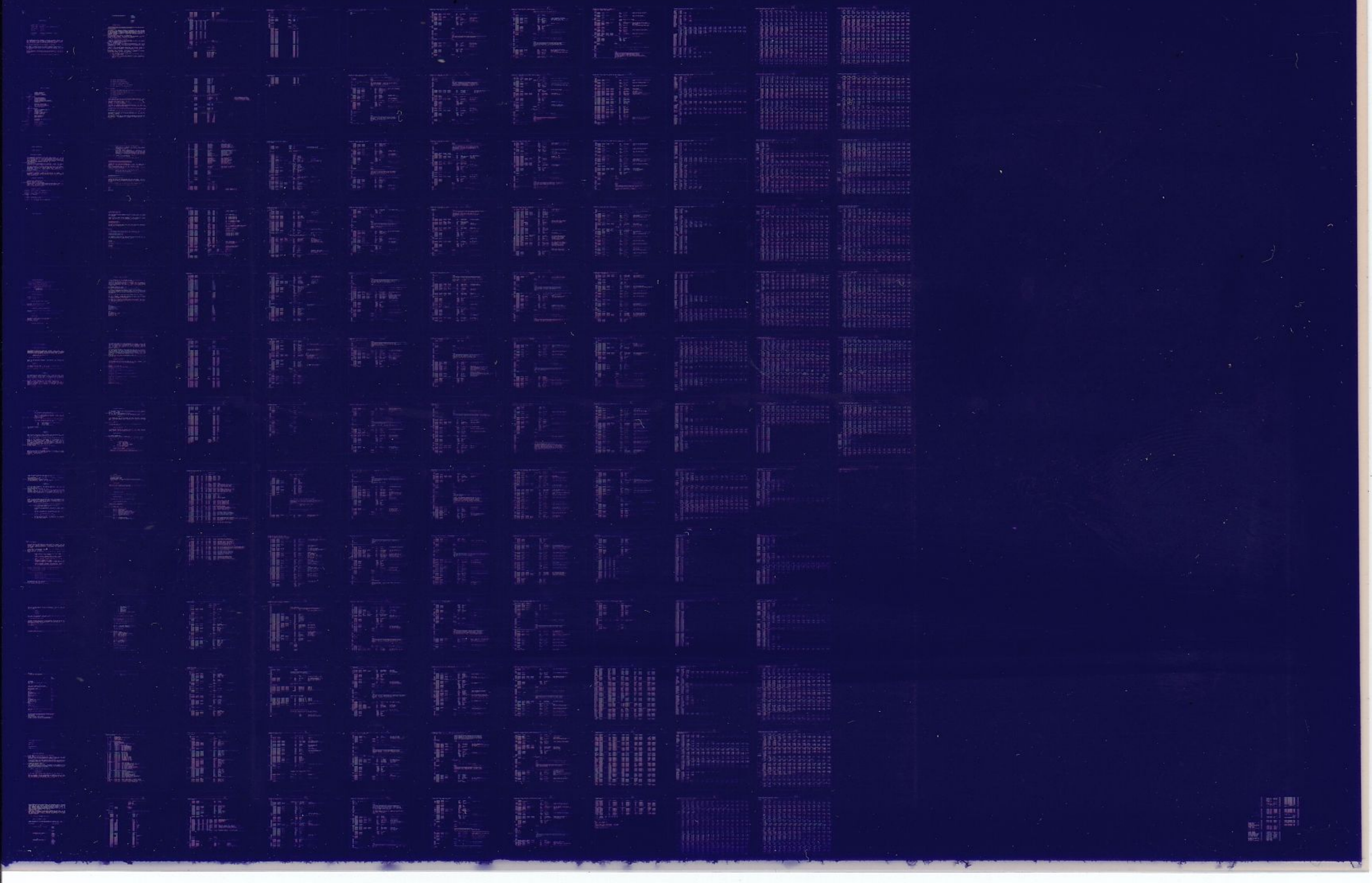
RLV11/12
RL01/02/11

RL11/RLV11/CTRL1
CZRLGE0

AH-F110E-MC
1 OF 1 JUL 1985
 MADE IN USA

digital



```
b  L w
A  ;;
001
.REM @
```

SEQ 0

IDENTIFICATION

PRODUCT CODE: AC-F111E-MC

PRODUCT NAME: CZRLGEO RL11/RLV11 CONTROLLER TEST 1

DATE CREATED: 5-JAN-79

REVISED: 6-DEC-84

MAINTAINER: DIAGNOSTIC ENGINEERING - COLORADO

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1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

1.1.1 STRUCTURE OF PROGRAM

THIS DIAGNOSTIC IS COMPATIBLE WITH BOTH XXDP+ AND ACT. IT CAN BE RUN STANDALONE UNDER XXDP+, AND CAN BE CHAINED UNDER XXDP+, ACT AND APT IN ACT MODE (SEE 2.2 "CHAIN MODE OPERATION" FOR DETAILS OF CHAINING PROCEDURE). IT IS A SINGLE PROGRAM FROM THE STANDPOINT OF THE DIAGNOSTIC USER, WHICH AT RUN TIME IS APPENDED TO A COMMON FRONT-END PIECE OF SUPERVISOR SOFTWARE THRO
UGH WHICH THE DIAGNOSTIC
INTERFACES TO THE ENVIRONMENT AS IT EXECUTES. USING THE DEFAULT VALUES IN THE P TABLES, PROGRAM EXECUTES ONE PASS IN 11 SECONDS.

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 COMMAN
DS 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.

1.1.3 DIAGNOSTIC HISTORY

REVISION A UPDATE CZRLAB TO INCORPORATE THE RL02.

REVISION B MAKE PROGRAM XXDP+ COMPATABLE.

REVISION C CORRECT NUMEROUS AIDS REPORTS IS
SUED AGAINST THE DIAGNOS-
TIC.

REVISION D EXPAND TEST TO INCLUDE THE RLV12. ADD THIS DIAGNOSTIC HISTORY TO THE DOCUMENTATION.

REVISON E FIX TESTS 21,22 FOR RLV CONRROLLERS

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/RLV12 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

CZRLGE0 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.

```
CHMDKAO 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 B
EING 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 SPECI
FIED 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 O
PERANDS 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 FUT
URE 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 QU
ESTIONS 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 (BECAU
SE 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 TH
E 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

THE MOST TYPICAL THING TO DO HERE IS TO ISSUE THE PROCEED, BUT WI
TH
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-O
                    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) O ?                           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) O ? 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 UN
TIL 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 PRO-
GRAMS 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 US
E 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 EXE-
CUTE 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 MO
DE 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 HAR
DWARE 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 EX-
ECUTED. 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 EXE-
CUTE 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 DE
FAULT IS
NON-ENDING TEST EXECUTION. "FLAG-LIST" IS A SEQUENCE OF ELEMENTS OF THE FORM <FLAG>, <FLAG=1>, OR <FLAG=0>, SEPARATED BY COLONS, WHERE <FLAG> HAS ONE OF THE FOLLOWING VALUES:

HOE HALT ON ERROR, CAUSING COMMAND MODE TO BE ENTERED WHEN AN ERROR IS ENCOUNTERED

LOE LOOP ON ERROR, CAUSING THE DIAGNOSTIC TO LOOP CONTINUOUSLY WITHIN THE SMALLEST DEFINED BLOCK OF CODING (SEGMENT, SUB-
TES
T, 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  ER
ROR  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 TEST-ED) SPECIFYING WHICH UN
ITS ARE TO BE TESTED. THE LOG-
ICAL 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 OPERA-TOR 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:<F
LAG-LIST>
****

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

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

1. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

****
EXIT
****

RETURN TO
XXDP. PROMPT MODE.

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

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

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

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

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

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

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

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

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

****
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, COM
MAS 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 CONSTRUC
T 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 RLOX 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 F
OR 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 D
RIVE 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 1 IF YOU HAVE AN
RL11 CONTROLLER, 2 IF YOU HAVE AN RLV11
CONTROLLER, AND 3 IF YOU HAVE AN RLV12 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) O?

ANSWER WITH THE DR
IVE(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 DESCRIPTIO
N
(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 - CO
NTROL AND STATUS REGISTER (XXXXXO)

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 - CON
TROLLER 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 WO

```
@
CZRLGEO RL11/RLV11 CTLR TST 1   MACRO V05.01a Tuesday 12-Feb-85 13:58
Table of contents


```

```
                                .TITLE  CZRLGEO RL11/RLV11 CTLR TST 1

                                .ENABLE AMA
                                .ENABLE ABS
                                .NLIST  ME,CND,MD
                                .MCALL SVC

                                SVC
                                SVCINS=0
                                SVCTAG=0
                                .=2000


                                        POINTER BGNSFT,BGNSW,BGNDU,BGNAU

                                BGNMOD  MDHEDR

                                        HEADER  CZRLG,E,0,7,0
002000      103                         .ASCII /C/
002001      132                         .ASCII /Z/
002002      122                         .ASCII /R/
002003      114                         .ASCII /L/

002004      107                 .ASCII /G/
002005      000                         .BYTE   0
002006      000                         .BYTE   0
002007      000                         .BYTE   0
002010      105                         .ASCII  /E/
002011      060                         .ASCII  /O/
002012   000000                         .WORD   0
002014   000007                         .WORD   7
002016   026556                         .WORD   L$HARD
002020   026762                         .WORD   L$SOFT
002022   013654                         .WORD   L$HW
002024   013672                         .WORD   L$SW
002026   027050                         .WORD   L$LAST
002030   000000                         .WORD   0
002032   000000                         .WORD   0
002034   000000                         .WORD   0
002036   000000                         .WORD   0
002040
013702                          .WORD   L$DISPATCH
002042   000000                         .WORD   0
002044   000000                         .WORD   0
002046   000000                         .WORD   0
002050      003                         .BYTE   C$REVISION
002051      003                         .BYTE   C$EDIT
002052   000000                         .WORD   0
002054   000000                         .WORD   0
002056   000000                         .WORD   0
002060   002230                         .WORD   L$DVTYP
002062   000000                         .WORD   0
002064   000000                         .WORD   0
002066   000000                         .WORD   0
002070   015076                         .WORD   L$AU
002072   015072                         .WORD   L$DU
002074   000000                         .WORD   0
002076   002122                         .WORD   L$DESC
00
2100    104035                  EMT     E$LOAD
002102  000000                         .WORD   0
```

```
        002104  014040                          .WORD   L$INIT
        002106  015024                          .WORD   L$CLEAN
        002110  014602                          .WORD   L$AUTO
        002112  014032                          .WORD   L$PROT
        002114  000000                          .WORD   0
        002116  000000                          .WORD   0
        002120  000000                          .WORD   0
     18
     19 002122                                  ENDMOD
     20
     21 002122                          DESCRIPT <CZRLG TESTS CONTROLLER FUNCT
IONS, INTERFACE LOGIC, REGISTER OPERATION>
        002122     103     132     122          .ASCIZ  /CZRLG TESTS CONTROLLER FUNCTIONS, INTERFACE LOGIC, REGISTER OPERATION/
        002125     114     107     040
        002130     124     105     123
        002133     124     123     040
        002136     103     117     116
        002141     124     122     117
        002144     114     114     105
        002147     122     040     106
        002152     125     116     103
        002155     124     111     117
        002160     116     123     054
        002163     040     111     116
        00
2166       124     105     122
        002171     106     101     103
        002174     105     040     114
        002177     117     107     111
        002202     103     054     040
        002205     122     105     107
        002210     111     123     124
        002213     105     122     040
        002216     117     120     105
        002221     122     101     124
        002224     111     117     116
        002227     000
                                           .EVEN
     22 002230                     DEVTYP  <RL01,RL02>
        002230     122     114     060             .ASCIZ  /RL01,RL02/
        002233     061     054     122
        002236
114        060     062
        002241     000
                                           .EVEN
     23
     24 002242                     BGNMOD  GLBEQAT
     25
     26 002242                             EQUALS
                                   ;
                                   ; BIT DEFINITIONS
                                   ;
           100000                  BIT15== 100000
           040000                  BIT14== 40000
           020000                  BIT13== 20000
           010000                  BIT12== 10000
           004000                  BIT11== 4000
           002000                  BIT10== 2000
           001000                  BIT09== 1000
           000400                  BIT08== 400
```

```
                000200                  BIT07== 200
                000100                  BIT06== 100
                000040                  BIT05== 40
                000020                  BIT04== 20
                000010                  BIT03== 10
                000004                  BIT02== 4
                000002                  BIT01== 2
                000001                  BIT00== 1
                                        ;
                001000                  BIT9==  BIT09
                000400                  BIT8==  BIT08
                000200                  BIT7==  BIT07
                000100                  BIT6==  BIT06
                000040                  BIT5==  BIT05
                000020                  BIT4==  BIT04
                000010                  BIT3==  BIT03
                000004                  BIT2==  BIT02
                000002                  BIT1==  BIT01
                000001                  BIT0==  BIT00
                                        ;
                                        ; EVENT FLAG DEFINITIONS
                                        ;
 EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
                                        ;
                000040                  EF.START==      32.             ; START COMMAND WAS ISSUED
                000037                  EF.RESTART==    31.             ; RESTART COMMAND WAS ISSUED
                000036                  EF.CONTINUE==   30.             ; CONTINUE COMMAND WAS ISSUED
                000035                  EF.NEW==        29.             ; A NEW PASS HAS BEEN STARTED
                000034                  EF.PWR==        28.             ; A POWER-FAIL/POWER-UP OCCURRED
                                        ;
                                        ;
                                        ; PRIORITY LEVEL DEFINITIONS
                                        ;
                000340                  PRI07== 340
                000300                  PRI06== 300
                000240                  PRI05== 240
                0
00200                   PRI04== 200
                000140                  PRI03== 140
                000100                  PRI02== 100
                000040                  PRI01== 40
                000000                  PRI00== 0
                                        ;
                                        ;OPERATOR FLAG BITS
                                        ;
                000004                  EVL==         4
                000010                  LOT==        10
                000020                  ADR==        20
                000040                  IDU==        40
                000100                  ISR==       100
                000200                  UAM==       200
                000400                  BOE==       400
                001000                  PNT==      1000
                002000                  PRI==      2000
                004000                  IXE==      4000
                010000                  IBE==     10000
                020000                  IER==     20000
                040000                  LOE==     40000
                100000                  H
OE==    100000
```

```
                        000001          DRDY=BIT0               ;DRIVE READY (RLCS)
                        000100          INTEN=BIT6              ;INTERRUPT ENABLE (RLCS)
                        100000          ERR=BIT15               ;RL11 ERROR (RLCS)
                        040000          DERR=BIT14              ;RL01 DRIVE ERROR (RLCS)
                        002000          OPI=BIT10               ;OPERATION INCOMPLETE (RLCS)
                        000200          CRDY=BIT7               ;CONTROLLER READY (RLCS)
                        000040          BA17=BIT5
;EXTENDED ADDRESS BIT 17 (RLCS)
                        000020          BA16=BIT4               ;EXTENDED ADDRESS BIT 16 (RLCS)
                        020000          NXM=BIT13               ;NON-EXISTANT MEMORY (RLCS)
                        000000          DS0=0                   ;DRIVE SELECT 0 (RLCS)
                        000400          DS1=BIT8                ;DRIVE SELECT 1 (RLCS)
                        001000          DS2=BIT9                ;DRIVE SELECT 2 (RLCS)
                        001400          DS3=BIT8!BIT9           ;DRIVE SELECT 3 (RLCS)
                        000000          NOOP0=0                 ;FUNCTION-NOOP(0)
                        000016          NOOP7=BIT1!BIT2!BIT3    ;FUNCTION-NOOP(7)
                        000002          WRCHK=BIT1              ;WRI
TE CHECK FUNCTION
                        000004          GSTAT=BIT2              ;GET STATUS FUNCTION
                        000006          SEEK=BIT2!BIT1          ;SEEK FUNCTION
                        000010          RDHDR=BIT3              ;READ HEADER FUNCTION
                        000012          WRITE=BIT3!BIT1         ;WRITE DATA FUNCTION
                        000014          READ=BIT3!BIT2          ;READ DATA FUNCTION
                        000202          GODRVR=BIT1!BIT7        ;CRDY AND DRDY
                        000010          DRST=BIT3               ;DRIVE RESET (RLDA)
                        000002          GSBIT=BIT1              ;GET STATUS BIT (RLDA)
                        000001          MK=BIT0                 ;MARKER BIT (RLDA)
                        00000
4                       SIGN=BIT2                       ;SIGN BIT (RLDA)
                        000100          RHHS=BIT6               ;HEAD SELECT IN READ HEADER
                        000100          STHS=BIT6               ;HEAD SELECT IN STATUS BACK
                        000020          DAHS=BIT4               ;HEAD SELECT IN SEEK

