RL11,RLV11 RL11/RLV11 CTLR TST 1 AH-F110B-MC
CZRLGB0 FICHE 1 OF 1

IDENTIFICATION

PRODUCT CODE: AC-F111B-MC

PRODUCT NAME: CZRLGB0 RL11/RLV11 CONTROLLER TEST 1

DATE CREATED: 5-JAN-79

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MAINTAINER: DIAGNOSTIC ENGINEERING

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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 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

THE RL11/RLV11 CONTROLLER TEST (PART 1) IS A PDP-11 (LSI-11) BASED PROGRAM THAT WILL TEST THE CONTROLLER. IT STARTS BY TESTING BASIC INTERFACE LOGIC, REGISTER MANIPULATION AND FUNCTIONALITY WHICH INCLUDES NOOP, GET STATUS, READ HEADERS AND SEEK OPERATIONS. IT IS AIMED AT FULLY TESTING THE CONTROLLER IN THESE AREAS, BUT BY DEFAULT ALSO EXERCISES THE DRIVE.

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'

* LINE PRINTER (OPTIONAL)

1.2.2 SOFTWARE REQUIREMENTS

CZRLGB0 RL11/RLV11 CTLR TST 1

(FORMERLY CZRLAB)

1.3 RELATED DOCUMENTS AND STANDARDS

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

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

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

CVRLAB0 RLV11 RL01 DISKLESS TEST (RLV11 ONLY)

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 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 OCCURRED. NO QUESTIONS ASKED.

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

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

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

THIS WILL DO THE FOLLOWING:

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

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

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

1. START
2. RESTART
3. CONTINUE

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

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

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

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

1. START
2. RESTART

YOU WOULD CHOOSE ONE, 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 CZRLGB                               O
DRS LOADED                              D
DIAG. RUN-TIME SERVICES REV D APR-79    D
CZRLG-B-0                               D

CZRLG TESTS CONTROLLER FUNCTIONS,       D
INTERFACE LOGIC, REGISTER OPERATION

UNIT IS RL01, RL02                      D
DR>STA/PASS:1/FLAGS:HOE                 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
BR LEVEL (O) 5 ?                        D,O
DRIVE TYPE = RL01 (L) Y ?               D,O (N=RL02)
DRIVE (O) 0 ?                           D,O

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

CHANGE SW (L) ? Y                       D,O

DROP ON ERROR LIMIT (L) N ?             D,O


CZRLG 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.
TYPING ^C ABORTS THE FUNCTION IN PROGRESS AND
RETURNS THE XXDP+ MONITOR TO COMMAND MODE.
**********************************************************
```

```
^C                                          0

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

CHANGE SW (L) ? N                           D,0

CZRLG 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.

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. THE 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. COMMENTS MAY BE INCLUDED IN THE FILE.

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 PASS 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 SOFTWARE SWITCH REGISTER 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 TERINATION HE MAY DO SO BY TYPING A CNTL-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	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, SUBTEST, OR TEST) CONTAINING THE ERROR

IER INHIBIT ERROR REPORTING

IBE INHIBIT BASIC ERROR REPORTS

IXE INHIBIT EXTENDED ERROR REPORTS

PRI DIRECT ALL MESSAGES TO A LINE PRINTER

PNT PRINT NUMBER OF 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

THESE FLAGS REPLACE THE USE OF THE HARDWARE SWITCH REGISTER. UNDER THE SUPERVISOR THERE IS NO ACCESS TO THE HARDWARE SWITCH REGISTER.

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 EFFECT OF THE COMMAND IS TO BEGIN EXECUTION AT THE LOCATION FOLLOWING THE ERROR CALL. NEITHER HARDWARE NOR SOFTWARE PARAMETERS MAY BE ALTERED.

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

1. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

****
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 ARE SO DESIGNATED.

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

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

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

ALL FLAGS ARE CLEARED.

2.4 EXTENDED P-TABLE DIALOGUE

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

AS SOON AS THE QUESTION "# UNITS?" IS ANSWERED (WITH THE NUMBER N), 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 ?
BR LEVEL (O) 5 ?
DRIVE TYPE = RL01 (L) Y ?
DRIVE (O) ? 0-3

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

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 #4). THE ACTUAL UNIT NUMBERS OF THE RL01'S FOR QUESTION #6 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 #6 AND THE DRIVE TYPE WAS SET FOR RL02'S FOR THE REMAINING 4 UNITS IN QUESTION #5. QUESTION #4 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.

BR LEVEL (O) 5?

ANSWER WITH THE INTERRUPT PRIORITY OF THE CONTROLLER.

DRIVE TYPE = RL01 (L) ?

ANSWER NO (N) IF DRIVE IS AN RL02

DRIVE (O) 0?

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

2.6 SOFTWARE PARAMETERS

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

A YES ANSWER WILL ASK THE FOLLOWING SOFTWARE PARAMETER QUESTION, 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>.

'DROP ON ERROR LIMIT (L) Y?''

TO ALLOW THE UNIT TO BE DROPPED ONCE A PREDETERMINED NUMBER OF ERRORS ARE ENCOUNTERED.

3.0 ERROR INFORMATION

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

3.1 ERROR REPORTING

ALL ERROR INFORMATION IS PRINTED ON THE CONSOLE DEVICE. ERROR REPORTS ARE AIMED AT BEING SELF EXPLANATORY. THE GENERAL FORMAT IS:

```
DZRL?  XXX    ERR  YYYYY   TST  ZZZ   SUB  PPP   PC:  RRRRRR
```

WHERE:

?	IS PROGRAM LETTER
XXX	IS SFT - SOFT ERROR
	HRD - HARD ERROR
	DV FAT - DEVICE FATAL ERROR
	SYS FAT - SYSTEM FATAL ERROR
YYYYY	IS THE ERROR NUMBER
ZZZ	IS THE TEST NUMBER
PPP	IS THE SUBTEST NUMBER
RRRRRR	IS THE PROGRAM LISTING LOCATION

ERRORS GIVE THE REGISTER CONTENTS BEFORE AND AFTER THE ERROR ALONG WITH A ONE LINE DESCRIPTION AND RELEVENT DATA.

EXAMPLE:

```
ONE LINE DESCRIPTION
(OPTIONAL SECOND LINE)
(OPTIONAL THIRD LINE)
BEFORE COMMAND: CS:XXXXXX BA:XXXXXX DA:XXXXXX MP:XXXXXX
TIME OF ERROR:  CS:XXXXXX BA:XXXXXX DA:XXXXXX MP:XXXXXX XXXXXX XXXXXX
```

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 COMPLIMENT)

FOR READ HEADER FUNCTION

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

FOR GET STATUS FUNCTION

HAS DRIVE STATUS

BIT 15 - WRITE DATA ERROR
BIT 14 - CURRENT HEAD ERROR (CHE)
BIT 13 - WRITE LOCK STATUS (WL)
BIT 12 - SEEK TIME OUT (SKTO)
BIT 11 - SPIN ERROR (SPE)
BIT 10 - WRITE GATE ERROR (WGE)
BIT 9 - VOLUME CHECK (VC)
BIT 8 - DRIVE SELECT ERROR (DSE)
BIT 7 - 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 - RLCS ADDRESSABILITY
******

THIS TEST WILL CHECK THAT THE CONTROL AND STATUS REGISTER CAN BE ACCESSED. IF THE REGISTER CANNOT BE ACCESSED THE PROCESSOR WILL TRAP TO LOCATION 4, WHICH IS SET UP TO HANDLE THE TRAP.

TEST 2 - RLBA ADDRESSABILITY
******

THIS TEST WILL CHECK THAT THE BUS ADDRESS REGISTER CAN BE ACCESSED. IF THE REGISTER CANNOT BE ACCESSED THE PROCESSOR WILL TRAP TO LOCATION 4, WHICH IS SET UP TO HANDLE THE TRAP.

TEST 3 - RLDA ADDRESSABILITY
******

THIS TEST WILL CHECK THAT THE DISK ADDRESS REGISTER CAN BE ACCESSED. IF THE REGISTER CANNOT BE ACCESSED THE PROCESSOR WILL TRAP TO LOCATION 4, WHICH IS SET UP TO HANDLE THE TRAP.

TEST 4 - RLMP ADDRESSABILITY
******

THIS TEST WILL CHECK THAT THE MULTIPURPOSE REGISTER CAN BE ACCESSED. IF THE REGISTER CANNOT BE ACCESSED THE PROCESSOR WILL TRAP TO LOCATION 4, WHICH IS SET UP TO HANDLE THE TRAP.

TEST 5 - READ WRITE OF RLCS
******

THIS TEST WILL ATTEMPT TO WRITE RLCS BITS 9-1 AND READ THEM BACK. WALKING AND GROWING 0'S AND 1'S ARE USED. BIT 7 (CONTROLLER READY) IS ALWAYS WRITTEN AS A 1 SO NOT TO INITIATE A FUNCTION. BITS 15, 14 AND 0 ARE TREATED AS DON'T CARE FOR THIS TEST.

TEST 6 - READ WRITE OF RLBA
******

THIS TEST WILL ATTEMPT TO WRITE RLBA BITS 15-0 AND READ THEM BACK. WALKING AND GROWING 0'S AND 1'S ARE USED. BIT 0 ON A RL11 SHOULD ALWAYS COME BACK AS A 0, WHILE ON AN RLV11 IT IS LOADABLE.

TEST 7 - READ WRITE OF RLDA
******

THIS TEST WILL ATTEMPT TO WRITE RLDA BITS 15-0 AND READ THEM BACK. WALKING AND GROWING 0'S AND 1'S ARE USED.

TEST 8 - BIS OF RLCS
******

THIS TEST WILL USE THE 11 INSTRUCTION 'BIS'' TO SHOW THAT A READ-MODIFY-WRITE SEQUENCE OF THE RLCS WORKS. BITS 9-1 ARE USED, BIT SETTING IN WALKING AND GROWING 0'S AND 1'S. BIT 7 (CONTROLLER READY) IS ALWAYS SET. BITS 15, 14 AND 1 ARE DON'T CARES.

TEST 9 - BIC OF RLCS
******

THIS TEST WILL USE THE 11 INSTRUCTION 'BIC'' TO SHOW THAT A READ-MODIFY-WRITE SEQUENCE OF THE RLCS WORKS. BITS 9-1 ARE USED, BIT CLEARING IN WALKING AND GROWING 0'S AND 1'S. BIT 7 (CONTROLLER READY) IS ALWAYS SET. BITS 15, 14 AND 1 ARE DON'T CARES.

TEST 10 - BIS OF RLBA
****

THIS TEST WILL USE THE 11 INSTRUCTION 'BIS'' TO SHOW THAT A READ-MODIFY-WRITE SEQUENCE OF THE RLBA WORKS. BITS 15-0 ARE BIT SET USING GROWING AND WALKING 0'S AND 1'S. BIT 0 CANNOT SET ON A RL11, BUT CAN ON A RLV11.

TEST 11 - BIC OF RLBA
****

THIS TEST WILL USE THE 11 INSTRUCTION 'BIC'' TO SHOW THAT A READ-MODIFY-WRITE SEQUENCE OF THE RLBA WORKS. BITS 15-0 ARE BIT CLEARED USING GROWING AND WALKING 0'S AND 1'S.

TEST 12 - BIS OF RLDA
****

THIS TEST WILL USE THE 11 INSTRUCTION 'BIS'' TO SHOW THAT A READ-MODIFY-WRITE SEQUENCE OF THE RLDA WORKS. BITS 15-0 ARE BIT SET USING GROWING AND WALKING 0'S AND 1'S.

TEST 13 - BIC OF RLDA
****

THIS TEST WILL USE THE 11 INSTRUCTION 'BIC'' TO SHOW THAT A READ-MODIFY-WRITE SEQUENCE OF THE RLDA WORKS. BITS 15-0 ARE BIT CLEARED USING GROWING AND WALKING 0'S AND 1'S.

TEST 14 - BUS RESET OF RLCS
****

THIS TEST WILL VERIFY THAT THE BUS RESET OF THE PROCESSOR WILL CLEAR ALL BITS OF THE RLCS WITH THE EXCEPTION OF BIT 7 (CONTROLLER READY), BIT 0 (DRIVE READY) AND BIT 15 (COMPOSITE ERROR) IF BIT 14 (DRIVE ERROR) IS SET.

TEST 15 - BUS RESET OF RLBA
****

THIS TEST WILL VERIFY THAT THE BUS RESET OF THE PROCESSOR WILL CLEAR ALL BITS OF THE RLBA.

TEST 16 - BUS RESET OF RLDA
****

THIS TEST WILL VERIFY THAT THE BUS RESET OF THE PROCESSOR WILL CLEAR ALL BITS OF THE RLDA.

TEST 17 - UNIQUENESS OF RLCS
****

THIS TEST WILL VERIFY THAT WHEN THE RLCS (XXXXX0) IS ADDRESSED ONLY THAT REGISTER IS EFFECTED. BOTH THE RLBA AND THE RLDA ARE SET UP WITH KNOWN DATA, THE RLDA IS WRITTEN, THEN THE RLBA AND RLDA ARE VERIFIED THAT THEY DID NOT CHANGE.

TEST 18 - UNIQUENESS OF RLBA
****

THIS TEST WILL VERIFY THAT WHEN THE RLBA (XXXXX2) IS ADDRESSED ONLY THAT REGISTER IS EFFECTED. BOTH THE RLCS AND RLDA ARE WRITTEN WITH KNOWN DATA, THE RLBA IS WRITTEN, THEN THE RLCS AND RLDA ARE VERIFIED THAT THEY DID NOT CHANGE.

TEST 19 - UNIQUENESS OF RLDA
****

THIS TEST WILL VERIFY THAT WHEN THE RLDA (XXXXX4) IS ADDRESSED ONLY THAT REGISTER IS EFFECTED. BOTH THE RLCS AND RLBA ARE WRITTEN WITH KNOWN DATA, THE RLDA IS WRITTEN, THEN THE RLCS AND RLBA ARE VERIFIED THAT THEY DID NOT CHANGE.

TEST 20 - UNIQUENESS OF RLMP
****

THIS TEST WILL VERIFY THAT WHEN THE RLMP (XXXXX6) IS ADDRESSED ONLY THAT REGISTER IS EFFECTED. THE RLCS, RLBA AND RLDA ARE WRITTEN WITH KNOWN DATA, THE RLMP IS WRITTEN, THEN THE RLCS, RLBA AND RLDA ARE VERIFIED THAT THEY DID NOT CHANGE.

TEST 21 - NOOP FUNCTION
****

THIS TEST WILL VERIFY THE OPERATION OF THE NOOP (0) FUNCTION ON PDP-11'S ONLY, SINCE ON AN LSI-11 IT IS A MAINTENANCE FUNCTION. THE ABILITY OF CONTROLLER READY TO RESET AND NO ERRORS ARE CHECKED.

TEST 22 - TEST NOOP DOES NOTHING
****

THIS TEST WILL CHECK THAT THE NOOP FUNCTION WILL NOT DISTRUB ANY REGISTERS OF THE CONTROLLER.

TEST 23 - TEST OF INTERRUPT
****

THIS TEST WILL CAUSE AN INTERRUPT FROM THE CONTROLLER USING NOOP (RL11 ONLY) TO CHECK THE INTERRUPT LOGIC AND VECTOR.

TEST 24 - TEST PRIORITY BR LEVEL
****

THIS TEST WILL CHECK THAT THE PROPER PRIORITY IS ON THE BOARD. WE VERIFY THAT ABOVE THE LEVEL THE BOARD WILL NOT INTERRUPT AND BELOW IT, IT WILL.

TEST 25 - GET STATUS FUNCTION
****

THIS TEST WILL VERIFY THAT THE GET STATUS FUNCTION (2) WILL COMPLETE CORRECTLY. THE RLDA IS SET UP AND GET STATUS IS ISSUED. CONTROLLER READY IS CHECKED AS WELL AS ERROR BITS. (FIRST TEST A DRIVE MUST BE PRESENT.)

TEST 26 - GET STATUS FUNCTION INTERRUPT
****

THIS TEST WILL VERIFY THAT THE GET STATUS FUNCTION WILL GEN-ERATE AN INTERRUPT ON COMPLETION.

TEST 27 - GET STATUS FUNCTION GENERATES OPI
****

THIS TEST WILL PROVE THE ABILITY FOR OPI (OPERATION INCOMPLETE) TO SET AND THAT THE DRIVE COMMAND IS BEING TRANSMITTED CORRECTLY. THE COMMAND WORD (RLDA) IS SET UP WITH THE MARKER BIT ONLY. AN OPI IS EXPECTED TO RESULT, THIS IS CHECKED.

TEST 28 - OPI UNDER INTERRUPT
****

THIS TEST WILL CHECK THE ABILITY OF AN OPI TO CAUSE AN INTERRUPT
TO OCCUR. WE SEND ONLY THE MARKER BIT WITH THE GET STATUS
COMMAND AND EXPECT AN OPI ERROR.

TEST 30 - READ HEADER FUNCTION INTERRUPT
****

THIS TEST WILL CHECK THE ABILITY OF THE READ HEADER FUNCTION
TO INTERRUPT ON COMPLETION.

TEST 31 - REPEATED RD HDRS YIELD SAME CYL AND HD
****

THIS TEST WILL CHECK THAT ON REPEATED READ HEADERS THE CYLINDER
AND HEAD BITS OF THE HEADER WORD (RLMP) ARE ALWAYS THE SAME.

TEST 32 - CHECK OF HEADER CRC
****

THIS TEST WILL VERIFY THE HEADER CRC THAT FOLLOWS THE TWO
HEADER WORDS IS ACTUALLY THE CORRECT CRC-16 CALCULATION OF
THE TWO HEADER WORDS.

TEST 33 - CHECK CONSECUTIVE HEADERS
****

THIS TEST WILL CHECK THAT HEADERS ARE CONSECUTIVE.

TEST 34 - SEEK FUNCTION
****

THIS TEST WILL CHECK THE SEEK FUNCTION (3) TO RESET CONTROLLER
READY AND POST NO ERRORS. COMMAND WORD IS LOADED WITH A ONE
CYLINDER FORWARD SEEK.

TEST 35 - CHECK DRIVE READY ON SEEK
****

THIS TEST WILL CHECK THAT DRIVE READY CLEARS AND RESETS ON
ISSUANCE OF A SEEK COMMAND.

TEST 36 - SEEK FUNCTION INTERRUPT
****

THIS TEST WILL CHECK THE ABILITY OF A SEEK COMMAND TO GENERATE AN INTERRUPT ON CONTROLLER READY RESETTING AND NOT ONE ON DRIVE READY RESETTING.

TEST 37 - TEST DIFFERENCE WORD TRANSMISSION
****

THIS TEST WILL TRY TO VERIFY THAT BITS 14-7, 6, 2, 0 OF THE COMMAND WORD GET TRANSMITTED CORRECTLY. WE ISSUE SEEKS FROM TRACK 0 WITH COMMAND WORDS OF WALKING AND GROWING 0'S AND 1'S. ALL SEEKS ARE VERIFIED WITH A READ HEADER AND RETURN TO TRACK 0 BEFORE NEXT PATTERN IS ISSUED.

TEST 38 - VERIFY HEAD SELECT 0 VIA RD HEADER
****

THIS TEST WILL VERIFY THAT HEAD 0 CAN BE SELECTED AND READ VIA READ HEADER.

TEST 39 - VERIFY HEAD SELECT 1 VIA RD HEADER
****

THIS TEST WILL VERIFY THAT HEAD 1 CAN BE SELECTED AND READ VIA READ HEADER.

TEST 40 - VERIFY HEAD SELECT 0 VIA GET STATUS
****

THIS TEST WILL VERIFY THE WORD RETURNED TO THE RLMP BY A GET STATUS CONTAINS THE RIGHT HEAD SELECT.

TEST 41 - VERIFY HEAD SELECT 1 VIA GET STATUS
****

THIS TEST WILL VERIFY THE WORD RETURNED TO THE RLMP BY A GET STATUS CONTAINS THE RIGHT HEAD SELECT.

TEST 42 - TEST TIME AT WHICH DP WD GETS
****

THIS TEST WILL CHECK THAT THE DIFFERENCE WORD (RLDA) ACTUALLY DOES GET TRANSMITTED PRIOR TO CONTROLLER READY RESETTING. THIS IS DONE BY ISSUING A SEEK, WAITING FOR CONTROLLER READY AND RE-LOADING THE RLDA. THE SEEK IS THEN VERIFIED TO SEE IF IT IS CORRECT.

TEST 43 - EXTENSIVE CHECK OF CRC
****

THIS TEST WILL MORE EXTENSIVELY CHECK THE CRC LOGIC BY POSI-
TIONING AT DIFFERENT POINTS ON THE PACK AND CHECKING THAT THE
HEADER CRC RECEIVED IS CORRECT.

TEST 44 - VERIFY GET STATUS WHILE DRDY IS LOW
****

THIS TEST WILL CHECK THE ABILITY TO PERFORM A GET STATUS WHILE
THE DRIVE IS SEEKING.

