1 OF 1

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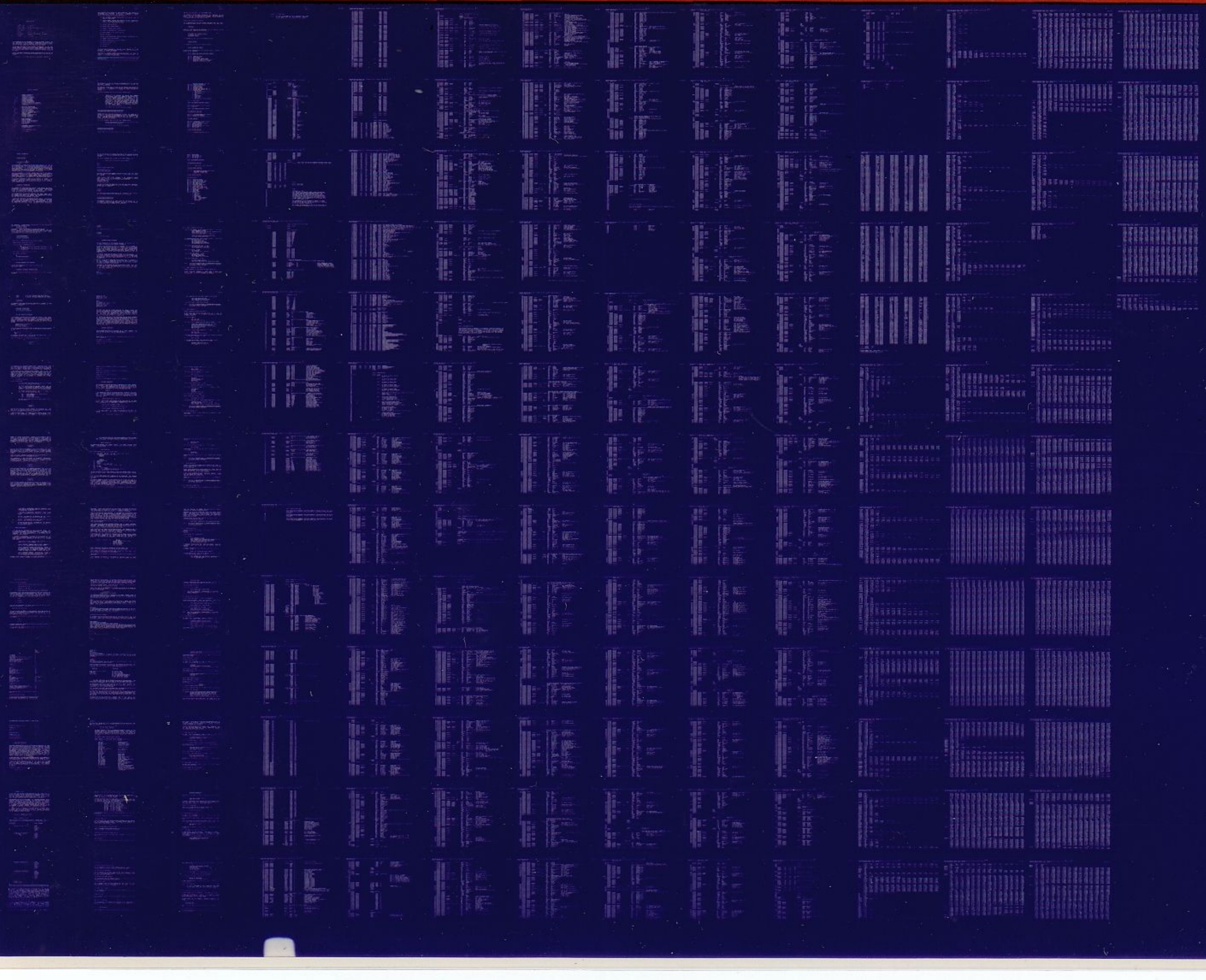

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IDENTIFICATION

PRODUCT CODE: AC-F119D-MC
PRODUCT NAME: CZRLIDO RL01/02 DRIVE TEST 1
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MAINTAINER: DIAGNOSTIC ENGINEERING - COLORADO
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1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

1.1.1 STRUCTURE OF PROGRAM

THIS DIAGNOSTIC 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 2.2 "CHAIN MODE OPERATION" FOR DETAILS OF CHAINING PROCEDURE). IT IS A SINGLE PROGRAM FROM THE STANDPOINT OF THE DIAGNOSTIC USER, WHICH AT RUN TIME IS APPENDED TO A COMMON FRONT-END PIECE OF SUPERVISOR SOFTWARE THROUGH WHICH THE DIAGNOSTIC PROGRAM INTERFACES TO THE ENVIRONMENT AS IT EXECUTES.

WHEN THIS DIAGNOSTIC IS STARTED, 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 (DR>). AT COMMAND MODE THE OPERATOR MAY ENTER ANY OF SEVERAL COMMANDS AS DESCRIBED IN 2.0 "OPERATING INSTRUCTIONS".

THE DIAGNOSTIC PROGRAM IS LOADED IN THE LOWER 8K OF MEMORY. THE DIAGNOSTIC SUPERVISOR CODING OCCUPIES 6.25K OF THE UPPER PART OF MEMORY JUST BELOW THE XXDP+ MONITOR WHICH RESIDES IN THE UPPERMOST 1.5K OF MEMORY SPACE.

1.1.2 DIAGNOSTIC INFORMATION

THIS PROGRAM TESTS AND EXERCISES RL01/02 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 TESTS THE RL01/02 INTERFACE AND BASIC DRIVE LOGIC. GET STATUS WITH RESET, GET STATUS, SEEK, AND READ HEADER ARE THE ONLY COMMANDS EXECUTED IN THE PROGRAM. ONLY SEEKS WITH 0 DIFFERENCE ARE USED SO NO HEAD MOVEMENT IS REQUIRED.

A SIGNIFICANT PORTION OF THE PROGRAM REQUIRES MANUAL INTERVENTION. THESE TESTS TEST THE COVER OPEN AND WRITE LOCK STATUS. THE DRIVE MUST BE LOADED AND UNLOADED TO TEST ALL THE CONDITIONS OF HEADS OUT, BRUSH HOME, AND DRIVE STATES. THE PROGRAM CAN BE RUN IN AUTOMATIC MODE IN WHICH CASE ALL TESTS REQUIRING MANUAL INTERVENTION

ARE BYPASSED. WITHOUT MANUAL INTERVENTION, THE TEST REQUIRES APPROXIMATELY 135 SECONDS TO RUN.

1.1.3 DIAGNOSTIC HISTORY

REVISION C: MODIFY THE DIAGNOSTIC TO RUN USING THE DRS.
REVISION D: THE RL DRIVES HAD THE BRUSH DRIVE REMOVED. THE DIAGNOSTIC CORRECTLY TESTS BOTH DRIVES WITH AND WITHOUT A BRUSH DRIVE. IT ALSO WILL WORK ON A SYSTEM THAT DOES NOT HAVE A KW11P. BREAKS WERE INSERTED TO FACILITATE QUICKER RESPONSE TO A C.

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.)
* 1 OR 2 RL11/RLV11 CONTROLLER(S) WITH:

  1 - 8 RL01 DRIVES WITH RL01K CARTRIDGES CONTAINING A 'BAD SECTOR FILE'
  1 - 8 RL02 DRIVES WITH RL02K CARTRIDGES CONTAINING A 'BAD SECTOR FILE'

* KW11P CLOCK (P CLOCK) OR KW11L (L CLOCK)
* LINE PRINTER (OPTIONAL)

1.2.2 SOFTWARE REQUIREMENTS

CZRLIDO RL01/02 DRIVE TEST 1

1.3 RELATED DOCUMENTS AND STANDARDS

RL01/02 DISK SUBSYSTEM USER'S GUIDE (EK-RL012-UG-002)
XXDP+/USER'S MANUAL

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

THE RL01/02 SUBSYSTEM SHOULD HAVE SUCCESSFULLY RUN THE FOLLOWING PROGRAMS:

CVRLA	RLV11 RL01 DISKLESS TEST (RLV11 ONLY)
CZRLG	RL11/RLV11 RL01/02 CONTROLLER TEST (PART 1)
CZRLH	RL11/RLV11 RL01/02 CONTROLLER TEST (PART 2)

1.5 ASSUMPTIONS

THE HARDWARE OTHER THAN THE RL01/02 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 FIVE STEPS OF EXECUTION

THIS DIAGNOSTIC PROGRAM SHOULD BE LOADED AND STARTED USING NORMAL XXDP+ PROCEDURES. START THE EXECUTION OF THE XXDP+ MONITOR BY USING THE APPROPRIATE BOOTSTRAP PROGRAM. THE MONITOR WILL PRINT A MESSAGE IDENTIFYING ITSELF AND REQUESTING THAT THE CURRENT DATE BE ENTERED. AN EXAMPLE OF THIS MESSAGE IS GIVEN BELOW FOR THE XXDP+ MONITOR:

```
CHMDKA0 XXDP+ DK MONITOR NNK
BOOTED VIA UNIT 0
ENTER DATE (DD-MMM-YY):
```

AFTER THE DATE HAS BEEN ACCEPTED BY THE MONITOR THE RESTART ADDRESS OF THE MONITOR IS PRINTED. THEN THE FOLLOWING TWO QUESTIONS ARE ASKED:

```
50 HZ ? N
LSI ?  N
```

THE DEFAULTS ARE BOTH "NO". TYPE "R" AND THE PROGRAM NAME TO RUN THE PROGRAM. DO NOT TYPE THE EXTENSION.

WHEN THIS DIAGNOSTIC IS STARTED THE FOLLOWING STEPS WILL OCCUR:

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

THE DIAGNOSTIC WILL ISSUE THE PROMPT "DR>". 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 "DR>" 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:

PNT	PRINT NUMBER OF TEST BEING EXECUTED
LOE	LOOP ON ERROR
HOE	HALT ON ERROR
IER	INHIBIT ERROR PRINTOUT

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

****
* STEP 2 *
****

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 3 *
****

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 4 *
****

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 5 *
****

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 DR>).

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 ENDLESSLY 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 OCCURRED.

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 RE-ISSUED.

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 AGAIN:

1. ISSUE ANOTHER "START" COMMAND (THUS GOING THRU ALL OF STEPS 1, 2, 3, 4, AND 5 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

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, DEPENDING ON WHETHER YOU WANTED TO ANSWER THE HARDWARE QUESTIONS AGAIN.

THE FULL PRINT-OUT FROM THE ABOVE DIALOGUE MIGHT LOOK LIKE THIS (O=OPERATOR, D=DIAGNOSTIC):

```
                                        BY
                                        WHOM
                                        ENTERED:
                                        --------

.R CZRL!D                               O
DRS LOADED                              D
DIAG. RUN-TIME SERVICES REV. D APR-79   D
CZRLI-D-0                               D
CZRLI TESTS THE RL01-02 INTERFACE       D
AND BASIC DRIVE LOGIC
UNIT IS RL01, RL02                      D
DR>STA/PASS:1/FLAGS:HOE                 D,O

CHANGE HW (L) ? Y                       D,O

# UNITS (D) ? 2                        D,O

UNIT 0                                  D
RL11 (L) Y ?                            D,O
BUS ADDRESS (O) 174400 ?                D,O
VECTOR (O) 160 ?                        D,O
DRIVE (O) 0 ?                           D,O
DRIVE TYPE = RL01 (L) Y ?               D,O
BR LEVEL (O) 5 ?                        D,O

UNIT 1                                  D
RL11 (L) Y ?                            D,O
BUS ADDRESS (O) 174400 ?                D,O
VECTOR (O) 160 ?                        D,O
DRIVE (O) 0 ? 1                         D,O
DRIVE TYPE = RL01 (L) ? N               D,O (N=RL02)
BR LEVEL (O) 5 ?                        D,O

CHANGE SW (L) ? N                       D,O

EXECUTE DRIVE SELECT TESTS (L) N ?      D,O
EXECUTE HEAD ALIGNMENT SUPPORT (L) N ?  D,O
DO MANUAL INTERVENTION TESTS (L) N ? Y  D,O
INPUT ERROR LIMIT (D) 20 ?              D,O


CZRLI HRD ERR 00004 TST 003 SUB 002 PC:004130
ERR HLT

DR>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                                          0

DR>CON/FLAGS:HOE:IER:LOE=0                  D,0

CHANGE SW (L) ? N                           D,0

CZRLI EOP 1                                 D
^C

DR>RESTART/PASS:1                           D,0

CHANGE SW (L) ? N                           D,0
------------------
------------------
------------------
------------------
```

2.2 CHAIN MODE OPERATION

CHAIN MODE OPERATION CONSISTS OF THE SEQUENTIAL EXECUTION OF PROGRAMS WITHOUT OPERATOR INTERVENTION. ONLY PROGRAMS THAT HAVE BEEN MODIFIED TO RUN IN CHAIN MODE CAN BE CHAINED. CHAINABLE PROGRAMS ARE IDENTIFIED IN THE DIRECTORY BY A BIC EXTENSION. THE BIC FILES ARE CREATED BY USING THE SETUP UTILITY PROGRAM WHICH IS USED TO PARAMETERIZE THE DIAGNOSTIC PRIOR TO ITS EXECUTION. SETUP PROMPTS THE OPERATOR WITH THE HARDWARE AND SOFTWARE QUESTIONS. THE RESPONSE TO THESE QUESTIONS ARE USED TO BUILD P-TABLES. THE RESULT OF THE SETUP PROCESS IS A FILE WHICH INCLUDES THE DIAGNOSTIC WITH APPENDED P-TABLES. REFER TO THE XXDP+/SUPERVISOR USER'S MANUAL FOR A COMPLETE DESCRIPTION OF THE SETUP UTILITY.

TO RUN CHAIN MODE, THE XXDP+ MONITOR USES AN ASCII FILE (KNOWN AS A CHAIN FILE) LISTING THE PROGRAMS TO BE RUN AND THE NUMBER OF PASSES EACH PROGRAM SHOULD RUN. THIS FILE MUST BE ON THE SYSTEM DEVICE.

A CHAIN FILE MAY BE GENERATED BY USE OF THE XTECO TEXT EDITOR. THIS FILE MUST HAVE A CCC EXTENSION. THE CHAIN FILE MAY CONTAIN ANY OF THE COMMANDS SUPPORTED BY THE XXDP+ MONITOR. THE COMMANDS IN THE ASCII FILE ARE EXECUTED IN THE ORDER IN WHICH THEY ARE ENCOUNTERED.

TO EXECUTE A CHAIN FILE THE USER TYPES:

```
C FILNAM <CR> OR
```

C FILNAM/QV <CR>

IN THE FIRST CASE THE PASS COUNT SPECIFIED IN THE CHAIN FILE IS USED BY THE XXDP+ MONITOR TO DETERMINE THE NUMBER OF PASSES TO EXECUTE EACH PROGRAM. IN THE SECOND CASE THE PROGRAM COUNT IS NOT USED AND EACH PROGRAM IS EXECUTED ONLY ONCE. THE /QV SWITCH PROVIDES A SINGLE EXECUTION MODE OF OPERATION OF QUICK VERIFY.

WHEN PROGRAMS ARE RUN IN CHAIN MODE, THE HARDWARE/SOFTWARE SWITCH REGISTERS SHOULD BE SET TO 000000. THE XXDP+ MONITOR PRINTS EACH COMMAND TAKEN FROM THE CHAIN FILE AND THEN EXECUTES THE COMMAND. WHEN THE LAST COMMAND OTHER THAN ANOTHER C COMMAND HAS BEEN EXECUTED THE XXDP+ MONITOR TERMINATES CHAIN MODE AND TYPES A PROMPT (.). IT IS READY TO ACCEPT ANOTHER COMMAND FROM THE CONSOLE. IF THE LAST COMMAND IS ANOTHER C COMMAND, THE CHAIN MODE WILL CONTINUE AND THE CHAIN FILE SPECIFIED BY THIS NEW C COMMAND WILL BE USED.

IF THE USER WISHES TO TERMINATE CHAIN MODE BEFORE ITS NORMAL TERMINATION HE MAY DO SO BY TYPING A CONTROL/C. HOWEVER, THE MONITOR WILL NOT ABORT THE CHAIN MODE UNTIL IT RECEIVES PROGRAM CONTROL FROM THE PROGRAM CURRENTLY RUNNING.

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 EXIT
2.	DIAGNOSTIC HAS FINISHED ALL ITS REQUESTED PASSES	START RESTART PRINT DISPLAY FLAGS ZFLAGS EXIT

3.	OPERATOR INTERRUPTED THE DIAGNOSTIC WITH CTRL/C	START RESTART CONTINUE PRINT DISPLAY FLAGS ZFLAGS EXIT
4.	AN ERROR WAS ENCOUNTERED WITH THE HOE FLAG SET SET	START RESTART CONTINUE PROCEED PRINT DISPLAY FLAGS ZFLAGS EXIT

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 NUMERICAL 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 SUBMITTED. THE DEFAULT IS NON-ENDING TEST EXECUTION. "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, SUB-TEST, 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 TEST 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

ADR EXECUTE AUTODROP CODE

LOT LOOP ON TEST

EVL EVALUATE

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 ANSWERS 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 RE-EXECUTED. HARDWARE PARAMETERS MAY NOT BE CHANGED.

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

1. DEFAULT 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 EF-

FECT 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

****
EXIT
****

RETURN TO XXDP+ PROMPT MODE.

****
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 APE 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), 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. 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 TRANSLATES 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 8 RL UNITS, AND THAT THERE ARE FIVE (5) HARDWARE PARAMETERS FOR EACH (5 SLOTS IN THE P-TABLE, 5 HARDWARE QUESTIONS IN THE DIALOGUE).

FOLLOWING IS THE DIALOGUE FOR THIS 8 RL0X DRIVE SYSTEM. THIS SYSTEM HAS TWO (2) RL11 TYPE CONTROLLERS ALL TO BE SET AT "BR LEVEL" 5. THE FIRST 4 DRIVES ARE RL01'S AND THE LAST 4 DRIVES ARE RL02'S (ON THE SECOND CONTROLLER):

```
  UNITS (D) ? 8

UNIT 0
RL11 (L) Y ?
BUS ADDDRESS (O) 174400 ?
```

```
VECTOR (O) 160 ?
DRIVE (O) 0 ? 0-3
DRIVE TYPE = RL01 (L) Y ?
BR LEVEL (O) 5 ?

UNIT 4
RL11 (L) Y ?
BUS ADDRESS (O) 174400 ? 175400
VECTOR (O) 160 ? 164
DRIVE (O) 0 ? 0-3
DRIVE TYPE = RL01 (L) Y ? N
BR LEVEL (O) 5 ?
```

THE FIRST TIME THRU THE P-TABLE QUESTIONS THE DEFAULT VALUES ARE USED FOR THE CONTROLLER TYPE (QUESTION #1), CSR ADDRESS OF THE CONTROLLER (QUESTION #2), THE CONTROLLER VECTOR ASSIGNMENT (QUESTION #3), THE DRIVE TYPE (QUESTION #5), AND THE "BR LEVEL" (QUESTION #6). THE ACTUAL UNIT NUMBERS OF THE RL01'S FOR QUESTION #4 WAS ASSIGNED 0 THRU 3 FOR THE FIRST 4 P-TABLE SLOTS.

THE SECOND TIME THRU THE P-TABLE QUESTIONS (FOR THE RL02 ASSIGNMENT ON THE SECOND CONTROLLER), THE FIRST QUESTION DEFAULTED TO "RL11" TYPE CONTROLLER. THE SECOND QUESTION WAS ANSWERED TO REFLECT THE CHANGE IN CSR ADDRESS FOR THE RL02 CONTROLLER (175400). THE SECOND CONTROLLER'S VECTOR WAS ALSO CHANGED TO 164 IN QUESTION #3. THE RL02 TEST UNIT NUMBERS WERE ASSIGNED VALUES 0 TO 3 IN QUESTION #4 AND THE DRIVE TYPE WAS SET FOR RL02'S FOR THE REMAINING 4 UNITS IN QUESTION #5. THE LAST QUESTION WAS DEFAULTED USING THE "BR LEVEL" FROM THE FIRST PASS.

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) 160?

ANSWER WITH THE INTERRUPT VECTOR OF THE CONTROLLER.

DRIVE (O) 0?

ANSWER WITH THE DRIVE(S) CONNECTED TO THE CONTROLLER

DRIVE TYPE = RL01 (L) ?

ANSWER NO (N) IF DRIVE IS AN RL02

BR LEVEL (O) 5?

ANSWER WITH THE INTERRUPT PRIORITY OF THE CONTROLLER.

2.6 SOFTWARE PARAMETERS

THE FOLLOWING QUESTIONS ARE ASKED IF REQUESTED ON A START, RESTART, OR CONTINUE. THEY ALLOW FLEXIBILITY 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.

EXECUTE DRIVE SELECT TESTS (N)?

IF "YES" TESTS 5 AND 6 ARE EXECUTED IN THE FIRST PASS OF THE PROGRAM. THESE TESTS REQUIRE MANUAL INTERVENTION TO CHANGE ADDRESS PLUGS AND REQUIRE A FULL COMPLEMENT OF ADDRESS PLUGS (0 - 3).

EXECUTE HEAD ALIGNMENT SUPPORT (N)?

IF "YES", TEST 11 IS EXECUTED IN THE FIRST PASS.

EXECUTE MANUAL INTERVENTION TESTS (N)?

IF "YES", TESTS 1, 2, 3, AND 4 ARE EXECUTED TO TEST BASIC INTERFACE OPERATIONS, HEAD LOADING, HEAD UNLOADING, AND ALL STATE CHANGES.

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 FURTHER TESTING.

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 RELEVANT DATA.

3.1 ERROR REPORTING

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 SUB TEST 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 AS 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 CONTENTS 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.

3.1.1 SPECIFIC OPERATION MESSAGES

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-EXISTENT 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	(BRUSH HOME)
WRT LCK	(WRITE LOCK)
HDS OUT	(HEADS 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	(HDR CRC OR DATA CRC ERROR BIT 11 OF CS REGISTER)
HDR NOT FND/DAT LATE	(HDR NOT FOUND OR DATA LATE ERROR 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 TOO 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 LOSING READY BEFORE STARTING A READ HEADER AND THEREFORE NOT COMPLETING THE READ HEADER IN 1MS.

''FAIL TO RELOAD HEADS AFTER ERR CLEAR''

THIS 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''

THIS IS REPORTED WHEN THE PROGRAM CANNOT DETERMINE THE DRIVE STATE OR STATUS.

''WRITE ABORTED''

THIS IS REPORTED WHEN THE PROGRAM ABORTS A WRITE TO PROTECT THE BAD

SECTOR FILES.

''COULD NOT RETRIEVE DRIVE STATUS''

THIS 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''

THIS 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''

THIS IS REPORTED WHEN THE COMMAND SUCCESSFULLY COMPLETES BUT THE CONTROLLER HAS NOT GENERATED AN INTERRUPT.

''ERR DID NOT CLEAR''

THIS 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''

THIS IS REPORTED WHEN THE GET STATUS W/RESET COMMAND DOES NOT CLEAR ALL DRIVE ERRORS.

''UNEXPECTED ERR''

THIS IS REPORTED WHEN THE CONTROLLER SENSES AN ERROR BUT NO ERROR BITS ARE SET.

''BAD SEC FILE FMT ERR''

THIS 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''

THIS IS REPORTED (WITH THE UNIT NUMBER) WHEN MORE THAN THE SPECIFIED NUMBER OF ERRORS (DEFAULT 20) HAVE OCCURED IN ANY SINGLE PASS.

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 15-7 - CYLINDER ADDRESS FOR TRANSFER
BIT 6 - SURFACE FOR TRANSFER
BIT 5-0 - SECTOR FOR TRANSFER (1-40.)

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

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

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

BIT 15-4 - IGNORED SHOULD BE ZERO (0)
```

BIT 3 - DRIVE RESET
BIT 2 - MUST BE ZERO (0)
BIT 1 - MUST BE ONE (1)
BIT 0 - MUST BE ONE (1)

RLMP - MULTIPURPOSE REGISTER

FOR READ/WRITE FUNCTION

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

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 - DRIVE TYPE IS RL02 IF SET
BIT 6 - SURFACE (0=UPPPER, 1=LOWER)
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 BASIC INTERFACE TEST (PART 1)

LOAD IN DRIVE NUMBER. DO GET STATUS WITH RESET. IF OPI SETS:
DRIVE INTERFACE IS DEAD
DRIVE COMMAND SHIFT REGISTER NOT LOADING/SHIFTING
MARKER DETECTION FAILED
DRIVE IS NOT SELECTING OR AC LOW IS SET

SYSTEM OR STATUS CLOCKS NOT OPERATIONAL
GET STATUS DETECTION FAILED.

IF INTERRUPT WITH NO OPI, CHECK STATUS RECEIVED. COVER OPEN AND BRUSH HOME SHOULD BE SET. IF NOT:
BAD STATUS DATA LINE
BAD COVER SWITCH OR LOGIC
DRIVE COMMAND SHIFT REGISTER
BAD BRUSH HOME SWITCH OR LOGIC

CHECK WRITE LOCK STATUS BIT SET. IF NOT:
BAD SWITCH OR WRITE LOCK LOGIC
DRIVE COMMAND SHIFT REGISTER

CHECK STATE FOR 0. IF NOT:
BAD STATE ROM
DRIVE COMMAND SHIFT REGISTER

CHECK VOLUME CHECK RESET. IF NOT:
BAD RESET DETECTION
BAD VOLUME CHECK LOGIC
DRIVE COMMAND SHIFT REGISTER

CHECK DRIVE ERROR RESET. IF NOT:

BAD DRIVE ERROR INTERFACE
SOME OTHER ERROR STUCK ON. REPORT WHICH ERROR.

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

TEST 2 BASIC INTERFACE TEST (PART 2)

REQUEST OPERATOR TO CLOSE COVER AND RESET WRITE LOCK.

DO GET STATUS LOOP CHECKING IF COVER OPEN OR WRITE LOCK RESETS. WAIT 15 SECONDS FOR BOTH TO CHANGE. IF NO CHANGE, ASK OPERATOR TO TYPE CR IF PROCEDURE WAS FOLLOWED.

IF ONE CHANGED BUT NOT THE OTHER, REPORT WHICH FAILURE:

WRITE LOCK SWITCH OR LOGIC
(CR) COVER OPEN SWITCH OR LOGIC
DRIVE COMMAND SHIFT REGISTER

IF NEITHER CHANGED, REPORT BOTH FAILURES.

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

TEST 3 HEAD LOADING TEST

REQUEST OPERATOR TO PRESS LOAD SWITCH.

DO GET STATUS LOOP CHECKING FOR STATE TO GO TO 1. WAIT 30 SECONDS FOR CHANGE. IF NO CHANGE, ASK OPERATOR TO CONFIRM ACTION BY TYPING CR.

IF LOAD WAS PRESSED:

BAD STATE ROM
BAD LOAD SWITCH OR LOGIC

CHECK THAT STATE 1 REMAINS FOR LESS THAN 30 SECONDS. IF NOT:

SPINDLE NOT TURNING OR TOO SLOW (AC SERVO)
SECTOR PULSE DETECTION OR LOGIC BAD
BAD CLOCK SHIFT REGISTER IN SPEED CONTROL
BAD DISK ON SPEED LOGIC
BAD STATE ROM

AND CHECK IF SPINUP TIMEOUT ERPOR SET. IF NOT:

BAD STATE ROM
BAD TIMEOUT DETECTION LOGIC

CHECK THAT STATE GOES TO 2 OR 3 (WHICH STATE DEPENDS ON WHETHER THE DRIVE HAS A BRUSH). IF NOT:

BAD STATE ROM

IF THE DRIVE HAS A BRUSH, CHECK THAT BRUSH HOME IS RESET 5 SECONDS OR LESS AFTER STATE IS 2. IF NOT:

BAD BRUSH HOME SWITCH OR LOGIC
BAD BRUSH MOTOR (AC SERVO)

WAIT 30 SECONDS FOR BRUSH HOME TO SET. IF NOT:

BAD AC SERVO
BAD SWITCH OR LATCH

CHECK THAT STATE HAS CHANGED TO 3. IF NOT:

BAD STATE ROM

AFTER STATE IS 3, CHECK HEADS OUT IS SET. IF NOT:

BAD SWITCH
BAD SEEK CONTROL ROM
BAD VELOCITY ROM
BAD DC SERVO

CHECK IF DRIVE ERROR IS SET. IF NOT:

BAD DRIVE ERROR LOGIC OR INTERFACE

WAIT 300 MS FOR STATE TO CHANGE TO 4. IF IT DOESN'T CHANGE:

STATE ROM BAD
SEEK ROM
VEL ROM
GUARD BAND DETECTION

WAIT 15 MS FOR STATE TO CHANGE TO 5.

CHECK VOLUME CHECK IS SET. IF NOT:

BAD VOLUME CHECK LOGIC

8 MS AFTER STATE GOES TO 5, DRIVE READY SHOULD SET. IF NOT:

INTEGRATOR OR NULL DETECTION FAILURE
READY ONE SHOT BAD
ENABLE TIMEOUT H NOT SETTING OR COUNT LOGIC BAD

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

TEST 4 HEAD UNLOADING TEST

CHECK DRIVE IS READY. IF NOT REPORT AND ASK OPERATOR TO MAKE DRIVE READY.

REQUEST OPERATOR TO UNLOAD DRIVE.

LOOP ON GET STATUS WAITING FOR STATE TO CHANGE TO 6. IF NO CHANGE:

BAD STATE ROM
BAD SWITCH

WAIT 300 MS FOR STATE TO CHANGE TO 7. IF NO CHANGE:

BAD STATE ROM

AFTER STATE IS 7, WAIT 30 SEC FOR STATE TO CHANGE TO STATE 0. IF NO CHANGE:

NO BRAKING
BAD AC SERVO

REQUEST OPERATOR TO LOAD DRIVE. WAIT UNTIL DRIVE BECOMES READY.

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

TEST 5 DRIVE SELECT TEST

INSTRUCT THE OPERATOR TO REMOVE DRIVE ADDRESS PLUGS FROM ALL DRIVES EXCEPT THE DRIVE UNDER TEST. ASK THAT CARRIAGE RETURN BE TYPED WHEN DONE.

DO GET STATUS TO ADDRESS OF DRIVE UNDER TEST. CHECK THAT NO ERRORS ARE REPORTED. DO GET STATUS TO ALL OTHER ADDRESSES AND CHECK THAT OPI SETS FOR ALL OTHER ADDRESSES.

DO GET STATUS TO ADDRESS OF NEXT SEQUENTIAL ADDRESS. CHECK THAT NO ERRORS ARE REPORTED. DO GET STATUS TO ALL OTHER ADDRESSES AND CHECK THAT OPI SETS.

REPEAT FOR ALL DRIVE ADDRESSES (0,1,2,3 - 0 IS SEQUENTIAL AFTER 3).

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

TEST 6 DRIVE SELECT ERROR TEST

REQUEST OPERATOR INSERT IDENTICAL ADDRESS PLUGS IN TWO DRIVES

(MUST BE IDENTICAL TO NUMBER SPECIFIED EARLIER). REQUEST OPERATOR TYPE CARRIAGE RETURN WHEN READY.

PROCEDURE WILL BE TO GET STATUS AND CHECK FOR DRIVE SELECT ERROR. THEN RESET THAT DRIVE AND VERIFY THAT DRIVE SELECT ERROR IS NOT REPORTED AGAIN. WAIT 1 SECOND, THEN CHANGE DRIVE SELECT TO A DIFFERENT NUMBER AND BACK AGAIN. DRIVE SELECT ERROR SHOULD SET AGAIN.

OPERATOR SHOULD SEE THE FAULT LIGHT ON ON BOTH DRIVES. IF INDICATOR IS NOT SEEN ON A DRIVE:

DRIVE SELECT ERROR DETECTION IS BAD IN THAT DRIVE.

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

TEST 7 INITIAL STATE TEST

INSTRUCT OPERATOR TO GO THROUGH A LOAD HEADS CYCLE TO INITIALIZE
THE TEST.

DO GET STATUS, WAIT FOR INTERRUPT.

IF OPI OCCURS:

DRIVE INTERFACE IS DEAD
DRIVE COMMAND SHIFT REGISTER NOT LOADING/SHIFTING
DRIVE IS NOT SELECTING OR AC LOW IS SET
SYSTEM OR STATUS CLOCKS NOT OPERATIONAL
GET STATUS DETECTION FAILED.

IF INTERRUPT OCCURS WITHOUT OPI, CHECK DRIVE READY. READY SET INDICATES HEADS ARE LOADED AND ARE TRACKING (POSITION WORKING).

IF MANUAL INTERVENTION TESTS WERE RUN, CHECK THAT HEAD 0 IS SELECTED. IF NOT:

DRIVE CYCLE UP DID NOT SELECT HEAD 0

IF DRIVE READY IS SET, CHECK STATUS MESSAGE RECEIVED. HEADS OUT AND BRUSH HOME MUST BE SET. IF NOT:

DRIVE COMMAND SHIFT REGISTER NOT LOADING/SHIFTING
HEADS OUT OR BRUSH HOME SWITCH OR ASSOCIATED
CIRCUITRY BAD

STATUS DATA BAD

IF MANUAL INTERVENTION TESTS WERE RUN AND THIS IS THE FIRST PASS CHECK THAT VOLUME CHECK AND DRIVE ERROR ARE SET.

CHECK ALL ERROR BITS ARE 0.

CHECK STATE IS 5. IF NOT:

DRIVE COMMAND SHIFT REGISTER BAD

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

TEST 8 INITIAL RESET STATE TEST

DO GET STATUS HEAD SELECT = 0, WAIT FOR INTERRUPT.

DO GET STATUS WITH RESET, WAIT FOR INTERRUPT. BOTH DRIVE ERROR AND VOLUME CHECK SHOULD NOW BE RESET. IF NOT:

RESET DETECTION, RESET ERROR, OR VOLUME CHECK FLOP BAD

DRIVE COMMAND SHIFT REGISTER BAD

HEAD SELECTED BIT SHOULD STILL BE ZERO. IF NOT:

DRIVE COMMAND SHIFT REGISTER BAD
HEAD SELECT SHIFT REGISTER NOT LOADING

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

TEST 9 DRIVE READY TEST

DO SEEK WITH 0 DIFFERENCE, SIGN 0, HEAD 0. WAIT FOR INTERRUPT. GET STATUS. CHECK STATE IS 5. IF NOT:

DIFFERENCE COUNTER PICKING UP BITS
COUNTER CIRCUITRY IS NOT INDICATING 0 DIFFERENCE

CHECK DRIVE READY IS RESET. IF NOT:

ENABLE TIMEOUT OR READY LATCH/ONE SHOT BAD

WAIT APPROX 8 MS FOR READY TO SET. IF IT TAKES LONGER OR DOESN'T SET AT ALL:

HEADS MAY HAVE MOVED (INTEGRATOR OR NULL DETECTION)
READY ONE SHOT FAILED

CHECK DRIVE ERROR DID NOT SET. IF IT SET, DO GET STATUS AND REPORT WHICH ERROR.

VERIFY HEAD SELECT IS ZERO.

TEST 10 SEEK SIGN SWITCH TEST

DO SEEK WITH DIFFERENCE 0, SIGN 1, HEAD 0. WAIT FOR INTERRUPT. GET STATUS AND CHECK STATE IS 5. IF NOT:

COUNT ROM
DIFFERENCE COUNTER PICKING UP BITS
COUNTER CIRCUITRY IS NOT INDICATING 0 DIFFERENCE

VERIFY DRIVE IS NOT READY

WAIT APPROX 8 MS FOR READY TO SET. IF IT TAKES LONGER OR DOESN'T SET AT ALL:

HEADS ARE MOVING (INTEGRATOR OR NULL DETECTION)
READY ONE SHOT FAILED
COUNT ROM

VERIFY DRIVE ERROR DID NOT SET

VERIFY HEAD SELECT IS ZERO.

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

TEST 11 HEAD ALIGNMENT SUPPORT ROUTINE

THIS TEST IS EXECUTED WHEN HEAD ALIGNMENT SUPPORT IS REQUESTED,

AND IN THE FIRST PASS ONLY.

****

NOTE: THE NULL DETECTOR AND SEEK TIMEOUT SHOULD BE GROUNDED ON THOSE DRIVES WHICH LACK THE HEAD SELECT TEST POINTS. THE TEST WILL NOT SWITCH HEADS IF THERE IS A DRIVE FAULT.

****

THIS TEST SELECTS THE DRIVE UNDER TEST AND LOOPS ON A GET STATUS WITH RESET. THE WRITE LOCK BIT IS MONITORED AND WHEN

WRITE LOCK IS RESET HEAD 0 IS SELECTED AND WHEN WRITE LOCK IS SET HEAD 1 IS SELECTED. THIS WILL PERMIT THE HEADS TO BE ALIGNED IN KEEPING WITH THE PRESENT HEAD ALIGNMENT PROCEDURE WITHOUT RETURNING TO THE CONSOLE.

TYPING A CARRIAGE RETURN ON THE CONSOLE WILL TERMINATE THIS TEST ON THE DRIVE UNDER TEST. BEFORE TERMINATING, THE TEST WILL CHECK THAT WRITE LOCK IS RESET. IF NOT, THE OPERATOR WILL BE REQUESTED TO RESET WRITE LOCK.

TEST 12 HEAD SWITCHING TEST

DO SEEK WITH 0 DIFFERENCE, SIGN 0, HEAD 1. WAIT FOR INTERRUPT. GET STATUS AND CHECK STATE IS 5. IF NOT:

DIFFERENCE COUNTER IS PICKING UP BITS
ASSOCIATED CIRCUITRY IS BAD

VERIFY DRIVE READY RESET. IF NOT:

ENABLE TIMEOUT OR READY LATCH/ONE SHOT BAD

WAIT APPROX 8 MS FOR READY TO SET. IF IT TAKES LONGER OR DOESN'T SET AT ALL:

HEADS ARE MOVING (INTEGRATOR OR NULL DETECTION)
READY ONE SHOT FAILED
DRIVE CANNOT TRACK WITH THIS HEAD

VERIFY DRIVE ERROR DID NOT SET.

DO GET STATUS, CHECK HEAD SELECT IS CORRECT. IF NOT:

HEAD SELECT REGISTER BAD
DRIVE COMMAND SHIFT REGISTER BAD

DO SEEK WITH 0 DIFFERENCE, SIGN 0, HEAD 0. REPEAT ABOVE TESTS.

TEST 13 READ HEADER TEST (PART 1)

DO SEEK WITH DIFFERENCE 0, HEAD 0, SIGN 0. WAIT FOR INTERRUPT AND WAIT FOR DRIVE READY.

DO READ HEADER, WAIT FOR INTERRUPT.

CHECK IF HEADER CRC ERROR SET. IF SET:

READ/WRITE BOARD BAD
READ DATA LINE BAD

CHECK IF BIT 6 OF WORD 1 IS SAME AS HEAD SELECT BIT IN STATUS. IF NOT:

HEADS ARE SWITCHED (CABLE)
HEAD SELECT LOGIC

IF MANUAL INTERVENTION TESTS WERE RUN AND HEAD ALIGNMENT TESTS WERE NOT RUN, CHECK THAT HEADER WORD 0 INDICATES HEADS ARE POSITIONED OVER CYLINDER 0. STORE HEADER WORD 1.

REPEAT TESTS USING HEAD 1.

CHECK THAT CYLINDER PORTION OF STORED HEADER WORD 1 IS THE SAME AS HEADER WORD 1 OF THIS HEADER. IF NOT:

HEADS ARE MISALIGNED

TEST 14 READ HEADER TEST (PART 2)

DO SEEK WITH DIFFERENCE 0, SIGN 0, HEAD 0. WAIT FOR INTERRUPT. WAIT FOR READY.

DO 40 CONSECUTIVE READ HEADER, STORE 3 HEADER WORDS AFTER EACH READ.

CHECK ALL HEADERS FOR SEQUENCE AND CONTENT (WORD 2 ALL ZERO, BIT 15 WORD 1 AND 3 IS 0, HS BIT WORD 1 IS 0). IF NOT:

BAD READ/WRITE BOARD
BAD PACK

DO SEEK WITH DIFFERENCE 0, SIGN 0, HEAD 1. REPEAT ABOVE TEST FOR HEAD 1.

TEST 15 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 20 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 16 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 "HILIMIT" 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
INTEGRATOR 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.

```
                                        PART1==1
                                        .ENABLE ABS
                                        .LIST   MC
                                        .NLIST  MD,ME,CND,TOC
                    002000                      .=2000
                                                .MCALL  SVC

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  CZRLI,D,0,1,0
002000      103                                 .ASCII /C/
002001      132                                 .ASCII /Z/
002002      122                                 .ASCII /R/
002003      114                                 .ASCII /L/
002004      111                                 .ASCII /I/
002005      000                                 .BYTE   0
002006      000                                 .BYTE   0
002007      000                                 .BYTE   0
002010      104                                 .ASCII  /D/
002011      060                                 .ASCII  /0/
002012  000000                                  .WORD   0
002014  000001                                  .WORD   1
002016  040376                                  .WORD   L$HARD
002020  040552                                  .WORD   L$SOFT
002022  014310                                  .WORD   L$HW
002024  014326                                  .WORD   L$SW
002026  040764                                  .WORD   L$LAST
002030  000000                                  .WORD   0
002032  000000                                  .WORD   0
002034  000000                                  .WORD   0
002036  000000                                  .WORD   0
002040  014344                                  .WORD   L$DISPATCH
002042  000000                                  .WORD   0
002044  000000                                  .WORD   0
002046  000000                                  .WORD   0
002050     003                                  .BYTE   C$REVISION
002051     003                                  .BYTE   C$EDIT
002052  000000                                  .WORD   0
002054  000000                                  .WORD   0
002056  000000                                  .WORD   0
002060  002212                                  .WORD   L$DVTYP
002062  000000                                  .WORD   0
002064  000000                                  .WORD   0
002066  000000                                  .WORD   0
002070  000000                                  .WORD   0
002072  016364                                  .WORD   L$DU
002074  000000                                  .WORD   0
002076  002122                                  .WORD   L$DESC
002100  104035                                  EMT     E$LOAD
002102  000000                                  .WORD   0
```

```
            002104  014412                          .WORD   L$INIT
            002106  016174                          .WORD   L$CLEAN
            002110  015636                          .WORD   L$AUTO
            002112  014404                          .WORD   L$PROT
            002114  000000                          .WORD   0
            002116  000000                          .WORD   0
            002120  000000                          .WORD   0
     18     002122                          ENDMOD
     19
     20     002122                          DESCRIPT        <CZRLI TESTS THE RL01-02 INTERFACE AND BASIC DRIVE LOGIC>
            002122  103     132     122             .ASCIZ  /CZRLI TESTS THE RL01-02 INTERFACE AND BASIC DRIVE LOGIC/
            002125  114     111     040
            002130  124     105     123
            002133  124     123     040
            002136  124     110     105
            002141  040     122     114
            002144  060     061     055
            002147  060     062     040
            002152  111     116     124
            002155  105     122     106
            002160  101     103     105
            002163  040     101     116
            002166  104     040     102
            002171  101     123     111
            002174  103     040     104
            002177  122     111     126
            002202  105     040     114
            002205  117     107     111
            002210  103     000
                                            .EVEN
     21
     22     002212                          DEVTYP  <RL01,RL02>
            002212  122     114     060     .ASCIZ  /RL01,RL02/
            002215  061     054     122
            002220  114     060     062
            002223  000
                                            .EVEN
     23
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     40
```

```
      1                               .SBTTL  BIT AND OFFSET DEFINITIONS
      2
      3 002224                        BGNMOD  GLBEQAT
      4
      5 002224                        EQUALS
                                      ;
                                      ; BIT DIFINITIONS
                                      ;
            100000                    BIT15== 100000
            040000                    BIT14== 40000
            020000                    BIT13== 20000
            010000                    BIT12== 10000
            004000                    BIT11== 4000
            002000                    BIT10== 2000
            001000                    BIT09== 1000
            000400                    BIT08== 400
            000200                    BIT07== 200
            000100                    BIT06== 100
            000040                    BIT05== 40
            000020                    BIT04== 20
            000010                    BIT03== 10
            000004                    BIT02== 4
            000002                    BIT01== 2
            000001                    BIT00== 1
                                      ;
            001000                    BIT9==  BIT09
            000400                    BIT8==  BIT08
            000200                    BIT7==  BIT07
            000100                    BIT6==  BIT06
            000040                    BIT5==  BIT05
            000020                    BIT4==  BIT04
            000010                    BIT3==  BIT03
            000004                    BIT2==  BIT02
            000002                    BIT1==  BIT01
            000001                    BIT0==  BIT00
                                      ;
                                      ; EVENT FLAG DEFINITIONS
                                      ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
                                      ;
            000040                    EF.START==      32.                     ; START COMMAND WAS ISSUED
            000037                    EF.RESTART==    31.                     ; RESTART COMMAND WAS ISSUED
            000036                    EF.CONTINUE==   30.                     ; CONTINUE COMMAND WAS ISSUED
            000035                    EF.NEW==        29.                     ; A NEW PASS HAS BEEN STARTED
            000034                    EF.PWR==        28.                     ; A POWER-FAIL/POWER-UP OCCURRED
                                      ;
                                      ;
                                      ; PRIORITY LEVEL DEFINITIONS
                                      ;
            000340                    PRI07== 340
            000300                    PRI06== 300
            000240                    PRI05== 240
            000200                    PRI04== 200
            000140                    PRI03== 140
            000100                    PRI02== 100
            000040                    PRI01== 40
            000000                    PRI00== 0
                                      ;
```

```
                                ;OPERATOR FLAG BITS
                                ;
000004                          EVL==       4
000010                          LOT==      10
000020                          ADR==      20
000040                          IDU==      40
000100                          ISR==     100
000200                          UAM==     200
000400                          BOE==     400
001000                          PNT==    1000
002000                          PRI==    2000
004000                          IXE==    4000
010000                          IBE==   10000
020000                          IER==   20000
040000                          LOE==   40000
100000                          HOE==  100000

                                ;       OFFSETS FOR HARDWARE P-TABLE
000000                          CSR     =0                      ;BUS ADDRESS
000002                          VECT    =2                      ;VECTOR ADDRESS
000004                          PRIOR   =4                      ;PRIORITY
000006                          TYPDR   =6                      ;DRIVE TYPE
000010                          DRSB    =10                     ;DRIVE SELECT
000012                          CNT     =12                     ;CONTROLLER TYPE