                                        ;OFFSET FOR HARDWARE P-TABLE

                        000000          CSR=0
                        000002          VECT=2
                        000004          PRIOR=4
                        000006          TYPDR=6
                        000010          DRBT=10
                        000012          CNT=12

                                        ;OFFSET FOR SOFTWARE P-TABLE

                        000000          DLT=0

                        000002          ELT=2
                        000004          SIZE=4

002242                                  ENDMOD

002242                                  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               ;LOGICAL ADDRESS OF CS
002252  000000                          RLBA:   .WORD   0               ;LOGICAL ADDRESS OF BA
002254  000000                          RLDA:   .WORD   0               ;LOGICAL ADDRESS OF DA
```

GLOBAL DATA

```
      84 002256  000000                RLMP:    .WORD   0               ;LOGICAL ADDRESS OF MP
      85 002260  000000                RLBE:    .WORD   0               ;LOGICAL ADDRESS OF BE
      86 002262  000000                BCSR:    .WORD   0
      87 002264  000000                BPRIOR:  .WORD   0
      88 002266  000000                BVEC:    .WORD   0
      89 002270  000000                DRIVE:   .WORD   0               ;DRIVE UNDER TEST
      90 002272  000000                B.CS:    .WORD   0               ;CS - BEFORE OPERATION

  91      002274  000000                B.BA:    .WORD   0               ;BA - BEFORE OPERATION
      92 002276  000000                B.DA:    .WORD   0               ;DA - BEFORE OPERATION
      93 002300  000000                B.MP:    .WORD   0               ;MP - BEFORE OPERATION
      94 002302  000000                B.BE:    .WORD   0               ;BE - BEFORE OPERATION
      95 002304  000000                DERFLG:  .WORD
      96 002306  000000                E.CS:    .WORD   0               ;CS - AT OCCURANCE OF ERROR
      97 002310  000000                E.BA:    .WORD   0               ;BA - AT OCCRUANCE OF ERROR
      98 002312  000000                E.DA:    .WORD   0               ;DA - AT OCCURANCE OF ERROR
      99 0023
14        000000                E.MP:    .WORD   0               ;MP - AT OCCURANCE OF ERROR
     100 002316  000000                E.MP1:   .WORD   0
     101 002320  000000                E.MP2:   .WORD   0               ;MP - AT OCCURANCE OF ERROR READ HEADER
     102 002322  000000                E.BE:    .WORD   0               ;BE - AT OCCURANCE OF ERROR RLV12 ONLY
     103 002324  000000                PFLG:    .WORD   0               ;PROCESSOR TYPE, 0=UNIBUS, 1=Q-BUS
     104 002326  000000                TRPFLG:  .WORD   0
     105 002330  000000                INTFLG:  .WORD   0               ;INTERRUPT OCCURRENCE FLAG
     106 002332  000000                LDCSR:   .WORD   0               ;LOCATION TO FORM RLCS

     107 002334  000077                SECMSK:  .WORD   77              ;MASK OUT SECTOR
     108 002336  120001                XPOLY:   .WORD   120001          ;POLYNOMIAL FOR CRC 16
     109 002340  000004                ERRVEC:  .WORD   4
     110 002342  000000                BCCFBK:  .WORD   0               ;LOCATION USED BY "SIMBCC"
     111 002344  000000                CALBCC:  .WORD   0               ;LOCATION USED BY "SIMBCC"
     112 002346  000000                TEMP2:   .WORD   0               ;LOCATION USED BY "SIMBCC"
     113 002350  000000                TEMP3:   .WORD   0               ;LOCATION USED BY "SIMBCC"
     114 002352  000000                TEMP4:   .WORD   0               ;LOCATION USED BY "
SIMBCC"
     115 002354  000000                TMP0:    .WORD   0
     116 002356  000000                TMP1:    .WORD   0
     117 002360  000000                TMP2:    .WORD   0
     118 002362  000000                GDDAT:   .WORD   0
     119 002364  000000                BDDAT:   .WORD   0
     120 002366  000000                FIRST:   .WORD   0               ;FIRST SECTOR READ
     121 002370  177700                CYLMSK:  .WORD   177700          ;MASK CYLINDER AND HEAD SELECT
     122 002372  000050                MXSEC1:  .WORD   40.             ;MAX SECTOR ADDRESS +1
     123 002374  000047                MAXSEC:  .WORD   39.             ;MAX SECTOR ADDRESS
     124 002376  000000                DWO
RD:       .WORD   0               ;DIFFERENCE WORD (SEEK)
     125 002400  177600                MAXCYL:  .WORD   177600          ;MAXIMUM CYLINDER ADDRESS
     126 002402  000000                SVHD:    .WORD   0               ;SAVE CURRENT HEAD SELECT
     127 002404  000000                WHY:     .WORD   0               ;REASON FOR DROP UNIT
     128
     129 002406  000000                T.DRIVE:         .WORD   0       ;DRIVE TYPE
     130 002410  000000                T.CNTLR:         .WORD   0       ;CONTOLLER TYPE
     131 002412  000000                TMPFNC:          .WORD   0
     132 002414  000000                DLYCNT:          .WORD   0       ;DELAY COUNTER
     133 002416                        DBUFF:: .BLKW    512.    ;WORDS  ;DA
TA BUFFER                 B
     134                              ;
     135                              ;PATTERNS USED FOR LOADING/READING REGISTERS
     136
     137 004416  000000                BEGPAT:  0                       ;GROWING 1
     138 004420  000001                         1
     139 004422  000003                         3
     140 004424  000007                         7
```

F3


```
     141 004426  000017                          17
     142 004430  000037                          37
     143 004432  000077                          77
     144 004434  000177                          177
     145 0
04436    000377                        377
     146 004440  000777                          777
     147 004442  001777                          1777
     148 004444  003777                          3777
     149 004446  007777                          7777
     150 004450  017777                          17777
     151 004452  037777                          37777
     152 004454  077777                          77777
     153 004456  177777                          177777
     154 004460  177776                          177776          ;GROWING 0
     155 004462  177774                          177774
     156 004464  177770                          177770
     157 004466  177760                          177760
     158 004470  177740                          177740
     159 004472  177700                          177700
     160 00447
4        177600                        177600
     161 004476  177400                          177400
     162 004500  177000                          177000
     163 004502  176000                          176000
     164 004504  174000                          174000
     165 004506  170000                          170000
     166 004510  160000                          160000
     167 004512  140000                          140000
     168 004514  100000                          100000
     169
     170 004516  000000                          000000
     171 004520  000001                          1               ;WALKING 1
     172 004522  000002                          2
     173 004524  000004                          4
     174 004526  000010                          10
     175 004530  000020                          20
     176 004532  0
00040                      40
     177 004534  000100                          100
     178 004536  000200                          200
     179 004540  000400                          400
     180 004542  001000                          1000
     181 004544  002000                          2000
     182 004546  004000                          4000
     183 004550  010000                          10000
     184 004552  020000                          20000
     185 004554  040000                          40000
     186 004556  100000                          100000
     187 004560  177777                          177777          ;WALKING 0
     188 004562  177776                          177776
     189 004564  177775                          177775
     190 004566  177773                          177773
     191 004570  177767                          1
77767
     192 004572  177757                          177757
     193 004574  177737                          177737
     194 004576  177677                          177677
     195 004600  177577                          177577
     196 004602  177377                          177377
     197 004604  176777                          176777
```

```
    198 004606  175777                        175777
    199 004610  173777                        173777
    200 004612  167777                        167777
    201 004614  157777                        157777
    202 004616  1
37777                       137777
    203 004620  077777                        077777
    204 004622  177777                        177777
    205 004624  000000              ENDPAT:   000000
    206
    207                             .SBTTL  PATTERNS FOR DIFFERENCE WORD
    208
    209 004626  000200              SKLST:    .WORD   BIT7
    210 004630  000400                        .WORD   BIT8            ;SHIFTING 1
    211 004632  001000                        .WORD   BIT9
    212 004634  002000                        .WORD   BIT10
    213 004636  004000                        .WORD   BIT11
    214 004640  010000                        .WORD   BIT12
    215 004642  020000                        .WORD   BIT13
    216 004644  040000                        .WO
RD      BIT14
    217 004646  077600                        .WORD   77600           ;SHIFTING 0
    218 004650  077400                        .WORD   77400
    219 004652  076600                        .WORD   76600
    220 004654  075600                        .WORD   75600
    221 004656  073600                        .WORD   73600
    222 004660  067600                        .WORD   67600
    223 004662  057600                        .WORD   57600
    224 004664  037600                        .WORD   37600
    225 004666  077600                        .WORD   77600
    226 004670  000200                        .WORD   200
    227 004672  000600                        .WORD   600             ;GROWING 1
    228 004674  001600                        .WORD   1600
    229 004676
        003600                      .WORD   3600
    230 004700  007600                        .WORD   7600
    231 004702  017600              QUAMAX:   .WORD   17600
    232 004704  037600              HALMAX:   .WORD   37600
    233 004706  077600                        .WORD   77600
    234 004710  077400                        .WORD   77400           ;GROWING 0
    235 004712  077000                        .WORD   77000
    236 004714  076000                        .WORD   76000
    237 004716  074000                        .WORD   74000
    238 004720  070000                        .WORD   70000
    239 004722  060000                        .WORD   60000
    240 004724  040000                        .WORD   40000
    241 004726  000000              SKEND:    .W
ORD     00000
    242 004730  100000              RL2:      .WORD   BIT15
    243 004732  037600              QMAX:     .WORD   37600
    244 004734  077600              HMAX:     .WORD   77600
    245
    246 004736  177600                        .WORD   177600
    247 004740  177400                        .WORD   177400
    248 004742  176600                        .WORD   176600
    249 004744  173600                        .WORD   173600
    250 004746  167600                        .WORD   167600
    251 004750  157600                        .WORD   157600
    252 004752  137600                        .WORD   137600
    253 004754  177000                        .WORD   177000
    254 004756  176000                        .WORD   176000
```

H3


```
     255 004760  174000                          .WORD   174000
     256 004762  170000                          .WORD   170000
     257 004764  060000                          .WORD   60000
     258 004766  040000                          .WORD   40000
     259 004770  000000                SKEEND:   .WORD   000000
     260
     261                                         ;PATTERNS FOR TEST OF RLCS
     262
     263 004772  000000                CSPAT:    .WORD   0               ;SHIFTING 1
     264 004774  000002                          .WOR
D         BIT1
     265 004776  000004                          .WORD   BIT2
     266 005000  000010                          .WORD   BIT3
     267 005002  000020                          .WORD   BIT4
     268 005004  000040                          .WORD   BIT5
     269 005006  000100                          .WORD   BIT6
     270 005010  000400                          .WORD   BIT8
     271 005012  001000                          .WORD   BIT9
     272 005014  001576                          .WORD   1576            ;GROWING 0
     273 005016  001574                          .WORD   1574
     274 005020  001570                          .WORD   1570
     275 005022  001560                          .WORD   1560
     276 005024  001540                          .WORD   1540
     277 005026  001500                          .WORD   1500

     278 005030  001400                          .WORD   1400
     279 005032  001576                          .WORD   1576            ;SHIFT 0
     280 005034  001574                          .WORD   1574
     281 005036  001566                          .WORD   1566
     282 005040  001556                          .WORD   1556
     283 005042  001536                          .WORD   1536
     284 005044  001436                          .WORD   1436
     285 005046  001136                          .WORD   1136
     286 005050  000076                          .WORD   76
     287 005052  000006                          .WORD   6               ;GROWING 1
     288 005054  000016                          .WORD   16
     289 005056  000036                          .WORD   36
     290 005060  000076                          .WORD   76
     2
91        005062  000176                          .WORD   176             ;
     292 005064  000576                          .WORD   576
     293 005066  001576                          .WORD   1576
     294 005070  000000                CSEND:    .WORD   0
     295 005072  000000                ERPOINT:  .WORD   0
     296 005074                        ERCOUNT:  .BLKW   64.
     297 005274                        HDRBUF:   .BLKW   160.
     298 005774                        ENDMOD
     299
```

```
                                        BGNMOD  GLBTXT
                                
                                .SBTTL  GLOBAL TEXT
                                
005774                                  DEMES:  .ASCIZ  / DRV/
006001          040     104     122     NXMMES: .ASCIZ  / NXM/
006006          040     117     120     OPIMES: .ASCIZ  / OPI/
006013          040     110     103     HCRCMES:.ASCIZ  / HCRC/
006021          040     110     116     HNFMES: .ASCIZ  / HNF/
006026          040     104     103     DCKMES: .ASCIZ  / DCK/
006033          040     104     114     DLTMES: .ASCIZ  / DLT/
006040          015     012     000     MSCRLF
:       .ASCIZ  <15><12>
006043          015     000             LF:     .ASCIZ  <15>
006045          040     103     117     COMP:   .ASCIZ  / COMP/
006053          106     117     122     OPIERR: .ASCIZ  /FORCED OPI(GET STATUS) CAUSED OTHER ERRORS/
006126          116     117     117     NOPMES: .ASCIZ  /NOOP OPERATION-FLAG MODE/
006157          116     117     117     NOPINT: .ASCIZ  /NOOP OPERATION-INTR. MODE/
006211          127     122     111     WCKMES: .ASCIZ  /WRITE CHECK OPERATION-FLAG MODE/
006251          127     122
        111     WCKINT: .ASCIZ  /WRITE CHECK OPERATION-INTR. MODE/
006312          122     105     101     RHDMES: .ASCIZ  /READ HEADER OPERATION-FLAG MODE/
006352          122     105     101     RHDINT: .ASCIZ  /READ HEADER OPERATION-INTR. MODE/
006413          123     105     105     SEKMES: .ASCIZ  /SEEK OPERATION-FLAG MODE/
006444          123     105     105     SEKINT: .ASCIZ  /SEEK OPERATION-INTR. MODE/
006476          107     105     124     GSTMES: .ASCIZ  /GET STATUS OPERATION-FLAG MODE/
006535          1
07      105     124     GSTINT: .ASCIZ  /GET STATUS OPERATION-INTR MODE/
006574          103     123     072     ARLCS:  .ASCIZ  /CS: /
006601          040     102     101     ARLBA:  .ASCIZ  / BA: /
006607          040     104     101     ARLDA:  .ASCIZ  / DA: /
006615          040     115     120     ARLMP:  .ASCIZ  / MP: /
006623          102     105     106     BEREG:  .ASCIZ  /BEFORE COMMAND: /
006644          124     111     115     AFREG:  .ASCIZ  /TIME OF ERROR:  /
006665          103     117     116     CRTIM:  .ASC
IZ      /CONTROLLER TIMED OUT/
006712          104     122     111     DRTIM:  .ASCIZ  /DRIVE READY TIMED OUT/
006740          103     101     116     EM1:    .ASCIZ  /CAN NOT ADDRESS RLCS/
006765          103     101     116     EM2:    .ASCIZ  /CAN NOT ADDRESS RLBA/
007012          103     101     116     EM3:    .ASCIZ  /CAN NOT ADDRESS RLDA/
007037          103     101     116     EM4:    .ASCIZ  /CAN NOT ADDRESS RLMP/
007064          122     114     103     EM5:    .ASCIZ  %RLCS READ/WRITE ERROR (BIT 0 DON'T CARE)%
0071
35      122     114     102     EM6:    .ASCIZ  %RLBA READ/WRITE ERROR%
007163          122     114     104     EM7:    .ASCIZ  %RLDA READ/WRITE ERROR%
007211          117     120     111     EM11:   .ASCIZ  /OPI WOULD NOT GENERATE INTERRUPT/
007252          116     117     040     EM13:   .ASCIZ  /NO INTERRUPT FROM NOOP(0)/
007304          116     117     117     EM14:   .ASCIZ  /NOOP(0) MODIFIED RLMP/
007332          116     117     117     EM15:   .ASCIZ  /NOOP(0) MODIFIED RLBA/
007360          116     117     117     EM16:   .ASC
IZ      /NOOP(0) MODIFIED RLDA/
007406          111     116     124     EM17:   .ASCIZ  /INTERRUPT PRIORITY FAILURE/
007441          107     105     124     EM30:   .ASCIZ  /GET STATUS WOULD NOT INTERRUPT/
007500          107     105     124     EM30A:  .ASCIZ  /GET STATUS SHOULD NOT INTERRUPT/
007540          122     114     115     EM32:   .ASCIZ  /RLMP CONTAINED WRONG STATUS/
007574          117     120     111     EM33:   .ASCIZ  /OPI DID NOT SET-GSTAT WITHOUT GS BIT/
007641          117     120     111     EM34:   .ASCIZ  /
OPI DID NOT SET-GSTAT WITHOUT GS AND MK BITS/
007716          122     105     101     EM37:   .ASCIZ  /READ HEADER WOULD NOT INTERRUPT/
007756          102     101     104     EM41:   .ASCIZ  /BAD CYLINDER OR HEAD SELECT IN REPEATED READ HEADER TEST/
010047          102     101     104     EM42:   .ASCIZ  /BAD HEADER CRC ON READ HEADER/
010105          123     105     103     EM43:   .ASCIZ  /SECTOR ADDRESS OUT OF SEQUENCE DURING CONSECUTIVE READ HEADERS/
010204          127     122     111     EM44:   .ASCIZ  /WRITING RL
MP MODIFIED RLCS/
010237          127     122     111     EM45:   .ASCIZ  /WRITING RLMP MODIFIED RLBA/
010272          127     122     111     EM46:   .ASCIZ  /WRITING RLMP MODIFIED RLDA/
```

GLOBAL TEXT