@

```
     1                                  .TITLE  CZRLGB0 RL11/RLV11 CTLR TST 1
     2                                  .ENABLE AMA
     3                                  .ENABLE ABS
     4                                  .NLIST  ME,CND,MD
     6
     7  000000                          SVC
     8          000000                  SVCINS=0
     9          000000                  SVCTAG=0
    10          002000                  .=2000
    11
    12
    13  002000                                  POINTER BGNSFT,BGNSW,BGNDU,BGNAU
    14
    15  002000                          BGNMOD  MDHEDR
    16
    17  002000                                  HEADER  CZRLG,B,0,4,0
(4) 002000      103                             .ASCII /C/
(4) 002001      132                             .ASCII /Z/
(4) 002002      122                             .ASCII /R/
(4) 002003      114                             .ASCII /L/
(4) 002004      107                             .ASCII /G/
(6) 002005      000                             .BYTE   0
(6) 002006      000                             .BYTE   0
(5) 002007      000                             .BYTE   0
(4) 002010      102                             .ASCII  /B/
(4) 002011      060                             .ASCII  /0/
(4) 002012  000000                              .WORD   0
(4) 002014  000004                              .WORD   4
(4) 002016  024350                              .WORD   L$HARD
(4) 002020  024524                              .WORD   L$SOFT
(4) 002022  011622                              .WORD   L$HW
(4) 002024  011640                              .WORD   L$SW
(4) 002026  024612                              .WORD   L$LAST
(4) 002030  000000                              .WORD   0
(4) 002032  000000                              .WORD   0
(4) 002034  000000                              .WORD   0
(4) 002036  000000                              .WORD   0
(4) 002040  011650                              .WORD   L$DISPATCH
(4) 002042  000000                              .WORD   0
(4) 002044  000000                              .WORD   0
(4) 002046  000000                              .WORD   0
(4) 002050      003                             .BYTE   C$REVISION
(3) 002051      003                             .BYTE   C$EDIT
(4) 002052  000000                              .WORD   0
(5) 002054  000000                              .WORD   0
(4) 002056  000000                              .WORD   0
(4) 002060  002230                              .WORD   L$DVTYP
(4) 002062  000000                              .WORD   0
(4) 002064  000000                              .WORD   0
(4) 002066  000000                              .WORD   0
(4) 002070  013024                              .WORD   L$AU
(4) 002072  013020                              .WORD   L$DU
(4) 002074  000000                              .WORD   0
(4) 002076  002122                              .WORD   L$DESC
(4) 002100  104035                          EMT     E$LOAD
(4) 002102  000000                          .WORD   0
```

```
(4)  002104  012006                          .WORD   L$INIT
(4)  002106  012752                          .WORD   L$CLEAN
(4)  002110  012530                          .WORD   L$AUTO
(4)  002112  012000                          .WORD   L$PROT
(4)  002114  000000                          .WORD   0
(4)  002116  000000                          .WORD   0
(4)  002120  000000                          .WORD   0
 18
 19  002122                                  ENDMOD
 20
 21  002122                          DESCRIPT <CZRLG TESTS CONTROLLER FUNCTIONS, INTERFACE LOGIC, REGISTER OPERATION>
(3)  002122  055103  046122  020107          .ASCIZ  /CZRLG TESTS CONTROLLER FUNCTIONS, INTERFACE LOGIC, REGISTER OPERATION/
(3)  002130  042524  052123  020123
(3)  002136  047503  052116  047522
(3)  002144  046114  051105  043040
(3)  002152  047125  052103  047511
(3)  002160  051516  020054  047111
(3)  002166  042524  043122  041501
(3)  002174  020105  047514  044507
(3)  002202  026103  051040  043505
(3)  002210  051511  042524  020122
(3)  002216  050117  051105  052101
(3)  002224  047511  000116
(2)                                          .EVEN
 22  002230                          DEVTYP   <RL01,RL02>
(3)  002230  046122  030460  051054          .ASCIZ  /RL01,RL02/
(3)  002236  030114  000062
(2)                                          .EVEN
 23
 24  002242                              BGNMOD  GLBEQAT
 25
 26  002242                                      EQUALS
(1)                                      ;
(1)                                      ; BIT DIFINITIONS
(1)                                      ;
(1)            100000                    BIT15== 100000
(1)            040000                    BIT14== 40000
(1)            020000                    BIT13== 20000
(1)            010000                    BIT12== 10000
(1)            004000                    BIT11== 4000
(1)            002000                    BIT10== 2000
(1)            001000                    BIT09== 1000
(1)            000400                    BIT08== 400
(1)            000200                    BIT07== 200
(1)            000100                    BIT06== 100
(1)            000040                    BIT05== 40
(1)            000020                    BIT04== 20
(1)            000010                    BIT03== 10
(1)            000004                    BIT02== 4
(1)            000002                    BIT01== 2
(1)            000001                    BIT00== 1
(1)                                      ;
(1)            001000                    BIT9==  BIT09
(1)            000400                    BIT8==  BIT08
(1)            000200                    BIT7==  BIT07
(1)            000100                    BIT6==  BIT06
```

```
(1)   000040          BIT5==  BIT05
(1)   000020          BIT4==  BIT04
(1)   000010          BIT3==  BIT03
(1)   000004          BIT2==  BIT02
(1)   000002          BIT1==  BIT01
(1)   000001          BIT0==  BIT00
(1)                   ;
(1)                   ; EVENT FLAG DEFINITIONS
(1)                   ;   EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
(1)                   ;
(1)   000040          EF.START==      32.                     ; START COMMAND WAS ISSUED
(1)   000037          EF.RESTART==    31.                     ; RESTART COMMAND WAS ISSUED
(1)   000036          EF.CONTINUE==   30.                     ; CONTINUE COMMAND WAS ISSUED
(1)   000035          EF.NEW==        29.                     ; A NEW PASS HAS BEEN STARTED
(1)   000034          EF.PWR==        28.                     ; A POWER-FAIL/POWER-UP OCCURRED
(1)                   ;
(1)                   ;
(1)                   ; PRIORITY LEVEL DEFINITIONS
(1)                   ;
(1)   000340          PRI07== 340
(1)   000300          PRI06== 300
(1)   000240          PRI05== 240
(1)   000200          PRI04== 200
(1)   000140          PRI03== 140
(1)   000100          PRI02== 100
(1)   000040          PRI01== 40
(1)   000000          PRI00== 0
(1)                   ;
(1)                   ;OPERATOR FLAG BITS
(1)                   ;
(1)   000004          EVL==         4
(1)   000010          LOT==        10
(1)   000020          ADR==        20
(1)   000040          IDU==        40
(1)   000100          ISR==       100
(1)   000200          UAM==       200
(1)   000400          BOE==       400
(1)   001000          PNT==      1000
(1)   002000          PRI==      2000
(1)   004000          IXE==      4000
(1)   010000          IBE==     10000
(1)   020000          IER==     20000
(1)   040000          LOE==     40000
(1)   100000          HOE==    100000
 27   000001          DRDY=BIT0               ;DRIVE READY (RLCS)
 28   000100          INTEN=BIT6              ;INTERRUPT ENABLE (RLCS)
 29   100000          ERR=BIT15               ;RL11 ERROR (RLCS)
 30   040000          DERR=BIT14              ;RL01 DRIVE ERROR (RLCS)
 31   002000          OPI=BIT10               ;OPERATION INCOMPLETE (RLCS)
 32   000200          CRDY=BIT7               ;CONTROLLER READY (RLCS)
 33   000040          BA17=BIT5               ;EXTENDED ADDRESS BIT 17 (RLCS)
 34   000020          BA16=BIT4               ;EXTENDED ADDRESS BIT 16 (RLCS)
 35   020000          NXM=BIT13               ;NON-EXISTANT MEMORY (RLCS)
 36   000000          DS0=0                   ;DRIVE SELECT 0 (RLCS)
 37   000400          DS1=BIT8                ;DRIVE SELECT 1 (RLCS)
 38   001000          DS2=BIT9                ;DRIVE SELECT 2 (RLCS)
```

```
                        DS3=BIT8!BIT9           ;DRIVE SELECT 3 (RLCS)
                        NOOP0=0                 ;FUNCTION-NOOP(0)
                        NOOP7=BIT1!BIT2!BIT3    ;FUNCTION-NOOP(7)
                        WRCHK=BIT1              ;WRITE CHECK FUNCTION
                        GSTAT=BIT2              ;GET STATUS FUNCTION
                        SEEK=BIT2!BIT1          ;SEEK FUNCTION
                        RDHDR=BIT3              ;READ HEADER FUNCTION
                        WRITE=BIT3!BIT1         ;WRITE DATA FUNCTION
                        READ=BIT3!BIT2          ;READ DATA FUNCTION
                        GODRVR=BIT1!BIT7        ;CRDY AND DRDY
                        DRST=BIT3               ;DRIVE RESET (RLDA)
                        GSBIT=BIT1              ;GET STATUS BIT (RLDA)
                        MK=BIT0                 ;MARKER BIT (RLDA)
                        SIGN=BIT2               ;SIGN BIT (RLDA)
                        RHHS=BIT6               ;HEAD SELECT IN READ HEADER
                        STHS=BIT6               ;HEAD SELECT IN STATUS BACK
                        DAHS=BIT4               ;HEAD SELECT IN SEEK

                        ;OFFSET FOR HARDWARE P-TABLE

                        CSR=0
                        VECT=2
                        PRIOR=4
                        TYPDR=6
                        DRBT=10
                        CNT=12

                        ;OFFSET FOR SOFTWARE P-TABLE

                        DLT=0
                        ELT=2
                        SIZE=4

                                ENDMOD

                        BGNMOD  GLBDAT

                        .SBTTL  GLOBAL DATA

002242  000000          PWRFLG: .WORD   0
002244  000000          UUT:    .WORD   0
002246  000000          UNITST: .WORD   0
002250  000000          RLCS:   .WORD   0
002252  000000          RLBA:   .WORD   0
002254  000000          RLDA:   .WORD   0
002256  000000          RLMP:   .WORD   0
002260  000000          BCSR:   .WORD   0
002262  000000          BPRIOR: .WORD   0
002264  000000          BVEC:   .WORD   0
002266  000000          DRIVE:  .WORD   0               ;DRIVE UNDER TEST
002270  000000          B.CS:   .WORD   0
002272  000000          B.BA:   .WORD   0
002274  000000          B.DA:   .WORD   0
002276  000000          B.MP:   .WORD   0
002300  000000          DERFLG: .WORD
002302  000000          E.CS:   .WORD   0
```

```
    95  002304  000000                E.BA:    .WORD   0
    96  002306  000000                E.DA:    .WORD   0
    97  002310  000000                E.MP:    .WORD   0
    98  002312  000000                E.MP1:   .WORD   0
    99  002314  000000                E.MP2:   .WORD   0
   100  002316  000000                PFLG:    .WORD   0              ;PROCESSOR TYPE, 0=UNIBUS, 1=Q-BUS
   101  002320  000000                TRPFLG:  .WORD   0
   102  002322  000000                INTFLG:  .WORD   0              ;INTERRUPT OCCURRENCE FLAG
   103  002324  000000                LDCSR:   .WORD   0              ;LOCATION TO FORM RLCS
   104  002326  000077                SECMSK:  .WORD   77             ;MASK OUT SECTOR
   105  002330  120001                XPOLY:   .WORD   120001
   106  002332  000004                ERRVEC:  .WORD   4
   107  002334  000000                BCCFBK:  .WORD   0              ;LOCATION USED BY ''SIMBCC''
   108  002336  000000                CALBCC:  .WORD   0              ;LOCATION USED BY ''SIMBCC''
   109  002340  000000                TEMP2:   .WORD   0              ;LOCATION USED BY ''SIMBCC''
   110  002342  000000                TEMP3:   .WORD   0              ;LOCATION USED BY ''SIMBCC''
   111  002344  000000                TEMP4:   .WORD   0              ;LOCATION USED BY ''SIMBCC''
   112  002346  000000                TMP0:    .WORD   0
   113  002350  000000                TMP1:    .WORD   0
   114  002352  000000                TMP2:    .WORD   0
   115  002354  000000                GDDAT:   .WORD   0
   116  002356  000000                BDDAT:   .WORD   0
   117  002360  000000                FIRST:   .WORD   0              ;FIRST SECTOR READ
   118  002362  177700                CYLMSK:  .WORD   177700         ;MASK CYLINDER AND HEAD SELECT
   119  002364  000050                MXSEC1:  .WORD   40.            ;MAX SECTOR ADDRESS +1
   120  002366  000047                MAXSEC:  .WORD   39.            ;MAX SECTOR ADDRESS
   121  002370  000000                DWORD:   .WORD   0              ;DIFFERENCE WORD (SEEK)
   122  002372  177600                MAXCYL:  .WORD   177600         ;MAXIMUM CYLINDER ADDRESS
   123  002374  000000                SVHD:    .WORD   0              ;SAVE CURRENT HEAD SELECT
   124  002376  000000                WHY:     .WORD   0              ;REASON FOR DROP UNIT
   125
   126  002400  000000                T.DRIVE:         .WORD   0
   127  002402  000000                T.CNTLR:         .WORD   0
   128  002404  000000                TMPFNC:          .WORD   0
   129  002406  000000                DLYCNT:          .WORD   0
   130
   131                                ;
   132                                ;PATTERNS USED FOR LOADING/READING REGISTERS
   133
   134  002410  000000                BEGPAT: 0                       ;GROWING 1
   135  002412  000001                        1
   136  002414  000003                        3
   137  002416  000007                        7
   138  002420  000017                        17
   139  002422  000037                        37
   140  002424  000077                        77
   141  002426  000177                        177
   142  002430  000377                        377
   143  002432  000777                        777
   144  002434  001777                        1777
   145  002436  003777                        3777
   146  002440  007777                        7777
   147  002442  017777                        17777
   148  002444  037777                        37777
   149  002446  077777                        77777
   150  002450  177777                        177777
```

```
  151  002452  177776                    177776          ;GROWING 0
  152  002454  177774                    177774
  153  002456  177770                    177770
  154  002460  177760                    177760
  155  002462  177740                    177740
  156  002464  177700                    177700
  157  002466  177600                    177600
  158  002470  177400                    177400
  159  002472  177000                    177000
  160  002474  176000                    176000
  161  002476  174000                    174000
  162  002500  170000                    170000
  163  002502  160000                    160000
  164  002504  140000                    140000
  165  002506  100000                    100000
  166
  167  002510  000000                    000000
  168  002512  000001                    1               ;WALKING 1
  169  002514  000002                    2
  170  002516  000004                    4
  171  002520  000010                    10
  172  002522  000020                    20
  173  002524  000040                    40
  174  002526  000100                    100
  175  002530  000200                    200
  176  002532  000400                    400
  177  002534  001000                    1000
  178  002536  002000                    2000
  179  002540  004000                    4000
  180  002542  010000                    10000
  181  002544  020000                    20000
  182  002546  040000                    40000
  183  002550  100000                    100000
  184  002552  177777                    177777          ;WALKING 0
  185  002554  177776                    177776
  186  002556  177775                    177775
  187  002560  177773                    177773
  188  002562  177767                    177767
  189  002564  177757                    177757
  190  002566  177737                    177737
  191  002570  177677                    177677
  192  002572  177577                    177577
  193  002574  177377                    177377
  194  002576  176777                    176777
  195  002600  175777                    175777
  196  002602  173777                    173777
  197  002604  167777                    167777
  198  002606  157777                    157777
  199  002610  137777                    137777
  200  002612  077777                    077777
  201  002614  177777                    177777
  202  002616  000000          ENDPAT:   000000
  203
  204                          .SBTTL    PATTERNS FOR DIFFERENCE WORD
  205
  206  002620  000200          SKLST:    .WORD     BIT7
```

```
                                        .WORD   BIT8            ;SHIFTING 1
                                        .WORD   BIT9
                                        .WORD   BIT10
                                        .WORD   BIT11
                                        .WORD   BIT12
                                        .WORD   BIT13
                                        .WORD   BIT14
                                        .WORD   77600           ;SHIFTING 0
                                        .WORD   77400
                                        .WORD   76600
                                        .WORD   75600
                                        .WORD   73600
                                        .WORD   67600
                                        .WORD   57600
                                        .WORD   37600
                                        .WORD   77600
                                        .WORD   200
                                        .WORD   600             ;GROWING 1
                                        .WORD   1600
                                        .WORD   3600
                                        .WORD   7600
                                QUAMAX: .WORD   17600
                                HALMAX: .WORD   37600
                                        .WORD   77600
                                        .WORD   77400           ;GROWING 0
                                        .WORD   77000
                                        .WORD   76000
                                        .WORD   74000
                                        .WORD   70000
                                        .WORD   60000
                                        .WORD   40000
                                SKEND:  .WORD   00000
                                RL2:    .WORD   BIT15
                                QMAX:   .WORD   37600
                                HMAX:   .WORD   77600

                                        .WORD   177600
                                        .WORD   177400
                                        .WORD   176600
                                        .WORD   173600
                                        .WORD   167600
                                        .WORD   157600
                                        .WORD   137600
                                        .WORD   177000
                                        .WORD   176000
                                        .WORD   174000
                                        .WORD   170000
                                        .WORD   60000
                                        .WORD   40000
                                SKEEND: .WORD   000000

                                ;PATTERNS FOR TEST OF RLCS

                                CSPAT:  .WORD   0               ;SHIFTING 1
                                        .WORD   BIT1
                                        .WORD   BIT2
```

```
  263  002772  000010                    .WORD   BIT3
  264  002774  000020                    .WORD   BIT4
  265  002776  000040                    .WORD   BIT5
  266  003000  000100                    .WORD   BIT6
  267  003002  000400                    .WORD   BIT8
  268  003004  001000                    .WORD   BIT9
  269  003006  001576                    .WORD   1576            ;GROWING 0
  270  003010  001574                    .WORD   1574
  271  003012  001570                    .WORD   1570
  272  003014  001560                    .WORD   1560
  273  003016  001540                    .WORD   1540
  274  003020  001500                    .WORD   1500
  275  003022  001400                    .WORD   1400
  276  003024  001576                    .WORD   1576            ;SHIFT 0
  277  003026  001574                    .WORD   1574
  278  003030  001566                    .WORD   1566
  279  003032  001556                    .WORD   1556
  280  003034  001536                    .WORD   1536
  281  003036  001436                    .WORD   1436
  282  003040  001136                    .WORD   1136
  283  003042  000076                    .WORD   76
  284  003044  000006                    .WORD   6               ;GROWING 1
  285  003046  000016                    .WORD   16
  286  003050  000036                    .WORD   36
  287  003052  000076                    .WORD   76
  288  003054  000176                    .WORD   176             ;
  289  003056  000576                    .WORD   576
  290  003060  001576                    .WORD   1576
  291  003062  000000            CSEND:  .WORD   0
  292  003064  000000            ERPOINT: .WORD  0
  293  003066  000100            ERCOUNT: .BLKW  64.
  294  003266  000240            HDRBUF: .BLKW   160.
  295  003766                    ENDMOD
  296
```

```
                                        BGNMOD  GLBTXT
                                        .SBTTL  GLOBAL TEXT

003766                                  DEMES:  .ASCIZ  / DRV/
003773                                  NXMMES: .ASCIZ  / NXM/
004000                                  OPIMES: .ASCIZ  / OPI/
004005                                  HCRCMES:.ASCIZ  / HCRC/
004013                                  HNFMES: .ASCIZ  / HNF/
004020                                  DCKMES: .ASCIZ  / DCK/
004025                                  DLTMES: .ASCIZ  / DLT/
004032                                  MSCRLF: .ASCIZ  <15><12>
004035                                  LF:     .ASCIZ  <15>
004037                                  COMP:   .ASCIZ  / COMP/
004045                                  OPIERR: .ASCIZ  /FORCED OPI(GET STATUS) CAUSED OTHER ERRORS/
004120                                  NOPMES: .ASCIZ  /NOOP OPERATION-FLAG MODE/
004151                                  NOPINT: .ASCIZ  /NOOP OPERATION-INTR. MODE/
004203                                  WCKMES: .ASCIZ  /WRITE CHECK OPERATION-FLAG MODE/
004243                                  WCKINT: .ASCIZ  /WRITE CHECK OPERATION-INTR. MODE/
004304                                  RHDMES: .ASCIZ  /READ HEADER OPERATION-FLAG MODE/
004344                                  RHDINT: .ASCIZ  /READ HEADER OPERATION-INTR. MODE/
004405                                  SEKMES: .ASCIZ  /SEEK OPERATION-FLAG MODE/
004436                                  SEKINT: .ASCIZ  /SEEK OPERATION-INTR. MODE/
004470                                  GSTMES: .ASCIZ  /GET STATUS OPERATION-FLAG MODE/
004527                                  GSTINT: .ASCIZ  /GET STATUS OPERATION-INTR MODE/
004566                                  ARLCS:  .ASCIZ  /CS: /
004573                                  ARLBA:  .ASCIZ  / BA: /
004601                                  ARLDA:  .ASCIZ  / DA: /
004607                                  ARLMP:  .ASCIZ  / MP: /
004615                                  BEREG:  .ASCIZ  /BEFORE COMMAND: /
004636                                  AFREG:  .ASCIZ  /TIME OF ERROR:  /
004657                                  CRTIM:  .ASCIZ  /CONTROLLER TIMED OUT/
004704                                  DRTIM:  .ASCIZ  /DRIVE READY TIMED OUT/
004732                                  EM1:    .ASCIZ  /CAN NOT ADDRESS RLCS/
004757                                  EM2:    .ASCIZ  /CAN NOT ADDRESS RLBA/
005004                                  EM3:    .ASCIZ  /CAN NOT ADDRESS RLDA/
005031                                  EM4:    .ASCIZ  /CAN NOT ADDRESS RLMP/
005056                                  EM5:    .ASCIZ  %RLCS READ/WRITE ERROR (BIT 0 DON'T CARE)%
005127                                  EM6:    .ASCIZ  %RLBA READ/WRITE ERROR%
005155                                  EM7:    .ASCIZ  %RLDA READ/WRITE ERROR%
005203                                  EM11:   .ASCIZ  /OPI WOULD NOT GENERATE INTERRUPT/
005244                                  EM13:   .ASCIZ  /NO INTERRUPT FROM NOOP(0)/
005276                                  EM14:   .ASCIZ  /NOOP(0) MODIFIED RLMP/
005324                                  EM15:   .ASCIZ  /NOOP(0) MODIFIED RLBA/
005352                                  EM16:   .ASCIZ  /NOOP(0) MODIFIED RLDA/
005400                                  EM17:   .ASCIZ  /INTERRUPT PRIORITY FAILURE/
005433                                  EM30:   .ASCIZ  /GET STATUS WOULD NOT INTERRUPT/
005472                                  EM30A:  .ASCIZ  /GET STATUS SHOULD NOT INTERRUPT/
005532                                  EM32:   .ASCIZ  /RLMP CONTAINED WRONG STATUS/
005566                                  EM33:   .ASCIZ  /OPI DID NOT SET-GSTAT WITHOUT GS BIT/
005633                                  EM34:   .ASCIZ  /OPI DID NOT SET-GSTAT WITHOUT GS AND MK BITS/
005710                                  EM37:   .ASCIZ  /READ HEADER WOULD NOT INTERRUPT/
005750                                  EM41:   .ASCIZ  /BAD CYLINDER OR HEAD SELECT IN REPEATED READ HEADER TEST/
006041                                  EM42:   .ASCIZ  /BAD HEADER CRC ON READ HEADER/
006077                                  EM43:   .ASCIZ  /SECTOR ADDRESS OUT OF SEQUENCE DURING CONSECUTIVE READ HEADERS/
006176                                  EM44:   .ASCIZ  /WRITING RLMP MODIFIED RLCS/
006231                                  EM45:   .ASCIZ  /WRITING RLMP MODIFIED RLBA/
```

```
357  006264  051127  052111  047111  EM46:   .ASCIZ  /WRITING RLMP MODIFIED RLDA/
358  006317     123  042505  020113  EM47:   .ASCIZ  /SEEK WOULD NOT INTERRUPT/
359  006350  051104  053111  020105  EM52:   .ASCIZ  /DRIVE READY CAUSED EXTRANEOUS INTERRUPT/
360  006420  040502  020104  042523  EM54:   .ASCIZ  /BAD SEEK-TEST OF DIFFENCE WORD/
361  006457     102  042101  044040  EM55:   .ASCIZ  /BAD HEAD SELECT VIA RD HDR/
362  006512  040502  020104  042510  EM56:   .ASCIZ  /BAD HEAD SELECT VIA GET STATUS/
363  006551     114  040517  044504  EM57:   .ASCII  /LOADING RLDA BEFORE DRIVE READY ON SEEK/<15><12>
364  006622  051104  053111  020105          .ASCIZ  /DRIVE READY DID NOT SET/
365  006652  044502  020124  042523  EM61:   .ASCIZ  /BIT SET INSTRUCTION ON RLCS YIELDED WRONG RESULT/
366  006733     102  052111  041440  EM62:   .ASCIZ  /BIT CLEAR INSTRUCTION ON RLCS YIELDED WRONG RESULT/
367  007016  044502  020124  042523  EM63:   .ASCIZ  /BIT SET INSTRUCTION ON RLBA YIELDED WRONG RESULT/
368  007077     102  052111  041440  EM64:   .ASCIZ  /BIT CLEAR INSTRUCTION ON RLBA YIELDED WRONG RESULT/
369  007162  044502  020124  042523  EM65:   .ASCIZ  /BIT SET INSTRUCTION ON RLDA YIELDED WRONG RESULT/
370  007243     102  052111  041440  EM66:   .ASCIZ  /BIT CLEAR INSTRUCTION ON RLDA YIELDED WRONG RESULT/
371  007326  052502  020123  042522  EM67:   .ASCIZ  /BUS RESET DID NOT CLEAR RLCS/
372  007363     102  051525  051040  EM70:   .ASCIZ  /BUS RESET DID NOT CLEAR RLBA/
373  007420  052502  020123  042522  EM71:   .ASCIZ  /BUS RESET DID NOT CLEAR RLDA/
374  007455     127  044522  044524  EM72:   .ASCIZ  /WRITING RLCS MODIFIED RLBA/
375  007510  051127  052111  047111  EM73:   .ASCIZ  /WRITING RLCS MODIFIED RLDA/
376  007543     127  044522  044524  EM74:   .ASCIZ  /WRITING RLBA MODIFED RLCS/
377  007575     127  044522  044524  EM75:   .ASCIZ  /WRITING RLBA MODIFED RLDA/
378  007627     127  044522  044524  EM76:   .ASCIZ  /WRITING RLDA MODIFIED RLCS/
379  007662  051127  052111  047111  EM77:   .ASCIZ  /WRITING RLDA MODIFIED RLBA/
380  007715     122  041514  020123  EM101:  .ASCIZ  /RLCS CONTAINED FOLLOWING ERROR(S):  /
381  007762  000170                  EM102:  .BLKB   120.
382
383                                  .EVEN
384
388  010152                          ENDMOD
389
```

```
                                        .SBTTL  GLOBAL ERRORS

                                        BGNMOD  GLBERR

                                        BGNMSG  ERR0

010152  004737  010476                        JSR     PC,LINE1
010156  004737  010532                        JSR     PC,LINE2

010162  004537  013030                        JSR     R5,CKERLT       ;CHECK ERROR LIMIT
010166                                        ENDMSG
(3)  010166                             L10000:
(3)  010166  104423                           TRAP    C$MSG

                                        BGNMSG  ERR1

010170  004737  010476                        JSR     PC,LINE1

010174  004537  013030                        JSR     R5,CKERLT       ;CHECK ERROR LIMIT
010200                                        ENDMSG
(3)  010200                             L10001:
(3)  010200  104423                           TRAP    C$MSG

                                        BGNMSG  ERR2

010202  004737  010476                        JSR     PC,LINE1
010206                                        PRINTB  #FRMT4,GDDAT,BDDAT
(9)  010206  013746  002356                   MOV     BDDAT,-(SP)
(8)  010212  013746  002354                   MOV     GDDAT,-(SP)
(7)  010216  012746  011154                   MOV     #FRMT4,-(SP)
(6)  010222  012746  000003                   MOV     #3,-(SP)
(3)  010226  010600                           MOV     SP,R0
(4)  010230  104414                           TRAP    C$PNTB
(4)  010232  062706  000010                   ADD     #10,SP

010236  004537  013030                        JSR     R5,CKERLT       ;CHECK ERROR LIMIT
010242                                        ENDMSG
(3)  010242                             L10002:
(3)  010242  104423                           TRAP    C$MSG

                                        BGNMSG  ERR3

010244  004737  010476                        JSR     PC,LINE1
010250  004737  010532                        JSR     PC,LINE2
010254                                        PRINTB  #FRMT5,TMP0,BDDAT,GDDAT
(10) 010254  013746  002354                   MOV     GDDAT,-(SP)
(9)  010260  013746  002356                   MOV     BDDAT,-(SP)
(8)  010264  013746  002346                   MOV     TMP0,-(SP)
(7)  010270  012746  011212                   MOV     #FRMT5,-(SP)
(6)  010274  012746  000004                   MOV     #4,-(SP)
(3)  010300  010600                           MOV     SP,R0
(4)  010302  104414                           TRAP    C$PNTB
(4)  010304  062706  000012                   ADD     #12,SP

010310  004537  013030                        JSR     R5,CKERLT       ;CHECK ERROR LIMIT
010314                                        ENDMSG
```

```
(3)  010314
(3)  010314  104423
426
427  010316
428
429  010316  004737  010476
430  010322  004737  010532
431  010326
(9)  010326  013746  002356
(8)  010332  013746  002354
(7)  010336  012746  011154
(6)  010342  012746  000003
(3)  010346  010600
(4)  010350  104414
(4)  010352  062706  000010
432
433  010356  004537  013030
434  010362
(3)  010362
(3)  010362  104423
435
436  010364
437
438  010364  004737  010476
439
440  010370  004537  013030
441  010374
(3)  010374
(3)  010374  104423
442
443  010376
444
445  010376  004737  010476
446  010402  004737  010754
447  010406  004737  010532
448
449
450  010412
(7)  010412  012746  011207
(6)  010416  012746  000001
(3)  010422  010600
(4)  010424  104414
(4)  010426  062706  000004
451  010432  004537  013030
452  010436
(3)  010436
(3)  010436  104423
453
454  010440
455
456  010440  004737  010476
457  010444
(8)  010444  013746  002356
(7)  010450  012746  011263
(6)  010454  012746  000002
(3)  010460  010600

L10003:
             TRAP    C$MSG

BGNMSG  ERR4

             JSR     PC,LINE1
             JSR     PC,LINE2
             PRINTB  #FRMT4,GDDAT,BDDAT
             MOV     BDDAT,-(SP)
             MOV     GDDAT,-(SP)
             MOV     #FRMT4,-(SP)
             MOV     #3,-(SP)
             MOV     SP,R0
             TRAP    C$PNTB
             ADD     #10,SP

             JSR     R5,CKERLT       ;CHECK ERROR LIMIT
             ENDMSG
L10004:
             TRAP    C$MSG

BGNMSG  ERR5

             JSR     PC,LINE1

             JSR     R5,CKERLT       ;CHECK ERROR LIMIT
             ENDMSG
L10005:
             TRAP    C$MSG

BGNMSG  ERR6

             JSR     PC,LINE1
             JSR     PC,LINE3
             JSR     PC,LINE2

1$:          PRINTB  #FRMT99
             MOV     #FRMT99,-(SP)
             MOV     #1,-(SP)
             MOV     SP,R0
             TRAP    C$PNTB
             ADD     #4,SP
             JSR     R5,CKERLT       ;CHECK ERROR LIMIT
             ENDMSG
L10006:
             TRAP    C$MSG

BGNMSG  ERR7

             JSR     PC,LINE1
             PRINTB  #FRMT6,BDDAT
             MOV     BDDAT,-(SP)
             MOV     #FRMT6,-(SP)
             MOV     #2,-(SP)
             MOV     SP,R0
```

```
 (4)  010462  104414                        TRAP    C$PNTB
 (4)  010464  062706  000006                ADD     #6,SP
458
459   010470  004537  013030                JSR     R5,CKERLT
460
461   010474                                ENDMSG
 (3)  010474                        L10007:
 (3)  010474  104423                        TRAP    C$MSG
462
463   010476                        LINE1:  PRINTB  #FRMT1,RLCS,<B,DRIVE+1>
 (9)  010476  005046                        CLR     -(SP)
 (9)  010500  153716  002267                BISB    DRIVE+1,(SP)
 (8)  010504  013746  002250                MOV     RLCS,-(SP)
 (7)  010510  012746  011026                MOV     #FRMT1,-(SP)
 (6)  010514  012746  000003                MOV     #3,-(SP)
 (3)  010520  010600                        MOV     SP,R0
 (4)  010522  104414                        TRAP    C$PNTB
 (4)  010524  062706  000010                ADD     #10,SP
464   010530  000207                        RTS     PC
465
466   010532                        LINE2:  PRINTB  #FRMT2,#BEREG,#ARLCS,B.CS,#ARLBA,B.BA
(12)  010532  013746  002272                MOV     B.BA,-(SP)
(11)  010536  012746  004573                MOV     #ARLBA,-(SP)
(10)  010542  013746  002270                MOV     B.CS,-(SP)
 (9)  010546  012746  004566                MOV     #ARLCS,-(SP)
 (8)  010552  012746  004615                MOV     #BEREG,-(SP)
 (7)  010556  012746  011066                MOV     #FRMT2,-(SP)
 (6)  010562  012746  000006                MOV     #6,-(SP)
 (3)  010566  010600                        MOV     SP,R0
 (4)  010570  104414                        TRAP    C$PNTB
 (4)  010572  062706  000016                ADD     #16,SP
467   010576                                PRINTB  #FRMT2A,#ARLDA,B.DA,#ARLMP,B.MP
(11)  010576  013746  002276                MOV     B.MP,-(SP)
(10)  010602  012746  004607                MOV     #ARLMP,-(SP)
 (9)  010606  013746  002274                MOV     B.DA,-(SP)
 (8)  010612  012746  004601                MOV     #ARLDA,-(SP)
 (7)  010616  012746  011105                MOV     #FRMT2A,-(SP)
 (6)  010622  012746  000005                MOV     #5,-(SP)
 (3)  010626  010600                        MOV     SP,R0
 (4)  010630  104414                        TRAP    C$PNTB
 (4)  010632  062706  000014                ADD     #14,SP
468   010636                                PRINTB  #FRMT2,#AFREG,#ARLCS,E.CS,#ARLBA,E.BA
(12)  010636  013746  002304                MOV     E.BA,-(SP)
(11)  010642  012746  004573                MOV     #ARLBA,-(SP)
(10)  010646  013746  002302                MOV     E.CS,-(SP)
 (9)  010652  012746  004566                MOV     #ARLCS,-(SP)
 (8)  010656  012746  004636                MOV     #AFREG,-(SP)
 (7)  010662  012746  011066                MOV     #FRMT2,-(SP)
 (6)  010666  012746  000006                MOV     #6,-(SP)
 (3)  010672  010600                        MOV     SP,R0
 (4)  010674  104414                        TRAP    C$PNTB
 (4)  010676  062706  000016                ADD     #16,SP
469   010702                                PRINTB  #FRMT2B,#ARLDA,E.DA,#ARLMP,E.MP,E.MP1,E.MP2
(13)  010702  013746  002314                MOV     E.MP2,-(SP)
(12)  010706  013746  002312                MOV     E.MP1,-(SP)
(11)  010712  013746  002310                MOV     E.MP,-(SP)
```

```
(10) 010716  012746  004607                    MOV     #ARLMP,-(SP)
(9)  010722  013746  002306                    MOV     E.DA,-(SP)
(8)  010726  012746  004601                    MOV     #ARLDA,-(SP)
(7)  010732  012746  011120                    MOV     #FRMT2B,-(SP)
(6)  010736  012746  000007                    MOV     #7,-(SP)
(3)  010742  010600                            MOV     SP,R0
(4)  010744  104414                            TRAP    C$PNTB
(4)  010746  062706  000020                    ADD     #20,SP
470  010752  000207                            RTS     PC
471
472  010754                         LINE3:     PRINTB  #FRMT3,#EM101
(8)  010754  012746  007715                    MOV     #EM101,-(SP)
(7)  010760  012746  011147                    MOV     #FRMT3,-(SP)
(6)  010764  012746  000002                    MOV     #2,-(SP)
(3)  010770  010600                            MOV     SP,R0
(4)  010772  104414                            TRAP    C$PNTB
(4)  010774  062706  000006                    ADD     #6,SP
473  011000                                    PRINTB  #FRMT3,#EM102
(8)  011000  012746  007762                    MOV     #EM102,-(SP)
(7)  011004  012746  011147                    MOV     #FRMT3,-(SP)
(6)  011010  012746  000002                    MOV     #2,-(SP)
(3)  011014  010600                            MOV     SP,R0
(4)  011016  104414                            TRAP    C$PNTB
(4)  011020  062706  000006                    ADD     #6,SP
474  011024  000207                            RTS     PC
475
479
480  011026  040445  047503  052116  FRMT1:   .ASCIZ   /%ACONTROLLER: %06%A  DRIVE: %01/
481  011066  047045  052045  052045  FRMT2:   .ASCIZ   /%N%T%T%06%T%06/
482  011105     045  022524  033117  FRMT2A:  .ASCIZ   /%T%06%T%06/
483  011120  052045  047445  022466  FRMT2B:  .ASCIZ   /%T%06%T%06%A %06%A %06/
484  011147     045  022516  000124  FRMT3:   .ASCIZ   /%N%T/
485  011154  047045  040445  054105  FRMT4:   .ASCII   /%N%AEXP'D: %06%A REC'D: %06/
486  011207     045  000116          FRMT99:  .ASCIZ   /%N/
487  011212  047045  040445  040514  FRMT5:   .ASCIZ   /%N%ALAST: %06%A PRES: %06%A EXP'D: %06%N/
488  011263     045  022516  040501  FRMT6:   .ASCIZ   /%N%AAT PROCESSOR LEVEL %06%N/
489  011320  040445  051105  047522  FRMT11:  .ASCIZ   /%AERROR LIMIT EXCEEDED-DROPPED%N/
490  011361     045  022516  042101  FRMT12:  .ASCIZ   /%N%ADRIVE DID NOT RECOVER FROM POWER FAILURE%N/
491  011440  047045  052045  040445  FRMT13:  .ASCIZ   /%N%T%A - WILL NOT TEST%N/
492  011471     045  022516  042101  FRMT14:  .ASCIZ   /%N%ADRIVE DROPPED - NO CONTROLLER%N/
493  011535     045  022516  042101  FRMT15:  .ASCIZ   /%N%ADRIVE DROPPED - DID NOT RESPOND WITH 'READY'%N/
494
495                                    .EVEN
496
497
501
502
503
504  011620                                    ENDMOD
505
506  011620                         BGNMOD     HPTCODE
507
508  011620                         BGNHW
(3)  011620  000006                            .WORD   L10010-L$HW/2
509  011622  174400                            .WORD   174400          ;CSR
510  011624  000160                            .WORD   160             ;VECTOR
```

```
  511  011626  000240                        .WORD   240             ;PRIORITY
  512  011630  000001                        .WORD   1               ;RL01 = 1
  513  011632  000000                        .WORD   0               ;DRIVE (BITS 8,9,10)
  514  011634  000001                        .WORD   1               ;RL11 = 1, RLV11 = 0
  515
  516  011636                        ENDHW
  (3)  011636                        L10010:
  517
  518  011636                                ENDMOD
  519
  520  011636                        BGNMOD  SPTCODE
  521
  522  011636                        BGNSW
  (3)  011636  000003                        .WORD   L10011-L$SW/2
  523
  524  011640  000000                DROP:   .WORD   0
  525  011642  000012                MERLMT: .WORD   10.
  526  011644  000000                T.SIZE: .WORD   0
  527
  528  011646                        ENDSW
  (3)  011646                        L10011:
  529
  530  011646                                ENDMOD
  531
  532  011646                        BGNMOD  DSPCODE
  533
  534  011646                        DISPATCH        44
  (4)  011646  000054                        .WORD   44
  (6)  011650  014346                        .WORD   T1
  (6)  011652  014442                        .WORD   T2
  (6)  011654  014536                        .WORD   T3
  (6)  011656  014632                        .WORD   T4
  (6)  011660  014726                        .WORD   T5
  (6)  011662  015046                        .WORD   T6
  (6)  011664  015150                        .WORD   T7
  (6)  011666  015236                        .WORD   T8
  (6)  011670  015362                        .WORD   T9
  (6)  011672  015506                        .WORD   T10
  (6)  011674  015612                        .WORD   T11
  (6)  011676  015712                        .WORD   T12
  (6)  011700  016002                        .WORD   T13
  (6)  011702  016102                        .WORD   T14
  (6)  011704  016212                        .WORD   T15
  (6)  011706  016264                        .WORD   T16
  (6)  011710  016322                        .WORD   T17
  (6)  011712  016446                        .WORD   T18
  (6)  011714  016606                        .WORD   T19
  (6)  011716  016746                        .WORD   T20
  (6)  011720  017152                        .WORD   T21
  (6)  011722  017202                        .WORD   T22
  (6)  011724  017406                        .WORD   T23
  (6)  011726  017472                        .WORD   T24
  (6)  011730  017636                        .WORD   T25
  (6)  011732  017666                        .WORD   T26
  (6)  011734  020040                        .WORD   T27
  (6)  011736  020126                        .WORD   T28
```

```
    (6)  011740  020254                    .WORD   T29
    (6)  011742  020276                    .WORD   T30
    (6)  011744  020356                    .WORD   T31
    (6)  011746  020522                    .WORD   T32
    (6)  011750  020660                    .WORD   T33
    (6)  011752  021176                    .WORD   T34
    (6)  011754  021272                    .WORD   T35
    (6)  011756  021336                    .WORD   T36
    (6)  011760  021462                    .WORD   T37
    (6)  011762  022100                    .WORD   T38
    (6)  011764  022232                    .WORD   T39
    (6)  011766  022374                    .WORD   T40
    (6)  011770  022534                    .WORD   T41
    (6)  011772  022706                    .WORD   T42
    (6)  011774  023334                    .WORD   T43
    (6)  011776  024054                    .WORD   T44
    535
    536  012000                            ENDMOD
    537
    538
```

```
                                        .SBTTL  LOAD PROTECTION TABLE
012000                                  BGNPROT
012000  000000                          .WORD    0                      ;P-TABLE OFFSET OF CSR
012002  177777                          .WORD   -1                      ;NOT A MASS-BUS DRIVE
012004  000012                          .WORD   10.                     ;P-TABLE OFFSET OF DRIVE
012006                                  ENDPROT

                                        .SBTTL  INITIALIZATION CODE
012006                                  BGNMOD  INITCODE

012006                                          BGNINIT

012006                                          BRESET
(3) 012006  104433                              TRAP    C$RESET
012010                                          READEF  #EF.PWR                 ;POWER UP?????
(3) 012010  012700  000034                      MOV     #EF.PWR,R0
(3) 012014  104447                              TRAP    C$REFG
012016                                          BNCOMPLETE      NOPWR           ;NO,BRANCH
(2) 012016  103004                              BCC     NOPWR
012020  013737  002012  002242                  MOV     L$UNIT,PWRFLG           ;YES, SET POWER FLAG
012026  000475                                  BR      CONT                    ;GO TO CONTINUE POINT
012030                                  NOPWR:  READEF  #EF.RESTART     ;RESTART?
(3) 012030  012700  000037                      MOV     #EF.RESTART,R0
(3) 012034  104447                              TRAP    C$REFG
012036                                          BCOMPLETE START1
(2) 012036  103404                              BCS     START1
012040                                          READEF  #EF.START               ;START???
(3) 012040  012700  000040                      MOV     #EF.START,R0
(3) 012044  104447                              TRAP    C$REFG
012046                                          BNCOMPLETE      CONTINUE
(2) 012046  103010                              BCC     CONTINUE
012050  012700  003066              START1: MOV     #ERCOUNT,R0
012054  012701  000100                      MOV     #64.,R1
012060  005020                      1$:     CLR     (R0)+
012062  005301                              DEC     R1
012064  001375                              BNE     1$
012066  000407                              BR      START

012070                                  CONTINUE:       READEF  #EF.CONTINUE    ;CONTINUE????
(3) 012070  012700  000036                      MOV     #EF.CONTINUE,R0
(3) 012074  104447                              TRAP    C$REFG
012076                                          BCOMPLETE       CONT
(2) 012076  103451                              BCS     CONT

012100  005737  002244              NXT:    TST     UUT                     ;DONE ALL UUT'S
012104  001011                              BNE     XXX                     ;NO
012106  012737  177777  002246      START:  MOV     #-1,UNITST
012114  013737  002012  002244              MOV     L$UNIT,UUT
012122  012737  003064  003064              MOV     #ERCOUNT-2,ERPOINT

012130  005237  002246              XXX:    INC     UNITST
012134  062737  000002  003064              ADD     #2,ERPOINT
012142  005337  002244                      DEC     UUT
012146                                  REST:   GPHARD  UNITST,R0
(3) 012146  013700  002246                      MOV     UNITST,R0
```

```
(3)  012152  104442                    TRAP    C$GPHRD
582  012154                             BCOMPLETE       1$
(2)  012154  103406                    BCS     1$
583  012156  005737  002242            TST     PWRFLG                  ;POWER FLAG TO 0
584  012162  001746                    BEQ     NXT                     ;YES, DONT DEC IT
585  012164  005337  002242            DEC     PWRFLG
586  012170  000743                    BR      NXT                     ;GET NEXT ONE
587  012172  012037  002260    1$:     MOV     (R0)+,BCSR
588  012176  012037  002264            MOV     (R0)+,BVEC
589  012202  012037  002262            MOV     (R0)+,BPRIOR
590  012206  012037  002400            MOV     (R0)+,T.DRIVE
591  012212  012037  002266            MOV     (R0)+,DRIVE
592  012216  012037  002402            MOV     (R0)+,T.CNTLR   ;GET CONTROLLER TYPE
593
594  012222  013700  002260    CONT:   MOV     BCSR,R0
595  012226  010037  002250            MOV     R0,RLCS
596  012232  062700  000002            ADD     #2,R0
597  012236  010037  002252            MOV     R0,RLBA
598  012242  062700  000002            ADD     #2,R0
599  012246  010037  002254            MOV     R0,RLDA
600  012252  062700  000002            ADD     #2,R0
601  012256  010037  002256            MOV     R0,RLMP
602  012262  005737  002242            TST     PWRFLG                  ;RECENT POWER FAILURE?
603  012266  001476                    BEQ     END                     ;NO
604
605                             ;THERE WAS A RECENT POWER FAILURE, THEREFORE WE WILL WAIT
606                             ;FOR THE DRIVE TO COME READY
607
608  012270  012701  000170            MOV     #120.,R1                ;INITIALIZE WAIT COUNT
609  012274  012777  000200  167746    MOV     #200,@RLCS              ;SET CRDY
610  012302  053777  002266  167740    BIS     DRIVE,@RLCS             ;SET IN DRIVE SELECT
611  012310  032777  000001  167732    BIT     #DRDY,@RLCS             ;DRIVE READY???
612  012316  001042                    BNE     BGNTST                  ;YES, THEN START TEST
613  012320  012737  000050  002406    MOV     #40.,DLYCNT             ;INITIALIZE DELAY COUNT
614  012326                     WAIT0:  DELAY   #1                      ;IMPLEMENT 100-USEC DELAY