                                ;       OFFSETS 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 ASSIGNMENTS 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
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 TOO 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-EXISTENT MEMORY ERROR
                010000          DLTERR  =10000                  ;DATA LATE ERROR
                010000          HNFERR  =10000                  ;HEADER NOT FOUND ERROR
                004000          DCKERR  =4000                   ;DATA CHECK ERROR
                004000          HCPCERR =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
```

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

                                ;       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
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                  HDSTAT  =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

002224                  ENDMOD
```

```
                .SBTTL  MACRO DEFINITIONS

;DELAY EXECUTION OF PROGRAM A SPECIFIED NUMBER OF 100-MILLISECOND TIME COUNTS.
;THIS TIMING IS PERFORMED BY SOFTWARE USING CPU TIMING AND IS HIGHLY MACHINE
;DEPENDENT.

;DELAY EXECUTION OF PROGRAM A SPECIFIED NUMBER OF 100-MICROSECOND TIME COUNTS.
;THIS TIMING IS PERFORMED BY SOFTWARE USING CPU TIMING AND IS HIGHLY MACHINE
;DEPENDENT.

;DELAY EXECUTION OF PROGRAM A SPECIFIED NUMBER OF 100-MICROSECOND TIME COUNTS
;USING A KW11-P PROGRAMMABLE CLOCK OR A LINE CLOCK. THE TIME DELAY IS INVALID
;IF TOO LARGE AN ARGUMENT IS USED WITH THE LINE CLOCK.
```

```
                                .SBTTL  GLOBAL DATA AND CONSTANTS

002224                          BGNMOD  GLBDAT

                                ;       TABLE OF OPERATION MESSAGES
002224  000000                  OPMSGS: .WORD   0               ;FILLER
002226  005271                          .WORD   MWRCHK          ;MESSAGE FOR WRITE CHECK
002230  005315                          .WORD   MGTSTA          ;               GET STATUS
002232  005242                          .WORD   MSEEK           ;               SEEK
002234  005261                          .WORD   MREADH          ;               READ HEADER
002236  005303                          .WORD   MWRITE          ;               WRITE DATA
002240  005250                          .WORD   MREAD           ;               READ DATA
002242  005400                          .WORD   MWRSET          ;               WITH RESET
002244  005327                          .WORD   MDATCP          ;               WITH DATA COMPARE
002246  005346                          .WORD   MHDRCP          ;               WITH HEADER COMPARE
002250  005445                          .WORD   MCYLUP          ;               LOAD HEADS
002252  005434                          .WORD   MULOAD          ;               UNLOAD HEADS
002254  005476                          .WORD   MINOUT          ;                  IN-OUT SEQ
002256  005455                          .WORD   MOUTIN          ;                  OUT-IN SEQ
002260  005521                          .WORD   MFOLWRT         ;                  FOLLOWING WRITE
002262  005543                          .WORD   MREVSK          ;                  REV SEEK
002264  005576                          .WORD   MFWDSK          ;                  FWD SEEK
002266  005665                          .WORD   MRESKO          ;                  REV SEEK
002270  005631                          .WORD   MFWSKO          ;                  FWD SEEK
002272  005721                          .WORD   MBADAD          ;                  BAD DISK ADD FOR WRITE
002274  005364                          .WORD   M40HDR          ;               40 HEADER OPERATION
002276  000000                  T.DRIVE: .WORD  0
002300  000000                  JJJ:    .WORD   0
002302  000000                  HLMTW:  .WORD   0
002304  000000                  CLRBYT: .WORD   0
002306  000000                  NXTHL:  .WORD   0
002310  000000                  GBND:   .WORD   0
002312  000000                  CAMSK:  .WORD   0
002314  000000                  DIRMSK: .WORD   0
002316  000000                  HDCYL:  .WORD   0

                                ;       TABLE OF RESULT NAME MESSAGE ADDRESSES
002320  010415                  RESTBL: .WORD   MCERR            ;CONTROLLER ERROR
002322  010526                          .WORD   MDRERR          ;DRIVE ERROR
002324  011041                          .WORD   MNEERR          ;NON-EXISTENT MEMORY ERROR
002326  011013                          .WORD   MFLERR          ;HEADER NOT FOUND-DATA LATE
002330  010776                          .WORD   MHDERR          ;HEADER OR DATA ERROR
002332  010766                          .WORD   MOPERR          ;OPERATION INCOMPLETE
002334  011057                          .WORD   MNDRST          ;NO DRIVE STATUS AVAILABLE
002336  000000                          .WORD   0
002340  010751                          .WORD   MWDERR          ;WRITE DATA ERROR
002342  010733                          .WORD   MHCERR          ;HEAD CURRENT ERROR
002344  000000                          .WORD   0
002346  010715                          .WORD   MSTERR          ;SEEK TIMEOUT ERROR
002350  010662                          .WORD   MSPERR          ;SPINDLE ERROR
002352  010700                          .WORD   MWGERR          ;WRITE GATE ERROR
002354  000000                          .WORD   0
002356  010632                          .WORD   MDSERR          ;DRIVE SELECT ERROR
```

```
                                ;       PATTERN TABLE
002360  004764                  PATTBL: .WORD   PAT1
002362  004766                          .WORD   PAT2
002364  005026                          .WORD   PAT3
002366  005066                          .WORD   PAT4
002370  005126                          .WORD   PAT5
002372  005134                          .WORD   PAT6
002374  005174                          .WORD   PAT7
002376  005176                          .WORD   PAT8
002400  005236                          .WORD   PAT9
002402  005240                          .WORD   PAT10

                                ;       SUBROUTINE CALLING STACK
002404  000000                  SUBSTK: .WORD   0               ;STACK IS 12 WORDS LONG
002406  000000                          .WORD   0
002410  000000                          .WORD   0
002412  000000                          .WORD   0
002414  000000                          .WORD   0
002416  000000                          .WORD   0
002420  000000                          .WORD   0
002422  000000                          .WORD   0
002424  000000                          .WORD   0
002426  000000                          .WORD   0

                                ;RL01 TABLE OF CYLINDERS
002430  000002                  T25TBL: .WORD   2               ;TABLE OF DIFFERENCES
002432  000006                          .WORD   6
002434  000011                          .WORD   9.
002436  000014                          .WORD   12.
002440  000021                          .WORD   17.
002442  000026                          .WORD   22.
002444  000033                          .WORD   27.
002446  000042                          .WORD   34.
002450  000051                          .WORD   41.
002452  000200                          .WORD   128.
002454  000377                          .WORD   255.

                                ;RL02 TABLE OF CYLINDERS
002456  000004                  T25TB2: .WORD   4
002460  000014                          .WORD   12.
002462  000022                          .WORD   18.
002464  000030                          .WORD   24.
002466  000042                          .WORD   34.
002470  000054                          .WORD   44.
002472  000066                          .WORD   54.
002474  000104                          .WORD   68.
002476  000122                          .WORD   82.
002500  000400                          .WORD   256.
002502  000777                          .WORD   511.

                                ;       TABLE TO BE USED TO BUILD AND STORE THE CYLINDERS

002504                          T33TBL: .BLKW   16.
002544                          TBT:    .BLKW   16.
```

```
                        
002604  002     CYLTBL: .BYTE   2               ;TABLE OF DEFAJLT CYLINDERS
002605  007             .BYTE   7.
002606  016             .BYTE   14.
002607  024             .BYTE   20.
002610  033             .BYTE   27.
002611  041             .BYTE   33.
002612  046             .BYTE   38.
002613  055             .BYTE   45.
002614  064             .BYTE   52.
002615  072             .BYTE   58.
002616  101             .BYTE   65.
002617  110             .BYTE   72.
002620  115             .BYTE   77.
002621  124             .BYTE   84.
002622  133             .BYTE   91.
002623  141             .BYTE   97.
002624  146             .BYTE   102.
002625  154             .BYTE   108.
002626  161             .BYTE   113.
002627  170             .BYTE   120.
002630  177             .BYTE   127.
002631  206             .BYTE   134.
002632  213             .BYTE   139.
002633  222             .BYTE   146.
002634  230             .BYTE   152.
002635  235             .BYTE   157.
002636  244             .BYTE   164.
002637  252             .BYTE   170.
002640  261             .BYTE   177.
002641  270             .BYTE   184.
002642  275             .BYTE   189.
002643  303             .BYTE   195.
002644  312             .BYTE   202.
002645  317             .BYTE   207.
002646  326             .BYTE   214.
002647  334             .BYTE   220.
002650  343             .BYTE   227.
002651  352             .BYTE   234.
002652  361             .BYTE   241.
002653  367             .BYTE   247.
002654  375             .BYTE   253.
002655  000             .BYTE   0
002656  000401          .WORD   257.
002660  000406          .WORD   262.
002662  000415          .WORD   269.
002664  000423          .WORD   275.
002666  000432          .WORD   282.
002670  000445          .WORD   293.
002672  000454          .WORD   300.
002674  000463          .WORD   307.
002676  000471          .WORD   313.
002700  000500          .WORD   320.
002702  000507          .WORD   327.
002704  000514          .WORD   332.
002706  000523          .WORD   339.
002710  000532          .WORD   346.
```

```
                                                .WORD   352.
                                                .WORD   357.
                                                .WORD   363.
                                                .WORD   368.
                                                .WORD   375.
                                                .WORD   382.
                                                .WORD   389.
                                                .WORD   394.
                                                .WORD   401.
                                                .WORD   407.
                                                .WORD   412.
                                                .WORD   419.
                                                .WORD   425.
                                                .WORD   432.
                                                .WORD   439.
                                                .WORD   444.
                                                .WORD   450.
                                                .WORD   457.
                                                .WORD   462.
                                                .WORD   469.
                                                .WORD   475.
                                                .WORD   482.
                                                .WORD   489.
                                                .WORD   496.
                                                .WORD   502.
                                                .WORD   508.
                                                .WORD   508.
                                                .WORD   0
                                SSINDX: .WORD   0               ;SUBROUTINE STACK INDEX POINTER

                                ;       OPERATIONAL FLAGS
                                OPFLAG: .WORD   0               ;OPERATION FLAGS
                                DONE:   .WORD   0               ;OPERATION COMPLETE FLAG
                                HADONE: .WORD   0               ;HEAD ALIGNMENT DONE FLAG
                                ERHEAD: .WORD   0               ;ADDRESS OF ERROR HEADER
                                MORECE: .WORD   0               ;MORE THAN 1 COMPARE ERROR
                                ERPSWI: .WORD   0               ;ERROR RETURN SWITCH
                                BSFLAG: .WORD   0               ;BAD SECTOR FLAGS
                                WRTSWI: .WORD   0               ;WRITE SWITCH
                                TBLSTR: .WORD   0               ;TABLE STORAGE

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

                                L.CS:   .WORD   0               ;CONTROLLER REGISTER STORAGE
                                L.BA:   .WORD   0               ;BEFORE OPERATION
                                L.DA:   .WORD   0
                                L.MP:   .WORD   0
                                T.CS:   .WORD   0               ;CONTROLLER REGISTER STORAGE
                                T.BA:   .WORD   0               ;   AFTER OPERATION
                                T.DA:   .WORD   0
                                T.MP:
                                HDWRD1: .WORD   0               ;HEADER WORD STORAGE
                                HDWRD2: .WORD   0
                                HDWRD3: .WORD   0
```

```
003060  000000    T.STAT:  .WORD   0          ;DRIVE STATE STORAGE

003062  000000    RESPARM: .WORD   0          ;PARAM BLOCK FOR REASON REPORT
003064  000000             .WORD   0
003066  000000             .WORD   0
003070  000000             .WORD   0
003072  000000             .WORD   0

003074  000000    DRVCNT:  .WORD   0          ;DRIVE COUNT FOR DRIVES UNDER TEST
003076  000000    DIFAUG:  .WORD   0          ;DIFFERENCE ARGUMENT FOR SEEK
003100  000000    OLDCYL:  .WORD   0          ;OLD CYLINDER
003102  000000    NEWCYL:  .WORD   0          ;NEW CYLINDER
003104  000000    CURCYL:  .WORD   0          ;CURRENT CYLINDER
003106  000000    DESDIF:  .WORD   0          ;DESIRED DIFFERENCE
003110  000000    DESSGN:  .WORD   0          ;DESIRED SIGN
003112  000000    DESHD:   .WORD   0          ;DESIRED HEAD
003114  000000    DESSEC:  .WORD   0          ;DESIRED SECTOR
003116  000000    TEMP0:   .WORD   0          ;TEMPORARY STORAGE
003120  000000    TEMP1:   .WORD   0          ;TEMPORARY STARAGE
003122  000000    TEMP2:   .WORD   0          ;TEMPORARY STORAGE
003124  000000    TEMP3:   .WORD   0          ;TEMPORARY STORAGE
003126  000000    TEMP4:   .WORD   0          ;TEMPORARY STORAGE
003130  000000    TEMP5:   .WORD   0          ;TEMPORARY STORAGE
003132  000000    TEMP6:   .WORD   0          ;TEMPORARY STORAGE
003134  000000    TEMP7:   .WORD   0          ;TEMPORARY STORAGE
003136  000000    TEMP8:   .WORD   0          ;TEMPORARY STORAGE
003140  000004    ERRVEC:  .WORD   4          ;ERROR VECTOR
003142  000000    DLYCNT:  .WORD   0          ;DELAY COUNTER USED IN TIMING MACROS
003144  000000    CLKFLG:  .WORD   0          ;FLAG INDICATING PRESENCE OF A L OR P CLOCK
003146  000000    CLKADR:  .WORD   0          ;POINTER TO DIAGNOSTIC MONITOR CLOCK TABLE
003150  000000    LBASE:   .WORD   0          ;L CLOCK ITERATION NUMBER TO FAKE P CLOCK

                  ;        MISCELLANEOUS COUNTERS
003152  000000    PASCNT:  .WORD   0          ;PASS COUNTER (LOCAL TO A TEST)
003154  000000    COUNT:   .WORD   0          ;A COUNTER (LOCAL TO A TEST)
003156  000000    ERRPOINT: .WORD  0          ;ERROR POINTER
003160            ERPCNT:  .BLKW   64.        ;ERROR COUNTER FOR PROGRAM
003360  000000    PASNUM:  .WORD   0          ;PASS NUMBER FOR PROGRAM
003362  000000    PSETNM:  .WORD   0          ;COUNTER FOR PARAMETER SET NUMBER IN USE
003364     000    LOCERR:  .BYTE   0          ;LOCAL ERROR COUNTER
003365     000    NOERCT:  .BYTE   0          ;INHIBIT ERROR COUNTING FLAG
003366  000000    TRPFLG:  .WORD   0          ;HARDWARE TRAP FLAG
003370  000000    PWRFLG:  .WORD   0          ;POWER FAILURE FLAG

                  ;        BAD SECTOR TABLES AND POINTERS
003372  000000    BSFVAL:  .WORD   0          ;BAD SECTORS FILES VALID FLAG

003374            SBSFIL:  .BLKW   76         ;SOFTWARE BAD SECTOR FILE
003570            FBSFIL:  .BLKW   76         ;FACTORY BAD SECTOR FILE

003764            IBUFF:   .BLKW   200        ;INPUT BUFFER
004364            OBUFF:   .BLKW   200        ;OUTPUT BUFFER

004764  000000    PAT1:    .WORD   0          ;PATTERN 1 (ALL ZEROS)
004766  177772    PAT2:    .WORD   177772
004770  177777             .WORD   177777
004772  177777             .WORD   177777
```

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261 004774  052525                        .WORD   052525
262 004776  052525                        .WORD   052525
263 005000  052525                        .WORD   052525
264 005002  177777                        .WORD   177777
265 005004  177777                        .WORD   177777
266 005006  052525                        .WORD   052525
267 005010  052525                        .WORD   052525
268 005012  177777                        .WORD   177777
269 005014  052525                        .WORD   052525
270 005016  177252                        .WORD   177252
271 005020  177252                        .WORD   177252
272 005022  172765                        .WORD   172765
273 005024  172765                        .WORD   172765
274
275 005026  000003                PAT3:   .WORD   000003
276 005030  000000                        .WORD   000000
277 005032  000000                        .WORD   000000
278 005034  177777                        .WORD   177777
279 005036  177777                        .WORD   177777
280 005040  177777                        .WORD   177777
281 005042  000000                        .WORD   000000
282 005044  000000                        .WORD   000000
283 005046  177777                        .WORD   177777
284 005050  177777                        .WORD   177777
285 005052  000000                        .WORD   000000
286 005054  177777                        .WORD   177777
287 005056  000000                        .WORD   000000
288 005060  177777                        .WORD   177777
289 005062  000000                        .WORD   000000
290 005064  177777                        .WORD   177777
291
292 005066  025252                PAT4:   .WORD   025252
293 005070  052525                        .WORD   052525
294 005072  052525                        .WORD   052525
295 005074  125252                        .WORD   125252
296 005076  125252                        .WORD   125252
297 005100  125252                        .WORD   125252
298 005102  052525                        .WORD   052525
299 005104  052525                        .WORD   052525
300 005106  125252                        .WORD   125252
301 005110  125252                        .WORD   125252
302 005112  052525                        .WORD   052525
303 005114  125252                        .WORD   125252
304 005116  052525                        .WORD   052525
305 005120  125252                        .WORD   125252
306 005122  052525                        .WORD   052525
307 005124  125252                        .WORD   125252
308
309 005126  155555                PAT5:   .WORD   155555
310 005130  133333                        .WORD   133333
311 005132  066666                        .WORD   066666
312
313 005134  121105                PAT6:   .WORD   121105
314 005136  150442                        .WORD   150442
315 005140  064221                        .WORD   064221
316 005142  132110                        .WORD   132110
317 005144  055044                        .WORD   055044
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318 005146  026442                        .WORD   026442
319 005150  013211                        .WORD   013211
320 005152  105504                        .WORD   105504
321 005154  042642                        .WORD   042642
322 005156  021321                        .WORD   021321
323 005160  110550                        .WORD   110550
324 005162  044264                        .WORD   044264
325 005164  022132                        .WORD   022132
326 005166  011055                        .WORD   011055
327 005170  104426                        .WORD   104426
328 005172  042213                        .WORD   042213
329
330 005174  177777              PAT7:     .WORD   177777
331
332 005176  045513              PAT8:     .WORD   045513
333 005200  122645                        .WORD   122645
334 005202  151322                        .WORD   151322
335 005204  064551                        .WORD   064551
336 005206  132264                        .WORD   132264
337 005210  055132                        .WORD   055132
338 005212  026455                        .WORD   026455
339 005214  113226                        .WORD   113226
340 005216  045513                        .WORD   045513
341 005220  122645                        .WORD   122645
342 005222  151322                        .WORD   151322
343 005224  064551                        .WORD   064551
344 005226  132264                        .WORD   132264
345 005230  055132                        .WORD   055132
346 005232  026455                        .WORD   026455
347 005234  113226                        .WORD   113226
348
349 005236  125252              PAT9:     .WORD   125252
350
351 005240  155555              PAT10:    .WORD   155555
352
353 005242                      ENDMOD
354
355
356                             .SBTTL  GLOBAL MESSAGES
357
361 005242                      BGNMOD  GLBTXT
362 005242      123     105     105     MSEEK:  .ASCIZ  /SEEK /
363 005250      122     104     040     MREAD:  .ASCIZ  /RD DATA /
364 005261      122     104     040     MREADH: .ASCIZ  /RD HDR /
365 005271      127     122     124     MWRCHK: .ASCIZ  /WRT CHECK/
366 005303      127     122     124     MWRITE: .ASCIZ  /WRT DATA /
367 005315      107     105     124     MGTSTA: .ASCIZ  /GET STAT /
368 005327      127     111     124     MDATCP: .ASCIZ  /WITH DATA CMP /
369 005346      127     111     124     MHDRCP: .ASCIZ  /WITH HDR CMP /
370 005364      106     117     122     M40HDR: .ASCIZ  /FOR 40 HDRS/
371 005400      127     111     124     MWRSET: .ASCIZ  /WITH RESET /
372 005414      117     120     105     MOPER:  .ASCIZ  /OPER: /
373 005423      122     105     123     MRSLT:  .ASCIZ  /RESULT:       /
374 005434      125     116     114     MULOAD: .ASCIZ  /UNLD DRV/
375 005445      114     104     040     MCYLUP: .ASCIZ  /LD DRV /
376 005455      106     117     114     MOUTIN: .ASCIZ  /FOL 0 TO CC SEEK/
377 005476      106     117     114     MINOUT: .ASCIZ  /FOL 255 TO CC SEEK/
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 378 005521      106     117     114  MFOLWRT: .ASCIZ /FOL WRT (NO SEEK)/
 379 005543      101     104     112  MREVSK:  .ASCIZ  /ADJ CYL WRTTN AFTER REV SK/
 380 005576      101     104     112  MFWDSK:  .ASCIZ  /ADJ CYL WRTTN AFTER FWD SK/
 381 005631      123     113     040  MFWSKO:  .ASCIZ  /SK FWD,WRT - SK REV,OVEPWRT/
 382 005665      123     113     040  MRESKO:  .ASCIZ  /SK REV,WRT - SK FWD,OVERWRT/
 383 005721      117     116     040  MBADAD:  .ASCIZ  /ON BAD SEC FILES/
 384 005742      103     101     116  MBADSF:  .ASCIZ  /CANNOT GET BAD SEC FILES/
 385 005773      102     101     104  MFMTER:  .ASCIZ  /BAD SEC FILE FMT ERR/
 386 006020      124     117     117  MTMBS:   .ASCIZ  /TOO MANY BAD SEC /
 387 006042      102     125     123  BASADD:  .ASCIZ  /BUS ADD=/
 388 006053      104     122     126  DRVNAM:  .ASCIZ  /DRV=/
 389 006060      104     122     126  NOPWR:   .ASCIZ  /DRV DID NOT REC'R FROM PWR FAIL/
 390 006120      122     114     103  CSNAM:   .ASCIZ  /RLCS/
 391 006125      122     114     102  BANAM:   .ASCIZ  /RLBA/
 392 006132      122     114     104  DANAM:   .ASCIZ  /RLDA/
 393 006137      122     114     115  MPNAM:   .ASCIZ  /RLMP/
 394 006144      117     120     040  LAB1:    .ASCIZ  /OP INIT = /
 395 006157      117     120     040  LAB2:    .ASCIZ  /OP DONE = /
 396 006172      127     117     122  MWORD:   .ASCIZ  /WORD /
 397 006200      111     116     124  MTOSLOW: .ASCIZ /INTRPT TOO LATE/
 398 006220      116     117     040  MDRRES:  .ASCIZ  /NO DRV RESPONSE/
 399 006240      116     117     040  MNOINT:  .ASCIZ  /NO INTRPT ON CMND COMPLETE/
 400 006273      103     116     124  MCONHNG: .ASCIZ /CNTLR HUNG /
 401 006307      105     122     122  MNOCLR:  .ASCIZ  /ERR DID NOT CLR/
 402 006327      126     117     114  VCNRST:  .ASCIZ  /VOL CHK NOT RSET/
 403 006350      125     116     130  UNXERR:  .ASCIZ  /UNXPCTED ERR/
 404 006365      040     124     105  TSTLAB:  .ASCIZ  / TEST/
 406 006373      115     101     116  MISTST:  .ASCIZ  /MAN INTERVENT STAT/
 407 006416      123     124     101  NSTACHG: .ASCIZ /STATE CHG/
 408 006430      123     120     116  SPDERR:  .ASCIZ  /SPNDL TIMEOUT FAILED TO SET/
 409 006464      106     101     111  GSTER1:  .ASCIZ  /FAIL FORCING DRV SEL ERR/
 410 006515      111     116     111  INITST:  .ASCIZ  /INIT STATE/
 411 006530      104     122     126  T05ERR:  .ASCIZ  /DRV SELECT/
 412 006543      104     122     126  T09ERR:  .ASCIZ  /DRV RDY/
 413 006553      123     105     105  T10ERR:  .ASCIZ  /SEEK SGN SWITCH/
 414 006573      110     104     040  T12ERR:  .ASCIZ  /HD SWITCH/
 415 006605      122     104     040  T13ERR:  .ASCIZ  /RD HDR (P1)/
 416 006621      122     104     040  T14ERR:  .ASCIZ  /RD HDR (P2)/
 417 006635      127     122     124  T16ERR:  .ASCIZ  /WRT LCK/
 418 006645                           P2T01E:
 419 006645      104     111     106  P2T02E:  .ASCIZ  /DIFF OF 1 SEEK/
 420 006664      124     105     123  NOTST:   .ASCIZ  /TEST CANNOT BE PERFORMED...NO P CLOCK OR SOFTWARE CLOCK/
 421 006754      104     122     126  NOCTLR:  .ASCIZ  /DRV DROPPED - NO CNTLR/
 422 007003      104     122     126  NOTRDY:  .ASCIZ  /DRV DROPPED - NOT RDY/
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                        .ASCIZ  /HDS FAILED TO MOVE IN 10 TRIES/
                        .ASCIZ  /CYL PORTION OF HDRS DIFFER WHEN READ FROM TRK 0 & 1/
                        .ASCIZ  /HEAD ALIGN. RSET WRT LCK TO SEL HD 0, SET FOR HD 1/
                        .ASCIZ  &TYPE "CTL/C" TO GET BACK TO SUPVR CMD MODE AND THEN TYPE "CONT"    &
                        .ASCIZ  /IF HD SEL TP (21, 22) DO NOT EXIST/
                        .ASCIZ  /GND NULL DET ON DRV LGC MOD DISABLE SEEK TIME OUT/
                        .ASCIZ  /ABOVE CONDITIONS MET/
                        .ASCIZ  /WAS LOAD DEPRESSED/
                        .ASCIZ  /CHK DRV IS UNLDED, COVER OPN, AND WRTE LCKED /
                        .ASCIZ  /CLOSE COVER & RST WRT LCK /
                        .ASCIZ  /PRESS LOAD /
                        .ASCIZ  /PRESS LOAD & WAIT FOR RDY /
                        .ASCIZ  /REMOVE ADR PLGS EXCPT /
                        .ASCIZ  /INSRT ADR PLG /
                        .ASCIZ  /IN ALL DRVS /
                        .ASCIZ  /INSUFFICIENT DRVS FOR DRV SEL ERR TST/
                        .ASCIZ  /RPLCE ADR PLGS AS BEFORE/
                        .ASCIZ  /RESET WRT LCK /
                        .ASCIZ  /SET WRT LCK/
                        .ASCIZ  /ON /
                        .ASCIZ  /ON DRV /
                        .ASCIZ  /UNDER TEST/
                        .ASCIZ  /SET WRT LCK /
                        .ASCIZ  /DIFF /
                        .ASCIZ  /SGN /
                        .ASCIZ  /HD /
                        .ASCIZ  /SEC /
                        .ASCIZ  /CYL /
                        .ASCIZ  /FROM /
                        .ASCIZ  / BYPASSED /
                        .ASCIZ  /ROUTINE TRACE SEQ:/
                        .ASCIZ  /DRV STAT/
                        .ASCIZ  /BAD SEC FILES NOT STRD. ALL SEC ASSUMED OK./
                        .ASCIZ  /TOTAL CMP ERRS: /

                        ;       RESULT NAMES
                        .ASCIZ  /DRV RDY /
                        .ASCIZ  /CONT ERR /
                        .ASCIZ  /HDR CRC/
                        .ASCIZ  /DATA CRC/
                        .ASCIZ  /HDR NOT FND/
                        .ASCIZ  /DATA LATE/
                        .ASCIZ  &HDR NOT FND/HDR CRC/OPI&
                        .ASCIZ  /DRV ERR /
                        .ASCIZ  /SEL'D HD /
                        .ASCIZ  /VOL CHK /
                        .ASCIZ  /COVER OPEN/
                        .ASCIZ  /BRUSH HOME/
                        .ASCIZ  /WRT LCK /
                        .ASCIZ  /HDS OUT /
                        .ASCIZ  /DRV SEL ERR /
                        .ASCIZ  /DRV STATE /
                        .ASCIZ  /SPIN TIMEOUT /
                        .ASCIZ  /WRT GAT ERR /
                        .ASCIZ  /SEEK TIMEOUT /
                        .ASCIZ  /HEAD CUR ERR /
                        .ASCIZ  /WRT DAT ERR /
```

GLOBAL MESSAGES

```
     69 010766      117     120     122  MOPERR: .ASCIZ  /OPR-INC/
     70 010776      110     104     122  MHDERR: .ASCIZ  &HDR/DAT ERR &
     71 011013      110     104     122  MFLERR: .ASCIZ  &HDR NOT FND/DAT LATE &
     72 011041      116     055     130  MNEERR: .ASCIZ  /N-X-MEM /
     73 011052      103     131     114  MCYLOC: .ASCIZ  /CYL /
     74 011057      103     101     116  MNDRST: .ASCIZ  /CANNOT GET DRV STAT/
     75 011103      125     116     113  MUNDEF: .ASCIZ  /UNKN DRV STATE-NO RDY,NO ERR,HDS OUT/
     76 011150      106     101     111  MRLFAL: .ASCIZ  /FAIL TO RELD HDS AFTER ERR CLEAR/
     77 011211      127     122     124  MWRTAB: .ASCIZ  /WRT ABORTED/
     78 011225      040     117     126  MEXERS: .ASCIZ  / OVER ERR LIMIT - UNIT DROPPED /
     79 011265      040     105     122  MERRS:  .ASCIZ  / ERROR/
     80 011274      207     377     377  BELL:   .ASCIZ  <207><377><377>
     81
     82                                   ;       RESULT SETTINGS
     83 011300      111     123     040  RESE3:  .ASCIZ  /IS /
     84 011304      040     123     102  RESE4:  .ASCIZ  / SB /
     85
     86                                   ;       RESULT CONDITIONS
     87 011311      040     111     116  RESE5:  .ASCIZ  / IN /
     88 011316      040     117     106  RESE6:  .ASCIZ  / OF /
     89 011323      123     124     101  STATE2: .ASCIZ  /STATE 2/
     90 011333      123     124     101  STATE3: .ASCIZ  /STATE 3/
     91 011343      123     124     101  STATE5: .ASCIZ  /STATE 5/
     93 011353      123     105     105  CDRDY:  .ASCIZ  &SEEK W/O MOTION&
     95 011373      061     123     124  C10MS:  .ASCIZ  /1ST 3 MS/
     96 011404      065     060     060  C500MS: .ASCIZ  /500MS/
     97 011412      103     131     103  CCYLUP: .ASCIZ  /CYCLE UP/
     98 011423      104     101     124  CAFDT:  .ASCIZ  /DATA XFR/
     99 011434      065     040     123  C5SEC:  .ASCIZ  /5 SEC/
    100
    101 011442      045     116     045  FMTOP1: .ASCIZ  /%N%T%N%T%T%06%S%T%01%N/
    102 011471      045     116     045  FMTOP2: .ASCIZ  /%N%T%01%S1%T%01%N/
    103 011513      045     116     045  FMTOP3: .ASCIZ  /%N%T%01%S1%T%T%N/
    104 011534      045     124     045  FMT1:   .ASCIZ  /%T%T/
    105 011541      045     116     045  FMT1.1: .ASCIZ  /%N%T%T/
    106 011550      045     124     000  FMT2:   .ASCIZ  /%T/
    107 011553      045     116     000  FMT3:   .ASCIZ  /%N/
    108 011556      045     116     045  FMT4:   .ASCIZ  /%N%T%T%N/
    109 011567      045     116     045  FMT5:   .ASCIZ  /%N%T%06%S1%T%01/
    110 011607      045     116     045  FMT6:   .ASCIZ  /%N%S11%T%S4%T%S4%T%S4%T%S4%T%S2%T/
    111 011651      045     116     045  FMT7:   .ASCIZ  /%N%T%06%S2%06%S2%06%S2%06%S3%03%S2%01%N/
    112 011721      045     116     045  FMT8:   .ASCIZ  /%N%T%06%S2%06%S2%06%S2%06/
    113 011753      045     116     045  FMT9:   .ASCIZ  /%N%T/
    114 011760      045     124     045  FMT11:  .ASCIZ  /%T%01/
    115 011766      045     124     045  FMT12:  .ASCIZ  /%T%03/
    116 011774      045     116     045  FMT13:  .ASCIZ  /%N%S11%T%03%S1%T%03%S1%T%01%S1%T%01/
    117 012040      045     116     045  FMT14:  .ASCIZ  /%N%T%T%D3%S1%T%06%S1%T%06/
    118 012072      045     116     045  FMT15:  .ASCIZ  /%N%S11%T%D3%S1%T%06%S1%T%06/
    119 012126      045     116     045  FMT16:  .ASCIZ  /%N%S5%06/
    120 012137      045     123     061  FMT17:  .ASCIZ  /%S10%T%N%S11%06%N/
    121 012161      045     116     045  FMT18:  .ASCIZ  /%N%S15%T%S5%T%S4%T%S5%T%N/
    122 012213      045     124     045  FMT19:  .ASCIZ  /%T%S4%D6%S4%D6%S4%D6%S4%D6%N/
    123 012250      045     124     045  FMT20:  .ASCIZ  /%T%S2%D6%S14%D6%S4%D6%N/
    124 012300      045     124     045  FMT21:  .ASCIZ  /%T%S12%D6%S14%D6%N/
    125 012323      045     116     045  FMT22:  .ASCIZ  /%N%S11%T%03%S1%T%01%S1%T%02/
    126 012357      045     124     045  FMT23:  .ASCIZ  /%T%T%T%01%N/
    127 012373      045     116     045  FMT24:  .ASCIZ  /%N%T/
```

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    128 012400      045     116     045  FMT25:  .ASCIZ  /%N%D2%T/
    129 012410      045     116     045  FMT26:  .ASCIZ  /%N%S1%T%D4%T%T%D3%N/
    130 012434      045     116     045  FMT27:  .ASCIZ  /%N%T%D3%T%D3%N/
    131 012453      045     116     045  FMT28:  .ASCIZ  /%N%T%T%T/
    132 012464                           ENDMOD
    137
    138
    139                                  .SBTTL  ERROR MESSAGES
    140
    141 012464                           BGNMOD  GLBERR
    142                                  ;       ERR1    R3 POINTS TO RESULT MESSAGE
    143                                  ;               RESULT: (R3)
    144
    145                                  ;       ERR2    R3 POINTS TO RESULT NAME
    146                                  ;               RESULT: (R3) IS 1 SB 0
    147
    148                                  ;       ERR3    R3 POINTS TO RESULT NAME
    149                                  ;               RESULT: (R3) IS 0 SB 1
    150
    151                                  ;       ERR4    R3 POINTS TO RESULT NAME
    152                                  ;               R4 POINTS TO RESULT CONDITIONS
    153                                  ;               RESULT: (R3) IS 1 SB 0 (R4)
    154
    155                                  ;       ERR5    R3 POINTS TO RESULT NAME
    156                                  ;               R4 POINTS TO RESULT CONDITIONS
    157                                  ;               RESULT: (R3) IS 0 SB 1 (R4)
    158
    159                                  ;       ERR6    RESULT ROUTINE DETERMINES WHICH ERROR(S) ARE SET AND
    160                                  ;               REPORTS ALL
    161                                  ;               RESULT: "ERROR" IS 1 SB 0
    162
    163                                  ;       ERR7    DRIVE STATE ERROR REPORT
    164                                  ;               R3 CONTAINS EXPECTED STATE
    165                                  ;               T.STAT CONTAINS BAD STATE
    166                                  ;               RESULT: DRIVE STATE IS (T.STAT) SB (R3)
    167
    168                                  ;       ERR8    HEAD POSITIONING ERROR REPORT
    169                                  ;               NEWCYL CONTAINS EXPECTED CYLINDER
    170                                  ;               HDWRD1 CONTAINS BAD CYLINDER
    171                                  ;               RESULT: CYLINDER IS (HDWRD1) SB (NEWCYL)
    172
    173                                  ;       ERR9    UTILITY RESULT REPORT
    174                                  ;               R3 POINTS TO RESULT NAME
    175                                  ;               R4 POINTS TO VALUE 1
    176                                  ;               R5 POINTS TO VALUE 2
    177                                  ;               RESULT: (R3-NAME) IS (R4-VALUE 1) SB (R5-VALUE 2)
    178
    179                                  ;       ERR10   COMPARE ERROR REPORT
    180                                  ;               R3 CONTAINS THE BAD WORD NUMBER
    181                                  ;               R4 POINTS TO BAD WORD
    182                                  ;               R5 POINTS TO GOOD WORD
    183                                  ;               RESULT: WORD (R3) IS (R4) SB (R5)
    184
    185
    186                                  .NLIST  MD,ME
    187
    188
```

```
                                                BGNMSG  ERR1
012464                                                  TSTB    NOERCT          ;TEST IF ERROR COUNTING INHIBITED
012464  105767  170675                                  BNE     1$              ;YES - SKIP
012470  001002                                          INC     @ERRPOINT       ;ELSE BUMP ERROR COUNT
012472  005277  170460                          1$:     MOV     R1,-(SP)        ;STORE R1
012476  010146                                          JSR     PC,RPTOP        ;REPORT OPERATION
012500  004767  011212                                  MOV     #1,(R1)+        ;SET PARAM NUMBER
012504  012721  000001                                  MOV     R3,(R1)+        ;INSERT MESSAGE ADDRESS POINTER
012510  010321                                          JSR     PC,RPTRES       ;REPORT RESULTS
012512  004767  011766                                  JSR     PC,RPTREM       ;REPORT REMAINDER
012516  004767  012170                                  MOV     (SP)+,R1        ;RESTORE R1
012522  012601                                          JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
012524  004767  003714                          ENDMSG
012530                                          L10000:
012530                                                  TRAP    C$MSG
012530  104423
                                                BGNMSG  ERR2
012532                                                  INC     @ERRPOINT       ;BUMP ERROR COUNT
012532  005277  170420                                  MOV     R1,-(SP)        ;STORE R1
012536  010146                                          JSR     PC,RPTOP        ;REPORT OPERATION
012540  004767  011152                                  MOV     #3,(R1)+        ;SET PARAM NUMBER
012544  012721  000003                                  MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
012550  010321                                          MOV     #1,(R1)+        ;SET IS VALUE
012552  012721  000001                                  CLR     (R1)+           ;SET SB VALUE
012556  005021                                          JSR     PC,RPTRES       ;REPORT RESULTS
012560  004767  011720                                  JSR     PC,RPTREM       ;REPORT REMAINDER
012564  004767  012122                                  MOV     (SP)+,R1        ;RESTORE R1
012570  012601                                          JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
012572  004767  003646                          ENDMSG
012576                                          L10001:
012576                                                  TRAP    C$MSG
012576  104423

012600                                          BGNMSG  ERR3
012600  005277  170352                                  INC     @ERRPOINT       ;BUMP ERROR COUNT
012604  010146                                          MOV     R1,-(SP)        ;STORE R1
012606  004767  011104                                  JSR     PC,RPTOP        ;REPORT OPERATION
012612  012721  000003                                  MOV     #3,(R1)+        ;SET PARAM NUMBER
012616  010321                                          MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
012620  005021                                          CLR     (R1)+           ;SET IS VALUE
012622  012721  000001                                  MOV     #1,(R1)+        ;SET SB VALUE
012626  004767  011652                                  JSR     PC,RPTRES       ;REPORT RESULTS
012632  004767  012054                                  JSR     PC,RPTREM       ;REPORT REMAINDER
012636  012601                                          MOV     (SP)+,R1        ;RESTORE R1
012640  004767  003600                                  JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
012644                                          ENDMSG
012644                                          L10002:
012644  104423                                          TRAP    C$MSG

012646                                          BGNMSG  ERR4
012646  005277  170304                                  INC     @ERRPOINT       ;BUMP ERROR COUNT
012652  010146                                          MOV     R1,-(SP)        ;STORE R1
012654  004767  011036                                  JSR     PC,RPTOP        ;REPORT OPERATION
012660  012721  000004                                  MOV     #4,(R1)+        ;SET PARAM NUMBER
012664  010321                                          MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
012666  012721  000001                                  MOV     #1,(R1)+        ;SET IS VALUE
012672  005021                                          CLR     (R1)+           ;SET SB VALUE
012674  010411                                          MOV     R4,(R1)         ;INSERT ADD OF CONDITION POINTER
```

```
                                                        JSR     PC,RPTRES       ;REPORT RESULTS
                                                        JSR     PC,RPTREM       ;REPORT REMAINDER
                                                        MOV     (SP)+,R1        ;RESTORE R1
                                                        JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
                                                ENDMSG
                                                L10003:
                                                        TRAP    C$MSG

                                                BGNMSG  ERR5
                                                        INC     @ERRPOINT       ;BUMP ERROR COUNT
                                                        MOV     R1,-(SP)        ;STORE R1
                                                        JSR     PC,RPTOP        ;REPORT OPERATION
                                                        MOV     #4,(R1)+        ;SET PARAM NUMBER
                                                        MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
                                                        CLR     (R1)+           ;SET IS VALUE
                                                        MOV     #1,(R1)+        ;SET SB VALUE
                                                        MOV     R4,(R1)         ;INSERT ADD OF CONDITION POINTER
                                                        JSR     PC,RPTRES       ;REPORT RESULTS
                                                        JSR     PC,RPTREM       ;REPORT REMAINDER
                                                        MOV     (SP)+,R1        ;RESTORE R1
                                                        JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
                                                ENDMSG
                                                L10004:
                                                        TRAP    C$MSG

                                                BGNMSG  ERR6
                                                        TSTB    NOERCT          ;TEST IF ERROR COUNTING INHIBITED
                                                        BNE     17$             ;YES - SKIP
                                                        INC     @ERRPOINT       ;ELSE BUMP ERROR COUNT
                                                17$:    MOV     R1,-(SP)        ;STORE R1
                                                        MOV     R3,-(SP)        ;STORE R3
                                                        MOV     R4,-(SP)        ;STORE R4
                                                        MOV     R5,-(SP)        ;STORE R5
                                                        JSR     PC,RPTOP        ;REPORT OPERATION
                                                        MOV     #3,(R1)+        ;SET PARAM NUMBER
                                                        MOV     #1,2(R1)        ;INSERT IS VALUE
                                                        CLR     TEMP3           ;CLEAR FOR STATUS STORAGE
                                                        MOV     T.CS,R3         ;GET T.CS
                                                        BIC     #177761,R3      ;AND CLEAR ALL BUT FUNCTION
                                                        CMP     #4,R3           ;CHECK IF IT WAS GET STATUS
                                                        BEQ     1$              ;YES - STATUS IS IN T.MP, SKIP
                                                        MOV     #GETSTAT,RLDA(R2) ;ELSE DO GET STATUS
                                                        MOV     #4,R3
                                                        BIS     RLDRV,R3
                                                        MOV     R3,RLCS(R2)
                                                        WAITUS  10.             ;WAIT FOR CONTROLLER READY
                                                        MOV     #10.,(PC)+
                                                        .WORD   0
                                                        MOV     L$DLY,(PC)+
                                                        .WORD   0
                                                        DEC     -6(PC)
                                                        BNE     .-4
                                                        DEC     -22(PC)
                                                        BNE     .-20
                                                        BIT     #CRDYMSK,RLCS(R2)       ;TEST IF READY
                                                        BNE     10$             ;YES - SKIP
                                                9$:     MOV     #BIT9,R3        ;ELSE SET NO DRIVE STATUS BIT
```

```
285 013136  000413                    BR      2$                  ;IN MESSAGE WORD AND SKIP
286 013140  016203  000006  10$:      MOV     RLMP(R2),R3         ;STORE STATUS FOR REPORT
287 013144  010367  167754            MOV     R3,TEMP3
288 013150  116703  167751            MOVB    TEMP3+1,R3          ;GET ERROR BITS IN PROPER POSITION
289 013154  000402                    BR      13$
290 013156  116703  167671  1$:       MOVB    T.MP+1,R3           ;GET ERROR BITS FROM MP REG
291 013162  042703  177442  13$:      BIC     #177442,R3          ;CLEAR UNUSED BITS
292 013166  016704  167652  2$:       MOV     T.CS,R4             ;GET ERROR BITS FROM CS REG
293 013172  042704  001777            BIC     #1777,R4            ;CLEAR UNUSED BITS
294 013176  050403                    BIS     R4,R3               ;MAKE ONE WORD OF POSSIBLE ERRORS
295 013200  032703  002000            BIT     #OPIERR,R3          ;TEST IF OPI SET
296 013204  001442                    BEQ     115$                ;NO - SKIP
297 013206  032703  010000            BIT     #HNFERR,R3          ;TEST IF HDR NOT FOUND ERROR
298 013212  001026                    BNE     107$                ;YES - SKIP
299 013214  032703  004000            BIT     #HCRCERR,R3         ;TEST IF HDR CRC ERR
300 013220  001020                    BNE     105$                ;YES - SKIP
301 013222  012704  010766            MOV     #MOPERR,R4          ;SET OPI ALONE MESSAGE
302 013226                  100$:     PRINTB  #FMT28,#MRSLT,R4,#MERRS ;REPORT ERROR
    013226  012746  011265            MOV     #MERRS,-(SP)
    013232  010446                    MOV     R4,-(SP)
    013234  012746  005423            MOV     #MRSLT,-(SP)
    013240  012746  012453            MOV     #FMT28,-(SP)
    013244  012746  000004            MOV     #4,-(SP)
    013250  010600                    MOV     SP,R0
    013252  104414                    TRAP    C$PNTB
    013254  062706  000012            ADD     #12,SP
303 013260  000430                    BR      120$                ;SKIP
304 013262  012704  010427  105$:      MOV     #MHCRC,R4           ;HDR CRC MESSAGE
305 013266  000757                    BR      100$
306 013270  032703  004000  107$:      BIT     #HCRCERR,R3         ;TEST IF HCRC WITH HDR NOT FND
307 013274  001003                    BNE     109$                ;YES - SKIP
308 013276  012704  010450            MOV     #MHNF,R4            ;MESSAGE HEADER NOT FOUND
309 013302  000751                    BR      100$
310 013304  012704  010476  109$:      MOV     #MHFCRC,R4          ;HNF AND HCRC MESSAGE
311 013310  000746                    BR      100$                ;SKIP
312 013312  032703  004000  115$:      BIT     #DCKERR,R3          ;TEST IF DATA CHECK SET, NOT OPI
313 013316  001403                    BEQ     118$                ;NO - SKIP
314 013320  012704  010437            MOV     #MDCRC,R4           ;SET MESSAGE DATA CHECK
315 013324  000740                    BR      100$                ;SKIP
316 013326  032703  010000  118$:      BIT     #DLTERR,R3          ;TEST IF DATA LATE ERROR
317 013332  001403                    BEQ     120$                ;NO - SKIP
318 013334  012704  010464            MOV     #MDLT,R4            ;SET MESSAGE DATA LATE
319 013340  000732                    BR      100$                ;SKIP
320 013342  012705  100000  120$:      MOV     #BIT15,R5           ;SET BIT POINTER FOR TEST
321 013346  005004                    CLR     R4                  ;CLEAR R4 FOR TABLE COUNT
322 013350  030503          3$:       BIT     R5,R3               ;TEST IF BIT IS SET
323 013352  001005                    BNE     6$                  ;YES - SKIP TO REPORT
324 013354  005724          4$:       TST     (R4)+               ;ELSE BUMP TABLE POINTER
325 013356  000241                    CLC                         ;CLEAR CARRY
326 013360  006005                    ROR     R5                  ;SHIFT BIT POINTER TO NEXT BIT
327 013362  001372                    BNE     3$                  ;LOOP IF NOT 0
328 013364  000405                    BR      7$                  ;ELSE REPORT REMAINDER
329 013366  016411  002320  6$:       MOV     RESTBL(R4),(R1)     ;INSERT NAME ADDRESS
330 013372  004767  011106            JSR     PC,RPTRES           ;REPORT RESULTS
331 013376  000766                    BR      4$                  ;GET NEXT BIT
332 013400  004767  011306  7$:       JSR     PC,RPTREM           ;REPORT REMAINDER
333 013404  005767  167514            TST     TEMP3               ;TEST IF ANY NEW STATUS
```

```
    013410  001414                          BEQ     15$                 ;NO - SKIP
    013412                                  PRINTB  #FMT17,#STAMES,TEMP3
    013412  016746  167506                  MOV     TEMP3,-(SP)
    013416  012746  010276                  MOV     #STAMES,-(SP)
    013422  012746  012137                  MOV     #FMT17,-(SP)
    013426  012746  000003                  MOV     #3,-(SP)
    013432  010600                          MOV     SP,R0
    013434  104414                          TRAP    C$PNTB
    013436  062706  000010                  ADD     #10,SP
    013442  032767  004000  167374  15$:    BIT     #DCKERR,T.CS        ;TEST IF DATA CHECK ERROR
    013450  001453                          BEQ     25$                 ;NO - SKIP
    013452  032767  002000  167364          BIT     #OPIERR,T.CS        ;TEST IF OPI SET
    013460  001047                          BNE     25$                 ;YES - SKIP
    013462  005067  167326                  CLR     MORECE              ;CLEAR COMPARE ERROR COUNT
    013466  012701  000200                  MOV     #128.,R1            ;SET COMPARE LENGTH
    013472  012703  000001                  MOV     #1,R3               ;SET WORD COUNT
    013476  012705  004364                  MOV     #OBUFF,R5           ;SET GOOD WORD POINTER
    013502  012704  003764                  MOV     #IBUFF,R4           ;SET TEST WORD POINTER
    013506  021514                  18$:    CMP     (R5),(R4)           ;CHECK WORD
    013510  001427                          BEQ     19$                 ;GOOD - SKIP
    013512  026727  167276  000012          CMP     MORECE,#10.         ;TEST IF COMPARE LIMIT REACHED
    013520  003021                          BGT     20$                 ;YES - SKIP
    013522                                  PRINTB  #FMT15,#MWORD,R3,#RESE3,(R4),#RESE4,(R5)
    013522  011546                          MOV     (R5),-(SP)
    013524  012746  011304                  MOV     #RESE4,-(SP)
    013530  011446                          MOV     (R4),-(SP)
    013532  012746  011300                  MOV     #RESE3,-(SP)
    013536  010346                          MOV     R3,-(SP)
    013540  012746  006172                  MOV     #MWORD,-(SP)
    013544  012746  012072                  MOV     #FMT15,-(SP)
    013550  012746  000007                  MOV     #7,-(SP)
    013554  010600                          MOV     SP,R0
    013556  104414                          TRAP    C$PNTB
    013560  062706  000020                  ADD     #20,SP
    013564  005267  167224          20$:    INC     MORECE              ;BUMP ERROR COUNTER
    013570  022524                  19$:    CMP     (R5)+,(R4)+         ;BUMP POINTERS
    013572  005203                          INC     R3                  ;BUMP COUNTER
    013574  005301                          DEC     R1                  ;DEC LENGTH COUNT
    013576  001343                          BNE     18$                 ;LOOP IF NOT DONE
    013600  005767  167210          25$:    TST     MORECE              ;TEST IF ANY COMPARE ERRORS
    013604  001421                          BEQ     27$                 ;NO - SKIP
    013606  012701  000200                  MOV     #128.,R1            ;SET COMPARE LENGTH
    013612                                  PRINTB  #FMT27,#TCERR,MORECE,#RESE6,R1
    013612  010146                          MOV     R1,-(SP)
    013614  012746  011316                  MOV     #RESE6,-(SP)
    013620  016746  167170                  MOV     MORECE,-(SP)
    013624  012746  010363                  MOV     #TCERR,-(SP)
    013630  012746  012434                  MOV     #FMT27,-(SP)
    013634  012746  000005                  MOV     #5,-(SP)
    013640  010600                          MOV     SP,R0
    013642  104414                          TRAP    C$PNTB
    013644  062706  000014                  ADD     #14,SP
    013650  012605                  27$:    MOV     (SP)+,R5            ;RESTORE R5, 4, 3, 1
    013652  012604                          MOV     (SP)+,R4
    013654  012603                          MOV     (SP)+,R3
    013656  012601                          MOV     (SP)+,R1
    013660  004767  002560                  JSR     PC,CKERLM           ;GO CHECK IF ERROR COUNT EXCEEDED
```