```
     61 010325      123      105      105  EM47:   .ASCIZ  /SEEK WOULD NOT INTERRUPT/
     62 010356      104      122      111  EM52:   .ASCIZ  /DRIVE READY CAUSED EXTRANEOUS INTERRUPT/

63        010426      102      101      104  EM54:   .ASCIZ  /BAD SEEK-TEST OF DIFFENCE WORD/
     64 010465      102      101      104  EM55:   .ASCIZ  /BAD HEAD SELECT VIA RD HDR/
     65 010520      102      101      104  EM56:   .ASCIZ  /BAD HEAD SELECT VIA GET STATUS/
     66 010557      114      117      101  EM57:   .ASCII  /LOADING RLDA BEFORE DRIVE READY ON SEEK/<15><12>
     67 010630      104      122      111          .ASCIZ  /DRIVE READY DID NOT SET/
     68 010660      102      111      124  EM61:   .ASCIZ  /BIT SET INSTRUCTION ON RLCS YIELD
ED WRONG RESULT/
     69 010741      102      111      124  EM62:   .ASCIZ  /BIT CLEAR INSTRUCTION ON RLCS YIELDED WRONG RESULT/
     70 011024      102      111      124  EM63:   .ASCIZ  /BIT SET INSTRUCTION ON RLBA YIELDED WRONG RESULT/
     71 011105      102      111      124  EM64:   .ASCIZ  /BIT CLEAR INSTRUCTION ON RLBA YIELDED WRONG RESULT/
     72 011170      102      111      124  EM65:   .ASCIZ  /BIT SET INSTRUCTION ON RLDA YIELDED WRONG RESULT/
     73 011251      102      111      124  EM66:   .ASCIZ  /BIT CLEAR INSTRUCTION
 ON RLDA YIELDED WRONG RESULT/
     74 011334      102      125      123  EM67:   .ASCIZ  /BUS RESET DID NOT CLEAR RLCS/
     75 011371      102      125      123  EM70:   .ASCIZ  /BUS RESET DID NOT CLEAR RLBA/
     76 011426      102      125      123  EM71:   .ASCIZ  /BUS RESET DID NOT CLEAR RLDA/
     77 011463      127      122      111  EM72:   .ASCIZ  /WRITING RLCS MODIFIED RLBA/
     78 011516      127      122      111  EM73:   .ASCIZ  /WRITING RLCS MODIFIED RLDA/
     79 011551      127      122      111  EM74:   .ASCIZ  /WRITING RLB
A MODIFED RLCS/
     80 011603      127      122      111  EM75:   .ASCIZ  /WRITING RLBA MODIFED RLDA/
     81 011635      127      122      111  EM76:   .ASCIZ  /WRITING RLDA MODIFIED RLCS/
     82 011670      127      122      111  EM77:   .ASCIZ  /WRITING RLDA MODIFIED RLBA/
     83 011723      122      114      103  EM101:  .ASCIZ  /RLCS CONTAINED FOLLOWING ERROR(S):  /
     84 011770                            EM102:  .BLKB   120.
     85 012160      122      114      126  EM103:  .ASCIZ  /RLV11 OR RLV12 RLDA INCREMENTED WRONG/                ;B
     86
     87

   88                                        .EVEN
     89
     93 012226                              ENDMOD
     94
```

```
                                        .SBTTL  GLOBAL ERRORS
                                        
012226                                  BGNMOD  GLBERR
                                        
012226                                  BGNMSG  ERR0
                                        
012226  004737  012552                        JSR     PC,LINE1
012232  004737  012606                        JSR     PC,LINE2
                                        
012236  004537  015102                        JSR     R5,CKERLT       ;CHECK ERROR LIMIT
012242                                          ENDMSG
012242                                  L10000:
012242  104423                                  TRAP    C$MSG
                                        
012244                                  BGNMSG  ERR1
                                        
012244  004737  012552                        JSR     PC,LINE1
                                        
012250  004537  015102                        JSR     R5,CKERLT       ;CHECK ERROR LIMIT
012254                                          ENDMSG
012254                                  L10001:
012254  104423                                  TRAP    C$MSG
                                        
012256                                  BGNMSG  ERR2
                                        
012256  004737  012552                        JSR     PC,LINE1
012262                                          PRINTB  #FRMT4,GDDAT,BDDAT
012262  013746  002364                        MOV     BDDAT,-(SP)
012
013746  002362                          MOV     GDDAT,-(SP)
012272  012746  013205                        MOV     #FRMT4,-(SP)
012276  012746  000003                        MOV     #3,-(SP)
012302  010600                              MOV     SP,R0
012304  104414                              TRAP    C$PNTB
012306  062706  000010                        ADD     #10,SP
                                        
012312  004537  015102                        JSR     R5,CKERLT       ;CHECK ERROR LIMIT
012316                                          ENDMSG
012316                                  L10002:
012316  104423                                  TRAP    C$MSG
                                        
012320                                  BGNMSG  ERR3
                                        
012320  004737  012552                        JSR     PC,LINE1
012324  004737  012606                        JSR     PC
,LINE2
012330                                          PRINTB  #FRMT5,TMP0,BDDAT,GDDAT
012330  013746  002362                        MOV     GDDAT,-(SP)
012334  013746  002364                        MOV     BDDAT,-(SP)
012340  013746  002354                        MOV     TMP0,-(SP)
012344  012746  013243                        MOV     #FRMT5,-(SP)
012350  012746  000004                        MOV     #4,-(SP)
012354  010600                              MOV     SP,R0
012356  104414                              TRAP    C$PNTB
012360  062706  000012                        ADD     #12,SP
                                        
012364  004537  015102                        JSR     R5,CKERLT       ;CHECK ERROR LIMIT
012370                                          ENDMSG
012370                                  L10003:
```

```
                012370  104423                          TRAP    C$MSG
     36
     37 012372                          BGNMSG  ERR4
     38
     39 012372  004737  012552                  JSR     PC,LINE1
     40 012376  004737  012606                  JSR     PC,LINE2
     41 012402                          PRINTB  #FRMT4,GDDAT,BDDAT
        012402  013746  002364                  MOV     BDDAT,-(SP)
        012406  013746  002362                  MOV     GDDAT,-(SP)
        012412  012746  013205                  MOV     #FRMT4,-(SP)
        012416  012746  000003                  MOV
        #3,-(SP)
        012422  010600                          MOV     SP,R0
        012424  104414                          TRAP    C$PNTB
        012426  062706  000010                  ADD     #10,SP
     42
     43 012432  004537  015102                  JSR     R5,CKERLT       ;CHECK ERROR LIMIT
     44 012436                          ENDMSG
        012436                          L10004:
        012436  104423                          TRAP    C$MSG
     45
     46 012440                          BGNMSG  ERR5
     47
     48 012440  004737  012552                  JSR     PC,LINE1
     49
     50 012444  004537  015102                  JSR     R5,CKERLT       ;CHECK ERROR LIMIT
     51 012450                          ENDMSG
        012450                          L10005:
        012450  104423                          TRAP    C$MS
G
     52
     53 012452                          BGNMSG  ERR6
     54
     55 012452  004737  012552                  JSR     PC,LINE1
     56 012456  004737  013020                  JSR     PC,LINE3
     57 012462  004737  012606                  JSR     PC,LINE2
     58
     59
     60 012466                          1$:     PRINTB  #FRMT99
        012466  012746  013240                  MOV     #FRMT99,-(SP)
        012472  012746  000001                  MOV     #1,-(SP)
        012476  010600                          MOV     SP,R0
        012500  104414                          TRAP    C$PNTB
        012502  062706  000004                  ADD     #4,SP
     61 012506  004537  015102                  JSR     R5,CKERLT       ;CHECK ERROR LIMIT
     62 0125
12                                  ENDMSG
        012512                          L10006:
        012512  104423                          TRAP    C$MSG
     63
     64 012514                          BGNMSG  ERR7
     65
     66 012514  004737  012552                  JSR     PC,LINE1
     67 012520                                  PPINTB  #FRMT6,BDDAT
        012520  013746  002364                  MOV     BDDAT,-(SP)
        012524  012746  013314                  MOV     #FRMT6,-(SP)
        012530  012746  000002                  MOV     #2,-(SP)
        012534  010600                          MOV     SP,R0
        012536  104414                          TRAP    C$PNTB
        012540  062706  000006                  ADD     #6,SP
```

M3

GLOBAL ERRORS

```
      68
      69 012544  004537  015102                    JSR     R5,CKERLT
      70
      71 012550                                     ENDMSG
         012550                                L10007:
         012550  104423                            TRAP    C$MSG
      72
      73 012552                                LINE1: PRINTB  #FRMT1,RLCS,<B,DRIVE+1>
         012552  005046                            CLR     -(SP)
         012554  153716  002271                    BISB    DRIVE+1,(SP)
         012560  013746  002250                    MOV     RLCS,-(SP)
         012564  012746  013072                    MOV     #FRMT1,-(SP)
         012570  012746  000003                    MOV     #3,-(SP)
         012574  010600                            MOV     SP,R0
         012
576      104414                                TRAP    C$PNTB
         012600  062706  000010                    ADD     #10,SP
      74 012604  000207                            RTS     PC
      75
      76 012606                                LINE2: PRINTB  #FRMT2,#BEREG,#ARLCS,B.CS,#ARLBA,B.BA
         012606  013746  002274                    MOV     B.BA,-(SP)
         012612  012746  006601                    MOV     #ARLBA,-(SP)
         012616  013746  002272                    MOV     B.CS,-(SP)
         012622  012746  006574                    MOV     #ARLCS,-(SP)
         012626  012746  006623                    MOV     #BEREG,-(SP)
         012632  012746  013132                    MOV     #FRMT2,-(SP)
         012636  012746  000006                    MOV     #6,-(SP)
         012642  010600                            MOV     SP,R0
         0
12644    104414                                TRAP    C$PNTB
         012646  062706  000016                    ADD     #16,SP
      77 012652                                    PRINTB  #FRMT2A,#ARLDA,B.DA,#ARLMP,B.MP
         012652  013746  002300                    MOV     B.MP,-(SP)
         012656  012746  006615                    MOV     #ARLMP,-(SP)
         012662  013746  002276                    MOV     B.DA,-(SP)
         012666  012746  006607                    MOV     #ARLDA,-(SP)
         012672  012746  013151                    MOV     #FRMT2A,-(SP)
         012676  012746  000005                    MOV     #5,-(SP)
         012702  010600                            MOV     SP,R0
         012704  104414                            TRAP    C$PNTB
         012706  062706  000014                    ADD     #14,SP
      78 012712                                    PRINTB  #F
RMT2,#AFREG,#ARLCS,E.CS,#ARLBA,E.BA
         012712  013746  002310                    MOV     E.BA,-(SP)
         012716  012746  006601                    MOV     #ARLBA,-(SP)
         012722  013746  002306                    MOV     E.CS,-(SP)
         012726  012746  006574                    MOV     #ARLCS,-(SP)
         012732  012746  006644                    MOV     #AFREG,-(SP)
         012736  012746  013132                    MOV     #FRMT2,-(SP)
         012742  012746  000006                    MOV     #6,-(SP)
         012746  010600                            MOV     SP,R0
         012750  104414                            TRAP    C$PNTB
         012752  062706  000016                    ADD     #16,SP
      79 012756                                    PRINTB  #FRMT2B,#ARLDA,E.DA,#ARLMP,E.MP
         012756  013746
002314                   MOV     E.MP,-(SP)
         012762  012746  006615                    MOV     #ARLMP,-(SP)
         012766  013746  002312                    MOV     E.DA,-(SP)
         012772  012746  006607                    MOV     #ARLDA,-(SP)
         012776  012746  013164                    MOV     #FRMT2B,-(SP)
         013002  012746  000005                    MOV     #5,-(SP)
```

```
                013006  010600                          MOV     SP,R0
                013010  104414                          TRAP    C$PNTB
                013012  062706  000014                  ADD     #14,SP
            80  013016  00020
7                                       RTS     PC
            81
            82  013020                          LINE3:  PRINTB  #FRMT3,#EM101
                013020  012746  011723                  MOV     #EM101,-(SP)
                013024  012746  013200                  MOV     #FRMT3,-(SP)
                013030  012746  000002                  MOV     #2,-(SP)
                013034  010600                          MOV     SP,R0
                013036  104414                          TRAP    C$PNTB
                013040  062706  000006                  ADD     #6,SP
            83  013044                                  PRINTB  #FRMT3,#EM102
                013044  012746  011770                  MOV     #EM102,-(SP)
                013050  012746  013200                  MOV     #FRMT3,-(SP)
                013054  012746  000002                  MOV     #2,-(SP)
                013060  010600                          MOV     SP,R0
                013062  104414
                                TRAP    C$PNTB
                013064  062706  000006                  ADD     #6,SP
            84  013070  000207                          RTS     PC
            85
            89
            90  013072      045     101     103 FRMT1:  .ASCIZ  /%ACONTROLLER: %O6%A  DRIVE: %O1/
            91  013132      045     116     045 FRMT2:  .ASCIZ  /%N%T%T%O6%T%O6/
            92  013151      045     124     045 FRMT2A: .ASCIZ  /%T%O6%T%O6/
            93  013164      045     124     045 FRMT2B: .ASCIZ  /%T%O6%T%O6%/
            94  013200      045     116     045 FRMT3:  .ASCIZ  /%N%T/
            95  013205      045     116     045 FRMT4:  .ASC
II          /%N%AEXP'D: %O6%A REC'D: %O6/
            96  013240      045     116     000 FRMT99: .ASCIZ  /%N/
            97  013243      045     116     045 FRMT5:  .ASCIZ  /%N%ALAST: %O6%A PRES: %O6%A EXP'D: %O6%N/
            98  013314      045     116     045 FRMT6:  .ASCIZ  /%N%AAT PROCESSOR LEVEL %O6%N/
            99  013351      045     101     105 FRMT11: .ASCIZ  /%AERROR LIMIT EXCEEDED-DROPPED%N/
           100  013412      045     116     045 FRMT12: .ASCIZ  /%N%ADRIVE DID NOT RECOVER FROM POWER FAILURE%N/
           101  013471      045     116     045 FRM
T13:        .ASCIZ  /%N%T%A - WILL NOT TEST%N/
           102  013522      045     116     045 FRMT14: .ASCIZ  /%N%ADRIVE DROPPED - NO CONTROLLER%N/
           103  013566      045     116     045 FRMT15: .ASCIZ  /%N%ADRIVE DROPPED - DID NOT RESPOND WITH "READY"%N/
           104
           105                                  .EVEN
           106
           107
           111
           112
           113
           114  013652                                  ENDMOD
           115
           116  013652                          BGNMOD  HPTCODE
           117
           118  013652                          BGNHW                   ;DEFAULT HARDWARE TABLE
                013652  000006                          .WORD   L10010-L$HW/2
           119  013654  174400                          .
WORD        174400          ;CSR
           120  013656  000160                          .WORD   160             ;VECTOR
           121  013660  000240                          .WORD   240             ;PRIORITY
           122  013662  000001                          .WORD   1               ;RL01 = 1
           123  013664  000000                          .WORD   0               ;DRIVE (BITS 8,9,10)
           124  013666  000001                          .WORD   1               ;RL11 = 1, RLV11 = 2, RLV12 = 3
           125
           126  013670                          ENDHW
```