(2)  012326  012727  000001            MOV     ##1,(PC)+
(2)  012332  000000                    .WORD   0
(2)  012334  013727  002116            MOV     L$DLY,(PC)+
(2)  012340  000000                    .WORD   0
(2)  012342  005367  177772            DEC     -6(PC)
(2)  012346  001375                    BNE     .-4
(2)  012350  005367  177756            DEC     -22(PC)
(2)  012354  001367                    BNE     .-20
615  012356  005337  002406            DEC     DLYCNT                  ;DECREMENT DELAY COUNT
616  012362  001361                    BNE     WAIT0                   ;BRANCH IF TIME DELAY NOT EXPIRED
617  012364  005301                    DEC     R1                      ;SIXTY SECONDS GONE BY
618  012366  001350                    BNE     DRVRDY                  ;NO, GO BACK
619  012370                             PRINTB  #FRMT12                 ;DROPPING DRIVE - DRIVE DID NOT RECOVER
(7)  012370  012746  011361            MOV     #FRMT12,-(SP)
(6)  012374  012746  000001            MOV     #1,-(SP)
(3)  012400  010600                    MOV     SP,R0
(4)  012402  104414                    TRAP    C$PNTB
(4)  012404  062706  000004            ADD     #4,SP
620
621  012410  004737  010476    6$:     JSR     PC,LINE1                ;/FROM POWER FAILURE
622  012414                             DODU    UNITST                  ;GIVE DRIVE INFO
                                                                       ;TELL SUPERVISOR TO DROP IT
```

```
(3)  012414  013700  002246                MOV     UNITST,R0
(3)  012420  104451                        TRAP    C$DODU
623  012422                                DOCLN                           ;FORCE AN ABORT
(3)  012422  104444                        TRAP    C$DCLN
624  012424  012777  000013  167622  BGNTST: MOV     #13,@RLDA               ;SETUP DR RST
625  012432  012777  000204  167610        MOV     #204,@RLCS              ;GS FUNC
626  012440  053777  002266  167602        BIS     DRIVE,@RLCS             ;SELECT DRIVE
627  012446  042777  000200  167574        BIC     #200,@RLCS              ;ISSUE IT
628  012454  032777  000200  167566  4$:   BIT     #200,@RLCS              ;WAIT FOR READY
629  012462  001774                        BEQ     4$
630  012464                        END:    SETVEC  BVEC,#INTSRV,#340
(7)  012464  012746  000340                MOV     #340,-(SP)
(6)  012470  012746  014152                MOV     #INTSRV,-(SP)
(5)  012474  013746  002264                MOV     BVEC,-(SP)
(4)  012500  012746  000003                MOV     #3,-(SP)
(3)  012504  104437                        TRAP    C$SVEC
(2)  012506  062706  000010                ADD     #10,SP
631  012512  005037  002316                CLR     PFLG            ;CLR PROCESSOR FLAG
632  012516                                READBUS                 ;Q-BUS
(3)  012516  104407                        TRAP    C$RDBU
633  012520                                BNCOMPLETE      1$
(2)  012520  103002                        BCC     1$
634  012522  005237  002316                INC     PFLG            ;NO, Q-BUS THEN
635  012526                        1$:
636  012526                                ENDINIT
(3)  012526                        L10013:
(3)  012526  104411                        TRAP    C$INIT
637
638  012530                                ENDMOD
639
640
641  012530                        .SBTTL  AUTO DROP SECTION
642  012530  005037  002320        BGNAUTO
643  012534                                CLR     TRPFLG          ;CLEAR TRAP FLAG
(7)  012534  012746  000340                SETVEC  ERRVEC,#TRPHAN,#340     ;SET UP VECTOR TO DETECT NON-EXISTENT
(6)  012540  012746  014144                MOV     #340,-(SP)
(5)  012544  013746  002332                MOV     #TRPHAN,-(SP)
(4)  012550  012746  000003                MOV     ERRVEC,-(SP)
(3)  012554  104437                        MOV     #3,-(SP)
(2)  012556  062706  000010                TRAP    C$SVEC
644                                         ADD     #10,SP
645  012562  012746  000340                                        ;/CONTROLLER
646  012566  012746  014144                MOV     #340,-(SP)
647  012572  013746  002332                MOV     #TRPHAN,-(SP)
648  012576  012746  000003                MOV     ERRVEC,-(SP)
649  012602  104037                        MOV     #3,-(SP)
650  012604  062706  000010                EMT     C$SVEC
651  012610  005777  167434                ADD     #10,SP
652  012614                                TST     @RLCS           ;ACCESS CONTROLLER
(3)  012614  013700  002332                CLRVEC  ERRVEC          ;RELEASE VECTOR
(3)  012620  104436                        MOV     ERRVEC,R0
653  012622  013700  002332                TRAP    C$CVEC
654  012626  104036                        MOV     ERRVEC,R0
655  012630  005737  002320                EMT     C$CVEC
656  012634  001416                        TST     TRPFLG          ;DID IT TRAP?
657  012636                                BEQ     1$              ;NO - CHECK ITS DRIVE
                                           PRINTB  #FRMT14         ;ELSE, PRINT MSG. 'DRIVE DROPPED - NO CONTROLLER''
```

```
(7)  012636  012746  011471                      MOV     #FRMT14,-(SP)
(6)  012642  012746  000001                      MOV     #1,-(SP)
(3)  012646  010600                              MOV     SP,R0
(4)  012650  104414                              TRAP    C$PNTB
(4)  012652  062706  000004                      ADD     #4,SP
658  012656  004737  010476                      JSR     PC,LINE1        ;PROVIDE DRIVE INFORMATION
659  012662                                       DODU    UNITST          ;DO DROP UNIT ON DRIVE
(3)  012662  013700  002246                      MOV     UNITST,R0
(3)  012666  104451                              TRAP    C$DODU
660  012670  000427                              BR      2$              ;EXIT
661  012672  012777  000200  167350  1$:         MOV     #200,@RLCS      ;SET CONTROLLER READY
662  012700  053777  002266  167342              BIS     DRIVE,@RLCS     ;SELECT DRIVE
663  012706  032777  000001  167334              BIT     #1,@RLCS        ;IS DRIVE READY?
664  012714  001015                              BNE     2$              ;YES - EXIT
665  012716                                       PRINTB  #FRMT15         ;ELSE, PRINT MSG. 'DRIVE DROPPED - DID NOT
(7)  012716  012746  011535                      MOV     #FRMT15,-(SP)
(6)  012722  012746  000001                      MOV     #1,-(SP)
(3)  012726  010600                              MOV     SP,R0
(4)  012730  104414                              TRAP    C$PNTB
(4)  012732  062706  000004                      ADD     #4,SP
666                                              ;/RESPOND WITH 'READY''
667  012736  004737  010476                      JSR     PC,LINE1        ;PROVIDE DRIVE INFORMATION
668  012742                                       DODU    UNITST          ;DO DROP UNIT ON DRIVE
(3)  012742  013700  002246                      MOV     UNITST,R0
(3)  012746  104451                              TRAP    C$DODU
669  012750                           2$:
670  012750                           ENDAUTO
(3)  012750                           L10014:
(3)  012750  104461                              TRAP    C$AUTO
671
672  012752                           BGNMOD  CLNCODE
673
674  012752                                   BGNCLN
675
676  012752                                   SETPRI  #PRI07
(3)  012752  012700  000340                  MOV     #PRI07,R0
(3)  012756  104441                          TRAP    C$SPRI
677
678  012760  032777  000200  167262  1$:     BIT     #CRDY,@RLCS
679  012766  001774                          BEQ     1$
680
681  012770  042777  000100  167252          BIC     #INTEN,@RLCS
682
683  012776                                   CLRVEC  BVEC
(3)  012776  013700  002264                  MOV     BVEC,R0
(3)  013002  104436                          TRAP    C$CVEC
684
685
686
687  013004  005737  002242                  TST     PWRFLG                  ;TREAT POWER FAILURE
688  013010  001402                          BEQ     2$
689
690  013012  005337  002242                  DEC     PWRFLG
691
692  013016                           2$:
693  013016                                   ENDCLN
```

```
   (3)  013016                          L10015:
   (3)  013016  104412                          TRAP    C$CLEAN
694
695  013020                                      ENDMOD
696
697
698
699  013020                          BGNMOD  DRPCODE
700
701  013020                                  BGNDU
702
703  013020  000240                          NOP
704
705  013022                                  ENDDU
   (3)  013022                          L10016:
   (3)  013022  104453                          TRAP    C$DU
706
707  013024                          ENDMOD
708
709  013024                          BGNMOD  ADDCODE
710
711  013024                                  BGNAU
712
713  013024  000240                          NOP
714
715  013026                                  ENDAU
   (3)  013026                          L10017:
   (3)  013026  104452                          TRAP    C$AU
716
717  013030                          ENDMOD
718
719
720
```

```
                                .SBTTL  GLOBAL SUBROUTINES

013030                          BGNMOD  GLBSUB

013030                          CKERLT: INLOOP
013030  104420                          TRAP    C$INLP
013032                                  BCOMPLETE       99$
013032  103427                          BCS     99$
013034  005737  011640                  TST     DROP
013040  001424                          BEQ     99$
013042  005277  170016                  INC     @ERPOINT
013046  027737  170012  011642          CMP     @ERPOINT,MERLMT
013054  002416                          BLT     99$

013056                                  PRINTF  #FRMT11
013056  012746  011320                  MOV     #FRMT11,-(SP)
013062  012746  000001                  MOV     #1,-(SP)
013066  010600                          MOV     SP,R0
013070  104417                          TRAP    C$PNTF
013072  062706  000004                  ADD     #4,SP
013076  004737  010476                  JSR     PC,LINE1
013102                                  DODU    UNITST          ;DROP THE UNIT
013102  013700  002246                  MOV     UNITST,R0
013106  104451                          TRAP    C$DODU
013110                                  DOCLN
013110  104444                          TRAP    C$DCLN
013112                          99$:
013112  000205                          RTS     R5


                                .SBTTL  ROUTINE TO CHECK FOR CONTROLLER ERRORS

                                ;*********************************************************************
                                ;*THIS ROUTINE WILL CHECK RLCS FOR ERRORS AND PRINT THEM
                                ;*ACCORDINGLY.  IT WILL MERGE THE ERROR PRINTOUT WITH THE TEST
                                ;*ERROR MESSAGE.
                                ;*
                                ;*EXAMPLE:   RLCS CONTAINED FOLLOWING ERROR(S):
                                ;*                  DRV   OPI   HCRC   HNF
                                ;*          SEEK UNDER INTERRUPT
                                ;*
                                ;*
                                ;*
                                ;*ROUTINE USES R0,R1 AND PICKS HEADER FROM R3
                                ;*
                                ;*      CALL    JSR     R5,CHERR
                                ;*
                                ;*
                                ;*

013114  005037  002300          CHERR:  CLR     DERFLG          ;CLEAR OUT DRIVE ERROR FLAG
013120  032737  176000  002302          BIT     #176000,E.CS    ;ANY ERRORS SET
013126  001001                          BNE     199$            ;IF YES, INVESTIGATE
```

```
768  013130  000205                          RTS     R5              ;NO, EXIT
769  013132  023727  002404  000004  199$:   CMP     TMPFNC,#GSTAT   ;FUNCTION-NOP, RESET, GETSTATUS
770  013140  002401                          BLT     98$             ;YES, GO CHECK IF ONLY DRIVE ERROR
771  013142  000414                          BR      1$              ;YES SERVICE ERROR
772  013144  023727  002404  000002  98$:    CMP     TMPFNC,#WRCHK
773  013152  001410                          BEQ     1$
774  013154  013700  002302                  MOV     E.CS,R0         ;GET E.CS
775  013160  042700  001777                  BIC     #1777,R0        ;
776  013164  022700  140000                  CMP     #140000,R0      ;DRIVE ERROR ALONE?
777  013170  001001                          BNE     1$              ;NO, GO SERVICE
778  013172  000205                  2$:     RTS     R5              ;YES, EXIT
779
780  013174  012701  007762          1$:     MOV     #EM102,R1       ;GET START OF STRING
781  013200  005737  002302                  TST     E.CS            ;IS COMPOSITE ERROR SET?(BETTER BE)
782  013204  100003                          BPL     99$             ;IT'S NOT SOMETHING IS WRONG
783  013206  004537  013660                  JSR     R5,FIX          ;YES, PUT ''COMP'' IN STRING
784  013212  004037                          COMP                    ;''COMP''
785  013214  032737  040000  002302  99$:    BIT     #DERR,E.CS      ;DRIVE ERROR SET?
786  013222  001405                          BEQ     3$              ;NO, CONTINUE
787  013224  005237  002300                  INC     DERFLG          ;SET DRV ERROR FLAG
788  013230  004537  013660                  JSR     R5,FIX          ;YES, PUT ''DRV'' INTO STRING
789  013234  003766                          DEMES                   ;''DRV''
790  013236  032737  020000  002302  3$:     BIT     #NXM,E.CS       ;NON-EXISTENT MEMORY ERROR?
791  013244  001403                          BEQ     4$              ;NO, CONTINUE
792  013246  004537  013660                  JSR     R5,FIX          ;YES, PUT ''NXM'' INTO STRING
793  013252  003773                          NXMMES                  ;''NXM''
794  013254  032737  002000  002302  4$:     BIT     #OPI,E.CS       ;IS OPI SET?
795  013262  001422                          BEQ     6$              ;NO, GO CHECK BITS 11 & 12
796  013264  004537  013660                  JSR     R5,FIX          ;PUT ''OPI'' INTO STRING
797  013270  004000                          OPIMES                  ;''OPI''
798  013272  032737  004000  002302          BIT     #BIT11,E.CS     ;HEADERCRC ERROR?
799  013300  001403                          BEQ     5$              ;NO, GO CHECK HEADER NOT FOUND
800  013302  004537  013660                  JSR     R5,FIX          ;GO PUT ''HCRC'' IN STRING
801  013306  004005                          HCRCMES                 ;''HCRC''
802  013310  032737  010000  002302  5$:     BIT     #BIT12,E.CS     ;HEADER NOT FOUND?
803  013316  001422                          BEQ     8$              ;NO, GO PUT ''CRLF'' IN STRING
804  013320  004537  013660                  JSR     R5,FIX          ;PUT ''HNF'' IN STRING
805  013324  004013                          HNFMES                  ;''HNF''
806  013326  000416                          BR      8$              ;PUT ''CRLF'' IN STRING
807  013330  032737  004000  002302  6$:     BIT     #BIT11,E.CS     ;DATA CRC ERROR?
808  013336  001403                          BEQ     7$              ;NO, GO CHECK DATA LATE
809  013340  004537  013660                  JSR     R5,FIX          ;PUT ''DCK'' IN STRING
810  013344  004020                          DCKMES                  ;''DCK''
811  013346  032737  010000  002302  7$:     BIT     #BIT12,E.CS     ;DATA LATE ERROR?
812  013354  001403                          BEQ     8$              ;NO, GO PUT IN ''CRLF''
813  013356  004537  013660                  JSR     R5,FIX          ;PUT ''DLT'' IN STRING
814  013362  004025                          DLTMES                  ;''DLT''
815  013364  004537  013660          8$:     JSR     R5,FIX
816  013370  004032                          MSCRLF
817  013372  004537  013660                  JSR     R5,FIX
818  013376  000000                  RESTMS: .WORD   0               ;HEADER FROM TEST
819  013400  105011                          CLRB    (R1)            ;PUT TERMINATOR IN
820
821  013402                                  ERRDF   300.,LF,ERR6
(4)  013402  104455                          TRAP    C$ERDF
(5)  013404  000454                          .WORD   300
```

```
(5)  013406  004035                        .WORD   LF
(5)  013410  010376                        .WORD   ERR6
822
823  013412  000205                        RTS     R5              ;EXIT ROUTINE
824
825                                 .SBTTL  LOAD RLCS
826                                 ;*****************************************************************
827                                 ;* ROUTINE TO LOAD RLCS WITH FUNCTION TO BE PERFORMED
828                                 ;*      CALL:   JSR     R5,LDFUNC
829                                 ;*              .WORD           ;BITS TO BE LOADED, FUNCTION
830                                 ;*                              ;AND INTR ENABLE ONLY
831                                 ;*
832                                 ;
833
834  013414  012537  002324         LDFUNC: MOV     (R5)+,LDCSR     ;GET BITS TO LOAD
835  013420  005737  002300                 TST     DERFLG
836  013424  001424                         BEQ     98$
837  013426  013746  002270                 MOV     B.CS,-(SP)
838  013432  012777  000013  166614         MOV     #13,@RLDA
839  013440  012737  000004  002270         MOV     #GSTAT,B.CS
840  013446  053737  002266  002270         BIS     DRIVE,B.CS
841  013454  013777  002270  166566         MOV     B.CS,@RLCS
842  013462  012637  002270                 MOV     (SP)+,B.CS
843  013466  032777  000200  166554 99$:    BIT     #200,@RLCS
844  013474  001774                         BEQ     99$
845  013476  010346                 98$:    MOV     R3,-(SP)        ;SAVE R3
846  013500  042737  177661  002324         BIC     #177661,LDCSR   ;CLEAR ALL BUT FUNC & INTR EN
847  013506  013737  002324  013632         MOV     LDCSR,FNDFNC    ;SAVE FUNCTION
848  013514  042737  000100  013632         BIC     #INTEN,FNDFNC   ;ONLY FUNCTION
849  013522  013737  013632  002404         MOV     FNDFNC,TMPFNC
850  013530  012703  013634                 MOV     #HDRLST,R3      ;GET HEADER LIST
851  013534  006237  013632                 ASR     FNDFNC          ;ALIGN TO RIGHT
852  013540  001404                         BEQ     2$
853  013542  022323                 1$:     CMP     (R3)+,(R3)+     ;BUMP R3 BY 4
854  013544  005337  013632                 DEC     FNDFNC          ;FOUND IT
855  013550  001374                         BNE     1$              ;NO,KEEP LOOKING
856  013552  032737  000100  002324 2$:     BIT     #INTEN,LDCSR    ;YES,DO WE WANT FLAG OR INTR
857  013560  001401                         BEQ     3$              ;FLAG BRANCH
858  013562  005723                         TST     (R3)+           ;INTR POINT TO THAT ONE
859  013564  011303                 3$:     MOV     (R3),R3         ;SET HEADER
860  013566  010337  013376                 MOV     R3,RESTMS       ;SET UP HEADER
861  013572  053737  002266  002324         BIS     DRIVE,LDCSR     ;SELECT DRIVE
862  013600  052737  000200  002324 4$:     BIS     #200,LDCSR      ;CONTROLLER READY
863  013606  013777  002324  166434         MOV     LDCSR,@RLCS
864  013614  004537  013672                 JSR     R5,BEFORE
865  013620  042777  000200  166422 5$:     BIC     #200,@RLCS
866  013626  012603                         MOV     (SP)+,R3        ;RESTORE R3
867  013630  000205                         RTS     R5              ;EXIT
868
869  013632  000000                 FNDFNC: .WORD   0
870
871  013634  004120                 HDRLST: NOPMES
872  013636  004151                         NOPINT
873  013640  004203                         WCKMES
874  013642  004243                         WCKINT
875  013644  004470                 OKHDR:  GSTMES
```

```
                        GSTINT
                        SEKMES
                        SEKINT
                        RHDMES
                        RHDINT

                ;*****************************************************************
                ;*ROUTINE TO MOVE ASCII STRINGS
                ;*USES REGISTERS R1 - WHERE STRING IS BEING BUILT
                ;*
                ;*      CALL    JSR     R5,FIX
                ;*              .WORD           ;ADDRESS OF STRING TO MOVE

013660  012500  FIX:    MOV     (R5)+,R0        ;GET ADDRESS AND MOVE RETURN
013662  112021  1$:     MOVB    (R0)+,(R1)+     ;GET BYTE AND UPDATE
013664  001376          BNE     1$              ;WATCH 0 BYTE TERMINATOR
013666  105741          TSTB    -(R1)           ;BACK UP OVER ZERO BYTE
013670  000205          RTS     R5              ;EXIT


                ;LOAD REGISTERS BEFORE FUNCTION
                ;CALL:  JSR     R5,BEFORE

013672  017737  166352  002270  BEFORE: MOV     @RLCS,B.CS      ;READ CS
013700  017737  166346  002272          MOV     @RLBA,B.BA      ;READ BA
013706  017737  166342  002274          MOV     @RLDA,B.DA      ;READ DA
013714  017737  166336  002276          MOV     @RLMP,B.MP      ;READ MP
013722  000205                        RTS     R5


                ;LOAD REGISTERS AT ERROR
                ;CALL:  JSR     R5,AFTER

013724  017737  166320  002302  AFTER:  MOV     @RLCS,E.CS      ;READ CS
013732  017737  166314  002304          MOV     @RLBA,E.BA      ;READ BA
013740  017737  166310  002306          MOV     @RLDA,E.DA      ;READ DA
013746  017737  166304  002310          MOV     @RLMP,E.MP      ;READ MP
013754  017737  166276  002312          MOV     @RLMP,E.MP1     ;READ MP
013762  017737  166270  002314          MOV     @RLMP,E.MP2     ;READ MP
013770  000205                        RTS     R5


                .SBTTL  ROUTINE TO CALCULATE CRC

                ;ROUTINE WILL CALCULATE A CRC-16 CRC ON A WORD OF
                ;1-16 BITS IN LENGTH, RESULT IS RETURNED IN ''CALBCC''
                ;
                ;       CALL:   JSR     R5,SIMBCC
                ;               .WORD           ;NUMBER OF BITS (1-16)
                ;               .WORD           ;DATA FOR CRC CALCULATION
                ;               .WORD           ;PREVIOUS OR STARTING CRC
                ;                               (SHOULD BE ZEROED FOR START)
                ;       ROUTINE USES R0,R1,R2

013772  010046  SIMBCC: MOV     R0,-(SP)        ;SAVE R0
```

```
                                        MOV     R1,-(SP)        ;SAVE R1
                                        MOV     R2,-(SP)        ;SAVE R2
                                        MOV     (R5)+,TEMP2     ;GET NUMBER OF BITS
                                        MOV     (R5)+,TEMP3     ;GET DATA FOR CRC CALCULATION
                                        MOV     (R5)+,TEMP4     ;GET STARTING CRC
                                1$:     CLR     BCCFBK          ;
                                        MOV     TEMP4,R0        ;GET PRESENT CRC
                                        ROR     TEMP3           ;ROTATE NEW DATA
                                        ADC     R0              ;MERGE NEW WITH OLD
                                        BIT     #1,R0           ;BIT 0 SET
                                        BEQ     2$              ;IF NOT CONTINUE
                                        COM     BCCFBK          ;
                                2$:     MOV     XPOLY,R0        ;GET CRC POLYNOMIAL (CRC-16)
                                        COM     R0              ;COMPLIMENT POLYNOMIAL
                                        BIC     R0,BCCFBK
                                        CLC                     ;CLEAR CARRY
                                        ROR     TEMP4
                                        MOV     BCCFBK,R0
                                        MOV     TEMP4,R1
                                        MOV     R1,R2
                                        BIC     R1,R0
                                        BIC     BCCFBK,R2
                                        BIS     R2,R0
                                        BIC     XPOLY,TEMP4
                                        BIS     R0,TEMP4
                                        DEC     TEMP2
                                        BNE     1$
                                        MOV     TEMP4,CALBCC
                                        MOV     (SP)+,R2
                                        MOV     (SP)+,R1
                                        MOV     (SP)+,R0
                                        RTS     R5              ;RETURN


                                ;ROUTINE TO SET FLAG IF TRAP OCCURRED
                                ;''TRPHAN'' IS IN LOCATION 4.

                                TRPHAN: INC     TRPFLG          ;INDICATE TRAP
                                        RTI                     ;RETURN

                                BGNSRV

                                INTSRV: INC     INTFLG          ;INDICATE INTERRUPT

                                ENDSRV
                                L10020:
                                        RTI

                                ;ROUTINE TO WAIT FOR DRIVE READY
                                WTDRDY: MOV     R1,-(SP)        ;SAVE R1
                                        MOV     #2000.,R1       ;TIME OUT OF 200 MILLISECONDS
                                1$:     BIT     #DRDY,@RLCS     ;DRIVE READY?
                                        BNE     2$              ;YES, EXIT
                                        DELAY   #1              ;WAIT A WHILE
```

```
    (2)  014176  012727  000001                  MOV     ##1,(PC)+
    (2)  014202  000000                          .WORD   0
    (2)  014204  013727  002116                  MOV     L$DLY,(PC)+
    (2)  014210  000000                          .WORD   0
    (2)  014212  005367  177772                  DEC     -6(PC)
    (2)  014216  001375                          BNE     .-4
    (2)  014220  005367  177756                  DEC     -22(PC)
    (2)  014224  001367                          BNE     .-20
    986  014226  005301                          DEC     R1              ;CHECK IF TIME UP
    987  014230  001356                          BNE     1$              ;NO, GO CHECK DRIVE READY
    988
    989  014232                                  ERRDF   200.,DRTIM,ERR5 ;DRIVE READY DID NOT SET
    (4)  014232  104455                          TRAP    C$ERDF
    (5)  014234  000310                          .WORD   200
    (5)  014236  004704                          .WORD   DRTIM
    (5)  014240  010364                          .WORD   ERR5
    990
    991  014242  012601                2$:       MOV     (SP)+,R1        ;RESTORE
    992  014244  000205                          RTS     R5              ;EXIT
    993
    994                                 ;ROUTINE TO WAIT FOR CONTROLLER READY
    995  014246  010146                WTCRDY:   MOV     R1,-(SP)        ;SAVE R1
    996  014250  012701  017500                  MOV     #8000.,R1       ;WAIT 800 MILLISECONDS
    997  014254  032777  000200  165766  1$:     BIT     #CRDY,@RLCS     ;CONTROLLER READY
    998  014262  001025                          BNE     2$              ;YES, EXIT
    999  014264                                  DELAY   #1              ;WAIT A WHILE
    (2)  014264  012727  000001                  MOV     ##1,(PC)+
    (2)  014270  000000                          .WORD   0
    (2)  014272  013727  002116                  MOV     L$DLY,(PC)+
    (2)  014276  000000                          .WORD   0
    (2)  014300  005367  177772                  DEC     -6(PC)
    (2)  014304  001375                          BNE     .-4
    (2)  014306  005367  177756                  DEC     -22(PC)
    (2)  014312  001367                          BNE     .-20
   1000  014314  005301                          DEC     R1              ;CHECK IF TIME UP
   1001  014316  001356                          BNE     1$              ;NO GO BACK
   1002
   1003  014320  004537  013724                  JSR     R5,AFTER        ;GET REGISTERS
   1004
   1005  014324                                  ERRDF   100.,CRTIM,ERR6 ;CONTROLLER TIMED OUT
    (4)  014324  104455                          TRAP    C$ERDF
    (5)  014326  000144                          .WORD   100
    (5)  014330  004657                          .WORD   CRTIM
    (5)  014332  010376                          .WORD   ERR6
   1006
   1007  014334  000402                          BR      3$              ;EXIT
   1008
   1009  014336  004537  013724        2$:       JSR     R5,AFTER        ;GET REGISTERS
   1010  014342  012601                3$:       MOV     (SP)+,R1
   1011  014344  000205                          RTS     R5              ;EXIT
   1012
   1013  014346                        ENDMOD
   1014
   1015
```

```
                                .SBTTL  **TEST 1** - RLCS ADDRESSABILITY

014346                          BGNTST                          ;****START OF TEST****
014346                          STARS
 (2)                            ;;**************************************************************
                                ;TEST TO SEE IF WE CAN ADDRESS THE CONTROL
                                ;AND STATUS REGISTER.  IF WE TRAP WE WILL REPORT
                                ;THE ERROR AND ABORT.  AFTER THIS TEST WE ONLY KNOW
                                ;THAT WE CAN ADDRESS THE REGISTER.
014346                          STARS
 (2)                            ;;**************************************************************

014346  005037  002320          1$:     CLR     TRPFLG          ;CLEAR TRAP OCCURANCE
014352                          2$:     SETVEC  ERRVEC,#TRPHAN,#340  ;SET TO CATCH TRAP
 (7)    014352  012746  000340          MOV     #340,-(SP)
 (6)    014356  012746  014144          MOV     #TRPHAN,-(SP)
 (5)    014362  013746  002332          MOV     ERRVEC,-(SP)
 (4)    014366  012746  000003          MOV     #3,-(SP)
 (3)    014372  104437                  TRAP    C$SVEC
 (2)    014374  062706  000010          ADD     #10,SP

014400  005777  165644                  TST     @RLCS           ;ADDRESS RLCS
014404                                  CLRVEC  ERRVEC          ;RELEASE TRAP VECTOR
 (3)    014404  013700  002332          MOV     ERRVEC,R0
 (3)    014410  104436                  TRAP    C$CVEC
014412  005737  002320                  TST     TRPFLG          ;TRAP OCCURRED???
014416  001407                          BEQ     3$              ;NO, IKAY PROCEED
014420  013737  002250  002354          MOV     RLCS,GDDAT      ;SET UP ERROR DATA

014426                                  ERRSF   0.,EM1,ERR1     ;BUS TIMEOUT IN ADDRESSING RLCS
 (4)    014426  104454                  TRAP    C$ERSF
 (5)    014430  000000                  .WORD   0
 (5)    014432  004732                  .WORD   EM1
 (5)    014434  010170                  .WORD   ERR1
014436                          3$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)    014436  104406                  TRAP    C$CLP1
014440                          ENDTST                          ;****END OF TEST****
 (3)    014440                  L10021:
 (3)    014440  104401                  TRAP    C$ETST

                                .SBTTL  **TEST 2** - RLBA ADDRESSABILITY

014442                          BGNTST                          ;****START OF TEST****

014442                          STARS
 (2)                            ;;**************************************************************
                                ;TEST TO SEE IF WE CAN ADDRESS THE BUS ADDRESS
                                ;REGISTER.  IF WE TRAP WE WILL REPORT THE ERROR
                                ;AND ABORT.  AFTER THIS TEST WE ONLY KNOW THAT
                                ;WE CAN ADDRESS THE REGISTER.
014442                          STARS
 (2)                            ;;**************************************************************
```

```
1054  014442  005037  002320          1$:     CLR     TRPFLG          ;CLEAR TRAP OCCURANCE
1055  014446                          2$:     SETVEC  ERRVEC,#TRPHAN,#340  ;SET TO CATCH TRAP
 (7)  014446  012746  000340                  MOV     #340,-(SP)
 (6)  014452  012746  014144                  MOV     #TRPHAN,-(SP)
 (5)  014456  013746  002332                  MOV     ERRVEC,-(SP)
 (4)  014462  012746  000003                  MOV     #3,-(SP)
 (3)  014466  104437                          TRAP    C$SVEC
 (2)  014470  062706  000010                  ADD     #10,SP
1056
1057  014474  005777  165552                  TST     @RLBA           ;ADDRESS RLBA
1058  014500                                  CLRVEC  ERRVEC          ;RELEASE TRAP VECTOR
 (3)  014500  013700  002332                  MOV     ERRVEC,R0
 (3)  014504  104436                          TRAP    C$CVEC
1059  014506  005737  002320                  TST     TRPFLG          ;TRAP OCCURRED???
1060  014512  001407                          BEQ     3$              ;NO, CONTINUE
1061  014514  013737  002252  002354          MOV     RLBA,GDDAT      ;SETUP ERROR DATA
1062
1063  014522                                  ERRSF   1.,EM2,ERR1     ;BUS TIMEOUT IN ADDRESSING RLBA
 (4)  014522  104454                          TRAP    C$ERSF
 (5)  014524  000001                          .WORD   1
 (5)  014526  004757                          .WORD   EM2
 (5)  014530  010170                          .WORD   ERR1
1064  014532                          3$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  014532  104406                          TRAP    C$CLP1
1065  014534                          ENDTST                          ;****END OF TEST****
 (3)  014534                          L10022:
 (3)  014534  104401                          TRAP    C$ETST
1066
1067
1068                                    .SBTTL  **TEST 3** - RLDA ADDRESSABILITY
1069
1070  014536                            BGNTST                        ;****START OF TEST****
1071  014536                            STARS
 (2)                                    ;;*****************************************************************
1072                                    ;TEST TO SEE IF WE CAN ADDRESS THE DISK ADDRESS
1073                                    ;REGISTER IF WE TRAP WE WILL REPORT THE ERROR
1074                                    ;AND ABORT.  AFTER THIS TEST WE ONLY KNOW THAT
1075                                    ;WE CAN ADDRESS THE REGISTER.
1076  014536                            STARS
 (2)                                    ;;*****************************************************************
1077
1078
1079  014536  005037  002320          1$:     CLR     TRPFLG          ;CLEAR TRAP OCCURANCE
1080  014542                          2$:     SETVEC  ERRVEC,#TRPHAN,#340  ;SET TO CATCH TRAP
 (7)  014542  012746  000340                  MOV     #340,-(SP)
 (6)  014546  012746  014144                  MOV     #TRPHAN,-(SP)
 (5)  014552  013746  002332                  MOV     ERRVEC,-(SP)
 (4)  014556  012746  000003                  MOV     #3,-(SP)
 (3)  014562  104437                          TRAP    C$SVEC
 (2)  014564  062706  000010                  ADD     #10,SP
1081
1082  014570  005777  165460                  TST     @RLDA           ;ADDRESS RLDA
1083  014574                                  CLRVEC  ERRVEC          ;RELEASE TRAP VECTOR
 (3)  014574  013700  002332                  MOV     ERRVEC,R0
 (3)  014600  104436                          TRAP    C$CVEC
1084  014602  005737  002320                  TST     TRPFLG          ;TRAP OCCURRED???
```

```
1085  014606  001407                          BEQ     3$              ;NO, CONTINUE
1086
1087  014610  013737  002254  002354          MOV     RLDA,GDDAT      ;SETUP ERROR INFO
1088  014616                                  ERRSF   2.,EM3,ERR1     ;BUS TIMEOUT IN ADDRESSING RLDA
 (4)  014616  104454                          TRAP    C$ERSF
 (5)  014620  000002                          .WORD   2
 (5)  014622  005004                          .WORD   EM3
 (5)  014624  010170                          .WORD   ERR1
1089  014626                          3$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  014626  104406                          TRAP    C$CLP1
1090  014630                          ENDTST                          ;****END OF TEST****
 (3)  014630                          L10023:
 (3)  014630  104401                          TRAP    C$ETST
1091
1092
1093                                  .SBTTL  **TEST 4** - RLMP ADDRESSABILITY
1094
1095  014632                          BGNTST                          ;****START OF TEST****
1096  014632                          STARS
 (2)                                  ;;*****************************************************************
1097                                  ;TEST TO SEE IF WE CAN ADDRESS THE MULTIPURPOSE
1098                                  ;REGISTER.  IF WE TRAP WE WILL REPORT THE ERROR AND
1099                                  ;ABORT.  AFTER THIS TEST WE ONLY KNOW THAT WE CAN
1100                                  ;ADDRESS THE REGISTER.
1101  014632                          STARS
 (2)                                  ;;*****************************************************************
1102
1103
1104  014632  005037  002320          1$:     CLR     TRPFLG          ;CLEAR TRAP OCCURANCE
1105  014636                          2$:     SETVEC  ERRVEC,#TRPHAN,#340  ;SET UP TO CATCH TRAP
 (7)  014636  012746  000340                  MOV     #340,-(SP)
 (6)  014642  012746  014144                  MOV     #TRPHAN,-(SP)
 (5)  014646  013746  002332                  MOV     ERRVEC,-(SP)
 (4)  014652  012746  000003                  MOV     #3,-(SP)
 (3)  014656  104437                          TRAP    C$SVEC
 (2)  014660  062706  000010                  ADD     #10,SP
1106
1107  014664  005777  165366                  TST     @RLMP           ;ADDRESS RLMP
1108  014670                                  CLRVEC  ERRVEC          ;RELEASE TRAP VECTOR
 (3)  014670  013700  002332                  MOV     ERRVEC,R0
 (3)  014674  104436                          TRAP    C$CVEC
1109  014676  005737  002320                  TST     TRPFLG          ;TRAP OCCURRED???
1110  014702  001407                          BEQ     3$              ;NO, CONTINUE
1111  014704  013737  002256  002354          MOV     RLMP,GDDAT      ;SET UP ERROR INFO
1112
1113  014712                                  ERRSF   3.,EM4,ERR1     ;BUS TIMEOUT IN ADDRESSING RLMP
 (4)  014712  104454                          TRAP    C$ERSF
 (5)  014714  000003                          .WORD   3
 (5)  014716  005031                          .WORD   EM4
 (5)  014720  010170                          .WORD   ERR1
1114  014722                          3$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  014722  104406                          TRAP    C$CLP1
1115  014724                          ENDTST                          ;****END OF TEST****
 (3)  014724                          L10024:
 (3)  014724  104401                          TRAP    C$ETST
1116
```

```
1117
1118                                    .SBTTL  **TEST 5** - READ WRITE OF RLCS
1119
1120  014726                            BGNTST                          ;****START OF TEST****
1121
1122
1123
1124  014726                            STARS
 (2)                                    ;;**********************************************************************
1125                                    ;TEST THAT WE CAN WRITE/READ BITS 8,9 AND BITS 6-1
1126                                    ;OF THE CONTROL AND STATUS REGISTER.  BITS 15-10 AND 0
1127                                    ;ARE DON'T CARE BITS AT THIS TIME AND BIT 7
1128                                    ;(CONTROLLER READY) IS ALWAYS WRITTEN TO A ONE.
1129  014726                            STARS
 (2)                                    ;;**********************************************************************
1130
1131
1132  014726  012703  002764                    MOV     #CSPAT,R3       ;SET UP TABLE POINTER OF PATTERNS
1133
1134  014732                            BGNSEG                          ;****START OF SEGMENT****
 (3)  014732  104404                            TRAP    C$BSEG
1135
1136  014734                            CSTEST:
1137  014734  011337  002354                    MOV     (R3),GDDAT      ;GET PATTERN INTO GDDAT
1138  014740  052737  000200  002354            BIS     #200,GDDAT      ;INSURE GO IS SET
1139  014746  013777  002354  165274            MOV     GDDAT,@RLCS     ;LOAD RLCS (CONTROL AND STATUS)
1140  014754  032777  040000  165266            BIT     #DERR,@RLCS     ;IF DRIVE ERROR PRESENT
1141  014762  001403                            BEQ     99$             ;THEN EXPECT DRIVE AND
1142  014764  052737  140000  002354            BIS     #ERR!DERR,GDDAT ;COMPOSITE ERROR
1143  014772  017737  165252  002356  99$:      MOV     @RLCS,BDDAT     ;READ RLCS BACK
1144  015000  042737  000001  002356            BIC     #DRDY,BDDAT     ;IGNORE DRIVE READY
1145  015006  023737  002354  002356            CMP     GDDAT,BDDAT     ;DID WE READ WHAT WE LOADED
1146  015014  001404                            BEQ     1$              ;YES, THEN BRANCH
1147
1148  015016                                    ERRDF   4.,EM5,ERR2     ;WRONG DATA IN RLCS
 (4)  015016  104455                            TRAP    C$ERDF
 (5)  015020  000004                            .WORD   4
 (5)  015022  005056                            .WORD   EM5
 (5)  015024  010202                            .WORD   ERR2
1149  015026                            1$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
 (3)  015026  104410                            TRAP    C$ESCAPE
 (3)  015030  000012                            .WORD   10000$-.
1150
1151
1152  015032  005723                            TST     (R3)+           ;BUMP FOR NEXT PATTERN
1153  015034  020327  003062                    CMP     R3,#CSEND       ;CHECK FOR END
1154  015040  001335                            BNE     CSTEST          ;NOT END, LOAD NEXT PATTERN
1155
1156  015042                            ENDSEG                          ;****END OF SEGMENT****
 (3)  015042                            10000$:
 (3)  015042  104405                            TRAP    C$ESEG
1157  015044                            ENDTST                          ;****END OF TEST****
 (3)  015044                            L10025:
 (3)  015044  104401                            TRAP    C$ETST
1158
1159
```

```
                        .SBTTL  **TEST 6** - READ WRITE OF RLBA

015046                  BGNTST                          ;****START OF TEST****

015046                  STARS
 (2)                    ;;*****************************************************************
                        ;TEST THAT WE CAN WRITE/READ BITS 15-1 OF THE
                        ;BUS ADDRESS REGISTER.  FOUR PATTERNS ARE USED: GROWING 1, SHIFTING 1,
                        ;GROWING 0 AND SHIFTING 0.  BIT 0 IS ALSO LOADED BUT
                        ;SHOULD ALWAYS COME BACK AS 0
015046                  STARS
 (2)                    ;;*****************************************************************

015046 012703 002410            MOV     #BEGPAT,R3      ;GET START OF PATTERN LIST
015052                  BGNSEG                          ;****START OF SEGMENT****
 (3)    015052 104404           TRAP    C$BSEG
015054                  BATEST:
015054 011337 002354            MOV     (R3),GDDAT      ;GET PATTERN TO SEND
015060 005737 002402            TST     T.CNTLR         ;RL11??
015064 001403                   BEQ     2$              ;NO,
015066 042737 000001 002354     BIC     #BIT0,GDDAT     ;KEEP RLBA EVEN (UNIBUS)
015074 013777 002354 165150 2$: MOV     GDDAT,@RLBA     ;LOAD PATTERN TO BUS ADDRESS
015102 017737 165144 002356     MOV     @RLBA,BDDAT     ;READ IT BACK
015110 023737 002354 002356     CMP     GDDAT,BDDAT     ;IS IT CORRECT?
015116 001404                   BEQ     1$              ;IF SO, BRANCH

015120                          ERRDF   5.,EM6,ERR2     ;DATA WRONG IN RLBA
 (4)    015120 104455           TRAP    C$ERDF
 (5)    015122 000005           .WORD   5
 (5)    015124 005127           .WORD   EM6
 (5)    015126 010202           .WORD   ERR2
015130                  1$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
 (3)    015130 104410           TRAP    C$ESCAPE
 (3)    015132 000012           .WORD   10000$-.
```

```
1187
1188
1189  015134  005723                          TST     (R3)+           ;BUMP FOR NEXT PATTERN
1190  015136  020327  002616                  CMP     R3,#ENDPAT      ;CHECK FOR END
1191  015142  001344                          BNE     BATEST          ;NOT END, BRANCH FOR NEXT
1192
1193  015144                          ENDSEG                          ;****END OF SEGMENT****
 (3)  015144                          10000$:
 (3)  015144  104405                          TRAP    C$ESEG
1194  015146                          ENDTST                          ;****END OF TEST****
 (3)  015146                          L10026:
 (3)  015146  104401                          TRAP    C$ETST
1195
1196
1197                                 .SBTTL  **TEST 7** - READ WRITE OF RLDA
1198
1199  015150                         BGNTST                          ;****START OF TEST****
1200
1201  015150                         STARS
 (2)                                 ;;**********************************************************************
1202                                 ;TEST THAT WE CAN WRITE/READ THE DISK ADDRESS REGISTER
1203                                 ;ALL BIT POSITIONS ARE WRITTEN USING FOUR PATTERNS:
1204                                 ;GROWING 1, SHIFTING 1, GROWING 0 AND SHIFTING 0
1205  015150                         STARS
 (2)                                 ;;**********************************************************************
1206
1207
1208  015150  012703  002410                  MOV     #BEGPAT,R3      ;SET UP POINTER TO PATTERN LIST
1209  015154                         BGNSEG                          ;****START OF SEGMENT****
 (3)  015154  104404                          TRAP    C$BSEG
1210  015156                         DATEST:
1211  015156  011337  002354                  MOV     (R3),GDDAT      ;GET PATTERN
1212  015162  013777  002354  165064          MOV     GDDAT,@RLDA     ;LOAD PATTERN IN DA
1213
1214  015170  017737  165060  002356          MOV     @RLDA,BDDAT     ;READ PATTERN BACK
1215  015176  023737  002354  002356          CMP     GDDAT,BDDAT     ;IS IT CORRECT?
1216  015204  001404                          BEQ     1$              ;BRANCH IF CORRECT
1217
1218  015206                                  ERRDF   6.,EM7,ERR2     ;WRONG DATA IN RLDA
 (4)  015206  104455                          TRAP    C$ERDF
 (5)  015210  000006                          .WORD   6
 (5)  015212  005155                          .WORD   EM7
 (5)  015214  010202                          .WORD   ERR2
1219  015216                         1$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
 (3)  015216  104410                          TRAP    C$ESCAPE
 (3)  015220  000012                          .WORD   10000$-.
1220
1221
1222  015222  005723                          TST     (R3)+           ;BUMP POINTER
1223  015224  020327  002616                  CMP     R3,#ENDPAT      ;AT END OF PATTERNS?
1224  015230  001352                          BNE     DATEST          ;NO, BRANCH BACK
1225
1226  015232                         ENDSEG                          ;****END OF SEGMENT****
 (3)  015232                         10000$:
 (3)  015232  104405                          TRAP    C$ESEG
1227  015234                         ENDTST                          ;****END OF TEST****
```

```
  (3)  015234                                   L10027:
  (3)  015234  104401                                   TRAP    C$ETST
1228
1229
1230                                            .SBTTL  **TEST 8** - BIS OF RLCS
1231
1232  015236                                    BGNTST                          ;****START OF TEST****
1233  015236                                    STARS
  (2)                                           ;;*****************************************************************
1234                                            ;TEST THAT WE CAN USE THE 'BIS' INSTRUCTION ON THE CONTROL
1235                                            ;AND STATUS REGISTER.  BITS 8,9 AND 6-1 ARE TESTED TO
1236                                            ;SET INDIVIDUALLY AS WELL AS COLLECTIVELY WITHOUT DESTROYING
1237                                            ;ANY PREVIOUS DATA PATTERN
1238  015236                                    STARS
  (2)                                           ;;*****************************************************************
1239
1240
1241  015236  012703  002764                            MOV     #CSPAT,R3       ;GET BEGINNING OF LIST
1242  015242                                    BGNSEG                          ;****START OF SEGMENT****
  (3)  015242  104404                                   TRAP    C$BSEG
1243  015244                                    1$:
1244  015244  012777  000200  164776                    MOV     #CRDY,@RLCS     ;INSURE GO IS THERE