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364 013664                                  ENDMSG
    013664                                  L10005:
    013664  104423                             TRAP    C$MSG
365
366 013666                                  BGNMSG  ERR7
367 013666  005277  167264                      INC     @ERRPOINT       ;BUMP ERROR COUNT
368 013672  010146                              MOV     R1,-(SP)        ;STORE R1
369 013674  004767  010016                      JSR     PC,RPTOP        ;REPORT OPERATION
370 013700  012721  000003                      MOV     #3,(R1)+        ;SET PARAM NUMBER
371 013704  012721  010647                      MOV     #MDRVST,(R1)+   ;INSERT NAME ADD POINTER
372 013710  016721  167144                      MOV     T.STAT,(R1)+    ;INSERT IS VALUE
373 013714  010311                              MOV     R3,(R1)         ;INSERT SB VALUE
374 013716  004767  010562                      JSR     PC,RPTRES       ;REPORT RESULTS
375 013722  004767  010764                      JSR     PC,RPTREM       ;REPORT REMAINDER
376 013726  012601                              MOV     (SP)+,R1        ;RESTORE R1
377 013730  004767  002510                      JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
378 013734                                  ENDMSG
    013734                                  L10006:
    013734  104423                             TRAP    C$MSG
379
380 013736                                  BGNMSG  ERR8
381 013736  005277  167214                      INC     @ERRPOINT       ;BUMP ERROR COUNT
382 013742  010146                              MOV     R1,-(SP)        ;STORE R1
383 013744  010346                              MOV     R3,-(SP)        ;STORE R3
384 013746  004767  007744                      JSR     PC,RPTOP        ;REPORT OPERATION
385 013752  012721  000003                      MOV     #3,(R1)+        ;SET PARAM NUMBER
386 013756  012721  011052                      MOV     #MCYLOC,(R1)+   ;INSERT NAME ADD POINTER
387 013762  016711  167064                      MOV     HDWRD1,(R1)     ;GET HEADER WORD
388 013766  012703  000007                      MOV     #7,R3           ;SET SHIFT COUNT
389 013772  000241                      3$:     CLC
390 013774  006011                              ROR     (R1)            ;ALIGN CHAR FOR PRINTING
391 013776  005303                              DEC     R3              ;  AS IS VALUE
392 014000  001374                              BNE     3$
393 014002  005721                              TST     (R1)+           ;BUMP PARAM POINTER
394 014004  016711  167072                      MOV     NEWCYL,(R1)     ;INSERT SB VALUE
395 014010  004767  010470                      JSR     PC,RPTRES       ;REPORT RESULTS
396 014014  004767  010672                      JSR     PC,RPTREM       ;REPORT REMAINDER
397 014020  012603                              MOV     (SP)+,R3        ;RESTORE R3
398 014022  012601                              MOV     (SP)+,R1        ;RESTORE R1
399 014024  004767  002414                      JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
400 014030                                  ENDMSG
    014030                                  L10007:
    014030  104423                             TRAP    C$MSG
401
402 014032                                  BGNMSG  ERR9
403 014032  005277  167120                      INC     @ERRPOINT       ;BUMP ERROR COUNT
404 014036  010146                              MOV     R1,-(SP)        ;STORE R1
405 014040  004767  007652                      JSR     PC,RPTOP        ;REPORT OPERATION
406 014044  012721  000003                      MOV     #3,(R1)+        ;SET PARAM NUMBER
407 014050  010321                              MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
408 014052  010421                              MOV     R4,(R1)+        ;SET IS VALUE
409 014054  010521                              MOV     R5,(R1)+        ;SET SB VALUE
410 014056  004767  010422                      JSR     PC,RPTRES       ;REPORT RESULTS
411 014062  004767  010624                      JSR     PC,RPTREM       ;REPORT REMAINDER
412 014066  012601                              MOV     (SP)+,R1        ;RESTORE R1
413 014070  004767  002350                      JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
414 014074                                  ENDMSG
```

```
                014074
                014074  104423
          415   014076
          416   014076  010146
          417   014100  005767  166710
          418   014104  001051
          419   014106  005277  167044
          420   014112  004767  007600
          421   014116
                014116  005046
                014120  156716  166707
                014124  012746  006053
                014130  016746  166672
                014134  012746  006042
                014140  012746  011567
                014144  012746  000005
                014150  010600
                014152  104414
                014154  062706  000014
          422   014160
                014160  011546
                014162  012746  011304
                014166  011446
                014170  012746  011300
                014174  010346
                014176  012746  006172
                014202  012746  005423
                014206  012746  012040
                014212  012746  000010
                014216  010600
                014220  104414
                014222  062706  000022
          423   014226  000421
          424   014230
                014230  011546
                014232  012746  011304
                014236  011446
                014240  012746  011300
                014244  010346
                014246  012746  006172
                014252  012746  012072
                014256  012746  000007
                014262  010600
                014264  104414
                014266  062706  000020
          425   014272  005267  166516
          426   014276  012601
          427   014300  004767  002140
          428   014304
                014304
                014304  104423
          429   014306
          430
          431
          432   014306
          433   014306
                014306  000006

L10010:
                TRAP    C$MSG
BGNMSG  ERR10
                MOV     R1,-(SP)        ;STORE R1
                TST     MORECE          ;TEST IF 2ND BAD LINE
                BNE     3$              ;YES - SKIP
                INC     @ERRPOINT       ;BUMP ERROR COUNT
                JSR     PC,RPTOP        ;REPORT OPERATION
                PRINTB  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1> ;REPORT ID
                CLR     -(SP)
                BISB    RLDRV+1,(SP)
                MOV     #DRVNAM,-(SP)
                MOV     RLBAS,-(SP)
                MOV     #BASADD,-(SP)
                MOV     #FMT5,-(SP)
                MOV     #5,-(SP)
                MOV     SP,R0
                TRAP    C$PNTB
                ADD     #14,SP
                PRINTB  #FMT14,#MRSLT,#MWORD,R3,#RESE3,(R4),#RESE4,(R5)
                MOV     (R5),-(SP)
                MOV     #RESE4,-(SP)
                MOV     (R4),-(SP)
                MOV     #RESE3,-(SP)
                MOV     R3,-(SP)
                MOV     #MWORD,-(SP)
                MOV     #MRSLT,-(SP)
                MOV     #FMT14,-(SP)
                MOV     #10,-(SP)
                MOV     SP,R0
                TRAP    C$PNTB
                ADD     #22,SP
                BR      4$
3$:             PRINTB  #FMT15,#MWORD,R3,#RESE3,(R4),#RESE4,(R5) ;REPORT DATA
                MOV     (R5),-(SP)
                MOV     #RESE4,-(SP)
                MOV     (R4),-(SP)
                MOV     #RESE3,-(SP)
                MOV     R3,-(SP)
                MOV     #MWORD,-(SP)
                MOV     #FMT15,-(SP)
                MOV     #7,-(SP)
                MOV     SP,R0
                TRAP    C$PNTB
                ADD     #20,SP
4$:             INC     MORECE          ;INC COMPARE ERROR COUNT
                MOV     (SP)+,R1        ;RESTORE R1
                JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
ENDMSG
L10011:
                TRAP    C$MSG
ENDMOD
                .EVEN

BGNMOD  HPTCODE
BGNHW
                .WORD   L10012-L$HW/2
```

```
                                                .WORD   174400          ;CSR BASE ADDRESS DEFAULT
                                                .WORD   160             ;VECTOR DEFAULT
                                                .WORD   240             ;PRIORITY DEFAULT
                                                .WORD   1               ;TYPE OF DRIVE, RL01=1, RL02=2
                                                .WORD   0               ;DRIVE NUMBER DEFAULT
                                                .WORD   1               ;RL11 CONTROLLER
                                        ENDHW
                                        L10012:
                                        ENDMOD

                                        BGNMOD  SPTCODE
                                        BGNSW
                                                .WORD   L10013-L$SW/2
                                        MISWIW: .WORD   0               ;BIT 0 = USE ALL CYLINDERS
                                                                        ;BIT 1 = USE ALL SECTORS
                                                                        ;BIT 2 = EXECUTE DRIVE SELECT TEST
                                                                        ;BIT 3 = EXECUTE HEAD ALIGNMENT
                                                                        ;BIT 12 = HEAD SELECT SUPPLIED FLAG
                                                                        ;BIT 13 = HILIMIT SPECIFIED FLAG
                                                                        ;BIT 14 = LO LIMIT SPECIFIED FLAG
                                                                        ;BIT 15 = DO MANUAL INTERVENTION
                                        LOLIMW: .WORD   0
                                        HILIMW: .WORD   255.
                                        HEADW:  .WORD   0
                                        ERLIMW: .WORD   20.             ;ERROR LIMIT
                                        DCLIMW: .WORD   10.             ;COMPARE ERROR LIMIT
                                        ENDSW
                                        L10013:
                                        ENDMOD

                                        BGNMOD  DSPCODE
                                        DISPATCH        16
                                                .WORD   16
                                                .WORD   T1
                                                .WORD   T2
                                                .WORD   T3
                                                .WORD   T4
                                                .WORD   T5
                                                .WORD   T6
                                                .WORD   T7
                                                .WORD   T8
                                                .WORD   T9
                                                .WORD   T10
                                                .WORD   T11
                                                .WORD   T12
                                                .WORD   T13
                                                .WORD   T14
                                                .WORD   T15
                                                .WORD   T16
                                        ENDMOD

                                        ;LOAD PROTECTION TABLE
                                        BGNPROT
                                        .WORD     0                     ;P-TABLE OFFSET OF CSR
                                        .WORD    -1                     ;NOT A MASS-BUSS DRIVE
                                        .WORD    10                     ;P-TABLE OFFSET OF DRIVE
                                        ENDPROT
```

```
                                        .SBTTL  INITIALIZATION CODE

014412                                  BGNMOD  INITCODE
014412                                  BGNINIT
                                        ;CHECK FOR PRESENCE OF A CLOCK
014412  005067  166526                  PCLK:   CLR     CLKFLG          ;CLEAR CLOCK FLAG

014416  012700  000120                          MOV     #'P,R0
014422  104462                          TRAP    C$CLCK
014424  010067  166516                  MOV     R0,CLKADR
014430  103004                          BCC     NOPCLK
014432  012737  000001  166504          MOV     #1,CLKFLG       ;INDICATE PRESENCE OF A P-CLOCK
014440  000451                          BR      TCLK            ;P CLOCK EXISTS, DO NOT USE L CLOCK.

014442  012737  014556  000004  NOPCLK: MOV     #TSTCLK,@#4     ;TEST FOR L CLOCK. IF NO CLOCK - SKIP.
014450  005737  177546                  TST     @#177546

014454  012767  000011  166462          MOV     #11,CLKFLG      ;INDICATE THE PRESENCE OF AN L CLOCK.

014462  012737  014514  000100          MOV     #LCLK,@#100     ;L CLOCK VECTOR POINTS TO LCLK.

014470  010146                          MOV     R1,-(SP)        ;SAVE   R1 ANS R2 ON THE STACK.
014472  010246                          MOV     R2,-(SP)

014474  005002                          CLR     R2
014476  012737  000100  177546          MOV     #100,@#177546   ;START THE L CLOCK.

014504  062702  000001          1$:     ADD     #1,R2           ;BUILD SOFTWARE LOOP. USE ADD TO SET FLAGS.
014510  000240                          NOP
014512  000774                          BR      1$

014514  012716  014522          LCLK:   MOV     #LCLK1,@SP      ;MODIFY THE STACK TO RETURN TO LCLK1.
014520  000002                          RTI
014522  005037  177546          LCLK1:  CLR     @#177546        ;STOP THE L CLOCK.

014526  012701  000246                  MOV     #166.,R1        ;THIS IS THE DIVISOR TO GET 100 US.

014532  005067  166412                  CLR     LBASE
014536  005267  166406          1$:     INC     LBASE           ;LBASE IS THE APPROXIMATE NUMBER OF ITERATIONS
014542  160102                          SUB     R1,R2           ;NEEDED TO GIVE 100 US.
014544  100401                          BMI     2$
014546  000773                          BR      1$

014550  012602                  2$:     MOV     (SP)+,R2        ;RESTORE R1 AND R2.
014552  012601                          MOV     (SP)+,R1
014554  000403                          BR      TCLK            ;SKIP RTI HANDLER

014556  012716  014564          TSTCLK: MOV     #TCLK,(SP)      ;ADJUST STACK FOR RTI
014562  000002                          RTI
014564  005767  166354          TCLK:   TST     CLKFLG          ;IF THERE IS NO P OR L CLOCK, DO NOT DO THE
014570  001015                          BNE     1$              ;TEST. PRINT A MESSAGE SAYING WHY THE TEST IS
014572  012746  006664                  MOV     #NOTST,-(SP)    ;ABORTED.
014576  012746  011753                  MOV     #FMT9,-(SP)
014602  012746  000002                  MOV     #2,-(SP)
014606  010600                          MOV     SP,R0
```

```
    533 014610  104417                        TRAP    C$PNTF
    534 014612  062706  000006                ADD     #6,SP
    535 014616  012701  000200                MOV     #200,R1
    536 014622  000111                        JMP     @R1
    537
    538 014624                          1$:   SETPRI  #340            ;SET PRIORITY TO 7 TO INHIBIT INTERRUPTS
        014624  012700  000340                MOV     #340,R0
        014630  104441                        TRAP    C$SPRI
    539 014632                                MANUAL                  ;CHECK IF MANUAL INTERVENTION ALLOWED
        014632  104450                        TRAP    C$MANI
    540 014634                                BCOMPLETE       2$      ;YES - SKIP
        014634  103403                        BCS     2$
    541 014636  042767  100014  177462        BIC     #MITEST!DRSELT!HDALIGN,MISWIW ;CLEAR ALL MANUAL
    542                                                               ; INTERVENTION FLAGS
    543 014644  005067  166132          2$:   CLR     SSINDX          ;CLEAR SUBROUTINE STACK INDEX
    544 014650                                READEF  #EF.PWR         ;POWER FAILURE?
        014650  012700  000034                MOV     #EF.PWR,R0
        014654  104447                        TRAP    C$REFG
    545 014656                                BNCOMPLETE  4$          ;NO, GO CHECK NEW PASS
        014656  103005                        BCC     4$
    546 014660  016767  165126  166502        MOV     L$UNIT,PWRFLG   ;SET POWER FAIL FLAG
    547 014666  000167  000406                JMP     PWCON           ;GO SERVICE POWER FAIL
    548                                 ;"START" COMMAND SEQUENCE
    549 014672                          4$:   READEF  #EF.START       ;CHECK IF START
        014672  012700  000040                MOV     #EF.START,R0
        014676  104447                        TRAP    C$REFG
    550 014700                                BNCOMPLETE      RESTART ;NO - SKIP
        014700  103034                        BCC     RESTART
    551                                 ;       ON START INITIALIZE TO START AT FIRST DRIVE, CLEAR INTERNAL
    552                                 ;       PASS COUNT, AND ERROR COUNT.
    553 014702  016767  165104  166164        MOV     L$UNIT,DRVCNT   ;SET UP UNIT COUNT
    554 014710  005067  166444          RSTRT: CLR    PASNUM          ;CLEAR PASS NUMBER
    555 014714  012700  003160                MOV     #ERRCNT,R0
    556 014720  012701  000100                MOV     #64.,R1         ;GET A COUNT
    557 014724  005020                  1$:   CLR     (R0)+           ;CLEAR ERROR COUNTER STORAGE AREA
    558 014726  005301                        DEC     R1
    559 014730  001375                        BNE     1$              ;LOOP TILL ALL CLEARED
    560 014732  012767  003156  166216        MOV     #ERRCNT-2,ERRPOINT ;INIT ERROR POINTER
    561 014740  012767  177777  166414        MOV     #-1,PSETNM      ;SET PARAM SELECT TO INITIAL VALUE
    562 014746  012767  177777  166034        MOV     #-1,HADONE      ;PRESET HEAD ALIGN DONE FLAG
    563 014754  032767  040000  177344  LAB:  BIT     #LOCYL,MISWIW   ;TEST IF LO LIMIT SET
    564 014762  001002                        BNE     5$              ;YES - SKIP
    565 014764  005067  177340                CLR     LOLIMW          ;ELSE CLEAR LO LIMIT
    566 014770  000432                  5$:   BR      SETDON
    567 014772                          RESTART:
    568 014772                                READEF  #EF.RESTART     ;CHECK IF RESTART
        014772  012700  000037                MOV     #EF.RESTART,R0
        014776  104447                        TRAP    C$REFG
    569 015000                                BCOMPLETE       RSTRT   ;NO - SKIP
        015000  103743                        BCS     RSTRT
    570                                 ;"CONTINUE" COMMAND SEQUENCE
    571 015002                          CONTINUE:
    572 015002                                READEF  #EF.CONTINUE    ;TEST IF CONTINUE
        015002  012700  000036                MOV     #EF.CONTINUE,R0
        015006  104447                        TRAP    C$REFG
    573 015010                                BCOMPLETE       PWCON
        015010  103533                        BCS     PWCON
```

```
                                        ;       ON CONTINUE PICK UP UNIT LAST UNDER TEST
015012                                  ;       READEF  #EF.NEW         ;CHECK IF STARTING NEW PASS
015012  012700  000035                          MOV     #EF.NEW,R0
015016  104447                                  TRAP    C$REFG
015020                                          BCOMPLETE       PASNEW
015020  103403                                  BCS     PASNEW
015022                                  NXTPAS:
015022  005767  166046                          TST     DRVCNT          ;TEST IF ALL UNITS CHECKED
015026  001013                                  BNE     SETDON          ;NO - SKIP
015030  005267  166324                  PASNEW: INC     PASNUM          ;ELSE BUMP PASS COUNT
015034  012767  003156  166114                  MOV     #ERRCNT-2,ERRPOINT ;INIT ERROR POINTER
015042  016767  164744  166024                  MOV     L$UNIT,DRVCNT   ;GET ALL DRIVES
015050  012767  177777  166304                  MOV     #-1,PSETNM      ;SET PARAM SELECT TO INITIAL
015056  005267  166300                  SETDON: INC     PSETNM          ;NEXT SET OF PARAMETERS
015062  005367  166006                          DEC     DRVCNT          ;DOWN COUNT DRIVE TOTAL
015066  062767  000002  166062                  ADD     #2,ERRPOINT     ;UPDATE THE ERROR POINTER
015074  016700  166262                          MOV     PSETNM,R0       ;SET UP TO GET PARAMETERS
015100  012702  003026                          MOV     #RLBAS,R2       ;GET POINTER TO RL11 BASE ADDRESS
015104                                          GPHARD  R0,R1
015104  104442                                  TRAP    C$GPHRD
015106  010001                                  MOV     R0,R1
015110                                          BCOMPLETE       7$      ;SKIP IF GOOD PARAM
015110  103406                                  BCS     7$
015112  005767  166252                          TST     PWRFLG          ;RECENT POWER FAILURE
015116  001741                                  BEQ     NXTPAS  ;NO
015120  005367  166244                          DEC     PWRFLG          ;ACCOUNT FOR DRIVE
015124  000736                                  BR      NXTPAS
                                        ;MOVE P-TABLE CONTENTS TO LOCAL STORAGE
015126  012122                          7$:     MOV     (R1)+,(R2)+     ;STORE CSR
015130  012122                                  MOV     (R1)+,(R2)+     ;STORE VECTOR
015132  005721                                  TST     (R1)+           ;BUMP PAST PRIORITY
015134  012167  165136                          MOV     (R1)+,T.DRIVE   ;STORE DRIVE TYPE
015140  012122                                  MOV     (R1)+,(R2)+
015142  022767  000001  165126                  CMP     #1,T.DRIVE
015150  001426                                  BEQ     65$
                                        ;INITIALIZE RL02 PARAMETERS
015152  012767  000776  165126                  MOV     #510.,NXTHL
015160  012767  000777  165114                  MOV     #511.,HLMTW
015166  012767  001000  165114                  MOV     #512.,GBND
015174  012767  177600  165110                  MOV     #177600,CAMSK
015202  012767  177600  165104                  MOV     #177600,DIRMSK
015210  012767  177600  165100                  MOV     #177600,HDCYL
015216  012767  177000  165060                  MOV     #177000,CLRBYT
015224  000425                                  BR      PWCON
                                        ;INITIALIZE RL01 PARAMETERS
015226  012767  000377  165046          65$:    MOV     #255.,HLMTW
015234  012767  000400  165046                  MOV     #256.,GBND
015242  012767  077600  165042                  MOV     #77600,CAMSK
015250  012767  077600  165036                  MOV     #77600,DIRMSK
015256  012767  077600  165032                  MOV     #77600,HDCYL
015264  012767  000376  165014                  MOV     #254.,NXTHL
015272  012767  177400  165004                  MOV     #177400,CLRBYT

015300  032767  020000  177020          PWCON:  BIT     #HICYL,MISWIW
015306  001003                                  BNE     1$
015310  016767  164766  177014                  MOV     HLMTW,HILIMW
015316                                  1$:     SETVEC  RLVEC,#INTHLR,#340      ;SET UP INTERRUPT VECTOR FOR DRIVE
```

```
        015316  012746  000340                  MOV     #340,-(SP)
        015322  012746  016370                  MOV     #INTHLR,-(SP)
        015326  016746  165476                  MOV     RLVEC,-(SP)
        015332  012746  000003                  MOV     #3,-(SP)
        015336  104437                          TRAP    C$SVEC
        015340  062706  000010                  ADD     #10,SP
    625 015344                                  SETPRI  #0              ;SET PRIORITY TO 0 TO ALLOW INTERRUPTS
        015344  012700  000000                  MOV     #0,R0
        015350  104441                          TRAP    C$SPRI
    626 015352  016702  165450                  MOV     RLBAS,R2        ;SET RL11 BASE ADDRESS POINTER
    627
    628
    630
    631 015356                                  MANUAL                  ;MANUAL INTERVENTION ALLOWED?
        015356  104450                          TRAP    C$MANI
    632 015360                                  BNCOMPLETE      4$      ;NO
        015360  103004                          BCC     4$
    633
    634 015362  005767  165772                  TST     PASNUM          ;YES, CHECK PASS NUMBER
    635 015366  001001                          BNE     4$              ;NOT FIRST PASS, NEED DRIVE UP
    636 015370  000521                          BR      8$              ;FIRST PASS, PROGRAM WILL INSTRUCT USER
    637
    639                             ;CHECK IF POWER FAILURE WAIT IS NEEDED
    640
    641 015372  005767  165772          4$:     TST     PWRFLG          ;NEEDED?
    642 015376  001516                          BEQ     8$              ;NO, SKIP
    643
    644 015400  016705  165426                  MOV     RLDRV,R5        ;DRIVE SELECT
    645 015404  052705  000200                  BIS     #CRDYMSK,R5     ;SET CRDY
    646 015410  010562  000000                  MOV     R5,RLCS(R2)     ;SELECT DRIVE
    647 015414  012701  000170                  MOV     #120.,R1        ;INITIALIZE WAIT COUNT
    648 015420  032762  000001  000000  9$:     BIT     #DRDYMSK,RLCS(R2)       ;DRIVE UP YET
    649 015426  001102                          BNE     8$              ;YES START TEST
    650
    651 015430                                  WAITMS  10.             ;WAIT A SECOND
        015446  012727  000372                  MOV     #250.,(PC)+
        015452  000000                          .WORD   0
        015454  016727  164436                  MOV     L$DLY,(PC)+
        015460  000000                          .WORD   0
        015462  005367  177772                  DEC     -6(PC)
        015466  001375                          BNE     .-4
        015470  005367  177756                  DEC     -22(PC)
        015474  001367                          BNE     .-20
        015476  104422                          TRAP    C$BRK
    652 015506  005301                          DEC     R1              ;SIXTY GONE BY
    653 015510  001343                          BNE     9$              ;NO
    654 015512                                  PRINTF  #FMT24,#NOPWR   ;REPORT ''DRV DID NOT REC'R FROM PWR FAIL''
        015512  012746  006060                  MOV     #NOPWR,-(SP)
        015516  012746  012373                  MOV     #FMT24,-(SP)
        015522  012746  000002                  MOV     #2,-(SP)
        015526  010600                          MOV     SP,R0
        015530  104417                          TRAP    C$PNTF
        015532  062706  000006                  ADD     #6,SP
    655 015536                                  PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1> ;REPORT DRIVE UNIBUS
        015536  005046                          CLR     -(SP)
        015540  156716  165267                  BISB    RLDRV+1,(SP)
        015544  012746  006053                  MOV     #DRVNAM,-(SP)
```

```
                015550  016746  165252                  MOV     RLBAS,-(SP)
                015554  012746  006042                  MOV     #BASADD,-(SP)
                015560  012746  011567                  MOV     #FMT5,-(SP)
                015564  012746  000005                  MOV     #5,-(SP)
                015570  010600                          MOV     SP,R0
                015572  104417                          TRAP    C$PNTF
                015574  062706  000014                  ADD     #14,SP
656
657             015600                                  PRINTF  #FMT3                   ;NEW LINE
                015600  012746  011553                  MOV     #FMT3,-(SP)
                015604  012746  000001                  MOV     #1,-(SP)
                015610  010600                          MOV     SP,R0
                015612  104417                          TRAP    C$PNTF
                015614  062706  000004                  ADD     #4,SP
658             015620                                  DODU    PSETNM                  ;DO DROP UNIT ON DRIVE
                015620  016700  165536                  MOV     PSETNM,R0
                015624  104451                          TRAP    C$DODU
659             015626                                  DOCLN                           ;INVOKE CLEAN-UP CODE TO RESTORE DRIVE
                015626  104444                          TRAP    C$DCLN
660                                                                                     ;/TO STATIC STATE
661             015630  005067  165304                  CLR     ERRVEC                  ;CLEAR ERROR VECTOR
662
663             015634                          8$:
664
665             015634                          ENDINIT
                015634                          L10015:
                015634  104411                          TRAP    C$INIT
666
667             015636                          ENDMOD
668
669
670                                             .SBTTL  AUTO DROP SECTION
671
672                                             ;THE AUTO DROP SECTION IS INVOKED BY THE DIAGNOSTIC SUPERVISOR WHENEVER THE
673                                             ;"ADR" FLAG IS SET BY THE OPERATOR. IT IS EXECUTED AFTER THE INITIALIZATION
674                                             ;CODE AND CHECKS THE DRIVE TO DETERMINE IF IT IS READY TO RECEIVE A COMMAND.
675                                             ;IF THE DRIVE IS NOT READY IT IS DROPPED FROM THE TEST CYCLE AND THE NEXT
676                                             ;DRIVE IS ACCESSED. IF THE DRIVE IS READY THE HARDWARE TESTS ARE PERFORMED
677                                             ;AFTER WHICH THE NEXT DRIVE IS ACCESSED.
678
679             015636                          BGNAUTO
680             015636  005067  165524                  CLR     TRPFLG                  ;CLEAR TRAP FLAG
681             015642                                  SETVEC  ERRVEC,#TRPHAN,#340     ;SET UP TRAP VECTOR TO DETECT
                015642  012746  000340                  MOV     #340,-(SP)
                015646  012746  016436                  MOV     #TRPHAN,-(SP)
                015652  016746  165262                  MOV     ERRVEC,-(SP)
                015656  012746  000003                  MOV     #3,-(SP)
                015662  104437                          TRAP    C$SVEC
                015664  062706  000010                  ADD     #10,SP
682                                                                                     ;/NON-EXISTENT CONTROLLER UNIBUS
683                                                                                     ;/ADDRESS
684             015670  016702  165132                  MOV     RLBAS,R2                ;GET RL11 BASE ADDRESS
685             015674  005762  000000                  TST     RLCS(R2)                ;ACCESS DRIVE CONTROLLER UNIBUS ADDRESS
686             015700  005767  165462                  TST     TRPFLG                  ;DID TRAP OCCUR?
687             015704  001447                          BEQ     1$                      ;BRANCH TO CHECK DRIVE IF TRAP DID NOT OCCUR
688             015706                                  PRINTF  #FMT24,#NOCTLR          ;ELSE, PRINT MSG. 'DRV DROPPED - NO CNTLR"
                015706  012746  006754                  MOV     #NOCTLR,-(SP)
```

```
        015712  012746  012373                 MOV     #FMT24,-(SP)
        015716  012746  000002                 MOV     #2,-(SP)
        015722  010600                         MOV     SP,R0
        015724  104417                         TRAP    C$PNTF
        015726  062706  000006                 ADD     #6,SP
689                                                             ;PRINT DRIVE INFORMATION
690     015732                                 PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
        015732  005046                         CLR     -(SP)
        015734  156716  165073                 BISB    RLDRV+1,(SP)
        015740  012746  006053                 MOV     #DRVNAM,-(SP)
        015744  016746  165056                 MOV     RLBAS,-(SP)
        015750  012746  006042                 MOV     #BASADD,-(SP)
        015754  012746  011567                 MOV     #FMT5,-(SP)
        015760  012746  000005                 MOV     #5,-(SP)
        015764  010600                         MOV     SP,R0
        015766  104417                         TRAP    C$PNTF
        015770  062706  000014                 ADD     #14,SP
691     015774                                 PRINTF  #FMT3
        015774  012746  011553                 MOV     #FMT3,-(SP)
        016000  012746  000001                 MOV     #1,-(SP)
        016004  010600                         MOV     SP,R0
        016006  104417                         TRAP    C$PNTF
        016010  062706  000004                 ADD     #4,SP
692     016014                                 DODU    PSETNM          ;DO DROP UNIT ON DRIVE
        016014  016700  165342                 MOV     PSETNM,R0
        016020  104451                         TRAP    C$DODU
693     016022  000460                         BR      2$              ;BRANCH TO EXIT
694     016024  016705  165002         1$:     MOV     RLDRV,R5        ;ELSE, GET DRIVE NUMBER
695     016030  052705  000200                 BIS     #CRDYMSK,R5     ;SET CONTROLLER READY
696     016034  010562  000000                 MOV     R5,RLCS(R2)     ;LOAD IN THE DRIVE NUMBER
697     016040  032762  000001  000000         BIT     #DRDYMSK,RLCS(R2)       ;IS DRIVE READY?
698     016046  001046                         BNE     2$              ;BRANCH TO PERFORM TESTS IF DRIVE IS READY
699     016050                                 PRINTF  #FMT24,#NOTRDY  ;PRINT MSG. 'DRV DROPPED - NOT RDY"
        016050  012746  007003                 MOV     #NOTRDY,-(SP)
        016054  012746  012373                 MOV     #FMT24,-(SP)
        016060  012746  000002                 MOV     #2,-(SP)
        016064  010600                         MOV     SP,R0
        016066  104417                         TRAP    C$PNTF
        016070  062706  000006                 ADD     #6,SP
700                                                             ;PRINT DRIVE INFORMATION
701     016074                                 PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
        016074  005046                         CLR     -(SP)
        016076  156716  164731                 BISB    RLDRV+1,(SP)
        016102  012746  006053                 MOV     #DRVNAM,-(SP)
        016106  016746  164714                 MOV     RLBAS,-(SP)
        016112  012746  006042                 MOV     #BASADD,-(SP)
        016116  012746  011567                 MOV     #FMT5,-(SP)
        016122  012746  000005                 MOV     #5,-(SP)
        016126  010600                         MOV     SP,R0
        016130  104417                         TRAP    C$PNTF
        016132  062706  000014                 ADD     #14,SP
702     016136                                 PRINTF  #FMT3
        016136  012746  011553                 MOV     #FMT3,-(SP)
        016142  012746  000001                 MOV     #1,-(SP)
        016146  010600                         MOV     SP,R0
        016150  104417                         TRAP    C$PNTF
        016152  062706  000004                 ADD     #4,SP
```

```
    703 016156                                          DODU    PSETNM          ;DO DROP UNIT ON DRIVE
        016156  016700  165200                           MOV     PSETNM,R0
        016162  104451                                  TRAP    C$DODU
    704 016164                                  2$:     CLRVEC  ERRVEC          ;RELEASE THE ERROR VECTOR
        016164  016700  164750                          MOV     ERRVEC,R0
        016170  104436                                  TRAP    C$CVEC
    705 016172                                  ENDAUTO
        016172                                  L10016:
        016172  104461                                  TRAP    C$AUTO
    706
    707
    708
    709
    710 016174                                  BGNMOD  CLNCODE
    711 016174                                  BGNCLN
    712
    713 016174                                          SETVEC  ERRVEC,#TRPHAN,#340
        016174  012746  000340                          MOV     #340,-(SP)
        016200  012746  016436                          MOV     #TRPHAN,-(SP)
        016204  016746  164730                          MOV     ERRVEC,-(SP)
        016210  012746  000003                          MOV     #3,-(SP)
        016214  104437                                  TRAP    C$SVEC
        016216  062706  000010                          ADD     #10,SP
    714
    715 016222                                          SETPRI  #7              ;SET PRIORITY TO 7
        016222  012700  000007                          MOV     #7,R0
        016226  104441                                  TRAP    C$SPRI
    716 016230  032762  000200  000000          2$:     BIT     #CRDYMSK,RLCS(R2)       ;TEST IF CONTROLLER READY
    717 016236  001407                                  BEQ     3$              ;NO LOOP UNTIL READY
    718 016240  056762  164566  000000                  BIS     RLDRV,RLCS(R2)  ;SET DRIVE NUMBER
    719 016246  032762  000001  000000                  BIT     #DRDYMSK,RLCS(R2)       ;TEST IF DRIVE BUSY
    720 016254  001027                                  BNE     5$              ;NO - SKIP
    721 016256                                  3$:     WAITMS  3               ;WAIT 300 MS
        016274  012727  000372                          MOV     #250.,(PC)+
        016300  000000                                  .WORD   0
        016302  016727  163610                          MOV     L$DLY,(PC)+
        016306  000000                                  .WORD   0
        016310  005367  177772                          DEC     -6(PC)
        016314  001375                                  BNE     .-4
        016316  005367  177756                          DEC     -22(PC)
        016322  001367                                  BNE     .-20
        016324  104422                                  TRAP    C$BRK
    722 016334                                  5$:     CLRVEC  RLVEC           ;RELEASE DRIVE VECTOR
        016334  016700  164470                          MOV     RLVEC,R0
        016340  104436                                  TRAP    C$CVEC
    723 016342  005767  165022                          TST     PWRFLG          ;PWR FAIL SET
    724 016346  001402                                  BEQ     7$              ;NO
    725 016350  005367  165014                          DEC     PWRFLG
    726 016354                                  7$:     CLRVEC  ERRVEC
        016354  016700  164560                          MOV     ERRVEC,R0
        016360  104436                                  TRAP    C$CVEC
    727 016362                                  ENDCLN
        016362                                  L10017:
        016362  104412                                  TRAP    C$CLEAN
    728
    729 016364                                  BGNDU
    730 016364  000240                                  NOP
```

```
731 016366                              ENDDU
    016366                              L10020:
    016366  104453                              TRAP    C$DU
732
733 016370                              ENDMOD
734
735
736
737                                     .SBTTL  INTERRUPT SERVICE ROUTINES
738
739 016370                              BGNSRV  INTHLR
740                                     ;INTERRUPT HANDLER FOR DRIVE ABORTS WAIT TIMER AND STORES ALL RL11 REGISTERS
741 016370  005067  164546                       CLR     DLYCNT          ;CLEAR UNELAPSED DELAY COUNT
742 016374  012267  164444                       MOV     (R2)+,T.CS      ;STORE RL REGISTERS
743 016400  012267  164442                       MOV     (R2)+,T.BA
744 016404  012267  164440                       MOV     (R2)+,T.DA
745 016410  011267  164436                       MOV     (R2),T.MP
746 016414  012767  177777  164364               MOV     #-1,DONE        ;SET DONE FLAG
747 016422  016702  164400                       MOV     RLBAS,R2        ;RESTORE R2
748 016426                              ENDSRV
    016426                              L10021:
    016426  000002                              RTI
749
750                                     ;INTERRUPT SERVICE ROUTINE FOR P-CLOCK DECREMENTS DELAY COUNTER AT 100-MICROSECOND
751                                     ;TIME INTERVALS
752 016430                              BGNSRV  CLKINT
753 016430  005367  164506                       DEC     DLYCNT          ;DECREMENT CLOCK DELAY COUNTER
754 016434                              ENDSRV
    016434                              L10022:
    016434  000002                              RTI
755
756                                     ;INTERRUPT SERVICE ROUTINE SETS TRAP FLAG WHEN A NON-EXISTENT UNIBUS ADDRESS IS
757                                     ;ACCESSED
758 016436                              BGNSRV  TRPHAN
759 016436  005267  164724                       INC     TRPFLG          ;INDICATE THAT TRAP OCCURRED
760 016442                              ENDSRV
    016442                              L10023:
    016442  000002                              RTI
761
762
```

```
                                        .SBTTL  GLOBAL SUBROUTINES


016444                                  BGNMOD  GLBSUB



                                        ;       ERROR LIMIT CHECKING ROUTINE
                                        ;       DROPS DRIVE IF ERROR LIMIT EXCEEDED
016444  027767  164506  175664  CKERLM: CMP     @ERRPOINT,ERLIMW        ;TEST IF ERROR LIMIT EXCEEDED
016452  002453                          BLT     1$                      ;NO - SKIP
016454                                  INLOOP                          ;CHECK IF IN ERROR LOOP
016454  104420                          TRAP    C$INLP
016456                                  BCOMPLETE       1$              ;YES - SKIP
016456  103451                          BCS     1$
016460                                  PRINTF  #FMT25,ERLIMW,#MEXERS ;PRINT MSG. "OVER ERROR LIMIT - UNIT DROPPED"
016460  012746  011225                  MOV     #MEXERS,-(SP)
016464  016746  175646                  MOV     ERLIMW,-(SP)
016470  012746  012400                  MOV     #FMT25,-(SP)
016474  012746  000003                  MOV     #3,-(SP)
016500  010600                          MOV     SP,R0
016502  104417                          TRAP    C$PNTF
016504  062706  000010                  ADD     #10,SP
016510                                  PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1> ;PRINT DRIVE INFORMATION
016510  005046                          CLR     -(SP)
016512  156716  164315                  BISB    RLDRV+1,(SP)
016516  012746  006053                  MOV     #DRVNAM,-(SP)
016522  016746  164300                  MOV     RLBAS,-(SP)
016526  012746  006042                  MOV     #BASADD,-(SP)
016532  012746  011567                  MOV     #FMT5,-(SP)
016536  012746  000005                  MOV     #5,-(SP)
016542  010600                          MOV     SP,R0
016544  104417                          TRAP    C$PNTF
016546  062706  000014                  ADD     #14,SP
016552                                  PRINTF  #FMT3
016552  012746  011553                  MOV     #FMT3,-(SP)
016556  012746  000001                  MOV     #1,-(SP)
016562  010600                          MOV     SP,R0
016564  104417                          TRAP    C$PNTF
016566  062706  000004                  ADD     #4,SP
016572                                  DODU    PSETNM                  ;DROP DRIVE
016572  016700  164564                  MOV     PSETNM,R0
016576  104451                          TRAP    C$DODU
016600                                  DOCLN                           ;GO TO CLEAN UP
016600  104444                          TRAP    C$DCLN
016602  000207                  1$:     RTS     PC



                                        ;       READ AND STORE ALL RL11 REGISTERS
016604  016267  000000  164232  READRL: MOV     RLCSR(R2),T.CS  ;GET CS REG
016612  016267  000002  164226          MOV     RLBA(R2),T.BA   ;GET BUS ADDRESS REG
016620  016267  000004  164222          MOV     RLDA(R2),T.DA   ;GET DISK ADDRESS
016626  016267  000006  164216          MOV     RLMP(R2),T.MP   ;GET MULTI-PURPOSE REG
016634  000207                          RTS     PC              ;RETURN
```

```
                                                ;       WAIT FOR CONTROLLER TIMEOUT TO FORCE INTERRUPT ROUTINE
016636  011646                                  WAITIN: MOV     (SP),-(SP)      ;MAKE ROOM FOR ERROR POINTER
016640  005066  000002                                  CLR     2(SP)           ;CLEAR FOR POINTER
016644  032762  000200  000000                          BIT     #CRDYMSK,RLCSR(R2)      ;TEST IF CONTROLLER READY
016652  001420                                          BEQ     4$              ;NO - SKIP TO WAIT
016654  004767  177724                                  JSR     PC,READRL       ;READ ALL RL REGS
016660  005767  164122                                  TST     DONE            ;TEST IF INTERRUPT OCCURRED
016664  001453                                          BEQ     5$              ;NO - GO SET NO INTERRUPT ERR FLAG
016666  012766  006200  000002          1$:             MOV     #MTOSLOW,2(SP)  ;ELSE SET TOO SLOW ERROR POINTER
016674  032767  002000  164142                          BIT     #OPIERR,T.CS    ;TEST IF OPI SET
016702  001403                                          BEQ     2$              ;NO - SKIP
016704  012766  006220  000002                          MOV     #MDRRES,2(SP)   ;SET MESSAGE FOR NO DRIVE RESPONSE
016712  000207                                  2$:     RTS     PC              ;RETURN
016714  012767  000001  164220          4$:             MOV     #1,DLYCNT       ;INITIALIZE DELAY COUNT
016722  006367  164214                                  ASL     DLYCNT          ;MULTIPLY BY 2
016726  006367  164210                                  ASL     DLYCNT          ;MULTIPLY BY 2 AGAIN
016732  012727  000012                                  MOV     #10.,(PC)+      ;IMPLEMENT TIME DELAY LOOP
016736  000000                                          .WORD   0
016740  016727  163152                                  MOV     L$DLY,(PC)+
016744  000000                                          .WORD   0
016746  005367  177772                                  DEC     -6(PC)
016752  001375                                          BNE     .-4
016754  005367  177756                                  DEC     -22(PC)
016760  001367                                          BNE     .-20
016762  032762  000200  000000                          BIT     #CRDYMSK,RLCS(R2) ;TEST IF READY NOW SET
016770  001006                                          BNE     3$              ;YES - SKIP
016772  004767  177606                                  JSR     PC,READRL       ;READ RL REGS
016776  012766  006273  000002                          MOV     #MCONHNG,2(SP)  ;SET MESSAGE FOR CONTROLLER HUNG
017004  000742                                          BR      2$              ;SKIP
017006  005767  163774                  3$:             TST     DONE            ;ELSE CHECK IF INTERRUPT OCCURRED
017012  001325                                          BNE     1$              ;YES - SKIP TO SET TOO SLOW
017014  004767  177564                  5$:             JSR     PC,READRL       ;READ RL REGS
017020  012766  006240  000002                          MOV     #MNOINT,2(SP)   ;ELSE SET NO INTERRUPT FLAG
017026  000731                                          BR      2$              ;GO TO RETURN


                                                ;       OPERATION AND TEST INITIALIZE ROUTINE
017030  005067  163750                  TSTINT: CLR     OPFLAG          ;CLEAR OPERATION FLAGS
017034  105067  164325                          CLRB    NOERCT          ;RESET INHIBIT ERROR COUNTING
017040  005067  163750                          CLR     MORECE          ;RESET MORE COMPARE ERRORS
017044  000207                                  RTS     PC


                                                ;       GET STATUS AND GET STATUS WITH RESET ROUTINE
017046  016746  164054                  GSTATR: MOV     TEMP4,-(SP)     ;STORE TEMP4
017052  012767  000013  164046                  MOV     #GETSTAT!DRSET,TEMP4    ;SET FOR RESET
017060  000412                                  BR      GSTATG
017062  016746  164040                  GSTATC: MOV     TEMP4,-(SP)     ;STORE TEMP4
017066  012767  000003  164032                  MOV     #GETSTAT,TEMP4  ;SET FOR NO RESET
017074  000404                                  BR      GSTATG
017076  016746  164024                  GSTAT:  MOV     TEMP4,-(SP)     ;STORE TEMP4
017102  005067  164020                          CLR     TEMP4           ;SET FOR SAVE L. AND T. REGS
017106  010346                          GSTATG: MOV     R3,-(SP)        ;STORE R3
017110  016703  163666                          MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
```

```
     88 017114  005723                          TST     (R3)+               ;BUMP IT FOR NEXT ENTRY
     89 017116  016663  000004  002404          MOV     4(SP),SUBSTK(R3)    ;INSERT THIS CALL
     90 017124  162763  000004  002404          SUB     #4,SUBSTK(R3)       ;ADJUST IT TO CALLING LOCATION
     91 017132  010367  163644                   MOV     R3,SSINDX           ;STORE IT BACK
     92 017136  010046                          MOV     R0,-(SP)            ;STORE R0
     93 017140  010146                          MOV     R1,-(SP)            ;STORE R1
     94 017142  012767  000002  163646          MOV     #2,ERRSWI           ;SET FOR NO ERROR RETURN
     95 017150  032767  000010  163750          BIT     #DRSET,TEMP4        ;TEST IF DRIVE RESET
     96 017156  001525                          BEQ     11$                 ;NO - SKIP
     97 017160  032762  040000  000000          BIT     #DRVERR,RLCS(R2)    ;TEST IF DRIVE ERROR SET
     98 017166  001427                          BEQ     49$                 ;NO - SKIP
     99 017170                                  WAITMS  3                   ;WAIT FOR DRIVE TO SETTLE
        017206  012727  000372                  MOV     #250.,(PC)+
        017212  000000                          .WORD   0
        017214  016727  162676                  MOV     L$DLY,(PC)+
        017220  000000                          .WORD   0
        017222  005367  177772                  DEC     -6(PC)
        017226  001375                          BNE     .-4
        017230  005367  177756                  DEC     -22(PC)
        017234  001367                          BNE     .-20
        017236  104422                          TRAP    C$BRK
    100                             .NLIST      ME
    101 017246  012701  000062          49$:    MOV     #50.,R1             ;INITIALIZE WAIT COUNTER
    102 017252  004767  177620          50$:    JSR     PC,GSTAT            ;GET DRIVE STATUS
    103 017256  020110                          3$
    104 017260  032767  000001  163556          BIT     #DRDYMSK,T.CS       ;TEST IF DRIVE READY
    105 017266  001077                          BNE     5$                  ;YES - GO DO CLEAR
    106 017270  032767  000020  163554          BIT     #HOSTAT,T.MP        ;ELSE TEST IF HEADS OUT
    107 017276  001010                          BNE     51$                 ;YES - BYPASS RELOAD WAIT FLAG SETTING
    108 017300  032767  144000  163544          BIT     #SPDSTAT!HCESTAT!WDESTAT,T.MP ;TEST IF DRIVE HAS ERROR
    109                                                                     ;THAT CAUSED HEADS TO
    110                                                                     ;UNLOAD
    111 017306  001467                          BEQ     5$                  ;NO - SKIP
    112 017310  052767  040000  163466          BIS     #RELDWT,OPFLAG      ;ELSE SET WAIT FLAG
    113 017316  000463                          BR      5$                  ;SKIP TO CLEAR
    114 017320  032767  040000  163516  51$:    BIT     #DRVERR,T.CS        ;TEST IF DRIVE ERROR NOW
    115 017326  001057                          BNE     5$                  ;YES - SKIP TO CLEAR
    116 017330                                  WAITMS  1                   ;WAIT FOR DRIVE TO GET ERROR, READY, OR HEADS OUT
        017346  012727  000372                  MOV     #250.,(PC)+
        017352  000000                          .WORD   0
        017354  016727  162536                  MOV     L$DLY,(PC)+
        017360  000000                          .WORD   0
        017362  005367  177772                  DEC     -6(PC)
        017366  001375                          BNE     .-4
        017370  005367  177756                  DEC     -22(PC)
        017374  001367                          BNE     .-20
        017376  104422                          TRAP    C$BRK
    117 017406  005301                          DEC     R1                  ;DEC WAIT COUNTER
    118 017410  001320                          BNE     50$                 ;IF NOT DONE, LOOP
    119 017412  012703  011103                  MOV     #MUNDEF,R3          ;MESSAGE FOR UNDEFINED STATE
    120 017416                                  ERRHRD  10001.,,ERR1
        017416  104456                          TRAP    C$ERHRD
        017420  023421                          .WORD   10001
        017422  000000                          .WORD   0
        017424  012464                          .WORD   ERR1
    121 017426  000167  000452                  JMP     14$                 ;EXIT
    122 017432  005767  163470          11$:    TST     TEMP4               ;TEST IF SAVE REGISTERS
```