```
                013670                          L10010:
127
128             013670
                                                ENDMOD
129
130             013670                          BGNMOD  SPTCODE
131
132             013670                          BGNSW                   ;DEFAULT SOFTWARE TABLE
                013670  000003                          .WORD   L10011-L$SW/2
133
134             013672  000000          DROP:   .WORD   0
135             013674  000012          MERLMT: .WORD   10.
136             013676  000000          T.SIZE: .WORD   0
137
138             013700                          ENDSW
                013700                          L10011:
139
140             013700                                  ENDMOD
141
142             013700                          BGNMOD  DSPCODE
143
144             013700                          DISPATCH        44
                013700  000054                          .WORD   44
                013702  016454
                .WORD   T1
                013704  016550                          .WORD   T2
                013706  016644                          .WORD   T3
                013710  016740                          .WORD   T4
                013712  017034                          .WORD   T5
                013714  017154                          .WORD   T6
                013716  017260                          .WORD   T7
                013720  017346                          .WORD   T8
                013722  017472                          .WORD   T9
                013724  017616                          .WORD   T10
                013726  017724                          .WORD   T11
                013730  020024                          .WORD   T12
                013732  020114                          .WORD   T13
                013734  020214                          .WORD   T14
                013736  020324                          .WORD   T15
                013740  020400                          .WORD   T16
                013742  020436                          .WORD   T17
                013744  020562                          .WORD   T18

                013746  020722                          .WORD   T19
                013750  021062                          .WORD   T20
                013752  021266                          .WORD   T21
                013754  021402                          .WORD   T22
                013756  021610                          .WORD   T23
                013760  021676                          .WORD   T24
                013762  022044                          .WORD   T25
                013764  022074                          .WORD   T26
                013766  022246                          .WORD   T27
                013770  022334                          .WORD   T28
                013772  022462                          .WORD   T29
                013774  022504                          .WORD   T30
                013776  022564                          .WORD   T31
                014000  022730                          .WORD   T32
                014002  023066                          .WORD   T33
                014004  023404                          .WORD   T34
                014006  023500                          .WORD   T35
```

```
          014010  023544                          .WORD   T36
          014012  023670                          .WORD   T37
          014014  024306                          .WORD   T38
          014016  024440                          .WORD   T39
          014020  024602                          .WORD   T40
          014022  024742                          .WORD   T41
          014024  025114                          .WORD   T42
          014026  025542                          .WORD   T43
          014030  026262                          .WORD   T44
    145
    146 014032                                    ENDMOD
    147
    148
```

```
                                .SBTTL  LOAD PROTECTION TABLE
                                BGNPROT
014032
014032  000000                  .WORD    CSR                    ;P-TABLE OFFSET OF CSR
014034  177777                  .WORD   -1                      ;NOT A MASS-BUS DRIVE
014036  000011                  .WORD   DRBT+1                  ;P-TABLE OFFSET OF DRIVE NUMBER IN BYTES
014040                          ENDPROT

                                .SBTTL  INITIALIZATION CODE
014040                          BGNMOD  INITCODE

014040                                  BGNINIT

014040                                  BRESET
014040  104433                          TRAP    C$RESET
014042                                  READEF  #EF.PWR                 ;POWER UP?????
014042  012700  000034                  MOV     #EF.PWR,R0
014046  104447                          TRAP    C$REFG
014050                                  BNCOMPLETE      NOPWR           ;NO,BRANCH
014050  103004                          BCC     NOPWR
014052  013737  002012  002242          MOV     L$UNIT,PWRFLG           ;YES, SET POWER FLAG
014060  000475                          BR      CONT                    ;GO TO CONTINUE POINT
014062                          NOPWR:  READEF  #EF.RESTART     ;RESTART?
014062  01270
0       000037                  MOV     #EF.RESTART,R0
014066  104447                          TRAP    C$REFG
014070                                  BCOMPLETE START1
014070  103404                          BCS     START1
014072                                  READEF  #EF.START               ;START???
014072  012700  000040                  MOV     #EF.START,R0
014076  104447                          TRAP    C$REFG
014100                                  BNCOMPLETE      CONTINUE
014100  103010                          BCC     CONTINUE
014102  012700  005074          START1: MOV     #ERCOUNT,R0
014106  012701  000100                  MOV     #64.,R1
014112  005020                  1$:     CLR     (R0)+
014114  005301                          DEC     R1
27      014116  001375                  BNE     1$
014120  000407                          BR      START

                                CONTINUE:       READEF  #EF.CONTINUE    ;CONTINUE????
014122  012700  000036                  MOV     #EF.CONTINUE,R0
014126  104447                          TRAP    C$REFG
014130                                  BCOMPLETE       CONT
014130  103451                          BCS     CONT

014132  005737  002244          NXT:    TST     UUT                     ;DONE ALL UUT'S
014136  001011                          BNE     XXX                     ;NO
014140  012737  177777  002246  START:  MOV     #-1,UNITST
014146  013737  002012  002244          MOV     L$UNIT,UUT
014154  012737  005072  005072          MOV     #ERCOUNT-2,ERPOINT

014162  005237  002246          XXX:    INC     UNITST
014166  062737  000002  005072          ADD     #2,ERPOINT
014174  005337  002244                  DEC     UUT
014200                          REST:   GPHARD  UNITST,R0
014200  013700  002246                  MOV     UNITST,R0
014204  104442                          TRAP    C$GPHRD
```

```
     43 014206
BCOMPLETE       1$
        014206  103406                  BCS     1$
     44 014210  005737  002242          TST     PWRFLG                  ;POWER FLAG TO 0
     45 014214  001746                  BEQ     NXT                     ;YES, DONT DEC IT
     46 014216  005337  002242          DEC     PWRFLG
     47 014222  000743                  BR      NXT                     ;GET NEXT ONE
     48
     49 014224  012037  002262  1$:     MOV     (R0)+,BCSR
     50 014230  012037  002266          MOV     (R0)+,BVEC
     51 014234  012037  002264          MOV     (R0)+,BPRIOR
     52 014240  012037  002406          MOV     (R0)+,T.DRIVE
     53 014244  012037  002270          MOV     (R0)+,D
RIVE
     54 014250  012037  002410          MOV     (R0)+,T.CNTLR   ;GET CONTROLLER TYPE
     55
     56 014254  013700  002262  CONT:   MOV     BCSR,R0         ;BUILD LOGICAL ADDRESSES OF REGISTERS
     57 014260  010037  002250          MOV     R0,RLCS
     58 014264  062700  000002          ADD     #2,R0
     59 014270  010037  002252          MOV     R0,RLBA
     60 014274  062700  000002          ADD     #2,R0
     61 014300  010037  002254          MOV     R0,RLDA
     62 014304  062700  000002          ADD     #2,R0
     63 014310  010037  002256          MOV     R0,RLMP
     64 014314  022
737     000003  002410      CMP     #3,T.CNTLR              ;IF THIS IS AN RLV12, BUILD LOGICAL
     65 014322  001004                  BNE     1$                      ;ADDRESS FOR BUS ADDRESS EXTENSION.
     66 014324  062700  000002          ADD     #2,R0
     67 014330  010037  002260          MOV     R0,RLBE
     68
     69 014334  005737  002242  1$:     TST     PWRFLG                  ;RECENT POWER FAILURE?
     70 014340  001476                  BEQ     END                     ;NO
     71
     72                              ;THERE WAS A RECENT POWER FAILURE, THEREFORE WE WILL WAIT
     73                              ;FOR THE DRIVE TO COME READY
     74
     75 014342  012701
        000170                  MOV     #120.,R1                ;INITIALIZE WAIT COUNT
     76 014346  012777  000200  165674          MOV     #200,@RLCS              ;SET CRDY
     77 014354  053777  002270  165666          BIS     DRIVE,@RLCS             ;SET IN DRIVE SELECT
     78 014362  032777  000001  165660  DRVRDY: BIT     #DRDY,@RLCS             ;DRIVE READY???
     79 014370  001042                  BNE     BGNTST                  ;YES, THEN START TEST
     80 014372  012737  000050  002414          MOV     #40.,DLYCNT             ;INITIALIZE DELAY COUNT
     81 014400                  WAIT0:  DELAY   1                       ;IMPLEMENT 100-USEC DELAY
        014400  012727  000001          MOV
     #1,(PC)+
        014404  000000                  .WORD   0
        014406  013727  002116          MOV     L$DLY,(PC)+
        014412  000000                  .WORD   0
        014414  005367  177772          DEC     -6(PC)
        014420  001375                  BNE     .-4
        014422  005367  177756          DEC     -22(PC)
        014426  001367                  BNE     .-20
     82 014430  005337  002414          DEC     DLYCNT                  ;DECREMENT DELAY COUNT
     83 014434  001361                  BNE     WAIT0                   ;BRANCH IF TIME DELAY NOT EXPIRED
     84 014436  005301                  DEC     R1                      ;SIXTY SECONDS GONE BY
     85 014440  001350                  BNE     DRVRDY                  ;NO, GO BACK
     86 01444
2                               PRINTB  #FRMT12                 ;DROPPING DRIVE - DRIVE DID NOT RECOVER
        014442  012746  013412          MOV     #FRMT12,-(SP)
        014446  012746  000001          MOV     #1,-(SP)
        014452  010600                  MOV     SP,R0
        014454  104414                  TRAP    C$PNTB
```

```
                014456  062706  000004                  ADD     #4,SP
          87
          88    014462  004737  012552          6$:     JSR     PC,LINE1                ;/FROM POWER FAILURE
          89    014466                                  DODU    UNITST                  ;GIVE DRIVE INFO
                014466  013700  002246                  MOV     UNITST,R0               ;TELL SUPERVISOR TO DROP IT
                014472  104451                          TRAP    C$DODU
          90    014474                                  DOCLN                           ;FORCE AN ABORT
                014474  104444                          TRAP    C$DCLN
          91    014476  012777  000013  165550  BGNTST: MOV     #13,@RLDA               ;SETUP DR RST
          92    014504  012777  000204  165536          MOV     #204,@RLCS              ;GS FUNC
          93    014512  053777  002270  165530          BIS     DRIVE,@RLCS             ;SELECT DRIVE
          94    014520  042777  000200  165522          BIC     #200,@RLCS              ;ISSUE IT
          95    014526  032
777             000200  165514  4$:     BIT     #200,@RLCS              ;WAIT FOR READY
          96    014534  001774                          BEQ     4$
          97    014536                          END:    SETVEC  BVEC,#INTSRV,#340
                014536  012746  000340                  MOV     #340,-(SP)
                014542  012746  016260                  MOV     #INTSRV,-(SP)
                014546  013746  002266                  MOV     BVEC,-(SP)
                014552  012746  000003                  MOV     #3,-(SP)
                014556  104437                          TRAP    C$SVEC
                014560  062706  000010                  ADD     #10,SP
          98    014564  005037  002324                  CLR     PFLG                    ;CLR PROCESSOR FLAG
          99    014570                                  READBUS                         ;Q-BUS
                014570  104407                          TRAP    C$RDBU

         100    014572                                  BNCOMPLETE      1$
                014572  103002                          BCC     1$
         101    014574  005237  002324                  INC     PFLG                    ;NO, Q-BUS THEN
         102    014600                          1$:
         103    014600                                  ENDINIT
                014600                          L10013:
                014600  104411                          TRAP    C$INIT
         104
         105    014602                                  ENDMOD
         106
         107                                    .SBTTL  AUTO DROP SECTION
         108    014602                          BGNAUTO
         109    014602  005037  002326                  CLR     TRPFLG                  ;CLEAR TRAP FLAG
         110                                                                            ;SET UP VECTOR TO DETECT NON-EXISTENT
         111                                                                            ;/CONTROLLER
         112    014606                                  SETVEC  ERR
VEC,#TRPHAN,#340
                014606  012746  000340                  MOV     #340,-(SP)
                014612  012746  016252                  MOV     #TRPHAN,-(SP)
                014616  013746  002340                  MOV     ERRVEC,-(SP)
                014622  012746  000003                  MOV     #3,-(SP)
                014626  104437                          TRAP    C$SVEC
                014630  062706  000010                  ADD     #10,SP
         113    014634  012746  000340                  MOV     #340,-(SP)
         114    014640  012746  016252                  MOV     #TRPHAN,-(SP)
         115    014644  013746  002340                  MOV     ERRVEC,-(SP)
         116    014650  012746  000003                  MOV     #3,-(SP)
         117    014654  104037                          EMT     C$SVEC
         118    014656  0
62706           000010                  ADD     #10,SP
         119
         120    014662  005777  165362                  TST     @RLCS                   ;ACCESS CONTROLLER
         121    014666                                  CLRVEC  ERRVEC                  ;RELEASE VECTOR
                014666  013700  002340                  MOV     ERRVEC,R0
                014672  104436                          TRAP    C$CVEC
```

```
    122 014674  013700  002340                      MOV     ERRVEC,R0
    123 014700  104036                              EMT     C$CVEC
    124 014702  005737  002326                      TST     TRPFLG
;DID IT TRAP?
    125 014706  001416                              BEQ     1$              ;NO - CHECK ITS DRIVE
    126 014710                                      PRINTB  #FRMT14         ;ELSE, PRINT MSG. "DRIVE DROPPED - NO CONTROLLER"
        014710  012746  013522                      MOV     #FRMT14,-(SP)
        014714  012746  000001                      MOV     #1,-(SP)
        014720  010600                              MOV     SP,R0
        014722  104414                              TRAP    C$PNTB
        014724  062706  000004                      ADD     #4,SP
    127 014730  004737  012552                      JSR     PC,LINE1        ;PROVIDE DRIVE INFORMATION
    128 014734                                      DODU    UNITST          ;DO DROP UNIT ON DRIVE
        014734  013700  002246                      MOV     UNITST,R0