1245  015252  011337  002354                            MOV     (R3),GDDAT      ;SET UP EXPECTED RLCS
1246  015256  052737  000200  002354                    BIS     #CRDY,GDDAT     ;IN GDDAT
1247  015264  051377  164760                            BIS     (R3),@RLCS      ;BIT SET PATTERN IN RLCS
1248  015270  032777  040000  164752                    BIT     #DERR,@RLCS     ;IF ERROR BIT SET THEN
1249  015276  001403                                    BEQ     99$             ;EXPECT IT ON THE READ
1250  015300  052737  140000  002354                    BIS     #ERR!DERR,GDDAT ;BACK
1251  015306  017737  164736  002356  99$:             MOV     @RLCS,BDDAT     ;READ RLCS TO CHECK 'BIS'
1252  015314  042737  000001  002356                    BIC     #DRDY,BDDAT     ;CLEAR OUT DRIVE READY
1253  015322  023737  002356  002354                    CMP     BDDAT,GDDAT     ;DID BIS WORK?
1254  015330  001404                                    BEQ     2$              ;BRANCH IF OKAY
1255
1256  015332                                            ERRDF   7.,EM61,ERR2    ;WRONG DATA IN RLCS
  (4)  015332  104455                                   TRAP    C$ERDF
  (5)  015334  000007                                   .WORD   7
  (5)  015336  006652                                   .WORD   EM61
  (5)  015340  010202                                   .WORD   ERR2
1257  015342                                    2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
  (3)  015342  104410                                   TRAP    C$ESCAPE
  (3)  015344  000012                                   .WORD   10000$-.
1258                                                                            ;BIT OR CLEARED OTHER BIT
1259
1260  015346  005723                                    TST     (R3)+           ;GET NEXT PATTERN
1261  015350  022703  003062                            CMP     #CSEND,R3       ;AT END OF LIST
1262  015354  001333                                    BNE     1$              ;NO GO BACK FOR TEST OF
1263                                                                            ;NEXT PATTERN
1264  015356                                    ENDSEG                          ;****END OF SEGMENT****
  (3)  015356                                   10000$:
  (3)  015356  104405                                   TRAP    C$ESEG
1265  015360                                    ENDTST                          ;****END OF TEST****
  (3)  015360                                   L10030:
  (3)  015360  104401                                   TRAP    C$ETST
1266
1267
1268                                            .SBTTL  **TEST 9** - BIC OF RLCS
```

```
1269
1270  015362                                BGNTST                          ;****START OF TEST****
1271
1272  015362                                STARS
 (2)                                        ;;*****************************************************************
1273                                        ;TEST THAT THE 'BIC'' INSTRUCTION WILL WORK ON THE
1274                                        ;CONTROL AND STATUS REGISTER.  BITS 8-9 AND 6-1 ARE
1275                                        ;TESTED.
1276  015362                                STARS
 (2)                                        ;;*****************************************************************
1277
1278
1279  015362  012703  002764                        MOV     #CSPAT,R3       ;GET BEGINNING OF PATTERNS
1280  015366                                BGNSEG                          ;****START OF SEGMENT****
 (3)  015366  104404                              TRAP    C$BSEG
1281  015370                                1$:
1282  015370  012777  001776  164652               MOV     #1776,@RLCS     ;SET ALL SETTABLE BITS
1283  015376  012737  001776  002354               MOV     #1776,GDDAT     ;SET UP EXPECT DATA IN
1284  015404  041337  002354                       BIC     (R3),GDDAT      ;GDDAT
1285  015410  041377  164634                       BIC     (R3),@RLCS      ;CLEAR BITS IN RLCS VIA 'BIC''
1286  015414  032777  040000  164626               BIT     #DERR,@RLCS     ;IF DRIVE ERROR BIT SET
1287  015422  001403                               BEQ     99$             ;EXPECT IT SET WHEN WE
1288  015424  052737  140000  002354               BIS     #ERR!DERR,GDDAT ;READ IT BACK
1289  015432  017737  164612  002356  99$:         MOV     @RLCS,BDDAT     ;MOVE RLCS TO BDDAT FOR COMPARE
1290  015440  042737  000001  002356               BIC     #DRDY,BDDAT     ;CLEAR DRIVE READY
1291  015446  023737  002356  002354               CMP     BDDAT,GDDAT     ;DID 'BIC'' WORK PROPERLY
1292  015454  001404                               BEQ     2$              ;BRANCH IF OKAY
1293
1294  015456                                       ERRDF   8.,EM62,ERR2    ;WRONG DATA IN RLCS
 (4)  015456  104455                              TRAP    C$ERDF
 (5)  015460  000010                              .WORD   8
 (5)  015462  006733                              .WORD   EM62
 (5)  015464  010202                              .WORD   ERR2
1295  015466                                2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
 (3)  015466  104410                              TRAP    C$ESCAPE
 (3)  015470  000012                              .WORD   10000$-.
1296
1297  015472  005723                               TST     (R3)+           ;GET NEXT PATTERN
1298  015474  020327  003062                       CMP     R3,#CSEND       ;AT END OF LIST
1299  015500  001333                               BNE     1$              ;NO, GO BACK WITH NEXT PATTERN
1300  015502                                ENDSEG                          ;****END OF SEGMENT****
 (3)  015502                                10000$:
 (3)  015502  104405                              TRAP    C$ESEG
1301  015504                                ENDTST                          ;****END OF TEST****
 (3)  015504                                L10031:
 (3)  015504  104401                              TRAP    C$ETST
1302
1303
1304                                        .SBTTL  **TEST 10** - BIS OF RLBA
1305
1306  015506                                BGNTST                          ;****START OF TEST****
1307
1308  015506                                STARS
 (2)                                        ;;*****************************************************************
1309                                        ;TEST THAT THE 'BIS'' INSTRUCTION WILL WORK ON THE BUS
1310                                        ;ADDRESS REGISTER.  BITS 15-0 ARE LOADED, ONLY BITS 15-1
```

```
                        ;ARE EXPECTED BACK.  FOUR PATTERNS ARE USED: GROWING 1, SHIFTING 1,
                        ;GROWING 0, AND SHIFTING 0.
015506                  STARS
  (2)                   ;;*****************************************************************
                        
015506 012703 002410            MOV     #BEGPAT,R3      ;GET START OF LIST
015512                  BGNSEG                          ;****START OF SEGMENT****
  (3)  015512 104404            TRAP    C$BSEG
015514                  1$:
015514 005077 164532            CLR     @RLBA           ;CLEAR 'BA''
015520 011337 002354            MOV     (R3),GDDAT      ;SET EXPECTED
015524 005737 002402            TST     T.CNTLR         ;RL11
015530 001403                   BEQ     3$              ;NO
015532 042737 000001 002354     BIC     #1,GDDAT        ;BIT 0 CAN'T SET IN RLBA (UNIBUS)
015540 051377 164506    3$:     BIS     (R3),@RLBA      ;BIS RLBA WITH PATTERN
015544 017737 164502 002356     MOV     @RLBA,BDDAT     ;READ 'BA''
015552 023737 002356 002354     CMP     BDDAT,GDDAT     ;DID RLBA LOAD PROPERLY?
015560 001404                   BEQ     2$              ;BRANCH IF YES

015562                          ERRDF   9.,EM63,ERR2    ;WRONG DATA IN RLBA
  (4)  015562 104455            TRAP    C$ERDF
  (5)  015564 000011            .WORD   9
  (5)  015566 007016            .WORD   EM63
  (5)  015570 010202            .WORD   ERR2
015572                  2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
  (3)  015572 104410            TRAP    C$ESCAPE
  (3)  015574 000012            .WORD   10000$-.

015576 005723                   TST     (R3)+           ;GET NEXT PATTERN
015600 020327 002616            CMP     R3,#ENDPAT      ;DID WE COMPLETE LIST
015604 001343                   BNE     1$              ;NO, GO BACK FOR NEXT.
015606                  ENDSEG                          ;****END OF SEGMENT****
  (3)  015606           10000$:
  (3)  015606 104405            TRAP    C$ESEG
015610                  ENDTST                          ;****END OF TEST****
  (3)  015610           L10032:
  (3)  015610 104401            TRAP    C$ETST


                        .SBTTL  **TEST 11** - BIC OF RLBA

015612                  BGNTST                          ;****START OF TEST****

015612                  STARS
  (2)                   ;;*****************************************************************
                        ;TEST THAT THE 'BIC'' INSTRUCTION WILL WORK ON THE BUS
                        ;ADDRESS REGISTER.  BITS 15-1 ARE TESTED WITH 4 PATTERNS
                        ;GROWING 1, SHIFTING 1, GROWING 0 AND SHIFTING 0.
015612                  STARS
  (2)                   ;;*****************************************************************


015612 012703 002410            MOV     #BEGPAT,R3      ;GET START OF LIST
015616                  BGNSEG                          ;****START OF SEGMENT****
  (3)  015616 104404            TRAP    C$BSEG
```

```
1352  015620                          1$:
1353  015620  012777  177776  164424          MOV     #-2,@RLBA       ;SET RLBA TO ALL 1'S (BIT 0=0)
1354  015626  012737  177776  002354          MOV     #-2,GDDAT       ;SET UP EXPECTED RESULTS
1355  015634  041337  002354                  BIC     (R3),GDDAT      ;IN GDDAT
1356  015640  041377  164406                  BIC     (R3),@RLBA      ;BIC RLBA
1357  015644  017737  164402  002356          MOV     @RLBA,BDDAT     ;READ RLBA
1358  015652  023737  002356  002354          CMP     BDDAT,GDDAT     ;BIC WORK OKAY?
1359  015660  001404                          BEQ     2$              ;IF YES BRANCH
1360
1361  015662                                  ERRDF   10.,EM64,ERR2   ;WRONG DATA IN RLBA
 (4)  015662  104455                          TRAP    C$ERDF
 (5)  015664  000012                          .WORD   10
 (5)  015666  007077                          .WORD   EM64
 (5)  015670  010202                          .WORD   ERR2
1362  015672                          2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
 (3)  015672  104410                          TRAP    C$ESCAPE
 (3)  015674  000012                          .WORD   10000$-.
1363
1364  015676  005723                          TST     (R3)+           ;GET NEXT PATTERN
1365  015700  020327  002616                  CMP     R3,#ENDPAT      ;HAVE WE COMPLETED LIST
1366  015704  001345                          BNE     1$              ;NO, GO BACK FOR NEXT
1367  015706                          ENDSEG                          ;****END OF SEGMENT****
 (3)  015706                          10000$:
 (3)  015706  104405                          TRAP    C$ESEG
1368  015710                          ENDTST                          ;****END OF TEST****
 (3)  015710                          L10033:
 (3)  015710  104401                          TRAP    C$ETST
1369
1370
1371                                  .SBTTL  **TEST 12** - BIS OF RLDA
1372
1373  015712                          BGNTST                          ;****START OF TEST****
1374
1375  015712                          STARS
 (2)                                  ;;*****************************************************************
1376                                  ;TEST THAT THE 'BIS'' INSTRUCTION WILL WORK ON THE DISK ADDRESS
1377                                  ;REGISTER.  BITS 15-0 ARE TESTED WITH 4 PATTERNS, GROWING 1,
1378                                  ;SHIFTING 1, GROWING 0, AND SHIFTING 0.
1379  015712                          STARS
 (2)                                  ;;*****************************************************************
1380
1381
1382  015712  012703  002410                  MOV     #BEGPAT,R3      ;GET START OF LIST
1383  015716                          BGNSEG                          ;****START OF SEGMENT****
 (3)  015716  104404                          TRAP    C$BSEG
1384  015720                          1$:
1385  015720  005077  164330                  CLR     @RLDA           ;CLEAR 'DA''
1386  015724  011337  002354                  MOV     (R3),GDDAT      ;SET EXPECTED
1387  015730  051377  164320                  BIS     (R3),@RLDA      ;BIS RLDA
1388  015734  017737  164314  002356          MOV     @RLDA,BDDAT     ;READ RLDA
1389  015742  023737  002356  002354          CMP     BDDAT,GDDAT     ;IS RLDA CORRECT
1390  015750  001404                          BEQ     2$              ;IF OKAY BRANCH
1391
1392  015752                                  ERRDF   11.,EM65,ERR2   ;WRONG DATA IN RLDA
 (4)  015752  104455                          TRAP    C$ERDF
 (5)  015754  000013                          .WORD   11
```

```
  (5)  015756  007162                        .WORD   EM65
  (5)  015760  010202                        .WORD   ERR2
 1393  015762                          2$:    ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
  (3)  015762  104410                        TRAP    C$ESCAPE
  (3)  015764  000012                        .WORD   10000$-.
 1394
 1395  015766  005723                        TST     (R3)+           ;GET NEXT PATTERN
 1396  015770  020327  002616                CMP     R3,#ENDPAT      ;HAVE WE FINISHED?
 1397  015774  001351                        BNE     1$              ;NO GO BACK
 1398  015776                          ENDSEG                        ;****END OF SEGMENT****
  (3)  015776                          10000$:
  (3)  015776  104405                        TRAP    C$ESEG
 1399  016000                          ENDTST                        ;****END OF TEST****
  (3)  016000                          L10034:
  (3)  016000  104401                        TRAP    C$ETST
 1400
 1401
 1402                                 .SBTTL  **TEST 13** - BIC OF RLDA
 1403
 1404  016002                         BGNTST                        ;****START OF TEST****
 1405
 1406  016002                         STARS
  (2)                                 ;;*****************************************************************
 1407                                 ;TEST THAT THE 'BIC'' INSTRUCTION WORKS ON THE DISK
 1408                                 ;ADDRESS REGISTER.  ALL BITS ARE TESTED WITH FOUR
 1409                                 ;PATTERNS: GROWING 1, SHIFTING 1, GROWING 0 AND SHIFTING 0
 1410  016002                         STARS
  (2)                                 ;;*****************************************************************
 1411
 1412
 1413  016002  012703  002410                 MOV     #BEGPAT,R3      ;GET START OF LIST
 1414  016006                         BGNSEG                        ;****START OF SEGMENT****
  (3)  016006  104404                        TRAP    C$BSEG
 1415  016010                          1$:
 1416  016010  012777  177777  164236        MOV     #-1,@RLDA       ;SET RLDA TO ALL 1'S
 1417  016016  012737  177777  002354        MOV     #-1,GDDAT       ;SET EXPECTED DATA
 1418  016024  041337  002354                BIC     (R3),GDDAT      ;SET EXPECTED DATA
 1419  016030  041377  164220                BIC     (R3),@RLDA      ;'BIC'' RLDA
 1420  016034  017737  164214  002356        MOV     @RLDA,BDDAT     ;READ RLDA
 1421  016042  023737  002354  002356        CMP     GDDAT,BDDAT     ;DID 'BIC'' WORK?
 1422  016050  001404                        BEQ     2$              ;IF IT DID BRANCH
 1423
 1424  016052                                 ERRDF   12.,EM66,ERR2   ;WRONG DATA IN RLDA
  (4)  016052  104455                        TRAP    C$ERDF
  (5)  016054  000014                        .WORD   12
  (5)  016056  007243                        .WORD   EM66
  (5)  016060  010202                        .WORD   ERR2
 1425  016062                          2$:    ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
  (3)  016062  104410                        TRAP    C$ESCAPE
  (3)  016064  000012                        .WORD   10000$-.
 1426
 1427  016066  005723                        TST     (R3)+           ;GET NEXT PATTERN
 1428  016070  020327  002616                CMP     R3,#ENDPAT      ;DONE?
 1429  016074  001345                        BNE     1$              ;NO GO BACK
 1430  016076                          ENDSEG                        ;****END OF SEGMENT****
  (3)  016076                          10000$:
```

```
  (3)  016076  104405                    TRAP    C$ESEG
1431   016100                    ENDTST                          ;****END OF TEST****
  (3)  016100                    L10035:
  (3)  016100  104401                    TRAP    C$ETST
1432
1433
1434                             .SBTTL  **TEST 14** - BUS RESET OF RLCS
1435
1436   016102                    BGNTST                          ;****START OF TEST****
1437
1438   016102                    STARS
  (2)                            ;;*****************************************************************
1439                             ;TEST THAT A BUS RESET WILL CLEAR THE PROPER BITS
1440                             ;OF THE CONTROL AND STATUS REGISTER.  THOSE BITS ARE
1441                             ;BITS 6-1,8,9,10,11,12,13,15.  BIT 15 WILL CLEAR ONLY
1442                             ;IF BIT 14 (DRIVE ERROR IS NOT SET).  BIT 0 (DRIVE READY)
1443                             ;IS A DON'T CARE.  IF AT THE START UP THIS TEST BIT
1444                             ;14 (DRIVE ERROR) IS SET WE WILL INSIST IF IS THERE AFTER
1445                             ;THE 'RESET'' ALONG WITH BIT 15 (COMPOSITE ERROR).  BITS
1446                             ;15-10 ARE NOT WRITEABLE.
1447   016102                    STARS
  (2)                            ;;*****************************************************************
1448
1449
1450   016102                            SETPRI  #PRI07          ;PRIORITY TO SEVEN
  (3)  016102  012700  000340            MOV     #PRI07,R0
  (3)  016106  104441                    TRAP    C$SPRI
1451   016110  012777  000377  164132    MOV     #377,@RLCS      ;LOAD ALL RLCS LOADABLE BITS
1452   016116  012737  000200  002354    MOV     #CRDY,GDDAT     ;SETUP EXPECTED
1453   016124  032777  040000  164116    BIT     #DERR,@RLCS     ;DRIVE ERR SET?
1454   016132  001403                    BEQ     1$              ;IF NOT DON'T EXPECT IT
1455   016134  052737  140000  002354    BIS     #DERR!ERR,GDDAT  ;IT'S SET, INIT BETTER NOT CLR
1456   016142  012700  000100    1$:     MOV     #100,R0         ;SET UP A WAIT LOOP
1457   016146                    BRESET                          ;BUS RESET
  (3)  016146  104433                    TRAP    C$RESET
1458   016150  005300            2$:     DEC     R0              ;WAIT IN CASE OF DRIVE ERROR
1459   016152  001376                    BNE     2$              ;
1460   016154  017737  164070  002356    MOV     @RLCS,BDDAT     ;READ RLCS
1461   016162  042737  000001  002356    BIC     #DRDY,BDDAT     ;CLEAR OUT DRDY - DON'T CARE
1462   016170  023737  002356  002354    CMP     BDDAT,GDDAT     ;DID INIT WORK
1463   016176  001404                    BEQ     3$              ;YES, BRANCH
1464
1465   016200                            ERRDF   13.,EM67,ERR2   ;WRONG DATA IN RLCS
  (4)  016200  104455                    TRAP    C$ERDF
  (5)  016202  000015                    .WORD   13
  (5)  016204  007326                    .WORD   EM67
  (5)  016206  010202                    .WORD   ERR2
1466   016210                    3$:
1467   016210                    ENDTST                          ;****END OF TEST****
  (3)  016210                    L10036:
  (3)  016210  104401                    TRAP    C$ETST
1468
1469
1470                             .SBTTL  **TEST 15** - BUS RESET OF RLBA
1471
1472   016212                    BGNTST                          ;****START OF TEST****
```

```
1473
1474  016212                          STARS
 (2)                                  ;;*****************************************************************
1475                                  ;TEST THAT A BUS RESET WILL CLEAR THE ENTIRE
1476                                  ;BUS ADDRESS REGISTER.  THE BUS ADDRESS IS LOADED WITH 177776
1477                                  ;AND IS EXPECTED TO BE ZERO AFTER THE RESET
1478  016212                          STARS
 (2)                                  ;;*****************************************************************
1479
1480
1481  016212  012777  177776  164032          MOV     #-2,@RLBA       ;SET BA TO ALL 1'S
1482  016220  005737  002402                  TST     T.CNTLR         ;RL11??
1483  016224  001403                          BEQ     2$              ;NO
1484  016226  052777  000001  164016          BIS     #1,@RLBA
1485  016234  005037  002354          2$:     CLR     GDDAT           ;CLEAR EXPECTED DATA
1486  016240                                  BRESET                  ;ISSUE BUS INIT
 (3)  016240  104433                          TRAP    C$RESET
1487  016242  017737  164004  002356          MOV     @RLBA,BDDAT     ;READ RLBA
1488  016250  001404                          BEQ     1$              ;IF CLEAR BRANCH
1489
1490  016252                                  ERRDF   14.,EM70,ERR2   ;WRONG DATA IN RLBA
 (4)  016252  104455                          TRAP    C$ERDF
 (5)  016254  000016                          .WORD   14
 (5)  016256  007363                          .WORD   EM70
 (5)  016260  010202                          .WORD   ERR2
1491  016262                          1$:
1492
1493  016262                          ENDTST                          ;****END OF TEST****
 (3)  016262                          L10037:
 (3)  016262  104401                          TRAP    C$ETST
1494
1495
1496                                  .SBTTL  **TEST 16** - BUS RESET OF RLDA
1497
1498  016264                          BGNTST                          ;****START OF TEST****
1499
1500  016264                          STARS
 (2)                                  ;;*****************************************************************
1501                                  ;TEST THAT A BUS RESET WILL CLEAR THE ENTIRE
1502                                  ;DISK ADDRESS REGISTER.  THE DISK ADDRESS IS LOADED WITH 177777
1503                                  ;AND IS EXPECTED TO BE ZERO AFTER THE RESET.
1504  016264                          STARS
 (2)                                  ;;*****************************************************************
1505
1506
1507  016264  012777  177777  163762          MOV     #-1,@RLDA       ;SET DA TO ALL 1'S
1508  016272  005037  002354                  CLR     GDDAT           ;CLEAR EXPECTED
1509  016276                                  BRESET                  ;ISSUE BUS INIT
 (3)  016276  104433                          TRAP    C$RESET
1510  016300  017737  163750  002356          MOV     @RLDA,BDDAT     ;READ RLDA
1511  016306  001404                          BEQ     1$              ;IF CLEAR BRANCH
1512
1513  016310                                  ERRDF   15.,EM71,ERR2   ;WRONG DATA IN RLDA
 (4)  016310  104455                          TRAP    C$ERDF
 (5)  016312  000017                          .WORD   15
 (5)  016314  007420                          .WORD   EM71
```

```
  (5)  016316  010202                        .WORD   ERR2
1514   016320                          1$:
1515
1516   016320                          ENDTST                          ;****END OF TEST****
  (3)  016320                          L10040:
  (3)  016320  104401                          TRAP    C$ETST
1517
1518
1519                                   .SBTTL  **TEST 17** - UNIQUENESS OF RLCS
1520
1521   016322                          BGNTST                          ;****START OF TEST****
1522
1523   016322                          STARS
  (2)                                  ;;*****************************************************************
1524                                   ;TEST THE UNIQUENESS OF THE CONTROL AND STATUS
1525                                   ;REGISTER.  THE RLBA AND RLDA ARE PRELOADED WITH
1526                                   ;177776 AND 177777 RESPECTIVELY.  THE RLCS IS THEN
1527                                   ;LOADED TO INSURE THAT NEITHER THE RLBA OR RLDA
1528                                   ;ARE MODIFIED BY THE WRITING OF THE RLCS.
1529   016322                          STARS
  (2)                                  ;;*****************************************************************
1530
1531
1532   016322  012737  000201  002324          MOV     #DRDY!CRDY,LDCSR        ;SET DRIVE AND CONTROLLER READY
1533   016330  012777  177776  163714          MOV     #-2,@RLBA               ;SET RLBA TO ALL 1'S
1534   016336  012777  177777  163710          MOV     #-1,@RLDA               ;SET RLDA TO ALL 1'S
1535   016344  013777  002324  163676          MOV     LDCSR,@RLCS             ;WRITE RLCS
1536
1537                                   ;CHECK THAT RLBA REMAINS UNAFFECTED
1538
1539   016352  022777  177776  163672          CMP     #-2,@RLBA               ;RLBA OKAY?
1540   016360  001412                          BEQ     1$                      ;YES, GO CHECK DA
1541
1542   016362  012737  177776  002354          MOV     #-2,GDDAT               ;SET UP EXPECTED
1543   016370  017737  163656  002356          MOV     @RLBA,BDDAT             ;READ RLBA
1544
1545   016376                                  ERRDF   16.,EM72,ERR2           ;CS MODIFIED BA
  (4)  016376  104455                          TRAP    C$ERDF
  (5)  016400  000020                          .WORD   16
  (5)  016402  007455                          .WORD   EM72
  (5)  016404  010202                          .WORD   ERR2
1546   016406                          1$:     CKLOOP                          ;CHECK IF /FL:LOE IS SET
  (3)  016406  104406                          TRAP    C$CLP1
1547
1548   016410  022777  177777  163636          CMP     #-1,@RLDA               ;RLDA OKAY?
1549   016416  001412                          BEQ     2$                      ;YES, CONTINUE
1550
1551   016420  012737  177777  002354          MOV     #-1,GDDAT               ;SET UP EXPECTED
1552   016426  017737  163622  002356          MOV     @RLDA,BDDAT             ;READ DA
1553
1554   016434                                  ERRDF   17.,EM73,ERR2           ;CS MODIFIED DA
  (4)  016434  104455                          TRAP    C$ERDF
  (5)  016436  000021                          .WORD   17
  (5)  016440  007510                          .WORD   EM73
  (5)  016442  010202                          .WORD   ERR2
1555   016444                          2$:
```

```
1556
1557
1558  016444                          ENDTST                          ;****END OF TEST****
 (3)  016444                          L10041:
 (3)  016444  104401                          TRAP    C$ETST
1559
1560
1561                                  .SBTTL  **TEST 18** - UNIQUENESS OF RLBA
1562
1563  016446                          BGNTST                          ;****START OF TEST****
1564  016446                          STARS
 (2)                                  ;;**************************************************************************
1565                                  ;TEST THE UNIQUENESS OF THE BUS ADDRESS REGISTER.  THE
1566                                  ;RLCS AND RLDA ARE LOADED WITH XXX20X AND 177777
1567                                  ;RESPECTIVELY.  THE RLBA IS THEN WRITTEN TO INSURE
1568                                  ;THAT NEITHER THE RLCS OR RLDA ARE MODIFIED
1569                                  ;BY WRITING THE RLBA.
1570  016446                          STARS
 (2)                                  ;;**************************************************************************
1571
1572
1573  016446  012737  000200  002354          MOV     #CRDY,GDDAT     ;CONTROLLER READY
1574  016454  032777  040000  163566          BIT     #DERR,@RLCS     ;IF DRIVE ERROR IS
1575  016462  001403                          BEQ     99$             ;SET THEN EXPECT IT
1576  016464  052737  140000  002354          BIS     #ERR!DERR,GDDAT ;SET WHEN WE READ IT.
1577  016472  013777  002354  163550  99$:    MOV     GDDAT,@RLCS     ;LOAD RLCS
1578  016500  012777  177777  163546          MOV     #-1,@RLDA       ;LOAD RLDA
1579  016506  005077  163540                  CLR     @RLBA           ;CLEAR RLBA
1580
1581                                  ;CHECK IF RLCS IS OKAY
1582
1583  016512  017737  163532  002356          MOV     @RLCS,BDDAT     ;READ RLCS
1584  016520  042737  000001  002356          BIC     #DRDY,BDDAT     ;IGNORE DRIVE READY
1585  016526  023737  002356  002354          CMP     BDDAT,GDDAT     ;CS OK?
1586  016534  001404                          BEQ     1$              ;YES, GO CHECK DA
1587
1588  016536                                  ERRDF   18.,EM74,ERR2   ;BA MODIFIED CS
 (4)  016536  104455                          TRAP    C$ERDF
 (5)  016540  000022                          .WORD   18
 (5)  016542  007543                          .WORD   EM74
 (5)  016544  010202                          .WORD   ERR2
1589  016546                          1$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  016546  104406                          TRAP    C$CLP1
1590
1591  016550  022777  177777  163476          CMP     #-1,@RLDA       ;IS RLDA OKAY?
1592
1593  016556  001412                          BEQ     2$              ;IF OKAY BRANCH
1594
1595  016560  012737  177777  002354          MOV     #-1,GDDAT       ;SET UP EXPECTED
1596  016566  017737  163462  002356          MOV     @RLDA,BDDAT     ;READ RLDA
1597
1598  016574                                  ERRDF   19.,EM75,ERR2   ;BA MODIFIED DA
 (4)  016574  104455                          TRAP    C$ERDF
 (5)  016576  000023                          .WORD   19
 (5)  016600  007575                          .WORD   EM75
 (5)  016602  010202                          .WORD   ERR2
```

```
1599  016604                          2$:
1600  016604                          ENDTST                          ;****END OF TEST****
 (3)  016604                          L10042:
 (3)  016604  104401                          TRAP    C$ETST
1601
1602
1603                                  .SBTTL  **TEST 19** - UNIQUENESS OF RLDA
1604
1605  016606                          BGNTST                          ;****START OF TEST****
1606
1607
1608  016606                          STARS
 (2)                                  ;;*****************************************************************
1609                                  ;TEST THE UNIQUENESS OF THE DISK ADDRESS REGISTER.  THE RLCS
1610                                  ;AND RLBA ARE LOADED WITH XXX20X AND 177776
1611                                  ;RESPECTIVELY.  THE RLDA IS THEN WRITTEN TO INSURE
1612                                  ;THAT NEITHER THE RLCS OR THE RLBA ARE MODIFIED
1613                                  ;BY WRITING THE RLDA.
1614  016606                          STARS
 (2)                                  ;;*****************************************************************
1615
1616
1617  016606  012737  000200  002354          MOV     #CRDY,GDDAT     ;CONTROLLER READY
1618  016614  032777  040000  163426          BIT     #DERR,@RLCS     ;IF DRIVE ERROR SET
1619  016622  001403                          BEQ     99$             ;THEN EXPECT IT LATER
1620  016624  052737  140000  002354          BIS     #ERR!DERR,GDDAT
1621  016632  013777  002354  163410  99$:    MOV     GDDAT,@RLCS     ;LOAD CS
1622  016640  012777  177776  163404          MOV     #-2,@RLBA       ;LOAD BA WITH ALL 1'S
1623  016646  005077  163402                  CLR     @RLDA           ;CLEAR RLDA
1624
1625                                  ;CHECK IF RLCS IS OKAY
1626
1627  016652  017737  163372  002356          MOV     @RLCS,BDDAT     ;READ RLCS
1628  016660  042737  000001  002356          BIC     #DRDY,BDDAT     ;IGNORE DRIVE READY
1629  016666  023737  002354  002356          CMP     GDDAT,BDDAT     ;RLCS OKAY?
1630  016674  001404                          BEQ     1$              ;YES, THEN BRANCH
1631
1632  016676                                  ERRDF   20.,EM76,ERR2   ;DA MODIFIED CS
 (4)  016676  104455                          TRAP    C$ERDF
 (5)  016700  000024                          .WORD   20
 (5)  016702  007627                          .WORD   EM76
 (5)  016704  010202                          .WORD   ERR2
1633  016706                          1$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  016706  104406                          TRAP    C$CLP1
1634
1635  016710  022777  177776  163334          CMP     #-2,@RLBA       ;IS RLBA OKAY?
1636  016716  001412                          BEQ     2$              ;BRANCH IF OKAY
1637
1638  016720  012737  177776  002354          MOV     #-2,GDDAT       ;SET UP EXPECTED
1639  016726  017737  163320  002356          MOV     @RLBA,BDDAT     ;READ RLBA
1640
1641  016734                                  ERRDF   21.,EM77,ERR2   ;DA MODIFIED BA
 (4)  016734  104455                          TRAP    C$ERDF
 (5)  016736  000025                          .WORD   21
 (5)  016740  007662                          .WORD   EM77
 (5)  016742  010202                          .WORD   ERR2
```

```
1642  016744                          2$:
1643
1644
1645  016744                          ENDTST                          ;****END OF TEST****
 (3)  016744                          L10043:
 (3)  016744  104401                          TRAP    C$ETST
1646
1647                                  .SBTTL  **TEST 20** - UNIQUENESS OF RLMP
1648
1649  016746                          BGNTST                          ;****START OF TEST****
1650
1651
1652  016746                          STARS
 (2)                                  ;;*****************************************************************
1653                                  ;TEST THE UNIQUENESS OF THE MULTI-PURPOSE REGISTER
1654                                  ;WE WILL WRITE THE RLCS, RLBA, AND THE RLDA, THEN THE
1655                                  ;RLMP IS WRITTEN. WE THEN GO BACK AN VERIFY THE CONTENTS
1656                                  ;OF THE RLCS, RLBA, RLDA.
1657  016746                          STARS
 (2)                                  ;;*****************************************************************
1658
1659
1660  016746  012737  000200  002354          MOV     #CRDY,GDDAT     ;CONTROLLER READY
1661  016754  032777  040000  163266          BIT     #DERR,@RLCS     ;IF DRIVE ERROR SET
1662  016762  001403                          BEQ     99$             ;THE EXPECT IT LATER
1663  016764  052737  140000  002354          BIS     #ERR!DERR,GDDAT
1664  016772  013777  002354  163250  99$:    MOV     GDDAT,@RLCS     ;LOAD CS
1665  017000  012777  177776  163244          MOV     #-2,@RLBA       ;LOAD BA WITH ALL 1'S
1666  017006  012777  177777  163240          MOV     #-1,@RLDA       ;LOAD RLDA
1667  017014  005077  163236                  CLR     @RLMP           ;WRITE RLMP
1668
1669                                  ;CHECK IF RLCS IS OKAY
1670
1671  017020  017737  163224  002356          MOV     @RLCS,BDDAT     ;READ RLCS
1672  017026  042737  000001  002356          BIC     #DRDY,BDDAT     ;IGNORE DRIVE READY
1673  017034  023737  002354  002356          CMP     GDDAT,BDDAT     ;RLCS OKAY?
1674  017042  001404                          BEQ     1$              ;YES, THEN BRANCH
1675
1676  017044                                  ERRDF   201.,EM44,ERR2  ;MP MODIFIED CS
 (4)  017044  104455                          TRAP    C$ERDF
 (5)  017046  000311                          .WORD   201
 (5)  017050  006176                          .WORD   EM44
 (5)  017052  010202                          .WORD   ERR2
1677  017054                          1$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  017054  104406                          TRAP    C$CLP1
1678
1679  017056  022777  177776  163166          CMP     #-2,@RLBA       ;IS RLBA OKAY?
1680  017064  001412                          BEQ     2$              ;BRANCH IF OKAY
1681
1682  017066  012737  177776  002354          MOV     #-2,GDDAT       ;SET UP EXPECTED
1683  017074  017737  163152  002356          MOV     @RLBA,BDDAT     ;READ RLBA
1684
1685  017102                                  ERRDF   211.,EM45,ERR2  ;MP MODIFIED BA
 (4)  017102  104455                          TRAP    C$ERDF
 (5)  017104  000323                          .WORD   211
 (5)  017106  006231                          .WORD   EM45
```

```
  (5)  017110  010202                          .WORD   ERR2
1686   017112                        2$:       CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  017112  104406                          TRAP    C$CLP1
1687   017114  022777  177777  163132          CMP     #-1,@RLDA       ;DISK ADDRESS OKAY
1688   017122  001412                          BEQ     3$              ;YES, CONTINUE
1689
1690   017124  017737  163124  002356          MOV     @RLDA,BDDAT     ;SET UP BAD
1691   017132  012737  177777  002354          MOV     #-1,GDDAT       ;SET UP EXPECTED
1692
1693   017140                                   ERRDF   212.,EM46,ERR2  ;MP MODIFIED DA
  (4)  017140  104455                          TRAP    C$ERDF
  (5)  017142  000324                          .WORD   212
  (5)  017144  006264                          .WORD   EM46
  (5)  017146  010202                          .WORD   ERR2
1694
1695   017150                        3$:
1696
1697
1698   017150                        ENDTST                          ;****END OF TEST****
  (3)  017150                        L10044:
  (3)  017150  104401                          TRAP    C$ETST
1699
1700                                 .SBTTL  **TEST 21** - NOOP FUNCTION(RL11 ONLY)
1701
1702   017152                        BGNTST                          ;****START OF TEST****
1703
1704
1705
1706   017152                        STARS
  (2)                                ;;**********************************************************************
1707                                 ;TEST THAT NOOP WILL FUNCTION.  WE WILL ISSUE THE
1708                                 ;NOOP AND WAIT FOR CONTROLLER READY TO SET.  A
1709                                 ;TIMEOUT OF 200 MILLISECS IS ALLOWED.  DRIVE 0 IS ALWAYS
1710                                 ;SELECTED SINCE THE DRIVE IS NOT NECESSARY.
1711   017152                        STARS
  (2)                                ;;**********************************************************************
1712
1713
1714   017152  005737  002402                  TST     T.CNTLR         ;RLV11??
1715   017156  001410                          BEQ     99$             ;YES SKIP TEST
1716
1717
1718   017160  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
1719   017164  000000                          NOOP0                   ;NOOP(0) FUNCTION
1720   017166  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
1721   017172                        2$:       CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  017172  104406                          TRAP    C$CLP1
1722
1723   017174  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
1724
1725   017200                        99$:
1726   017200                        ENDTST                          ;****END OF TEST****
  (3)  017200                        L10045:
  (3)  017200  104401                          TRAP    C$ETST
1727
1728
```

```
                                .SBTTL  **TEST 22** - TEST NOOP DOES NOTHING

017202                          BGNTST                          ;****START OF TEST****

017202                          STARS
 (2)                            ;;*****************************************************************
                                ;TEST THAT ISSUING A NOOP FUNCTION DOES NOTHING.  THIS IS DONE BY WRITING
                                ;THE RLBA, AND RLDA, READING THE RLMP AND MAKING SURE NOTHING CHANGES.
017202                          STARS
 (2)                            ;;*****************************************************************

017202  005737  002402                TST     T.CNTLR         ;RLV11??
017206  001476                        BEQ     3$

017210  012777  000001  163036        MOV     #1,@RLDA        ;LOAD DISK ADDRESS
017216  012777  000002  163026        MOV     #2,@RLBA        ;LOAD BUS ADDRESS
017224  005077  163026                CLR     @RLMP
017230  017737  163022  002354        MOV     @RLMP,GDDAT     ;READ RLMP

017236  004537  013414                JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
017242  000000                        NOOP0
017244  004537  014246                JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
017250                                CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)    017250  104406                TRAP    C$CLP1

017252  004537  013114                JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
017256                                ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)    017256  104410                TRAP    C$ESCAPE
 (3)    017260  000124                .WORD   L10046-.

017262  017737  162770  002356        MOV     @RLMP,BDDAT     ;READ RLMP
017270  023737  002354  002356        CMP     GDDAT,BDDAT     ;RLMP OK?
017276  001404                        BEQ     1$

017300                                ERRDF   202.,EM14,ERR2
 (4)    017300  104455                TRAP    C$ERDF
 (5)    017302  000312                .WORD   202
 (5)    017304  005276                .WORD   EM14
 (5)    017306  010202                .WORD   ERR2

017310                          1$:   CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)    017310  104406                TRAP    C$CLP1

017312  012737  000002  002354        MOV     #2,GDDAT        ;SET UP EXP'D BA
017320  017737  162726  002356        MOV     @RLBA,BDDAT     ;READ BA
017326  023737  002354  002356        CMP     GDDAT,BDDAT     ;BA OK?
017334  001404                        BEQ     2$              ;YES

017336                                ERRDF   203.,EM15,ERR2
 (4)    017336  104455                TRAP    C$ERDF
 (5)    017340  000313                .WORD   203
 (5)    017342  005324                .WORD   EM15
 (5)    017344  010202                .WORD   ERR2

017346                          2$:   CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)    017346  104406                TRAP    C$CLP1
```

```
1770
1771  017350  012737  000001  002354          MOV     #1,GDDAT        ;SET UP EXP'D DA
1772  017356  017737  162672  002356          MOV     @RLDA,BDDAT     ;READ DA
1773  017364  023737  002354  002356          CMP     GDDAT,BDDAT     ;DA OKAY
1774  017372  001404                          BEQ     3$
1775
1776  017374                                  ERRDF   204.,EM16,ERR2
 (4)  017374  104455                          TRAP    C$ERDF
 (5)  017376  000314                          .WORD   204
 (5)  017400  005352                          .WORD   EM16
 (5)  017402  010202                          .WORD   ERR2
1777
1778  017404                          3$:
1779
1780  017404                          ENDTST                          ;****END OF TEST****
 (3)  017404                          L10046:
 (3)  017404  104401                          TRAP    C$ETST
1781
1782
1783                                  .SBTTL  **TEST 23** - TEST OF INTERRUPT
1784
1785  017406                          BGNTST                          ;****START OF TEST****
1786
1787  017406                          STARS
 (2)                                  ;;*****************************************************************
1788                                  ;CHECK THE INTERRUPT WITH A NOOP.  WE WILL SET UP THE
1789                                  ;INTERRUPT VECTOR, LOWER THE PSW TO ZERO AND ISSUE
1790                                  ;A NOOP.  THE INTERRUPT SERVICE ROUTINE WILL SET A
1791                                  ;FLAG UPON INTERRUPT AND RETURN IN LINE.  WE WAIT 200 MILLISECONDS
1792                                  ;LOOKING FOR THAT FLAG TO BE SET BEFORE CALLING IT
1793                                  ;AN ERROR.  IF THE INTERRUPT SENDS US TO ANOTHER
1794                                  ;VECTOR ADDRESS THEN THE ERROR HANDLER WILL REPORT
1795                                  ;'TRAP TO XXXX FROM YYYY'' AND RETURN  TO DIAG SUP MONITOR.  IF THE
1796                                  ;INTERRUPT GOES TO ABOVE 1000 WHO KNOWS WHAT WILL HAPPEN.
1797  017406                          STARS
 (2)                                  ;;*****************************************************************
1798
1799
1800  017406  005737  002402                  TST     T.CNTLR
1801  017412  001426                          BEQ     99$
1802
1803  017414  005037  002322                  CLR     INTFLG          ;CLEAR INTERRUPT OCCURRENCE FLAG
1804  017420                                  SETPRI  #PRI00          ;SET PSW TO 0
 (3)  017420  012700  000000                  MOV     #PRI00,R0
 (3)  017424  104441                          TRAP    C$SPRI
1805  017426  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
1806  017432  000100                          NOOP0!INTEN             ;NOOP AND INTERRUPT ENABLE
1807  017434  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
1808  017440  005737  002322                  TST     INTFLG          ;DID INTERRUPT OCCUR
1809  017444  001004                          BNE     2$              ;IF SO BRANCH
1810  017446                                  ERRDF   22.,EM13,ERR0
 (4)  017446  104455                          TRAP    C$ERDF
 (5)  017450  000026                          .WORD   22
 (5)  017452  005244                          .WORD   EM13
 (5)  017454  010152                          .WORD   ERR0
1811  017456  005037  002322          2$:     CLR     INTFLG
```

```
1812  017462                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  017462  104406                          TRAP    C$CLP1
1813  017464  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
1814
1815
1816  017470                          99$:
1817  017470                          ENDTST                          ;****END OF TEST****
 (3)  017470                          L10047:
 (3)  017470  104401                          TRAP    C$ETST
1818
1819
1820                                  .SBTTL  **TEST 24** - TEST PRIORITY BR LEVEL
1821
1822  017472                          BGNTST                          ;****START OF TEST****
1823
1824  017472                          STARS
 (2)                                  ;;**********************************************************************
1825                                  ;TEST THAT PRIORITY GIVEN IS ACTUAL PRIORITY OF CONTROLLER.  WE KNOW
1826                                  ;THE BOARD WILL INTERRUPT.  WE WILL START TRYING TO INTERRUPT AT 7
1827                                  ;AND WORK DOWN TIL IT DOES INTERRUPT.
1828  017472                          STARS
 (2)                                  ;;**********************************************************************
1829
1830  017472  005737  002402                  TST     T.CNTLR         ;RLV11??
1831  017476  001456                          BEQ     6$              ;YES, SKIP TEST
1832
1833  017500  012737  000340  002356          MOV     #340,BDDAT      ;SET UP INITIAL OF 7
1834  017506  013737  002262  002354          MOV     BPRIOR,GDDAT    ;GET GIVEN PRIORITY
1835
1836  017514                          BGNSEG                          ;****START OF SEGMENT****
 (3)  017514  104404                          TRAP    C$BSEG
1837
1838  017516  005037  002322          5$:     CLR     INTFLG          ;CLEAR INTERRUPT OCCURRENCE
1839  017522                                  SETPRI  BDDAT           ;SET PRIORITY
 (3)  017522  013700  002356                  MOV     BDDAT,R0
 (3)  017526  104441                          TRAP    C$SPRI
1840
1841  017530  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
1842  017534  000100                          NOOP0!INTEN
1843
1844  017536  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
1845  017542                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)  017542  104410                          TRAP    C$ESCAPE
 (3)  017544  000070                          .WORD   L10050-.
1846
1847  017546  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
1848  017552                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)  017552  104410                          TRAP    C$ESCAPE
 (3)  017554  000060                          .WORD   L10050-.
1849
1850  017556  023737  002356  002354          CMP     BDDAT,GDDAT     ;SHOULD IT INTERRUPT
1851  017564  002012                          BGE     1$              ;NO, BRANCH
1852
1853  017566  005737  002322                  TST     INTFLG          ;DID INTERRUPT OCCUR
1854  017572  001004                          BNE     2$              ;YES, OK
1855
```

```
1856  017574                              3$:     ERRDF   204.,EM17,ERR7
 (4)  017574  104455                             TRAP    C$ERDF
 (5)  017576  000314                             .WORD   204