```
    123 017436  001013                          BNE     5$              ;NO SKIP
    124 017440  012701  000004                  MOV     #4,R1           ;SET SAVE COUNT
    125 017444  012703  003044                  MOV     #L.MP+2,R3      ;SET ADDRESS OF FIRST SAVE
    126 017450  014346                  8$:     MOV     -(R3),-(SP)     ;PUT REG ON STACK
    127 017452  005301                          DEC     R1              ;DEC COUNT
    128 017454  001375                          BNE     8$              ;LOOP UNTIL ALL SAVED
    129 017456  012767  000003  163354          MOV     #GETSTAT,L.DA   ;SET FOR GET STATUS
    130 017464  000403                          BR      6$              ;SKIP
    131 017466  016767  163434  163344  5$:     MOV     TEMP4,L.DA      ;INSERT PRESET FOR STATUS
    132 017474                          6$:
    133 017474  005067  163306                  CLR     DONE            ;CLEAR INTERRUPT FLAG
    134 017500  016767  163326  163326          MOV     RLDRV,L.CS      ;SET UP TO GET STATUS
    135 017506  042767  002000  163320          BIC     #BIT10,L.CS     ;CLEAR FOR DRIVE 4 - 7 SPEC'D
    136 017514  052767  000104  163312          BIS     #GTSTAT,L.CS
    137 017522  016762  163312  000004          MOV     L.DA,RLDA(R2)   ;LOAD RL REGS
    138 017530  016762  163300  000000          MOV     L.CS,RLCSR(R2)  ;LOAD CS REG
    139 017536                                  WAITUS  1               ;WAIT FOR INTERRUPT
        017536  012727  000001                  MOV     #1,(PC)+
        017542  000000                          .WORD   0
        017544  016727  162346                  MOV     L$DLY,(PC)+
        017550  000000                          .WORD   0
        017552  005367  177772                  DEC     -6(PC)
        017556  001375                          BNE     .-4
        017560  005367  177756                  DEC     -22(PC)
        017564  001367                          BNE     .-20
    140 017566  005767  163214                  TST     DONE            ;CHECK IF INTERRUPT OCCURRED
    141 017572  001535                          BEQ     1$              ;NO - SKIP
    142 017574  016767  163252  163256  4$:     MOV     T.MP,T.STAT     ;STORE MP REGISTER
    143 017602  042767  177770  163250          BIC     #^C<STAMSK>,T.STAT ;CLEAR ALL BUT STATE
    144 017610  032767  000010  163222          BIT     #DRSET,L.DA     ;TEST IF RESET WAS SPECIFIED
    145 017616  001534                          BEQ     3$              ;NO - SKIP TO EXIT
    146 017620  032767  040000  163156          BIT     #RELDWT,OPFLAG  ;TEST IF RELOAD WAIT FLAG SET
    147 017626  001451                          BEQ     12$             ;NO - SKIP
    148 017630  012701  001130                  MOV     #600.,R1        ;INITIALIZE WAIT COUNTER
    149 017634  032762  000001  000000  13$:     BIT     #DRDYMSK,RLCS(R2) ;TEST IF DRIVE NOW READY
    150 017642  001043                          BNE     12$             ;YES - SKIP
    151 017644                                  WAITMS  1               ;CALL WAIT
        017662  012727  000372                  MOV     #250.,(PC)+
        017666  000000                          .WORD   0
        017670  016727  162222                  MOV     L$DLY,(PC)+
        017674  000000                          .WORD   0
        017676  005367  177772                  DEC     -6(PC)
        017702  001375                          BNE     .-4
        017704  005367  177756                  DEC     -22(PC)
        017710  001367                          BNE     .-20
        017712  104422                          TRAP    C$BRK
    152 017722  005301                          DEC     R1              ;DEC COUNT
    153 017724  001343                          BNE     13$             ;LOOP IF NOT 0
    154 017726  004767  177144                  JSR     PC,GSTAT        ;GET DRIVE STATUS
    155 017732  020110                          3$                      ;ERROR RETURN
    156 017734  012703  011150                  MOV     #MRLFAL,R3      ;SET RESULT MESSAGE POINTER
    157 017740                                  ERRHRD  10003.,,ERR1
        017740  104456                          TRAP    C$ERHRD
        017742  023423                          .WORD   10003
        017744  000000                          .WORD   0
        017746  012464                          .WORD   ERR1
    158 017750  000455                          BR      14$             ;GO TO EXIT
```

```
159 017752                                  12$:    WAITUS  10.             ;WAIT
    017752  012727  000012                          MOV     #10.,(PC)+
    017756  000000                                  .WORD   0
    017760  016727  162132                          MOV     L$DLY,(PC)+
    017764  000000                                  .WORD   0
    017766  005367  177772                          DEC     -6(PC)
    017772  001375                                  BNE     .-4
    017774  005367  177756                          DEC     -22(PC)
    020000  001367                                  BNE     .-20
160 020002  004767  177070                          JSR     PC,GSTAT        ;GET DRIVE STATUS
161 020006  020110                                  3$
162 020010  032767  100000  163026                  BIT     #ANYERR,T.CS    ;TEST IF ANY ERROR
163 020016  001434                                  BEQ     3$              ;NO - SKIP
164 020020  032767  001000  163024                  BIT     #VCSTAT,T.MP    ;CHECK IF VOLUME CHECK RESET
165 020026  001403                                  BEQ     7$              ;YES SKIP
166 020030  012703  006327                          MOV     #VCNRST,R3      ;SET REASON POINTER
167 020034  000417                                  BR      2$              ;EXIT
168 020036  032767  040000  163000  7$:             BIT     #DRVERR,T.CS    ;CHECK IF DRIVE ERROR
169 020044  001405                                  BEQ     9$              ;NO - SKIP
170 020046                                          ERRHRD  10004.,,ERR6
    020046  104456                                  TRAP    C$ERHRD
    020050  023424                                  .WORD   10004
    020052  000000                                  .WORD   0
    020054  012766                                  .WORD   ERR6
171 020056  000412                                  BR      14$             ;EXIT
172 020060  012703  006350          9$:             MOV     #UNXERR,R3      ;SET REASON POINTER
173 020064  000403                                  BR      2$              ;EXIT
174 020066  004767  176544          1$:             JSR     PC,WAITIN       ;WAIT FOR INTERRUPT
175 020072  012603                                  MOV     (SP)+,R3        ;STORE REASON POINTER FOR RETURN
176 020074                          2$:             ERRHRD  10002.,,ERR1
    020074  104456                                  TRAP    C$ERHRD
    020076  023422                                  .WORD   10002
    020100  000000                                  .WORD   0
    020102  012464                                  .WORD   ERR1
177 020104  005067  162706          14$:            CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
178 020110  005767  163012          3$:             TST     TEMP4           ;TEST IF REGISTERS WERE SAVED
179 020114  001007                                  BNE     22$             ;NO - SKIP
180 020116  012703  003034                          MOV     #L.CS,R3        ;SET POINTER TO RESTORE
181 020122  012701  000004                          MOV     #4,R1           ;SET REGISTER COUNT
182 020126  012623                  20$:             MOV     (SP)+,(R3)+     ;RESTORE REG
183 020130  005301                                  DEC     R1              ;DEC COUNT
184 020132  001375                                  BNE     20$             ;LOOP UNTIL ALL ARE RESTORED
185 020134  162767  000002  162640  22$:            SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUTINE STACK
186 020142  012601                                  MOV     (SP)+,R1        ;RESTORE R1
187 020144  012600                                  MOV     (SP)+,R0        ;RESTORE R0
188 020146  012603                                  MOV     (SP)+,R3        ;RESTORE R3
189 020150  012667  162752                          MOV     (SP)+,TEMP4     ;RESTORE TEMP4
190 020154  005767  162636                          TST     ERRSWI          ;TEST IF ERROR RETURN
191 020160  001404                                  BEQ     99$             ;YES - SKIP
192 020162  066716  162630                          ADD     ERRSWI,(SP)     ;ADD IN FOR NO ERROR RETURN
193 020166  000240                                  NOP
194 020170  000207                                  RTS     PC
195 020172  017616  000000          99$:            MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
196 020176  000240                                  NOP
197 020200  000207                                  RTS     PC
198
199
```

```
                                                ;       GET DRIVE STATE ROUTINE
020202  010346                                  GDRSTA: MOV     R3,-(SP)        ;SAVE R3
020204  012701  000004                                  MOV     #4,R1           ;INITIALIZE REGISTER SAVE COUNT
020210  012703  003044                                  MOV     #L.MP+2,R3      ;INITIALIZE ADDRESS OF FIRST SAVE
020214  014346                                  1$:     MOV     -(R3),-(SP)     ;SAVE REGISTER ON STACK
020216  005301                                          DEC     R1              ;DECREMENT REGISTER SAVE COUNT
020220  001375                                          BNE     1$              ;LOOP UNTIL ALL 4 REGISTERS ARE SAVED
020222  012767  000003  162610                          MOV     #GETSTAT,L.DA   ;SET UP DISK ADDRESS REGISTER FOR GET STATUS
                                                                                ;/COMMAND
020230  005067  162552                                  CLR     DONE            ;CLEAR INTERRUPT FLAG
020234  016767  162572  162572                          MOV     RLDRV,L.CS      ;SET UP CONTROL STATUS REGISTER WITH
                                                                                ;/DRIVE NUMBER
020242  042767  002000  162564                          BIC     #BIT10,L.CS     ;CLEAR FOR DRIVES 4-7 SPECIFIED
020250  052767  000104  162556                          BIS     #GTSTAT,L.CS    ;INITIALIZE CONTROL STATUS REGISTER FOR
                                                                                ;/GET STATUS COMMAND
020256  016762  162556  000004                          MOV     L.DA,RLDA(R2)   ;INITIALIZE DISK ADDRESS REGISTER FOR
                                                                                ;/GET STATUS COMMAND
020264  016762  162544  000000                          MOV     L.CS,RLCSR(R2)  ;LOAD CONTROL STATUS REGISTER TO EXECUTE
                                                                                ;/GET STATUS COMMAND
020272  105762  000000                          5$:     TSTB    RLCS(R2)        ;WAIT FOR CONTROLLER READY INDICATING
020276  001775                                          BEQ     5$              ;/RECEIPT OF GET STATUS COMMAND
020300  005767  162502                                  TST     DONE            ;INTERRUPT OCCURRED?
020304  001416                                          BEQ     3$              ;BRANCH IF NOT
020306  016767  162540  162544                          MOV     T.MP,T.STAT     ;GET CONTENTS OF MULTI-PURPOSE REGISTER
020314  042767  177770  162536                          BIC     #^C<STAMSK>,T.STAT ;CLEAR ALL BUT STATE DRIVE BITS
020322  012703  003034                                  MOV     #L.CS,R3        ;INITIALIZE POINTER TO RESTORE RL REGISTERS
020326  012701  000004                                  MOV     #4,R1           ;INITIALIZE REGISTER SAVE COUNT
020332  012623                          2$:     MOV     (SP)+,(R3)+     ;RESTORE REGISTERS
020334  005301                                          DEC     R1              ;DECREMENT REGISTER SAVE COUNT
020336  001375                                          BNE     2$              ;LOOP UNTIL ALL 4 REGISTERS ARE RESTORED
020340  000402                                          BR      4$
020342  004767  176270                          3$:     JSR     PC,WAITIN       ;WAIT FOR INTERRUPT
020346  012603                          4$:     MOV     (SP)+,R3        ;RESTORE R3
020350  000207                                          RTS     PC              ;RETURN


                                                ;       SEEK ROUTINE
020352  012767  177777  162540            XSEEKT: MOV     #-1,TEMP1       ;SET SPECIAL TIMING SEEK FLAG
020360  000402                                          BR      XSEEK1
020362  005067  162532                    XSEEK:  CLR     TEMP1           ;CLEAR SPECIAL TIMING SEEK FLAG
020366  010346                            XSEEK1: MOV     R3,-(SP)        ;STORE R3
020370  016703  162406                            MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
020374  005723                                    TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
020376  016663  000002  002404                    MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
020404  162763  000004  002404                    SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
020412  010367  162364                            MOV     R3,SSINDX       ;STORE IT BACK
020416  010046                                    MOV     R0,-(SP)
020420  010146                                    MOV     R1,-(SP)
020422  010546                                    MOV     R5,-(SP)        ;STORE REG
020424  012767  000002  162364                    MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
020432  005067  162440                            CLR     DIFAUG          ;CLEAR DIFFERENCE ARGUMENT (FOR SEEKING
                                                                        ;    PAST GUARD BAND)
020436  004767  002560                            JSR     PC,GETPOS       ;GET PRESENT POSITION
020442  021112                                    65$
020444  016767  162434  162426                    MOV     CURCYL,OLDCYL   ;MOVE CURRENT TO OLD CYLINDER
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257 020452  026767  162424  161622          CMP     NEWCYL,HLMTW    ;TEST IF NEW IS GREATER THAN 255
258 020460  003427                          BLE     3$              ;NO - SKIP
259 020462  166767  161614  162412          SUB     HLMTW,NEWCYL    ;ELSE SUBTRACT 255.
260 020470  016767  162406  162400          MOV     NEWCYL,DIFAUG   ;STORE DIFFERENCE AS ARGUMENT
261 020476  016767  161600  162376          MOV     HLMTW,NEWCYL    ;SET NEWCYL AS 255.
262 020504  022767  000001  161564          CMP     #1,T.DRIVE
263 020512  001424                          BEQ     6$
264 020514  162767  000001  162360          SUB     #1,NEWCYL
265 020522  012767  000001  162360          MOV     #1,DESSGN
266 020530  012767  000001  162350          MOV     #1,DESDIF
267 020536  000451                          BR      18$
268 020540  005767  162336          3$:     TST     NEWCYL          ;TEST IF NEWCYL HAS NEGATIVE VALUE
269 020544  100007                          BPL     6$              ;NO - SKIP
270 020546  005467  162330                  NEG     NEWCYL          ;ELSE MAKE IT POSITIVE
271 020552  016767  162324  162316          MOV     NEWCYL,DIFAUG   ;AND STORE IT AS ARGUMENT
272 020560  005067  162316                  CLR     NEWCYL          ;AND SET NEWCYL TO 0
273 020564  016705  162314          6$:     MOV     CURCYL,R5       ;COMPUTE DIFFERENCE AND NEW CYLINDER
274 020570  166705  162306                  SUB     NEWCYL,R5       ;SUB NEWCYL FROM CURCYL
275 020574  100005                          BPL     13$             ;IF DIFF IS POSITIVE - SKIP(REV SEEK)
276 020576  012767  000001  162304          MOV     #1,DESSGN       ;ELSE SET SIGN FOR FORWARD
277 020604  005405                          NEG     R5              ;MAKE DIFFERENCE POSITIVE
278 020606  000402                          BR      14$             ;SKIP
279 020610  005067  162274          13$:    CLR     DESSGN          ;SET SIGN FOR REVERSE
280 020614  010567  162266          14$:    MOV     R5,DESDIF       ;STORE DIFFERENCE
281 020620  005767  162252                  TST     DIFAUG          ;IS THERE A DIFFERENCE ARGUMENT
282 020624  001416                          BEQ     18$             ;NO - SKIP
283 020626  026767  162250  161446          CMP     NEWCYL,HLMTW    ;CHECK IF NEW CYL IS 255.
284 020634  001007                          BNE     17$             ;NO - SKIP
285 020636  012767  000001  162244          MOV     #1,DESSGN       ;ELSE FORCE SIGN FOR FORWARD
286                                                                 ;(INNER GUARD BAND)
287 020644  022767  000001  161424          CMP     #1,T.DRIVE
288 020652  001003                          BNE     18$
289 020654  066767  162216  162224  17$:    ADD     DIFAUG,DESDIF
290 020662                          18$:
291 020662  012705  003034                  MOV     #L.CS,R5        ;GET RL REG ADDRESS
292 020666  012715  000106                  MOV     #SEEK,(R5)      ;SET FOR SEEK
293 020672  056715  162134                  BIS     RLDRV,(R5)      ;INSERT DRIVE NUMBER
294 020676  042725  002000                  BIC     #BIT10,(R5)+    ;CLEAR IF DRIVE 4 - 7 SPEC'D
295 020702  005025                          CLR     (R5)+           ;CLEAR BUS ADDRESS
296 020704  016715  162176                  MOV     DESDIF,(R5)     ;LOAD DIFFERENCE
297 020710  012700  000007                  MOV     #7,R0           ;SET TO SHIFT DIFFERENCE
298 020714  006315                  21$:    ASL     (R5)
299 020716  005300                          DEC     R0
300 020720  001375                          BNE     21$             ;LOOP UNTIL ALIGNED
301 020722  005767  162162                  TST     DESSGN          ;TEST SIGN
302 020726  001402                          BEQ     23$             ;SKIP IF 0
303 020730  052715  000004                  BIS     #DIRBIT,(R5)    ;ELSE INSERT SIGN
304 020734  005767  162152          23$:    TST     DESHD           ;TEST IF HEAD 0
305 020740  001402                          BEQ     25$             ;YES - SKIP
306 020742  052715  000020                  BIS     #HDSEL,(R5)     ;ELSE SET HEAD BIT
307 020746  052725  000001          25$:    BIS     #MBSET0,(R5)+   ;INSERT MARKER BIT
308 020752  004767  000504                  JSR     PC,RDYCHK       ;CHECK IF DRIVE READY
309 020756  021112                          65$
310 020760  005067  162022                  CLR     DONE            ;CLEAR INTERRUPT FLAG
311 020764  005767  162130                  TST     TEMP1           ;CHECK IF SPECIAL SEEK FLAG SET
312 020770  001050                          BNE     65$             ;YES - SKIP, DO NOT START SEEK
313 020772  014562  000004                  MOV     -(R5),RLDA(R2)  ;LOAD RL REGISTERS
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314 020776  014562  000002                  MOV     -(R5),RLBA(R2)
315 021002  014562  000000                  MOV     -(R5),RLCS(R2)  ;PERFORM SEEK OPERATION
316 021006                          30$:     WAITUS  1               ;ALLOW TIME FOR RECEIPT OF SEEK COMMAND
    021006  012727  000001                  MOV     #1,(PC)+
    021012  000000                          .WORD   0
    021014  016727  161076                  MOV     L$DLY,(PC)+
    021020  000000                          .WORD   0
    021022  005367  177772                  DEC     -6(PC)
    021026  001375                          BNE     .-4
    021030  005367  177756                  DEC     -22(PC)
    021034  001367                          BNE     .-20
317 021036  005767  161744                  TST     DONE            ;TEST IF INTERRUPT DONE
318 021042  001012                          BNE     32$             ;YES - SKIP
319 021044  004767  175566                  JSR     PC,WAITIN       ;GO WAIT FOR INTERRUPT
320 021050  012603                          MOV     (SP)+,R3        ;GET RESULT MESSAGE POINTER
321 021052                                  ERRHRD  10005.,,ERR1
    021052  104456                          TRAP    C$ERHRD
    021054  023425                          .WORD   10005
    021056  000000                          .WORD   0
    021060  012464                          .WORD   ERR1
322 021062  005067  161730                  CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
323 021066  000411                          BR      65$
324 021070  005767  161750          32$:     TST     T.CS            ;TEST IF ANY ERROR
325 021074  100006                          BPL     65$             ;NO - SKIP
326 021076                                  ERRHRD  10006.,,ERR6
    021076  104456                          TRAP    C$ERHRD
    021100  023426                          .WORD   10006
    021102  000000                          .WORD   0
    021104  012766                          .WORD   ERR6
327 021106  005067  161704                  CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
328 021112  162767  000002  161662  65$:     SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUTINE STACK
329 021120  012605                          MOV     (SP)+,R5        ;RESTORE REGISTER
330 021122  012601                          MOV     (SP)+,R1
331 021124  012600                          MOV     (SP)+,R0
332 021126  012603                          MOV     (SP)+,R3        ;RESTORE R3
333 021130  005767  161662                  TST     ERRSWI          ;TEST IF ERROR RETURN
334 021134  001403                          BEQ     99$             ;YES - SKIP
335 021136  066716  161654                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
336 021142  000207                          RTS     PC
337 021144  017616  000000          99$:     MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
338 021150  000207                          RTS     PC
339
341
342
343 021152  010346                  SIMSEK: MOV     R3,-(SP)        ;STORE REGISTERS
344 021154  016703  161622                  MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
345 021160  005723                          TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
346 021162  016663  000002  002404          MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
347 021170  162763  000004  002404          SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
348 021176  010367  161600                  MOV     R3,SSINDX       ;STORE IT BACK
349 021202  010046                          MOV     R0,-(SP)
350 021204  010446                          MOV     R4,-(SP)
351 021206  012767  000002  161602          MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
352 021214  004767  000242                  JSR     PC,RDYCHK       ;CHECK IF DRIVE READY
353 021220  021424                          65$
354 021222  012704  003034                  MOV     #L.CS,R4        ;GET POINTER TO L REGS
355 021226  012714  000106                  MOV     #SEEK,(R4)      ;SET FOP SEEK
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                                                BIS     RLDRV,(R4)      ;INSERT DRIVE NUMBER
                                                BIC     #BIT10,(R4)+    ;CLEAR FOR DRIVE 4 - 7 SPEC'D
                                                CLR     (R4)+           ;CLEAR BUS ADDRESS
                                                MOV     DESDIF,(R4)     ;LOAD DIFFERENCE
                                                MOV     #7,R3           ;SET COUNT FOR SHIFT TO ALIGN
                                        3$:     ASL     (R4)            ;ALIGN DIFFERENCE IN DA
                                                DEC     R3
                                                BNE     3$
                                                TST     DESSGN          ;TEST IF SIGN SET
                                                BEQ     5$              ;NO - SKIP
                                                BIS     #DIRBIT,(R4)    ;INSERT SIGN
                                        5$:     TST     DESHD           ;TEST IF HEAD 0
                                                BEQ     7$              ;YES - SKIP
                                                BIS     #HDSEL,(R4)     ;INSERT HEAD BIT
                                        7$:     BIS     #MBSET0,(R4)+   ;INSERT MARKER BIT
                                                CLR     DONE            ;CLEAR INTERRUPT FLAG
                                                MOV     #10.,R1         ;SET WAIT COUNT FOR 800US
                                                MOV     -(R4),RLDA(R2)  ;LOAD RL REGISTERS
                                                MOV     -(R4),RLBA(R2)
                                                MOV     -(R4),RLCS(R2)
                                        10$:    TST     DONE            ;CHECK IF INTERRUPTED
                                                BNE     65$             ;YES - SKIP
                                                DEC     R1              ;DEC WAIT COUNT
                                                BEQ     13$             ;IF 0 - SKIP
                                                WAITUS  1
021350  012727  000001                          MOV     #1,(PC)+
021354  000000                                  .WORD   0
021356  016727  160534                          MOV     L$DLY,(PC)+
021362  000000                                  .WORD   0
021364  005367  177772                          DEC     -6(PC)
021370  001375                                  BNE     .-4
021372  005367  177756                          DEC     -22(PC)
021376  001367                                  BNE     .-20
                                                BR      10$             ;GO CHECK DONE
021402  004767  175230                  13$:    JSR     PC,WAITIN       ;GO WAIT FOR TIMEOUT
021406  012603                                  MOV     (SP)+,R3        ;GET RESULT MESSAGE POINTER
021410                                          ERRHRD  10011,,ERR1
021410  104456                                  TRAP    C$ERHRD
021412  023433                                  .WORD   10011
021414  000000                                  .WORD   0
021416  012464                                  .WORD   ERR1
021420  005067  161372                          CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
021424                                  14$:
021424  162767  000002  161350        65$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
021432  012604                                  MOV     (SP)+,R4        ;RESTORE REGS
021434  012600                                  MOV     (SP)+,R0
021436  012603                                  MOV     (SP)+,R3
021440  005767  161352                          TST     ERRSWI          ;TEST IF ERROR RETURN
021444  001403                                  BEQ     99$             ;YES - SKIP
021446  066716  161344                          ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
021452  000207                                  RTS     PC
021454  017616  000000                  99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
021460  000207                                  RTS     PC


                                        ;       DRIVE READY TEST ROUTINE. CHECKS DRIVE IS READY. IF NOT, WAIT
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                                                ;       500MS FOR READY TO SET.
021462  010346                                  RDYCHK: MOV     R3,-(SP)        ;STORE REGS
021464  016703  161312                                MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
021470  005723                                        TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
021472  016663  000002  002404                        MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
021500  162763  000004  002404                        SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
021506  010367  161270                                MOV     R3,SSINDX       ;STORE IT BACK
021512  010046                                        MOV     R0,-(SP)
021514  010146                                        MOV     R1,-(SP)
021516  010446                                        MOV     R4,-(SP)
021520  012767  000002  161270                        MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
021526  012701  011610                                MOV     #5000.,R1       ;SET WAIT COUNT
021532  004767  175340                        1$:     JSR     PC,GSTAT        ;GET DRIVE STATUS
021536  021754                                        4$
021540  032767  000001  161276                        BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY
021546  001104                                        BNE     5$              ;YES - EXIT
021550                                                WAITUS  1
021550  012727  000001                                MOV     #1,(PC)+
021554  000000                                        .WORD   0
021556  016727  160334                                MOV     L$DLY,(PC)+
021562  000000                                        .WORD   0
021564  005367  177772                                DEC     -6(PC)
021570  001375                                        BNE     .-4
021572  005367  177756                                DEC     -22(PC)
021576  001367                                        BNE     .-20
021600  005301                                        DEC     R1              ;DEC WAIT COUNT
021602  001353                                        BNE     1$              ;LOOP IF NOT 0
021604  012703  010404                                MOV     #MDRDY,R3       ;SET RESULT MESSAGE POINTER
021610  012704  011404                                MOV     #C500MS,R4      ;SET CONDITION MESSAGE POINTER
021614                                                ERRHRD  10010.,,ERR5
021614  104456                                        TRAP    C$ERHRD
021616  023432                                        .WORD   10010
021620  000000                                        .WORD   0
021622  012716                                        .WORD   ERR5
021624  012701  000030                                MOV     #24.,R1         ;INITIALIZE WAIT COUNT
021630  004767  175242                        2$:     JSR     PC,GSTAT        ;GET DRIVE STATUS
021634  021754                                        4$
021636  032767  000001  161200                        BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY
021644  001031                                        BNE     3$              ;YES - SKIP
021646                                                WAITMS  1               ;WAIT FOR 100MS
021664  012727  000372                                MOV     #250.,(PC)+
021670  000000                                        .WORD   0
021672  016727  160220                                MOV     L$DLY,(PC)+
021676  000000                                        .WORD   0
021700  005367  177772                                DEC     -6(PC)
021704  001375                                        BNE     .-4
021706  005367  177756                                DEC     -22(PC)
021712  001367                                        BNE     .-20
021714  104422                                        TRAP    C$BRK
021724  005301                                        DEC     R1              ;DEC WAIT COUNTER
021726  001340                                        BNE     2$              ;LOOP UNTIL TIME DONE
021730  032767  100000  161106          3$:     BIT     #ANYERR,T.CS    ;TEST IF ANYERR SET
021736  001406                                        BEQ     4$              ;NO - SKIP
021740                                                ERRHRD  10011.,,ERR6    ;REPORT ALL ERRORS
021740  104456                                        TRAP    C$ERHRD
021742  023433                                        .WORD   10011
021744  000000                                        .WORD   0
```

```
     021746  012766                                  .WORD   ERR6
510  021750  005367  161204                        DEC     ERRCNT          ;REDUCE ERROR COUNT FOR DUAL ERRORS
511  021754  005067  161036              4$:       CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
512  021760  162767  000002  161014      5$:       SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
513  021766  012604                                MOV     (SP)+,R4        ;RESTORE REGS
514  021770  012601                                MOV     (SP)+,R1
515  021772  012600                                MOV     (SP)+,R0
516  021774  012603                                MOV     (SP)+,R3
517  021776  005767  161014                        TST     ERRSWI          ;TEST IF ERROR RETURN
518  022002  001403                                BEQ     99$             ;YES - SKIP
519  022004  066716  161006                        ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
520  022010  000207                                RTS     PC
521  022012  017616  000000              99$:      MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
522  022016  000207                                RTS     PC
523
524                                      ;         CHOOSE HEAD ROUTINE. PICKS HEAD 0 UNLESS SPECIFIC HEAD IS
525                                      ;         SELECTED BY SOFTWARE PARAMETER.
526  022020  005067  161066              CHOSHD:   CLR     DESHD           ;CLEAR TO HEAD 0
527  022024  032767  010000  172274              BIT     #HEADLM,MISWIW  ;TEST IF HEAD SPECIFIED
528  022032  001403                                BEQ     1$              ;NO - SKIP
529  022034  016767  172274  161050              MOV     HEADW,DESHD     ;INSERT SPECIFIED HEAD
530  022042  000207                      1$:       RTS     PC
531
532
533
534                                      ;         SWAP HEAD ROUTINE. CHANGES SELECTED HEAD TO HEAD 1
535                                      ;         UNLESS HEAD 0 SPECIFICALLY SELECTED BY SOFTWARE PARAMETER.
536  022044  032767  010000  172254      SWAPHD:   BIT     #HEADLM,MISWIW  ;TEST IF HEAD SPECIFIED
537  022052  001011                                BNE     2$              ;YES - TAKE ABORT EXIT
538  022054  005767  161032                        TST     DESHD           ;TEST IF HEAD ONE USED
539  022060  001006                                BNE     2$              ;YES - TAKE ABORT EXIT
540  022062  012767  000001  161022              MOV     #1,DESHD        ;ELSE SET FOR HEAD ONE
541  022070  062716  000002                        ADD     #2,(SP)         ;BUMP PAST ABORT RETURN
542  022074  000207                                RTS     PC              ;RETURN
543  022076  017616  000000              2$:       MOV     @(SP),(SP)      ;GET ABORT DESTINATION
544  022102  000207                      3$:       RTS     PC
545
546
547
548                                      ;         SWAP OLD CYLINDER AND NEW CYLINDER ROUTINE.
549  022104  010046                      ONSWAP:   MOV     R0,-(SP)        ;STORE R0
550  022106  016700  160766                        MOV     OLDCYL,R0       ;MOVE OLD TO R0
551  022112  016767  160764  160760              MOV     NEWCYL,OLDCYL   ;MOVE NEW TO OLD
552  022120  010067  160756                        MOV     R0,NEWCYL       ;PUT OLD IN NEW
553  022124  012600                                MOV     (SP)+,R0        ;RESTORE R0
554  022126  000207                                RTS     PC
555
570
571
572                                      ;         READ HEADERS ROUTINE.
573  022130  012767  000001  160770      XRDHDC:   MOV     #1,TEMP4        ;SET FLAG TO BYPASS REG STORAGE
574  022136  000402                                BR      XRDHDG          ;GO DO IT
575  022140  005067  160762              XRDHD:    CLR     TEMP4           ;SET FLAG TO SAVE T. AND L. REGS
576  022144  010346                      XRDHDG:   MOV     R3,-(SP)        ;STORE REGISTERS
577  022146  016703  160630                        MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
578  022152  005723                                TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
579  022154  016663  000002  002404              MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
```

```
                                                SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
                                                MOV     R3,SSINDX       ;STORE IT BACK
                                                MOV     R0,-(SP)
                                                MOV     R1,-(SP)
                                                MOV     R4,-(SP)
                                                MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
                                                TST     TEMP4           ;TEST IF REGISTERS TO BE SAVED
                                                BNE     2$              ;NO - SKIP
                                                MOV     #L.MP+2,R3      ;SET POINTER FOR REGS
                                                MOV     #4,R1           ;SET COUNT
                                        1$:     MOV     -(R3),-(SP)     ;SAVE REGISTER
                                                DEC     R1              ;DEC COUNT
                                                BNE     1$              ;LOOP UNTIL ALL ARE SAVED
                                        2$:     JSR     PC,RDYCHK       ;CHECK DRIVE READY
                                                65$
                                                CLR     DONE            ;CLEAR INTERRUPT FLAG
                                                MOV     #L.CS,R1        ;GET ADDRESS OF LOAD REGS
                                                MOV     RLDRV,(R1)      ;LOAD DRIVE NUMBER
                                                BIC     #BIT10,(R1)     ;CLEAR FOR DRIVE 4 - 7 SPEC'D
                                                BIS     #RDHEAD,(R1)+   ;INSERT COMMAND
                                                CLR     (R1)+           ;CLEAR BA
                                                CLR     (R1)+           ;CLEAR DA
                                                MOV     -(R1),RLDA(R2)  ;LOAD RL11 REGS
                                                MOV     -(R1),RLBA(R2)
                                                MOV     -(R1),RLCSR(R2)
                                        3$:     WAITUS  10.             ;WAIT 1 MS FOR INTERRUPT
022306  012727  000012                          MOV     #10.,(PC)+
022312  000000                                  .WORD   0
022314  016727  157576                          MOV     L$DLY,(PC)+
022320  000000                                  .WORD   0
022322  005367  177772                          DEC     -6(PC)
022326  001375                                  BNE     .-4
022330  005367  177756                          DEC     -22(PC)
022334  001367                                  BNE     .-20
022336  005767  160444                          TST     DONE            ;TEST IF INTERRUPT FLAG SET
022342  001460                                  BEQ     14$             ;NO - SKIP
022344  032767  000001  160472        5$:       BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY
022352  001035                                  BNE     10$             ;YES - SKIP
022354  012703  010404                          MOV     #MDRDY,R3       ;SET NO READY MESSAGE
022360  012704  011423                          MOV     #CAFDT,R4       ;CONDITION OF AFTER DATA XFER
022364                                          ERRHRD  10017,,ERR5
022364  104456                                  TRAP    C$ERHRD
022366  023441                                  .WORD   10017
022370  000000                                  .WORD   0
022372  012716                                  .WORD   ERR5
022374  012701  000030                          MOV     #24.,R1         ;INITIALIZE WAIT COUNT
022400  004767  174472        4$:               JSR     PC,GSTAT        ;GET STATUS
022404  022522                                  60$
022406  032767  000001  160430                  BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE HAS COME READY
022414  001403                                  BEQ     11$             ;NO - SKIP
022416  005067  160374                          CLR     ERRSWI          ;CLEAR ERROR SWITCH
022422  000411                                  BR      10$             ;SKIP
022424  005301                          11$:    DEC     R1              ;DEC WAIT COUNT
022426  001364                                  BNE     4$              ;LOOP UNTIL TIME DONE
022430  012704  011434                          MOV     #C5SEC,R4       ;SET CONDITION AFTER 5 SECONDS
022434                                          ERRHRD  10014,,ERR5
022434  104456                                  TRAP    C$ERHRD
```

```
                022436  023436                          .WORD   10014
                022440  000000                          .WORD   0
                022442  012716                          .WORD   ERR5
624             022444  000426                          BR      60$             ;EXIT
625             022446  005767  160372          10$:    TST     T.CS            ;CHECK FOR ANY ERRORS
626             022452  100005                          BPL     12$             ;NO - SKIP
627             022454                                  ERRHRD  10016.,,ERR6     ;REPORT ALL ERRORS
                022454  104456                          TRAP    C$ERHRD
                022456  023440                          .WORD   10016
                022460  000000                          .WORD   0
                022462  012766                          .WORD   ERR6
628             022464  000416                          BR      60$
629             022466  012701  003054          12$:    MOV     #HDWRD2,R1      ;GET POINTER
630             022472  016221  000006                  MOV     RLMP(R2),(R1)+  ;STORE LAST TWO HEADER WORDS
631             022476  016221  000006                  MOV     RLMP(R2),(R1)+
632             022502  000411                          BR      65$             ;EXIT
633             022504  004767  174126          14$:    JSR     PC,WAITIN       ;WAIT FOR INTERRUPT
634             022510  012603                          MOV     (SP)+,R3        ;GET RESULTS
635             022512                                  ERRHRD  10015.,,ERR1    ;REPORT
                022512  104456                          TRAP    C$ERHRD
                022514  023437                          .WORD   10015
                022516  000000                          .WORD   0
                022520  012464                          .WORD   ERR1
636             022522  005067  160270          60$:    CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
637             022526  005767  160374          65$:    TST     TEMP4           ;TEST IF REGISTERS WERE SAVED
638             022532  001007                          BNE     22$             ;NO - SKIP
639             022534  012703  003034                  MOV     #L.CS,R3        ;SET POINTER TO RESTORE REGS
640             022540  012701  000004                  MOV     #4,R1           ;SET COUNT
641             022544  012623                  20$:    MOV     (SP)+,(R3)+     ;RESTORE REGISTER
642             022546  005301                          DEC     R1              ;DEC COUNT
643             022550  001375                          BNE     20$             ;LOOP UNTIL ALL ARE RESTORED
644             022552  162767  000002  160222  22$:    SUB     #2.SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
645             022560  012604                          MOV     (SP)+,R4        ;RESTORE REGS
646             022562  012601                          MOV     (SP)+,R1
647             022564  012600                          MOV     (SP)+,R0
648             022566  012603                          MOV     (SP)+,R3
649             022570  005767  160222                  TST     ERRSWI          ;TEST IF ERROR RETURN
650             022574  001403                          BEQ     99$             ;YES - SKIP
651             022576  066716  160214                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
652             022602  000207                          RTS     PC
653             022604  017616  000000          99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
654             022610  000207                          RTS     PC
655
731
732
733                                             ;       POSITION HEAD BIT FROM HEADER OR MULTIPURPOSE REGISTER TO LSB.
734             022612  016705  160234          POSHW1: MOV     HDWRD1,R5       ;START FOR POSITION HD BIT IN WD 1
735             022616  000402                          BR      POSHD0          ;SKIP
736             022620  016705  160226          POSHSB: MOV     T.MP,R5         ;START FOR POSITION HD BIT IN MP
737             022624  010146                  POSHD0: MOV     R1,-(SP)        ;STORE R1
738             022626  042705  177677                  BIC     #^CHSSTAT,R5    ;CLEAR ALL BUT HEAD SEL BIT
739             022632  012701  000006                  MOV     #6,R1           ;SET SHIFT COUNT
740             022636  006205                  1$:     ASR     R5              ;SHIFT FOR RIGHT JUSTIFY
741             022640  005301                          DEC     R1
742             022642  001375                          BNE     1$
743             022644  012601                          MOV     (SP)+,R1        ;RESTORE R1
744             022646  000207                          RTS     PC              ;RETURN
```

```
                                        ;       WAIT FOR READY ROUTINE. DURATION OF WAIT PASSED TO THE ROUTINE
                                        ;       FROM THE CALLING ROUTINE IN R1.
022650  010346                          RDYWAIT:        MOV     R3,-(SP)        ;STORE R3
022652  016703  160124                          MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
022656  005723                          TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
022660  016663  000002  002404          MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
022666  162763  000004  002404          SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
022674  010367  160102                  MOV     R3,SSINDX       ;STORE IT BACK
022700  010046                          MOV     R0,-(SP)
022702  010146                          MOV     R1,-(SP)
022704  010446                          MOV     R4,-(SP)
022706  012767  000002  160102          MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN

022714                                  5$:     BREAK                   ;ALLOW A ^C
022714  104422                          TRAP    C$BRK
022716  004767  174154                  JSR     PC,GSTAT        ;GET DRIVE STATUS
022722  023156                          10$
022724  032767  000001  160112          BIT     #DRDYMSK,T.CS   ;CHECK IF READY
022732  001113                          BNE     9$              ;YES - SKIP
022734  005301                          DEC     R1              ;DEC WAIT COUNT
022736  001415                          BEQ     7$              ;SKIP IF 0
022740                                  WAITUS  1
022740  012727  000001                  MOV     #1,(PC)+
022744  000000                          .WORD   0
022746  016727  157144                  MOV     L$DLY,(PC)+
022752  000000                          .WORD   0
022754  005367  177772                  DEC     -6(PC)
022760  001375                          BNE     .-4
022762  005367  177756                  DEC     -22(PC)
022766  001367                          BNE     .-20
022770  000751                  BR      5$
022772  012703  010404          7$:     MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
022776                                  ERRHRD  10020.,,ERR3    ;REPORT READY ERROR
022776  104456                          TRAP    C$ERHRD
023000  023444                          .WORD   10020
023002  000000                          .WORD   0
023004  012600                          .WORD   ERR3
023006  012701  000030                  MOV     #24.,R1         ;INITIALIZE WAIT COUNT

023012                                  6$:     BREAK                   ;ALLOW A ^C
023012  104422                          TRAP    C$BRK
023014  004767  174056                  JSR     PC,GSTAT        ;GET DRIVE STATUS
023020  023156                          10$
023022  032767  000001  160014          BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY
023030  001040                          BNE     8$              ;YES - SKIP
023032                                  WAITMS  1               ;WAIT 100 MS
023050  012727  000372                  MOV     #250.,(PC)+
023054  000000                          .WORD   0
023056  016727  157034                  MOV     L$DLY,(PC)+
023062  000000                          .WORD   0
023064  005367  177772                  DEC     -6(PC)
023070  001375                          BNE     .-4
023072  005367  177756                  DEC     -22(PC)
023076  001367                          BNE     .-20
```

```
                023100  104422                          TRAP    C$BRK
780             023110  005301                          DEC     R1              ;DEC WAIT COUNT
781             023112  001337                          BNE     6$              ;LOOP UNTIL TIME DONE
782             023114  012704  011434                  MOV     #C5SEC,R4       ;SET CONDITION AFTER 5 SECDS
783             023120                                  ERRHRD  10021.,,ERR5
                023120  104456                          TRAP    C$ERHRD
                023122  023445                          .WORD   10021
                023124  000000                          .WORD   0
                023126  012716                          .WORD   ERR5
784             023130  000410                          BR      11$             ;EXIT
785             023132  032767  100000  157704  8$:     BIT     #ANYERR,T.CS    ;TEST IF ANY ERROR SET
786             023140  001406                          BEQ     10$             ;NO - SKIP
787             023142                                  ERRHRD  10022.,,ERR6    ;REPORT ALL ERRORS
                023142  104456                          TRAP    C$ERHRD
                023144  023446                          .WORD   10022
                023146  000000                          .WORD   0
                023150  012766                          .WORD   ERR6
788             023152  005367  160002          11$:    DEC     ERRCNT          ;DECREMENT FOR DOUBLE ERROR REPORT
789             023156  005067  157634          10$:    CLR     ERRSWI          ;CLEAR FOR ERROR ERROR RETURN
790             023162  162767  000002  157612  9$:     SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
791             023170  012604                          MOV     (SP)+,R4        ;RESTORE REGISTERS
792             023172  012601                          MOV     (SP)+,R1
793             023174  012600                          MOV     (SP)+,R0
794             023176  012603                          MOV     (SP)+,R3        ;RESTORE R3
795             023200  005767  157612                  TST     ERRSWI          ;TEST IF ERROR RETURN
796             023204  001403                          BEQ     99$             ;YES - SKIP
797             023206  066716  157604                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
798             023212  000207                          RTS     PC
799             023214  017616  000000          99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
800             023220  000207                          RTS     PC
801
802
803
804                                             ;       GET POSITION ROUTINE. READS A HEADER FROM CURRENT CYLINDER
805                                             ;       (WHERE IT IS PRESENTLY POSITIONED) AND STORES CYLINDER
806                                             ;       NUMBER IN CURCYL.
807             023222  010346                  GETPOS: MOV     R3,-(SP)        ;STORE REGISTERS
808             023224  016703  157552                  MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
809             023230  005723                          TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
810             023232  016663  000002  002404          MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
811             023240  162763  000004  002404          SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
812             023246  010367  157530                  MOV     R3,SSINDX       ;STORE IT BACK
813             023252  010046                          MOV     R0,-(SP)
814             023254  010546                          MOV     R5,-(SP)
815             023256  004767  176656                  JSR     PC,XRDHD        ;DO READ HEADER
816             023262  023312                          65$
817             023264  016703  157562                  MOV     HDWRD1,R3       ;GET HEADER WORD
818             023270  012705  000007                  MOV     #7,R5           ;SET SHIFT COUNT
819             023274  006203                  4$:     ASR     R3              ;SHIFT TO RIGHT JUSTIFY
820             023276  005305                          DEC     R5
821             023300  001375                          BNE     4$
822             023302  042703  177000                  BIC     #177000,R3
823             023306  010367  157572                  MOV     R3,CURCYL       ;STORE AS CURRENT CYLINDER
824             023312  162767  000002  157462  65$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
825             023320  012605                          MOV     (SP)+,R5        ;RESTORE REGISTERS
826             023322  012600                          MOV     (SP)+,R0
827             023324  012603                          MOV     (SP)+,R3
```