        014740  104451                              TRAP    C$DODU
    129 014742  000427                              BR      2$              ;EXIT
    130
    131 014744  012777  000200  165276  1$:         MOV     #200,@RLCS      ;SET CONTROLLER READY
    132 014752  053777  002270  165270              BIS     DRIVE,@RLCS     ;SELECT DRIVE
    133 014760  032777  000001  165262              BIT     #1,@RLCS        ;IS DRIVE READY?
    134 014766  001015                              BNE     2$              ;YES - EXIT
    135                                                                     ;ELSE, PRINT MSG. "DRIVE DROPPED - DID NOT
    136                                                                     ;/RESPOND WITH "READY"
    137 014770                                      PRINTB  #FRMT15
        014770  012746  013566
        MOV     #FRMT15,-(SP)
        014774  012746  000001                      MOV     #1,-(SP)
        015000  010600                              MOV     SP,R0
        015002  104414                              TRAP    C$PNTB
        015004  062706  000004                      ADD     #4,SP
    138 015010  004737  012552                      JSR     PC,LINE1        ;PROVIDE DRIVE INFORMATION
    139 015014                                      DODU    UNITST          ;DO DROP UNIT ON DRIVE
        015014  013700  002246                      MOV     UNITST,R0
        015020  104451                              TRAP    C$DODU
    140 015022                          2$:
    141 015022                          ENDAUTO
        015022                          L10014:
        015022  104461                              TRAP    C$AUTO
    142
    143 015024                          BGNMOD  CLNCODE
    1
44
    145 015024                                      BGNCLN
    146
    147 015024                                      SETPRI  #PRIO7
        015024  012700  000340                      MOV     #PRIO7,R0
        015030  104441                              TRAP    C$SPRI
    148
    149 015032  032777  000200  165210  1$:         BIT     #CRDY,@RLCS
    150 015040  001774                              BEQ     1$
    151
    152 015042  042777  000100  165200              BIC     #INTEN,@RLCS
    153
    154 015050                                      CLRVEC  BVEC
        015050  013700  002266                      MOV     BVEC,R0
        015054  104436                              TRAP    C$CVEC
    155
    156
    157
    158 015056  005737  002242                      TST     PWRFLG                  ;TREAT POW
ER FAILURE
```

```
    159 015062  001402                        BEQ     2$
    160
    161 015064  005337  002242                DEC     PWRFLG
    162
    163 015070                          2$:
    164 015070                                  ENDCLN
        015070                          L10015:
        015070  104412                          TRAP    C$CLEAN
    165
    166 015072                                  ENDMOD
    167
    168
    169
    170 015072                          BGNMOD  DRPCODE
    171
    172 015072                                  BGNDU
    173

174     015072  000240                          NOP
    175
    176 015074                                  ENDDU
        015074                          L10016:
        015074  104453                          TRAP    C$DU
    177
    178 015076                          ENDMOD
    179
    180 015076                          BGNMOD  ADDCODE
    181
    182 015076                                  BGNAU
    183
    184 015076  000240                          NOP
    185
    186 015100                                  ENDAU
        015100                          L10017:
        015100  104452                          TRAP    C$AU
    187
    188 015102                          ENDMOD
    189
    190
    191
```

```
                                        .SBTTL  GLOBAL SUBROUTINES

015102                                  BGNMOD  GLBSUB


015102                                  CKERLT: INLOOP
015102  104420                                  TRAP    C$INLP
015104                                          BCOMPLETE       99$
015104  103427                                  BCS     99$
015106  005737  013672                          TST     DROP
015112  001424                                  BEQ     99$
015114  005277  167752                          INC     @ERPOINT
015120  027737  167746  013674                  CMP     @ERPOINT,MERLMT
015126  002416                                  BLT     99$

015130                                          PRINTF  #FRMT11
015130  012746  013351                          MOV     #FRMT11,-(SP)
015134  012746  000001                          MOV     #1,-(SP)
015140  010600                                  MOV     SP,R0
015142  104417                                  TRAP    C$PNTF
015144  062706  000004                          ADD     #4,SP
015150  004737  012552                          JSR     PC,LINE1
015154                                          DODU    UNITST          ;DROP THE UNIT
015154  013700  002246                          MOV     UNITST,R0
015160  104451                                  TRAP    C$DODU
015162                                          DOCLN
015162  104444                                  TRAP    C$DCLN
015164                                  99$:
015164  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 INTE
RRUPT
                                        ;*
                                        ;*
                                        ;*
                                        ;*ROUTINE USES R0,R1 AND PICKS HEADER FROM R3
                                        ;*
                                        ;*      CALL    JSR     R5,CHERR
                                        ;*
                                        ;*
                                        ;*

015166  005037  002304                  CHERR:  CLR     DERFLG          ;CLEAR OUT DRIVE ERROR FLAG
015172  032737  176000  002306                  BIT     #176000,E.CS    ;ANY ERRORS SET
015200  001001                                  BNE     199$            ;IF YES, INVESTIGATE
015202  000205                                  RTS     R5              ;NO, EXIT
```

```
     48 015204  023727  002412  000004  199$:   CMP     TMPFNC,#GSTAT   ;FUNCTION-NOP, RESET, GETSTATUS
     49 015212  002401                           BLT     98$             ;YES, GO CHECK IF ONLY DRIVE ERROR
     50 015214  000414                           BR      1$              ;YES SERVICE ERROR
     51 015216  023727  002412  000002  98$:    CMP     TMPFNC,#WRCHK
     52 015224  001410                           BEQ     1$
     53 015226  013700  002306                   MOV     E.CS,R0         ;GET E.
CS
     54 015232  042700  001777                   BIC     #1777,R0        ;
     55 015236  022700  140000                   CMP     #140000,R0      ;DRIVE ERROR ALONE?
     56 015242  001001                           BNE     1$              ;NO, GO SERVICE
     57 015244  000205                   2$:     RTS     R5              ;YES, EXIT
     58
     59 015246  012701  011770           1$:     MOV     #EM102,R1       ;GET START OF STRING
     60 015252  005737  002306                   TST     E.CS            ;IS COMPOSITE ERROR SET?(BETTER BE)
     61 015256  100003                           BPL     99$             ;IT'S NOT SOMETHING IS WRONG
     62 015260  004537  015732                   JSR     R5,FIX          ;YES, PUT "COMP" IN
 STRING
     63 015264  006045                           COMP                    ;"COMP"
     64 015266  032737  040000  002306  99$:     BIT     #DERR,E.CS      ;DRIVE ERROR SET?
     65 015274  001405                           BEQ     3$              ;NO, CONTINUE
     66 015276  005237  002304                   INC     DERFLG          ;SET DRV ERROR FLAG
     67 015302  004537  015732                   JSR     R5,FIX          ;YES, PUT "DRV" INTO STRING
     68 015306  005774                           DEMES                   ;"DRV"
     69 015310  032737  020000  002306  3$:      BIT     #NXM,E.CS       ;NON-EXISTENT MEMORY ERROR?
     70 015316  001403                           BEQ     4$              ;NO, CONTINUE
     71 015320  00
4537    015732                           JSR     R5,FIX                  ;YES, PUT "NXM" INTO STRING
     72 015324  006001                           NXMMES                  ;"NXM"
     73 015326  032737  002000  002306  4$:      BIT     #OPI,E.CS       ;IS OPI SET?
     74 015334  001422                           BEQ     6$              ;NO, GO CHECK BITS 11 & 12
     75 015336  004537  015732                   JSR     R5,FIX          ;PUT "OPI" INTO STRING
     76 015342  006006                           OPIMES                  ;"OPI"
     77 015344  032737  004000  002306           BIT     #BIT11,E.CS     ;HEADERCRC ERROR?
     78 015352  001403                           BEQ     5$              ;NO, GO CHECK HEADER NOT FOUND
     79 015354  004537  015
732                              JSR     R5,FIX          ;GO PUT "HCRC" IN STRING
     80 015360  006013                           HCRCMES                 ;"HCRC"
     81 015362  032737  010000  002306  5$:      BIT     #BIT12,E.CS     ;HEADER NOT FOUND?
     82 015370  001422                           BEQ     8$              ;NO, GO PUT "CRLF" IN STRING
     83 015372  004537  015732                   JSR     R5,FIX          ;PUT "HNF" IN STRING
     84 015376  006021                           HNFMES                  ;"HNF"
     85 015400  000416                           BR      8$              ;PUT "CRLF" IN STRING
     86 015402  032737  004000  002306  6$:      BIT     #BIT11,E.CS     ;DATA CRC ERROR?
     87 015410  001403                           BEQ     7$              ;N
O, GO CHECK DATA LATE
     88 015412  004537  015732                   JSR     R5,FIX          ;PUT "DCK" IN STRING
     89 015416  006026                           DCKMES                  ;"DCK"
     90 015420  032737  010000  002306  7$:      BIT     #BIT12,E.CS     ;DATA LATE ERROR?
     91 015426  001403                           BEQ     8$              ;NO, GO PUT IN "CRLF"
     92 015430  004537  015732                   JSR     R5,FIX          ;PUT "DLT" IN STRING
     93 015434  006033                           DLTMES                  ;"DLT"
     94 015436  004537  015732           8$:     JSR     R5,FIX
     95 015442  006040                           MSCRLF
     96 015444  004537  015732                   JSR     R5,FIX
     97
        015450  000000                   RESTMS: .WORD   0               ;HEADER FROM TEST
     98 015452  105011                           CLRB    (R1)            ;PUT TERMINATOR IN
     99
    100 015454                                   ERRDF   300.,LF,ERR6
        015454  104455                           TRAP    C$ERDF
        015456  000454                           .WORD   300
        015460  006043                           .WORD   LF
        015462  012452                           .WORD   ERR6
```

```
     101
     102 015464  000205                          RTS     R5              ;EXIT ROUTIN
E
     103
     104                                  .SBTTL  LOAD RLCS
     105                                  ;**************************************************************************
     106                                  ;* ROUTINE TO LOAD RLCS WITH FUNCTION TO BE PERFORMED
     107                                  ;*      CALL:   JSR     R5,LDFUNC
     108                                  ;*              .WORD                   ;BITS TO BE LOADED, FUNCTION
     109                                  ;*                                      ;AND INTR ENABLE ONLY
     110                                  ;*
     111                                  ;
     112
     113 015466  012537  002332           LDFUNC: MOV     (R5)+,LDCSR     ;GET BITS TO LOAD
     114 015472  005737  002304                   TST     DERFLG
     115 015476  001424                           BEQ     98$
     116 015500  013746  002272                   MOV     B.CS,-(SP)
     117 015504  012777  000013  164542           MOV     #13,@RLDA
     118 015512  012737  000004  002272           MOV     #GSTAT,B.CS
     119 015520  053737  002270  002272           BIS     DRIVE,B.CS
     120 015526  013777  002272  164514           MOV     B.CS,@RLCS
     121 015534  012637  002272                   MOV     (SP)+,B.CS
     122 015540  032777  000200  164502  99$:     BIT     #200,@RLCS
     123 015546  001774                           BEQ     99$
     124 015550  010346                   98$:    MOV     R3,-(SP)        ;SAVE R3
     125 015552  042737  177661  002332           BI
C         #177661,LDCSR   ;CLEAR ALL BUT FUNC & INTR EN
     126 015560  013737  002332  015704           MOV     LDCSR,FNDFNC    ;SAVE FUNCTION
     127 015566  042737  000100  015704           BIC     #INTEN,FNDFNC   ;ONLY FUNCTION
     128 015574  013737  015704  002412           MOV     FNDFNC,TMPFNC
     129 015602  012703  015706                   MOV     #HDRLST,R3      ;GET HEADER LIST
     130 015606  006237  015704                   ASR     FNDFNC          ;ALIGN TO RIGHT
     131 015612  001404                           BEQ     2$
     132 015614  022323                   1$:     CMP     (R3)+,(R3)+     ;BUMP R3 BY 4
     133 015616  005337  015704                   DEC
FNDFNC          ;FOUND IT
     134 015622  001374                           BNE     1$              ;NO,KEEP LOOKING
     135 015624  032737  000100  002332   2$:     BIT     #INTEN,LDCSR    ;YES,DO WE WANT FLAG OR INTR
     136 015632  001401                           BEQ     3$              ;FLAG BRANCH
     137 015634  005723                           TST     (R3)+           ;INTR POINT TO THAT ONE
     138 015636  011303                   3$:     MOV     (R3),R3         ;SET HEADER
     139 015640  010337  015450                   MOV     R3,RESTMS       ;SET UP HEADER
     140 015644  053737  002270  002332           BIS     DRIVE,LDCSR     ;SELECT DRIVE
     141 015652  052737  000200  002332   4$:     BIS     #200,
LDCSR     ;CONTROLLER READY
     142 015660  013777  002332  164362           MOV     LDCSR,@RLCS
     143 015666  004537  015744                   JSR     R5,BEFORE
     144 015672  042777  000200  164350   5$:     BIC     #200,@RLCS
     145 015700  012603                           MOV     (SP)+,R3        ;RESTORE R3
     146 015702  000205                           RTS     R5              ;EXIT
     147
     148 015704  000000                   FNDFNC: .WORD   0
     149
     150 015706  006126                   HDRLST: NOPMES
     151 015710  006157                           NOPINT
     152 015712  006211                           WCKMES
     153 015714  006251                           WCKINT
     154 015716  006476                   OK
HDR:      GSTMES
     155 015720  006535                           GSTINT
     156 015722  006413                           SEKMES
     157 015724  006444                           SEKINT
```

```
     158 015726  006312                          RHDMES
     159 015730  006352                          RHDINT
     160
     161                                ;*********************************************************************
     162                                ;*ROUTINE TO MOVE ASCII STRINGS
     163                                ;*USES REGISTERS R1 - WHERE STRING IS
BEING BUILT
     164                                ;*
     165                                ;*       CALL    JSR     R5,FIX
     166                                ;*               .WORD           ;ADDRESS OF STRING TO MOVE
     167
     168 015732  012500                 FIX:    MOV     (R5)+,R0        ;GET ADDRESS AND MOVE RETURN
     169 015734  112021                 1$:     MOVB    (R0)+,(R1)+     ;GET BYTE AND UPDATE
     170 015736  001376                         BNE     1$              ;WATCH O BYTE TERMINATOR
     171 015740  105741                         TSTB    -(R1)           ;BACK UP OVER ZERO BYTE
     172 015742  000205                         RTS     R5              ;EXIT
     173
     174
     175                                ;LOAD REGISTERS BEFORE OPERATION
     176                                ;CALL:  JSR
     R5,BEFORE
     177
     178 015744  017737  164300  002272 BEFORE: MOV     @RLCS,B.CS      ;READ CS
     179 015752  017737  164274  002274         MOV     @RLBA,B.BA      ;READ BA
     180 015760  017737  164270  002276         MOV     @RLDA,B.DA      ;READ DA
     181 015766  017737  164264  002300         MOV     @RLMP,B.MP      ;READ MP
     182 015774  022737  000003  002410         CMP     #3,T.CNTLR      ;IF THE CONTOLLER IS AN RLV12
     183 016002  001003                         BNE     1$              ;READ BE
     184 016004  017737  164250  002302         MOV     @RLBE,B.BE
     185
     186 016012  000205                 1$:
RTS  R5
     187
     188
     189                                ;LOAD REGISTERS AT ERROR
     190                                ;CALL:  JSR     R5,AFTER
     191
     192 016014  017737  164230  002306 AFTER:  MOV     @RLCS,E.CS      ;READ CS
     193 016022  017737  164224  002310         MOV     @RLBA,E.BA      ;READ BA
     194 016030  017737  164220  002312         MOV     @RLDA,E.DA      ;READ DA
     195 016036  017737  164214  002314         MOV     @RLMP,E.MP      ;READ MP
     196 016044  017737  164206  002316         MOV     @RLMP,E.MP1     ;READ MP SECOND WORD IN SILO
     197 016052  017737  164200  002320         MOV     @RLMP,E.MP
2       ;READ MP THIRD WORD IN SILO
     198 016060  022737  000003  002410         CMP     #3,T.CNTLR      ;IF THE CONTROLLER IS AN RLV12
     199 016066  001003                         BNE     1$              ;READ BE
     200 016070  017737  164164  002322         MOV     @RLBE,E.BE
     201
     202 016076  000205                 1$:     RTS     R5
     203
     204
     205
     206                                .SBTTL  ROUTINE TO CALCULATE CRC
     207
     208                                ;ROUTINE WILL CALCULATE A CRC-16 CRC ON A WORD OF
     209                                ;1-16 BITS IN LENGTH, RESULT IS RETURNED IN "CALBCC"
     210                                ;
     211                                ;       CALL:   JSR
     R5,SIMBCC
     212                                ;               .WORD           ;NUMBER OF BITS (1-16)
     213                                ;               .WORD           ;DATA FOR CRC CALCULATION
     214                                ;               .WORD           ;PREVIOUS OR STARTING CRC
```