 (5)  017600  005400                             .WORD   EM17
 (5)  017602  010440                             .WORD   ERR7
1857
1858  017604                              2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
 (3)  017604  104410                             TRAP    C$ESCAPE
 (3)  017606  000014                             .WORD   10000$-.
1859  017610  000405                             BR      4$
1860  017612  005737  002322              1$:     TST     INTFLG          ;DID INTERRUPT OCCUR
1861  017616  001772                             BEQ     2$              ;NO, OK
1862  017620  000765                             BR      3$              ;YES, ERROR
1863
1864  017622                              ENDSEG                          ;****END OF SEGMENT****
 (3)  017622                              10000$:
 (3)  017622  104405                             TRAP    C$ESEG
1865  017624  162737  000040  002356      4$:     SUB     #40,BDDAT       ;NEXT LEVEL
1866  017632  100331                             BPL     5$
1867
1868  017634                              6$:
1869  017634                              ENDTST                          ;****END OF TEST****
 (3)  017634                              L10050:
 (3)  017634  104401                             TRAP    C$ETST
1870
1871                                      .SBTTL  **TEST 25** - GET STATUS FUNCTION
1872
1873  017636                              BGNTST                          ;****START OF TEST****
1874
1875
1876  017636                              STARS
 (2)                                      ;;*****************************************************************
1877                                      ;TEST GET STATUS FUNCTION.  THE GET STATUS FUNCTION WILL
1878                                      ;WORK IF DRIVE IS LOADED AND READY OR NOT.  THE RLDA
1879                                      ;IS LOADED WITH THE GET STATUS AND MARKER BITS (BITS 1,0)
1880                                      ;AND THE FUNCTION IS ISSUED.  WE WAIT 200 MILLISECONDS
1881                                      ;FOR CONTROLLER READY.  VERIFY THAT NO ERRORS OCCUR.
1882  017636                              STARS
 (2)                                      ;;*****************************************************************
1883
1884
1885  017636  012777  000013  162410              MOV     #GSBIT!MK!DRST,@RLDA    ;SET GET STATUS AND MARKER BIT
1886  017644  004537  013414                      JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
1887  017650  000004                              GSTAT                   ;GET STATUS
1888  017652  004537  014246                      JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
1889  017656                              2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  017656  104406                             TRAP    C$CLP1
1890
1891  017660  004537  013114                      JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
1892
1893  017664                              ENDTST                          ;****END OF TEST****
 (3)  017664                              L10051:
 (3)  017664  104401                             TRAP    C$ETST
1894
1895
1896                                      .SBTTL  **TEST 26** - GET STATUS FUNCTION INTERRUPT
```

```
1897
1898  017666                          BGNTST                          ;****START OF TEST****
1899
1900                                  ;CHECK GET STATUS UNDER INTERRUPT
1901
1902  017666  005037  002322                CLR     INTFLG          ;CLEAR INTERRUPT OCCURANCE
1903  017672                          SETPRI  #PRI00          ;PSW TO LEVEL 0
 (3)  017672  012700  000000                MOV     #PRI00,R0
 (3)  017676  104441                        TRAP    C$SPRI
1904  017700  012777  000003  162346        MOV     #GSBIT!MK,@RLDA ;SET UP DA
1905  017706  004537  013414                JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
1906  017712  000104                        GSTAT!INTEN             ;GET STATUS, INT ENABLE
1907  017714  004537  014246                JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
1908  017720                          SETPRI  #PRI07
 (3)  017720  012700  000340                MOV     #PRI07,R0
 (3)  017724  104441                        TRAP    C$SPRI
1909  017726  005737  002322                TST     INTFLG          ;DID INTERRUPT OCCUR
1910  017732  001004                        BNE     2$              ;YES-BRANCH
1911  017734                          ERRDF   28.,EM30,ERR0
 (4)  017734  104455                        TRAP    C$ERDF
 (5)  017736  000034                        .WORD   28
 (5)  017740  005433                        .WORD   EM30
 (5)  017742  010152                        .WORD   ERR0
1912  017744                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  017744  104406                        TRAP    C$CLP1
1913  017746  004537  013114                JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
1914  017752  005037  002322                CLR     INTFLG          ;CLEAR INTERRUPT OCCURANCE
1915  017756                          SETPRI  #PRI00          ;PSW TO LEVEL 0
 (3)  017756  012700  000000                MOV     #PRI00,R0
 (3)  017762  104441                        TRAP    C$SPRI
1916  017764  012777  000003  162262        MOV     #GSBIT!MK,@RLDA ;SET UP DA FOR GET STATUS CMD
1917  017772  004537  013414                JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
1918  017776  000004                        GSTAT                   ;GET STATUS - SHOULD NOT CAUSE AN INTERRUPT
1919  020000  004537  014246                JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
1920  020004                          SETPRI  #PRI07
 (3)  020004  012700  000340                MOV     #PRI07,R0
 (3)  020010  104441                        TRAP    C$SPRI
1921  020012  005737  002322                TST     INTFLG          ;DID INTERRUPT OCCUR (SHOULD NOT)
1922  020016  001404                        BEQ     3$              ;NO - BRANCH (OK)
1923  020020                          ERRDF   281.,EM30A,ERR0
 (4)  020020  104455                        TRAP    C$ERDF
 (5)  020022  000431                        .WORD   281
 (5)  020024  005472                        .WORD   EM30A
 (5)  020026  010152                        .WORD   ERR0
1924  020030                          3$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  020030  104406                        TRAP    C$CLP1
1925  020032  004537  013114                JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
1926  020036                          ENDTST                          ;****END OF TEST****
 (3)  020036                          L10052:
 (3)  020036  104401                        TRAP    C$ETST
1927
1928
1929                                  .SBTTL  **TEST 27** - GET STATUS FUNCTION GENERATES OPI W/O GS BIT
1930
1931  020040                          BGNTST                          ;****START OF TEST****
1932
```

```
 1933  020040                          STARS
  (2)                                ;;*****************************************************************
 1934                                ;VERIFY THAT GET STATUS FUNCTION WILL NOT COMPLETE
 1935                                ;WITHOUT SENDING OUT THE GET STATUS BIT IN THE RLDA.
 1936                                ;WE SET MARKER BUT NO GET STATUS BIT IN THE RLDA AND
 1937                                ;ISSUE A GET STATUS WE SHOULD RECIEVE AN OPI ERROR.
 1938                                ;VERIFY THAT CONTROLLER READY SETS AND OPI SETS
 1939  020040                          STARS
  (2)                                ;;*****************************************************************
 1940
 1941
 1942  020040  012777  000001  162206        MOV     #MK,@RLDA       ;SET ONLY MARKER BIT!!
 1943  020046  004537  013414                JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
 1944  020052  000004                        GSTAT                   ;GET STATUS
 1945  020054  004537  014246                JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1946  020060  032737  074000  002302        BIT #74000,E.CS
 1947  020066  001405                        BEQ     1$
 1948  020070  012737  004045  013376        MOV     #OPIERR,RESTMS
 1949  020076  004537  013114                JSR     R5,CHERR
 1950  020102                          1$:   CKLOOP
  (3)  020102  104406                        TRAP    C$CLP1
 1951  020104  032737  002000  002302        BIT     #OPI,E.CS       ;IS OPI SET?
 1952  020112  001004                        BNE     2$              ;YES-BRANCH NO-CHECK TIMEOUT
 1953  020114                              ERRDF   29.,EM33,ERR0
  (4)  020114  104455                        TRAP    C$ERDF
  (5)  020116  000035                        .WORD   29
  (5)  020120  005566                        .WORD   EM33
  (5)  020122  010152                        .WORD   ERR0
 1954  020124                          2$:
 1955
 1956  020124                          ENDTST                          ;****END OF TEST****
  (3)  020124                          L10053:
  (3)  020124  104401                        TRAP    C$ETST
 1957
 1958
 1959                                .SBTTL  **TEST 28** - OPI UNDER INTERRUPT
 1960
 1961  020126                          BGNTST                          ;****START OF TEST****
 1962  020126                          STARS
  (2)                                ;;*****************************************************************
 1963                                ;FORCE AN OPI ERROR UNDER INTERRUPT TO VERIFY THAT
 1964                                ;AN INTERRUPT WILL OCCUR FROM OPI.  THE OPI IS FORCED
 1965                                ;USING A GET STATUS WITHOUT THE GET STATUS BIT SET
 1966                                ;IN RLDA.
 1967  020126                          STARS
  (2)                                ;;*****************************************************************
 1968
 1969
 1970  020126                              SETPRI  #PRI00
  (3)  020126  012700  000000                MOV     #PRI00,R0
  (3)  020132  104441                        TRAP    C$SPRI
 1971  020134  005037  002322                CLR     INTFLG
 1972  020140  012777  000001  162106        MOV     #MK,@RLDA       ;SET ONLY MARKER BIT!!
 1973  020146  004537  013414                JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
 1974  020152  000104                        GSTAT!INTEN             ;GET STATUS
 1975  020154  004537  014246                JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
```

```
1976  020160                                  SETPRI  #PRI07
 (3)  020160  012700  000340                 MOV     #PRI07,R0
 (3)  020164  104441                         TRAP    C$SPRI
1977  020166  005737  002322                 TST     INTFLG          ;INTERRUPT OCCUR
1978  020172  001004                         BNE     2$
1979  020174                                  ERRDF   30.,EM11,ERR0
 (4)  020174  104455                         TRAP    C$ERDF
 (5)  020176  000036                         .WORD   30
 (5)  020200  005203                         .WORD   EM11
 (5)  020202  010152                         .WORD   ERR0
1980  020204                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  020204  104406                         TRAP    C$CLP1
1981  020206  032737  074000  002302         BIT     #74000,E.CS
1982  020214  001405                         BEQ     1$
1983  020216  012737  004045  013376         MOV     #OPIERR,RESTMS
1984  020224  004537  013114                 JSR     R5,CHERR
1985  020230                          1$:     CKLOOP
 (3)  020230  104406                         TRAP    C$CLP1
1986  020232  032737  002000  002302         BIT     #OPI,E.CS       ;IS OPI SET?
1987  020240  001004                         BNE     3$              ;YES-BRANCH NO-CHECK TIMEOUT
1988  020242                                  ERRDF   31.,EM33,ERR0
 (4)  020242  104455                         TRAP    C$ERDF
 (5)  020244  000037                         .WORD   31
 (5)  020246  005566                         .WORD   EM33
 (5)  020250  010152                         .WORD   ERR0
1989  020252                          3$:
1990
1991  020252                                  ENDTST                  ;****END OF TEST****
 (3)  020252                          L10054:
 (3)  020252  104401                         TRAP    C$ETST
1992
1993                                    .SBTTL  **TEST 29** - READ HEADER FUNCTION
1994
1995  020254                                  BGNTST                  ;****START OF TEST****
1996  020254                                  STARS
 (2)                                    ;;**********************************************************************
1997                                    ;CHECK THAT READ HEADER WORKS, THAT WE CAN ISSUE
1998                                    ;IT, GET READY BACK WITHOUT ANY ERRORS SETTING.
1999  020254                            STARS
 (2)                                    ;;**********************************************************************
2000
2001  020254  004537  013414                   JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2002  020260  000010                           RDHDR                   ;READ HEADER
2003  020262  004537  014246                   JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH READY
2004  020266                          2$:       CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  020266  104406                           TRAP    C$CLP1
2005  020270  004537  013114                   JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2006
2007  020274                                  ENDTST                  ;****END OF TEST****
 (3)  020274                          L10055:
 (3)  020274  104401                         TRAP    C$ETST
2008
2009                                    .SBTTL  **TEST 30** - READ HEADER FUNCTION INTERRUPT
2010
2011  020276                                  BGNTST                  ;****START OF TEST****
2012
```

```
2013  020276                          STARS
 (2)                                  ;;*****************************************************************
2014                                  ;CHECK THAT READ HEADER WILL GENERATE AN INTERRRUPT
2015                                  ;UPON COMPLETION WITHOUT ANY ERRORS SETTING
2016  020276                          STARS
 (2)                                  ;;*****************************************************************
2017
2018
2019  020276                              SETPRI  #PRI00          ;PSW TO 0
 (3)  020276  012700  000000              MOV     #PRI00,R0
 (3)  020302  104441                      TRAP    C$SPRI
2020  020304  005037  002322              CLR     INTFLG          ;CLEAR INTERRUPT OCCURENCE
2021  020310  004537  013414              JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2022  020314  000110                      RDHDR!INTEN             ;READ HEADER, INTR. ENA
2023  020316  004537  014246              JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2024  020322                              SETPRI  #PRI07
 (3)  020322  012700  000340              MOV     #PRI07,R0
 (3)  020326  104441                      TRAP    C$SPRI
2025  020330  005737  002322              TST     INTFLG          ;INTERRUPT HAPPEN
2026  020334  001004                      BNE     2$              ;YES-CONTINUE
2027  020336                              ERRDF   35.,EM37,ERR0
 (4)  020336  104455                      TRAP    C$ERDF
 (5)  020340  000043                      .WORD   35
 (5)  020342  005710                      .WORD   EM37
 (5)  020344  010152                      .WORD   ERR0
2028  020346                          2$: CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  020346  104406                      TRAP    C$CLP1
2029
2030  020350  004537  013114              JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2031
2032  020354                          ENDTST                      ;****END OF TEST****
 (3)  020354                          L10056:
 (3)  020354  104401                      TRAP    C$ETST
2033
2034
2035                                  .SBTTL  **TEST 31** - REPEATED RD HDRS YIELD SAME CYL AND HD
2036
2037  020356                          BGNTST                      ;****START OF TEST****
2038
2039
2040  020356                          STARS
 (2)                                  ;;*****************************************************************
2041                                  ;CHECK THAT READ HEADERS WILL RELIABLY READ THE SAME
2042                                  ;CYLINDER AND HEAD SELECT.  WE WILL READ HEADERS VERIFYING
2043                                  ;THAT WE ALWAYS READ THE SAME CYLINDER AND HEAD SELECT.
2044  020356                          STARS
 (2)                                  ;;*****************************************************************
2045
2046
2047  020356  012701  000144              MOV     #100.,R1        ;SET UP TO DO 100 RD HDR'S
2048  020362  004537  013414              JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2049  020366  000010                      RDHDR                   ;READ HEADER
2050  020370  004537  014246              JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2051  020374                          99$: ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)  020374  104410                      TRAP    C$ESCAPE
 (3)  020376  000122                      .WORD   L10057-.
```

```
2052
2053  020400  004537  013114          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2054  020404                          ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)  020404  104410                  TRAP    C$ESCAPE
 (3)  020406  000112                  .WORD   L10057-.
2055
2056  020410  013737  002310  002354  MOV     E.MP,GDDAT      ;READ FIRST HEADER (ASSUME GOOD)
2057  020416  043737  002326  002354  BIC     SECMSK,GDDAT    ;MASK AWAY SECTOR BITS
2058  020424                  BGNSEG                          ;****START OF SEGMENT****
 (3)  020424  104404                  TRAP    C$BSEG
2059  020426                  2$:
2060  020426  004537  013414          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2061  020432  000010                  RDHDR
2062  020434  004537  014246          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2063  020440                  97$:    ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
 (3)  020440  104410                  TRAP    C$ESCAPE
 (3)  020442  000054                  .WORD   10000$-.
2064
2065  020444  004537  013114          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2066  020450                          ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
 (3)  020450  104410                  TRAP    C$ESCAPE
 (3)  020452  000044                  .WORD   10000$-.
2067
2068  020454  013737  002310  002356  MOV     E.MP,BDDAT      ;READ HEADER
2069  020462  043737  002326  002356  BIC     SECMSK,BDDAT    ;MASK AWAY SECTOR BITS
2070  020470  023737  002354  002356  CMP     GDDAT,BDDAT     ;IS HEADER CORRECT
2071  020476  001404                  BEQ     4$
2072
2073  020500                          ERRDF   36.,EM41,ERR4
 (4)  020500  104455                  TRAP    C$ERDF
 (5)  020502  000044                  .WORD   36
 (5)  020504  005750                  .WORD   EM41
 (5)  020506  010316                  .WORD   ERR4
2074                                                        ;CONSTANT CYL & HS
2075  020510                  4$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  020510  104406                  TRAP    C$CLP1
2076
2077  020512  005301                  DEC     R1              ;PERFORM ALL READ HDR'S
2078  020514  001344                  BNE     2$              ;IF NOT GO BACK AND DO ANOTHER
2079  020516                  ENDSEG                          ;****END OF SEGMENT****
 (3)  020516                  10000$:
 (3)  020516  104405                  TRAP    C$ESEG
2080  020520                  ENDTST                          ;****END OF TEST****
 (3)  020520                  L10057:
 (3)  020520  104401                  TRAP    C$ETST
2081
2082
2083                                .SBTTL  **TEST 32** - CHECK OF HEADER CRC
2084
2085  020522                        BGNTST                    ;****START OF TEST****
2086
2087  020522                        STARS
 (2)                              ;;*****************************************************************
2088                              ;CHECK THAT WE CAN READ THE HDCRC AFTER A
2089                              ;READ HEADER AND THAT IT IS THE CORRECT CRC
2090                              ;FOR THE HEADER.
```

```
2091  020522                          STARS
 (2)                                  ;;*****************************************************************
2092
2093
2094  020522  005037  020572                  CLR     3$
2095  020526  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2096  020532  000010                          RDHDR                   ;READ HEADER
2097  020534  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2098  020540                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)  020540  104410                          TRAP    C$ESCAPE
 (3)  020542  000114                          .WORD   L10060-.
2099
2100  020544  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2101  020550                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)  020550  104410                          TRAP    C$ESCAPE
 (3)  020552  000104                          .WORD   L10060-.
2102
2103  020554  013737  002310  020570          MOV     E.MP,2$         ;READ HEADER WORD
2104  020562  004537  013772                  JSR     R5,SIMBCC       ;GO CALCULATE CRC
2105  020566  000020                          16.                     ;16 BITS
2106  020570  000000                  2$:     .WORD   0               ;HEADER GOES HERE
2107  020572  000000                  3$:     .WORD   0               ;START WITH 0 CRC
2108  020574  013737  002336  020620          MOV     CALBCC,5$
2109  020602  013737  002312  020616          MOV     E.MP1,4$        ;GET SECOND HALF
2110  020610  004537  013772                  JSR     R5,SIMBCC
2111  020614  000020                          16.
2112  020616  000000                  4$:     .WORD   0
2113  020620  000000                  5$:     .WORD   0
2114  020622  013737  002336  002354          MOV     CALBCC,GDDAT    ;STORE CALCULATED CRC AS GOOD
2115  020630  013737  002314  002356          MOV     E.MP2,BDDAT     ;THIRD READ OF DB GETS CRC
2116  020636  023737  002354  002356          CMP     GDDAT,BDDAT     ;IS CRC CORRECT?
2117  020644  001404                          BEQ     6$              ;IF SO CONTINUE
2118
2119  020646                                  ERRDF   37.,EM42,ERR4
 (4)  020646  104455                          TRAP    C$ERDF
 (5)  020650  000045                          .WORD   37
 (5)  020652  006041                          .WORD   EM42
 (5)  020654  010316                          .WORD   ERR4
2120  020656                          6$:
2121
2122  020656                          ENDTST                          ;****END OF TEST****
 (3)  020656                          L10060:
 (3)  020656  104401                          TRAP    C$ETST
2123
2124
2125                                  .SBTTL  **TEST 33** - CHECK CONSECUTIVE HEADERS
2126
2127  020660                          BGNTST                          ;****START OF TEST****
2128
2129
2130  020660                          STARS
 (2)                                  ;;*****************************************************************
2131                                  ;CHECK THAT THE HEADERS ARE CONSECUTIVE.  WE WILL DO
2132                                  ;40 (FORTY) READ HEADERS AND STORE EACH.  AFTER WE HAVE
2133                                  ;READ THE FORTIETH HEADER WE WILL VERIFY THAT
2134                                  ;THEY CAME IN SEQUENTIAL, THAT 0 FOLLOWS 39,
```

```
2135                                    ;THAT THERE WERE NO ERRORS.
2136  020660                            STARS
 (2)                                    ;;*****************************************************************
2137
2138
2139  020660  005037  002360                  CLR     FIRST           ;CLEAR FIRST READ DONE FLAG
2140  020664  012703  003266                  MOV     #HDRBUF,R3      ;STORE HEADERS
2141  020670  012701  000050                  MOV     #40.,R1         ;FORTY HEADERS
2142  020674  012737  000210  002270          MOV     #RDHDR!CRDY,B.CS
2143  020702  053737  002266  002270          BIS     DRIVE,B.CS
2144  020710  013777  002270  161332          MOV     B.CS,@RLCS
2145  020716  042777  000200  161324  2$:     BIC     #200,@RLCS
2146  020724  032777  000200  161316  1$:     BIT     #200,@RLCS      ;DONE?
2147  020732  001774                          BEQ     1$
2148  020734  017723  161310                  MOV     @RLCS,(R3)+
2149  020740  017723  161312                  MOV     @RLMP,(R3)+
2150  020744  017723  161306                  MOV     @RLMP,(R3)+
2151  020750  017723  161302                  MOV     @RLMP,(R3)+
2152  020754  005301                          DEC     R1              ;HAVE WE READ FORTY HEADERS
2153  020756  001357                          BNE     2$              ;GO BACK UNTIL FOURTY DONE
2154  020760  012703  003266                  MOV     #HDRBUF,R3      ;GET LIST OF HEADERS
2155  020764  012701  000050                  MOV     #40.,R1         ;CHECK FORTY OF THEM
2156  020770  011337  002302                  MOV     (R3),E.CS
2157  020774  005737  002302                  TST     E.CS
2158  021000  100016                          BPL     99$
2159  021002  012737  004304  013376          MOV     #RHDMES,RESTMS
2160  021010  005723                          TST     (R3)+
2161  021012  012337  002310                  MOV     (R3)+,E.MP
2162  021016  012337  002312                  MOV     (R3)+,E.MP1
2163  021022  012337  002314                  MOV     (R3)+,E.MP2
2164  021026  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2165  021032  000137  021174                  JMP     7$
2166  021036  005723                  99$:    TST     (R3)+
2167  021040  011337  002356                  MOV     (R3),BDDAT      ;GET HEADER
2168  021044  005737  002360                  TST     FIRST           ;IS THIS FIRST READ?
2169  021050  001007                          BNE     4$              ;NO, BRANCH
2170  021052  012737  000001  002360          MOV     #1,FIRST        ;SET FIRST READ DONE FLAG
2171  021060  013737  002356  002354  3$:     MOV     BDDAT,GDDAT     ;SET UP NEXT READ EXPECTED
2172  021066  000435                          BR      6$              ;GO SEE IF TEST IS DONE
2173  021070  005237  002354          4$:     INC     GDDAT           ;INCREMENT EXP'D HEADER
2174  021074  023737  002356  002354          CMP     BDDAT,GDDAT     ;IS NEW HEADER SEQUENTIAL?
2175  021102  001766                          BEQ     3$              ;YES THEN BRANCH
2176  021104  033737  002326  002356          BIT     SECMSK,BDDAT    ;IS NEW HEADER ZERO?
2177  021112  001015                          BNE     5$              ;NO, THEN ERROR GO REPORT IT
2178  021114  013737  002354  002340          MOV     GDDAT,TEMP2     ;YES, CHECK IF LAST HEADER WAS
2179  021122  043737  002362  002340          BIC     CYLMSK,TEMP2    ;MAX ADDRESS, IF SO BRANCH
2180  021130  023737  002364  002340          CMP     MXSEC1,TEMP2    ;STORE NEW DATA AS OLD
2181  021136  001750                          BEQ     3$              ;AND PERFORM NEW RD HDR
2182  021140  043737  002326  002354          BIC     SECMSK,GDDAT    ;EXPECTING ZERO SECTOR
2183
2184  021146                          5$:
2185
2186  021146  005037  002360                  CLR     FIRST           ;ERROR WILL MAKE US MISS
2187                                                                  ;NEXT SECTOR SEQUENTIALLY
2188                                                                  ;START OVER; CLEAR FIRST FLAG
2189  021152                                  ERRDF   38.,EM43,ERR2
```

```
  (4)  021152  104455                    TRAP    C$ERDF
  (5)  021154  000046                    .WORD   38
  (5)  021156  006077                    .WORD   EM43
  (5)  021160  010202                    .WORD   ERR2
2190   021162                  6$:       CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  021162  104406                    TRAP    C$CLP1
2191
2192   021164  062703  000006            ADD     #6,R3
2193   021170  005301                    DEC     R1              ;HAVE WE DONE THIS ENOUGH
2194   021172  001321                    BNE     99$             ;NO, GO BACK DO IT AGAIN
2195   021174                  7$:
2196   021174                  ENDTST                          ;****END OF TEST****
  (3)  021174                  L10061:
  (3)  021174  104401                    TRAP    C$ETST
2197
2198
2199                           .SBTTL  **TEST 34** - SEEK FUNCTION
2200
2201   021176                  BGNTST                          ;****START OF TEST****
2202   021176                  STARS
  (2)                          ;;**************************************************************
2203                           ;CHECK THE SEEK FUNCTION RETURNS CONTROLLER READY
2204                           ;WITH NO ERRORS.  WE ISSUE A ONE TRACK IN WORD SEEK.
2205                           ;WE DO NOT CHECK THE RESULT FOR POSITION
2206   021176                  STARS
  (2)                          ;;**************************************************************
2207
2208
2209   021176  012777  000205  161050          MOV     #BIT7!MK!SIGN,@RLDA  ;SET UP DA-DIFF=1,MARKER,TOWARDS
2210   021204  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2211   021210  000006                          SEEK                    ;SEEK
2212   021212  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2213   021216  012737  000010  002406          MOV     #8.,DLYCNT      ;INITIALIZE DELAY COUNT
2214   021224                  WAIT1:  DELAY   #250.                   ;IMPLEMENT TIME DELAY
  (2)  021224  012727  000372            MOV     ##250.,(PC)+
  (2)  021230  000000                    .WORD   0
  (2)  021232  013727  002116            MOV     L$DLY,(PC)+
  (2)  021236  000000                    .WORD   0
  (2)  021240  005367  177772            DEC     -6(PC)
  (2)  021244  001375                    BNE     .-4
  (2)  021246  005367  177756            DEC     -22(PC)
  (2)  021252  001367                    BNE     .-20
2215   021254  005337  002406                  DEC     DLYCNT          ;DECREMENT DELAY COUNT
2216   021260  001361                          BNE     WAIT1           ;BRANCH IF DELAY NOT EXPIRED
2217   021262                  2$:     CKLOOP                          ;CHECK IF /FL:LOE IS SET
  (3)  021262  104406                    TRAP    C$CLP1
2218   021264  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2219
2220   021270                  ENDTST                          ;****END OF TEST****
  (3)  021270                  L10062:
  (3)  021270  104401                    TRAP    C$ETST
2221
2222
2223                           .SBTTL  **TEST 35** - CHECK DRIVE READY ON SEEK
2224
2225   021272                  BGNTST                          ;****START OF TEST****
```

```
                                STARS
                                ;;*****************************************************************
                                ;CHECK THE SEEK FUNCTION RETURNS DRIVE READY WITH
                                ;NO ERRORS.  WE ISSUE A ONE TRACK INWARD SEEK.  WE DO
                                ;NOT CHECK THE RESULT FOR POSITION
                                STARS
                                ;;*****************************************************************

021272  012777  000201  160754          MOV     #BIT7!MK,@RLDA  ;SET DA, MARKER, DIFF=1.
021300  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
021304  000006                          SEEK                    ;SEEK
021306  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
021312                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
(3) 021312  104406                      TRAP    C$CLP1

021314  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
021320                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
(3) 021320  104406                      TRAP    C$CLP1

021322  004537  014160                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
021326                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
(3) 021326  104406                      TRAP    C$CLP1

021330  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS

021334                          ENDTST                          ;****END OF TEST****
(3) 021334                      L10063:
(3) 021334  104401                      TRAP    C$ETST


                                .SBTTL  **TEST 36** - SEEK FUNCTION INTERRUPT

021336                          BGNTST                          ;****START OF TEST****


021336                          STARS
                                ;;*****************************************************************
                                ;CHECK THAT CONTROLLER READY RESETTING WHEN THE SEEK IS
                                ;INITIATED CAUSES AN INTERRUPT BUT DRIVE READY WILL
                                ;NOT.  WE ALSO MONITOR FOR ANY ERROR BITS SETTING.
021336                          STARS
                                ;;*****************************************************************


021336  005037  002322                  CLR     INTFLG
021342                                  SETPRI  #PRI00          ;SET PSW TO 0
(3) 021342  012700  000000              MOV     #PRI00,R0
(3) 021346  104441                      TRAP    C$SPRI
021350  012777  000205  160676          MOV     #BIT7!MK!SIGN,@RLDA  ;SET UP RLDA
021356  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
```

```
2271  021362  000106                    SEEK!INTEN                ;SEEK AND INTR. ENA.
2272  021364  004537  014246            JSR     R5,WTCRDY         ;WAIT FOR CONTROLLER READY HIGH
2273  021370  000240                    NOP                       ;
2274  021372  005737  002322      1$:   TST     INTFLG            ;DID INTERRUPT OCCUR
2275  021376  001004                    BNE     2$                ;YES, GO CHECK DRDY
2276  021400                            ERRDF   40.,EM47,ERR0
  (4) 021400  104455                    TRAP    C$ERDF
  (5) 021402  000050                    .WORD   40
  (5) 021404  006317                    .WORD   EM47
  (5) 021406  010152                    .WORD   ERR0
2277  021410                      2$:   CKLOOP                    ;CHECK IF /FL:LOE IS SET
  (3) 021410  104406                    TRAP    C$CLP1
2278
2279
2280  021412  004537  013114            JSR     R5,CHERR          ;CHECK CONTROLLER FOR ERRORS
2281  021416                            CKLOOP                    ;CHECK IF /FL:LOE IS SET
  (3) 021416  104406                    TRAP    C$CLP1
2282
2283  021420  005037  002322            CLR     INTFLG            ;CLEAR INTERRUPT OCCURANCE
2284
2285
2286  021424  004537  014160            JSR     R5,WTDRDY         ;WAIT FOR DRIVE READY
2287  021430                      5$:   CKLOOP                    ;CHECK IF /FL:LOE IS SET
  (3) 021430  104406                    TRAP    C$CLP1
2288
2289  021432                            SETPRI  #PRI07
  (3) 021432  012700  000340            MOV     #PRI07,R0
  (3) 021436  104441                    TRAP    C$SPRI
2290  021440  005737  002322            TST     INTFLG            ;DID DRIVE READY CAUSE INTERRUPT
2291  021444  001404                    BEQ     6$                ;NO, CONTINUE
2292
2293  021446                            ERRDF   42.,EM52,ERR0
  (4) 021446  104455                    TRAP    C$ERDF
  (5) 021450  000052                    .WORD   42
  (5) 021452  006350                    .WORD   EM52
  (5) 021454  010152                    .WORD   ERR0
2294  021456                      6$:   CKLOOP                    ;CHECK IF /FL:LOE IS SET
  (3) 021456  104406                    TRAP    C$CLP1
2295
2296  021460                      ENDTST                          ;****END OF TEST****
  (3) 021460                      L10064:
  (3) 021460  104401                    TRAP    C$ETST
2297
2298
2299                              .SBTTL  **TEST 37** - TEST DIFFERENCE WORD TRANSMISSION
2300
2301  021462                      BGNTST                          ;****START OF TEST****
2302
2303
2304
2305
2306  021462                      STARS
  (2)                             ;;*****************************************************************
2307                              ;VERIFY THAT THE DIFFERENCE WORD LOADS AND IS
2308                              ;TRANSMITTED CORRECTLY.  WE WILL ISSUE SEEKS WITH THE
2309                              ;DIFFERENCE WORD CONTAINING ALL OF THE BIT PATTERNS FLOATING 1,
```

```
                                ;GROWING 1, GROWING 0 AND SHITING 0.  THE SEEK WILL
                                ;START FROM TRACK 0 EACH TIME AND WILL RETURN THERE
                                ;EACH, THUS BOTH DIRECTIONS FOR PATTERNS WILL BE CHECKED.
                                ;READ HEADERS ARE USED TO VERIFY THE SEEK CORRECTNESS.
                                ;ERRORS ARE MONITORED AND REPORTED.
021462                          STARS
 (2)                            ;;*****************************************************************
                        MOV     #SKLST,R3       ;GET LIST OF DIFFERENCE WORDS
                BGNSEG                          ;****START OF SEGMENT****
                        TRAP    C$BSEG
                1$:
                        JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
                        RDHDR                   ;READ HEADER
                        JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
                98$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
                        TRAP    C$CLP1

                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
                        TRAP    C$CLP1

021512 013737 002310 002356     MOV     E.MP,BDDAT      ;READ HEADER
021520 043737 002326 002356     BIC     SECMSK,BDDAT    ;CLEAR OUT SECTOR
021526 001462                   BEQ     99$             ;IF ON TRACK ZERO, H.S. ZERO, OK

                                ;NOT ON TRACK ZERO CALCULATE DIFFERENCE WORD AND PUT IT BACK
                                ;ON ZERO.

021530 042737 000100 002356     BIC     #RHHS,BDDAT     ;CLEAR OUT HEAD SELECT
021536 013777 002356 160510     MOV     BDDAT,@RLDA     ;PUT CYLINDER AS DIFFERENCE WORD
021544 052777 000001 160502     BIS     #MK,@RLDA       ;SET MARKER BIT
                        JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
                        SEEK                    ;SEEK
                        JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
                        TRAP    C$CLP1

                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
                        TRAP    C$CLP1

                        JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
                89$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
                        TRAP    C$CLP1

                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
                        TRAP    C$CLP1

                        JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
                        RDHDR                   ;READ HEADER
                        JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
                96$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
                        TRAP    C$CLP1
```

```
2357
2358  021624  004537  013114          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2359  021630                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 021630  104406                  TRAP    C$CLP1
2360
2361  021632  005037  002354          CLR     GDDAT           ;CLEAR EXPECTED
2362  021636  013737  002356  002370  MOV     BDDAT,DWORD     ;SAVE DIFFERENCE WORD
2363  021644  013737  002310  002356  MOV     E.MP,BDDAT      ;READ HEADER
2364  021652  043737  002326  002356  BIC     SECMSK,BDDAT    ;MASK OUT SECTOR BITS
2365  021660  001404                  BEQ     5$              ;BRANCH IF ON ZERO TRACK
2366
2367  021662                          ERRDF   43.,EM54,ERR3
  (4) 021662  104455                  TRAP    C$ERDF
  (5) 021664  000053                  .WORD   43
  (5) 021666  006420                  .WORD   EM54
  (5) 021670  010244                  .WORD   ERR3
2368  021672                    5$:   CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 021672  104406                  TRAP    C$CLP1
2369
2370  021674  011377  160354    99$:  MOV     (R3),@RLDA      ;GET DIFFERENCE WORD
2371  021700  052777  000005  160346  BIS     #SIGN!MK,@RLDA  ;SET SIGN (TOWARDS SPINDLE) AND MARKER
2372  021706  004537  013414          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2373  021712  000006                  SEEK                    ;SEEK
2374  021714  004537  014246          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2375  021720                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 021720  104406                  TRAP    C$CLP1
2376
2377  021722  004537  013114          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2378  021726                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 021726  104406                  TRAP    C$CLP1
2379
2380  021730  004537  014160          JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
2381  021734                    87$:  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 021734  104406                  TRAP    C$CLP1
2382
2383  021736  004537  013114          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2384  021742                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 021742  104406                  TRAP    C$CLP1
2385
2386  021744  004537  013414          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2387  021750  000010                  RDHDR                   ;READ HEADER
2388
2389  021752  004537  014246          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2390  021756                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 021756  104406                  TRAP    C$CLP1
2391
2392  021760  004537  013114          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2393  021764                          ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
  (3) 021764  104410                  TRAP    C$ESCAPE
  (3) 021766  000106                  .WORD   10000$-.
2394
2395  021770  011337  002354          MOV     (R3),GDDAT      ;GET EXPECTED CYLINDER
2396  021774  011337  002370    8$:   MOV     (R3),DWORD      ;SET UP DIFFERENCE FOR SEEK
2397  022000  013737  002310  002356  MOV     E.MP,BDDAT      ;READ HEADER FROM RLMP
2398  022006  043737  002326  002356  BIC     SECMSK,BDDAT    ;CLEAR OUT SECTOR BITS
2399  022014  023737  002354  002356  CMP     GDDAT,BDDAT     ;DID SEEK GO TO THE RIGHT
```

```
2400  022022  001404                        BEQ     9$              ;TRACK, IF SO, GO GET NEXT
2401
2402  022024                                ERRDF   44.,EM54,ERR3
 (4)  022024  104455                        TRAP    C$ERDF
 (5)  022026  000054                        .WORD   44
 (5)  022030  006420                        .WORD   EM54
 (5)  022032  010244                        .WORD   ERR3
2403  022034                        9$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  022034  104406                        TRAP    C$CLP1
2404
2405  022036  005723                        TST     (R3)+           ;BUMP PATTERN
2406  022040  023727  002400  000001        CMP     T.DRIVE,#1
2407  022046  001005                        BNE     2$
2408  022050  020327  002720                CMP     R3,#SKEND
2409  022054  001407                        BEQ     10$
2410  022056  000137  021470                JMP     1$
2411
2412  022062  020327  002762        2$:     CMP     R3,#SKEEND
2413  022066  001402                        BEQ     10$
2414  022070  000137  021470                JMP     1$
2415
2416  022074                        10$:
2417
2418  022074                        ENDSEG                          ;****END OF SEGMENT****
 (3)  022074                        10000$:
 (3)  022074  104405                        TRAP    C$ESEG
2419  022076                        ENDTST                          ;****END OF TEST****
 (3)  022076                        L10065:
 (3)  022076  104401                        TRAP    C$ETST
2420
2421
2422                                .SBTTL  **TEST 38** - VERIFY HEAD SELECT 0 VIA RD HDR
2423
2424  022100                        BGNTST                          ;****START OF TEST****
2425
2426                                ;
2427
2428  022100                        STARS
 (2)                                ;;**********************************************************************
2429                                ;CHECK THAT WE CAN SELECT HEAD SELECT ZERO.  ISSUE
2430                                ;SEEK TO HEAD SELECT 0 AND VERIFY WITH READ HEADER.
2431  022100                        STARS
 (2)                                ;;**********************************************************************
2432
2433  022100  012777  000001  160146  99$:    MOV     #MK,@RLDA       ;SET MARKER IN RLDA
2434  022106  005037  002354                 CLR     GDDAT           ;SET EXPECTED
2435                                                                  ;LOAD HS=0 INTO RLDA
2436  022112                        2$:
2437  022112  004537  013414                 JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2438  022116  000006                         SEEK                    ;SEEK
2439  022120  004537  014246                 JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2440  022124                                CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  022124  104406                        TRAP    C$CLP1
2441
2442  022126  004537  013114                 JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2443  022132                                CKLOOP                  ;CHECK IF /FL:LOE IS SET
```

```
  (3)  022132  104406                          TRAP    C$CLP1
2444
2445   022134  004537  014160                 JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
2446   022140                          89$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  022140  104406                          TRAP    C$CLP1
2447
2448   022142  004537  013114                 JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2449   022146                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  022146  104406                          TRAP    C$CLP1
2450
2451   022150  004537  013414                 JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2452   022154  000010                          RDHDR                   ;READ HEADER
2453   022156  004537  014246                 JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2454   022162                          96$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  022162  104406                          TRAP    C$CLP1
2455
2456   022164  004537  013114                 JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2457   022170                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
  (3)  022170  104410                          TRAP    C$ESCAPE
  (3)  022172  000036                          .WORD   L10066-.
2458
2459   022174  013737  002310  002356          MOV     E.MP,BDDAT      ;READ HEADER FOR HEAD SELECT
2460   022202  042737  177677  002356          BIC     #177677,BDDAT   ;MASK ONLY HEAD SELECT
2461   022210  023737  002354  002356          CMP     GDDAT,BDDAT     ;COMPARE HEAD SELECTS
2462   022216  001404                          BEQ     5$              ;IF EQUAL CONTINUE
2463
2464   022220                                  ERRDF   45.,EM55,ERR4
  (4)  022220  104455                          TRAP    C$ERDF
  (5)  022222  000055                          .WORD   45
  (5)  022224  006457                          .WORD   EM55
  (5)  022226  010316                          .WORD   ERR4
2465   022230                          5$:
2466
2467   022230                          ENDTST                          ;****END OF TEST****
  (3)  022230                          L10066:
  (3)  022230  104401                          TRAP    C$ETST
2468
2469
2470                                    .SBTTL  **TEST 39** - VERIFY HEAD SELECT 1 VIA RD HDR
2471
2472   022232                          BGNTST                          ;****START OF TEST****
2473
2474
2475   022232                          STARS
  (2)                                   ;;**************************************************************************
2476                                    ;CHECK THAT WE CAN SELECT HEAD SELECT ONE.  ISSUE
2477                                    ;SEEK TO HEAD SELECT 1 AND VERIFY WITH READ HEADER.
2478   022232                          STARS