```
828 023326  005767  157464            TST     ERRSWI          ;TEST IF ERROR RETURN
829 023332  001403                    BEQ     99$             ;YES - SKIP
830 023334  066716  157456            ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
831 023340  000207                    RTS     PC
832 023342  017616  000000      99$:  MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
833 023346  000207                    RTS     PC
834
863
864
865                             ;     READ ALL HEADERS ROUTINE. 40 HEADERS ARE READ AND STORED
866                             ;     IN IBUFF.
867 023350  010346              RDALHD: MOV     R3,-(SP)        ;STORE REGISTERS
868 023352  016703  157424            MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
869 023356  005723                    TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
870 023360  016663  000002  002404    MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
871 023366  162763  000004  002404    SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
872 023374  010367  157402            MOV     R3,SSINDX       ;STORE IT BACK
873 023400  010046                    MOV     R0,-(SP)
874 023402  010146                    MOV     R1,-(SP)
875 023404  010446                    MOV     R4,-(SP)
876 023406  012767  000002  157402    MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
877 023414  012701  000050            MOV     #40.,R1         ;SET HEADER COUNT
878 023420  052767  100000  157356    BIS     #HDR40,OPFLAG   ;SET 40 HDR OP FLAG
879 023426  012703  003764            MOV     #IBUFF,R3       ;SET POINTER TO STORE HDRS
880 023432  016704  157370            MOV     RLBAS,R4        ;GET BASE ADDRESS
881 023436  062704  000006            ADD     #RLMP,R4        ;MAKE IT POINT TO MP REG
882 023442  012767  000010  157364    MOV     #10,L.CS        ;LOAD FOR READ HEADER, NO INTERRUPT
883 023450  056767  157356  157356    BIS     RLDRV,L.CS      ;INSERT DRIVE NUMBER
884 023456  042767  002000  157350    BIC     #BIT10,L.CS     ;CLEAR FOR DRIVE 4 - 7 SPEC'D
885 023464  005067  157346            CLR     L.BA            ;CLEAR BA
886 023470  005067  157344            CLR     L.DA            ;CLEAR DA
887 023474  005767  157412            TST     DESHD           ;TEST IF HEAD 0
888 023500  001403                    BEQ     3$              ;YES - SKIP
889 023502  052767  000020  157330    BIS     #HDSEL,L.DA     ;ELSE INSERT HEAD 0
890 023510  016762  157324  000004  3$: MOV     L.DA,RLDA(R2)   ;LOAD RLDA REG
891 023516  016762  157314  000002    MOV     L.BA,RLBA(R2)   ;LOAD RLBA
892 023524  032762  000200  000000    BIT     #CRDYMSK,RLCS(R2)       ;TEST IF CONTROLLER READY
893 023532  001003                    BNE     6$              ;YES - SKIP
894 023534  004767  175722            JSR     PC,RDYCHK       ;ELSE CHECK READY
895 023540  023656                    65$
896 023542  016762  157266  000000  6$: MOV     L.CS,RLCS(R2)   ;LOAD RLCS REG
897 023550  012700  077777            MOV     #77777,R0       ;SET COUNT FOR WAIT
898 023554  032762  000200  000000  7$: BIT     #CRDYMSK,RLCS(R2) ;CHECK THAT OPERATION COMPLETED
899 023562  001016                    BNE     8$              ;YES - SKIP
900 023564  005300                    DEC     R0              ;DEC COUNT
901 023566  001372                    BNE     7$              ;SKIP IF NOT YET 0
902 023570  004767  173010            JSR     PC,READRL       ;ELSE GET ALL REGISTERS
903 023574  004767  173036            JSR     PC,WAITIN       ;ELSE WAIT FOR TIMEOUT
904 023600  012603                    MOV     (SP)+,R3        ;GET RESULT MESSAGE POINTER
905 023602                            ERRHRD  10025.,,ERR1
    023602  104456                    TRAP    C$ERHRD
    023604  023451                    .WORD   10025
    023606  000000                    .WORD   0
    023610  012464                    .WORD   ERR1
906 023612  005067  157200            CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
907 023616  000417                    BR      65$
908 023620  005767  157220      8$:   TST     T.CS            ;TEST FOR ANY ERRORS
```

```
  909 023624  100007                          BPL     12$             ;NO - SKIP
  910 023626                                  ERRHRD  10026.,,ERR6
      023626  104456                          TRAP    C$ERHRD
      023630  023452                          .WORD   10026
      023632  000000                          .WORD   0
      023634  012766                          .WORD   ERR6
  911 023636  005067  157154                  CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
  912 023642  000405                          BR      65$
  913 023644  011423                  12$:    MOV     (R4),(R3)+      ;STORE HEADER WORDS
  914 023646  011423                          MOV     (R4),(R3)+
  915 023650  011423                          MOV     (R4),(R3)+
  916 023652  005301                          DEC     R1              ;DEC HEADER COUNT
  917 023654  001332                          BNE     6$
  918 023656  162767  000002  157116  65$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
  919 023664  012604                          MOV     (SP)+,R4        ;RESTORE REGISTERS
  920 023666  012601                          MOV     (SP)+,R1
  921 023670  012600                          MOV     (SP)+,R0
  922 023672  012603                          MOV     (SP)+,R3
  923 023674  005767  157116                  TST     ERRSWI          ;TEST IF ERROR RETURN
  924 023700  001403                          BEQ     99$             ;YES - SKIP
  925 023702  066716  157110                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
  926 023706  000207                          RTS     PC
  927 023710  017616  000000          99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
  928 023714  000207                          RTS     PC
  929
  930
 1158
 1159                                 ;       REPORT OPERATION ROUTINE. PRINTS SUBROUTINE TRACE SEQUENCE AND
 1160                                 ;       OPERATION BEING PERFORMED PORTION OF ALL
 1161                                 ;       ERROR MESSAGES.
 1162 023716  010446                  RPTOP:  MOV     R4,-(SP)
 1163 023720  005767  157056                  TST     SSINDX          ;TEST SUBROUTINE INDEX 0
 1164 023724  001433                          BEQ     1$              ;SKIP IF 0
 1165 023726  012704  000002                  MOV     #2,R4           ;SET INDEXER TO FIRST ENTRY
 1166 023732                                  PRINTB  #FMT9,#SEQMES   ;PRINT "SUBROUTINE CALL SEQ"
      023732  012746  010253                  MOV     #SEQMES,-(SP)
      023736  012746  011753                  MOV     #FMT9,-(SP)
      023742  012746  000002                  MOV     #2,-(SP)
      023746  010600                          MOV     SP,R0
      023750  104414                          TRAP    C$PNTB
      023752  062706  000006                  ADD     #6,SP
 1167 023756                          3$:     PRINTB  #FMT16,SUBSTK(R4)       ;PRINT CALLING LOCATION
      023756  016446  002404                  MOV     SUBSTK(R4),-(SP)
      023762  012746  012126                  MOV     #FMT16,-(SP)
      023766  012746  000002                  MOV     #2,-(SP)
      023772  010600                          MOV     SP,R0
      023774  104414                          TRAP    C$PNTB
      023776  062706  000006                  ADD     #6,SP
 1168 024002  062704  000002                  ADD     #2,R4           ;BUMP INDEX
 1169 024006  020467  156770                  CMP     R4,SSINDX       ;CHECK IF ALL PRINTED
 1170 024012  003761                          BLE     3$              ;LOOP IF NOT ALL PRINTED YET
 1171 024014                          1$:     PRINTB  #FMT4,ERHEAD,#TSTLAB    ;PRINT ERROR HEADER
      024014  012746  006365                  MOV     #TSTLAB,-(SP)
      024020  016746  156766                  MOV     ERHEAD,-(SP)
      024024  012746  011556                  MOV     #FMT4,-(SP)
      024030  012746  000003                  MOV     #3,-(SP)
      024034  010600                          MOV     SP,R0
```

```
                024036  104414                          TRAP    C$PNTB
                024040  062706  000010                  ADD     #10,SP
1172            024044  042767  030000  156732          BIC     #SEEKOP!RORWOP,OPFLAG   ;CLEAR SK & RD OR WRT FLAG
1173            024052  016701  156756                  MOV     L.CS,R1         ;GET COMMAND EXECUTED
1174            024056  042701  177741                  BIC     #177741,R1      ;STRIP ALL BUT FUNCTION CODE
1175            024062  022701  000006                  CMP     #6,R1   ;TEST IF SEEK OPERATION
1176            024066  001003                          BNE     2$              ;NO - SKIP
1177            024070  052767  010000  156706          BIS     #SEEKOP,OPFLAG  ;ELSE SET SEEK FLAG
1178            024076  022701  000012          2$:     CMP     #12,R1          ;TEST IF WRITE
1179            024102  001003                          BNE     20$             ;NO - SKIP
1180            024104  052767  020000  156672          BIS     #RORWOP,OPFLAG  ;SET RD OR WRT FLAG
1181            024112  022701  000014          20$:    CMP     #14,R1          ;TEST IF READ
1182            024116  001003                          BNE     22$             ;NO - SKIP
1183            024120  052767  020000  156656          BIS     #RORWOP,OPFLAG  ;SET RD OR WRT FLAG
1184            024126                          22$:    PRINTB  #FMT1,#MOPER,OPMSGS(R1) ;PRINT OPERATION
                024126  016146  002224                  MOV     OPMSGS(R1),-(SP)
                024132  012746  005414                  MOV     #MOPER,-(SP)
                024136  012746  011534                  MOV     #FMT1,-(SP)
                024142  012746  000003                  MOV     #3,-(SP)
                024146  010600                          MOV     SP,R0
                024150  104414                          TRAP    C$PNTB
                024152  062706  000010                  ADD     #10,SP
1185            024156  020127  000004                  CMP     R1,#4           ;CHECK IF GET STATUS
1186            024162  001007                          BNE     4$              ;NO - SKIP
1187            024164  032767  000010  156646          BIT     #DRSET,L.DA     ;TEST IF RESET INCLUDED
1188            024172  001403                          BEQ     4$              ;NO - SKIP
1189            024174  012701  000016                  MOV     #16,R1          ;SET TO PRINT WITH RESET
1190            024200  000436                          BR      9$
1191            024202  032767  007777  156574  4$:     BIT     #COMPOP,OPFLAG  ;TEST IF ANY OTHER OPERATION
1192            024210  001424                          BEQ     8$              ;NO - SKIP
1193            024212  016704  156566                  MOV     OPFLAG,R4       ;SET UP TO DETERMINE WHICH ONE
1194            024216  012701  000020                  MOV     #20,R1          ;PRESET THE POINTER
1195            024222  032704  000001          5$:     BIT     #BIT00,R4       ;CHECK THE BIT
1196            024226  001003                          BNE     6$              ;IF SET - SKIP
1197            024230  005721                          TST     (R1)+           ;BUMP POINTER
1198            024232  006204                          ASR     R4
1199            024234  000772                          BR      5$
1200            024236                          6$:     PRINTB  #FMT2,OPMSGS(R1)
                024236  016146  002224                  MOV     OPMSGS(R1),-(SP)
                024242  012746  011550                  MOV     #FMT2,-(SP)
                024246  012746  000002                  MOV     #2,-(SP)
                024252  010600                          MOV     SP,R0
                024254  104414                          TRAP    C$PNTB
                024256  062706  000006                  ADD     #6,SP
1201            024262  032767  100000  156514  8$:     BIT     #HDR40,OPFLAG   ;TEST IF 40 HEADER OPERATION
1202            024270  001415                          BEQ     10$             ;NO - SKIP
1203            024272  012701  000050                  MOV     #50,R1          ;ELSE PRINT IT
1204            024276                          9$:     PRINTB  #FMT2,OPMSGS(R1)
                024276  016146  002224                  MOV     OPMSGS(R1),-(SP)
                024302  012746  011550                  MOV     #FMT2,-(SP)
                024306  012746  000002                  MOV     #2,-(SP)
                024312  010600                          MOV     SP,R0
                024314  104414                          TRAP    C$PNTB
                024316  062706  000006                  ADD     #6,SP
1205            024322  000434                          BR      15$             ;SKIP
1206            024324  032767  000000  156452  10$:    BIT     #SEEKOP,OPFLAG  ;TEST IF SEEK
1207            024332  001430                          BEQ     15$             ;NO - SKIP
```

```
1208 024334                                          PRINTB  #FMT13,#FRMWD,OLDCYL,#DIFWD,DESDIF,#SGNWD,DESSGN,#HDWD,DESHD
     024334  016746  156552                          MOV     DESHD,-(SP)
     024340  012746  010214                          MOV     #HDWD,-(SP)
     024344  016746  156540                          MOV     DESSGN,-(SP)
     024350  012746  010207                          MOV     #SGNWD,-(SP)
     024354  016746  156526                          MOV     DESDIF,-(SP)
     024360  012746  010201                          MOV     #DIFWD,-(SP)
     024364  016746  156510                          MOV     OLDCYL,-(SP)
     024370  012746  010232                          MOV     #FRMWD,-(SP)
     024374  012746  011774                          MOV     #FMT13,-(SP)
     024400  012746  000011                          MOV     #11,-(SP)
     024404  010600                                  MOV     SP,R0
     024406  104414                                  TRAP    C$PNTB
     024410  062706  000024                          ADD     #24,SP
1209 024414  032767  020000  156362  15$:            BIT     #RORWOP,OPFLAG  ;TEST IF READ OR WRITE SET
1210 024422  001424                                  BEQ     17$             ;NO - SKIP
1211 024424                                          PRINTB  #FMT22,#CYLWD,CURCYL,#HDWD,DESHD,#SECWD,DESSEC
     024424  016746  156464                          MOV     DESSEC,-(SP)
     024430  012746  010220                          MOV     #SECWD,-(SP)
     024434  016746  156452                          MOV     DESHD,-(SP)
     024440  012746  010214                          MOV     #HDWD,-(SP)
     024444  016746  156434                          MOV     CURCYL,-(SP)
     024450  012746  010225                          MOV     #CYLWD,-(SP)
     024454  012746  012323                          MOV     #FMT22,-(SP)
     024460  012746  000007                          MOV     #7,-(SP)
     024464  010600                                  MOV     SP,R0
     024466  104414                                  TRAP    C$PNTB
     024470  062706  000020                          ADD     #20,SP
1212 024474  004767  000446          17$:            JSR     PC,CLRPARM      ;CLEAR PARAM TABLE
1213 024500  012604                                  MOV     (SP)+,R4        ;RESTORE R4
1214 024502  000207                                  RTS     PC
1215
1216
1217
1218                                         ;       REPORT REASON ROUTINE
1219                                         ;       PRINTS REASON PORTION FOR ALL ERROR REPORTS.
1220 024504  010146                          RPTRES: MOV     R1,-(SP)        ;STORE R1
1221 024506  010346                                  MOV     R3,-(SP)        ;STORE R3
1222 024510  010446                                  MOV     R4,-(SP)        ;STORE R4
1223 024512  012701  003062                          MOV     #RESPARM,R1     ;GET START OF PARAM
1224 024516  012103                                  MOV     (R1)+,R3        ;GET NUMBER OF PARAM
1225 024520                                          PRINTB  #FMT1.1,#MRSLT,(R1)     ;PRINT NAME
     024520  011146                                  MOV     (R1),-(SP)
     024522  012746  005423                          MOV     #MRSLT,-(SP)
     024526  012746  011541                          MOV     #FMT1.1,-(SP)
     024532  012746  000003                          MOV     #3,-(SP)
     024536  010600                                  MOV     SP,R0
     024540  104414                                  TRAP    C$PNTB
     024542  062706  000010                          ADD     #10,SP
1226 024546  021127  011057                          CMP     (R1),#MNDRST    ;TEST IF MESSAGE IS NO DRV STATUS
1227 024552  001453                                  BEQ     6$              ;YES - SKIP REST OF REPORT
1228 024554  012704  011760                          MOV     #FMT11,R4       ;PRESET FOR FORMAT 11
1229 024560  022127  011052                          CMP     (R1)+,#MCYLOC   ;CHECK IF REPORTING CYLINDER LOC
1230 024564  001002                                  BNE     3$              ;NO - SKIP
1231 024566  012704  011766                          MOV     #FMT12,R4       ;ELSE CHANGE TO FORMAT 12
1232 024572  005303                          3$:     DEC     R3              ;DEC PARAM COUNT
1233 024574  001442                                  BEQ     6$              ;IF 0 - EXIT
```

```
1234 024576                                    PRINTB  R4,#RESE3,(R1)+  ;REPORT IS VALUE
     024576  012146                           MOV     (R1)+,-(SP)
     024600  012746  011300                    MOV     #RESE3,-(SP)
     024604  010446                           MOV     R4,-(SP)
     024606  012746  000003                    MOV     #3,-(SP)
     024612  010600                           MOV     SP,R0
     024614  104414                           TRAP    C$PNTB
     024616  062706  000010                    ADD     #10,SP
1235 024622                                    PRINTB  R4,#RESE4,(R1)+  ;REPORT SB VALUE
     024622  012146                           MOV     (R1)+,-(SP)
     024624  012746  011304                    MOV     #RESE4,-(SP)
     024630  010446                           MOV     R4,-(SP)
     024632  012746  000003                    MOV     #3,-(SP)
     024636  010600                           MOV     SP,R0
     024640  104414                           TRAP    C$PNTB
     024642  062706  000010                    ADD     #10,SP
1236 024646  162703  000002                    SUB     #2,R3           ;DEC PARAM COUNT
1237 024652  001413                           BEQ     6$              ;IF 0 - EXIT
1238 024654                                    PRINTB  #FMT1,#RESE5,(R1)+  ;REPORT CONDITION
     024654  012146                           MOV     (R1)+,-(SP)
     024656  012746  011311                    MOV     #RESE5,-(SP)
     024662  012746  011534                    MOV     #FMT1,-(SP)
     024666  012746  000003                    MOV     #3,-(SP)
     024672  010600                           MOV     SP,R0
     024674  104414                           TRAP    C$PNTB
     024676  062706  000010                    ADD     #10,SP
1239 024702  012604                    6$:     MOV     (SP)+,R4        ;RESTORE REGS
1240 024704  012603                           MOV     (SP)+,R3
1241 024706  012601                           MOV     (SP)+,R1
1242 024710  000207                           RTS     PC              ;RETURN
1243
1244
1245
1246                                   ;       REPORT PHYSICAL ADDRESS OF DEVICE UNDER TEST
1247                                   ;       AND ALL REGISTER CONTENTS.
1248 024712                            RPTREM: PRINTB  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
     024712  005046                           CLR     -(SP)
     024714  156716  156113                    BISB    RLDRV+1,(SP)
     024720  012746  006053                    MOV     #DRVNAM,-(SP)
     024724  016746  156076                    MOV     RLBAS,-(SP)
     024730  012746  006042                    MOV     #BASADD,-(SP)
     024734  012746  011567                    MOV     #FMT5,-(SP)
     024740  012746  000005                    MOV     #5,-(SP)
     024744  010600                           MOV     SP,R0
     024746  104414                           TRAP    C$PNTB
     024750  062706  000014                    ADD     #14,SP
1249                                   ;       REPORT RL11 REGISTERS
1250 024754                                    PRINTB  #FMT6,#CSNAM,#DANAM,#BANAM,#MPNAM,#CYLWD,#HDWD
     024754  012746  010214                    MOV     #HDWD,-(SP)
     024760  012746  010225                    MOV     #CYLWD,-(SP)
     024764  012746  006137                    MOV     #MPNAM,-(SP)
     024770  012746  006125                    MOV     #BANAM,-(SP)
     024774  012746  006132                    MOV     #DANAM,-(SP)
     025000  012746  006120                    MOV     #CSNAM,-(SP)
     025004  012746  011607                    MOV     #FMT6,-(SP)
     025010  012746  000007                    MOV     #7,-(SP)
     025014  010600                           MOV     SP,R0
```

```
                025016  104414                  TRAP    C$PNTB
                025020  062706  000020          ADD     #20,SP
1251            025024                          PRINTB  #FMT8,#LAB1,L.CS,L.DA,L.BA,L.MP
                025024  016746  156012          MOV     L.MP,-(SP)
                025030  016746  156002          MOV     L.BA,-(SP)
                025034  016746  156000          MOV     L.DA,-(SP)
                025040  016746  155770          MOV     L.CS,-(SP)
                025044  012746  006144          MOV     #LAB1,-(SP)
                025050  012746  011721          MOV     #FMT8,-(SP)
                025054  012746  000006          MOV     #6,-(SP)
                025060  010600                  MOV     SP,R0
                025062  104414                  TRAP    C$PNTB
                025064  062706  000016          ADD     #16,SP
1252            025070                          PRINTB  #FMT7,#LAB2,T.CS,T.DA,T.BA,T.MP,CURCYL,DESHD
                025070  016746  156016          MOV     DESHD,-(SP)
                025074  016746  156004          MOV     CURCYL,-(SP)
                025100  016746  155746          MOV     T.MP,-(SP)
                025104  016746  155736          MOV     T.BA,-(SP)
                025110  016746  155734          MOV     T.DA,-(SP)
                025114  016746  155724          MOV     T.CS,-(SP)
                025120  012746  006157          MOV     #LAB2,-(SP)
                025124  012746  011651          MOV     #FMT7,-(SP)
                025130  012746  000010          MOV     #10,-(SP)
                025134  010600                  MOV     SP,R0
                025136  104414                  TRAP    C$PNTB
                025140  062706  000022          ADD     #22,SP
1253            025144  000207                  RTS     PC
1254
1255
1256
1257                                    ;       CLEAR PARAMETER BLOCK FOR REPORTING
1258            025146  010546          CLRPARM: MOV    R5,-(SP)        ;STORE R5
1259            025150  012701  003062          MOV     #RESPARM,R1     ;GET ADDRESS OF BLOCK
1260            025154  012705  000005          MOV     #5,R5           ;SET COUNT
1261            025160  005021          2$:     CLR     (R1)+           ;CLEAR WORD
1262            025162  005305                  DEC     R5              ;DEC COUNT
1263            025164  001375                  BNE     2$              ;LOOP UNTIL 0
1264            025166  012701  003062          MOV     #RESPARM,R1     ;RESET POINTER
1265            025172  012605                  MOV     (SP)+,R5        ;RESTORE R5
1266            025174  000207                  RTS     PC
1267
1268            025176                  ENDMOD
1269
1270
1271
1272                                    .TITLE  CZRLIDO RL01/02 DRIVE TEST 1
1273
1274
1275
1276
1277                                    ;DISK STATE FUNCTIONS
1278                                    ;
1279                                    ;BITS 0-2 OF THE MULTIPURPOSE REGISTER DURING GET STATUS COMMAND DEFINE THE
1280                                    ;STATE OF THE DRIVE
1281                                    ;
1282                                    ;       STATE   0               LOAD STATE
1283                                    ;       STATE   1               SPIN UP
```

```
1284                            ;       STATE   2               BRUSH CYCLE
1285                            ;       STATE   3               LOAD HEADS
1286                            ;       STATE   4               SEEK
1287                            ;       STATE   5               LOCK ON
1288                            ;       STATE   6               UNLOAD HEADS
1289                            ;       STATE   7               SPIN DOWN
1290
1291
1292
```

```
                                        BGNMOD  HRDWTST

                                        .SBTTL  *TEST 1         BASIC INTERFACE (PART 1)

025176                                  BGNTST                  ;TEST01
025176                                                                          T1::
                                                                ;TEST THAT UNLOAD, COVER OPEN AND WRITE PROTECT START
                                                                ;IN THE PROPER STATE.
025176  005767  156156                        TST     PASNUM          ;CHECK IF FIRST PASS
025202  001124                                BNE     65$             ;EXIT IF NO
025204  005767  167116                        TST     MISWIW          ;CHECK IF MANUAL INTERVENTION
025210  100121                                BPL     65$             ;NO - EXIT TEST
025212  012767  006373  155572    2$:         MOV     #MISTST,ERHEAD  ;LOAD ERR HEADER
                                                                ;PROMPT CHK DRV IS UNLDED, COVR OPN, AND
                                                                ;WRTE LCKED
025220                                      PRINTF  #FMTOP1,#OPR1,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
025220  005046                            CLR     -(SP)
025222  156716  155605                    BISB    RLDRV+1,(SP)
025226  012746  006053                    MOV     #DRVNAM,-(SP)
025232  016746  155570                    MOV     RLBAS,-(SP)
025236  012746  006042                    MOV     #BASADD,-(SP)
025242  012746  010135                    MOV     #OPR1A,-(SP)
025246  012746  007540                    MOV     #OPR1,-(SP)
025252  012746  011442                    MOV     #FMTOP1,-(SP)
025256  012746  000007                    MOV     #7,-(SP)
025262  010600                            MOV     SP,R0
025264  104417                            TRAP    C$PNTF
025266  062706  000020                    ADD     #20,SP

025272  005067  157066                    CLR     OBUFF           ;CLEAR FOR RESPONSE
025276                                      GMANIL  OPR002,OBUFF,1,NO
025276  104443                            TRAP    C$GMAN
025300  000404                            BR      10000$
025302  004364                            .WORD   OBUFF
025304  000120                            .WORD   T$CODE
025306  007470                            .WORD   OPR002
025310  000001                            .WORD   1
025312                          10000$:
025312  005767  157046                    TST     OBUFF           ;TEST RESPONSE YES
025316  001735                            BEQ     2$              ;YES - SKIP
025320  004767  171504            1$:     JSR     PC,TSTINT       ;INITIALIZE TEST
025324  004767  171516                    JSR     PC,GSTATR       ;GO GET STATUS WITH RESET
025330  025454                            65$
025332  032767  000040  155512            BIT     #COSTAT,T.MP    ;CHECK IF COVER OPEN SET
025340  001006                            BNE     7$              ;YES - SKIP
025342  012703  010562                    MOV     #MCOSTA,R3      ;SET NAME POINTER
025346                                      ERRHRD  101,,ERR3
025346  104456                            TRAP    C$ERHRD
025350  000145                            .WORD   101
025352  000000                            .WORD   0
025354  012600                            .WORD   ERR3
025356  032767  000010  155466    7$:     BIT     #BHSTAT,T.MP    ;TEST IF BRUSHES HOME
025364  001006                            BNE     9$              ;YES - SKIP
025366  012703  010575                    MOV     #MBHSTA,R3      ;SET POINTER FOR BRUSH HOME ERROR
025372                                      ERRHRD  102,,ERR3
```

```
                025372  104456                          TRAP    C$ERHRD
                025374  000146                          .WORD   102
                025376  000000                          .WORD   0
                025400  012600                          .WORD   ERR3
     34         025402  032767  020000  155442  9$:     BIT     #WLSTAT,T.MP    ;TEST IF WRITE LOCK SET
     35         025410  001006                          BNE     11$             ;YES - SKIP
     36         025412  012703  010610                  MOV     #MWLSTA,R3      ;SET NAME POINTER
     37         025416                                  ERRHRD  103.,,ERR3
                025416  104456                          TRAP    C$ERHRD
                025420  000147                          .WORD   103
                025422  000000                          .WORD   0
                025424  012600                          .WORD   ERR3
     38         025426  005767  155426          11$:    TST     T.STAT          ;TEST IF STATE ZERO
     39         025432  001405                          BEQ     15$             ;YES - SKIP
     40         025434  005003                          CLR     R3              ;SET STATE EXPECTED
     41         025436                                  ERRHRD  104.,,ERR7
                025436  104456                          TRAP    C$ERHRD
                025440  000150                          .WORD   104
                025442  000000                          .WORD   0
                025444  013666                          .WORD   ERR7
     42         025446  004767  171374          15$:    JSR     PC,GSTATR       ;DO DRIVE RESET
     43         025452  025454                          65$
     44         025454                          65$:
     45         025454                          ENDTST
                025454                          L10024:
                025454  104401                          TRAP    C$ETST
     46
     47
     48
     49                                         .SBTTL  *TEST 2         BASIC INTERFACE (PART 2)
     50
     51         025456                          BGNTST                  ;TEST 2
                025456                                                                  T2::
     52                                                                 ;VERIFY THAT COVER OPEN AND WRITE PROTECT WORK.
     53         025456  005767  155676                  TST     PASNUM          ;TEST IF PASS 0
     54         025462  001077                          BNE     65$             ;NO - SKIP
     55         025464  005767  166636                  TST     MISWIW          ;TEST IF MANUAL INTERVENTION
     56         025470  100074                          BPL     65$             ;NO - SKIP
     57         025472  012767  006373  155312          MOV     #MISTST,ERHEAD  ;SET ERROR HEADER
     58
     59         025500                          2$:                             ;PROMPT CLOSE COVER AND RESET WRITE LOCK.
     60         025500                                  PRINTF  #FMTOP1,#OPR2,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
                025500  005046                          CLR     -(SP)
                025502  156716  155325                  BISB    RLDRV+1,(SP)
                025506  012746  006053                  MOV     #DRVNAM,-(SP)
                025512  016746  155310                  MOV     RLBAS,-(SP)
                025516  012746  006042                  MOV     #BASADD,-(SP)
                025522  012746  010135                  MOV     #OPR1A,-(SP)
                025526  012746  007616                  MOV     #OPR2,-(SP)
                025532  012746  011442                  MOV     #FMTOP1,-(SP)
                025536  012746  000007                  MOV     #7,-(SP)
                025542  010600                          MOV     SP,R0
                025544  104417                          TRAP    C$PNTF
                025546  062706  000020                  ADD     #20,SP
     61         025552  005067  156606                  CLR     OBUFF           ;CLEAR FOR RESPONSE
     62         025556                                  GMANIL  OPR002,OBUFF,1,NO
                025556  104443                          TRAP    C$GMAN
```

```
                025560  000404                          BR      10000$
                025562  004364                          .WORD   OBUFF
                025564  000120                          .WORD   T$CODE
                025566  007470                          .WORD   OPR002
                025570  000001                          .WORD   1
                025572                          10000$:
     63         025572  005767  156566                  TST     OBUFF           ;TEST IF RESPONSE YES
     64         025576  001740                          BEQ     2$              ;NO - SKIP
     65
     66         025600  004767  171224          1$:     JSR     PC,TSTINT       ;INITIALIZE TEST
     67         025604  004767  171236                  JSR     PC,GSTATR       ;GET STATUS WITH RESET
     68         025610  025662                          65$
     69         025612  032767  000040  155232          BIT     #COSTAT,T.MP    ;TEST IF COVER OPEN RESET
     70         025620  001406                          BEQ     9$              ;YES - SKIP
     71         025622  012703  010562                  MOV     #MCOSTA,R3      ;SET NAME MESSAGE POINTER
     72         025626                                  ERRHRD  201.,,ERR2
                025626  104456                          TRAP    C$ERHRD
                025630  000311                          .WORD   201
                025632  000000                          .WORD   0
                025634  012532                          .WORD   ERR2
     73
     74         025636  032767  020000  155206  9$:     BIT     #WLSTAT,T.MP    ;TEST IF WRITE LOCK RESET
     75         025644  001406                          BEQ     65$             ;YES - SKIP
     76         025646  012703  010610                  MOV     #MWLSTA,R3      ;SET NAME MESSAGE POINTER
     77         025652                                  ERRHRD  202.,,ERR2
                025652  104456                          TRAP    C$ERHRD
                025654  000312                          .WORD   202
                025656  000000                          .WORD   0
                025660  012532                          .WORD   ERR2
     78         025662                          65$:
     79         025662                          ENDTST
                025662                          L10025:
                025662  104401                          TRAP    C$ETST
     80
     81
     82
     83                                         .SBTTL  *TEST 3         HEAD LOADING
     84         025664                          BGNTST                  ;TEST03
                025664                                                                  T3::
     85                                                                 ;SPIN UP THE DRIVE. VERIFY THAT THE DRIVE GOES FROM
     86                                                                 ;STATE 0 TO STATE 5 PROPERLY.
     87         025664  005767  155470                  TST     PASNUM          ;TEST IF PASS 0
     88         025670  001003                          BNE     1$              ;NO - SKIP
     89         025672  005767  166430                  TST     MISWIW          ;TEST IF MANUAL INTERVENTION
     90         025676  100402                          BMI     2$              ;YES - SKIP
     91         025700                          1$:     EXIT    TST
                025700  104432                          TRAP    C$EXIT
                025702  002440                          .WORD   L10026-.
     92         025704  004767  171120          2$:     JSR     PC,TSTINT       ;INITIALIZE TEST
     93         025710  004767  171132                  JSR     PC,GSTATR       ;GET STATUS
     94         025714  030342                          T365$
     95         025716  005767  155136                  TST     T.STAT          ;TEST IF STATE 0
     96         025722  001426                          BEQ     4$              ;YES - SKIP
     97         025724                          3$:                             ;PRINT UNEXPECTED ERROR AND EXIT TEST
     98         025724                                  PRINTF  #FMTOP1,#UNXERR,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
                025724  005046                          CLR     -(SP)
                025726  156716  155101                  BISB    RLDRV+1,(SP)
```

```
*TEST 3          HEAD LOADING

        025732  012746  006053                  MOV     #DRVNAM,-(SP)
        025736  016746  155064                  MOV     RLBAS,-(SP)
        025742  012746  006042                  MOV     #BASADD,-(SP)
        025746  012746  010135                  MOV     #OPR1A,-(SP)
        025752  012746  006350                  MOV     #UNXERR,-(SP)
        025756  012746  011442                  MOV     #FMTOP1,-(SP)
        025762  012746  000007                  MOV     #7,-(SP)
        025766  010600                          MOV     SP,R0
        025770  104417                          TRAP    C$PNTF
        025772  062706  000020                  ADD     #20,SP
     99 025776  104401                          TRAP    C$ETST
    100
    101 026000                          4$:                             ;PROMPT OPERATOR TO "PRESS LOAD"
    102 026000                                  PRINTF  #FMTOP1,#OPR3,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
        026000  005046                          CLR     -(SP)
        026002  156716  155025                  BISB    RLDRV+1,(SP)
        026006  012746  006053                  MOV     #DRVNAM,-(SP)
        026012  016746  155010                  MOV     RLBAS,-(SP)
        026016  012746  006042                  MOV     #BASADD,-(SP)
        026022  012746  010135                  MOV     #OPR1A,-(SP)
        026026  012746  007651                  MOV     #OPR3,-(SP)
        026032  012746  011442                  MOV     #FMTOP1,-(SP)
        026036  012746  000007                  MOV     #7,-(SP)
        026042  010600                          MOV     SP,R0
        026044  104417                          TRAP    C$PNTF
        026046  062706  000020                  ADD     #20,SP
    103
    104 026052  012767  000004  154724          MOV     #CYLUP,OPFLAG   ;SET CYCLE UP FLAG
    105 026060  012703  000001                  MOV     #1,R3           ;SET EXPECTED STATE VALUE
    106 026064  012767  006416  154720          MOV     #NSTACHG,ERHEAD ;SET ERROR HEADER
    107 026072  012701  000454                  MOV     #300.,R1        ;WAIT COUNT R1*TIMDLY= 30 SECONDS.
    108 026076  004767  170760          6$:     JSR     PC,GSTATC       ;GET STATUS
    109 026102  030342                          T365$
    110 026104  005767  154750                  TST     T.STAT          ;TEST IF STATE IS STILL 0
    111 026110  001072                          BNE     10$             ;NO - SKIP
    112 026112  005301                          DEC     R1              ;DEC WAIT COUNT
    113 026114  001453                          BEQ     7$              ;EXIT IF WAIT DONE
    114 026116                                  TIMDLY  1000.
    115 026242  000715                          BR      6$
    116
    117 026244  005067  156114          7$:     CLR     OBUFF           ;CLEAR FOR RESPONSE
    118 026250                                  GMANIL  OPR003,OBUFF,1,NO
        026250  104443                          TRAP    C$GMAN
        026252  000404                          BR      10000$
        026254  004364                          .WORD   OBUFF
        026256  000120                          .WORD   T$CODE
        026260  007515                          .WORD   OPR003
        026262  000001                          .WORD   1
        026264                      10000$:
    119 026264  005767  156074                  TST     OBUFF           ;TEST IF RESPONSE YES
    120 026270  001005                          BNE     11$             ;YES - REPORT
    121 026272  000167  177426                  JMP     3$
    122 026276  020367  154556          10$:    CMP     R3,T.STAT       ;CHECK IF NOW STATE 1
    123 026302  001406                          BEQ     13$             ;YES - SKIP
    124 026304                          11$:    ERRHRD  301.,,ERR7
        026304  104456                          TRAP    C$ERHRD
        026306  000455                          .WORD   301
```

```
                026310  000000                          .WORD   0
                026312  013666                          .WORD   ERR7
            125 026314                                  EXIT    TST
                026314  104432                          TRAP    C$EXIT
                026316  002024                          .WORD   L10026-.
            126 026320  012701  000454          13$:    MOV     #300.,R1        ;INITIALIZE WAIT COUNT FOR 30 SECONDS
            127 026324  012703  000002                  MOV     #2,R3           ;SET EXPECTED STATE VALUE
            128 026330  004767  170526          14$:    JSR     PC,GSTATC       ;GET STATUS
            129 026334  030342                          T365$
            130 026336  020367  154516                  CMP     R3,T.STAT       ;CHECK IF STATE 2
            131 026342  001503                          BEQ     20$             ;YES - GO TO STATE 2
            132 026344  002002                          BGE     17$             ;CHECK IF NO CHANGE CONTINUE WAIT
            133 026346  000167  001000                  JMP     32$             ;GO TO STATE 3.
            134 026352  005301                  17$:    DEC     R1              ;DEC WAIT COUNT
            135 026354  001453                          BEQ     18$             ;SKIP IF 0
            136 026356                                  TIMDLY  1000.
            137 026502  000712                          BR      14$             ;CHECK FOR STATE CHANGE
            138 026504                          18$:    ERRHRD  303.,,ERR7
                026504  104456                          TRAP    C$ERHRD
                026506  000457                          .WORD   303
                026510  000000                          .WORD   0
                026512  013666                          .WORD   ERR7
            139 026514  032767  004000  154330          BIT     #SPDSTAT,T.MP   ;TEST IF SPINDLE TIMEOUT
            140 026522  001011                          BNE     19$             ;YES - SKIP
            141 026524  012767  006430  154260          MOV     #SPDERR,ERHEAD  ;SET ERROR HEADER
            142 026532  012703  010662                  MOV     #MSPERR,R3      ;SET NAME MESSAGE POINTER
            143 026536                                  ERRHRD  304.,,ERR3
                026536  104456                          TRAP    C$ERHRD
                026540  000460                          .WORD   304
                026542  000000                          .WORD   0
                026544  012600                          .WORD   ERR3
            144 026546                          19$:    EXIT    TST
                026546  104432                          TRAP    C$EXIT
                026550  001572                          .WORD   L10026-.
            145
            146 026552  012701  000005          20$:    MOV     #5,R1           ;WAIT .5 SECONDS
            147 026556                          21$:    TIMDLY  1000.
            148 026702  005301                          DEC     R1
            149 026704  001324                          BNE     21$
            150
            151 026706  004767  170150                  JSR     PC,GSTATC       ;CHECK TO SEE IF STATE 3, IF YES GO TO STATE 3
            152 026712  030342                          T365$
            153 026714  022767  000003  154136          CMP     #3,T.STAT
            154 026722  003002                          BGT     22$
            155 026724  000167  000422                  JMP     32$
            156
            157 026730  012767  006373  154054  22$:    MOV     #MISTST,ERHEAD  ;SET ERROR HEADER
            158 026736  012704  011323                  MOV     #STATE2,R4      ;SET CONDITION MESSAGE POINTER
            159 026742  012703  010575                  MOV     #MBHSTA,R3      ;SET NAME MESSAGE POINTER
            160 026746  032767  000010  154076          BIT     #BHSTAT,T.MP    ;TEST IF BRUSH HOME STILL SET
            161 026754  001006                          BNE     23$             ;YES - SKIP
            162 026756                                  ERRHRD  305.,,ERR5
                026756  104456                          TRAP    C$ERHRD
                026760  000461                           WORD   305
                026762  000000                          .WORD   0
                026764  012716                          .WORD   ERR5
            163 026766                                  EXIT    TST
```

```
        026766  104432                          TRAP    C$EXIT
        026770  001352                          .WORD   L10026-.
   164  026772  012701  000062          23$:    MOV     #50.,R1         ;SET WAIT COUNT FOR 5 SECONDS
   165  026776  004767  170060          24$:    JSR     PC,GSTATC       ;GET STATUS
   166  027002  030342                          T365$
   167  027004  032767  000010  154040          BIT     #BHSTAT,T.MP    ;TEST IF BRUSH HOME RESET
   168  027012  001463                          BEQ     27$             ;YES - SKIP
   169  027014  005301                          DEC     R1              ;DEC WAIT COUNT
   170  027016  001453                          BEQ     26$             ;SKIP IF ZERO
   171  027020                                  TIMDLY  1000.
   172  027144  000714                          BR      24$             ;LOOP
   173  027146                          26$:    ERRHRD  306.,,ERR4
        027146  104456                          TRAP    C$ERHRD
        027150  000462                          .WORD   306
        027152  000000                          .WORD   0
        027154  012646                          .WORD   ERR4
   174  027156                                  EXIT    TST
        027156  104432                          TRAP    C$EXIT
        027160  001162                          .WORD   L10026-.
   175  027162  012701  000454          27$:    MOV     #300.,R1        ;INITIALIZE WAIT COUNT FOR 30 SECONDS
   176  027166  004767  167670          28$:    JSR     PC,GSTATC       ;GET STATUS
   177  027172  030342                          T365$
   178  027174  032767  000010  153650          BIT     #BHSTAT,T.MP    ;TEST IF BRUSH HOME SET AGAIN
   179  027202  001063                          BNE     32$             ;YES - SKIP
   180  027204  005301                          DEC     R1              ;ELSE DEC WAIT COUNT
   181  027206  001453                          BEQ     30$             ;SKIP IF 0
   182  027210                                  TIMDLY  1000.
   183  027334  000714                          BR      28$
   184  027336                          30$:    ERRHRD  307.,,ERR5
        027336  104456                          TRAP    C$ERHRD
        027340  000463                          .WORD   307
        027342  000000                          .WORD   0
        027344  012716                          .WORD   ERR5
   185  027346                                  EXIT    TST
        027346  104432                          TRAP    C$EXIT
        027350  000772                          .WORD   L10026-.
   186  027352  012767  006416  153432  32$:    MOV     #NSTACHG,ERHEAD ;SET ERROR HEADER
   187  027360  012703  000003                  MOV     #3,R3           ;SET EXPECTED STATE VALUE
   188  027364  004767  167472                  JSR     PC,GSTATC       ;GET STATUS
   189  027370  030342                          T365$
   190  027372  020367  153462                  CMP     R3,T.STAT       ;CHECK IF STATE 3
   191  027376  001406                          BEQ     36$             ;YES - SKIP
   192  027400                                  ERRHRD  308.,,ERR7
        027400  104456                          TRAP    C$ERHRD
        027402  000464                          .WORD   308
        027404  000000                          .WORD   0
        027406  013666                          .WORD   ERR7
   193  027410                                  EXIT    TST
        027410  104432                          TRAP    C$EXIT
        027412  000730                          .WORD   L10026-.
   194  027414  012767  006373  153370  36$:    MOV     #MISTST,ERHEAD  ;SET ERROR HEADER
   195  027422  012704  011333                  MOV     #STATE3,R4      ;SET CONDITION MESSAGE POINTER
   196  027426  012703  010621                  MOV     #MHOSTA,R3      ;SET NAME MESSAGE POINTER
   197  027432  004767  167424                  JSR     PC,GSTATC       ;GET STATUS
   198  027436  030342                          T365$
   199  027440  032767  000020  153404          BIT     #HOSTAT,T.MP    ;TEST IF HEADS OUT SET
   200  027446  001006                          BNE     38$             ;YES - SKIP
```

```
201 027450                                      ERRHRD  309.,,ERR5
    027450  104456                              TRAP    C$ERHRD
    027452  000465                              .WORD   309
    027454  000000                              .WORD   0
    027456  012716                              .WORD   ERR5
202 027460                                      EXIT    TST
    027460  104432                              TRAP    C$EXIT
    027462  000660                              .WOPD   L10026-.
203 027464  012701  005670          38$:        MOV     #3000.,R1               ;SET WAIT COUNT FOR 300 MS
204 027470  012767  006416  153314              MOV     #NSTACHG,ERHEAD ;SET ERROR HEADER
205 027476  012703  000004                      MOV     #4,R3           ;SET EXPECTED STATE VALUE
206 027502  004767  167354          43$:        JSR     PC,GSTATC       ;GET STATUS
207 027506  030342                              T365$
208 027510  020367  153344                      CMP     R3,T.STAT       ;CHECK IF STATE 4
209 027514  001463                              BEQ     49$             ;YES - SKIP
210 027516  005301                              DEC     R1              ;DEC WAIT COUNT
211 027520  001453                              BEQ     47$             ;SKIP IF 0
212 027522                                      TIMDLY  1
213 027646  000715                              BR      43$
214 027650                          47$:        ERRHRD  312.,,ERR7
    027650  104456                              TRAP    C$ERHRD
    027652  000470                              .WORD   312
    027654  000000                              .WORD   0
    027656  013666                              .WORD   ERR7
215 027660                                      EXIT    TST
    027660  104432                              TRAP    C$EXIT
    027662  000460                              .WORD   L10026-.
216 027664  012701  000454          49$:        MOV     #300.,R1        ;SET WAIT COUNT FOR 30 MS
217 027670  012703  000005                      MOV     #5,R3           ;SET EXPECTED STATE VALUE
218 027674  004767  167162          50$:        JSR     PC,GSTATC       ;GET STATUS
219 027700  030342                              T365$
220 027702  020367  153152                      CMP     R3,T.STAT       ;CHECK IF STATE 5
221 027706  001463                              BEQ     53$             ;YES - SKIP
222 027710  005301                              DEC     R1              ;DEC WAIT COUNT
223 027712  001453                              BEQ     52$             ;ELSE SKIP
224 027714                                      TIMDLY  1
225 030040  000715                              BR      50$
226 030042                          52$:        ERRHRD  313.,,ERR7
    030042  104456                              TRAP    C$ERHRD
    030044  000471                              .WORD   313
    030046  000000                              .WORD   0
    030050  013666                              .WORD   ERR7
227 030052                                      EXIT    TST
    030052  104432                              TRAP    C$EXIT
    030054  000266                              .WORD   L10026-.
228 030056  032767  001000  152766  53$:        BIT     #VCSTAT,T.MP    ;VOLUME CHECK SHOULD BE SET FOR
229 030064  001010                              BNE     54$             ;STATE 5, IF NOT GIVE ERROR.
230 030066  012703  010551                      MOV     #MVOLCK,R3      ;SET NAME MESSAGE POINTER
231 030072                                      ERRHRD  310.,,ERR5
    030072  104456                              TRAP    C$ERHRD
    030074  000466                              .WORD   310
    030076  000000                              .WORD   0
    030100  012716                              .WORD   ERR5
232 030102                                      EXIT    TST
    030102  104432                              TRAP    C$EXIT
    030104  000276                              .WORD   L10026-.
233 030106  032767  040000  152730  54$:        BIT     #DRVERR,T.CS    ;TEST IF DRIVE ERROR SET
```

```
*TEST 3          HEAD LOADING

    234 030114  001010                          BNE     57$             ;YES - SKIP
    235 030116  012703  010526                  MOV     #MDRERR,R3      ;SET NAME MESSAGE POINTER
    236 030122                                  ERRHRD  315.,,ERR5
        030122  104456                          TRAP    C$ERHRD
        030124  000473                          .WORD   315
        030126  000000                          .WORD   0
        030130  012716                          .WORD   ERR5
    237 030132                                  EXIT    TST
        030132  104432                          TRAP    C$EXIT
        030134  000206                          .WORD   L10026-.
    238 030136  012701  000120          57$:    MOV     #80.,R1         ;SET WAIT FOR 8 MS
    239 030142  004767  166714          56$:    JSR     PC,GSTATC       ;GET STATUS
    240 030146  030342                          T365$
    241 030150  032767  000001  152666          BIT     #DRDYMSK,T.CS   ;CHECK IF DRIVE READY
    242 030156  001071                          BNE     172$            ;YES - SKIP
    243 030160  005301                          DEC     R1              ;DEC COUNT
    244 030162  001453                          BEQ     58$             ;SKIP IF 0
    245 030164                                  TIMDLY  1
    246 030310  000714                          BR      56$
    247 030312  012767  006373  152472  58$:    MOV     #MISTST,ERHEAD  ;SET ERROR HEADER
    248 030320  012704  011343                  MOV     #STATE5,R4      ;SET CONDITION MESSAGE POINTER
    249 030324  012703  010404                  MOV     #MDRDY,R3       ;SET NAME MESSAGE POINTER
    250 030330                                  ERRHRD  316,,ERR5
        030330  104456                          TRAP    C$ERHRD
        030332  000474                          .WORD   316
        030334  000000                          .WORD   0
        030336  012716                          .WORD   ERR5
    251 030340  000400                          BR      172$            ;EXIT TEST
    252 030342                          172$:
    253 030342                          T365$:
    254 030342                          ENDTST
        030342                          L10026:
        030342  104401                          TRAP    C$ETST
    255
    256
    257
    258                                 .SBTTL  *TEST 4         HEAD UNLOADING
    259 030344                          BGNTST                  ;TEST04
        030344                                                                  T4::
    260                                                         ;SPIN DOWN AND UNLOAD HEADS. VERIFY THAT THE DRIVE
    261                                                         ;GOES FROM STATE 5 TO STATE 7 PROPERLY.
    262 030344  005767  153010                  TST     PASNUM          ;TEST IF FIRST PASS
    263 030350  001003                          BNE     8$              ;NO - SKIP
    264 030352  005767  163750                  TST     MISWIW          ;TEST IF MANUAL INTERVENTION
    265 030356  100403                          BMI     TST4            ;YES - SKIP
    266 030360                          8$:     EXIT    TST
        030360  104432                          TRAP    C$EXIT
        030362  001146                          .WORD   L10027-.
    267
    268 030364                          BGNSUB
        030364                                                                  14.1:
        030364  104402                          TRAP    C$BSUB
    269 030366  012767  006416  152416  TST4:   MOV     #NSTACHG,ERHEAD ;SET ERROR HEADER
    270 030374  004767  166430                  JSR     PC,TSTINT       ;INITIALIZE TEST
    271 030400  004767  166442                  JSR     PC,GSTATR       ;GET STATUS
    272 030404  031420                          T465$
    273 030406  032767  000001  152430          BIT     #DRDYMSK,T.CS   ;CHECK IF DRIVE READY
```