```
                                        ;                                       (SHOULD BE ZEROED FOR START)
                                        ;       ROUTINE USES R0,F ,R2
                                SIMBCC: MOV     R0,-(SP)        ;SAVE R0
                                        MOV     R1,-(SP)        ;SAVE
R1
                                        MOV     R2,-(SP)        ;SAVE R2

016106  012537  002346                 MOV     (R5)+,TEMP2     ;GET NUMBER OF BITS
016112  012537  002350                 MOV     (R5)+,TEMP3     ;GET DATA FOR CRC CALCULATION
016116  012537  002352                 MOV     (R5)+,TEMP4     ;GET STARTING CRC

016122  005037  002342         1$:     CLR     BCCFBK          ;
016126  013700  002352                 MOV     TEMP4,R0        ;GET PREVIOUS CRC
016132  006037  002350                 ROR     TEMP3           ;ROTATE NEW DATA
016136  005500                         ADC     R0              ;MERGE NEW
WITH OLD
016140  032700  000001                 BIT     #1,R0           ;BIT 0 SET
016144  001402                         BEQ     2$              ;IF NOT CONTINUE
016146  005137  002342                 COM     BCCFBK          ;
016152  013700  002336         2$:     MOV     XPOLY,R0        ;GET CRC POLYNOMIAL (CRC-16)
016156  005100                         COM     R0              ;COMPLIMENT POLYNOMIAL
016160  040037  002342                 BIC     R0,BCCFBK
016164  000241                         CLC                     ;CLEAR CARRY
016166  006037  002352                 ROR     TEMP4
016172  013700  002342                 MOV     BCCFBK,R0
016176  013701
002352                  MOV     TEMP4,R1
016202  010102                         MOV     R1,R2
016204  040100                         BIC     R1,R0
016206  043702  002342                 BIC     BCCFBK,R2
016212  050200                         BIS     R2,R0
016214  043737  002336  002352         BIC     XPOLY,TEMP4
016222  050037  002352                 BIS     R0,TEMP4
016226  005337  002346                 DEC     TEMP2
016232  001333                         BNE     1$
016234  013737  002352  002344         MOV     TEMP4,CALBCC

016242  012602                         MOV     (SP)+,R2        ;RESTORE REGISTERS FROM STACK
01
6244    012601                 MOV     (SP)+,R1
016246  012600                         MOV     (SP)+,R0

016250  000205                         RTS     R5              ;RETURN


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


016252  005237  002326         TRPHAN: INC     TRPFLG          ;INDICATE TRAP
016256  000002                         RTI                     ;RETURN

016260                          BGNSRV

016260  005237  002330         INTSRV: INC     INTFLG          ;INDICATE INTERRUPT

016264
ENDSRV
016264                          L10020:
016264  000002                         RTI
```

```
    270
    271                                         ;ROUTINE TO WAIT FOR DRIVE READY
    272 016266  010146                  WTDRDY: MOV     R1,-(SP)        ;SAVE R1
    273 016270  012701  003720                  MOV     #2000.,R1       ;TIME OUT OF 200 MILLISECONDS
    274 016274  032777  000001  163746  1$:     BIT     #DRDY,@RLCS     ;DRIVE READY?
    275 016302  001022                          BNE     2$              ;
YES, EXIT
    276 016304                                  DELAY   1               ;WAIT A WHILE
        016304  012727  000001                 MOV     #1,(PC)+
        016310  000000                          .WORD   0
        016312  013727  002116                 MOV     L$DLY,(PC)+
        016316  000000                          .WORD   0
        016320  005367  177772                 DEC     -6(PC)
        016324  001375                         BNE     .-4
        016326  005367  177756                 DEC     -22(PC)
        016332  001367                         BNE     .-20
    277 016334  005301                          DEC     R1              ;CHECK IF TIME UP
    278 016336  001356                          BNE     1$              ;NO, GO CHECK DRIVE READY
    279
    280 016340                                  ERRDF   200.,DRTIM,ERR5 ;DRIVE READY DID NOT
SET
        016340  104455                          TRAP    C$ERDF
        016342  000310                          .WORD   200
        016344  006712                          .WORD   DRTIM
        016346  012440                          .WORD   ERR5
    281
    282 016350  012601                  2$:     MOV     (SP)+,R1        ;RESTORE
    283 016352  000205                          RTS     R5              ;EXIT
    284
    285                                         ;ROUTINE TO WAIT FOR CONTROLLER READY
    286 016354  010146                  WTCRDY: MOV     R1,-(SP)        ;SAVE R1
    287 016356  012701  017500                  MOV     #8000.,R1       ;WAIT 800 MILLISECONDS
    288 016362  032777  000200  163660  1$:     BIT     #CRDY,@RLCS     ;CONTROLLER READY
    289 016370
001025                                  BNE     2$                      ;YES, EXIT
    290 016372                                  DELAY   1               ;WAIT A WHILE
        016372  012727  000001                 MOV     #1,(PC)+
        016376  000000                          .WORD   0
        016400  013727  002116                 MOV     L$DLY,(PC)+
        016404  000000                          .WORD   0
        016406  005367  177772                 DEC     -6(PC)
        016412  001375                         BNE     .-4
        016414  005367  177756                 DEC     -22(PC)
        016420  001367                         BNE     .-20
    291 016422  005301                          DEC     R1              ;CHECK IF TIME UP
    292 016424  001356                          BNE     1$              ;NO GO BACK
    293
    294 016426  004537  016014                  JSR     R5,AFTER        ;GET REGIS
TERS
    295
    296 016432                                  ERRDF   100.,CRTIM,ERR6 ;CONTROLLER TIMED OUT
        016432  104455                          TRAP    C$ERDF
        016434  000144                          .WORD   100
        016436  006665                          .WORD   CRTIM
        016440  012452                          .WORD   ERR6
    297
    298 016442  000402                          BR      3$              ;EXIT
    299
    300 016444  004537  016014          2$:     JSR     R5,AFTER        ;GET REGISTERS
    301 016450  012601                  3$:     MOV     (SP)+,R1
    302 016452  000205                          RTS     R5              ;EXIT
```

```
     303
     304 016454                          ENDMOD
     305
     306
```

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

                                BGNTST                          ;****START OF TEST****
                                STARS
                                ;;*************************************************************
                                ;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.
                                STARS
                                ;;*************************************************************

016454  005037  002326          1$:     CLR     TRPFLG          ;CLEAR TRAP OCCURANCE
016460                          2$:     SETVEC  ERRVEC,#TRPHAN,#340  ;SET TO CATCH TRAP
016460  012746  000340                  MOV     #340,-(SP)
016464  012746  016252                  MOV     #TRPHAN,-(SP)
016470  013746  002340                  MOV     ERRVEC,-(SP)
016474  012746  000003                  MOV     #3,-(SP)
016500  104437                          TRAP    C$SVEC
016502  062706  000010                  ADD     #10,SP

016506  005777  163536                  TST     @RLCS           ;ADDRESS RLCS
016512                                  CLRVEC  ERRVEC          ;RELEASE TRAP VECTOR
016512  013700  002340                  MOV     ERRVEC,R0
016516  104436                          TRAP    C$CVEC
016520  005737  002326                  TST     TRPFLG          ;TRAP OCCURRED???
016524  001407                          BEQ     3$              ;NO, IKAY PROCEED

016526  013737  002250  002362          MOV     RLCS,GDDAT      ;SET UP ERROR DATA

016534                                  ERRSF   0.,EM1,ERR1     ;BUS TIMEOUT IN ADDRESSING RLCS
016534  104454                          TRAP    C$ERSF
016536  000000                          .WORD   0
016540  006740                          .WORD   EM1
016542  012244                          .WORD   ERR1
016544                          3$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
016544  104406                          TRAP    C$CLP1
016546                          ENDTST                          ;****END OF TEST****
016546                          L10021:
016546  104401                          TRAP    C$ETST


                                .SBTTL  **TEST 2
** - RLBA ADDRESSABILITY

016550                          BGNTST                          ;****START OF TEST****


016550                          STARS
                                ;;*************************************************************
                                ;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.
016550                          STARS
                                ;;*************************************************************
*********

016550  005037  002326          1$:     CLR     TRPFLG          ;CLEAR TRAP OCCURANCE
```

```
     39 016554                                  2$:     SETVEC  ERRVEC,#TRPHAN,#340  ;SET TO CATCH TRAP
        016554  012746  000340                         MOV     #340,-(SP)
        016560  012746  016252                         MOV     #TRPHAN,-(SP)
        016564  013746  002340                         MOV     ERRVEC,-(SP)
        016570  012746  000003                         MOV     #3,-(SP)
        016574  10
4437                                    TRAP    C$SVEC
        016576  062706  000010                         ADD     #10,SP
     40
     41 016602  005777  163444                         TST     @RLBA               ;ADDRESS RLBA
     42 016606                                         CLRVEC  ERRVEC              ;RELEASE TRAP VECTOR
        016606  013700  002340                         MOV     ERRVEC,R0
        016612  104436                                 TRAP    C$CVEC
     43 016614  005737  002326                         TST     TRPFLG              ;TRAP OCCURRED???
     44 016620  001407                                 BEQ     3$                  ;NO, CONTINUE
     45 016622  013737  002252  002362                 MOV     RLBA,GDDAT          ;SETUP ERROR DATA
     46
     47 016630                                         ERRSF   1.,EM2,ERR1         ;BUS TIMEOUT IN ADDRES
SING RLBA
        016630  104454                                 TRAP    C$ERSF
        016632  000001                                 .WORD   1
        016634  006765                                 .WORD   EM2
        016636  012244                                 .WORD   ERR1
     48 016640                                  3$:     CKLOOP                      ;CHECK IF /FL:LOE IS SET
        016640  104406                                 TRAP    C$CLP1
     49 016642                                  ENDTST                              ;****END OF TEST****
        016642                                  L10022:
        016642  104401                                 TRAP    C$ETST
     50
     51
     52                                         .SBTTL  **TEST 3** - RLDA ADDRESSABILITY
     53
     54 016644                                  BGNTST                              ;****START OF TEST****
     55 016644                                  STARS
                                                ;;**************************
*****************************************
     56                                         ;TEST TO SEE IF WE CAN ADDRESS THE DISK ADDRESS
     57                                         ;REGISTER IF WE TRAP WE WILL REPORT THE ERROR
     58                                         ;AND ABORT.  AFTER THIS TEST WE ONLY KNOW THAT
     59                                         ;WE CAN ADDRESS THE REGISTER.
     60 016644                                  STARS
                                                ;;**********************************************************************
     61
     62
     63 016644  005037  002326                  1$:     CLR     TRPFLG              ;CLEAR TRAP OCCURANCE
     64 016650                                  2$:     SETVEC  ERRVEC,#TRPHAN,#340  ;SET TO CATCH
TRAP
        016650  012746  000340                         MOV     #340,-(SP)
        016654  012746  016252                         MOV     #TRPHAN,-(SP)
        016660  013746  002340                         MOV     ERRVEC,-(SP)
        016664  012746  000003                         MOV     #3,-(SP)
        016670  104437                                 TRAP    C$SVEC
        016672  062706  000010                         ADD     #10,SP
     65
     66 016676  005777  163352                         TST     @RLDA               ;ADDRESS RLDA
     67 016702                                         CLRVEC  ERRVEC              ;RELEASE TRAP VECTOR
        016702  013700  002340                         MOV     ERRVEC,R0
        016706  104436                                 TRAP    C$CVEC
     68 016710  005737  002326                         TST     TRPFLG              ;TRAP OCCURRED???

 69     016714  001407                                 BEQ     3$                  ;NO, CONTINUE
     70
```

```
     71 016716  013737  002254  002362          MOV     RLDA,GDDAT      ;SETUP ERROR INFO
     72 016724                                  ERRSF   2.,EM3,ERR1     ;BUS TIMEOUT IN ADDRESSING RLDA
        016724  104454                          TRAP    C$ERSF
        016726  000002                          .WORD   2
        016730  007012                          .WORD   EM3
        016732  012244                          .WORD   ERR1
     73 016734                          3$:
CKLOOP                  ;CHECK IF /FL:LOE IS SET
        016734  104406                          TRAP    C$CLP1
     74 016736                          ENDTST                          ;****END OF TEST****
        016736                          L10023:
        016736  104401                          TRAP    C$ETST
     75
     76
     77                                 .SBTTL  **TEST 4** - RLMP ADDRESSABILITY
     78
     79 016740                          BGNTST                          ;****START OF TEST****
     80 016740                          STARS
                                        ;;*************************************************************************
     81                                 ;TEST TO SEE IF WE CAN ADDRESS THE MULTIPURPOSE
     82                                 ;REGISTER.  IF WE TRAP WE WILL REPORT THE
ERROR AND
                                        ;ABORT.  AFTER THIS TEST WE ONLY KNOW THAT WE CAN
     84                                 ;ADDRESS THE REGISTER.
     85 016740                          STARS
                                        ;;*************************************************************************
     86
     87
     88 016740  005037  002326          1$:     CLR     TRPFLG          ;CLEAR TRAP OCCURANCE
     89 016744                          2$:     SETVEC  ERRVEC,#TRPHAN,#340  ;SET UP TO CATCH TRAP
        016744  012746  000340                  MOV     #340,-(SP)
        016750  012746  016252                  MOV     #TRPHAN,-(SP)
        016754  013746  002340                  MOV     ERRVEC,-(SP)
        016760  012
746     000003                  MOV     #3,-(SP)
        016764  104437                  TRAP    C$SVEC
        016766  062706  000010                  ADD     #10,SP
     90
     91 016772  005777  163260                  TST     @RLMP           ;ADDRESS RLMP
     92 016776                                  CLRVEC  ERRVEC          ;RELEASE TRAP VECTOR
        016776  013700  002340                  MOV     ERRVEC,R0
        017002  104436                          TRAP    C$CVEC
     93 017004  005737  002326                  TST     TRPFLG          ;TRAP OCCURRED???
     94 017010  001407                          BEQ     3$              ;NO, CONTINUE
     95 017012  013737  002256  002362          MOV     RLMP,GDDAT      ;SET UP ERROR INFO
     96
     97 017020
ERRSF   3.,EM4,ERR1     ;BUS TIMEOUT IN ADDRESSING RLMP
        017020  104454                          TRAP    C$ERSF
        017022  000003                          .WORD   3
        017024  007037                          .WORD   EM4
        017026  012244                          .WORD   ERR1
     98 017030                          3$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        017030  104406                          TRAP    C$CLP1
     99 017032                          ENDTST                          ;****END OF TEST****
        017032                          L10024:
        017032  104401                          TRAP    C$ETST
    100
    101
    102                                 .SBTTL  **TEST 5** - READ WRITE OF RLCS
    103
```