  (2)                                   ;;**************************************************************************
2479
2480
2481   022232  012777  000001  160014  99$:    MOV     #MK,@RLDA       ;SET MARKER IN RLDA
2482   022240  052777  000020  160006          BIS     #DAHS,@RLDA     ;LOAD HS=1 INTO RLDA
2483   022246  004537  013414          2$:     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2484   022252  000006                          SEEK                    ;SEEK
2485   022254  004537  014246                 JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
```

```
2486  022260                                    CKLOOP                ;CHECK IF /FL:LOE IS SET
 (3)  022260  104406                            TRAP    C$CLP1
2487
2488  022262  004537  013114                    JSR     R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
2489  022266                                    CKLOOP                ;CHECK IF /FL:LOE IS SET
 (3)  022266  104406                            TRAP    C$CLP1
2490
2491  022270  004537  014160                    JSR     R5,WTDRDY     ;WAIT FOR DRIVE CLEAR
2492  022274                          89$:      CKLOOP                ;CHECK IF /FL:LOE IS SET
 (3)  022274  104406                            TRAP    C$CLP1
2493
2494  022276  004537  013114                    JSR     R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
2495  022302                                    CKLOOP                ;CHECK IF /FL:LOE IS SET
 (3)  022302  104406                            TRAP    C$CLP1
2496
2497  022304  004537  013414                    JSR     R5,LDFUNC     ;ISSUE FUNCTION OF FOLLOWING WORD
2498  022310  000010                            RDHDR                 ;READ HEADER
2499  022312  004537  014246                    JSR     R5,WTCRDY     ;WAIT FOR CONTROLLER READY HIGH
2500  022316                                    CKLOOP                ;CHECK IF /FL:LOE IS SET
 (3)  022316  104406                            TRAP    C$CLP1
2501
2502  022320  004537  013114                    JSR     R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
2503  022324                                    ESCAPE  TST           ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)  022324  104410                            TRAP    C$ESCAPE
 (3)  022326  000044                            .WORD   L10067-.
2504
2505  022330  013737  002310  002356            MOV     E.MP,BDDAT    ;READ HEADER
2506  022336  042737  177677  002356            BIC     #177677,BDDAT ;MASK FOR H.S.
2507  022344  012737  000100  002354            MOV     #RHHS,GDDAT   ;SET EXPECTED
2508  022352  023737  002354  002356            CMP     GDDAT,BDDAT   ;CORRECT HEAD
2509  022360  001404                            BEQ     5$            ;YES, CONTINUE
2510
2511  022362                                    ERRDF   46.,EM55,ERR4
 (4)  022362  104455                            TRAP    C$ERDF
 (5)  022364  000056                            .WORD   46
 (5)  022366  006457                            .WORD   EM55
 (5)  022370  010316                            .WORD   ERR4
2512  022372                          5$:
2513
2514  022372                          ENDTST                        ;****END OF TEST****
 (3)  022372                          L10067:
 (3)  022372  104401                            TRAP    C$ETST
2515
2516
2517                                  .SBTTL  **TEST 40** - VERIFY HEAD SELECT 0 VIA GET STATUS
2518
2519  022374                          BGNTST                        ;****START OF TEST****
2520
2521  022374                          STARS
 (2)                                  ;;*****************************************************************
2522                                  ;CHECK THAT WE CAN READ BACK HEAD SELECT 0 WITH
2523                                  ;A GET STATUS FUNCTION.  SELECT H.S. 0 WITH A SEEK
2524                                  ;VERIFY WITH GET STATUS
2525  022374                          STARS
 (2)                                  ;;*****************************************************************
2526
```

```
2527  022374  012777  000001  157652          MOV     #MK,@RLDA       ;SET MARKER IN RLDA
2528                                                                    ;LOAD HS=0 INTO RLDA
2529  022402  005037  002354          2$:     CLR     GDDAT           ;SET UP EXP'D
2530  022406  004537  013414          3$:     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2531  022412  000006                          SEEK                    ;SEEK
2532  022414  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2533  022420                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 022420  104406                          TRAP    C$CLP1
2534
2535  022422  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2536  022426                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 022426  104406                          TRAP    C$CLP1
2537
2538  022430  004537  014160                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
2539  022434                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 022434  104406                          TRAP    C$CLP1
2540
2541  022436  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2542  022442                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 022442  104406                          TRAP    C$CLP1
2543
2544  022444  012777  000003  157602          MOV     #GSBIT!MK,@RLDA ;SET UP FOR GET STATUS IN DA
2545  022452  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2546  022456  000004                          GSTAT                   ;GET STATUS
2547  022460  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2548  022464                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 022464  104406                          TRAP    C$CLP1
2549
2550  022466  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2551  022472                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
  (3) 022472  104410                          TRAP    C$ESCAPE
  (3) 022474  000036                          .WORD   L10070-.
2552
2553  022476  013737  002310  002356          MOV     E.MP,BDDAT      ;READ STATUS FOR HEAD SELECT BIT
2554  022504  042737  177677  002356          BIC     #177677,BDDAT   ;LEAVE ONLY H.S. BIT
2555  022512  023737  002354  002356          CMP     GDDAT,BDDAT     ;IS HEAD SELECT CORRECT?
2556  022520  001404                          BEQ     6$              ;YES, CONTINUE
2557
2558  022522                                  ERRDF   47.,EM56,ERR4
  (4) 022522  104455                          TRAP    C$ERDF
  (5) 022524  000057                          .WORD   47
  (5) 022526  006512                          .WORD   EM56
  (5) 022530  010316                          .WORD   ERR4
2559  022532                        6$:
2560
2561  022532                        ENDTST                            ;****END OF TEST****
  (3) 022532                        L10070:
  (3) 022532  104401                          TRAP    C$ETST
2562
2563
2564                                .SBTTL  **TEST 41** - VERIFY HEAD SELECT 1 VIA GET STATUS
2565
2566  022534                        BGNTST                            ;****START OF TEST****
2567
2568  022534                        STARS
  (2)                             ;;**********************************************************************
```

```
                                ;CHECK THAT WE CAN READ BACK HEAD SELECT 1 WITH A GET
                                ;STATUS FUNCTION.  SELECT H.S. 1 WITH A SEEK AND VERIFIY WITH
                                ;GET STATUS
022534                          STARS
 (2)                            ;;*****************************************************************

022534  012777  000001  157512          MOV     #MK,@RLDA       ;SET MARKER IN RLDA
022542  052777  000020  157504          BIS     #DAHS,@RLDA     ;LOAD HS=1 INTO RLDA
022550  012737  000100  002354  2$:     MOV     #STHS,GDDAT     ;SET UP EXP'D
022556  004537  013414          3$:     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
022562  000006                          SEEK                    ;SEEK
022564  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
022570                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)    022570  104406                  TRAP    C$CLP1

022572  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
022576                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)    022576  104406                  TRAP    C$CLP1

022600  004537  014160                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
022604                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)    022604  104406                  TRAP    C$CLP1

022606  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
022612                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)    022612  104406                  TRAP    C$CLP1

022614  012777  000003  157432          MOV     #GSBIT!MK,@RLDA ;SET UP FOR GET STATUS IN DA
022622  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
022626  000004                          GSTAT                   ;GET STATUS
022630  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
022634                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)    022634  104410                  TRAP    C$ESCAPE
 (3)    022636  000046                  .WORD   L10071-.

022640  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
022644                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
 (3)    022644  104410                  TRAP    C$ESCAPE
 (3)    022646  000036                  .WORD   L10071-.

022650  013737  002310  002356          MOV     E.MP,BDDAT      ;READ STATUS FOR HEAD SELECT BIT
022656  042737  177677  002356          BIC     #177677,BDDAT   ;LEAVE ONLY H.S. BIT
022664  023737  002354  002356          CMP     GDDAT,BDDAT     ;IS HEAD SELECT CORRECT?
022672  001404                          BEQ     6$              ;YES, CONTINUE

022674                                  ERRDF   48.,EM56,ERR4
 (4)    022674  104455                  TRAP    C$ERDF
 (5)    022676  000060                  .WORD   48
 (5)    022700  006512                  .WORD   EM56
 (5)    022702  010316                  .WORD   ERR4
022704                          6$:

022704                          ENDTST                          ;****END OF TEST****
 (3)    022704                  L10071:
 (3)    022704  104401                  TRAP    C$ETST
```

```
2610
2611
2612                                    .SBTTL  **TEST 42** - TEST TIME AT WHICH DIF WD GETS TRANSMITTED
2613
2614  022706                            BGNTST                          ;****START OF TEST****
2615
2616
2617  022706                            STARS
 (2)                                    ;;**********************************************************************
2618                                    ;VERIFY THAT THE DIFFERENCE WORD ON A SEEK IS
2619                                    ;TRANSMITTED PRIOR TO CONTROLLER READY SETTING.  THIS
2620                                    ;IS DONE BY SETTING A KNOWN DIFFERENCE WORD IN
2621                                    ;THE RLDA ISSUING A A SEEK, WAITING FOR CONTROLLER READY
2622                                    ;(BUT NOT DRIVE READY), WRITING A DIFFERENT RLDA AND WAITING
2623                                    ;FOR DRIVE READY.  THE RESULTANT POSITION SHOULD BE THAT
2624                                    ;OF THE FIRST RLDA ONLY.
2625  022706                            STARS
 (2)                                    ;;**********************************************************************
2626
2627
2628  022706  004537  013414                    JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2629  022712  000010                            RDHDR                   ;READ HEADER
2630  022714  004537  014246                    JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2631  022720                            99$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  022720  104406                            TRAP    C$CLP1
2632
2633  022722  004537  013114                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2634  022726                                    CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  022726  104406                            TRAP    C$CLP1
2635
2636  022730  013737  002310  002354             MOV     E.MP,GDDAT      ;READ HEADER
2637  022736  043737  002326  002354             BIC     SECMSK,GDDAT    ;CLEAR SECTOR BITS
2638  022744  012777  000001  157302             MOV     #MK,@RLDA       ;SET MARKER IN RLDA
2639  022752  032737  000100  002354             BIT     #RHHS,GDDAT     ;TEST H.S.
2640  022760  001403                             BEQ     2$              ;IF ZERO, CONTINUE
2641  022762  052777  000020  157264             BIS     #DAHS,@RLDA     ;ONE, SET SO WE WILL REMAIN THERE
2642  022770  013737  002354  002346  2$:        MOV     GDDAT,TMP0      ;STORE HEADER
2643  022776  042737  000100  002346             BIC     #RHHS,TMP0      ;CLEAR H.S. FROM STORED WORD
2644  023004  023727  002400  000001             CMP     T.DRIVE,#1
2645  023012  001034                             BNE     12$
2646  023014  023737  002346  002676             CMP     TMP0,HALMAX
2647  023022  101007                             BHI     3$
2648  023024  052777  000004  157222             BIS     #SIGN,@RLDA
2649  023032  063737  002674  002354             ADD     QUAMAX,GDDAT
2650  023040  000403                             BR      4$
2651  023042  163737  002674  002354  3$:        SUB     QUAMAX,GDDAT
2652  023050  053777  002674  157176  4$:        BIS     QUAMAX,@RLDA
2653  023056  012737  000001  002350             MOV     #MK,TMP1
2654  023064  032777  000020  157162             BIT     #DAHS,@RLDA
2655  023072  001037                             BNE     5$
2656  023074  052737  000020  002350             BIS     #DAHS,TMP1
2657  023102  000433                             BR      5$
2658  023104  023737  002346  002726  12$:       CMP     TMP0,HMAX
2659  023112  101007                             BHI     13$
2660  023114  052777  000004  157132             BIS     #SIGN,@RLDA
2661  023122  063737  002724  002354             ADD     QMAX,GDDAT
```

```
2662  023130  000403                          BR      14$
2663  023132  163737  002724  002354  13$:    SUB     QMAX,GDDAT
2664  023140  053777  002724  157106  14$:    BIS     QMAX,@RLDA
2665  023146  012737  000001  002350          MOV     #MK,TMP1
2666  023154  032777  000020  157072          BIT     #DAHS,@RLDA
2667  023162  001003                          BNE     5$
2668  023164  052737  000020  002350          BIS     #DAHS,TMP1
2669  023172  004537  013414          5$:     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2670  023176  000006                          SEEK                    ;SEEK
2671  023200  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2672  023204                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 023204  104406                          TRAP    C$CLP1
2673
2674
2675  023206  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2676  023212                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 023212  104406                          TRAP    C$CLP1
2677
2678  023214  013777  002350  157032          MOV     TMP1,@RLDA      ;SEND IN NEW DIFFERENCE WORD
2679  023222  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2680  023226                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 023226  104406                          TRAP    C$CLP1
2681
2682  023230  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2683  023234                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 023234  104406                          TRAP    C$CLP1
2684
2685  023236  004537  014160                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
2686  023242                          8$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 023242  104406                          TRAP    C$CLP1
2687
2688
2689  023244  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2690  023250                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 023250  104406                          TRAP    C$CLP1
2691
2692  023252  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2693  023256  000010                          RDHDR                   ;READ HEADER
2694  023260  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2695  023264                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3) 023264  104406                          TRAP    C$CLP1
2696
2697  023266  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2698  023272                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
  (3) 023272  104410                          TRAP    C$ESCAPE
  (3) 023274  000036                          .WORD   L10072-.
2699
2700  023276  013737  002310  002356          MOV     E.MP,BDDAT      ;READ HEADER
2701  023304  043737  002326  002356          BIC     SECMSK,BDDAT    ;CLEAR SECTOR ADDRESS
2702  023312  023737  002354  002356          CMP     GDDAT,BDDAT     ;IS HEADER CORRECT?
2703  023320  001404                          BEQ     10$             ;IF SO BRANCH
2704
2705  023322                                  ERRDF   50.,EM57,ERR4
  (4) 023322  104455                          TRAP    C$ERDF
  (5) 023324  000062                          .WORD   50
  (5) 023326  006551                          .WORD   EM57
```

```
  (5)  023330  010316                        .WORD   ERR4
2706   023332                          10$:
2707
2708   023332                          ENDTST                          ;****END OF TEST****
  (3)  023332                          L10072:
  (3)  023332  104401                          TRAP    C$ETST
2709
2710
2711                                   .SBTTL  **TEST 43** - EXTENSIVE CHECK OF HEADER CRC
2712
2713   023334                          BGNTST                          ;****START OF TEST****
2714   023334                          STARS
  (2)                                  ;;*****************************************************************
2715                                   ;MORE EXTENSIVE CHECK OF HEADER CRC.  WE WILL SEEK
2716                                   ;AND READ HEADERS VERIFYING HDR CRC ACROSS THE
2717                                   ;PLATTER USING THE GROWING 0, GROWING 1, SHIFTING 0 AND
2718                                   ;GROWING 0 PATTERNS FOR TRACK ADDRESSES.
2719   023334                          STARS
  (2)                                  ;;*****************************************************************
2720
2721
2722   023334  012703  002620                  MOV     #SKLST,R3       ;GET LIST OF DIFFERENCE WORDS
2723   023340                          BGNSEG                          ;****START OF SEGMENT****
  (3)  023340  104404                          TRAP    C$BSEG
2724   023342                          1$:
2725   023342  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2726   023346  000010                          RDHDR                   ;READ HEADER
2727   023350  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2728   023354                          98$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  023354  104406                          TRAP    C$CLP1
2729
2730   023356  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2731   023362                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  023362  104406                          TRAP    C$CLP1
2732
2733   023364  013737  002310  002356          MOV     E.MP,BDDAT      ;READ HEADER
2734   023372  043737  002326  002356          BIC     SECMSK,BDDAT    ;CLEAR OUT SECTOR
2735   023400  001461                          BEQ     5$              ;IF ON TRACK ZERO, H.S. ZERO, OK
2736
2737                                  ;NOT ON TRACK ZERO CALCULATE DIFFERENCE WORD AND PUT IT BACK
2738                                  ;ON ZERO.
2739
2740   023402  042737  000100  002356          BIC     #RHHS,BDDAT     ;CLEAR OUT HEAD SELECT
2741   023410  013777  002356  156636          MOV     BDDAT,@RLDA     ;PUT CYLINDER AS DIFFERENCE WORD
2742   023416  052777  000001  156630          BIS     #MK,@RLDA       ;SET MARKER BIT
2743   023424  004537  013414                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2744   023430  000006                          SEEK                    ;SEEK
2745   023432  004537  014246                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2746   023436                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  023436  104406                          TRAP    C$CLP1
2747
2748   023440  004537  013114                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2749   023444                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  023444  104406                          TRAP    C$CLP1
2750
2751   023446  004537  014160                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
```

```
2752  023452                          89$:  CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  023452  104406                        TRAP   C$CLP1
2753
2754  023454  004537  013114                JSR    R5,CHERR       ;CHECK CONTROLLER FOR ERRORS
2755  023460                              CKLOOP                    ;CHECK IF /FL:LOE IS SET
 (3)  023460  104406                        TRAP   C$CLP1
2756
2757
2758  023462  004537  013414                JSR    R5,LDFUNC      ;ISSUE FUNCTION OF FOLLOWING WORD
2759  023466  000010                      RDHDR                     ;READ HEADER
2760  023470  004537  014246                JSR    R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
2761  023474                          96$:  CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  023474  104406                        TRAP   C$CLP1
2762
2763  023476  004537  013114                JSR    R5,CHERR       ;CHECK CONTROLLER FOR ERRORS
2764  023502                              CKLOOP                    ;CHECK IF /FL:LOE IS SET
 (3)  023502  104406                        TRAP   C$CLP1
2765
2766  023504  005037  002354                CLR    GDDAT          ;CLEAR EXPECTED
2767  023510  013737  002356  002370        MOV    BDDAT,DWORD    ;SAVE DIFFERENCE WORD
2768  023516  013737  002310  002356        MOV    E.MP,BDDAT     ;READ HEADER
2769  023524  043737  002326  002356        BIC    SECMSK,BDDAT   ;MASK OUT SECTOR BITS
2770  023532  001404                        BEQ    5$             ;BRANCH IF ON ZERO TRACK
2771
2772  023534                              ERRDF  51.,EM54,ERR3
 (4)  023534  104455                        TRAP   C$ERDF
 (5)  023536  000063                        .WORD  51
 (5)  023540  006420                        .WORD  EM54
 (5)  023542  010244                        .WORD  ERR3
2773  023544                          5$:   CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  023544  104406                        TRAP   C$CLP1
2774
2775  023546  011377  156502                MOV    (R3),@RLDA     ;GET DIFFERENCE WORD
2776  023552  052777  000005  156474        BIS    #SIGN!MK,@RLDA ;SET SIGN (TOWARDS SPINDLE) AND MARKER
2777  023560  004537  013414                JSR    R5,LDFUNC      ;ISSUE FUNCTION OF FOLLOWING WORD
2778  023564  000006                      SEEK                      ;SEEK
2779  023566  004537  014246                JSR    R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
2780  023572                              CKLOOP                    ;CHECK IF /FL:LOE IS SET
 (3)  023572  104406                        TRAP   C$CLP1
2781
2782  023574  004537  013114                JSR    R5,CHERR       ;CHECK CONTROLLER FOR ERRORS
2783  023600                              CKLOOP                    ;CHECK IF /FL:LOE IS SET
 (3)  023600  104406                        TRAP   C$CLP1
2784
2785  023602  004537  014160                JSR    R5,WTDRDY      ;WAIT FOR DRIVE READY
2786  023606                              CKLOOP                    ;CHECK IF /FL:LOE IS SET
 (3)  023606  104406                        TRAP   C$CLP1
2787
2788
2789  023610  004537  013114                JSR    R5,CHERR       ;CHECK CONTROLLER FOR ERRORS
2790  023614                              CKLOOP                    ;CHECK IF /FL:LOE IS SET
 (3)  023614  104406                        TRAP   C$CLP1
2791
2792  023616  004537  013414                JSR    R5,LDFUNC      ;ISSUE FUNCTION OF FOLLOWING WORD
2793  023622  000010                      RDHDR                     ;READ HEADER
2794  023624  004537  014246                JSR    R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
```

```
2795  023630                                    CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  023630  104406                            TRAP    C$CLP1
2796
2797
2798  023632  004537  013114                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2799  023636                                    CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  023636  104406                            TRAP    C$CLP1
2800
2801  023640  011337  002354                    MOV     (R3),GDDAT      ;GET EXPECTED CYLINDER
2802  023644  011337  002370            8$:     MOV     (R3),DWORD      ;SET UP DIFFERENCE FOR SEEK
2803  023650  013737  002310  002356            MOV     E.MP,BDDAT      ;READ HEADER FROM RLMP
2804  023656  043737  002326  002356            BIC     SECMSK,BDDAT    ;CLEAR OUT SECTOR BITS
2805  023664  023737  002354  002356            CMP     GDDAT,BDDAT     ;DID SEEK GO TO THE RIGHT
2806  023672  001404                            BEQ     9$              ;TRACK, IF SO, GO GET NEXT
2807
2808  023674                                    ERRDF   52.,EM54,ERR3
 (4)  023674  104455                            TRAP    C$ERDF
 (5)  023676  000064                            .WORD   52
 (5)  023700  006420                            .WORD   EM54
 (5)  023702  010244                            .WORD   ERR3
2809  023704                            9$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  023704  104406                            TRAP    C$CLP1
2810
2811  023706  013737  002310  023722            MOV     E.MP,10$        ;GET HEADER WORD
2812  023714  004537  013772                    JSR     R5,SIMBCC       ;GO CALCULATE HEADER CRC
2813  023720  000020                            16.                     ;16 BITS
2814  023722  000000                    10$:    .WORD   0               ;HEADER GOES HERE
2815  023724  000000                            .WORD   0               ;START WITH ZERO CRC
2816  023726  013737  002336  023752            MOV     CALBCC,20$
2817  023734  013737  002312  023750            MOV     E.MP1,21$
2818  023742  004537  013772                    JSR     R5,SIMBCC
2819  023746  000020                            16.
2820  023750  000000                    21$:    .WORD   0
2821  023752  000000                    20$:    .WORD   0
2822  023754  013737  002336  002354            MOV     CALBCC,GDDAT    ;MOVE CALCULATED CRC TO GDDAT
2823  023762  013737  002314  002356            MOV     E.MP2,BDDAT     ;GET HEADER CRC FROM RLMP
2824  023770  023737  002354  002356            CMP     GDDAT,BDDAT     ;IS CRC CORRECT?
2825  023776  001404                            BEQ     11$             ;IF SO CONTINUE
2826
2827  024000                                    ERRDF   53.,EM42,ERR4
 (4)  024000  104455                            TRAP    C$ERDF
 (5)  024002  000065                            .WORD   53
 (5)  024004  006041                            .WORD   EM42
 (5)  024006  010316                            .WORD   ERR4
2828  024010                            11$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  024010  104406                            TRAP    C$CLP1
2829
2830
2831  024012  005723                            TST     (R3)+           ;BUMP PATTERN
2832  024014  023727  002400  000001            CMP     T.DRIVE,#1
2833  024022  001005                            BNE     2$
2834  024024  020327  002720                    CMP     R3,#SKEND
2835  024030  001407                            BEQ     12$
2836  024032  000137  023342                    JMP     1$
2837  024036  020327  002762            2$:     CMP     R3,#SKEEND
2838  024042  001402                            BEQ     12$
```

```
2839  024044  000137  023342                JMP     1$
2840  024050                              12$:
2841
2842  024050                              ENDSEG                          ;****END OF SEGMENT****
 (3)  024050                              10000$:
 (3)  024050  104405                        TRAP    C$ESEG
2843  024052                              ENDTST                          ;****END OF TEST****
 (3)  024052                              L10073:
 (3)  024052  104401                        TRAP    C$ETST
2844
2845
2846                                      .SBTTL  **TEST 44** - VERIFY GET STATUS WHILE DRDY IS LOW
2847
2848  024054                              BGNTST                          ;****START OF TEST****
2849
2850  024054                              STARS
 (2)                                      ;;*****************************************************************
2851                                      ;VERIFY THAT WE CAN ISSUE GET STATUS AND RECIEVE
2852                                      ;THE STATUS WORD WHILE THE DRIVE IS IN NOTION SEEKING
2853  024054                              STARS
 (2)                                      ;;*****************************************************************
2854
2855
2856  024054                              1$:
2857  024054  004537  013414                JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2858  024060  000010                        RDHDR                   ;READ HEADER
2859  024062  004537  014246                JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2860  024066                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  024066  104406                        TRAP    C$CLP1
2861
2862  024070  004537  013114                JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2863  024074                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  024074  104406                        TRAP    C$CLP1
2864
2865  024076  013737  002310  002356        MOV     E.MP,BDDAT      ;READ HEADER
2866  024104  043737  002326  002356        BIC     SECMSK,BDDAT    ;CLEAR OUT SECTOR
2867  024112  001461                        BEQ     5$              ;IF ON TRACK ZERO, H.S. ZERO, OK
2868
2869                                    ;NOT ON TRACK ZERO CALCULATE DIFFERENCE WORD AND PUT IT BACK
2870                                    ;ON ZERO.
2871
2872  024114  042737  000100  002356        BIC     #RHHS,BDDAT     ;CLEAR OUT HEAD SELECT
2873  024122  013777  002356  156124        MOV     BDDAT,@RLDA     ;PUT CYLINDER AS DIFFERENCE WORD
2874  024130  052777  000001  156116        BIS     #MK,@RLDA       ;SET MARKER BIT
2875  024136  004537  013414                JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2876  024142  000006                         SEEK                    ;SEEK
2877  024144  004537  014246                JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2878  024150                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  024150  104406                        TRAP    C$CLP1
2879
2880  024152  004537  013114                JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2881  024156                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
 (3)  024156  104406                        TRAP    C$CLP1
2882
2883  024160  004537  014160                JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
2884  024164                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
```

```
  (3)  024164  104406                          TRAP    C$CLP1
2885
2886   024166  004537  013114                 JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2887   024172                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  024172  104406                          TRAP    C$CLP1
2888
2889
2890   024174  004537  013414                 JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2891   024200  000010                         RDHDR                   ;READ HEADER
2892   024202  004537  014246                 JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2893   024206                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  024206  104406                          TRAP    C$CLP1
2894
2895   024210  004537  013114                 JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2896   024214                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  024214  104406                          TRAP    C$CLP1
2897
2898   024216  005037  002354                 CLR     GDDAT           ;CLEAR EXPECTED
2899   024222  013737  002356  002370         MOV     BDDAT,DWORD     ;SAVE DIFFERENCE WORD
2900   024230  013737  002310  002356         MOV     E.MP,BDDAT      ;READ HEADER
2901   024236  043737  002326  002356         BIC     SECMSK,BDDAT    ;MASK OUT SECTOR BITS
2902   024244  001404                         BEQ     5$              ;BRANCH IF ON ZERO TRACK
2903
2904   024246                                 ERRDF   54.,EM54,ERR3
  (4)  024246  104455                          TRAP    C$ERDF
  (5)  024250  000066                         .WORD   54
  (5)  024252  006420                         .WORD   EM54
  (5)  024254  010244                         .WORD   ERR3
2905   024256                          5$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  024256  104406                          TRAP    C$CLP1
2906
2907   024260  012777  077601  155766         MOV     #77601,@RLDA    ;GET DIFFERENCE WORD
2908   024266  052777  000005  155760         BIS     #SIGN!MK,@RLDA  ;SET SIGN (TOWARDS SPINDLE) AND MARKER
2909   024274  004537  013414                 JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2910   024300  000006                         SEEK                    ;SEEK
2911   024302  004537  014246                 JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2912   024306                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  024306  104406                          TRAP    C$CLP1
2913
2914
2915   024310  004537  013114                 JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2916   024314                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  024314  104406                          TRAP    C$CLP1
2917   024316  012777  000003  155730         MOV     #MK!GSBIT,@RLDA
2918   024324  004537  013414                 JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
2919   024330  000004                         GSTAT
2920   024332  004537  014246                 JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
2921   024336                                 CKLOOP                  ;CHECK IF /FL:LOE IS SET
  (3)  024336  104406                          TRAP    C$CLP1
2922   024340  004537  013114                 JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
2923
2924   024344                          ENDTST                         ;****END OF TEST****
  (3)  024344                          L10074:
  (3)  024344  104401                          TRAP    C$ETST
2925
2926   024346                          BGNMOD  HRDPRM
```

```
2927
2928  024346                                        BGNHRD
 (3)  024346  000030                               .WORD L10075-L$HARD/2
2929
2930  024350                                        GPRML   CNTMSG,CNT,1,YES
 (4)  024350  005130                               .WORD   T$CODE
 (4)  024352  024444                               .WORD   CNTMSG
 (4)  024354  000001                               .WORD   1
2931  024356                                        GPRMA   CSRMSG,CSR,0,160000,177776,YES
 (4)  024356  000031                               .WORD   T$CODE
 (4)  024360  024430                               .WORD   CSRMSG
 (4)  024362  160000                               .WORD   T$LOLIM
 (4)  024364  177776                               .WORD   T$HILIM
2932  024366                                        GPRMA   VECMSG,VECT,0,0,776,YES
 (4)  024366  001031                               .WORD   T$CODE
 (4)  024370  024462                               .WORD   VECMSG
 (4)  024372  000000                               .WORD   T$LOLIM
 (4)  024374  000776                               .WORD   T$HILIM
2933  024376                                        GPRMD   BRMSG,PRIOR,0,340,0,7,YES
 (4)  024376  002032                               .WORD   T$CODE
 (4)  024400  024451                               .WORD   BRMSG
 (4)  024402  000340                               .WORD   340
 (4)  024404  000000                               .WORD   T$LOLIM
 (4)  024406  000007                               .WORD   T$HILIM
2934  024410                                        GPRML   DRTYPE,TYPDR,1,YES
 (4)  024410  003130                               .WORD   T$CODE
 (4)  024412  024471                               .WORD   DRTYPE
 (4)  024414  000001                               .WORD   1
2935  024416                                        GPRMD   DRMSG,DRBT,0,03400,0,7,YES
 (4)  024416  004032                               .WORD   T$CODE
 (4)  024420  024513                               .WORD   DRMSG
 (4)  024422  003400                               .WORD   03400
 (4)  024424  000000                               .WORD   T$LOLIM
 (4)  024426  000007                               .WORD   T$HILIM
2936
2937  024430                                        ENDHRD
 (2)                                               .EVEN
 (3)  024430                          L10075:
2938
2939  024430  052502  020123  042101  CSRMSG: .ASCIZ  /BUS ADDRESS/
      024436  051104  051505  000123
2940  024444  046122  030461     000  CNTMSG: .ASCIZ  /RL11/
2941  024451     102  020122  042514  BRMSG:  .ASCIZ  /BR LEVEL/
      024456  042526  000114
2942  024462  042526  052103  051117  VECMSG: .ASCIZ  /VECTOR/
      024470     000
2943  024471     104  044522  042526  DRTYPE: .ASCIZ  /DRIVE TYPE = RL01/
      024476  052040  050131  020105
      024504  020075  046122  030460
      024512     000
2944  024513     104  044522  042526  DRMSG:  .ASCIZ  /DRIVE/
      024520     000
2945        024522                    .EVEN
2946
2947  024522                                        ENDMOD
2948
```

```
2949
2950
2951  024522                          BGNMOD  SFTPRM
2952
2953  024522                                  BGNSFT
 (3)  024522  000011                         .WORD L10076-L$SOFT/2
2954  024524                                  GPRML   DMSG,DLT,1,YES
 (4)  024524  000130                         .WORD   T$CODE
 (4)  024526  024546                         .WORD   DMSG
 (4)  024530  000001                         .WORD   1
2955  024532                                  XFERF   1$
 (5)  024532  006044                         .WORD   T$CODE
2956  024534                                  GPRMD   EMSG,ELT,0,177777,0,177777,YES
 (4)  024534  001032                         .WORD   T$CODE
 (4)  024536  024572                         .WORD   EMSG
 (4)  024540  177777                         .WORD   177777
 (4)  024542  000000                         .WORD   T$LOLIM
 (4)  024544  177777                         .WORD   T$HILIM
2957  024546                          1$:     ENDSFT
 (2)                                         .EVEN
 (3)  024546                          L10076:
2958
2962
2963  024546  051104  050117  047440  DMSG:   .ASCIZ  /DROP ON ERROR LIMIT/
2964  024572  051105  047522  020122  EMSG:   .ASCIZ  /ERROR LIMIT/
2965
2969
2970                                  .EVEN
2971
2972  024606                                  ENDMOD
2973  024606                          LASTAD
 (2)                                         .EVEN
 (4)  024606  000000                         .WORD   0
 (4)  024610  000000                         .WORD   0
 (3)  024612                          L$LAST::
2974
2975         000001                   .END
```

```
ADDCOD  013024 G          709#
ADR   = 000020 G           26#
AFREG   004636             330#   468
AFTER   013724             909#  1003   1009
ARLBA   004573             326#   466    468
ARLCS   004566             325#   466    468
ARLDA   004601             327#   467    469
ARLMP   004607             328#   467    469
ASSEMB= 000010               7
BATEST  015054            1174#  1191
BA16  = 000020              34#
BA17  = 000040              33#
BCCFBK  002334             107#   937*   943*   946*   949    953
BCSR    002260              85#   587*   594
BDDAT   002356             116#   413    422    431    457   1143*  1144*  1145   1180*  1181   1214*  1215   1251*
                          1252*  1253   1289*  1290*  1291  1325*  1326   1357*  1358   1388*  1389   1420*  1421
                          1460*  1461*  1462   1487*  1510*  1543*  1552*  1583*  1584*  1585   1596*  1627*  1628*
                          1629   1639*  1671*  1672*  1673  1683*  1690*  1754*  1755   1763*  1764   1772*  1773
                          1833*  1839   1850   1865*  2068*  2069*  2070   2115*  2116   2167*  2171   2174   2176
                          2329*  2330*  2336*  2337   2362  2363*  2364*  2397*  2398*  2399   2459*  2460*  2461
                          2505*  2506*  2508   2553*  2554*  2555   2601*  2602*  2603   2700*  2701*  2702   2733*
                          2734*  2740*  2741   2767   2768*  2769*  2803*  2804*  2805   2823*  2824   2865*  2866*
                          2872*  2873   2899   2900*  2901*
BEFORE  013672              864    899#
BEGPAT  002410              134#  1172   1208   1316   1350  1382   1413
BEREG   004615              329#   466
BGNTST  012424              612    624#
BIT0  = 000001 G             26#    27     51   1178
BIT00 = 000001 G             26#
BIT01 = 000002 G             26#
BIT02 = 000004 G             26#
BIT03 = 000010 G             26#
BIT04 = 000020 G             26#
BIT05 = 000040 G             26#
BIT06 = 000100 G             26#
BIT07 = 000200 G             26#
BIT08 = 000400 G             26#
BIT09 = 001000 G             26#
BIT1  = 000002 G             26#     41     42     44     46     48     50    261
BIT10 = 002000 G             26#     31    209
BIT11 = 004000 G             26#    210    798    807
BIT12 = 010000 G             26#    211    802    811
BIT13 = 020000 G             26#     35    212
BIT14 = 040000 G             26#     30    213
BIT15 = 100000 G             26#     29    239
BIT2  = 000004 G             26#     41     43     44     47     52    262
BIT3  = 000010 G             26#     41     45     46     47     49    263
BIT4  = 000020 G             26#     34     55    264
BIT5  = 000040 G             26#     33    265
BIT6  = 000100 G             26#     28     53     54    266
BIT7  = 000200 G             26#     32     48    206   2209   2236   2269
BIT8  = 000400 G             26#     37     39    207    267
BIT9  = 001000 G             26#     38     39    208    268
BOE   = 000400 G             26#
BPRIOR  002262               86#    589*   1834
BRMSG   024451              2933   2941#
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BVEC    002264          87#   588*   630    683
B.BA    002272          90#   466    900*
B.CS    002270          89#   466    837    839*   840*   841    842*   899*   2142*  2143*  2144
B.DA    002274          91#   467    901*
B.MP    002276          92#   467    902*
CALBCC  002336         108#   959*  2108   2114   2816   2822
CHERR   013114         765#  1723   1751   1813   1847   1891   1913   1925   1949   1984   2005   2030   2053
                      2065   2100   2164   2218   2242   2248   2280   2326   2344   2350   2358   2377   2383
                      2392   2442   2448   2456   2488   2494   2502   2535   2541   2550   2583   2589   2598
                      2633   2675   2682   2689   2697   2730   2748   2754   2763   2782   2789   2798   2862
                      2880   2886   2895   2915   2922
CKERLT  013030          400    407    415    424    433    440    451    459    728#
CLNCOD  012752 G        672#
CNT   = 000012           64#  2930
CNTMSG  024444         2930   2940#
COMP    004037          313#   784
CONT    012222          557    570    594#
CONTIN  012070          561    569#
CRDY  = 000200           32#   678    997   1244   1246   1452   1532   1573   1617   1660   2142
CRTIM   004657          331#  1005
CSEND   003062          291#  1153   1261   1298
CSPAT   002764          260#  1132   1241   1279
CSR   = 000000           59#  2931
CSRMSG  024430         2931   2939#
CSTEST  014734         1136#  1154
CYLMSK  002362          118#  2179
C$AU  = 000052            7#   715
C$AUTO= 000061            7#   670
C$BRK = 000022            7#
C$BSEG= 000004            7#  1134   1173   1209   1242   1280   1317   1351   1383   1414   1836   2058   2319
                      2723
C$BSUB= 000002            7#
C$CEFG= 000045            7#
C$CLCK= 000062            7#
C$CLEA= 000012            7#   693
C$CLOS= 000035            7#
C$CLP1= 000006            7#  1038   1064   1089   1114   1546   1589   1633   1677   1686   1721   1749   1760
                      1769   1812   1889   1912   1924   1950   1980   1985   2004   2028   2075   2190   2217
                      2240   2243   2246   2277   2281   2287   2294   2324   2327   2342   2345   2348   2351
                      2356   2359   2368   2375   2378   2381   2384   2390   2403   2440   2443   2446   2449
                      2454   2486   2489   2492   2495   2500   2533   2536   2539   2542   2548   2581   2584
                      2587   2590   2631   2634   2672   2676   2680   2683   2686   2690   2695   2728   2731
                      2746   2749   2752   2755   2761   2764   2773   2780   2783   2786   2790   2795   2799
                      2809   2828   2860   2863   2878   2881   2884   2887   2893   2896   2905   2912   2916
                      2921
C$CVEC= 000036            7#   652    654    683   1032   1058   1083   1108
C$DCLN= 000044            7#   623    739
C$DODU= 000051            7#   622    659    668    738
C$DRPT= 000024            7#
C$DU  = 000053            7#   705
C$EDIT= 000003            7#    17
C$ERDF= 000055            7#   821    989   1005   1148   1184   1218   1256   1294   1329   1361   1392   1424
                      1465   1490   1513   1545   1554   1588   1598   1632   1641   1676   1685   1693   1758
                      1767   1776   1810   1856   1911   1923   1953   1979   1988   2027   2073   2119   2189
                      2276   2293   2367   2402   2464   2511   2558   2606   2705   2772   2808   2827   2904
C$ERHR= 000056            7#
```

```
C$ERRO= 000060          7#
C$ERSF= 000054          7#  1037  1063  1088  1113
C$ERSO= 000057          7#
C$ESCA= 000010          7#  1149  1185  1219  1257  1295  1330  1362  1393  1425  1752  1845  1848
                     1858  2051  2054  2063  2066  2098  2101  2393  2457  2503  2551  2596  2599
                     2698
C$ESEG= 000005          7#  1156  1193  1226  1264  1300  1335  1367  1398  1430  1864  2079  2418
                     2842
C$ESUB= 000003          7#
C$ETST= 000001          7#  1039  1065  1090  1115  1157  1194  1227  1265  1301  1336  1368  1399
                     1431  1467  1493  1516  1558  1600  1645  1698  1726  1780  1817  1869  1893
                     1926  1956  1991  2007  2032  2080  2122  2196  2220  2250  2296  2419  2467
                     2514  2561  2609  2708  2843  2924
C$EXIT= 000032          7#
C$GETB= 000026          7#
C$GETW= 000027          7#
C$GMAN= 000043          7#
C$GPHR= 000042          7#  581
C$GPLO= 000030          7#
C$GPRI= 000040          7#
C$INIT= 000011          7#  636
C$INLP= 000020          7#  728
C$MANI= 000050          7#
C$MEM = 000031          7#
C$MSG = 000023          7#  401  408  416  425  434  441  452  461
C$OPEN= 000034          7#
C$PNTB= 000014          7#  413  422  431  450  457  463  466  467  468  469  472  473
                     619  657  665
C$PNTF= 000017          7#  736
C$PNTS= 000016          7#
C$PNTX= 000015          7#
C$QIO = 000377          7#
C$RDBU= 000007          7#  632
C$REFG= 000047          7#  554  558  560  569
C$RESE= 000033          7#  553  1457  1486  1509
C$REVI= 000003          7#  17
C$RFLA= 000021          7#
C$RPT = 000025          7#
C$SEFG= 000046          7#
C$SPRI= 000041          7#  676  1450  1804  1839  1903  1908  1915  1920  1970  1976  2019  2024
                     2268  2289
C$SVEC= 000037          7#  630  643  649  1029  1055  1080  1105
C$TPRI= 000013          7#
DAHS  = 000020         55#  2482  2576  2641  2654  2656  2666  2668
DATEST  015156       1210#  1224
DCKMES  004020        309#  810
DEMES   003766        304#  789
DERFLG  002300         93#  765*  787*  835
DERR  = 040000         30#  785  1140  1142  1248  1250  1286  1288  1453  1455  1574  1576  1618
                     1620  1661  1663
DIAGMC= 000000          7
DLT   = 000000         68#  2954
DLTMES  004025        310#  814
DLYCNT  002406        129#  613*  615*  2213*  2215*
DMSG    024546       2954   2963#
DRBT  = 000010         63#  2935
```