```
*TEST 4          HEAD UNLOADING

    274 030414  001040                          BNE     3$              ;YES - SKIP
    275                                         ;PROMPT PRESS LD AND WAIT FOR RDY
    276 030416                          1$:     PRINTF  #FMTOP1,#OPR6,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
        030416  005046                          CLR     -(SP)
        030420  156716  152407                  BISB    RLDRV+1,(SP)
        030424  012746  006053                  MOV     #DRVNAM,-(SP)
        030430  016746  152372                  MOV     RLBAS,-(SP)
        030434  012746  006042                  MOV     #BASADD,-(SP)
        030440  012746  010135                  MOV     #OPR1A,-(SP)
        030444  012746  007665                  MOV     #OPR6,-(SP)
        030450  012746  011442                  MOV     #FMTOP1,-(SP)
        030454  012746  000007                  MOV     #7,-(SP)
        030460  010600                          MOV     SP,R0
        030462  104417                          TRAP    C$PNTF
        030464  062706  000020                  ADD     #20,SP
    277 030470  005067  153670                  CLR     OBUFF           ;CLEAR FOR RESPONSE
    278 030474                                  GMANIL  OPR002,OBUFF,1,NO
        030474  104443                          TRAP    C$GMAN
        030476  000404                          BR      10000$
        030500  004364                          .WORD   OBUFF
        030502  000120                          .WORD   T$CODE
        030504  007470                          .WORD   OPR002
        030506  000001                          .WORD   1
        030510                          10000$:
    279 030510  005767  153650                  TST     OBUFF           ;TST RESPONSE YES
    280 030514  001740                          BEQ     1$              ;NO - SKIP
    281
    282 030516  052767  000010  152260  3$:     BIS     #ULOAD,OPFLAG   ;SET UNLOAD OPERATION
    283                                         ;PROMPT PRESS LOAD
    284 030524                          4$:     PRINTF  #FMTOP1,#OPR3,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
        030524  005046                          CLR     -(SP)
        030526  156716  152301                  BISB    RLDRV+1,(SP)
        030532  012746  006053                  MOV     #DRVNAM,-(SP)
        030536  016746  152264                  MOV     RLBAS,-(SP)
        030542  012746  006042                  MOV     #BASADD,-(SP)
        030546  012746  010135                  MOV     #OPR1A,-(SP)
        030552  012746  007651                  MOV     #OPR3,-(SP)
        030556  012746  011442                  MOV     #FMTOP1,-(SP)
        030562  012746  000007                  MOV     #7,-(SP)
        030566  010600                          MOV     SP,R0
        030570  104417                          TRAP    C$PNTF
        030572  062706  000020                  ADD     #20,SP
    285
    286 030576  012703  000006                  MOV     #6,R3           ;SET EXPECTED STATE VALUE
    287 030602  012704  000144                  MOV     #100.,R4        ;SET SECOND LEVEL COUNT
    288 030606  012701  001274                  MOV     #700.,R1        ;SET WAIT COUNT FOR 30 SECONDS
    289 030612  004767  166244          5$:     JSR     PC,GSTATC       ;GET STATUS
    290 030616  031420                          T465$
    291 030620  020367  152234                  CMP     R3,T.STAT       ;WATCH FOR STATE CHANGE FROM 5 TO 6
    292 030624  001506                          BEQ     11$             ;YES - SKIP
    293 030626  022767  000005  152224          CMP     #5,T.STAT       ;TEST IF STATE 5
    294 030634  001074                          BNE     9$              ;NO - REPORT WRONG STATE
    295 030636  005304                  8$:     DEC     R4              ;DEC 2ND LEVEL COUNT
    296 030640  001004                          BNE     6$              ;SKIP IF NOT 0
    297 030642  005301                          DEC     R1              ;ELSE DEC 1ST LEVEL COUNT
    298 030644  001455                          BEQ     7$              ;IF 0 - SKIP TO QUESTION
    299 030646  012704  000144                  MOV     #100.,R4        ;ELSE RESET 2ND LEVEL
```

```
                                                6$:     TIMDLY  1               ;WAIT 100 US
                                                        BR      5$
                                                7$:     CLR     OBUFF           ;CLEAR FOR RESPONSE
                                                        GMANIL  OPR003,OBUFF,1,NO
                                                        TRAP    C$GMAN
                                                        BR      10001$
                                                        .WORD   OBUFF
                                                        .WORD   T$CODE
                                                        .WORD   OPR003
                                                        .WORD   1
                                                10001$:
                                                        TST     OBUFF           ;TEST IF RESPONSE YES
                                                        BEQ     4$              ;NO - SKIP
                                                9$:     ERRHRD  401,,ERR7       ;ELSE REPORT STATE CHANGE WRONG
                                                        TRAP    C$ERHRD
                                                        .WORD   401
                                                        .WORD   0
                                                        .WORD   ERR7
                                                        EXIT    SUB
                                                        TRAP    C$EXIT
                                                        .WORD   L10030-.
                                                11$:    MOV     #7,R3           ;SET EXPECTED STATE VALUE
                                                        MOV     #3000.,R1       ;SET COUNT FOR 300MS
                                                12$:    JSR     PC,GSTATC       ;GET STATUS
                                                        T465$
                                                        CMP     R3,T.STAT       ;CHECK IF STATE 7
                                                        BEQ     18$             ;YES - SKIP
                                                        DEC     R1              ;DEC WAIT COUNT
                                                        BEQ     16$             ;TIME OUT GIVE ERROR MESSAGE
                                                        TIMDLY  1
                                                        BR      12$
                                                16$:    ERRHRD  402,,ERR7       ;REPORT WRONG STATE CHANGE
                                                        TRAP    C$ERHRD
                                                        .WORD   402
                                                        .WORD   0
                                                        .WORD   ERR7
                                                        EXIT    SUB
                                                        TRAP    C$EXIT
                                                        .WORD   L10030-.
                                                18$:    CLR     R3              ;SET EXPECTED STATE VALUE
                                                        MOV     #6000.,R1       ;SET WAIT COUNT FOR 60 SECONDS
                                                20$:    JSR     PC,GSTATC       ;GET STATUS
                                                        T465$
                                                        TST     T.STAT          ;CHECK IF STATE 0
                                                        BEQ     24$             ;YES - SKIP
                                                        DEC     R1              ;DEC WAIT COUNT
                                                        BEQ     22$             ;SKIP IF 0
                                                        TIMDLY  100.
                                                        BR      20$
                                                22$:    ERRHRD  403,,ERR7       ;REPORT WRONG STATE CHANGE
                                                        TRAP    C$ERHRD
                                                        .WORD   403
                                                        .WORD   0
                                                        .WORD   ERR7
                                                24$:
                                                T465$:  MOV     #2,ERRSWI       ;INIT ERROR SWITCH
```

```
*TEST 4          HEAD UNLOADING

                                        ENDSUB
                                        L10030:
                         TRAP    C$ESUB
                                                 ;PROMPT PRESS LD AND WAIT FOR RDY
                                        26$:     PRINTF  #FMTOP1,#OPR6,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
                         CLR     -(SP)
                         BISB    RLDRV+1,(SP)
                         MOV     #DRVNAM,-(SP)
                         MOV     RLBAS,-(SP)
                         MOV     #BASADD,-(SP)
                         MOV     #OPR1A,-(SP)
                         MOV     #OPR6,-(SP)
                         MOV     #FMTOP1,-(SP)
                         MOV     #7,-(SP)
                         MOV     SP,R0
                         TRAP    C$PNTF
                         ADD     #20,SP

                         CLR     OBUFF           ;CLEAR FOR RESPONSE
                         GMANIL  OPR002,OBUFF,1,NO
                         TRAP    C$GMAN
                         BR      10000$
                         .WORD   OBUFF
                         .WORD   T$CODE
                         .WORD   OPR002
                         .WORD   1
                                        10000$:
                         TST     OBUFF           ;TEST IF RESPONSE YES
                         BEQ     26$             ;NO - SKIP
                                        29$:

                                        ENDTST
                                        L10027:
                         TRAP    C$ETST


                                        .SBTTL  *TEST 5         DRIVE SELECT
                                        BGNTST                  ;TEST05
                                                                                T5::
                         MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
                         TST     PASNUM          ;TEST IF FIRST PASS
                         BNE     EXT05           ;NO - SKIP
                         BIT     #DRSELT,MISWIW  ;TEST IF SELECT TESTS
                         BEQ     EXT05           ;NO - SKIP
                                        1$:      PRINTF  #FMTOP1,#OPR7,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
                         CLR     -(SP)
                         BISB    RLDRV+1,(SP)
                         MOV     #DRVNAM,-(SP)
                         MOV     RLBAS,-(SP)
                         MOV     #BASADD,-(SP)
                         MOV     #OPR1A,-(SP)
                         MOV     #OPR7,-(SP)
                         MOV     #FMTOP1,-(SP)
                         MOV     #7,-(SP)
                         MOV     SP,R0
                         TRAP    C$PNTF
```

```
                031624  062706  000020                  ADD     #20,SP
356
357             031630  005067  152530                  CLR     OBUFF           ;CLEAR FOR RESPONSE
358             031634                                  GMANIL  OPR002,OBUFF,1,NO
                031634  104443                          TRAP    C$GMAN
                031636  000404                          ER      10000$
                031640  004364                          .WORD   OBUFF
                031642  000120                          .WORD   T$CODE
                031644  007470                          .WORD   OPR002
                031646  000001                          .WORD   1
                031650                          10000$:
359             031650  005767  152510                  TST     OBUFF           ;TEST RESPONSE YES
360             031654  001740                          BEQ     1$              ;NO - SKIP
361             031656  012767  006530  151126  3$:     MOV     #TOSERR,ERHEAD  ;SET ERROR HEADER MESSAGE
362             031664  004767  165140                  JSR     PC,TSTINT       ;INITIALIZE TEST
363             031670  004767  165166                  JSR     PC,GSTATC       ;DO SELECT AND GET STATUS
364             031674  032056                          T504$
365             031676  016767  151130  151212          MOV     RLDRV,TEMPO     ;STORE ORIGINAL DRIVE NUMBER
366             031704  016701  151122                  MOV     RLDRV,R1        ;PUT IT IN R1
367             031710  012704  000004                  MOV     #4,R4           ;SET COUNT FOR NUMBER OF PLUGS
368             031714  062701  000400          LPT05:  ADD     #400,R1         ;BUMP TO NEXT DRIVE
369             031720  022701  002000                  CMP     #2000,R1        ;CHECK IF TO LARGE
370             031724  001001                          BNE     4$              ;NO - SKIP
371             031726  005001                          CLR     R1              ;ELSE CLEAR TO DRIVE 0
372             031730  010167  151076          4$:     MOV     R1,RLDRV        ;PUT IT BACK IN RLDRV
373             031734                          5$:     PRINTF  #FMTOP3,#OPR8,<8,RLDRV+1>,#OPR1B,#UNDTST
                031734  012746  010151                  MOV     #UNDTST,-(SP)
                031740  012746  010141                  MOV     #OPR1B,-(SP)
                031744  005046                          CLR     -(SP)
                031746  156716  151061                  BISB    RLDRV+1,(SP)
                031752  012746  007747                  MOV     #OPR8,-(SP)
                031756  012746  011513                  MOV     #FMTOP3,-(SP)
                031762  012746  000005                  MOV     #5,-(SP)
                031766  010600                          MOV     SP,R0
                031770  104417                          TRAP    C$PNTF
                031772  062706  000014                  ADD     #14,SP
374
375             031776  005067  152362                  CLR     OBUFF           ;CLEAR FOR RESPONSE
376             032002                                  GMANIL  OPR002,OBUFF,1,NO
                032002  104443                          TRAP    C$GMAN
                032004  000404                          BR      10001$
                032006  004364                          .WORD   OBUFF
                032010  000120                          .WORD   T$CODE
                032012  007470                          .WORD   OPR002
                032014  000001                          .WORD   1
                032016                          10001$:
377             032016  005767  152342                  TST     OBUFF           ;TEST RESPONSE YES
378             032022  001744                          BEQ     5$              ;NO - SKIP
379             032024                          BGNSUB
                032024                                                                  T5.1:
                032024  104402                          TRAP    C$BSUB
380             032026  004767  165030                  JSR     PC,GSTATC       ;GET STATUS - REPORT ANY ERROR
381             032032  032034                          60$
382             032034  012767  000002  150754  60$:    MOV     #2,ERRSWI       ;INIT ERROR SWITCH
383
384             032042                          ENDSUB
                032042                          L10032:
```

```
     032042  104403                          TRAP    C$ESUB
385  032044  005304                          DEC     R4                  ;DEC COUNT
386  032046  001322                          BNE     LPT05               ;LOOP IF NOT ZERO
387  032050  016767  151042  150754          MOV     TEMP0,RLDRV         ;ELSE RESTORE RLDRV
388  032056                          T504$:
389  032056                          4$:     PRINTF  #FMT4,#OPR8,#OPR9
     032056  012746  007766                  MOV     #OPR9,-(SP)
     032062  012746  007747                  MOV     #OPR8,-(SP)
     032066  012746  011556                  MOV     #FMT4,-(SP)
     032072  012746  000003                  MOV     #3,-(SP)
     032076  010600                          MOV     SP,R0
     032100  104417                          TRAP    C$PNTF
     032102  062706  000010                  ADD     #10,SP
390  032106  005067  152252                  CLR     OBUFF               ;CLEAR FOR RESPONSE
391  032112                                  GMANIL  OPR002,OBUFF,1,NO
     032112  104443                          TRAP    C$GMAN
     032114  000404                          BR      10000$
     032116  004364                          .WORD   OBUFF
     032120  000120                          .WORD   T$CODE
     032122  007470                          .WORD   OPR002
     032124  000001                          .WORD   1
     032126                          10000$:
392  032126  005767  152232                  TST     OBUFF               ;TEST IF RESPONSE YES
393  032132  001751                          BEQ     4$                  ;NO - SKIP
394  032134                          EXT05:
395  032134                          ENDTST
     032134                          L10031:
     032134  104401                          TRAP    C$ETST
396
397
398
399                                  .SBTTL  *TEST 6         DRIVE SELECT ERROR TEST
400  032136                          BGNTST                  ;TEST06
     032136                                                                  T6::
401  032136  005767  151216                  TST     PASNUM              ;CHECK IF FIRST PASS
402  032142  001004                          BNE     1$                  ;NO - SKIP
403  032144  032767  000004  162154          BIT     #DRSELT,MISWIW      ;CHECK IF TEST DRIVE SELECT
404  032152  001002                          BNE     6$                  ;YES - SKIP
405  032154                          1$:     EXIT    TST
     032154  104432                          TRAP    C$EXIT
     032156  001230                          .WORD   L10033-.
406  032160  012767  006464  150624  6$:     MOV     #GSTER1,ERHEAD      ;SET ERROR HEADER
407  032166  004767  164636                  JSR     PC,TSTINT           ;INITIALIZE TEST
408  032172  016703  151164                  MOV     PSETNM,R3           ;GET PARAM SET NUMBER
409  032176  026727  147610  000001          CMP     L$UNIT,#1           ;TEST IF MORE THAN 1 UNIT
410  032204  101517                          BLOS    5$                  ;NO - SKIP
411  032206  005203                  2$:     INC     R3                  ;BUMP PARAMETER SET NUMBER
412  032210  020367  147576                  CMP     R3,L$UNIT           ;CHECK IF PAST VALID PARAMETER TABLE
413  032214  101401                          BLOS    3$                  ;NO - SKIP
414  032216  005003                          CLR     R3                  ;ELSE CLEAR TO POINT TO ENTRY 0
415  032220                          3$:     GPHARD  R3,R0
     032220  010300                          MOV     R3,R0
     032222  104442                          TRAP    C$GPHRD
416  032224                                  BNCOMPLETE      2$          ;SKIP IF NOT AVAILABLE
     032224  103370                          BCC     2$
417  032226  010004                          MOV     R0,R4               ;PUT POINTER INTO R4
418  032230  021467  150572                  CMP     (R4),RLBAS          ;CHECK IF SAME CONTROLLER
```

```
  419 032234  001364                        BNE     2$                  ;NO - SKIP
  420 032236  005067  150544                CLR     DONE                ;CLEAR DONE FLAG
  421 032242  012767  000104  150564        MOV     #GTSTAT,L.CS        ;LOAD GET STATUS
  422 032250  056467  000010  150556        BIS     10(R4),L.CS         ;INSERT DRIVE
  423 032256  012767  000013  150554        MOV     #GETSTAT!DRSET,L.DA     ;SET UP TO CLEAR DRIVE
  424 032264  016762  150550  000004        MOV     L.DA,RLDA(R2)       ;LOAD DA REG
  425 032272  016762  150536  000000        MOV     L.CS,RLCS(R2)       ;LOAD CS REG
  426 032300                                TIMDLY  30.                 ;WAIT 3 MS
  427 032424  005767  150356                TST     DONE                ;TEST  IF INTERRUPT
  428 032430  001666                        BEQ     2$                  ;NO - SKIP
  429 032432  032767  100000  150404        BIT     #ANYERR,T.CS        ;TEST IF ANY ERROR SET
  430 032440  001415                        BEQ     7$                  ;NO - GO TEST
  431 032442  000661                        BR      2$                  ;ELSE CHECK NEXT DRIVE
  432 032444                        5$:     PRINTF  #FMT9,#OPR10        ;REPORT CAN'T FIND 2ND DRIVE
      032444  012746  010003                MOV     #OPR10,-(SP)
      032450  012746  011753                MOV     #FMT9,-(SP)
      032454  012746  000002                MOV     #2,-(SP)
      032460  010600                        MOV     SP,R0
      032462  104417                        TRAP    C$PNTF
      032464  062706  000006                ADD     #6,SP
  433 032470  000167  000712                JMP     LCLEXT
  434 032474  016467  000010  150416  7$:   MOV     10(R4),TEMP1        ;STORE NEW ADDRESS
  435                                                                   ;ASK FOR PLUG CHANGE
  436 032502  016700  150324          9$:   MOV     RLDRV,R0            ;GET DRIVE UNDER TEST
  437 032506  016705  150406                MOV     TEMP1,R5            ;GET NEW ADDRESS
  438 032512  042700  002000                BIC     #2000,R0            ;CLEAR FOR ADDRESS 0 TO 3
  439 032516  042705  002000                BIC     #2000,R5
  440 032522  020527  001400          20$:  CMP     R5,#1400            ;TEST IF DRIVE NUMBER 3
  441 032526  001001                        BNE     21$                 ;NO - SKIP
  442 032530  005005                        CLR     R5                  ;ELSE SET TO DRIVE NUMBER 0
  443 032532  062705  000400          21$:  ADD     #400,R5             ;BUMP TO NEXT ADDRESS
  444 032536  020500                        CMP     R5,R0               ;THIS EQUAL TO NEW ADDRESS?
  445 032540  001770                        BEQ     20$                 ;YES - SKIP
  446 032542  052705  000200                BIS     #CRDYMSK,R5         ;ELSE SET CONTROLLER READY BIT
  447 032546  010562  000000                MOV     R5,RLCS(R2)         ;AND LOAD CS REG
  448                                                                   ;PROMPT INSRT ADR PLG AN DRV
  449 032552                                PRINTF  #FMTOP2,#OPR8,<B,RLDRV+1>,#OPR1B,<B,TEMP1+1>
      032552  005046                        CLR     -(SP)
      032554  156716  150341                BISB    TEMP1+1,(SP)
      032560  012746  010141                MOV     #OPR1B,-(SP)
      032564  005046                        CLR     -(SP)
      032566  156716  150241                BISB    RLDRV+1,(SP)
      032572  012746  007747                MOV     #OPR8,-(SP)
      032576  012746  011471                MOV     #FMTOP2,-(SP)
      032602  012746  000005                MOV     #5,-(SP)
      032606  010600                        MOV     SP,R0
      032610  104417                        TRAP    C$PNTF
      032612  062706  000014                ADD     #14,SP
  450 032616  005067  151542                CLR     OBUFF               ;CLEAR FOR RESPONSE
  451 032622                                GMANIL  OPR002,OBUFF,1,NO
      032622  104443                        TRAP    C$GMAN
      032624  000404                        BR      10000$
      032626  004364                        .WORD   OBUFF
      032630  000120                        .WORD   T$CODE
      032632  007470                        .WORD   OPR002
      032634  000001                        .WORD   1
      032636                    10000$:
```

```
032636  005767  150522                   TST     OBUFF            ;TEST IF RESPONSE YES
032642  001717                           BEQ     9$               ;NO - SKIP
032644  012704  000012                   MOV     #10.,R4          ;SET COUNT
032650                          BGNSUB
032650                                                                          T6.1:
032650  104402                           TRAP    C$BSUB
032652  016767  150154  150154  8$:      MOV     RLDRV,L.CS       ;SET UP TO SELECT MULTIPLE DRIVES
032660  016762  150150  000000           MOV     L.CS,RLCSR(R2)   ;DO IT
032666                                   TIMDLY  100.
033012  052767  000104  150014           BIS     #GTSTAT,L.CS     ;SET GET STATUS
033020  012767  000013  150012           MOV     #GETSTAT!DRSET,L.DA     ;SET RESET BIT 3 IN THE DA REG FOR THE
                                                                         ;/DRIVE TO CLEAR ITS ERROR REGISTER
                                                                         ;/BEFORE SENDING A STATUS WORD TO THE
                                                                         ;/MP REG DURING GET STATUS COMMAND

033026  016762  150006  000004           MOV     L.DA,RLDA(R2)
033034  005067  147746                   CLR     DONE
033040  016762  147770  000000           MOV     L.CS,RLCSR(R2)   ;DO GET STATUS
033046                                   WAITUS  1                ;WAIT FOR INTERRUPT
033046  012727  000001                   MOV     #1,(PC)+
033052  000000                           .WORD   0
033054  016727  147036                   MOV     L$DLY,(PC)+
033060  000000                           .WORD   0
033062  005367  177772                   DEC     -6(PC)
033066  001375                           BNE     .-4
033070  005367  177756                   DEC     -22(PC)
033074  001367                           BNE     .-20
033076  005767  147704                   TST     DONE             ;CHECK IF INTERRUPTED
033102  001012                           BNE     12$              ;YES - SKIP
033104  004767  163526                   JSR     PC,WAITIN        ;WAIT FOR TIMEOUT
033110  012603                           MOV     (SP)+,R3         ;GET ERROR POINTER
033112  001406                           BEQ     12$              ;SKIP IF 0
033114                                   ERRHRD  601.,GSTER1,ERR1
033114  104456                           TRAP    C$ERHRD
033116  001131                           .WORD   601
033120  006464                           .WORD   GSTER1
033122  012464                           .WORD   ERR1
033124                                   EXIT    SUB
033124  104432                           TRAP    C$EXIT
033126  000204                           .WORD   L10034-.
033130                          12$:     TIMDLY  20.              ;WAIT FOR DSE TO SET
033254  004767  164722                   JSR     PC,GDRSTA        ;GET STATUS
033260  032767  000400  147564           BIT     #DSESTAT,T.MP    ;TEST IF DRIVE SELECT ERROR SET
033266  001010                           BNE     16$              ;YES - SKIP
033270  012703  010632                   MOV     #MDSERR,R3       ;SET NAME MESSAGE POINTER
033274                                   ERRHRD  602.,,ERR3
033274  104456                           TRAP    C$ERHRD
033276  001132                           .WORD   602
033300  000000                           .WORD   0
033302  012600                           .WORD   ERR3
033304                                   EXIT    SUB
033304  104432                           TRAP    C$EXIT
033306  000024                           .WORD   L10034-.
033310  010562  000000          16$:     MOV     R5,RLCS(R2)      ;LOAD IN DIFFERENT ADDRESS
033314  005304                           DEC     R4               ;DEC COUNT
033316  001402                           BEQ     60$              ;LOOP IF NOT ZERO
033320  000167  177326                   JMP     8$
```

```
*TEST 6         DRIVE SELECT ERROR TEST

    487 033324  012767  000002  147464  60$:    MOV     #2,ERRSWI       ;INIT ERROR SWITCH
    488 033332                          ENDSUB
        033332                          L10034:
        033332  104403                          TRAP    C$ESUB
    489 033334                          15$:    PRINTF  #FMT9,#OPR11    ;REQUEST PLUG CHANGE
        033334  012746  010051                  MOV     #OPR11,-(SP)
        033340  012746  011753                  MOV     #FMT9,-(SP)
        033344  012746  000002                  MOV     #2,-(SP)
        033350  010600                          MOV     SP,R0
        033352  104417                          TRAP    C$PNTF
        033354  062706  000006                  ADD     #6,SP
    490 033360  005067  151000                  CLR     OBUFF           ;CLEAR FOR RESPONSE
    491 033364                                  GMANIL  OPR002,OBUFF,1,NO
        033364  104443                          TRAP    C$GMAN
        033366  000404                          BR      10000$
        033370  004364                          .WORD   OBUFF
        033372  000120                          .WORD   T$CODE
        033374  007470                          .WORD   OPR002
        033376  000001                          .WORD   1
        033400                          10000$:
    492 033400  005767  150760                  TST     OBUFF           ;TEST IF RESPONSE YES
    493 033404  001753                          BEQ     15$             ;NO - SKIP
    494 033406                          LCLEXT:
    495 033406                          ENDTST
        033406                          L10033:
        033406  104401                          TRAP    C$ETST
    496
    497
    498
    499                         .SBTTL  *TEST 7         INITIAL STATE
    500 033410                  BGNTST                  ;TEST 07
        033410                                                          T7::
    501 033410  005767  147744                  TST     PASNUM          ;CHECK IF FIRST PASS
    502 033414  001003                          BNE     1$              ;NO - EXIT TEST
    503 033416  005767  160704                  TST     MISWIW          ;CHECK IF MANUAL INTERVENTION
    504 033422  100402                          BMI     3$              ;PERFORM TEST IF MANUAL INTERVENTION
    505 033424                          1$:     EXIT    TST
        033424  104432                          TRAP    C$EXIT
        033426  000652                          .WORD   L10035-.
    506 033430  012767  006515  147354  3$:     MOV     #INITST,ERHEAD  ;SET ERROR HEADER
    507 033436  004767  163366                  JSR     PC,TSTINT       ;INITIALIZE TEST
    508 033442                                  TIMDLY  10.             ;WAIT 1 MS
    509 033566  004767  163254                  JSR     PC,GSTATR       ;GET STATUS WITH RESET
    510 033572  034300                          100$
    511 033574  032767  000001  147242          BIT     #DRDYMSK,T.CS   ;CHECK IF DRIVE IS READY
    512 033602  001432                          BEQ     20$             ;BRANCH IF DRIVE IS NOT READY
    513
    514 033604  052767  000010  147172          BIS     #ULOAD,OPFLAG   ;SET UNLOAD OPERATION
    515                                                                 ;PROMPT OPERATOR TO "PRESS LOAD"
    516 033612                                  PRINTF  #FMTOP1,#OPR3,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
        033612  005046                          CLR     -(SP)
        033614  156716  147213                  BISB    RLDRV+1,(SP)
        033620  012746  006053                  MOV     #DRVNAM,-(SP)
        033624  016746  147176                  MOV     RLBAS,-(SP)
        033630  012746  006042                  MOV     #BASADD,-(SP)
        033634  012746  010135                  MOV     #OPR1A,-(SP)
        033640  012746  007651                  MOV     #OPR3,-(SP)
```

```
*TEST 7          INITIAL STATE

        033644  012746  011442                  MOV     #FMTOP1,-(SP)
        033650  012746  000007                  MOV     #7,-(SP)
        033654  010600                          MOV     SP,R0
        033656  104417                          TRAP    C$PNTF
        033660  062706  000020                  ADD     #20,SP
    517 033664  012703  000000                  MOV     #0,R3           ;SET ''LOAD CARTRIDGE'' STATE VALUE 0
    518
    519 033670  004767  163166          20$:    JSR     PC,GSTATC       ;GET STATUS
    520 033674  034300                          100$
    521 033676                                  BREAK                   ;MAKE A SUPERVISOR CALL
        033676  104422                          TRAP    C$BRK
    522 033700  022767  000000  147152          CMP     #0,T.STAT       ;TEST IF STATE 0
    523 033706  001370                          BNE     20$             ;WAIT FOR STATE 0
    524
    525                                                                 ;PROMPT OPERATOR TO ''PRESS LOAD &
    526                                                                 ;/WAIT FOR READY''
    527 033710                          21$:    PRINTF  #FMTOP1,#OPR6,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
        033710  005046                          CLR     -(SP)
        033712  156716  147115                  BISB    RLDRV+1,(SP)
        033716  012746  006053                  MOV     #DRVNAM,-(SP)
        033722  016746  147100                  MOV     RLBAS,-(SP)
        033726  012746  006042                  MOV     #BASADD,-(SP)
        033732  012746  010135                  MOV     #OPR1A,-(SP)
        033736  012746  007665                  MOV     #OPR6,-(SP)
        033742  012746  011442                  MOV     #FMTOP1,-(SP)
        033746  012746  000007                  MOV     #7,-(SP)
        033752  010600                          MOV     SP,R0
        033754  104417                          TRAP    C$PNTF
        033756  062706  000020                  ADD     #20,SP
    528 033762  005067  150376                  CLR     OBUFF           ;CLEAR FOR RESPONSE
    529 033766                                  GMANIL  OPR002,OBUFF,1,NO       ;PROMPT OPERATOR FOR RESPONSE
        033766  104443                          TRAP    C$GMAN
        033770  000404                          BR      10000$
        033772  004364                          .WORD   OBUFF
        033774  000120                          .WORD   T$CODE
        033776  007470                          .WORD   OPR002
        034000  000001                          .WORD   1
        034002                      10000$:
    530 034002  005767  150356                  TST     OBUFF           ;TEST IF RESPONSE IS YES
    531 034006  001740                          BEQ     21$             ;BRANCH IF NOT READY
    532
    533 034010  004767  163046          22$:    JSR     PC,GSTATC       ;GET STATUS
    534 034014  034300                          100$
    535 034016                                  BREAK                   ;MAKE A SUPERVISOR CALL
        034016  104422                          TRAP    C$BRK
    536 034020  022767  000005  147032          CMP     #5,T.STAT       ;CHECK IF STATE 5
    537 034026  001370                          BNE     22$             ;WAIT FOR STATE 5
    538
    539 034030  016701  147016                  MOV     T.MP,R1         ;GET MP REG
    540 034034  032701  000020                  BIT     #HOSTAT,R1      ;CHECK HEADS OUT
    541 034040  001003                          BNE     7$              ;YES-SKIP
    542 034042  012703  010621                  MOV     #MHOSTA,R3      ;SET NAME MESSAGE PTR
    543 034046  000405                          BR      9$              ;GO REPORT
    544 034050  032701  000010          7$:     BIT     #BHSTAT,R1      ;CHECK BRUSH HOME SET
    545 034054  001010                          BNE     10$             ;YES-SKIP
    546 034056  012703  010575                  MOV     #MBHSTA,R3      ;SET NAME MESSAGE PTR
    547 034062                          9$:     ERRHRD  702,,ERR3       ;REPORT ERROR
```

```
*TEST 7          INITIAL STATE

        034062  104456                          TRAP    C$ERHRD
        034064  001276                          .WORD   702
        034066  000000                          .WORD   0
        034070  012600                          .WORD   ERR3
   548  034072                                  EXIT    TST             ;EXIT
        034072  104432                          TRAP    C$EXIT
        034074  000204                          .WORD   L10035-.
   549  034076  005767  160224          10$:    TST     MISWIW          ;TEST IF MANUAL INTERVENTION RUN
   550  034102  100035                          BPL     16$             ;NO-SKIP
   551  034104  005767  147250                  TST     PASNUM          ;CHECK IF FIRST PASS
   552  034110  001032                          BNE     16$             ;NO-SKIP
   553  034112  032701  000100                  BIT     #HSSTAT,R1      ;ELSE CHECK HD 0 SELECTED
   554  034116  001412                          BEQ     13$             ;YES-SKIP
   555  034120  012703  010537                  MOV     #MHSTA,R3       ;SET NAME MESSAGE PTR
   556  034124  012704  011412                  MOV     #CCYLUP,R4      ;SET CONDITION POINTER
   557  034130                                  ERRHRD  703,,,ERR4      ;REPORT ERROR
        034130  104456                          TRAP    C$ERHRD
        034132  001277                          .WORD   703
        034134  000000                          .WORD   0
        034136  012646                          .WORD   ERR4
   558  034140                                  EXIT    TST             ;EXIT
        034140  104432                          TRAP    C$EXIT
        034142  000136                          .WORD   L10035-.
   559  034144  032701  001000          13$:    BIT     #VCSTAT,R1      ;CHECK VOL CHECK SET
   560  034150  001003                          BNE     15$             ;YES-SKIP
   561  034152  012703  010551                  MOV     #MVOLCK,R3      ;ELSE SET NAME MESSAGE PTR
   562  034156  000741                          BR      9$              ;GO REPORT
   563  034160  032767  040000  146656  15$:    BIT     #DRVERR,T.CS    ;TEST DRIVE ERROR SET
   564  034166  001003                          BNE     16$             ;YES-SKIP
   565  034170  012703  010526                  MOV     #MDRERR,R3      ;ELSE SET NAME MESSAGE PTR
   566  034174  000732                          BR      9$              ;GO REPORT
   567  034176  032701  020000          16$:    BIT     #WLSTAT,R1      ;CHECK WRITE LOCK STATUS
   568  034202  001406                          BEQ     17$             ;SKIP IF RESET
   569  034204  012703  010610                  MOV     #MWLSTA,R3      ;ELSE SET NAME MESSAGE PTR
   570  034210                                  ERRHRD  705,,,ERR2
        034210  104456                          TRAP    C$ERHRD
        034212  001301                          .WORD   705
        034214  000000                          .WORD   0
        034216  012532                          .WORD   ERR2
   571  034220  042701  021177          17$:    BIC     #21177,R1       ;CLEAR STAUS EXCEPT FOR ERROR BITS
   572  034224  026727  146046  000001          CMP     T.DRIVE,#1
   573  034232  001404                          BEQ     99$
   574  034234  022701  000200                  CMP     #200,R1
   575  034240  001411                          BEQ     19$
   576  034242  000402                          BR      18$
   577  034244  005701                  99$:    TST     R1
   578  034246  001406                          BEQ     19$             ;NO-SKIP
   579  034250                          18$:    ERRHRD  704,,,ERR6      ;ELSE REPORT ALL ERRORS
        034250  104456                          TRAP    C$ERHRD
        034252  001300                          .WORD   704
        034254  000000                          .WORD   0
        034256  012766                          .WORD   ERR6
   580  034260                                  EXIT    TST             ;EXIT
        034260  104432                          TRAP    C$EXIT
        034262  000016                          .WORD   L10035-.
   581  034264  016701  146554          19$:    MOV     T.CS,R1         ;GET CS REG
   582  034270  042701  141777                  BIC     #141777,R1      ;CLEAR ALL BUT ERROR BITS
```

```
*TEST 7          INITIAL STATE

    583 034274  005701                          TST     R1              ;TEST IF ANY ERROR SET
    584 034276  001364                          BNE     18$             ;YES-SKIP TO REPORT
    585 034300                          25$:
    586 034300                          100$:
    587 034300                          ENDTST
        034300                          L10035:
        034300  104401                          TRAP    C$ETST
    588
    589
    590
    591                                 .SBTTL  *TEST 8         INITIAL RESET STATE
    592 034302                          BGNTST                  ;TEST 8
        034302                                                                          T8::
    593 034302  012767  006515  146502          MOV     #INITST,ERHEAD
    594 034310  004767  162514                  JSR     PC,TSTINT       ;INITIALIZE TEST
    595
    596 034314  004767  162526                  JSR     PC,GSTATR       ;GET STATUS WITH RESET
    597 034320  034366                          65$
    598 034322  005767  160000                  TST     MISWIW          ;CHECK IF MAN INTERVENTION WAS RUN
    599 034326  100017                          BPL     4$              ;NO-SKIP
    600 034330  005767  147024                  TST     PASNUM          ;CHECK IF 1ST PASS
    601 034334  001014                          BNE     4$              ;NO-SKIP
    602 034336  032767  000100  146506          BIT     #HSSTAT,T.MP    ;CHECK HD SELECT STILL 0
    603 034344  001410                          BEQ     4$              ;YES-SKIP
    604 034346  012703  010537                  MOV     #MHSTA,R3       ;SET NAME MESSAGE PTR
    605 034352  012704  011412                  MOV     #CCYLUP,R4      ;SET CONDITION POINTER
    606 034356                                  ERRHRD  801,,ERR4       ;REPORT ERROR
        034356  104456                          TRAP    C$ERHRD
        034360  001441                          .WORD   801
        034362  000000                          .WORD   0
        034364  012646                          .WORD   ERR4
    607 034366                          4$:
    608 034366                          65$:
    609 034366                          ENDTST
        034366                          L10036:
        034366  104401                          TRAP    C$ETST
    610
    611
    612
    613                                 .SBTTL  *TEST 9         DRIVE READY
    614 034370                          BGNTST                  ;TEST 9
        034370                                                                          T9::
    615 034370  012767  006543  146414          MOV     #T09ERR,ERHEAD  ;SET ERROR HEADER
    616 034376  012701  003102                  MOV     #NEWCYL,R1      ;GET POINTER TO DESIRED LOC
    617 034402  005021                          CLR     (R1)+           ;CLEAR NEW CYL
    618 034404  005021                          CLR     (R1)+           ;CLEAR CURRENT CYL
    619 034406  005021                          CLR     (R1)+           ;       DIFFERENCE
    620 034410  005011                          CLR     (R1)            ;       SIGN
    621 034412  004767  162412                  JSR     PC,TSTINT       ;INITIALIZE TEST
    622 034416  004767  162424                  JSR     PC,GSTATR       ;GET STATUS WITH RESET
    623 034422  035022                          100$
    624 034424  004767  166170                  JSR     PC,POSHSB       ;POSITION HEAD SELECTED BIT
    625 034430  010567  146456                  MOV     R5,DESHD        ;STORE AS DESIRED HEAD
    626 034434  004767  164512                  JSR     PC,SIMSEK       ;EXECUTE SIMPLE SEEK
    627 034440  035022                          100$
    628 034442  012703  010404                  MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
    629 034446  012704  011353                  MOV     #CDRDY,R4       ;SET CONDITION POINTER
```

```
*TEST 9         DRIVE READY

    034452  004767  162420              JSR     PC,GSTAT        ;GET STATUS
    034456  035022                      100$
    034460  032767  000001  146356      BIT     #DRDYMSK,T.CS   ;TEST READY SET
    034466  001406                      BEQ     4$              ;NO-SKIP
    034470                              ERRHRD  901,,ERR4       ;REPORT READY ERROR
    034470  104456                      TRAP    C$ERHRD
    034472  001605                      .WORD   901
    034474  000000                      .WORD   0
    034476  012646                      .WORD   ERR4
    034500                              EXIT    TST             ;EXIT
    034500  104432                      TRAP    C$EXIT
    034502  000320                      .WORD   L10037-.
    034504  012701  000121      4$:     MOV     #81.,R1         ;SET WAIT COUNT
    034510  004767  162362      5$:     JSR     PC,GSTAT        ;GET STATUS
    034514  035022                      100$
    034516                              BREAK                   ;ALLOW FOR A ^C
    034516  104422                      TRAP    C$BRK

    034520  012703  000005              MOV     #5,R3           ;SET EXPECTED STATE VALUE
    034524  026703  146330              CMP     T.STAT,R3       ;CHECK STATE IS 5
    034530  001406                      BEQ     7$              ;YES-SKIP
    034532                              ERRHRD  902,,ERR7       ;ELSE REPORT
    034532  104456                      TRAP    C$ERHRD
    034534  001606                      .WORD   902
    034536  000000                      .WORD   0
    034540  013666                      .WORD   ERR7
    034542                              EXIT    TST
    034542  104432                      TRAP    C$EXIT
    034544  000256                      .WORD   L10037-.
    034546  012703  010404      7$:     MOV     #MDRDY,R3
    034552  032767  000001  146264      BIT     #DRDYMSK,T.CS   ;CHECK READY SET
    034560  001063                      BNE     12$             ;YES-SKIP
    034562  005301                      DEC     R1              ;ELSE DEC WAIT COUNT
    034564  001403                      BEQ     9$              ;SKIP IF 0
    034566                              TIMDLY  1
    034712  000676                      BR      5$
    034714                      9$:     ERRHRD  903,,ERR5       ;REPORT READY ERROR
    034714  104456                      TRAP    C$ERHRD
    034716  001607                      .WORD   903
    034720  000000                      .WORD   0
    034722  012716                      .WORD   ERR5
    034724                              EXIT    TST
    034724  104432                      TRAP    C$EXIT
    034726  000074                      .WORD   L10037-.