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

    104 017034                                  BGNTST                                  ;****START OF TEST****
    105
    106
    107
    108 017034                                  STARS
                                                ;;*************************************************************************
    109                                         ;TEST THAT WE CAN WRITE/READ BITS 8,9 AND BITS 6-1
    110                                         ;OF THE CONTROL AND STATUS REGISTER.  BITS 15-10 AND 0
    111                                         ;ARE DON'T CARE BITS AT THIS TIME AND BIT 7
    112                                         ;(CONTROLLER READY) IS ALWAYS WRITTE
N TO A ONE.
    113 017034                                  STARS
                                                ;;*************************************************************************
    114
    115
    116 017034  012703  004772                          MOV     #CSPAT,R3       ;SET UP TABLE POINTER OF PATTERNS
    117
    118 017040                                  BGNSEG                          ;****START OF SEGMENT****
        017040  104404                                  TRAP    C$BSEG
    119
    120 017042                                  CSTEST:
    121 017042  011337  002362                          MOV     (R3),GDDAT      ;GET PATTERN INTO GDDAT
    122 017046  052737  000200  002362                  BIS     #200,GDDAT      ;INSURE GO IS SET
    123 017054  013777
002362  163166          MOV     GDDAT,@RLCS     ;LOAD RLCS (CONTROL AND STATUS)
    124 017062  032777  040000  163160                  BIT     #DERR,@RLCS     ;IF DRIVE ERROR PRESENT
    125 017070  001403                                  BEQ     99$             ;THEN EXPECT DRIVE AND
    126 017072  052737  140000  002362                  BIS     #ERR!DERR,GDDAT ;COMPOSITE ERROR
    127 017100  017737  163144  002364  99$:     MOV     @RLCS,BDDAT     ;READ RLCS BACK
    128 017106  042737  000001  002364          BIC     #DRDY,BDDAT     ;IGNORE DRIVE READY
    129 017114  023737  002362  002364          CMP     GDDAT,BDDAT     ;DID WE READ WHAT
WE LOADED
    130 017122  001404                          BEQ     1$              ;YES, THEN BRANCH
    131
    132 017124                                  ERRDF   4.,EM5,ERR2     ;WRONG DATA IN RLCS
        017124  104455                          TRAP    C$ERDF
        017126  000004                          .WORD   4
        017130  007064                          .WORD   EM5
        017132  012256                          .WORD   ERR2
    133 017134                          1$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
        017134  104410                          TRAP    C$ESCAPE
        017136  000012                          .WORD   10000$-.
    134
    135
    136 017140  005723                          TST     (R3)+           ;BUMP FOR NEXT PATTERN
    137 017142  020327  005070                  CMP     R3,#
CSEND   ;CHECK FOR END
    138 017146  001335                          BNE     CSTEST          ;NOT END, LOAD NEXT PATTERN
    139
    140 017150                          ENDSEG                          ;****END OF SEGMENT****
        017150                          10000$:
        017150  104405                          TRAP    C$ESEG
    141 017152                          ENDTST                          ;****END OF TEST****
        017152                          L10025:
        017152  104401                          TRAP    C$ETST
    142
    143
    144                                 .SBTTL  **TEST 6** - READ WRITE OF RLBA
    145
    146 017154                          BGNTST                          ;****START OF TEST****
    147
```

TEST 6 - READ WRITE OF RLBA

```
    148 017154                                  STARS
                                                ;;**********************************************************************
    149                                         ;TEST THAT WE CAN WRITE/READ BITS 15-1 OF THE
    150                                         ;BUS ADDRESS REGISTER.  FOUR PATTERNS ARE USED: GROWING 1, SHIFTING 1,
    151                                         ;GROWING 0 AND SHIFTING 0.  BIT 0 IS ALSO LOADED BUT
    152                                         ;SHOULD ALWAYS COME BACK AS 0
    153 017154                                  STARS
                                                ;;*******************************
************************************
    154
    155
    156 017154  012703  004416                      MOV     #BEGPAT,R3      ;GET START OF PATTERN LIST
    157 017160                              BGNSEG                          ;****START OF SEGMENT****
        017160  104404                              TRAP    C$BSEG
    158 017162                              BATEST:
    159 017162  011337  002362                      MOV     (R3),GDDAT      ;GET PATTERN TO SEND
    160 017166  022737  000001  002410              CMP     #1,T.CNTLR              ;RL11??
    161 017174  002403                              BLT     2$              ;NO,
    162 017176  042737  000001  002362              BIC     #BIT0,GDDAT     ;KEEP RLBA EVEN (UNIBUS)
    163 017
204     013777  002362  163040  2$:     MOV     GDDAT,@RLBA     ;LOAD PATTERN TO BUS ADDRESS
    164 017212  017737  163034  002364              MOV     @RLBA,BDDAT     ;READ IT BACK
    165 017220  023737  002362  002364              CMP     GDDAT,BDDAT     ;IS IT CORRECT?
    166 017226  001404                              BEQ     1$              ;IF SO, BRANCH
    167
    168 017230                                      ERRDF   5.,EM6,ERR2     ;DATA WRONG IN RLBA
        017230  104455                              TRAP    C$ERDF
        017232  000005                              .WORD   5
        017234  007135                              .WORD   EM6
        017236  012256                              .WORD   ERR2
    169 017240                              1$:     ESCAPE  SEG             ;IF /FL:LOE SET LO
OP, ELSE EXIT SEG
        017240  104410                              TRAP    C$ESCAPE
        017242  000012                              .WORD   10000$-.
```

```
                                                TST     (R3)+           ;BUMP FOR NEXT PATTERN
                                                CMP     R3,#ENDPAT      ;CHECK FOR END
                                                BNE     BATEST          ;NOT END, BRANCH FOR NEXT

                                        ENDSEG                          ;****END O
F SEGMENT****
                                        10000$:
                                                TRAP    C$ESEG
                                        ENDTST                          ;****END OF TEST****
                                        L10026:
                                                TRAP    C$ETST


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

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

                                        STARS
                                        ;;*****************************************************************
                                        ;TEST THAT WE CAN WRITE/READ THE DISK ADDRESS REGISTER
                                        ;ALL BIT POSITIONS ARE WRI
TTEN USING FOUR PATTERNS:
                                        ;GROWING 1, SHIFTING 1, GROWING 0 AND SHIFTING 0
                                        STARS
                                        ;;*****************************************************************


                                                MOV     #BEGPAT,R3      ;SET UP POINTER TO PATTERN LIST
                                        BGNSEG                          ;****START OF SEGMENT****
                                                TRAP    C$BSEG
                                        DATEST:
                                                MOV     (R3),GDDAT      ;GET PATTERN
                                                MOV     GDDAT,@
RLDA    ;LOAD PATTERN IN DA

                                                MOV     @RLDA,BDDAT     ;READ PATTERN BACK
                                                CMP     GDDAT,BDDAT     ;IS IT CORRECT?
                                                BEQ     1$              ;BRANCH IF CORRECT

                                                ERRDF   6.,EM7,ERR2     ;WRONG DATA IN RLDA
                                                TRAP    C$ERDF
                                                .WORD   6
                                                .WORD   EM7
                                                .WORD   ERR2
                                        1$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
                                                TRAP    C$ESCAPE
                                                .WORD   10000$-.


                                                TST     (R3)+           ;BUMP POINTER
                                                CMP     R3,#ENDPAT      ;AT END OF PATTERNS?
                                                BNE     DATEST          ;NO, BRANCH BACK

                                        ENDSEG                          ;****END OF SEGMENT****
                                        10000$:
                                                TRAP    C$ESEG
                                        ENDTST                          ;****END OF TEST****
                                        L10027:
```

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

        017344  104401                          TRAP    C$ETST
     42
     43
     44                                 .SBTTL  **TEST 8** - BIS OF RLCS
     45
     46 017346                          BGNTST                          ;****START OF TEST****
     47 017346                          STARS
                                        ;;*****************************************************************
     48                                 ;TEST THAT WE CAN USE THE "BIS" INSTRUCTION ON THE CONTROL
     49                                 ;AND STATUS REGISTER.  BITS 8,9 AND 6-1 ARE TESTED TO
     50                                 ;SET INDIVIDUALLY
 AS WELL AS COLLECTIVELY WITHOUT DESTROYING
     51                                 ;ANY PREVIOUS DATA PATTERN
     52 017346                          STARS
                                        ;;*****************************************************************
     53
     54
     55 017346  012703  004772                  MOV     #CSPAT,R3       ;GET BEGINNING OF LIST
     56 017352                          BGNSEG                          ;****START OF SEGMENT****
        017352  104404                          TRAP    C$BSEG
     57 017354                          1$:
     58 017354  012777  000200  162666          MOV     #CRDY,@RLCS     ;INSURE GO IS THERE
     59 017362  011337  002362                  MOV     (R3),GDDAT      ;SET U
P EXPECTED RLCS
     60 017366  052737  000200  002362          BIS     #CRDY,GDDAT     ;IN GDDAT
     61 017374  051377  162650                  BIS     (R3),@RLCS      ;BIT SET PATTERN IN RLCS
     62 017400  032777  040000  162642          BIT     #DERR,@RLCS     ;IF ERROR BIT SET THEN
     63 017406  001403                          BEQ     99$             ;EXPECT IT ON THE READ
     64 017410  052737  140000  002362          BIS     #ERR!DERR,GDDAT ;BACK
     65 017416  017737  162626  002364  99$:    MOV     @RLCS,BDDAT     ;READ RLCS TO CHECK "BIS"
     66 017424  042737  000001  002364          BIC     #DRDY,BDDAT     ;CLEA
R OUT DRIVE READY
     67 017432  023737  002364  002362          CMP     BDDAT,GDDAT     ;DID BIS WORK?
     68 017440  001404                          BEQ     2$              ;BRANCH IF OKAY
     69
     70 017442                                  ERRDF   7.,EM61,ERR2    ;WRONG DATA IN RLCS
        017442  104455                          TRAP    C$ERDF
        017444  000007                          .WORD   7
        017446  010660                          .WORD   EM61
        017450  012256                          .WORD   ERR2
     71 017452                          2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
        017452  104410                          TRAP    C$ESCAPE
        017454  000012                          .WORD   10000$-.
     72                                                                 ;BIT OR CLEARED OTHER BI
T
     73
     74 017456  005723                          TST     (R3)+           ;GET NEXT PATTERN
     75 017460  022703  005070                  CMP     #CSEND,R3       ;AT END OF LIST
     76 017464  001333                          BNE     1$              ;NO GO BACK FOR TEST OF
     77                                                                 ;NEXT PATTERN
     78 017466                          ENDSEG                          ;****END OF SEGMENT****
        017466                          10000$:
        017466  104405                          TRAP    C$ESEG
     79 017470                          ENDTST                          ;****END OF TEST****
        017470                          L10030:
        017470  104401                          TRAP    C$ETST
     80
     81
     82                                 .SBTTL  **TEST 9** - BIC OF RLCS
     83
     84 017
472                             BGNTST                          ;****START OF TEST****
```

```
     85
     86 017472                          STARS
                                        ;;*****************************************************************
     87                                 ;TEST THAT THE "BIC" INSTRUCTION WILL WORK ON THE
     88                                 ;CONTROL AND STATUS REGISTER.  BITS 8-9 AND 6-1 ARE
     89                                 ;TESTED.
     90 017472                          STARS
                                        ;;**********************
**********************************************
     91
     92
     93 017472  012703  004772                  MOV     #CSPAT,R3       ;GET BEGINNING OF PATTERNS
     94 017476                          BGNSEG                          ;****START OF SEGMENT****
        017476  104404                          TRAP    C$BSEG
     95 017500                          1$:
     96 017500  012777  001776  162542          MOV     #1776,@RLCS     ;SET ALL SETTABLE BITS
     97 017506  012737  001776  002362          MOV     #1776,GDDAT     ;SET UP EXPECT DATA IN
     98 017514  041337  002362                  BIC     (R3),GDDAT      ;GDDAT
     99 017520  041377  162524                  BIC     (R3),@RLCS      ;
CLEAR BITS IN RLCS VIA "BIC"
    100 017524  032777  040000  162516          BIT     #DERR,@RLCS     ;IF DRIVE ERROR BIT SET
    101 017532  001403                          BEQ     99$             ;EXPECT IT SET WHEN WE
    102 017534  052737  140000  002362          BIS     #ERR!DERR,GDDAT ;READ IT BACK
    103 017542  017737  162502  002364  99$:     MOV     @RLCS,BDDAT     ;MOVE RLCS TO BDDAT FOR COMPARE
    104 017550  042737  000001  002364          BIC     #DRDY,BDDAT     ;CLEAR DRIVE READY
    105 017556  023737  002364  002362          CMP     BDDAT,GDDAT     ;DID "BIC" WORK PROPERLY
    106 017564  0
01404                                   BEQ     2$              ;BRANCH IF OKAY
    107
    108 017566                                  ERRDF   8.,EM62,ERR2    ;WRONG DATA IN RLCS
        017566  104455                          TRAP    C$ERDF
        017570  000010                          .WORD   8
        017572  010741                          .WORD   EM62
        017574  012256                          .WORD   ERR2
    109 017576                          2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
        017576  104410                          TRAP    C$ESCAPE
        017600  000012                          .WORD   10000$-.
    110
    111 017602  005723                          TST     (R3)+           ;GET NEXT PATTERN
    112 017604  020327  005070                  CMP     R3,#CSEND       ;AT END OF LIST
    113 017610  001
333                                     BNE     1$              ;NO, GO BACK WITH NEXT PATTERN
    114 017612                          ENDSEG                          ;****END OF SEGMENT****
        017612                          10000$:
        017612  104405                          TRAP    C$ESEG
    115 017614                          ENDTST                          ;****END OF TEST****
        017614                          L10031:
        017614  104401                          TRAP    C$ETST
    116
    117
    118                                 .SBTTL  **TEST 10** - BIS OF RLBA
    119
    120 017616                          BGNTST                          ;****START OF TEST****
    121
    122 017616                          STARS
                                        ;;*****************************************************************
    123                                 ;TEST THAT THE
"BIS" INSTRUCTION WILL WORK ON THE BUS
    124                                 ;ADDRESS REGISTER.  BITS 15-0 ARE LOADED, ONLY BITS 15-1
    125                                 ;ARE EXPECTED BACK.  FOUR PATTERNS ARE USED: GROWING 1, SHIFTING 1,
    126                                 ;GROWING 0, AND SHIFTING 0.
    127 017616                          STARS
```

K5


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


     017616  012703  004416                   MOV     #BEGPAT,R3          ;GET START OF LIST
     017622                           BGNSEG                              ;****START OF SEGMENT****
     017622  104404                           TRAP    C$BSEG
     017624                           1$:
     017624  005077  162422                   CLR     @RLBA               ;CLEAR "BA"
     017630  011337  002362                   MOV     (R3),GDDAT          ;SET EXPECTED
     017634  022737  000001  002410           CMP     #1,T.CNTLR                  ;RL11
     017642  002403                           BLT     3$                  ;NO
     017644  042737  000001  002362           BIC     #1,GDDAT            ;BIT 0 CAN'T SET IN RLBA (UNIBUS)
     017652  051377  16
2374         3$:     BIS     (R3),@RLBA       ;BIS RLBA WITH PATTERN
     017656  017737  162370  002364           MOV     @RLBA,BDDAT         ;READ "BA"
     017664  023737  002364  002362           CMP     BDDAT,GDDAT         ;DID RLBA LOAD PROPERLY?
     017672  001404                           BEQ     2$                  ;BRANCH IF YES

     017674                                   ERRDF   9.,EM63,ERR2        ;WRONG DATA IN RLBA
     017674  104455                           TRAP    C$ERDF
     017676  000011                           .WORD   9
     017700  011024                           .WORD   EM63
     017702  012256                           .WORD   ERR2
     017704                           2$:     ESCAPE  SEG                 ;IF /FL:LOE SET LOOP, ELSE EXIT SEG

017704  104410                        TRAP    C$ESCAPE
     017706  000012                           .WORD   10000$-.