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DRDY  = 000001              27#   611    983    1144   1252   1290   1461   1532   1584   1628   1672
DRIVE   002266              88#   463    591*    610    626    662    840    861   2143
DRMSG   024513            2935   2944#
DROP    011640             524#   730
DRPCOD  013020 G           699#
DRST  = 000010              49#  1885
DRTIM   004704             332#   989
DRTYPE  024471            2934   2943#
DRVRDY  012310             611#   618
DSPCOD  011646 G           532#
DS0   = 000000              36#
DS1   = 000400              37#
DS2   = 001000              38#
DS3   = 001400              39#
DWORD   002370             121#  2362*  2396*  2767*  2802*  2899*
EF.CON= 000036 G            26#   569
EF.NEW= 000035 G            26#
EF.PWR= 000034 G            26#   554
EF.RES= 000037 G            26#   558
EF.STA= 000040 G            26#   560
ELT   = 000002              69#  2956
EMSG    024572            2956   2964#
EM1     004732             333#  1037
EM101   007715             380#   472
EM102   007762             381#   473    780
EM11    005203             340#  1979
EM13    005244             341#  1810
EM14    005276             342#  1758
EM15    005324             343#  1767
EM16    005352             344#  1776
EM17    005400             345#  1856
EM2     004757             334#  1063
EM3     005004             335#  1088
EM30    005433             346#  1911
EM30A   005472             347#  1923
EM32    005532             348#
EM33    005566             349#  1953   1988
EM34    005633             350#
EM37    005710             351#  2027
EM4     005031             336#  1113
EM41    005750             352#  2073
EM42    006041             353#  2119   2827
EM43    006077             354#  2189
EM44    006176             355#  1676
EM45    006231             356#  1685
EM46    006264             357#  1693
EM47    006317             358#  2276
EM5     005056             337#  1148
EM52    006350             359#  2293
EM54    006420             360#  2367   2402   2772   2808   2904
EM55    006457             361#  2464   2511
EM56    006512             362#  2558   2606
EM57    006551             363#  2705
EM6     005127             338#  1184
EM61    006652             365#  1256
EM62    006733             366#  1294
```

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EM63    007016              367#  1329
EM64    007077              368#  1361
EM65    007162              369#  1392
EM66    007243              370#  1424
EM67    007326              371#  1465
EM7     005155              339#  1218
EM70    007363              372#  1490
EM71    007420              373#  1513
EM72    007455              374#  1545
EM73    007510              375#  1554
EM74    007543              376#  1588
EM75    007575              377#  1598
EM76    007627              378#  1632
EM77    007662              379#  1641
END     012464              603    630#
ENDPAT  002616              202#  1190  1223   1333   1365   1396   1428
ERCOUN  003066              293#   562   576
ERPOIN  003064              292#   576*  579*   732*   733
ERR   = 100000               29#  1142  1250   1288   1455   1576   1620   1663
ERRVEC  002332              106#   643   647    652    653   1029   1032   1055   1058   1080   1083   1105   1108
ERR0    010152  G           395#  1810  1911   1923   1953   1979   1988   2027   2276   2293
ERR1    010170  G           403#  1037  1063   1088   1113
ERR2    010202  G           410#  1148  1184   1218   1256   1294   1329   1361   1392   1424   1465   1490   1513
                           1545  1554  1588   1598   1632   1641   1676   1685   1693   1758   1767   1776   2189
ERR3    010244  G           418#  2367  2402   2772   2808   2904
ERR4    010316  G           427#  2073  2119   2464   2511   2558   2606   2705   2827
ERR5    010364  G           436#   989
ERR6    010376  G           443#   821  1005
ERR7    010440  G           454#  1856
EVL   = 000004  G            26#
E$END = 002100                7#
E$LOAD= 000035                7#    17
E.BA    002304               95#   468   910*
E.CS    002302               94#   468   766    774    781    785    790    794    798    802    807    811    909*
                           1946  1951  1981   1986  2156*  2157
E.DA    002306               96#   469   911*
E.MP    002310               97#   469   912*  2056   2068   2103  2161*  2329   2363   2397   2459   2505   2553
                           2601  2636  2700   2733   2768   2803   2811   2865   2900
E.MP1   002312               98#   469   913*  2109  2162*  2817
E.MP2   002314               99#   469   914*  2115  2163*  2823
FIRST   002360              117#  2139*  2168  2170*  2186*
FIX     013660              783   788   792    796    800    804    809    813    815    817    889#
FNDFNC  013632              847*  848*  849    851*   854*   869#
FRMT1   011026              463   480#
FRMT11  011320              489#  736
FRMT12  011361              490#  619
FRMT13  011440              491#
FRMT14  011471              492#  657
FRMT15  011535              493#  665
FRMT2   011066              466   468   481#
FRMT2A  011105              467   482#
FRMT2B  011120              469   483#
FRMT3   011147              472   473   484#
FRMT4   011154              413   431   485#
FRMT5   011212              422   487#
FRMT6   011263              457   488#
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FRMT99  011207          450    486#
F$AU  = 000015            7#   711    715
F$AUTO= 000020            7#   641    670
F$BGN = 000040            7#    15     19     24     72     74    295    298    388    393    395    403    410
                        418   427    436    443    454    504    506    518    520    530    532    536    542
                        549   551    638    641    672    674    695    699    701    707    709    711    717
                        725   974   1013   1019   1039   1044   1065   1070   1090   1095   1115   1120   1134
                       1149  1157   1162   1173   1185   1194   1199   1209   1219   1227   1232   1242   1257
                       1265  1270   1280   1295   1301   1306   1317   1330   1336   1341   1351   1362   1368
                       1373  1383   1393   1399   1404   1414   1425   1431   1436   1467   1472   1493   1498
                       1516  1521   1558   1563   1600   1605   1645   1649   1698   1702   1726   1731   1752
                       1780  1785   1817   1822   1836   1845   1848   1858   1869   1873   1893   1898   1926
                       1931  1956   1961   1991   1995   2007   2011   2032   2037   2051   2054   2058   2063
                       2066  2080   2085   2098   2101   2122   2127   2196   2201   2220   2225   2250   2255
                       2296  2301   2319   2393   2419   2424   2457   2467   2472   2503   2514   2519   2551
                       2561  2566   2596   2599   2609   2614   2698   2708   2713   2723   2843   2848   2924
                       2926  2928   2947   2951   2953   2972
F$CLEA= 000007            7#   674    693
F$DU  = 000016            7#   701    705
F$END = 000041            7#    15     19     24     72     74    295    298    388    393    401    408    416
                        425   434    441    452    461    504    506    518    520    530    532    536    549
                        636   638    670    672    693    695    699    705    707    709    715    717    725
                        978  1013   1019   1039   1044   1065   1070   1090   1095   1115   1120   1149   1156
                       1157  1162   1185   1193   1194   1199   1219   1226   1227   1232   1257   1264   1265
                       1270  1295   1300   1301   1306   1330   1335   1336   1341   1362   1367   1368   1373
                       1393  1398   1399   1404   1425   1430   1431   1436   1467   1472   1493   1498   1516
                       1521  1558   1563   1600   1605   1645   1649   1698   1702   1726   1731   1752   1780
                       1785  1817   1822   1845   1848   1858   1864   1869   1873   1893   1898   1926   1931
                       1956  1961   1991   1995   2007   2011   2032   2037   2051   2054   2063   2066   2079
                       2080  2085   2098   2101   2122   2127   2196   2201   2220   2225   2250   2255   2296
                       2301  2393   2418   2419   2424   2457   2467   2472   2503   2514   2519   2551   2561
                       2566  2596   2599   2609   2614   2698   2708   2713   2842   2843   2848   2924   2926
                       2937  2947   2951   2957   2972
F$HARD= 000004            7#   2928   2937   2955
F$HW  = 000013            7#    508    516
F$INIT= 000006            7#    551    636
F$JMP = 000050            7#
F$MOD = 000000            7#     15     19     24     72     74    295    298    388    393    504    506    518
                        520    530    532    536    549    638    672    695    699    707    709    717    725
                       1013   2926   2947   2951   2972
F$MSG = 000011            7#    395    401    403    408    410    416    418    425    427    434    436    441
                        443    452    454    461
F$PROT= 000021            7#    542    546
F$PWR = 000017            7#
F$RPT = 000012            7#
F$SEG = 000003            7#   1134   1156   1173   1193   1209   1226   1242   1264   1280   1300   1317   1335
                       1351   1367   1383   1398   1414   1430   1836   1864   2058   2079   2319   2418   2723
                       2842
F$SOFT= 000005            7#   2953   2955   2957
F$SRV = 000010            7#    974    978
F$SUB = 000002            7#
F$SW  = 000014            7#    522    528
F$TEST= 000001            7#   1019   1039   1044   1065   1070   1090   1095   1115   1120   1157   1162   1194
                       1199   1227   1232   1265   1270   1301   1306   1336   1341   1368   1373   1399   1404
                       1431   1436   1467   1472   1493   1498   1516   1521   1558   1563   1600   1605   1645
                       1649   1698   1702   1726   1731   1780   1785   1817   1822   1869   1873   1893   1898
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                        1926    1931    1956    1961    1991    1995    2007    2011    2032    2037    2080    2085    2122
                        2127    2196    2201    2220    2225    2250    2255    2296    2301    2419    2424    2467    2472
                        2514    2519    2561    2566    2609    2614    2708    2713    2843    2848    2924
GDDAT   002354           115#     413     422     431    1035*   1061*   1087*   1111*   1137*   1138*   1139    1142*   1145
                        1175*   1178*   1179    1181    1211*   1212    1215    1245*   1246*   1250*   1253    1283*   1284*
                        1288*   1291    1320*   1323*   1326    1354*   1355*   1358    1386*   1389    1417*   1418*   1421
                        1452*   1455*   1462    1485*   1508*   1542*   1551*   1573*   1576*   1577    1585    1595*   1617*
                        1620*   1621    1629    1638*   1660*   1663*   1664    1673    1682*   1691*   1744*   1755    1762*
                        1764    1771*   1773    1834*   1850    2056*   2057*   2070    2114*   2116    2171*   2173*   2174
                        2178    2182*   2361*   2395*   2399    2434*   2461    2507*   2508    2529*   2555    2577*   2603
                        2636*   2637*   2639    2642    2649*   2651*   2661*   2663*   2702    2766*   2801*   2805    2822*
                        2824    2898*
GLBDAT  002242 G          74#
GLBEQA  002242 G          24#
GLBERR  010152 G         393#
GLBSUB  013030 G         725#
GLBTXT  003766 G         298#
GODRVR= 000202            48#
GSBIT = 000002            50#    1885    1904    1916    2544    2592    2917
GSTAT = 000004            43#     769     839    1887    1906    1918    1944    1974    2546    2594    2919
GSTINT  004527           324#     876
GSTMES  004470           323#     875
G$CNTO= 000200             7#
G$DELM= 000372             7#     614     985     999    2214
G$DISP= 000003             7#
G$EXCP= 000400             7#
G$HILI= 000002             7#
G$LOLI= 000001             7#
G$NO  = 000000             7#
G$OFFS= 000400             7#    2930    2931    2932    2933    2934    2935    2954    2956
G$OFSI= 000376             7#    2930    2931    2932    2933    2934    2935    2954    2956
G$PRMA= 000001             7#    2931    2932
G$PRMD= 000002             7#    2933    2935    2956
G$PRML= 000000             7#    2930    2934    2954
G$RADA= 000140             7#
G$RADB= 000000             7#
G$RADD= 000040             7#
G$RADL= 000120             7#    2930    2934    2954
G$RADO= 000020             7#    2931    2932    2933    2935    2956
G$XFER= 000004             7#    2955
G$YES = 000010             7#    2930    2931    2932    2933    2934    2935    2954    2956
HALMAX  002676           229#    2646
HCRCME  004005           307#     801
HDRBUF  003266           294#    2140    2154
HDRLST  013634           850      871#
HMAX    002726           241#    2658
HNFMES  004013           308#     805
HOE   = 100000 G          26#
HPTCOD  011620 G         506#
HRDPRM  024346 G        2926#
IBE   = 010000 G          26#
IDU   = 000040 G          26#
IER   = 020000 G          26#
INITCO  012006 G         549#
INTEN = 000100            28#     681     848     856    1806    1842    1906    1974    2022    2271
INTFLG  002322           102#     976*   1803*   1808    1811*   1838*   1853    1860    1902*   1909    1914*   1921    1971*
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                    1977    2020*   2025    2267*   2274    2283*   2290
INTSRV  014152       630     976#
ISR   = 000100 G      26#
IXE   = 004000 G      26#
I$AU  = 000041         7#     711#    715#
I$AUTO= 000041         7#     641#    670#
I$CLN = 000041         7#     674#    693#
I$DU  = 000041         7#     701#    705#
I$HRD = 000041      2928#    2937#
I$INIT= 000041         7#     551#    636#
I$MOD = 000041         7#      15#     19#     24#     72#     74#    295#    298#    388#    393#    504#    506#    518#
                     520#     530#    532#    536#    549#    638#    672#    695#    699#    707#    709#    717#    725#
                    1013#    2926#   2947#   2951#   2972#
I$MSG = 000041         7#     395#    401#    403#    408#    410#    416#    418#    425#    427#    434#    436#    441#
                     443#     452#    454#    461#
I$PROT= 000040         7#     542#
I$PTAB= 000041         7#
I$PWR = 000041         7#
I$RPT = 000041         7#
I$SEG = 000041         7#    1019    1044    1070    1095    1120    1134#   1149    1156#   1162    1173#   1185    1193#
                    1199    1209#   1219    1226#   1232    1242#   1257    1264#   1270    1280#   1295    1300#   1306
                    1317#   1330    1335#   1341    1351#   1362    1367#   1373    1383#   1393    1398#   1404    1414#
                    1425    1430#   1436    1472    1498    1521    1563    1605    1649    1702    1731    1785    1822
                    1836#   1858    1864#   1873    1898    1931    1961    1995    2011    2037    2058#   2063    2066
                    2079#   2085    2127    2201    2225    2255    2301    2319#   2393    2418#   2424    2472    2519
                    2566    2614    2713    2723#   2842#   2848
I$SETU= 000041         7#
I$SFT = 000041      2953#    2957#
I$SRV = 000041         7#     974#    978#
I$SUB = 000041         7#    1019    1044    1070    1095    1120    1162    1199    1232    1270    1306    1341    1373
                    1404    1436    1472    1498    1521    1563    1605    1649    1702    1731    1785    1822    1873
                    1898    1931    1961    1995    2011    2037    2085    2127    2201    2225    2255    2301    2424
                    2472    2519    2566    2614    2713    2848
I$TST = 000041         7#    1019#   1039#   1044#   1065#   1070#   1090#   1095#   1115#   1120#   1157#   1162#   1194#
                    1199#   1227#   1232#   1265#   1270#   1301#   1306#   1336#   1341#   1368#   1373#   1399#   1404#
                    1431#   1436#   1467#   1472#   1493#   1498#   1516#   1521#   1558#   1563#   1600#   1605#   1645#
                    1649#   1698#   1702#   1726#   1731#   1752    1780#   1785#   1817#   1822#   1845    1848    1869#
                    1873#   1893#   1898#   1926#   1931#   1956#   1961#   1991#   1995#   2007#   2011#   2032#   2037#
                    2051    2054    2080#   2085#   2098    2101    2122#   2127#   2196#   2201#   2220#   2225#   2250#
                    2255#   2296#   2301#   2419#   2424#   2457    2467#   2472#   2503    2514#   2519#   2551    2561#
                    2566#   2596    2599    2609#   2614#   2698    2708#   2713#   2843#   2848#   2924#
J$JMP = 000167         7#
LDCSR   002324       103#     834*    846*    847     856     861*    862*    863    1532*   1535
LDFUNC  013414       834#    1718    1746    1805    1841    1886    1905    1917    1943    1973    2001    2021    2048
                    2060    2095    2210    2237    2270    2321    2339    2353    2372    2386    2437    2451    2483
                    2497    2530    2545    2578    2593    2628    2669    2692    2725    2743    2758    2777    2792
                    2857    2875    2890    2909    2918
LF      004035       312#     821
LINE1   010476       397     405     412     420     429     438     445     456     463#    621     658     667     737
LINE2   010532       398     421     430     447     466#
LINE3   010754       446     472#
LOE   = 040000 G      26#
LOT   = 000010 G      26#
L$ACP   002110 G      17#
L$APT   002036 G      17#
L$AU    013024 G      17     711#
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L$CO    002032 G          17#
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L$DESC  002122 G          17      21#
L$DESP  002076 G          17#
L$DEVP  002060 G          17#
L$DISP  011650 G          17     534#
L$DLY   002116 G          17#    614      985      999     2214
L$DTP   002040 G          17#
L$DTYP  002034 G          17#
L$DU    013020 G          17     701#
L$DUT   002072 G          17#
L$DVTY  002230 G          17      22#
L$EF    002052 G          17#
L$ENVI  002044 G          17#
L$ETP   002102 G          17#
L$EXP1  002046 G          17#
L$EXP4  002064 G          17#
L$EXP5  002066 G          17#
L$HARD  024350 G          17    2928#
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L$HPTP  002022 G          17#
L$HW    011622 G          17     508#
L$ICP   002104 G          17#
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L$LADP  002026 G          17#
L$LAST  024612 G          17    2973#
L$LOAD  002100 G          17#
L$LUN   002074 G          17#
L$MREV  002050 G          17#
L$NAME  002000 G          17#
L$PRIO  002042 G          17#
L$PROT  012000 G          17     542#
L$PRT   002112 G          17#
L$REPP  002062 G          17#
L$REV   002010 G          17#
L$SOFT  024524 G          17    2953#
L$SPC   002056 G          17#
L$SPCP  002020 G          17#
L$SPTP  002024 G          17#
L$STA   002030 G          17#
L$SW    011640 G          17     522#
L$TEST  002114 G          17#
L$TIML  002014 G          17#
L$UNIT  002012 G          17#    556      575
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L10001  010200            408#
L10002  010242            416#
L10003  010314            425#
L10004  010362            434#
L10005  010374            441#
L10006  010436            452#
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L10007  010474              461#
L10010  011636              508     516#
L10011  011646              522     528#
L10013  012526              636#
L10014  012750              670#
L10015  013016              693#
L10016  013022              705#
L10017  013026              715#
L10020  014156              978#
L10021  014440             1039#
L10022  014534             1065#
L10023  014630             1090#
L10024  014724             1115#
L10025  015044             1157#
L10026  015146             1194#
L10027  015234             1227#
L10030  015360             1265#
L10031  015504             1301#
L10032  015610             1336#
L10033  015710             1368#
L10034  016000             1399#
L10035  016100             1431#
L10036  016210             1467#
L10037  016262             1493#
L10040  016320             1516#
L10041  016444             1558#
L10042  016604             1600#
L10043  016744             1645#
L10044  017150             1698#
L10045  017200             1726#
L10046  017404             1752    1780#
L10047  017470             1817#
L10050  017634             1845    1848    1869#
L10051  017664             1893#
L10052  020036             1926#
L10053  020124             1956#
L10054  020252             1991#
L10055  020274             2007#
L10056  020354             2032#
L10057  020520             2051    2054    2080#
L10060  020656             2098    2101    2122#
L10061  021174             2196#
L10062  021270             2220#
L10063  021334             2250#
L10064  021460             2296#
L10065  022076             2419#
L10066  022230             2457    2467#
L10067  022372             2503    2514#
L10070  022532             2551    2561#
L10071  022704             2596    2599    2609#
L10072  023332             2698    2708#
L10073  024052             2843#
L10074  024344             2924#
L10075  024430             2928    2937#
L10076  024546             2953    2957#
MAXCYL  002372              122#
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MDHEDR  002000 G             15#
MERLMT  011642              525#   733
MK    = 000001               51#  1885   1904   1916   1942   1972   2209   2236   2269   2338   2371   2433   2481
                            2527  2544   2575   2592   2638   2653   2665   2742   2776   2874   2908   2917
MSCRLF  004032              311#   816
MXSEC1  002364              119#  2180
NOOP0 = 000000               40#  1719   1747   1806   1842
NOOP7 = 000016               41#
NOPINT  004151              316#   872
NOPMES  004120              315#   871
NOPWR   012030              555    558#
NXM   = 020000               35#   790
NXMMES  003773              305#   793
NXT     012100              572#   584    586
OKHDR   013644              875#
OPI   = 002000               31#   794   1951   1986
OPIERR  004045              314#  1948   1983
OPIMES  004000              306#   797
O$APTS= 000000                7#    17
O$AU  = 000001                7#    13#    17
O$BGNR= 000000                7#    17
O$BGNS= 000001                7#    13#    17
O$DU  = 000001                7#    13#    17
O$ERRT= 000000                7#    17
O$GNSW= 000001                7#    13#    17
O$POIN= 000001                7#    13#    17
O$SETU= 000000                7#    17    2973
PFLG    002316              100#   631*   634*
PNT   = 001000 G             26#
PRI   = 002000 G             26#
PRIOR = 000004               61#  2933
PRI00 = 000000 G             26#  1804   1903   1915   1970   2019   2268
PRI01 = 000040 G             26#
PRI02 = 000100 G             26#
PRI03 = 000140 G             26#
PRI04 = 000200 G             26#
PRI05 = 000240 G             26#
PRI06 = 000300 G             26#
PRI07 = 000340 G             26#   676   1450   1908   1920   1976   2024   2289
PWRFLG  002242               78#   556*   583   585*   602   687   690*
QMAX    002724              240#  2661   2663   2664
QUAMAX  002674              228#  2649   2651   2652
RDHDR = 000010               45#  2002   2022   2049   2061   2096   2142   2322   2354   2387   2452   2498   2629
                            2693  2726   2759   2793   2858   2891
READ  = 000014               47#
REST    012146              581#
RESTMS  013376              818#   860*  1948*  1983*  2159*
RHDINT  004344              320#   880
RHDMES  004304              319#   879   2159
RHHS  = 000100               53#  2336   2507   2639   2643   2740   2872
RLBA    002252               82#   597*   900    910   1057   1061  1179*  1180  1319*  1324*  1325  1353*  1356*
                            1357  1481*  1484*  1487  1533*  1539  1543  1579*  1622*  1635  1639  1665*  1679
                            1683  1742*  1763
RLCS    002250               81#   463    595*   609*   610*   611   625*   626*   627*   628   651   661*   662*
                             663   678    681*   841*   843   863*   865*   899   909   983   997   1031   1035
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                    2146   2148
RLDA     002254       83#   599*   624*   838*   901    911    1082   1087   1212*  1214   1385*  1387*  1388
                    1416*  1419*  1420   1507*  1510   1534*  1548   1552   1578*  1591   1596   1623*  1666*
                    1687   1690   1741*  1772   1885*  1904*  1916*  1942*  1972*  2209*  2236*  2269*  2337*
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                    2648*  2652*  2654   2660*  2664*  2666   2678*  2741*  2742*  2775*  2776*  2873*  2874*
                    2907*  2908*  2917*
RLMP     002256       84#   601*   902    912    913    914    1107   1111   1667*  1743*  1744   1754   2149
                    2150   2151
RL2      002722      239#
SECMSK   002326      104#  2057   2069   2176   2182   2330   2364   2398   2637   2701   2734   2769   2804
                    2866   2901
SEEK   = 000006       44#  2211   2238   2271   2340   2373   2438   2484   2531   2579   2670   2744   2778
                    2876   2910
SEKINT   004436      322#   878
SEKMES   004405      321#   877
SFTPRM   024522 G   2951#
SIGN   = 000004       52#  2209   2269   2371   2648   2660   2776   2908
SIMBCC   013772      931#  2104   2110   2812   2818
SIZE   = 000004       70#
SKEEND   002762      256#  2412   2837
SKEND    002720      238#  2408   2834
SKLST    002620      206#  2318   2722
SPTCOD   011636 G    520#
START    012106      567    574#
START1   012050      559    562#
STHS   = 000100       54#  2577
SVCGBL= 000000         7#    15     17     21     22     24     74    298    393    395    403    410    418
                     427    436    443    454    506    508    520    522    532    534    542    549    551
                     641    672    674    699    701    709    711    725   2926   2928   2951   2953  2973#
SVCINS= 000000         7#     8#    17     21     22    401    408    413    416    422    425    431    434
                     441    450    452    457    461    463    466    467    468    469    472    473    508
                     522    534    553    554    555    558    559    560    561    569    570    581    582
                     614    619    622    623    630    632    633    636    643    652    657    659    665
                     668    670    676    683    693    705    715    728    729    736    738    739    821
                     978    985    989    999   1005   1029   1032   1037   1038   1039   1055   1058   1063
                    1064   1065   1080   1083   1088   1089   1090   1105   1108   1113   1114   1115   1134
                    1148   1149   1156   1157   1173   1184   1185   1193   1194   1209   1218   1219   1226
                    1227   1242   1256   1257   1264   1265   1280   1294   1295   1300   1301   1317   1329
                    1330   1335   1336   1351   1361   1362   1367   1368   1383   1392   1393   1398   1399
                    1414   1424   1425   1430   1431   1450   1457   1465   1467   1486   1490   1493   1509
                    1513   1516   1545   1546   1554   1558   1588   1589   1598   1600   1632   1633   1641
                    1645   1676   1677   1685   1686   1693   1698   1721   1726   1749   1752   1758   1760
                    1767   1769   1776   1780   1804   1810   1812   1817   1836   1839   1845   1848   1856
                    1858   1864   1869   1889   1893   1903   1908   1911   1912   1915   1920   1923   1924
                    1926   1950   1953   1956   1970   1976   1979   1980   1985   1988   1991   2004   2007
                    2019   2024   2027   2028   2032   2051   2054   2058   2063   2066   2073   2075   2079
                    2080   2098   2101   2119   2122   2189   2190   2196   2214   2217   2220   2240   2243
                    2246   2250   2268   2276   2277   2281   2287   2289   2293   2294   2296   2319   2324
                    2327   2342   2345   2348   2351   2356   2359   2367   2368   2375   2378   2381   2384
                    2390   2393   2402   2403   2418   2419   2440   2443   2446   2449   2454   2457   2464
                    2467   2486   2489   2492   2495   2500   2503   2511   2514   2533   2536   2539   2542
                    2548   2551   2558   2561   2581   2584   2587   2590   2596   2599   2606   2609   2631
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                2731  2746  2749  2752  2755  2761  2764  2772  2773  2780  2783  2786  2790
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                2887  2893  2896  2904  2905  2912  2916  2921  2924  2928  2930  2931  2932
                2933  2934  2935  2937  2953  2954  2955  2956  2957  2973
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SVCTAG= 000000     7#    9#   401   408   416   425   434   441   452   461   516   528   636
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SVHD    002374   123#
S$LSYM= 010000     7#   401#  408#  416#  425#  434#  441#  452#  461#  516#  528#  636#  670#
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                1467# 1493# 1516# 1558# 1600# 1645# 1698# 1726# 1780# 1817# 1836# 1869# 1893#
                1926# 1956# 1991# 2007# 2032# 2058# 2080# 2122# 2196# 2220# 2250# 2296# 2319#
                2419# 2467# 2514# 2561# 2609# 2708# 2723# 2843# 2924# 2937# 2957#
TEMP2   002340   109#  934*  957* 2178* 2179* 2180
TEMP3   002342   110#  935*  939*
TEMP4   002344   111#  936*  938   948*  950   955*  956*  959
TMPFNC  002404   128#  769   772   849*
TMP0    002346   112#  422  2642* 2643* 2646  2658
TMP1    002350   113# 2653* 2656* 2665* 2668* 2678
TMP2    002352   114#
TRPFLG  002320   101#  642*  655   971* 1028* 1033  1054* 1059  1079* 1084  1104* 1109
TRPHAN  014144   643   646   971# 1029  1055  1080  1105
TYPDR =  000006   62#  2934
T$ARGC= 000001    17#  413#  422#  431#  450#  457#  463#  466#  467#  468#  469#  472#  473#
                 619#  657#  665#  736#
T$CODE= 001032  2930# 2931# 2932# 2933# 2934# 2935# 2954# 2955# 2956#
T$ERRN= 000066     7#  821#  989# 1005# 1037# 1063# 1088# 1113# 1148# 1184# 1218# 1256# 1294#
                1329# 1361# 1392# 1424# 1465# 1490# 1513# 1545# 1554# 1588# 1598# 1632# 1641#
                1676# 1685# 1693# 1758# 1767# 1776# 1810# 1856# 1911# 1923# 1953# 1979# 1988#
                2027# 2073# 2119# 2189# 2276# 2293# 2367# 2402# 2464# 2511# 2558# 2606# 2705#
                2772# 2808# 2827# 2904#
T$EXCP= 000000  2931# 2932# 2933# 2935# 2956#
T$FLAG= 000040  1149# 1185# 1219# 1257# 1295# 1330# 1362# 1393# 1425# 1752# 1845# 1848# 1858#
                2051# 2054# 2063# 2066# 2098# 2101# 2393# 2457# 2503# 2551# 2596# 2599# 2698#
T$GMAN= 000000     7#
T$HILI= 177777  2931# 2932# 2933# 2935# 2956#
T$LAST= 000001     7# 2973#
T$LOLI= 000000  2931# 2932# 2933# 2935# 2956#
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                 693   705   715   978  1039  1065  1090  1115  1157  1194  1227  1265  1301
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                    1817    1869    1893    1926    1956    1991    2007    2032    2080    2122    2196    2220    2250
                    2296    2419    2467    2514    2561    2609    2708    2843    2924    2937    2957
T$LTNO= 000054      2973#
T$NEST= 177777       7#      15#     19#     24#     72#     74#     295#    298#    388#    393#    395#    401#    403#
                    408#    410#    416#    418#    425#    427#    434#    436#    441#    443#    452#    454#    461#
                    504#    506#    508#    516#    518#    520#    522#    528#    530#    532#    536#    542#    546#
                    549#    551#    636#    638#    641#    670#    672#    674#    693#    695#    699#    701#    705#
                    707#    709#    711#    715#    717#    725#    974#    978#    1013#   1019#   1039#   1044#   1065#
                    1070#   1090#   1095#   1115#   1120#   1134#   1156#   1157#   1162#   1173#   1193#   1194#   1199#
                    1209#   1226#   1227#   1232#   1242#   1264#   1265#   1270#   1280#   1300#   1301#   1306#   1317#
                    1335#   1336#   1341#   1351#   1367#   1368#   1373#   1383#   1398#   1399#   1404#   1414#   1430#
                    1431#   1436#   1467#   1472#   1493#   1498#   1516#   1521#   1558#   1563#   1600#   1605#   1645#
                    1649#   1698#   1702#   1726#   1731#   1780#   1785#   1817#   1822#   1836#   1864#   1869#   1873#
                    1893#   1898#   1926#   1931#   1956#   1961#   1991#   1995#   2007#   2011#   2032#   2037#   2058#
                    2079#   2080#   2085#   2122#   2127#   2196#   2201#   2220#   2225#   2250#   2255#   2296#   2301#
                    2319#   2418#   2419#   2424#   2467#   2472#   2514#   2519#   2561#   2566#   2609#   2614#   2708#
                    2713#   2723#   2842#   2843#   2848#   2924#   2926#   2928#   2937#   2947#   2951#   2953#   2955
                    2957#   2972#
T$NS0 = 000000       15#     19      24#     72      74#     295     298#    388     393#    504     506#    518     520#
                     530     532#    536     542#    546     549#    638     641#    670     672#    695     699#    707
                     709#    717     725#    1013    1019#   1039    1044#   1065    1070#   1090    1095#   1115    1120#
                    1157    1162#   1194    1199#   1227    1232#   1265    1270#   1301    1306#   1336    1341#   1368
                    1373#   1399    1404#   1431    1436#   1467    1472#   1493    1498#   1516    1521#   1558    1563#
                    1600    1605#   1645    1649#   1698    1702#   1726    1731#   1780    1785#   1817    1822#   1869
                    1873#   1893    1898#   1926    1931#   1956    1961#   1991    1995#   2007    2011#   2032    2037#
                    2080    2085#   2122    2127#   2196    2201#   2220    2225#   2250    2255#   2296    2301#   2419
                    2424#   2467    2472#   2514    2519#   2561    2566#   2609    2614#   2708    2713#   2843    2848#
                    2924    2926#   2947    2951#   2972
T$NS1 = 000005       395#    401     403#    408     410#    416     418#    425     427#    434     436#    441     443#
                     452     454#    461     508#    516     522#    528     551#    636     674#    693     701#    705
                     711#    715     974#    978     1134#   1156    1173#   1193    1209#   1226    1242#   1264    1280#
                    1300    1317#   1335    1351#   1367    1383#   1398    1414#   1430    1836#   1864    2058#   2079
                    2319#   2418    2723#   2842    2928#   2937    2953#   2955    2957
T$PTNU= 000000       7#
T$SAVL= 177777       7#
T$SEGL= 177777       7#     1134#   1149    1156#   1173#   1185    1193#   1209#   1219    1226#   1242#   1257    1264#
                    1280#   1295    1300#   1317#   1330    1335#   1351#   1362    1367#   1383#   1393    1398#   1414#
                    1425    1430#   1836#   1858    1864#   2058#   2063    2066    2079#   2319#   2393    2418#   2723#
                    2842#
T$SEK0= 010000      1134#   1149    1156    1173#   1185    1193    1209#   1219    1226    1242#   1257    1264    1280#
                    1295    1300    1317#   1330    1335    1351#   1362    1367    1383#   1393    1398    1414#   1425
                    1430    1836#   1858    1864    2058#   2063    2066    2079    2319#   2393    2418    2723#   2842
T$SUBN= 000000       7#     1019#   1044#   1070#   1095#   1120#   1162#   1199#   1232#   1270#   1306#   1341#   1373#
                    1404#   1436#   1472#   1498#   1521#   1563#   1605#   1649#   1702#   1731#   1785#   1822#   1873#
                    1898#   1931#   1961#   1995#   2011#   2037#   2085#   2127#   2201#   2225#   2255#   2301#   2424#
                    2472#   2519#   2566#   2614#   2713#   2848#
T$TAGL= 177777       7#
T$TAGN= 010077       7#     395#    403#    410#    418#    427#    436#    443#    454#    508#    522#    542#    551#
                     641#    674#    701#    711#    974#    1019#   1044#   1070#   1095#   1120#   1162#   1199#   1232#
                    1270#   1306#   1341#   1373#   1404#   1436#   1472#   1498#   1521#   1563#   1605#   1649#   1702#
                    1731#   1785#   1822#   1873#   1898#   1931#   1961#   1995#   2011#   2037#   2085#   2127#   2201#
                    2225#   2255#   2301#   2424#   2472#   2519#   2566#   2614#   2713#   2848#   2928#   2953#
T$TEMP= 000000       19#     72#     295#    388#    401#    408#    416#    425#    434#    441#    452#    461#    504#
                     516#    518#    528#    530#    534#    536#    546#    636#    638#    670#    693#    695#    705#
                     707#    715#    717#    978#    1013#   1020#   1025#   1039#   1047#   1052#   1065#   1071#   1076#
```

```
                    1090#  1096#  1101#  1115#  1124#  1129#  1149#  1156#  1157#  1164#  1169#  1185#  1193#
                    1194#  1201#  1205#  1219#  1226#  1227#  1233#  1238#  1257#  1264#  1265#  1272#  1276#
                    1295#  1300#  1301#  1308#  1313#  1330#  1335#  1336#  1343#  1347#  1362#  1367#  1368#
                    1375#  1379#  1393#  1398#  1399#  1406#  1410#  1425#  1430#  1431#  1438#  1447#  1467#
                    1474#  1478#  1493#  1500#  1504#  1516#  1523#  1529#  1558#  1564#  1570#  1600#  1608#
                    1614#  1645#  1652#  1657#  1698#  1706#  1711#  1726#  1733#  1736#  1752#  1780#  1787#
                    1797#  1817#  1824#  1828#  1845#  1848#  1858#  1864#  1869#  1876#  1882#  1893#  1926#
                    1933#  1939#  1956#  1962#  1967#  1991#  1996#  1999#  2007#  2013#  2016#  2032#  2040#
                    2044#  2051#  2054#  2063#  2066#  2079#  2080#  2087#  2091#  2098#  2101#  2122#  2130#
                    2136#  2196#  2202#  2206#  2220#  2228#  2232#  2250#  2258#  2262#  2296#  2306#  2315#
                    2393#  2418#  2419#  2428#  2431#  2457#  2467#  2475#  2478#  2503#  2514#  2521#  2525#
                    2551#  2561#  2568#  2572#  2596#  2599#  2609#  2617#  2625#  2698#  2708#  2714#  2719#
                    2842#  2843#  2850#  2853#  2924#  2930#  2931#  2932#  2933#  2934#  2935#  2937#  2947#
                    2954#  2956#  2957#  2972#
T$TEST= 000054         7#  1019#  1044#  1070#  1095#  1120#  1162#  1199#  1232#  1270#  1306#  1341#  1373#
                    1404#  1436#  1472#  1498#  1521#  1563#  1605#  1649#  1702#  1731#  1785#  1822#  1873#
                    1898#  1931#  1961#  1995#  2011#  2037#  2085#  2127#  2201#  2225#  2255#  2301#  2424#
                    2472#  2519#  2566#  2614#  2713#  2848#  2973
T$TSTM= 177777         7#   401   408   413   416   422   425   431   434   441   450   452   457
                     461   463   466   467   468   469   472   473   553   554   558   560   569
                     581   619   622   623   630   632   636   643   652   657   659   665   668
                     670   676   683   693   705   715   728   736   738   739   821   989  1005
                    1029  1032  1037  1038  1039  1055  1058  1063  1064  1065  1080  1083  1088
                    1089  1090  1105  1108  1113  1114  1115  1134  1148  1149  1156  1157  1173
                    1184  1185  1193  1194  1209  1218  1219  1226  1227  1242  1256  1257  1264
                    1265  1280  1294  1295  1300  1301  1317  1329  1330  1335  1336  1351  1361
                    1362  1367  1368  1383  1392  1393  1398  1399  1414  1424  1425  1430  1431
                    1450  1457  1465  1467  1486  1490  1493  1509  1513  1516  1545  1546  1554
                    1558  1588  1589  1598  1600  1632  1633  1641  1645  1676  1677  1685  1686
                    1693  1698  1721  1726  1749  1752  1758  1760  1767  1769  1776  1780  1804
                    1810  1812  1817  1836  1839  1845  1848  1856  1858  1864  1869  1889  1893
                    1903  1908  1911  1912  1915  1920  1923  1924  1926  1950  1953  1956  1970
                    1976  1979  1980  1985  1988  1991  2004  2007  2019  2024  2027  2028  2032
                    2051  2054  2058  2063  2066  2073  2075  2079  2080  2098  2101  2119  2122
                    2189  2190  2196  2217  2220  2240  2243  2246  2250  2268  2276  2277  2281
                    2287  2289  2293  2294  2296  2319  2324  2327  2342  2345  2348  2351  2356
                    2359  2367  2368  2375  2378  2381  2384  2390  2393  2402  2403  2418  2419
                    2440  2443  2446  2449  2454  2457  2464  2467  2486  2489  2492  2495  2500
                    2503  2511  2514  2533  2536  2539  2542  2548  2551  2558  2561  2581  2584
                    2587  2590  2596  2599  2606  2609  2631  2634  2672  2676  2680  2683  2686
                    2690  2695  2698  2705  2708  2723  2728  2731  2746  2749  2752  2755  2761
                    2764  2772  2773  2780  2783  2786  2790  2795  2799  2808  2809  2827  2828
                    2842  2843  2860  2863  2878  2881  2884  2887  2893  2896  2904  2905  2912
                    2916  2921  2924
T$TSTS= 000001         7#  1019#  1044#  1070#  1095#  1120#  1162#  1199#  1232#  1270#  1306#  1341#  1373#
                    1404#  1436#  1472#  1498#  1521#  1563#  1605#  1649#  1702#  1731#  1785#  1822#  1873#
                    1898#  1931#  1961#  1995#  2011#  2037#  2085#  2127#  2201#  2225#  2255#  2301#  2424#
                    2472#  2519#  2566#  2614#  2713#  2848#
T$$AU  = 010017   711#   715
T$$AUT= 010014   641#   670
T$$CLE= 010015   674#   693
T$$DU  = 010016   701#   705
T$$HAR= 010075  2928#  2937
T$$HW  = 010010   508#   516
T$$INI= 010013   551#   636
T$$MSG= 010007   395#   401   403#   408   410#   416   418#   425   427#   434   436#   441   443#
```

```
                    452    454#   461
T$$PRO= 010012      542#
T$$SEG= 010000     1134#  1149   1156#  1173#  1185   1193#  1209#  1219   1226#  1242#  1257   1264#  1280#
                   1295   1300#  1317#  1330   1335#  1351#  1362   1367#  1383#  1393   1398#  1414#  1425
                   1430#  1836#  1858   1864#  2058#  2063   2066   2079#  2319#  2393   2418#  2723#  2842#
T$$SOF= 010076     2953#  2957
T$$SRV= 010020      974#   978
T$$SW = 010011      522#   528
T$$TES= 010074     1019#  1039   1044#  1065   1070#  1090   1095#  1115   1120#  1157   1162#  1194   1199#
                   1227   1232#  1265   1270#  1301   1306#  1336   1341#  1368   1373#  1399   1404#  1431
                   1436#  1467   1472#  1493   1498#  1516   1521#  1558   1563#  1600   1605#  1645   1649#
                   1698   1702#  1726   1731#  1752   1780   1785#  1817   1822#  1845   1848   1869   1873#
                   1893   1898#  1926   1931#  1956   1961#  1991   1995#  2007   2011#  2032   2037#  2051
                   2054   2080   2085#  2098   2101   2122   2127#  2196   2201#  2220   2225#  2250   2255#
                   2296   2301#  2419   2424#  2457   2467   2472#  2503   2514   2519#  2551   2561   2566#
                   2596   2599   2609   2614#  2698   2708   2713#  2843   2848#  2924
T.CNTL  002402      127#   592*   1176   1321   1482   1714   1738   1800   1830
T.DRIV  002400      126#   590*   2406   2644   2832
T.SIZE  011644      526#
T1      014346 G    534   1019#
T10     015556 G    534   1306#
T11     015612 G    534   1341#
T12     015712 G    534   1373#
T13     016002 G    534   1404#
T14     016102 G    534   1436#
T15     016212 G    534   1472#
T16     016264 G    534   1498#
T17     016322 G    534   1521#
T18     016446 G    534   1563#
T19     016606 G    534   1605#
T2      014442 G    534   1044#
T20     016746 G    534   1649#
T21     017152 G    534   1702#
T22     017202 G    534   1731#
T23     017406 G    534   1785#
T24     017472 G    534   1822#
T25     017636 G    534   1873#
T26     017666 G    534   1898#
T27     020040 G    534   1931#
T28     020126 G    534   1961#
T29     020254 G    534   1995#
T3      014536 G    534   1070#
T30     020276 G    534   2011#
T31     020356 G    534   2037#
T32     020522 G    534   2085#
T33     020660 G    534   2127#
T34     021176 G    534   2201#
T35     021272 G    534   2225#
T36     021336 G    534   2255#
T37     021462 G    534   2301#
T38     022100 G    534   2424#
T39     022232 G    534   2472#
T4      014632 G    534   1095#
T40     022374 G    534   2519#
T41     022534 G    534   2566#
T42     022706 G    534   2614#
```

```
T43     023334 G          534    2713#
T44     024054 G          534    2848#
T5      014726 G          534    1120#
T6      015046 G          534    1162#
T7      015150 G          534    1199#
T8      015236 G          534    1232#
T9      015362 G          534    1270#
UAM   = 000200 G           26#
UNITST  002246             80#    574*   578*   581    622    659    668    738
UUT     002244             79#    572    575*   580*
VECMSG  024462           2932    2942#
VECT  = 000002             60#    2932
WAITO   012326            614#    616
WAIT1   021224           2214#    2216
WCKINT  004243            318#    874
WCKMES  004203            317#    873
WHY     002376            124#
WRCHK = 000002             42#    772
WRITE = 000012             46#
WTCRDY  014246            995#    1720   1748   1807   1844   1888   1907   1919   1945   1975   2003   2023   2050
                         2062    2097   2212   2239   2272   2323   2341   2355   2374   2389   2439   2453   2485
                         2499    2532   2547   2580   2595   2630   2671   2679   2694   2727   2745   2760   2779
                         2794    2859   2877   2892   2911   2920
WTDRDY  014160            981#    2245   2286   2347   2380   2445   2491   2538   2586   2685   2751   2785   2883
XPOLY   002330            105#    944    955
XXX     012130            573     578#
X$ALWA= 000000              7#
X$FALS= 000040              7#    2955
X$OFFS= 000400              7#    2955
X$TRUE= 000020              7#
.     = 024612             10#    293#   294#   381#   614    985    999    1149   1185   1219   1257   1295   1330
                         1362    1393   1425   1752   1845   1848   1858   2051   2054   2063   2066   2098   2101
                         2214    2393   2457   2503   2551   2596   2599   2698   2945#  2955
```

```
BCOMPL   559   570   582   729
BGNAU    711
BGNAUT   641
BGNCLN   674
BGNDU    701
BGNHRD  2928
BGNHW    508
BGNINI   551
BGNMOD    15    24    74   298   393   506   520   532   549   672   699   709   725  2926  2951
BGNMSG   395   403   410   418   427   436   443   454
BGNPRO   542
BGNSEG  1134  1173  1209  1242  1280  1317  1351  1383  1414  1836  2058  2319  2723
BGNSFT  2953
BGNSRV   974
BGNSW    522
BGNTST  1019  1044  1070  1095  1120  1162  1199  1232  1270  1306  1341  1373  1404  1436  1472
        1498  1521  1563  1605  1649  1702  1731  1785  1822  1873  1898  1931  1961  1995  2011
        2037  2085  2127  2201  2225  2255  2301  2424  2472  2519  2566  2614  2713  2848
BNCOMP   555   561   633
BRESET   553  1457  1486  1509
CKLOOP  1038  1064  1089  1114  1546  1589  1633  1677  1686  1721  1749  1760  1769  1812  1889
        1912  1924  1950  1980  1985  2004  2028  2075  2190  2217  2240  2243  2246  2277  2281
        2287  2294  2324  2327  2342  2345  2348  2351  2356  2359  2368  2375  2378  2381  2384
        2390  2403  2440  2443  2446  2449  2454  2486  2489  2492  2495  2500  2533  2536  2539
        2542  2548  2581  2584  2587  2590  2631  2634  2672  2676  2680  2683  2686  2690  2695
        2728  2731  2746  2749  2752  2755  2761  2764  2773  2780  2783  2786  2790  2795  2799
        2809  2828  2860  2863  2878  2881  2884  2887  2893  2896  2905  2912  2916  2921
CLRVEC   652   683  1032  1058  1083  1108
DELAY    614   985   999  2214
DESCRI    21
DEVTYP    22
DISPAT   534
DOCLN    623   739
DODU     622   659   668   738
ENDAU    715
ENDAUT   670
ENDCLN   693
ENDDU    705
ENDHRD  2937
ENDHW    516
ENDINI   636
ENDMOD    19    72   295   388   504   518   530   536   638   695   707   717  1013  2947  2972
ENDMSG   401   408   416   425   434   441   452   461
ENDPRO   546
ENDSEG  1156  1193  1226  1264  1300  1335  1367  1398  1430  1864  2079  2418  2842
ENDSFT  2957
ENDSRV   978
ENDSW    528
ENDTST  1039  1065  1090  1115  1157  1194  1227  1265  1301  1336  1368  1399  1431  1467  1493
        1516  1558  1600  1645  1698  1726  1780  1817  1869  1893  1926  1956  1991  2007  2032
        2080  2122  2196  2220  2250  2296  2419  2467  2514  2561  2609  2708  2843  2924
EQUALS    26
ERRDF    821   989  1005  1148  1184  1218  1256  1294  1329  1361  1392  1424  1465  1490  1513
        1545  1554  1588  1598  1632  1641  1676  1685  1693  1758  1767  1776  1810  1856  1911
        1923  1953  1979  1988  2027  2073  2119  2189  2276  2293  2367  2402  2464  2511  2558
        2606  2705  2772  2808  2827  2904
```