    034730  005767  146110      12$:    TST     T.CS            ;TEST IF ANY ERROR
    034734  100006                      BPL     15$             ;NO-SKIP
    034736                              ERRHRD  904,,ERR6
    034736  104456                      TRAP    C$ERHRD
    034740  001610                      .WORD   904
    034742  000000                      .WORD   0
    034744  012766                      .WORD   ERR6
    034746                              EXIT    TST
    034746  104432                      TRAP    C$EXIT
    034750  000052                      .WORD   L10037-.
    034752  012703  010537      15$:    MOV     #MHSTA,R3       ;SET NAME MESSAGE PTR
    034756  004767  165636              JSR     PC,POSHSB       ;POSITION HEAD SELECT BIT FOR TEST
```

```
662 034762 020567  146124                 CMP     R5,DESHD        ;CHECK IF CORRECT HEAD SELECTED
663 034766 001415                          BEQ     20$             ;YES-SKIP
664 034770 005767  146116                 TST     DESHD           ;ELSE TEST IF 1 DESIRED
665 034774 001406                          BEQ     17$             ;NO-REPORT SB 0
666 034776                                 ERRHRD  905.,,ERR3      ;ELSE REPORT SB 1
    034776 104456                          TRAP    C$ERHRD
    035000 001611                          .WORD   905
    035002 000000                          .WORD   0
    035004 012600                          .WORD   ERR3
667 035006                                 EXIT    TST
    035006 104432                          TRAP    C$EXIT
    035010 000012                          .WORD   L10037-.
668 035012                         17$:    ERRHRD  906.,,ERR2
    035012 104456                          TRAP    C$ERHRD
    035014 001612                          .WORD   906
    035016 000000                          .WORD   0
    035020 012532                          .WORD   ERR2
669 035022                         20$:
670 035022                         100$:
671 035022                         ENDTST
    035022                         L10037:
    035022 104401                          TRAP    C$ETST
672
673
674
675                                .SBTTL  *TEST 10        SEEK SIGN SWITCH
676 035024                         BGNTST                  ;TEST 10
    035024                                                                          T10::
677 035024 012767  006553  145760         MOV     #T10ERR,ERHEAD  ;SET ERROR HEADER
678 035032 012701  003102                 MOV     #NEWCYL,R1
679 035036 005021                          CLR     (R1)+           ;CLEAR NEW CYL
680 035040 005021                          CLR     (R1)+           ;CLEAR CURRENT CYLINDER
681 035042 005021                          CLR     (R1)+           ;CLEAR DIFFERENCE
682 035044 052721  000001                 BIS     #BIT0,(R1)+     ;SET FOR SIGN OF 1
683 035050 004767  165544                 JSR     PC,POSHSB       ;GET SELECTED HEAD
684 035054 010521                          MOV     R5,(R1)+        ;SET AS DESIRED HEAD
685 035056                         T104$:
686 035056                         BGNSUB
    035056                                                                          T10.1:
    035056 104402                          TRAP    C$BSUB
687 035060 004767  161744                 JSR     PC,TSTINT       ;INITIALIZE TEST
688 035064 004767  161756                 JSR     PC,GSTATR       ;GET STATUS
689 035070 035460                          60$
690 035072 004767  164054                 JSR     PC,SIMSEK       ;DO SEEK
691 035076 035460                          60$
692 035100 012703  010404                 MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
693 035104 012704  011353                 MOV     #CDRDY,R4       ;SET CONDITION MESSAGE PTR
694 035110 004767  161762                 JSR     PC,GSTAT        ;GET STATUS
695 035114 035460                          60$
696 035116 032767  000001  145720         BIT     #DRDYMSK,T.CS   ;CHECK READY RESET
697 035124 001406                          BEQ     4$              ;YES-SKIP
698 035126                                 ERRHRD  1001.,,ERR4     ;REPORT READY ERROR
    035126 104456                          TRAP    C$ERHRD
    035130 001751                          .WORD   1001
    035132 000000                          .WORD   0
    035134 012646                          .WORD   ERR4
699 035136                                 EXIT    SUB             ;EXIT SUBTEST
```

```
                035136  104432                          TRAP    C$EXIT
                035140  000320                          .WORD   L10041-.
    700
    701
    702 035142  012701  000121          4$:     MOV     #81.,R1         ;SET WAIT COUNT
    703 035146  004767  161724          5$:     JSR     PC,GSTAT        ;GET STATUS
    704 035152  035460                          60$
    705 035154                                  BREAK                   ;ALLOW FOR A ^C
                035154  104422                  TRAP    C$BRK
    706
    707 035156  012703  000005                  MOV     #5,R3           ;SET EXPECTED STATE
    708 035162  020367  145672                  CMP     R3,T.STAT       ;CHECK STATE IS 5
    709 035166  001406                          BEQ     7$              ;YES-SKIP
    710 035170                                  ERRHRD  1002.,,ERR7     ;REPORT STATE ERROR
                035170  104456                  TRAP    C$ERHRD
                035172  001752                  .WORD   1002
                035174  000000                  .WORD   0
                035176  013666                  .WORD   ERR7
    711 035200                                  EXIT    SUB             ;EXIT
                035200  104432                  TRAP    C$EXIT
                035202  000256                  .WORD   L10041-.
    712 035204  012703  010404          7$:     MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
    713 035210  032767  000001  145626          BIT     #DRDYMSK,T.CS   ;CHECK READY SET
    714 035216  001063                          BNE     12$             ;YES-SKIP
    715 035220  005301                          DEC     R1              ;DO WAIT COUNT
    716 035222  001453                          BEQ     9$              ;SKIP IF 0
    717 035224                                  TIMDLY  1
    718 035350  000676                          BR      5$
    719
    720 035352                          9$:     ERRHRD  1003.,,ERR5     ;REPORT READY ERROR
                035352  104456                  TRAP    C$ERHRD
                035354  001753                  .WORD   1003
                035356  000000                  .WORD   0
                035360  012716                  .WORD   ERR5
    721 035362                                  EXIT    SUB             ;EXIT
                035362  104432                  TRAP    C$EXIT
                035364  000074                  .WORD   L10041-.
    722 035366  005767  145452          12$:    TST     T.CS            ;TEST IF ANY OTHER ERROR
    723 035372  100006                          BPL     15$             ;NO-SKIP
    724 035374                                  ERRHRD  1004.,,ERR6     ;REPORT ALL ERROPS
                035374  104456                  TRAP    C$ERHRD
                035376  001754                  .WORD   1004
                035400  000000                  .WORD   0
                035402  012766                  .WORD   ERR6
    725 035404                                  EXIT    SUB             ;EXIT
                035404  104432                  TRAP    C$EXIT
                035406  000052                  .WORD   L10041-.
    726
    727 035410  012703  010537          15$:    MOV     #MHSTA,R3       ;SET NAME MESSAGE PTR
    728 035414  004767  165200                  JSR     PC,POSHSB       ;GET SELECTED HEAD BIT
    729 035420  020567  145466                  CMP     R5,DESHD        ;CHECK IF CORRECT
    730 035424  001415                          BEQ     20$             ;YES - SKIP
    731 035426  005767  145460                  TST     DESHD           ;WAS IT SET
    732 035432  001406                          BEQ     17$             ;NO-SKIP
    733 035434                                  ERRHRD  1005.,,ERR3     ;REPORT SB 1
                035434  104456                  TRAP    C$ERHRD
                035436  001755                  .WORD   1005
```

```
     035440  000000                          .WORD   0
     035442  012600                          .WORD   ERR3
734  035444                                  EXIT    SUB
     035444  104432                          TRAP    C$EXIT
     035446  000012                          .WORD   L10041-.
735  035450                          17$:    ERRHRD  1006.,,ERR2     ;REPORT SB 0
     035450  104456                          TRAP    C$ERHRD
     035452  001756                          .WORD   1006
     035454  000000                          .WORD   0
     035456  012532                          .WORD   ERR2
736
737  035460                          20$:
738  035460                          60$:
739  035460                          ENDSUB
     035460                          L10041:
     035460  104403                          TRAP    C$ESUB
740  035462  005767  145422                  TST     DESSGN          ;CHECK IF BOTH SIGN USED
741  035466  001404                          BEQ     25$             ;YES-SKIP
742  035470  005067  145414                  CLR     DESSGN          ;SET FOR SIGN OF 0
743  035474  000167  177356                  JMP     T104$           ;DO TEST AGAIN
744  035500                          25$:
745  035500                          ENDTST
     035500                          L10040:
     035500  104401                          TRAP    C$ETST
746
747
748
749                                  .SBTTL  *TEST 11        HEAD ALIGNMENT SUPPORT
750  035502                          BGNTST                  ;TEST 11
     035502                                                                  T11::
751  035502  032767  000010  156616          BIT     #HDALIGN,MISWIW ;CHECK IF RUN HEAD ALIGNMENT
752  035510  001411                          BEQ     1$              ;NO-EXIT
753  035512  005767  145642                  TST     PASNUM          ;TEST IF PASS 0
754  035516  001006                          BNE     1$              ;NO-EXIT
755  035520  026767  145306  145262          CMP     RLDRV,HADONE    ;TEST IF HEAD ALIGN DONE THIS DRIVE
756  035526  001004                          BNE     2$              ;NO - SKIP
757  035530  000167  000422                  JMP     T115$           ;GO CHECK WRITE LOCK
758  035534                          1$:     EXIT    TST
     035534  104432                          TRAP    C$EXIT
     035536  000520                          .WORD   L10042-.
759  035540  016767  145266  145242  2$:     MOV     RLDRV,HADONE    ;SET HEAD ALIGN DONE FLAG
760                                                                  ;TELL DRV AND CNTRL HD ALIGN TO BE DONE ON
761  035546                                  PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
     035546  005046                          CLR     -(SP)
     035550  156716  145257                  BISB    RLDRV+1,(SP)
     035554  012746  006053                  MOV     #DRVNAM,-(SP)
     035560  016746  145242                  MOV     RLBAS,-(SP)
     035564  012746  006042                  MOV     #BASADD,-(SP)
     035570  012746  011567                  MOV     #FMT5,-(SP)
     035574  012746  000005                  MOV     #5,-(SP)
     035600  010600                          MOV     SP,R0
     035602  104417                          TRAP    C$PNTF
     035604  062706  000014                  ADD     #14,SP
762                                                                  ;HD ALIGN. RSETWRT LCK TO SEL HD 0, SET HD 1
763  035610                                  PRINTF  #FMT9,#HAMES1
     035610  012746  007154                  MOV     #HAMES1,-(SP)
     035614  012746  011753                  MOV     #FMT9,-(SP)
```

```
                035620  012746  000002          MOV     #2,-(SP)
                035624  010600                  MOV     SP,R0
                035626  104417                  TRAP    C$PNTF
                035630  062706  000006          ADD     #6,SP
764                                                             ;^C TO RET TO SUPVR CMD MODE
765             035634                          PRINTF  #FMT9,#HAMES2
                035634  012746  007237          MOV     #HAMES2,-(SP)
                035640  012746  011753          MOV     #FMT9,-(SP)
                035644  012746  000002          MOV     #2,-(SP)
                035650  010600                  MOV     SP,R0
                035652  104417                  TRAP    C$PNTF
                035654  062706  000006          ADD     #6,SP
766                                                             ;IF HD SEL TP  (21, 22) DO NOT EXIST
767             035660                          PRINTF  #FMT9,#HAMES3
                035660  012746  007343          MOV     #HAMES3,-(SP)
                035664  012746  011753          MOV     #FMT9,-(SP)
                035670  012746  000002          MOV     #2,-(SP)
                035674  010600                  MOV     SP,R0
                035676  104417                  TRAP    C$PNTF
                035700  062706  000006          ADD     #6,SP
768                                                             ;JUMPER DRV RDY AND SEEK INCOMPLETE ON DRV
769                                                             ;LOGIC MOD
770             035704                          PRINTF  #FMT9,#HAMES4
                035704  012746  007406          MOV     #HAMES4,-(SP)
                035710  012746  011753          MOV     #FMT9,-(SP)
                035714  012746  000002          MOV     #2,-(SP)
                035720  010600                  MOV     SP,R0
                035722  104417                  TRAP    C$PNTF
                035724  062706  000006          ADD     #6,SP
771                                                             ;SET WRITE LOCK
772             035730                          PRINTF  #FMTOP1,#OPR12A,#OPR1A,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
                035730  005046                  CLR     -(SP)
                035732  156716  145075          BISB    RLDRV+1,(SP)
                035736  012746  006053          MOV     #DRVNAM,-(SP)
                035742  016746  145060          MOV     RLBAS,-(SP)
                035746  012746  006042          MOV     #BASADD,-(SP)
                035752  012746  010135          MOV     #OPR1A,-(SP)
                035756  012746  010121          MOV     #OPR12A,-(SP)
                035762  012746  011442          MOV     #FMTOP1,-(SP)
                035766  012746  000007          MOV     #7,-(SP)
                035772  010600                  MOV     SP,R0
                035774  104417                  TRAP    C$PNTF
                035776  062706  000020          ADD     #20,SP
773
774             036002                  BGNSUB
                036002                                                          T11.1:
                036002  104402                  TRAP    C$BSUR
775             036004  004767  161020          JSR     PC,TSTINT       ;INITIALIZE TEST
776             036010  005067  144772  11$:    CLR     DONE            ;CLEAR DONE
777
778             036014  016767  145012  145012  MOV     RLDRV,L.CS      ;SET UP FOR GET STATUS
779             036022  052767  000104  145004  BIS     #GTSTAT,L.CS
780             036030  012767  000013  145002  MOV     #GETSTAT!DRSET,L.DA
781
782             036036  016762  144776  000004  MOV     L.DA,RLDA(R2)   ;DO GET STATUS
783             036044  016762  144764  000000  MOV     L.CS,RLCSR(R2)
784
```

```
036052  005767  144730          13$:    TST     DONE            ;CHECK IF DONE
036056  001775                          BEQ     13$             ;NO-GO CLR CONTROLLER

036060  005067  144722                  CLR     DONE
036064  012767  000021  144746  20$:    MOV     #HDSEL!MBSETO,L.DA;LOAD FOR HEAD 1
036072  000240                          NOP
036074  032767  020000  144750          BIT     #WLSTAT,T.MP    ;CHECK IF WRITE LOCK SET
036102  001003                          BNE     22$             ;YES-SKIP
036104  042767  000020  144726          BIC     #HDSEL,L.DA     ;ELSE CLEAR TO HEAD 0
036112  016767  144714  144714  22$:    MOV     RLDRV,L.CS      ;LOAD IN DRIVE NUMBER
036120  052767  000106  144706          BIS     #SEEK,L.CS      ;SET FOR SEEK
036126  016762  144706  000004          MOV     L.DA,RLDA(R2)   ;LOAD & EXECUTE SEEK
036134  016762  144674  000000          MOV     L.CS,RLCSR(R2)
036142                                  BREAK                   ;ALLOW OPERATOR TO INTERRUPT PROGRAM TO GET
036142  104422                          TRAP    C$BRK
                                                                ;/BACK TO SUPERVISOR COMMAND MODE
036144  005767  144636          30$:    TST     DONE
036150  001775                          BEQ     30$
036152  000716                          BR      11$             ;LOOP
036154                          59$:
036154                          ENDSUB
036154                          L10043:
036154  104403                          TRAP    C$ESUB
036156                          T115$:
036156                          BGNSUB
036156                                                                                  T11.2:
036156  104402                          TRAP    C$BSUB
036160  004767  160644                  JSR     PC,TSTINT       ;INITIALIZE TEST
036164  004767  160656                  JSR     PC,GSTATR       ;CLEAR DRIVE
036170  036254                          60$
036172  032767  020000  144652          BIT     #WLSTAT,T.MP    ;CHECK WRITE LOCK RESET
036200  001425                          BEQ     19$             ;YES-SKIP
036202                          18$:    PRINTF  #FMT9,#OPR12    ;REQUEST WRITE LOCK RESET
036202  012746  010102                  MOV     #OPR12,-(SP)
036206  012746  011753                  MOV     #FMT9,-(SP)
036212  012746  000002                  MOV     #2,-(SP)
036216  010600                          MOV     SP,R0
036220  104417                          TRAP    C$PNTF
036222  062706  000006                  ADD     #6,SP
036226  005067  146132                  CLR     OBUFF           ;CLEAR FOR RESPONSE
036232                                  GMANIL  OPR002,OBUFF,1,NO       ;GET RESPONSE
036232  104443                          TRAP    C$GMAN
036234  000404                          BR      10000$
036236  004364                          .WORD   OBUFF
036240  000120                          .WORD   T$CODE
036242  007470                          .WORD   OPR002
036244  000001                          .WORD   1
036246                          10000$:
036246  005767  146112                  TST     OBUFF           ;WAS ANSWER YES
036252  001753                          BEQ     18$             ;NO-REPEAT REQUEST
036254                          19$:
036254                          60$:
036254                          ENDSUB
036254                          L10044:
036254  104403                          TRAP    C$ESUB
036256                          20$:
```

```
                                        ENDTST
                                        L10042:
036256  104401                                  TRAP    C$ETST

                                        .SBTTL  *TEST 12        HEAD SWITCHING
036260                                  BGNTST                  ;TEST 12
036260                                                                          T12::
036260  012767  006573  144524                   MOV     #T12ERR,ERHEAD  ;SET ERROR HEADER
036266  012701  003102                           MOV     #NEWCYL,R1      ;GET POINTER TO DESIRED LOCATION
036272  005021                                   CLR     (R1)+           ;CLEAR NEW CYLINDER
036274  005021                                   CLR     (R1)+           ;CLEAR CURRENT CYL.
036276  005021                                   CLR     (R1)+           ;CLEAR DIFFERENCE
036300  005021                                   CLR     (R1)+           ;CLEAR SIGN
036302  012721  000001                           MOV     #1,(R1)+        ;SET FOR HEAD 1
036306                                  T124$:
036306                                  BGNSUB
036306                                                                          T12.1:
036306  104402                                  TRAP    C$BSUB
036310  004767  160514                           JSR     PC,TSTINT       ;INITIALIZE TEST
036314  004767  160526                           JSR     PC,GSTATR       ;GET STATUS WITH RESET
036320  036710                                   60$
036322  004767  162624                           JSR     PC,SIMSEK       ;DO SEEK
036326  036710                                   60$
036330  012703  010404                           MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
036334  012704  011353                           MOV     #CDRDY,R4       ;SET CONDITION POINTER
036340  004767  160532                           JSR     PC,GSTAT        ;GET STATUS
036344  036710                                   60$
036346  032767  000001  144470                   BIT     #DRDYMSK,T.CS   ;CHECK IF READY
036354  001406                                   BEQ     5$              ;NO-SKIP
036356                                           ERRHRD  1201.,,ERR4     ;REPORT READY ERROR
036356  104456                                   TRAP    C$ERHRD
036360  002261                                   .WORD   1201
036362  000000                                   .WORD   0
036364  012646                                   .WORD   ERR4
036366                                           EXIT    SUB             ;EXIT
036366  104432                                   TRAP    C$EXIT
036370  000320                                   .WORD   L10046-.

036372  012701  000121                  5$:      MOV     #81.,R1         ;SET WAIT COUNT
036376  004767  160474                  6$:      JSR     PC,GSTAT        ;GET STATUS
036402  036710                                   60$
036404                                           BREAK                   ;ALLOW FOR A ^C
036404  104422                                   TRAP    C$BRK

036406  012703  000005                           MOV     #5,R3           ;SET EXPECTED STATE VALUE
036412  020367  144442                           CMP     R3,T.STAT       ;CHECK IF STATE IS 5
036416  001406                                   BEQ     7$              ;YES-SKIP
036420                                           ERRHRD  1202.,,ERR7     ;REPORT STATE ERROR
036420  104456                                   TRAP    C$ERHRD
036422  002262                                   .WORD   1202
036424  000000                                   .WORD   0
036426  013666                                   .WORD   ERR7
036430                                           EXIT    SUB
036430  104432                                   TRAP    C$EXIT
036432  000256                                   .WORD   L10046-.
```

```
                                                                ;
036434  012703  010404          7$:     MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
036440  032767  000001  144376          BIT     #DRDYMSK,T.CS   ;CHECK DRIVE READY
036446  001063                          BNE     12$             ;YES-SKIP
036450  005301                          DEC     R1              ;DEC WAIT COUNT
036452  001453                          BEQ     9$              ;SKIP IF 0
036454                                  TIMDLY  1
036600  000676                          BR      6$
                                                                ;
036602                          9$:     ERRHRD  1203.,,ERR5     ;REPORT READY ERROR
036602  104456                          TRAP    C$ERHRD
036604  002263                          .WORD   1203
036606  000000                          .WORD   0
036610  012716                          .WORD   ERR5
036612                                  EXIT    SUB             ;EXIT
036612  104432                          TRAP    C$EXIT
036614  000074                          .WORD   L10046-.
                                                                ;
036616  005767  144222          12$:    TST     T.CS            ;TEST IF ANY ERROR
036622  100006                          BPL     15$             ;NO-SKIP
036624                                  ERRHRD  1204.,,ERR6     ;REPORT ALL ERRORS
036624  104456                          TRAP    C$ERHRD
036626  002264                          .WORD   1204
036630  000000                          .WORD   0
036632  012766                          .WORD   ERR6
036634                                  EXIT    SUB
036634  104432                          TRAP    C$EXIT
036636  000052                          .WORD   L10046-.
036640  012703  010537          15$:    MOV     #MHSTA,R3       ;SET NAME MESSAGE PTR
036644  004767  163750                  JSR     PC,POSHSB       ;POSITION HEAD SELECT BIT
036650  026705  144236                  CMP     DESHD,R5        ;CHECK IF CORRECT HEAD SELECTED
036654  001415                          BEQ     20$             ;YES-SKIP
036656  005767  144230                  TST     DESHD           ;WAS HEAD 0 SELECTED
036662  001406                          BEQ     17$             ;YES-SKIP
036664                                  ERRHRD  1205.,,ERR3     ;REPORT HEAD SB 1
036664  104456                          TRAP    C$ERHRD
036666  002265                          .WORD   1205
036670  000000                          .WORD   0
036672  012600                          .WORD   ERR3
036674                                  EXIT    SUB             ;EXIT
036674  104432                          TRAP    C$EXIT
036676  000012                          .WORD   L10046-.
036700                          17$:    ERRHRD  1206.,,ERR2     ;ELSE REPORT HEAD SB 0
036700  104456                          TRAP    C$ERHRD
036702  002266                          .WORD   1206
036704  000000                          .WORD   0
036706  012532                          .WORD   ERR2
                                                                ;
036710                          20$:
036710                          60$:
036710                          ENDSUB
036710                          L10046:
036710  104403                          TRAP    C$ESUB
036712  005767  144174                  TST     DESHD           ;CHECK IF HD 0 WAS DONE
036716  001404                          BEQ     25$             ;YES-SKIP
036720  005067  144166                  CLR     DESHD           ;ELSE SET TO HEAD 0
036724  000167  177356                  JMP     T124$           ;REDO TEST
```

```
                                        25$:
                                        ENDTST
                                        L10045:
036730  104401                                  TRAP    C$ETST

                                        .SBTTL  *TEST 13         READ HEADER (PART 1)
036732                                  BGNTST                   ;TEST 13
036732                                                                                  T13::
036732  012767  006605  144052                  MOV     #T13ERR,ERHEAD  ;SET ERROR HEADER
036740  012701  003102                          MOV     #NEWCYL,R1      ;GET ADDRESS OF DESIRED LOCATIONS
036744  005021                                  CLR     (R1)+           ;CLEAR NEW CYL
036746  005021                                  CLR     (R1)+           ;CLEAR CURRENT CYL
036750  005021                                  CLR     (R1)+           ;CLEAR DIFF
036752  005021                                  CLR     (R1)+           ;CLEAR SIGN
036754  005021                                  CLR     (R1)+           ;CLEAR HEAD
036756                                  T134$:
036756                                  BGNSUB
036756                                                                                  T13.1:
036756  104402                                  TRAP    C$BSUB
036760  004767  160044                          JSR     PC,TSTINT       ;INITIALIZE TEST
036764  004767  160056                          JSR     PC,GSTATR       ;GET STATUS W/RESET
037070  037062                                  60$
037072  004767  162154                          JSR     PC,SIMSEK       ;DO SEEK
037076  037062                                  60$
037000  012701  000121                          MOV     #81.,R1         ;SET WAIT COUNT
037004  004767  163640                          JSR     PC,RDYWAIT      ;WAIT FOR READY
037010  037062                                  60$

037012  004767  163112                          JSR     PC,XRDHDC       ;DO READ HEADER
037016  037062                                  60$
037020  012703  010537                          MOV     #MHSTA,R3       ;SET NAME MESSAGE PTR
037024  004767  163562                          JSR     PC,POSHW1       ;POSITION HS BIT IN HD WRD 1
037030  020567  144056                          CMP     R5,DESHD        ;CHECK IF HEAD CORRECT
037034  001412                                  BEQ     15$             ;YES-SKIP
037036                                          ERRHRD  1301.,,ERR3     ;REPORT SB 1
037036  104456                                  TRAP    C$ERHRD
037040  002425                                  .WORD   1301
037042  000000                                  .WORD   0
037044  012600                                  .WORD   ERR3
037046                                          EXIT    SUB
037046  104432                                  TRAP    C$EXIT
037050  000012                                  .WORD   L10050-.
037052                                  17$:    ERRHRD  1302.,,ERR2     ;REPORT SB 0
037052  104456                                  TRAP    C$ERHRD
037054  002426                                  .WORD   1302
037056  000000                                  .WORD   0
037060  012532                                  .WORD   ERR2

037062                                  15$:
037062                                  60$:
037062                                  ENDSUB
037062                                  L10050:
037062  104403                                  TRAP    C$ESUB
037064  005767  144022                          TST     DESHD           ;TEST IF HEAD 1 DONE
037070  001007                                  BNE     20$             ;YES-SKIP
```

```
    934 037072  012767  000001  144012          MOV     #1,DESHD        ;ELSE SET TO HEAD 1
    935 037100  016767  143746  144010          MOV     HDWRD1,TEMPO    ;STORE HDR WORD 1
    936 037106  000723                          BR      T134$           ;DO TEST AGAIN
    937 037110  042767  000177  144000  20$:    BIC     #177,TEMPO      ;CLEAR ALL BUT CYLINDER IN 1ST HEADER
    938 037116  042767  000177  143726          BIC     #177,HDWRD1     ;CLEAR ALL BY CYL IN 2ND HEADER
    939 037124  026767  143766  143720          CMP     TEMPO,HDWRD1    ;COMPARE IF EQUAL
    940 037132  001406                          BEQ     22$             ;YES-SKIP
    941 037134  012703  007070                  MOV     #CYLPER,R3      ;SET NAME MESSAGE PTR
    942 037140                                  ERRHRD  1306.,,ERR1     ;REPORT HEAD ALIGNMENT PROBLEM
        037140  104456                          TRAP    C$ERHRD
        037142  002432                          .WORD   1306
        037144  000000                          .WORD   0
        037146  012464                          .WORD   ERR1
    943 037150                          22$:
    944 037150                          ENDTST
        037150                          L10047:
        037150  104401                          TRAP    C$ETST
    945
    946
    947
    948                                 .SBTTL  *TEST 14        READ HEADER (PART 2)
    949 037152                          BGNTST          ;TEST 14
        037152                                                                  T14::
    950 037152  012767  006621  143632          MOV     #T14ERR,ERHEAD  ;SET ERROR HEADER
    951 037160  012701  003104                  MOV     #CURCYL,R1      ;GET ADDRESS OF DESIRED VALUE
    952 037164  005021                          CLR     (R1)+           ;CLEAR CURRENT CYL
    953 037166  005021                          CLR     (R1)+           ;CLEAR DESIRED DIFF
    954 037170  005021                          CLR     (R1)+           ;CLEAR SIGN
    955 037172  005021                          CLR     (R1)+           ;CLEAR DESIRED HEAD
    956 037174                          T153$:
    957 037174                          BGNSUB
        037174                                                                  T14.1:
        037174  104402                          TRAP    C$BSUB
    958 037176  004767  157626                  JSR     PC,TSTINT       ;INITIALIZE TEST
    959 037202  004767  157640                  JSR     PC,GSTATR       ;CLEAR DRIVE
    960 037206  037406                          60$
    961 037210  004767  161736                  JSR     PC,SIMSEK       ;DO SEEK
    962 037214  037406                          60$
    963 037216  012701  000310                  MOV     #200.,R1        ;SET WAIT COUNT FOR 20 MS
    964 037222  004767  163422                  JSR     PC,RDYWAIT      ;WAIT FOR READY
    965 037226  037406                          60$
    966 037230  004767  164114                  JSR     PC,RDALHD       ;DO READ HEADER ALL HEADERS
    967 037234  037406                          60$
    968 037236  005067  143552                  CLR     MORECE          ;CLEAR MORE COMPARE ERRORS FOR REPORT
    969 037242  052767  000002  143534          BIS     #HDRCMP,OPFLAG  ;SET HDR COMPARE FLAG
    970 037250  005003                          CLR     R3              ;CLEAR FOR HDR COUNT
    971 037252  012704  003764                  MOV     #IBUFF,R4       ;GET POINTER FOR HDR TO BE CHECKED
    972 037256  012705  003116                  MOV     #TEMPO,R5       ;GET POINTER TO TEST AREA
    973 037262  012701  000050                  MOV     #40.,R1         ;SET HDR COUNT
    974 037266  011415                          MOV     (R4),(R5)       ;GET FIRST HEADER WORD
    975
    976 037270  042715  000100                  BIC     #HDHSEL,(R5)
    977 037274  005767  143612                  TST     DESHD           ;TEST IF HD 0 DESIRED
    978 037300  001404                          BEQ     10$             ;YES-SKIP
    979 037302  052715  000100                  BIS     #HDHSEL,(R5)    ;ELSE SET HEAD BIT
    980 037306  005065  000002                  CLR     2(R5)           ;CLEAR 2ND WORD OF TEST AREA
    981
```

```
 982 037312  021524                  10$:    CMP     (R5),(R4)+      ;COMPARE HEADER WORD
 983 037314  001406                          BEQ     13$             ;SKIP IF OK
 984 037316  005744                          TST     -(R4)           ;ELSE POSITION R4 TO BAD WORD
 985 037320                                  ERRHRD  1501.,,ERR10    ;REPORT ERROR
     037320  104456                          TRAP    C$ERHRD
     037322  002735                          .WORD   1501
     037324  000000                          .WORD   0
     037326  014076                          .WORD   ERR10
 986 037330  005724                          TST     (R4)+           ;BUMP R4 TO NEXT WORD
 987 037332  005203                  13$:    INC     R3              ;BUMP WORD COUNT
 988 037334  005724                          TST     (R4)+           ;TEST 2ND WORD IS 0
 989 037336  001406                          BEQ     15$             ;YES - SKIP
 990 037340  022544                          CMP     (R5)+,-(R4)     ;POSITION PTRS FOR REPORT
 991 037342                                  ERRHRD  1501.,,ERR10    ;REPORT ERROR
     037342  104456                          TRAP    C$ERHRD
     037344  002735                          .WORD   1501
     037346  000000                          .WORD   0
     037350  014076                          .WORD   ERR10
 992 037352  024524                          CMP     -(R5),(R4)+     ;REPOSITION POINTER
 993 037354  005724                  15$:    TST     (R4)+           ;POSITION R4 PAST ECC WORD
 994 037356  005203                          INC     R3              ;BUMP WORD COUNT
 995 037360  005215                          INC     (R5)            ;BUMP SECTOR COUNT
 996 037362  011500                          MOV     (R5),R0         ;CHECK IF SECTOR IS PAST LAST SECTOR
 997 037364  042700  177700               BIC     #^CHDSEC,R0
 998 037370  022700  000050               CMP     #40.,R0
 999 037374  001002                          BNE     17$             ;NO-SKIP
1000 037376  042715  000077               BIC     #HDSEC,(R5)     ;ELSE CLEAR SECTOR TO 0
1001 037402  005301                  17$:    DEC     R1              ;DEC HDR COUNT
1002 037404  001342                          BNE     10$             ;YES-SKIP
1003
1004 037406                          60$:
1005 037406                          ENDSUB
     037406                          L10052:
     037406  104403                          TRAP    C$ESUB
1006 037410  005767  143476               TST     DESHD           ;CHECK IF HD 1 TESTED
1007 037414  001005                          BNE     20$             ;YES-SKIP
1008 037416  012767  000001  143466       MOV     #1,DESHD        ;ELSE SET TO HEAD 1
1009 037424  000167  177544               JMP     T153$           ;REDO TEST
1010 037430                          20$:
1011 037430                          ENDTST
     037430                          L10051:
     037430  104401                          TRAP    C$ETST
1012
1013
1014
1015                                 .SBTTL  *TEST 15        DIFFERENCE OF 1 SEEK (PART 1)
1016 037432                          BGNTST                  ;TEST 15
     037432                                                                          T15::
1017
1018 037432  012767  006645  143352       MOV     #P2T01E,ERHEAD  ;SET ERROR HEADER
1019 037440  012767  000004  143450       MOV     #4,TEMP0        ;SET PASS COUNT
1020 037446  004767  157356               JSR     PC,TSTINT       ;INITIALIZE TEST
1021 037452  004767  157370               JSR     PC,GSTATR       ;GET STATUS
1022 037456  040076                      T1765$
1023 037460  022767  000001  142610       CMP     #1,T.DRIVE      ;RL01 OR RL02?
1024 037466  001404                          BEQ     2$              ;BRANCH TO SET UP DIFF ARGUMENT FOR RL01
1025 037470  012767  177776  143424       MOV     #-2,TEMP2       ;ELSE, SET -2 INTO DIFF ARGUMENT FOR RL02
```

```
1026                                                                    ;/(RL02 HAS DOUBLE THE TRACK DENSITY OF RL01)
1027 037476  000403                            BR      5$
1028 037500  012767  177777  143414  2$:      MOV     #-1,TEMP2       ;SET -1 INTO DIFF ARGUMENT FOR -1 SEEK
1029 037506  012704  003104          5$:      MOV     #CURCYL,R4      ;SET POINTERS
1030 037512  012705  003102                   MOV     #NEWCYL,R5
1031 037516  004767  162276                   JSR     PC,CHOSHD       ;GO CHOOSE HEAD
1032 037522                          T172%:
1033 037522                          BGNSUB
     037522                                                                             T15.1:
     037522  104402                           TRAP    C$BSUB
1034 037524  004767  163472                   JSR     PC,GETPOS       ;GET POSITION
1035 037530  040032                           60$
1036 037532                                   BREAK                   ;ALLOW FOR A ^C
     037532  104422                           TRAP    C$BRK
1037
1038 037534                                   INLOOP                  ;CHECK IF IN ERROR LOOP
     037534  104420                           TRAP    C$INLP
1039 037536                                   BNCOMPLETE      3$      ;NO - SKIP
     037536  103005                           BCC     3$
1040 037540  021415                           CMP     (R4),(R5)       ;CHECK IF CURRENT = NEW
1041 037542  001005                           BNE     4$              ;NO - SKIP
1042 037544  004767  162334                   JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW
1043 037550  000441                           BR      9$              ;SKIP TO SEEK
1044 037552  005467  143344          3$:      NEG     TEMP2           ;CHANGE DIFF ARGUMENT FOR OPPOSITE DIR
1045 037556  011415                  4$:      MOV     (R4),(R5)       ;MOVE CURRENT INTO OLD
1046 037560  026714  142516                   CMP     HLMTW,(R4)      ;CHECK IF CURRENT AT 255
1047 037564  001014                           BNE     7$              ;NO - SKIP
1048 037566  022767  000001  142502           CMP     #1,T.DRIVE      ;RL01 OR RL02?
1049 037574  001404                           BEQ     6$              ;BRANCH IF RL01
1050 037576  012767  177776  143316           MOV     #-2,TEMP2       ;ELSE, SET UP DIFF ARGUMENT FOR RL02
1051 037604  000421                           BR      8$
1052 037606  012767  177777  143306  6$:      MOV     #-1,TEMP2       ;AT MAX CYL, MAKE NEXT SEEK REV
1053 037614  000415                           BR      8$              ;SKIP
1054 037616  005714                  7$:      TST     (R4)            ;TEST IF CURRENT AT 0
1055 037620  001013                           BNE     8$              ;NO - SKIP
1056 037622  022767  000001  142446           CMP     #1,T.DRIVE      ;RL01 OR RL02?
1057 037630  001404                           BEQ     11$             ;BRANCH IF RL01
1058 037632  012767  000002  143262           MOV     #2,TEMP2        ;ELSE, SET UP DIFF ARGUMENT FOR RL02
1059 037640  000403                           BR      8$
1060 037642  012767  000001  143252  11$:     MOV     #1,TEMP2        ;AT CYL 0, MAKE NEXT SEEK FWRD
1061 037650  066715  143246          8$:      ADD     TEMP2,(R5)      ;ADD DIFF TO NEW CYL (+1 OR -1 FOR RL01,
1062                                                                    ;/+2 OR -2 FOR RL02)
1063 037654                          9$:      BREAK                   ;ALLOW A ^C
     037654  104422                           TRAP    C$BRK
1064 037656  004767  160500                   JSR     PC,XSEEK        ;DO SEEK
1065 037662  040032                           60$
1066 037664  004767  160312                   JSR     PC,GDRSTA       ;GET DRIVE STATE
1067
1068 037670  012703  000004                   MOV     #4,R3           ;SET EXPECTED STATE
1069 037674  020367  143160                   CMP     R3,T.STAT       ;CHECK DRIVE STATE
1070 037700  001405                           BEQ     10$             ;YES-SKIP
1071 037702                                   ERRHRD  101,,ERR7       ;REPORT STATE ERROR
     037702  104456                           TRAP    C$ERHRD
     037704  000145                           .WORD   101
     037706  000000                           .WORD   0
     037710  013666                           .WORD   ERR7
1072 037712  000442                           BR      16$             ;EXIT TEST
```

```
*TEST 15        DIFFERENCE OF 1 SEEK (PART 1)

 1073 037714  012703  000005          10$:    MOV     #5,R3           ;SET EXPECTED STATE
 1074 037720                                  WAITMS  20.             ;WAIT 20 MS FOR DRIVE STATE CHANGE FROM 4 TO 5
      037736  012727  000372                  MOV     #250.,(PC)+
      037742  000000                          .WORD   0
      037744  016727  142146                  MOV     L$DLY,(PC)+
      037750  000000                          .WORD   0
      037752  005367  177772                  DEC     -6(PC)
      037756  001375                          BNE     .-4
      037760  005367  177756                  DEC     -22(PC)
      037764  001367                          BNE     .-20
      037766  104422                          TRAP    C$BRK
 1075 037776  004767  160200                  JSR     PC,GDRSTA       ;GET DRIVE STATE
 1076 040002  020367  143052                  CMP     R3,T.STAT       ;IS STATE 5?
 1077 040006  001404                          BEQ     16$             ;YES-SKIP
 1078 040010                                  ERRHRD  102.,,ERR7      ;REPORT STATE ERROR
      040010  104456                          TRAP    C$ERHRD
      040012  000146                          .WORD   102
      040014  000000                          .WORD   0
      040016  013666                          .WORD   ERR7
 1079 040020  012701  000062          16$:    MOV     #50.,R1         ;INITIALIZE WAIT COUNT
 1080 040024  004767  162620                  JSR     PC,RDYWAIT      ;GO WAIT FOR DRIVE READY
 1081 040030  040032                          60$
 1082 040032  012767  000002  142756  60$:    MOV     #2,ERRSWI       ;INIT ERROR SWITCH
 1083 040040                          ENDSUB
      040040                          L10054:
      040040  104403                          TRAP    C$ESUB
 1084 040042                                  ESCAPE  TST             ;EXIT TEST IF ERROR
      040042  104410                          TRAP    C$ESCAPE
      040044  000032                          .WORD   L10053-.
 1085 040046  005367  143044                  DEC     TEMP0           ;DEC PASS COUNT
 1086 040052  001411                          BEQ     24$             ;SKIP IF 0-DONE
 1087
 1088 040054  032767  000001  143034          BIT     #BIT0,TEMP0     ;TEST IF PASS=2
 1089 040062  001003                          BNE     23$             ;NO-SKIP
 1090 040064  004767  161754                  JSR     PC,SWAPHD       ;GO SWAP TO HEAD 1 OR END TEST
 1091 040070  040076                          24$                     ;ABORT RETURN
 1092 040072  000167  177424          23$:    JMP     T172$
 1093 040076                          24$:
 1094 040076                          T1765$:
 1095 040076                          ENDTST
      040076                          L10053:
      040076  104401                          TRAP    C$ETST
 1096
 1097
 1098
 1099                                 .SBTTL  *TEST 16        DIFFERENCE OF 1 SEEK (PART 2)
 1100 040100                          BGNTST                  ;TEST 16
      040100                                                                          T16::
 1101 040100  012767  006645  142704          MOV     #P2T02E,ERHEAD  ;SET ERROR HEADER
 1102 040106  012767  000004  143002          MOV     #4,TEMP0        ;SET PASS COUNT
 1103 040114  004767  156710                  JSR     PC,TSTINT       ;INITIALIZE TEST
 1104 040120  004767  156722                  JSR     PC,GSTATR       ;GET STATUS, CLEAR DRIVE
 1105 040124  040372                          T1865$
 1106 040126  004767  161666                  JSR     PC,CHOSHD       ;GO CHOOSE HEAD
 1107 040132  012767  177777  142762          MOV     #-1,TEMP2       ;SET DIFF ARGUMENT TO -1 (REVERSE)
 1108 040140  012703  003102                  MOV     #NEWCYL,R3      ;GET ADDRESSES
 1109 040144  012704  003104                  MOV     #CURCYL,R4
```

```
1110 040150  012705  002100                    MOV     #OLDCYL,R5
1111 040154                             T187$:
1112 040154                             BGNSUB
     040154                                                                  T16.1:
     040154  104402                            TRAP    C$BSUB
1113 040156  004767  163040                    JSR     PC,GETPOS       ;GET CURRENT POSITION
1114 040162  040330                            60$
1115 040164                                    BREAK                   ;ALLOW FOR A ^C
     040164  104422                            TRAP    C$BRK
1116
1117 040166                                    INLOOP                  ;CHECK IF IN ERROR LOOP
     040166  104420                            TRAP    C$INLP
1118 040170                                    BNCOMPLETE      3$      ;NO - SKIP
     040170  103005                            BCC     3$
1119 040172  021413                            CMP     (R4),(R3)       ;CHECK IF CURRENT = NEW
1120 040174  001005                            BNE     4$              ;NO - SKIP
1121 040176  004767  161702                    JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW
1122 040202  000421                            BR      9$              ;SKIP TO SEEK
1123 040204  005467  142712             3$:    NEG     TEMP2           ;CHANGE DIFF ARGUMENT FOR OPPOSITE DIR
1124 040210  011413                     4$:    MOV     (R4),(R3)       ;MOV CURRENT INTO NEW
1125 040212  026714  142064                    CMP     HLMTW,(R4)      ;CHECK IF CURRENT AT 255
1126 040216  001004                            BNE     7$              ;NO - SKIP
1127 040220  012767  177777  142674            MOV     #-1,TEMP2       ;AT MAX CYL, MAKE NEXT SEEK REV
1128 040226  000405                            BR      8$              ;SKIP
1129 040230  005714                     7$:    TST     (R4)            ;TEST IF CURRENT AT 0
1130 040232  001003                            BNE     8$              ;NO - SKIP
1131 040234  012767  000001  142660            MOV     #1,TEMP2        ;AT CYL 0, MAKE NEXT SEEK FWRD
1132 040242  066713  142654             8$:    ADD     TEMP2,(R3)      ;ADD DIFF TO NEW CYL (+1 OR -1)
1133 040246  004767  160110             9$:    JSR     PC,XSEEK        ;DO SEEK
1134 040252  040330                            60$
1135 040254  012701  000226                    MOV     #150.,R1        ;SET WAIT COUNT FOR 15 MS
1136 040260  004767  162364                    JSR     PC,RDYWAIT      ;WAIT FOR READY
1137 040264  040330                            60$
1138 040266  004767  162730                    JSR     PC,GETPOS       ;STORE POSITION
1139 040272  040330                            60$
1140 040274  011501                            MOV     (R5),R1         ;GET OLD POSITION
1141 040276  161401                            SUB     (R4),R1         ;SUBTRACT FROM NEW POINTER (FORWARD)
1142 040300  005767  142604                    TST     DESSGN          ;CHECK IF SIGN FORWARD
1143 040304  001402                            BEQ     10$             ;YES-SKIP, ELSE SUB FOR SEEK REVERSE
1144 040306  011401                            MOV     (R4),R1         ;GET NEW CYLINDER
1145 040310  161501                            SUB     (R5),R1         ;SUBTRACT FROM OLD CYL
1146 040312  022701  000001             10$:   CMP     #1,R1           ;CHECK IF RESULT IS DIFFERENCE OF 1
1147 040316  001404                            BEQ     12$             ;YES-SKIP
1148 040320                                    ERRHRD  201.,,ERR8      ;ELSE REPORT ERROR
     040320  104456                            TRAP    C$ERHRD
     040322  000311                            .WORD   201
     040324  000000                            .WORD   0
     040326  013736                            .WORD   ERR8
1149 040330                             12$:
1150 040330  012767  000002  142460     60$:   MOV     #2,ERRSWI       ;INIT ERROR SWITCH
1151 040336                             ENDSUB
     040336                             L10056:
     040336  104403                            TRAP    C$ESUB
1152 040340                                    ESCAPE  TST             ;EXIT TEST IF ERROR
     040340  104410                            TRAP    C$ESCAPE
     040342  000030                            .WORD   L10055-.
1153 040344  005367  142546                    DEC     TEMP0           ;DEC PASS COUNT
```

```
1154 040350  001410                          BEQ     30$             ;EXIT IF DONE
1155
1156 040352  032767  000001  142536          BIT     #BIT0,TEMP0     ;TEST IF PASS 1 OR 3
1157 040360  001003                          BNE     20$             ;YES-SKIP
1158 040362  004767  161456                  JSR     PC,SWAPHD       ;GO SWAP TO HEAD 1 OR END TEST
1159 040366  040372                          30$                     ;ABORT RETURN
1160 040370  000671                  20$:    BR      T187$           ;LOOP
1161 040372                          30$:
1162 040372                          T1865$:
1163 040372                          ENDTST
     040372                          L10055:
     040372  104401                          TRAP    C$ETST
1164 040374                          ENDMOD
1165
1166                                 .SBTTL  PARAMETER CODING
1167 040374                          BGNMOD  HRDPRM
1168 040374                          BGNHRD
     040374  000030                          .WORD L10057-L$HARD/2
1169
1170 040376                          GPRML   CNTYPE,CNT,1,YES
     040376  005130                          .WORD   T$CODE
     040400  040542                          .WORD   CNTYPE
     040402  000001                          .WORD   1
1171
1172 040404                          GPRMA   CSRMSG,CSR,0,160000,177776,YES
     040404  000031                          .WORD   T$CODE
     040406  040456                          .WORD   CSRMSG
     040410  160000                          .WORD   T$LOLIM
     040412  177776                          .WORD   T$HILIM
1173
1174 040414                          GPRMA   VECMSG,VECT,0,0,776,YES
     040414  001031                          .WORD   T$CODE
     040416  040472                          .WORD   VECMSG
     040420  000000                          .WORD   T$LOLIM
     040422  000776                          .WORD   T$HILIM
1175
1176 040424                          GPPMD   DRMSG,DRSB,0,3400,0,7,YES
     040424  004032                          .WORD   T$CODE
     040426  040534                          .WORD   DRMSG
     040430  003400                          .WORD   3400
     040432  000000                          .WORD   T$LOLIM
     040434  000007                          .WORD   T$HILIM
1177
1178 040436                          GPRML   DRTYPE,TYPDR,1,YES
     040436  003130                          .WORD   T$CODE
     040440  040512                          .WORD   DRTYPE
     040442  000001                          .WORD   1
1179
1180 040444                          GPRMD   BRMSG,PRIOR,0,340,0,7,YES
     040444  002032                          .WORD   T$CODE
     040446  040501                          .WORD   BRMSG
     040450  000340                          .WORD   340
     040452  000000                          .WORD   T$LOLIM
     040454  000007                          .WORD   T$HILIM
1181
1182 040456                          ENDHRD
                                             .EVEN
```

```
                040456                          L10057:
1183
1184                                            .EVEN
1185
1186 040456     102     125     123    CSRMSG: .ASCIZ  /BUS ADDRESS/
     040461     040     101     104
     040464     104     122     105
     040467     123     123     000
1187
1188 040472     126     105     103    VECMSG: .ASCIZ  /VECTOR/
     040475     124     117     122
     040500     000
1189
1190 040501     102     122     040    BRMSG:  .ASCIZ  /BR LEVEL/
     040504     114     105     126
     040507     105     114     000
1191
1192 040512     104     122     111    DRTYPE: .ASCIZ  /DRIVE TYPE = RL01/
     040515     126     105     040
     040520     124     131     120
     040523     105     040     075
     040526     040     122     114
     040531     060     061     000
1193
1194 040534     104     122     111    DRMSG:  .ASCIZ  /DRIVE/
     040537     126     105     000
1195
1196 040542     122     114     061    CNTYPE: .ASCIZ  /RL11/
     040545     061     000
1197
1198 040547                             ENDMOD
1199
1200                                            .EVEN
1201
1202 040550                             BGNMOD  SFTPRM
1203 040550                             BGNSFT
     040550  000016                               .WORD L1C060-L$SOFT/2
1204
1205 040552                             GPRML   SELQ,MISWI,4,YES
     040552  000130                             .WORD   T$CODE
     040554  040606                             .WORD   SELQ
     040556  000004                             .WORD   4
1206
1207 040560                             GPRML   ALGNQ,MISWI,10,YES
     040560  000130                             .WORD   T$CODE
     040562  040641                             .WORD   ALGNQ
     040564  000010                             .WORD   10
1208
1209 040566                             GPRML   MANQ,MISWI,100000,YES
     040566  000130                             .WORD   T$CODE
     040570  040700                             .WORD   MANQ
     040572  100000                             .WORD   100000
1210
1211 040574                             3$:     GPRMD   ERLIMQ,ERLIM,D,377,0,377,YES
     040574  004052                             .WORD   T$CODE
     040576  040735                             .WORD   ERLIMQ
     040600  000377                             .WORD   377
```

```
                040602  000000                          .WORD   T$LOLIM
                040604  000377                          .WORD   T$HILIM
          1212
          1213  040606                        ENDSFT
                                                .EVEN
                040606                        L10060:
          1214
          1215                                  .EVEN
          1216
          1217  040606      105     130     105   SELQ:   .ASCIZ  /EXECUTE DRIVE SELECT TESTS/
                040611      103     125     124
                040614      105     040     104
                040617      122     111     126
                040622      105     040     123
                040625      105     114     105
                040630      103     124     040
                040633      124     105     123
                040636      124     123     000
          1218
          1219  040641      105     130     105   ALGNQ:  .ASCIZ  /EXECUTE HEAD ALIGNMENT SUPPORT/
                040644      103     125     124
                040647      105     040     110
                040652      105     101     104
                040655      040     101     114
                040660      111     107     116
                040663      115     105     116
                040666      124     040     123
                040671      125     120     120
                040674      117     122     124
                040677      000
          1220
          1221  040700      104     117     040   MANQ:   .ASCIZ  /DO MANUAL INTERVENTION TESTS/
                040703      115     101     116
                040706      125     101     114
                040711      040     111     116
                040714      124     105     122
                040717      126     105     116
                040722      124     111     117
                040725      116     040     124
                040730      105     123     124
                040733      123     000
          1222
          1223  040735      111     116     120   ERLIMQ: .ASCIZ  /INPUT ERROR LIMIT/
                040740      125     124     040
                040743      105     122     122
                040746      117     122     040
                040751      114     111     115
                040754      111     124     000
          1224
          1225                                  .EVEN
          1226
          1227  040760                        ENDMOD
          1228
          1229  040760                        LASTAD
                                                .EVEN
                040760  000000                          .WORD   0
                040762  000000                          .WORD   0
```

```
      040764                            L$LAST::
1230                                    .EVEN
1231
1232  040764                            L$LAST::
1233
1234            000001                  .END
```

SYMBOL TABLE

```
ADR    = 000020 G      CNT    = 000012      C$PNTX= 000015      ERR1    012464 G      F$HW   = 000013
ALGNQ    040641        CNTYPE   040542      C$QIO = 000377      ERR10   014076 G      F$INIT= 000006
ALLCYL = 000001        COMPOP= 007777       C$RDBU= 000007      ERR2    012532 G      F$JMP  = 000050
ALLSEC= 000002         CONHNG= 000004       C$REFG= 000047      ERR3    012600 G      F$MOD  = 000000
ANYERR= 100000         CONTIN   015002      C$RESE= 000033      ERR4    012646 G      F$MSG  = 000011
ASSEMB= 000010         COSTAT= 000040       C$REVI= 000003      ERR5    012716 G      F$PROT= 000021
BADADD= 004000         COUNT    003154      C$RFLA= 000021      ERR6    012766 G      F$PWR  = 000017
BAMSK  = 000060        CRDYMS= 000200       C$RPT  = 000025     ERR7    013666 G      F$RPT  = 000012
BANAM    006125        CSNAM    006120      C$SEFG= 000046      ERR8    013736 G      F$SEG  = 000003
BASADD   006042        CSR    = 000000      C$SPRI= 000041      ERR9    014032 G      F$SOFT= 000005
BELL     011274        CSRMSG   040456      C$SVEC= 000037      EVL    = 000004 G     F$SRV  = 000010
BHSTAT= 000010         CURCYL   003104      C$TPRI= 000013      EXT05    032134       F$SUB  = 000002
BIT0   = 000001 G      CYLPER   007070      C10MS    011373     E$END  = 002100       F$SW   = 000014
BIT00  = 000001 G      CYLTBL   002604      C5SEC    011434     E$LOAD= 000035        F$TEST= 000001
BIT01  = 000002 G      CYLUP  = 000004      C500MS   011404     FBSFIL   003570       GBND     002310
BIT02  = 000004 G      CYLWD    010225      DANAM    006132     FMTOP1   011442       GDRSTA   020202
BIT03  = 000010 G      C$AU   = 000052      DATACM= 000001      FMTOP2   011471       GETPOS   023222
BIT04  = 000020 G      C$AUTO= 000061       DCKERR= 004000      FMTOP3   011513       GETSTA= 000003
BIT05  = 000040 G      C$BRK  = 000022      DCLIM  = 000012     FMT1     011534       GLBDAT   002224 G
BIT06  = 000100 G      C$BSEG= 000004       DCLIMW   014340     FMT1.1   011541       GLBEQA   002224 G
BIT07  = 000200 G      C$BSUB= 000002       DESDIF   003106     FMT11    011760       GLBERR   012464 G
BIT08  = 000400 G      C$CEFG= 000045       DESHD    003112     FMT12    011766       GLBSUB   016444 G
BIT09  = 001000 G      C$CLCK= 000062       DESSEC   003114     FMT13    011774       GLBTXT   005242 G
BIT1   = 000002 G      C$CLEA= 000012       DESSGN   003110     FMT14    012040       GSTAT    017076
BIT10  = 002000 G      C$CLOS= 000035       DIAGMC= 000000      FMT15    012072       GSTATC   017062
BIT11  = 004000 G      C$CLP1= 000006       DIFAUG   003076     FMT16    012126       GSTATG   017106
BIT12  = 010000 G      C$CVEC= 000036       DIFWD    010201     FMT17    012137       GSTATR   017046
BIT13  = 020000 G      C$DCLN= 000044       DIRBIT= 000004      FMT18    012161       GSTER1   006464
BIT14  = 040000 G      C$DODU= 000051       DIRMSK   002314     FMT19    012213       GTSTAT= 000104
BIT15  = 100000 G      C$DRPT= 000024       DLTERR= 010000      FMT2     011550       G$CNTO= 000200
BIT2   = 000004 G      C$DU   = 000053      DLYCNT   003142     FMT20    012250       G$DELM= 000372
BIT3   = 000010 G      C$EDIT= 000003       DONE     003006     FMT21    012300       G$DISP= 000003
BIT4   = 000020 G      C$ERDF= 000055       DRDYMS= 000001      FMT22    012323       G$EXCP= 000400
BIT5   = 000040 G      C$ERHR= 000056       DRMSG    040534     FMT23    012357       G$HILI= 000002
BIT6   = 000100 G      C$ERRO= 000060       DRSB   = 000010     FMT24    012373       G$LOLI= 000001
BIT7   = 000200 G      C$ERSF= 000054       DRSELT= 000004      FMT25    012400       G$NO   = 000000
BIT8   = 000400 G      C$ERSO= 000057       DRSET  = 000010     FMT26    012410       G$OFFS= 000400
BIT9   = 001000 G      C$ESCA= 000010       DRTYPE   040512     FMT27    012434       G$OFSI= 000376
BOE    = 000400 G      C$ESEG= 000005       DRVCNT   003074     FMT28    012453       G$PRMA= 000001
BRMSG    040501        C$ESUB= 000003       DRVERR= 040000      FMT3     011553       G$PRMD= 000002
BSFLAG   003020        C$ETST= 000001       DRVNAM   006053     FMT4     011556       G$PRML= 000000
BSFVAL   003372        C$EXIT= 000032       DSESTA= 000400      FMT5     011567       G$RADA= 000140
BSNSTR   010307        C$GETB= 000026       DSMSK  = 001400     FMT6     011607       G$RADB= 000000
BYPSNM   010240        C$GETW= 000027       DSPCOD   014342 G   FMT7     011651       G$RADD= 000040
CAFDT    011423        C$GMAN= 000043       EF.CON= 000036 G    FMT8     011721       G$RADL= 000120
CAMSK    002312        C$GPHR= 000042       EF.NEW= 000035 G    FMT9     011753       G$RADO= 000020
CCYLUP   011412        C$GPLO= 000030       EF.PWR= 000034 G    FOLWRT= 000100        G$XFER= 000004
CDRDY    011353        C$GPRI= 000040       EF.RES= 000037 G    FRMWD    010232       G$YES  = 000010
CHOSHD   022020        C$INIT= 000011       EF.STA= 000040 G    FWDSKO= 002000        HADONE   003010
CKDATA= 000102         C$INLP= 000020       ERHEAD   003012     FWDSKS= 000400        HAMES1   007154
CKERLM   016444        C$MANI= 000050       ERLIM  = 000010     F$AU   = 000015       HAMES2   007237
CLKADR   003146        C$MEM  = 000031      ERLIMQ   040735     F$AUTO= 000020        HAMES3   007343
CLKFLG   003144        C$MSG  = 000023      ERLIMW   014336     F$BGN  = 000040       HAMES4   007406
CLKINT   016430 G      C$OPEN= 000034       ERRCNT   003160     F$CLEA= 000007        HCESTA= 040000
CLNCOD   016174 G      C$PNTB= 000014       ERRPDI   003156     F$DU   = 000016       HCRCER= 004000
CLRBYT   002304        C$PNTF= 000017       ERRSWI   003016     F$END  = 000041       HDALIG= 000010
CLRPAR   025146        C$PNTS= 000016       ERRVEC   003140     F$HARD= 000004        HDCYL    002316
```

SYMBOL TABLE

```
HDHSEL= 000100          LAB1    006144          L$SPCP  002020 G        L10057  040456          MRSLT   005423
HDMOVF  007031          LAB2    006157          L$SPTP  002024 G        L10060  040606          MSEEK   005242
HDRCMP= 000002          LBASE   003150          L$STA   002030 G        MANQ    040700          MSPERR  010662
HDR40 = 100000          LCLEXT  033406          L$SW    014326 G        MBADAD  005721          MSTERR  010715
HDSEC = 000077          LCLK    014514          L$TEST  002114 G        MBADSF  005742          MTMBS   006020
HDSEL = 000020          LCLK1   014522          L$TIML  002014 G        MBHSTA  010575          MTOSLO  006200
HDWD    010214          LOCERR  003364          L$UNIT  002012 G        MBSETO= 000001          MULOAD  005434
HDWRD1  003052          LOCYL = 040000          L.BA    003036          MCERR   010415          MUNDEF  011103
HDWRD2  003054          LOE   = 040000 G        L.CS    003034          MCONHN  006273          MVOLCK  010551
HDWRD3  003056          LOLIM = 000002          L.DA    003040          MCOSTA  010562          MWDERR  010751
HEAD  = 000006          LOLIMW  014330          L.MP    003042          MCYLOC  011052          MWGERR  010700
HEADLM= 010000          LOT   = 000010 G        L10000  012530          MCYLUP  005445          MWLSTA  010610
HEADW   014334          LPT05   031714          L10001  012576          MDATCP  005327          MWORD   006172
HICYL = 020000          L$ACP   002110 G        L10002  012644          MDCRL   010437          MWRCHK  005271
HILIM = 000004          L$APT   002036 G        L10003  012714          MDHEDR  002000 G        MWRITE  005303
HILIMW  014332          L$AUT   002070 G        L10004  012764          MDLT    010464          MWRSET  005400
HLMTW   002302          L$AUTO  015636 G        L10005  013664          MDRDY   010404          MWRTAB  011211
HNFERR= 010000          L$CCP   002106 G        L10006  013734          MDRERR  010526          M40HDR  005364
HOE   = 100000 G        L$CLEA  016174 G        L10007  014030          MDRRES  006220          NEWCYL  003102
HOSTAT= 000020          L$CO    002032 G        L10010  014074          MDRVST  010647          NOCLR = 000010
HPTCOD  014306 G        L$DEPO  002011 G        L10011  014304          MDSERR  010632          NOCTLR  006754
HRDPRM  040374 G        L$DESC  002122 G        L10012  014324          MERRS   011265          NOERCT  003365
HRDWTS  025176 G        L$DESP  002076 G        L10013  014342          MEXERS  011225          NOIRPT= 000002
HSMSK - 000100          L$DEVP  002060 G        L10015  015634          MFLERR  011013          NOOP  = 000100
HSSTAT= 000100          L$DISP  014344 G        L10016  016172          MFMTER  005773          NOPCLK  014442
IBE   = 010000 G        L$DLY   002116 G        L10017  016362          MFOLWR  005521          NOPWR   006060
IBUFF   003764          L$DTP   002040 G        L10020  016366          MFWDSK  005576          NOTRDY  007003
IDU   = 000040 G        L$DTYP  002034 G        L10021  016426          MFWSKO  005631          NOTST   006664
IER   = 020000 G        L$DU    016364 G        L10022  016434          MGTSTA  005315          NSTACH  006416
INITCO  014412 G        L$DUT   002072 G        L10023  016442          MHCERR  010733          NXMERR= 020000
INITST  006515          L$DVTY  002212 G        L10024  025454          MHCRC   010427          NXTHL   002306
INOUTS= 000020          L$EF    002052 G        L10025  025662          MHDERR  010776          NXTPAS  015022
INTEBL= 000100          L$ENVI  002044 G        L10026  030342          MHDRCP  005346          OBUFF   004364
INTHLR  016370 G        L$ETP   002102 G        L10027  031530          MHFCRC  010476          OLDCYL  003100
ISR   = 000100 G        L$EXP1  002046 G        L10030  031426          MHNF    010450          ONSWAP  022104
IXE   = 004000 G        L$EXP4  002064 G        L10031  032134          MHOSTA  010621          OPFLAG  003004
I$AU  = 000041          L$EXP5  002066 G        L10032  032042          MHSTA   010537          OPIERR= 002000
I$AUTO= 000041          L$HARD  040376 G        L10033  033406          MINOUT  005476          OPMSGS  002224
I$CLN = 000041          L$HIME  002120 G        L10034  033332          MISTST  006373          OPR002  007470
I$DU  = 000041          L$HPCP  002016 G        L10035  034300          MISWI = 000000          OPR003  007515
I$HRD = 000041          L$HPTP  002022 G        L10036  034366          MISWIW  014326          OPR004  010164
I$INIT= 000041          L$HW    014310 G        L10037  035022          MITEST= 100000          OPR1    007540
I$MOD = 000041          L$ICP   002104 G        L10040  035500          MNDRST  011057          OPR1A   010135
I$MSG = 000041          L$IWIT  014412 G        L10041  035460          MNEERR  011041          OPR1B   010141
I$PROT= 000040          L$LADP  002026 G        L10042  036256          MNOCLR  006307          OPR10   010003
I$PTAB= 000041          L$LAST  040764 G        L10043  036154          MNOINT  006240          OPR11   010051
I$PWR = 000041          L$LOAD  002100 G        L10044  036254          MOPER   005414          OPR12   010102
I$RPT = 000041          L$LUN   002074 G        L10045  036730          MOPERR  010766          OPR12A  010121
I$SEG = 000041          L$MREV  002050 G        L10046  036710          MORECE  003014          OPR2    007616
I$SETU= 000041          L$NAME  002000 G        L10047  037150          MOUTIN  005455          OPR3    007651
I$SFT = 000041          L$PRIO  002042 G        L10050  037062          MPNAM   006137          OPR6    007665
I$SRV = 000041          L$PROT  014404 G        L10051  037430          MQUALS= 003760          OPR7    007720
I$SUB = 000041          L$PRT   002112 G        L10052  037406          MREAD   005250          OPR8    007747
I$TST = 000041          L$REPP  002062 G        L10053  040076          MREADH  005261          OPR9    007766
JJJ     002300          L$REV   002010 G        L10054  040040          MRESKO  005665          OUTINS= 000040
J$JMP = 000167          L$SOFT  040552 G        L10055  040372          MREVSK  005543          O$APTS= 000000
LAB     014754          L$SPC   002056 G        L10056  040336          MRLFAL  011150          O$AU  = 000000
```

SYMBOL TABLE

```
O$BGNR= 000000          RELDWT= 040000          SVCTAG= 000000          T$TSTM= 177777          T16.1   040154
O$BGNS= 000001          RESE3   011300          SVCTST= 000001          T$TSTS= 000001          T172$   037522
O$DU  = 000001          RESE4   011304          SWAPHD  022044          T$$AUT= 010016          T1765$  040076
O$ERRT= 000000          RESE5   011311          S$LSYM= 010000          T$$CLE= 010017          T1865$  040372
O$GNSW= 000001          RESE6   011316          TBLSTR  003024          T$$DU = 010020          T187$   040154
O$POIN= 000001          RESPAR  003062          TBT     002544          T$$HAR= 010057          T2      025456 G
O$SETU= 000000          RESTAR  014772          TCERR   010363          T$$HW = 010012          T25TBL  002430
PART1 = 000C01 G        RESTBL  002320          TCLK    014564          T$$INI= 010015          T25TB2  002456
PASCNT  003152          REVSKO= 001000          TEMP0   003116          T$$MSG= 010011          T3      025664 G
PASNEW  015030          REVSKS= 000200          TEMP1   003120          T$$PRO= 010014          T33TBL  002504
PASNUM  003360          RLBA  = 000002          TEMP2   003122          T$$SOF= 010060          T365$   030342
PATTBL  002360          RLBAS   003026          TEMP3   003124          T$$SRV= 010023          T4      030344 G
PAT1    004764          RLCS  = 000000          TEMP4   003126          T$$SUB= 010056          T4.1    030364
PAT10   005240          RLCSR = 000000          TEMP5   003130          T$$SW = 010013          T465$   031420
PAT2    004766          RLDA  = 000004          TEMP6   003132          T$$TES= 010055          T5      031532 G
PAT3    005026          RLDRV   003032          TEMP7   003134          T.BA    003046          T5.1    032024
PAT4    005066          RLMP  = 000006          TEMP8   003136          T.CS    003044          T504$   032056
PAT5    005126          RLVEC   003030          TOSLOW= 000001          T.DA    003050          T6      032136 G
PAT6    005134          RORWOP= 020000          TRPFLG  003366          T.DRIV  002276          T6.1    032650
PAT7    005174          RPTOP   023716          TRPHAN  016436 G        T.MP    003052          T7      033410 G
PAT8    005176          RPTREM  024712          TSTCLK  014556          T.STAT  003060          T8      034302 G
PAT9    005236          RPTRES  024504          TSTINT  017030          T05ERR  006530          T9      034370 G
PCLK    014412          RSTRT   014710          TSTLAB  006365          T09ERR  006543          UAM   = 000200 G
PNT   = 001000 G        SAMSK = 000077          TST4    030364          T1      025176 G        ULOAD = 000010
POSHD0  022624          SBSFIL  003374          TY.UR = 000006          T10     035024 G        UNDTST  010151
POSHSE  022620          SECWD   010220          T$ARGC= 000002          T10ERR  006553          UNXERR  006350
POSHW1  022612          SEEK  = 000106          T$CODE= 004052          T10.1   035056          VCNRST  006327
PRI   = 002000 G        SEEKOP= 010000          T$ERRN= 000311          T104$   035056          VCSTAT= 001000
PRIOR = 000004          SELQ    040606          T$EXCP= 000000          T11     035502 G        VECMSG  040472
PRI00 = 000000 G        SEQMES  010253          T$FLAG= 000040          T11.1   036002          VECT  = 000002
PRI01 = 000040 G        SETDON  015056          T$GMAN= 000000          T11.2   036156          WAITIN  016636
PRI02 = 000100 G        SFTPRM  040550 G        T$HILI= 000377          T115$   036156          WCMSK = 017777
PRI03 = 000140 G        SGNWD   010207          T$LAST= 000001          T12     036260 G        WCRNG = 160000
PRI04 = 000200 G        SIMSEK  021152          T$LOLI= 000000          T12ERR  006573          WDESTA= 100000
PRI05 = 000240 G        SPDERR  006430          T$LSYM= 010000          T12.1   036306          WGESTA= 002000
PRI06 = 000300 G        SPDSTA= 004000          T$LTNO= 000020          T124$   036306          WLSTAT= 020000
PRI07 = 000340 G        SPTCOD  014324 G        T$NEST= 177777          T13     036732 G        WRTSWI  003022
PSETNM  003362          SSINDX  003002          T$NS0 = 000000          T13ERR  006605          WTDATA= 000112
PWCON   015300          STAMES  010276          T$NS1 = 000005          T13.1   036756          XRDHD   022140
PWRFLG  003370          STAMSK= 000007          T$NS2 = 000002          T134$   036756          XRDHDC  022130
P2T01E  006645          STATE2  011323          T$PTNU= 000000          T14     037152 G        XRDHDG  022144
P2T02E  006645          STATE3  011333          T$SAVL= 177777          T14ERR  006621          XSEEK   020362
RDALHD  023350          STATE5  011343          T$SEGL= 177777          T14.1   037174          XSEEKT  020352
RDDATA= 000114          STOSTA= 010000          T$SUBN= 000001          T15     037432 G        XSEEK1  020366
RDHEAD= 000110          SUBSTK  002404          T$TAGL= 177777          T15.1   037522          X$ALWA= 000000
RDNOHR= 000116          SVCBGL= 000001          T$TAGN= 010061          T153$   037174          X$FALS= 000040
RDYCHK  021462          SVCGBL= 000000          T$TEMP= 000000          T16     040100 G        X$OFFS= 000400
RDYWAI  022650          SVCINS= 000000          T$TEST= 000020          T16ERR  006635          X$TRUE= 000020
READRL  016604          SVCSUB= 000001

. ABS.  040764      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  30464 WORDS  ( 119 PAGES)
DYNAMIC MEMORY AVAILABLE FOR  71 PAGES
.CZRLID/C=SVC33.SRC/P:1,CZRLID.P11
```

CROSS REFERENCE TABLE (CREF V04.00)

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ADR       2-5#
ALGNQ     9-<07     9-<19#
ALLCYL    2-24#
ALLSEC    2-25#
ANYERR    2-77#     8-162     8-507     8-785     9-429
ASSEMB    1-8       1-8
BADADD    2-56#
BAMSK     2-88#
BANAM     6-391#    8-<50
BASADD    6-387#    7-421     7-655     7-690     7-701     8-15      8-<48     9-17      9-60      9-98      9-102     9-276     9-284     9-336
          9-355     9-516     9-527     9-761     9-772
BELL      7-80#
BHSTAT    3-24#     9-30      9-160     9-167     9-178     9-544
BIT0      2-5#      9-682     9-:88     9-;56
BIT00     2-5       2-5#      2-24      2-46      2-65      8-;95
BIT01     2-5       2-5#      2-25      2-45      2-66
BIT02     2-5       2-5#      2-26      2-47      2-67
BIT03     2-5       2-5#      2-27      2-48      2-68
BIT04     2-5       2-5#      2-49
BIT05     2-5       2-5#      2-50
BIT06     2-5       2-5#      2-51
BIT07     2-5       2-5#      2-52
BIT08     2-5       2-5#      2-53
BIT09     2-5       2-5#      2-54
BIT1      2-5#
BIT10     2-5#      2-55      8-135     8-213     8-294     8-357     8-598     8-884
BIT11     2-5#      2-56
BIT12     2-5#      2-28      2-57
BIT13     2-5#      2-29      2-58
BIT14     2-5#      2-30      2-59
BIT15     2-5#      2-31      2-60      7-320
BIT2      2-5#
BIT3      2-5#
BIT4      2-5#
BIT5      2-5#
BIT6      2-5#
BIT7      2-5#
BIT8      2-5#
BIT9      2-5#      7-284
BOE       2-5#
BRMSG     9-;80     9-;90#
BSFLAG    6-152#
BSFVAL    6-249#
BSNSTR    7-42#
BYPSNM    7-39#
C$AU      1-8#
C$AUTO    1-8#      7-705
C$BRK     1-8#      7-651     7-721     8-99      8-116     8-151     8-504     8-761     8-774     8-779     9-521     9-535     9-639     9-705
          9-799     9-854     9-:36     9-:63     9-:74     9-;15
C$BSEG    1-8#
C$BSUB    1-8#      9-268     9-379     9-455     9-686     9-774     9-807     9-836     9-909     9-957     9-:33     9-;12
C$CEFG    1-8#
C$CLCK    1-8#      7-486
C$CLEA    1-8#      7-727
C$CLOS    1-8#
C$CLP1    1-8#
```

CROSS REFERENCE TABLE (CREF V04.00)

CROSS REFERENCE TABLE (CREF V04.00)

	7-4>9#	7-461	7-461#	7-468	7-468#	7-480	7-480#	7-667	7-667#	7-710	7-710#	7-733	7-733#	8-4
	8-4#	8-<68	8-<68#	9-1	9-1#	9-;64	9-,64#	9-;67	9-;67#	9-;98	9-;98#	9-<02	9-<02#	9-<27
	9-<27#													
I$MSG	1-8#	7-189#	7-201#	7-203#	7-215#	7-217#	7-229#	7-231#	7-244#	7-246#	7-259#	7-261#	7-364#	7-366#
	7-378#	7-380#	7-400#	7-402#	7-414#	7-415#	7-428#							
I$PROT	1-8#	7-471#												
I$PTAB	1-8#													
I$PWR	1-8#													
I$RPT	1-8#													
I$SEG	1-8#	9-7	9-51	9-84	9-259	9-268	9-349	9-379	9-400	9-455	9-500	9-592	9-614	9-676
	9-686	9-750	9-774	9-807	9-827	9-836	9-900	9-909	9-949	9-957	9-:16	9-:33	9-;00	9-;12
I$SETU	1-8#													
I$SFT	9-<03#	9-<13#												
I$SRV	1-8#	7-739#	7-748#	7-752#	7-754#	7-758#	7-760#							
I$SUB	1-8#	9-7	9-51	9-84	9-259	9-268	9-268#	9-307	9-319	9-334	9-334#	9-334#	9-349	9-379
	9-379#	9-384	9-384#	9-384#	9-400	9-455	9-455#	9-475	9-482	9-488	9-488#	9-488#	9-500	9-592
	9-614	9-676	9-686	9-686#	9-699	9-711	9-721	9-725	9-734	9-739	9-739#	9-739#	9-750	9-774
	9-774#	9-805	9-805#	9-805#	9-807	9-807#	9-820	9-820#	9-820#	9-827	9-836	9-836#	9-849	9-860
	9-871	9-876	9-884	9-889	9-889#	9-889#	9-900	9-909	9-909#	9-926	9-931	9-931#	9-931#	9-949
	9-957	9-957#	9-:05	9-:05#	9-:05#	9-:16	9-:33	9-:33#	9-:83	9-:83#	9-:83#	9-;00	9-;12	9-;12#
	9-;51	9-;51#	9-;51#											
I$TST	1-8#	9-7	9-7#	9-45	9-45#	9-45#	9-51	9-51#	9-79	9-79#	9-79#	9-84	9-84#	9-91
	9-125	9-144	9-163	9-174	9-185	9-193	9-202	9-215	9-227	9-232	9-237	9-254	9-254#	9-254#
	9-259	9-259#	9-266	9-268	9-344	9-344#	9-344#	9-349	9-349#	9-379	9-395	9-395#	9-395#	9-400
	9-400#	9-405	9-455	9-495	9-495#	9-495#	9-500	9-500#	9-505	9-548	9-558	9-580	9-587	9-587#
	9-587#	9-592	9-592#	9-609	9-609#	9-609#	9-614	9-614#	9-635	9-645	9-654	9-659	9-667	9-671
	9-671#	9-671#	9-676	9-676#	9-686	9-745	9-745#	9-745#	9-750	9-750#	9-758	9-774	9-807	9-822
	9-822#	9-822#	9-827	9-827#	9-836	9-895	9-895#	9-895#	9-900	9-900#	9-909	9-944	9-944#	9-944#
	9-949	9-949#	9-957	9-:11	9-:11#	9-:11#	9-:16	9-:16#	9-:33	9-:84	9-:95	9-:95#	9-:95#	9-;00
	9-;00#	9-;12	9-;52	9-;63	9-;63#	9-;63#								
IBE	2-5#													
IBUFF	6-254#	7-344	8-879	9-971										
IDU	2-5#													
IER	2-5#													
INITCO	7-480#													
INITST	6-410#	9-506	9-593											
INOUTS	2-49#	2-61												
INTEBL	2-87#													
INTHLR	7-624	7-739#												
ISR	2-5#													
IXE	2-5#													
J$JMP	1-8#													
JJJ	5-29#													
L$ACP	1-17#													
L$APT	1-17#													
L$AUT	1-17#													
L$AUTO	1-17	7-679#												
L$CCP	1-17#													
L$CLEA	1-17	7-711#												
L$CO	1-17#													
L$DEPO	1-17#													
L$DESC	1-17	1-20#												
L$DESP	1-17#													
L$DEVP	1-17#													
L$DISP	1-17	7-463#												
L$DLY	1-17#	7-281	7-651	7-721	8-50	8-99	8-116	8-139	8-151	8-159	8-316	8-380	8-493	8-504

```
          8-605     8-768     8-779     9-468     9-:74
LSDTP     1-17#
LSDTYP    1-17#
LSDU      1-17      7-729#
LSDUT     1-17#
LSDVTY    1-17      1-22#
LSEF      1-17#
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LSEXP4    1-17#
LSEXP5    1-17#
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LSHIME    1-17#
LSHPCP    1-17#
LSHPTP    1-17#
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LSICP     1-17#
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LSNAME    1-17#
LSPRIO    1-17#
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LSSTA     1-17#
LSSW      1-17      7-444     7-444#
LSTEST    1-17#
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LSUNIT    1-17#     7-546     7-553     7-582     9-409     9-412
L.BA      6-161#    8-885*    8-891     8-<51
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          9-778*    9-779*    9-783     9-795*    9-796*    9-798
L.DA      6-162#    8-129*    8-131*    8-137     8-144     8-208*    8-216     8-886*    8-889*    8-890     8-;87     8-<51     9-423*    9-424
          9-460*    9-465     9-780*    9-782     9-790*    9-794*    9-797
L.MP      6-163#    8-125     8-204     8-588     8-<51
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L10005    7-364#
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L10007    7-400#
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L10011    7-428#
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CROSS REFERENCE TABLE (CREF V04.00)

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L10015   7-665#
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L10021   7-748#
L10022   7-754#
L10023   7-760#
L10024   9-45#
L10025   9-79#
L10026   9-91     9-125   9-144   9-163   9-174   9-185   9-193   9-202   9-215   9-227   9-232   9-237   9-254#
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L10030   9-307    9-319   9-334#
L10031   9-395#
L10032   9-384#
L10033   9-405    9-495#
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L10036   9-609#
L10037   9-635    9-645   9-654   9-659   9-667   9-671#
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L10041   9-699    9-711   9-721   9-725   9-734   9-739#
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L10043   9-805#
L10044   9-820#
L10045   9-895#
L10046   9-849    9-860   9-871   9-876   9-884   9-889#
L10047   9-944#
L10050   9-926    9-931#
L10051   9-:11#
L10052   9-:05#
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L10054   9-:83#
L10055   9-:52    9-:63#
L10056   9-:51#
L10057   9-:68    9-:82#
L10060   9-<03    9-<13#
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         9-426    9-458   9-476   9-508   9-651   9-717   9-867
LCLEXT   9-433    9-494#
LCLK     7-497    7-509#
LCLK1    7-509    7-511#
LOCERR   6-243#
LOCYL    2-30#    7-563
LOE      2-5#
LOLIM    2-17#
LOLIMW   7-453#   7-565*
LOT      2-5#
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MANQ     9-<09    9-<21#
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CROSS REFERENCE TABLE (CREF V04.00)

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MULOAD   5-18     6-374#
MUNDEF   7-75#    8-119
MVOLCK   7-56#    9-230    9-561
MWDERR   5-47     7-68#
MWGERR   5-52     7-65#
MWLSTA   7-59#    9-36     9-76     9-569
MWORD    6-396#   7-349    7-422    7-424
MWRCHK   5-8      6-365#
MWRITE   5-12     6-366#
MWRSET   5-14     6-371#
MWRTAB   7-77#
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         8-552*   9-616    9-678    9-829    9-902    9-:30    9-;08
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NOCTLR   6-421#   7-488
NOERCT   6-244#   7-190    7-262    8-71*
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NOOP     2-41#
NOPCLK   7-488    7-492#
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NOTRDY   6-422#   7-699
NOTST    6-420#   7-529
NSTACH   6-407#   9-106    9-186    9-204    9-269
NXMERR   2-79#
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NXTPAS   7-577#   7-592    7-594
OSAPTS   1-8#     1-17
OSAU     1-8#     1-17
OSBGNR   1-8#     1-17
OSBGNS   1-8#     1-14#    1-17
OSDU     1-8#     1-14#    1-17
OSERRT   1-8#     1-17
OSGNSW   1-8#     1-14#    1-17
OSPOIN   1-8#     1-14     1-14#    1-14#    1-14#    1-17
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         9-302*   9-303    9-304    9-338*   9-339    9-340    9-357*   9-358    9-359    9-375*   9-376    9-377    9-390*   9-391
         9-392    9-450*   9-451    9-452    9-490*   9-491    9-492    9-528*   9-529    9-530    9-814*   9-815    9-816
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OPMSGS   5-7#     8-;84    8-<00    8-<04
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OPR004   7-32#
OPR1     7-17#    9-17
OPR10    7-24#    9-432
OPR11    7-25#    9-489
OPR12    7-27#    9-813
OPR12A   7-28#    9-772
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CROSS REFERENCE TABLE (CREF V04.00)

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REVSKS   2-52#    2-61
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RLCSR    2-76#    8-24     8-35     8-138*   8-218*   8-604*   9-457*   9-467*   9-783*   9-798*
RLDA     2-72#    7-277*   8-26     8-137*   8-216*   8-313*   8-373*   8-602*   8-890*   9-424*   9-465*   9-782*   9-797*
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         9-373    9-387*   9-436    9-449    9-456    9-516    9-527    9-755    9-759    9-761    9-772    9-778    9-795
RLMP     2-73#    7-286    8-27     8-630    8-631    8-881
RLVEC    6-157#   7-624    7-722
RORWOP   2-58#    8-;72    8-;80    8-;83    8-<09
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SGNWD    7-34#    8-<08
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SPDSTA   3-31#    8-108    9-139
SPTCOD   7-443#
SSINDX   6-143#   7-543*   8-87     8-91*    8-185*   8-243    8-247*   8-328*   8-344    8-348*   8-387*   8-479    8-483*   8-512*
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STAMSK   3-23#    8-143    8-225
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STATE3   7-90#    9-195
STATE5   7-91#    9-248
STOSTA   3-32#
SUBSTK   6-16#    8-89*    8-90*    8-245*   8-246*   8-346*   8-347*   8-481*   8-482*   8-579*   8-580*   8-753*   8-754*   8-810*
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SVCBGL   1-11#
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CROSS REFERENCE TABLE (CREF V04.00)

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	9-900	9-949	9-:16	9-;00										
SWAPHD	8-536#	9-:90	9-;58											
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T$$DU	7-729#	7-731												
T$$HAR	9-;68	9-;68#	9-;82											
T$$HW	7-433	7-433#	7-440											
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T$$PRO	7-471#													
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	9-231#	9-236	9-236#	9-250	9-250#	9-306	9-306#	9-318	9-318#	9-330	9-330#	9-474	9-474#	9-481
	9-481#	9-547	9-547#	9-557	9-557#	9-570	9-570#	9-579	9-579#	9-606	9-606#	9-634	9-634#	9-644
	9-644#	9-653	9-653#	9-658	9-658#	9-666	9-666#	9-668	9-668#	9-698	9-698#	9-710	9-710#	9-720
	9-720#	9-724	9-724#	9-733	9-733#	9-735	9-735#	9-848	9-848#	9-859	9-859#	9-870	9-870#	9-875
	9-875#	9-883	9-883#	9-885	9-885#	9-925	9-925#	9-927	9-927#	9-942	9-942#	9-985	9-985#	9-991
	9-991#	9-:71	9-:71#	9-:78	9-:78#	9-;48	9-;48#							
T$EXCP	9-;72	9-;72#	9-;74	9-;74#	9-;76	9-;76#	9-;80	9-;80#	9-<11	9-<11#				
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	9-163#	9-163#	9-174	9-174	9-174#	9-174#	9-185	9-185	9-185#	9-185#	9-193	9-193	9-193#	9-193#
	9-202	9-202	9-202#	9-202#	9-215	9-215	9-215#	9-215#	9-227	9-227	9-227#	9-227#	9-232	9-232
	9-232#	9-232#	9-237	9-237	9-237#	9-237#	9-266	9-266	9-266#	9-266#	9-307	9-307	9-307#	9-307#
	9-319	9-319	9-319#	9-319#	9-405	9-405	9-405#	9-405#	9-475	9-475	9-475#	9-475#	9-482	9-482
	9-482#	9-482#	9-505	9-505	9-505#	9-505#	9-548	9-548	9-548#	9-548#	9-558	9-558	9-558#	9-558#
	9-580	9-580	9-580#	9-580#	9-635	9-635	9-635#	9-635#	9-645	9-645	9-645#	9-645#	9-654	9-654
	9-654#	9-654#	9-659	9-659	9-659#	9-659#	9-667	9-667	9-667#	9-667#	9-699	9-699	9-699#	9-699#
	9-711	9-711	9-711#	9-711#	9-721	9-721	9-721#	9-721#	9-725	9-725	9-725#	9-725#	9-734	9-734
	9-734#	9-734#	9-758	9-758	9-758#	9-758#	9-849	9-849	9-849#	9-849#	9-860	9-860	9-860#	9-860#

	9-871	9-871	9-871#	9-871#	9-876	9-876	9-876#	9-876#	9-884	9-884	9-884#	9-884#	9-926	9-926
	9-926#	9-926#	9-:84	9-:84#	9-:84#	9-;52	9-;52#	9-;52#						
TSGMAN	1-8#													
TSHILI	9-;72	9-;72#	9-;74	9-;74#	9-;76	9-;76#	9-;80	9-;80#	9-<11	9-<11#				
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TSLSYM	1-8	1-8#	7-201	7-215	7-229	7-244	7-259	7-364	7-378	7-400	7-414	7-428	7-440	7-458
	7-665	7-705	7-727	7-731	7-748	7-754	7-760	9-45	9-79	9-254	9-334	9-344	9-384	9-395
	9-488	9-495	9-587	9-609	9-671	9-739	9-745	9-805	9-820	9-822	9-889	9-895	9-931	9-944
	9-:05	9-:11	9-:83	9-:95	9-;51	9-;63	9-;82	9-<13						
TSLTNO	9-<29#													
TSNEST	1-8#	1-16	1-16	1-16#	1-18	1-18	1-18	1-18#	2-3	2-3	2-3#	3-37	3-37	3-37
	3-37#	5-4	5-4	5-4#	6-353	6-353	6-353	6-353#	6-361	6-361	6-361#	7-132	7-132	7-132
	7-132#	7-141	7-141	7-141#	7-189	7-189	7-189#	7-201	7-201	7-201	7-201#	7-203	7-203	7-203#
	7-215	7-215	7-215	7-215#	7-217	7-217	7-217#	7-229	7-229	7-229	7-229#	7-231	7-231	7-231#
	7-244	7-244	7-244	7-244#	7-246	7-246	7-246#	7-259	7-259	7-259	7-259#	7-261	7-261	7-261#
	7-364	7-364	7-364	7-364#	7-366	7-366	7-366#	7-378	7-378	7-378	7-378#	7-380	7-380	7-380#
	7-400	7-400	7-400	7-400#	7-402	7-402	7-402#	7-414	7-414	7-414	7-414#	7-415	7-415	7-415#
	7-428	7-428	7-428	7-428#	7-429	7-429	7-429	7-429#	7-432	7-432	7-432#	7-433	7-433	7-433#
	7-440	7-440	7-440	7-440#	7-441	7-441	7-441	7-441#	7-443	7-443	7-443#	7-444	7-444	7-444#
	7-458	7-458	7-458	7-458#	7-459	7-459	7-459	7-459#	7-461	7-461	7-461#	7-468	7-468	7-468
	7-468#	7-471	7-471	7-471#	7-475	7-475	7-475	7-475#	7-480	7-480	7-480#	7-481	7-481	7-481#
	7-665	7-665	7-665	7-665#	7-667	7-667	7-667	7-667#	7-679	7-679	7-679#	7-705	7-705	7-705
	7-705#	7-710	7-710	7-710#	7-711	7-711	7-711#	7-727	7-727	7-727	7-727#	7-729	7-729	7-729#
	7-731	7-731	7-731	7-731#	7-733	7-733	7-733	7-733#	7-739	7-739	7-739#	7-748	7-748	7-748
	7-748#	7-752	7-752	7-752#	7-754	7-754	7-754	7-754#	7-758	7-758	7-758#	7-760	7-760	7-760
	7-760#	8-4	8-4	8-4#	8-<68	8-<68	8-<68	8-<68#	9-1	9-1	9-1#	9-7	9-7	9-7#
	9-45	9-45	9-45	9-45#	9-51	9-51	9-51#	9-79	9-79	9-79	9-79#	9-84	9-84	9-84#
	9-254	9-254	9-254	9-254#	9-259	9-259	9-259#	9-268	9-268	9-268#	9-334	9-334	9-334	9-334#
	9-344	9-344	9-344	9-344#	9-349	9-349	9-349#	9-379	9-379	9-379#	9-384	9-384	9-384	9-384#
	9-395	9-395	9-395	9-395#	9-400	9-400	9-400#	9-455	9-455	9-455#	9-488	9-488	9-488	9-488#
	9-495	9-495	9-495	9-495#	9-500	9-500	9-500#	9-587	9-587	9-587	9-587#	9-592	9-592	9-592#
	9-609	9-609	9-609	9-609#	9-614	9-614	9-614#	9-671	9-671	9-671	9-671#	9-676	9-676	9-676#
	9-686	9-686	9-686#	9-739	9-739	9-739	9-739#	9-745	9-745	9-745	9-745#	9-750	9-750	9-750#
	9-774	9-774	9-774#	9-805	9-805	9-805	9-805#	9-807	9-807	9-807#	9-820	9-820	9-820	9-820#
	9-822	9-822	9-822	9-822#	9-827	9-827	9-827#	9-836	9-836	9-836#	9-889	9-889	9-889	9-889#
	9-895	9-895	9-895	9-895#	9-900	9-900	9-900#	9-909	9-909	9-909#	9-931	9-931	9-931	9-931#
	9-944	9-944	9-944	9-944#	9-949	9-949	9-949#	9-957	9-957	9-957#	9-:05	9-:05	9-:05	9-:05#
	9-:11	9-:11	9-:11	9-:11#	9-:16	9-:16	9-:16#	9-:33	9-:33	9-:33#	9-:83	9-:83	9-:83	9-:83#
	9-:95	9-:95	9-:95	9-:95#	9-;00	9-;00	9-;00#	9-;12	9-;12	9-;12#	9-;51	9-;51	9-;51	9-;51#
	9-;63	9-;63	9-;63	9-;63#	9-;64	9-;64	9-;64	9-;64#	9-;67	9-;67	9-;67#	9-;68	9-;68	9-;68#
	9-;82	9-;82	9-;82	9-;82#	9-;98	9-;98	9-;98	9-;98#	9-<02	9-<02	9-<02#	9-<03	9-<03	9-<03#
	9-<13	9-<13	9-<13	9-<13#	9-<27	9-<27	9-<27	9-<27#						
TSNS0	1-16#	1-18	2-3#	3-37	5-4#	6-353	6-361#	7-132	7-141#	7-429	7-432#	7-441	7-443#	7-459
	7-461#	7-468	7-471#	7-475	7-480#	7-667	7-679#	7-705	7-710#	7-733	7-739#	7-748	7-752#	7-754
	7-758#	7-760	8-4#	8-<68	9-1#	9-;64	9-;67#	9-;98	9-<02#	9-<27				
TSNS1	7-189#	7-201	7-203#	7-215	7-217#	7-229	7-231#	7-244	7-246#	7-259	7-261#	7-364	7-366#	7-378
	7-380#	7-400	7-402#	7-414	7-415#	7-428	7-433#	7-440	7-444#	7-458	7-481#	7-665	7-711#	7-727
	7-729#	7-731	9-7#	9-45	9-51#	9-79	9-84#	9-254	9-259#	9-344	9-349#	9-395	9-400#	9-495
	9-500#	9-587	9-592#	9-609	9-614#	9-671	9-676#	9-745	9-750#	9-822	9-827#	9-895	9-900#	9-944
	9-949#	9-:11	9-:16#	9-:95	9-;00#	9-;63	9-;68#	9-;82	9-<03#	9-<13				
TSNS2	9-268#	9-334	9-379#	9-384	9-455#	9-488	9-686#	9-739	9-774#	9-805	9-807#	9-820	9-836#	9-889
	9-909#	9-931	9-957#	9-:05	9-:33#	9-:83	9-;12#	9-;51						
TSPTNU	1-8#													
TSSAVL	1-8#													
TSSEGL	1-8#													

CROSS REFERENCE TABLE (CREF V04.00)

T$SUBN	1-8#	9-7#	9-51#	9-84#	9-259#	9-268	9-268	9-268#	9-349#	9-379	9-379	9-379#	9-400#	9-455
	9-455	9-455#	9-500#	9-592#	9-614#	9-676#	9-686	9-686	9-686#	9-750#	9-774	9-774	9-774#	9-807
	9-807	9-807#	9-827#	9-836	9-836	9-836#	9-900#	9-909	9-909	9-909#	9-949#	9-957	9-957	9-957#
	9-:16#	9-:33	9-:33	9-:33#	9-;00#	9-;12	9-;12	9-;12#						
T$TAGL	1-8#													
T$TAGN	1-8#	7-189	7-189	7-189#	7-203	7-203	7-203#	7-217	7-217	7-217#	7-231	7-231	7-231#	7-246
	7-246	7-246#	7-261	7-261	7-261#	7-366	7-366	7-366#	7-380	7-380	7-380#	7-402	7-402	7-402#
	7-415	7-415	7-415#	7-433	7-433	7-433#	7-444	7-444	7-444#	7-471	7-471	7-471#	7-481	7-481
	7-481#	7-679	7-679	7-679#	7-711	7-711	7-711#	7-729	7-729	7-729#	7-739	7-739	7-739#	7-752
	7-752	7-752#	7-758	7-758	7-758#	9-7	9-7	9-7#	9-51	9-51	9-51#	9-84	9-84	9-84#
	9-259	9-259	9-259#	9-268	9-268	9-268#	9-349	9-349	9-349#	9-379	9-379	9-379#	9-400	9-400
	9-400#	9-455	9-455	9-455#	9-500	9-500	9-500#	9-592	9-592	9-592#	9-614	9-614	9-614#	9-676
	9-676	9-676#	9-686	9-686	9-686#	9-750	9-750	9-750#	9-774	9-774	9-774#	9-807	9-807	9-807#
	9-827	9-827	9-827#	9-836	9-836	9-836#	9-900	9-900	9-900#	9-909	9-909	9-909#	9-949	9-949
	9-949#	9-957	9-957	9-957#	9-:16	9-:16	9-:16#	9-:33	9-:33	9-:33#	9-;00	9-;00	9-;00#	9-;12
	9-;12	9-;12#	9-;68	9-;68	9-;68#	9-<03	9-<03	9-<03#						
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	7-244	7-244#	7-259	7-259#	7-364	7-364#	7-378	7-378#	7-400	7-400#	7-414	7-414#	7-428	7-428#
	7-429	7-429#	7-440	7-440#	7-441	7-441#	7-458	7-458#	7-459	7-459#	7-463	7-463	7-463	7-463
	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463
	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463	7-463
	7-463#	7-463#	7-463#	7-463#	7-463#	7-463#	7-463#	7-463#	7-463#	7-463#	7-463#	7-463#	7-463#	7-463#
	7-463#	7-463#	7-463#	7-468	7-468#	7-475	7-475#	7-665	7-665#	7-667	7-667#	7-705	7-705#	7-727
	7-727#	7-731	7-731#	7-733	7-733#	7-748	7-748#	7-754	7-754#	7-760	7-760#	8-<68	8-<68#	9-20
	9-20	9-20	9-20#	9-20#	9-20#	9-45	9-45#	9-62	9-62	9-62	9-62#	9-62#	9-62#	9-79
	9-79#	9-91	9-91#	9-118	9-118	9-118	9-118#	9-118#	9-118#	9-125	9-125#	9-144	9-144#	9-163
	9-163#	9-174	9-174#	9-185	9-185#	9-193	9-193#	9-202	9-202#	9-215	9-215#	9-227	9-227#	9-232
	9-232#	9-237	9-237#	9-254	9-254#	9-266	9-266#	9-278	9-278	9-278	9-278#	9-278#	9-278#	9-303
	9-303	9-303	9-303#	9-303#	9-303#	9-307	9-307#	9-319	9-319#	9-334	9-334#	9-339	9-339	9-339
	9-339#	9-339#	9-339#	9-344	9-344#	9-358	9-358	9-358	9-358#	9-358#	9-358#	9-376	9-376	9-376
	9-376#	9-376#	9-376#	9-384	9-384#	9-391	9-391	9-391	9-391#	9-391#	9-391#	9-395	9-395#	9-405
	9-405#	9-451	9-451	9-451	9-451#	9-451#	9-451#	9-475	9-475#	9-482	9-482#	9-488	9-488#	9-491
	9-491	9-491	9-491#	9-491#	9-491#	9-495	9-495#	9-505	9-505#	9-529	9-529	9-529	9-529#	9-529#
	9-529#	9-548	9-548#	9-558	9-558#	9-580	9-580#	9-587	9-587#	9-609	9-609#	9-635	9-635#	9-645
	9-645#	9-654	9-654#	9-659	9-659#	9-667	9-667#	9-671	9-671#	9-699	9-699#	9-711	9-711#	9-721
	9-721#	9-725	9-725#	9-734	9-734#	9-739	9-739#	9-745	9-745#	9-758	9-758#	9-805	9-805#	9-815
	9-815	9-815	9-815#	9-815#	9-815#	9-820	9-820#	9-822	9-822#	9-849	9-849#	9-860	9-860#	9-871
	9-871#	9-876	9-876#	9-884	9-884#	9-889	9-889#	9-895	9-895#	9-926	9-926#	9-931	9-931#	9-944
	9-944#	9-:05	9-:05#	9-:11	9-:11#	9-:83	9-:83#	9-:84	9-:84#	9-:95	9-:95#	9-;51	9-;51#	9-;52
	9-;52#	9-;63	9-;63#	9-;64	9-;64#	9-;70	9-;70	9-;70	9-;70#	9-;70#	9-;70#	9-;72	9-;72	9-;72
	9-;72#	9-;72#	9-;72#	9-;74	9-;74	9-;74	9-;74#	9-;74#	9-;74#	9-;76	9-;76	9-;76	9-;76#	9-;76#
	9-;76#	9-;78	9-;78	9-;78	9-;78#	9-;78#	9-;78#	9-;80	9-;80	9-;80	9-;80#	9-;80#	9-;80#	9-;82
	9-;82#	9-;98	9-;98#	9-<05	9-<05	9-<05	9-<05#	9-<05#	9-<05#	9-<07	9-<07	9-<07	9-<07#	9-<07#
	9-<07#	9-<09	9-<09	9-<09	9-<09#	9-<09#	9-<09#	9-<11	9-<11	9-<11	9-<11#	9-<11#	9-<11#	9-<13
	9-<13#	9-<27	9-<27#											
T$TEST	1-8#	9-7	9-7	9-7#	9-51	9-51	9-51#	9-84	9-84	9-84#	9-259	9-259	9-259#	9-268
	9-349	9-349	9-349#	9-379	9-400	9-400	9-400#	9-455	9-500	9-500	9-500#	9-592	9-592	9-592#
	9-614	9-614	9-614#	9-676	9-676	9-676#	9-686	9-750	9-750	9-750#	9-774	9-807	9-827	9-827
	9-827#	9-836	9-900	9-900	9-900#	9-909	9-949	9-949	9-949#	9-957	9-:16	9-:16	9-:16#	9-:33
	9-;00	9-;00	9-;00#	9-;12	9-<29									
T$TSTM	1-8#	7-201	7-215	7-229	7-244	7-259	7-302	7-335	7-349	7-358	7-364	7-378	7-400	7-414
	7-421	7-422	7-424	7-428	7-538	7-539	7-544	7-549	7-568	7-572	7-575	7-589	7-624	7-625
	7-631	7-651	7-654	7-655	7-657	7-658	7-659	7-665	7-681	7-688	7-690	7-691	7-692	7-699
	7-701	7-702	7-703	7-704	7-705	7-713	7-715	7-721	7-722	7-726	7-727	7-731	8-12	8-14
	8-15	8-16	8-17	8-18	8-99	8-116	8-120	8-151	8-157	8-170	8-176	8-321	8-326	8-384
	8-498	8-504	8-509	8-612	8-623	8-627	8-635	8-761	8-771	8-774	8-779	8-783	8-787	8-905

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WLSTAT   3-33#    9-34     9-74     9-567    9-792    9-811
WRTSWI   6-153#
WTDATA   2-38#
X$ALWA   1-8#
X$FALS   1-8#
X$OFFS   1-8#
X$TRUE   1-8#
XRDHD    8-575#   8-815
XRDHDC   8-573#   9-919
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XSEEK    8-241#   9-:64    9-;33
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CROSS REFERENCE TABLE (CREF V04.00)

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MSHNAP          1-17     1-17#
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CROSS REFERENCE TABLE (CREF V04.00)

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	7-480	7-480#	7-481	7-481#	7-679	7-679#	7-710	7-710#	7-711	7-711#	7-729	7-729#	7-739	7-739#
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