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ERRSF    1037  1063  1088  1113
ESCAPE   1149  1185  1219  1257  1295  1330  1362  1393  1425  1752  1845  1848  1858  2051  2054
         2063  2066  2098  2101  2393  2457  2503  2551  2596  2599  2698
GPHARD    581
GPRMA    2931  2932
GPRMD    2933  2935  2956
GPRML    2930  2934  2954
HEADER     17
INLOOP    728
LASTAD   2973
M$BYTE     17#
M$CNTO   2930# 2931# 2932# 2933# 2934# 2935# 2954# 2956#
M$COUN    413#  422#  431#  450#  457#  463#  466#  467#  468#  469#  472#  473#  619#  657#  665#
          736#
M$DATA     17#   21#   22#
M$DECR     19#   72#  295#  388#  401#  408#  416#  425#  434#  441#  452#  461#  504#  516#  518#
          528#  530#  536#  546#  636#  638#  670#  693#  695#  705#  707#  715#  717#  978#  1013#
         1039# 1065# 1090# 1115# 1156# 1157# 1193# 1194# 1226# 1227# 1264# 1265# 1300# 1301# 1335#
         1336# 1367# 1368# 1398# 1399# 1430# 1431# 1467# 1493# 1516# 1558# 1600# 1645# 1698# 1726#
         1780# 1817# 1864# 1869# 1893# 1926# 1956# 1991# 2007# 2032# 2079# 2080# 2122# 2196# 2220#
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	2054#	2058#	2063#	2066#	2073#	2075#	2079#	2080#	2098#	2101#	2119#	2122#	2189#	2190#	2196#
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	2319#	2324#	2327#	2342#	2345#	2348#	2351#	2356#	2359#	2367#	2368#	2375#	2378#	2381#	2384#
	2390#	2393#	2402#	2403#	2418#	2419#	2440#	2443#	2446#	2449#	2454#	2457#	2464#	2467#	2486#
	2489#	2492#	2495#	2500#	2503#	2511#	2514#	2533#	2536#	2539#	2542#	2548#	2551#	2558#	2561#
	2581#	2584#	2587#	2590#	2596#	2599#	2606#	2609#	2631#	2634#	2672#	2676#	2680#	2683#	2686#
	2690#	2695#	2698#	2705#	2708#	2723#	2728#	2731#	2746#	2749#	2752#	2755#	2761#	2764#	2772#
	2773#	2780#	2783#	2786#	2790#	2795#	2799#	2808#	2809#	2827#	2828#	2842#	2843#	2860#	2863#
	2878#	2881#	2884#	2887#	2893#	2896#	2904#	2905#	2912#	2916#	2921#	2924#			
M$TSTL	401#	408#	413#	416#	422#	425#	431#	434#	441#	450#	452#	457#	461#	463#	466#
	467#	468#	469#	472#	473#	553#	554#	558#	560#	569#	581#	619#	622#	623#	630#
	632#	636#	643#	652#	657#	659#	665#	668#	670#	676#	683#	693#	705#	715#	728#
	736#	738#	739#	821#	989#	1005#	1029#	1032#	1037#	1038#	1039#	1055#	1058#	1063#	1064#
	1065#	1080#	1083#	1088#	1089#	1090#	1105#	1108#	1113#	1114#	1115#	1134#	1148#	1149#	1156#
	1157#	1173#	1184#	1185#	1193#	1194#	1209#	1218#	1219#	1226#	1227#	1242#	1256#	1257#	1264#
	1265#	1280#	1294#	1295#	1300#	1301#	1317#	1329#	1330#	1335#	1336#	1351#	1361#	1362#	1367#
	1368#	1383#	1392#	1393#	1398#	1399#	1414#	1424#	1425#	1430#	1431#	1450#	1457#	1465#	1467#
	1486#	1490#	1493#	1509#	1513#	1516#	1545#	1546#	1554#	1558#	1588#	1589#	1598#	1600#	1632#
	1633#	1641#	1645#	1676#	1677#	1685#	1686#	1693#	1698#	1721#	1726#	1749#	1752#	1758#	1760#
	1767#	1769#	1776#	1780#	1804#	1810#	1812#	1817#	1836#	1839#	1845#	1848#	1856#	1858#	1864#
	1869#	1889#	1893#	1903#	1908#	1911#	1912#	1915#	1920#	1923#	1924#	1926#	1950#	1953#	1956#
	1970#	1976#	1979#	1980#	1985#	1988#	1991#	2004#	2007#	2019#	2024#	2027#	2028#	2032#	2051#
	2054#	2058#	2063#	2066#	2073#	2075#	2079#	2080#	2098#	2101#	2119#	2122#	2189#	2190#	2196#
	2217#	2220#	2240#	2243#	2246#	2250#	2268#	2276#	2277#	2281#	2287#	2289#	2293#	2294#	2296#
	2319#	2324#	2327#	2342#	2345#	2348#	2351#	2356#	2359#	2367#	2368#	2375#	2378#	2381#	2384#
	2390#	2393#	2402#	2403#	2418#	2419#	2440#	2443#	2446#	2449#	2454#	2457#	2464#	2467#	2486#
	2489#	2492#	2495#	2500#	2503#	2511#	2514#	2533#	2536#	2539#	2542#	2548#	2551#	2558#	2561#
	2581#	2584#	2587#	2590#	2596#	2599#	2606#	2609#	2631#	2634#	2672#	2676#	2680#	2683#	2686#
	2690#	2695#	2698#	2705#	2708#	2723#	2728#	2731#	2746#	2749#	2752#	2755#	2761#	2764#	2772#
	2773#	2780#	2783#	2786#	2790#	2795#	2799#	2808#	2809#	2827#	2828#	2842#	2843#	2860#	2863#
	2878#	2881#	2884#	2887#	2893#	2896#	2904#	2905#	2912#	2916#	2921#	2924#			
M$WORD	17#	534#	821#	989#	1005#	1037#	1063#	1088#	1113#	1148#	1184#	1218#	1256#	1294#	1329#
	1361#	1392#	1424#	1465#	1490#	1513#	1545#	1554#	1588#	1598#	1632#	1641#	1676#	1685#	1693#

```
          1758#  1767#  1776#  1810#  1856#  1911#  1923#  1953#  1979#  1988#  2027#  2073#  2119#  2189#  2276#
          2293#  2367#  2402#  2464#  2511#  2558#  2606#  2705#  2772#  2808#  2827#  2904#  2930#  2931#  2932#
          2933#  2934#  2935#  2954#  2955#  2956#  2973
M$XFER    2955#
POINTE      13
PRINTB     413    422    431    450    457    463    466    467    468    469    472    473    619    657    665
PRINTF     736
READBU     632
READEF     554    558    560    569
SETPRI     676   1450   1804   1839   1903   1908   1915   1920   1970   1976   2019   2024   2268   2289
SETVEC     630    643   1029   1055   1080   1105
STARS     1020   1025   1047   1052   1071   1076   1096   1101   1124   1129   1164   1169   1201   1205   1233
          1238   1272   1276   1308   1313   1343   1347   1375   1379   1406   1410   1438   1447   1474   1478
          1500   1504   1523   1529   1564   1570   1608   1614   1652   1657   1706   1711   1733   1736   1787
          1797   1824   1828   1876   1882   1933   1939   1962   1967   1996   1999   2013   2016   2040   2044
          2087   2091   2130   2136   2202   2206   2228   2232   2258   2262   2306   2315   2428   2431   2475
          2478   2521   2525   2568   2572   2617   2625   2714   2719   2850   2853
SVC          5#      7
XFERF     2955

. ABS.  024612     000

 ERRORS DETECTED:  0

 ,CZRLGB.LST/CRF=SVC33/ML,CZRLGB.MAC
RUN-TIME: 97 94 12 SECONDS
RUN-TIME RATIO: 518/204=2.5
CORE USED:  15K  (29 PAGES)
```