     017710  005723                           TST     (R3)+               ;GET NEXT PATTERN
     017712  020327  004624                   CMP     R3,#ENDPAT          ;DID WE COMPLETE LIST
     017716  001342                           BNE     1$                  ;NO, GO BACK FOR NEXT.
     017720                           ENDSEG                              ;****END OF SEGMENT****
     017720                           10000$:
     017720  104405                           TRAP    C$ESEG
     017722                           ENDTST                              ;****END OF TEST****
     017722                           L10032:
     017722  104401                           TRAP    C$ETST



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

     017724                           BGNTST                              ;****START OF TEST****

     017724                           STARS
                                      ;;*****************************************************************
                                      ;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.
     017724                           STARS
                                      ;;*****************************************************************


     0
17724   012703  004416                MOV     #BEGPAT,R3       ;GET START OF LIST
     017730                           BGNSEG                              ;****START OF SEGMENT****
     017730  104404                           TRAP    C$BSEG
     017732                           1$:
     017732  012777  177776  162312           MOV     #-2,@RLBA           ;SET RLBA TO ALL 1'S (BIT 0=0)
     017740  012737  177776  002362           MOV     #-2,GDDAT           ;SET UP EXPECTED RESULTS
     017746  041337  002362                   BIC     (R3),GDDAT          ;IN GDDAT
```

```
**TEST 11** - BIC OF RLBA

    170 017752  041377  162274                      BIC     (R3),@RLBA      ;BIC RLBA
    171 017756  017737  162270  002364              MOV     @RLBA,BDDAT     ;READ RLBA
    172 017764  023737  002364  002362              CMP     BDDAT,GDDAT     ;BIC WORK OKAY?
    173 017772  001404                              BEQ     2$              ;IF YES BRANCH
    174
    175 017774                                      ERRDF   10.,EM64,ERR2   ;WRONG DATA IN RLBA
        017774  104455                              TRAP    C$ERDF
        017776  000012                              .WORD   10
        020000  011105                              .WORD   EM64
        020002  012256                              .WORD   ERR2
    176 020004                              2$:     ESC
APE     SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
        020004  104410                              TRAP    C$ESCAPE
        020006  000012                              .WORD   10000$-.
    177
    178 020010  005723                              TST     (R3)+           ;GET NEXT PATTERN
    179 020012  020327  004624                      CMP     R3,#ENDPAT      ;HAVE WE COMPLETED LIST
    180 020016  001345                              BNE     1$              ;NO, GO BACK FOR NEXT
    181 020020                              ENDSEG                          ;****END OF SEGMENT****
        020020                              10000$:
        020020  104405                              TRAP    C$ESEG
    182 020022                              ENDTST                          ;****END OF TEST****
        020022                              L10033:
        020022  104401                              TRAP    C$E
TST
    183
    184
    185                                     .SBTTL  **TEST 12** - BIS OF RLDA
    186
    187 020024                              BGNTST                          ;****START OF TEST****
    188
    189 020024                              STARS
                                            ;;**************************************************
    190                                     ;TEST THAT THE "BIS" INSTRUCTION WILL WORK ON THE DISK ADDRESS
    191                                     ;REGISTER.  BITS 15-0 ARE TESTED WITH 4 PATTERNS, GROWING 1,
    192                                     ;SHIFTING 1, GROWING 0, AND SHIFTING 0.
    193 020024                              STARS
                                            ;;**************************************************
**********************
    194
    195
    196 020024  012703  004416                      MOV     #BEGPAT,R3      ;GET START OF LIST
    197 020030                              BGNSEG                          ;****START OF SEGMENT****
        020030  104404                              TRAP    C$BSEG
    198 020032                              1$:
    199 020032  005077  162216                      CLR     @RLDA           ;CLEAR "DA"
    200 020036  011337  002362                      MOV     (R3),GDDAT      ;SET EXPECTED
    201 020042  051377  162206                      BIS     (R3),@RLDA      ;BIS RLDA
    202 020046  017737  162202  002364              MOV     @RLDA,BDDAT     ;READ RLDA
    203 020054  023737  002364  002362              CMP     B
DDAT,GDDAT          ;IS RLDA CORRECT
    204 020062  001404                              BEQ     2$              ;IF OKAY BRANCH
    205
    206 020064                                      ERRDF   11.,EM65,ERR2   ;WRONG DATA IN RLDA
        020064  104455                              TRAP    C$ERDF
        020066  000013                              .WORD   11
        020070  011170                              .WORD   EM65
        020072  012256                              .WORD   ERR2
    207 020074                              2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
        020074  104410                              TRAP    C$ESCAPE
        020076  000012                              .WORD   10000$-.
```

```
**TEST 12** - BIS OF RLDA

    208
    209 020100  005723                          TST     (R3)+           ;GET NEXT PATTERN
    210 020102  020327  004624                  CMP     R3,#ENDPAT      ;HAVE WE FINISHED?
    211 020106  001351                          BNE     1$              ;NO GO BACK
    212 020110                          ENDSEG                          ;****END OF SEGMENT****
        020110                          10000$:
        020110  104405                          TRAP    C$ESEG
    213 020112                          ENDTST                          ;****END OF TEST****
        020112                          L10034:
        020112  104401                          TRAP    C$ETST
    214
    215
    216                                 .SBTTL  **TEST 13** - BIC OF RLDA

    217
    218 020114                          BGNTST                          ;****START OF TEST****
    219
    220 020114                          STARS
                                        ;;**************************************************************
    221                                 ;TEST THAT THE "BIC" INSTRUCTION WORKS ON THE DISK
    222                                 ;ADDRESS REGISTER.  ALL BITS ARE TESTED WITH FOUR
    223                                 ;PATTERNS: GROWING 1, SHIFTING 1, GROWING 0 AND SHIFTING 0
    224 020114                          STARS
                                        ;;**************************************************************
    225
    226
    227 020114  012703  004416
                MOV     #BEGPAT,R3      ;GET START OF LIST
    228 020120                          BGNSEG                          ;****START OF SEGMENT****
        020120  104404                          TRAP    C$BSEG
    229 020122                          1$:
    230 020122  012777  177777  162124          MOV     #-1,@RLDA       ;SET RLDA TO ALL 1'S
    231 020130  012737  177777  002362          MOV     #-1,GDDAT       ;SET EXPECTED DATA
    232 020136  041337  002362                  BIC     (R3),GDDAT      ;SET EXPECTED DATA
    233 020142  041377  162106                  BIC     (R3),@RLDA      ;"BIC" RLDA
    234 020146  017737  162102  002364          MOV     @RLDA,BDDAT     ;READ RLDA
    235 020154  0
23737   002362  002364          CMP     GDDAT,BDDAT     ;DID "BIC" WORK?
    236 020162  001404                          BEQ     2$              ;IF IT DID BRANCH
    237
    238 020164                          ERRDF   12.,EM66,ERR2           ;WRONG DATA IN RLDA
        020164  104455                  TRAP    C$ERDF
        020166  000014                  .WORD   12
        020170  011251                  .WORD   EM66
        020172  012256                  .WORD   ERR2
    239 020174                  2$:     ESCAPE  SEG                     ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
        020174  104410                  TRAP    C$ESCAPE
        020176  000012                  .WORD   10000$-.
    240
    241 020200  005723                          TST     (R3)+           ;GET NEXT PATTERN

242     020202  020327  004624                  CMP     R3,#ENDPAT      ;DONE?
    243 020206  001345                          BNE     1$              ;NO GO BACK
    244 020210                          ENDSEG                          ;****END OF SEGMENT****
        020210                          10000$:
        020210  104405                          TRAP    C$ESEG
    245 020212                          ENDTST                          ;****END OF TEST****
        020212                          L10035:
        020212  104401                          TRAP    C$ETST
    246
    247
```

```
                                .SBTTL
**TEST 14** - BUS RESET OF RLCS

020214                          BGNTST                          ;****START OF TEST****

020214                          STARS
                                ;;*****************************************************************
                                ;TEST THAT A BUS RESET WILL CLEAR THE PROPER BITS
                                ;OF THE CONTROL AND STATUS REGISTER.  THOSE BITS ARE
                                ;BITS 6-1,8,9,10,11,12,13,15.  BIT 15 WILL CLEAR ONLY
                                ;IF BIT 14 (DRIVE ERROR IS NOT SET).  BIT 0 (DRIVE READY)
                                ;IS A DON'T CARE.  IF AT THE STAR
T UP THIS TEST BIT
                                ;14 (DRIVE ERROR) IS SET WE WILL INSIST IF IS THERE AFTER
                                ;THE "RESET" ALONG WITH BIT 15 (COMPOSITE ERROR).  BITS
                                ;15-10 ARE NOT WRITEABLE.
020214                          STARS
                                ;;*****************************************************************

020214                                  SETPRI  #PRI07          ;PRIORITY TO SEVEN
020214  012700  000340                  MOV     #PRI07,R0
020220  104441                          TRAP    C$SPRI
020222  012777  000377  162020          MOV     #377,@RLCS      ;LOAD ALL RLCS L
OADABLE BITS
020230  012737  000200  002362          MOV     #CRDY,GDDAT     ;SETUP EXPECTED
020236  032777  040000  162004          BIT     #DERR,@RLCS     ;DRIVE ERR SET?
020244  001403                          BEQ     1$              ;IF NOT DON'T EXPECT IT
020246  052737  140000  002362          BIS     #DERR!ERR,GDDAT  ;IT'S SET, INIT BETTER NOT CLR
020254  012700  000100          1$:     MOV     #100,R0         ;SET UP A WAIT LOOP
020260                                  BRESET                  ;BUS RESET
020260  104433                          TRAP    C$RESET
020262  005300                  2$:     DEC     R0              ;WAIT IN CASE OF DRI
VE ERROR
020264  001376                          BNE     2$              ;
020266  017737  161756  002364          MOV     @RLCS,BDDAT     ;READ RLCS
020274  042737  000001  002364          BIC     #DRDY,BDDAT     ;CLEAR OUT DRDY - DON'T CARE
020302  023737  002364  002362          CMP     BDDAT,GDDAT     ;DID INIT WORK
020310  001404                          BEQ     3$              ;YES, BRANCH

020312                                  ERRDF   13.,EM67,ERR2   ;WRONG DATA IN RLCS
020312  104455                          TRAP    C$ERDF
020314  000015                          .WORD   13
020316  011334                          .WORD   EM67
020320  012256                          .WORD   ERR2

020322                          3$:
020322                          ENDTST                          ;****END OF TEST****
020322                          L10036:
020322  104401                          TRAP    C$ETST

                                .SBTTL  **TEST 15** - BUS RESET OF RLBA

020324                          BGNTST                          ;****START OF TEST****

020324                          STARS
                                ;;*****************************************************************
                                ;TEST THAT A BUS RESET WILL CLEAR THE ENTIRE
                                ;BUS ADDRESS REGISTER.  THE BUS ADDRESS IS LOADED WITH 177776
                                ;AND
IS EXPECTED TO BE ZERO AFTER THE RESET
020324                          STARS
```

```
                                        ;;*****************************************************************
    293
    294
    295 020324  012777  177776  161720        MOV     #-2,@RLBA       ;SET BA TO ALL 1'S
    296 020332  022737  000001  002410        CMP     #1,T.CNTLR              ;RL11??
    297 020340  002403                        BLT     2$              ;NO
    298 0
20342   052777  000001  161702          DIS   #1,@RLBA
    299 020350  005037  002362          2$:   CLR     GDDAT           ;CLEAR EXPECTED DATA
    300 020354                                BRESET                  ;ISSUE BUS INIT
        020354  104433                        TRAP    C$RESET
    301 020356  017737  161670  002364        MOV     @RLBA,BDDAT     ;READ RLBA
    302 020364  001404                        BEQ     1$              ;IF CLEAR BRANCH
    303
    304 020366                                ERRDF   14.,EM70,ERR2   ;WRONG DATA IN RLBA
        020366  104455                        TRAP    C$ERDF
        020370  000016                        .WORD   14
        020372  011371                        .WORD   EM70
        020374  012256                        .WORD   ERR2
    305
020376                          1$:
    306
    307 020376                          ENDTST                          ;****END OF TEST****
        020376                          L10037:
        020376  104401                        TRAP    C$ETST
    308
    309
    310                                 .SBTTL  **TEST 16** - BUS RESET OF RLDA
    311
    312 020400                          BGNTST                          ;****START OF TEST****
    313
    314 020400                          STARS
                                        ;;*****************************************************************
    315                                 ;TEST THAT A BUS RESET WILL CLEAR THE ENTIRE
    316                                 ;DISK ADDRESS REGISTER.  THE DISK ADDRESS IS LOADED WITH 177777
    317                                 ;A
ND IS EXPECTED TO BE ZERO AFTER THE RESET.
    318 020400                          STARS
                                        ;;*****************************************************************
    319
    320
    321 020400  012777  177777  161646        MOV     #-1,@RLDA       ;SET DA TO ALL 1'S
    322 020406  005037  002362                CLR     GDDAT           ;CLEAR EXPECTED
    323 020412                                BRESET                  ;ISSUE BUS INIT
        020412  104433                        TRAP    C$RESET
    324 020414  017737  161634  002364        MOV     @RLDA,BDDAT     ;READ RLDA
    325 020422  001404                        BEQ     1$              ;IF CLEAR BRANCH
    326
    327 020
424                                 ERRDF   15.,EM71,ERR2   ;WRONG DATA IN RLDA
        020424  104455                        TRAP    C$ERDF
        020426  000017                        .WORD   15
        020430  011426                        .WORD   EM71
        020432  012256                        .WORD   ERR2
    328 020434                          1$:
    329
    330 020434                          ENDTST                          ;****END OF TEST****
        020434                          L10040:
        020434  104401                        TRAP    C$ETST
    331
    332
```

```
     333                                .SBTTL  **TEST 17** - UNIQUENESS OF RLCS
     334
     335 020436                         BGNTST                          ;****START OF TEST****
     336
     337 020436                         STARS
                                        ;;*****************************************************************
     338                                ;TEST THE UNIQUENESS OF THE CONTROL AND STATUS
     339                                ;REGISTER.  THE RLBA AND RLDA ARE PRELOADED WITH
     340                                ;177776 AND 177777 RESPECTIVELY.  THE RLCS IS THEN
     341                                ;LOADED TO INSURE THAT NEITHER THE RLBA OR RLDA
     342                                ;ARE MODIFIED BY THE WRITING OF THE RLCS.
     343
020436                          STARS
                                        ;;*****************************************************************
     344
     345
     346 020436  012737  000201  002332          MOV     #DRDY!CRDY,LDCSR        ;SET DRIVE AND CONTROLLER READY
     347 020444  012777  177776  161600          MOV     #-2,@RLBA               ;SET RLBA TO ALL 1'S
     348 020452  012777  177777  161574          MOV     #-1,@RLDA               ;SET RLDA TO ALL 1'S
     349 020460  013777  002332  161562          MOV     LDCSR,@RLCS             ;WRITE RLCS
     350
     351                                ;CHECK THAT RLBA REMAINS UNAFFECTED
     352
     353 020466  02277
7         177776  161556          CMP     #-2,@RLBA       ;RLBA OKAY?
     354 020474  001412                  BEQ     1$                      ;YES, GO CHECK DA
     355
     356 020476  012737  177776  002362          MOV     #-2,GDDAT       ;SET UP EXPECTED
     357 020504  017737  161542  002364          MOV     @RLBA,BDDAT     ;READ RLBA
     358
     359 020512                          ERRDF   16.,EM72,ERR2   ;CS MODIFIED BA
         020512  104455                  TRAP    C$ERDF
         020514  000020                  .WORD   16
         020516  011463                  .WORD   EM72
         020520  012256                  .WORD   ERR2
     360 020522                  1$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
         020522  104406
         TRAP    C$CLP1
     361
     362 020524  022777  177777  161522          CMP     #-1,@RLDA       ;RLDA OKAY?
     363 020532  001412                  BEQ     2$                      ;YES, CONTINUE
     364
     365 020534  012737  177777  002362          MOV     #-1,GDDAT       ;SET UP EXPECTED
     366 020542  017737  161506  002364          MOV     @RLDA,BDDAT     ;READ DA
     367
     368 020550                          ERRDF   17.,EM73,ERR2   ;CS MODIFIED DA
         020550  104455                  TRAP    C$ERDF
         020552  000021                  .WORD   17
         020554  011516                  .WORD   EM73
         020556  012256                  .WORD   ERR2
     369 020560                  2$:
     370
     3
71
     372 020560                         ENDTST                          ;****END OF TEST****
         020560                         L10041:
         020560  104401                         TRAP    C$ETST
     373
     374
     375                                .SBTTL  **TEST 18** - UNIQUENESS OF RLBA
     376
```

```
                                        BGNTST                          ;****START OF TEST****
                                        STARS
                                        ;;*************************************************************************

                                        ;TEST THE UNIQUENESS OF THE BUS ADDRESS REGISTER.  THE
                                        ;RLCS AND RLDA ARE LOADED WITH XXX20X AND 177777
                                        ;RESPECTIVELY.  THE RLBA IS THEN WRITTEN TO INSURE
                                        ;THAT NEITHER THE RLCS OR RLDA ARE MODIFIED
                                        ;BY WRITING THE RLBA.
                                        STARS
                                        ;;*************************************************************************

020562  012737  000200  002362          MOV     #CRDY,GDDAT     ;CONTROLLER READY
020570  032777  040000  161452          BIT
    #DERR,@RLCS     ;IF DRIVE ERROR IS
020576  001403                          BEQ     99$             ;SET THEN EXPECT IT
020600  052737  140000  002362          BIS     #ERR!DERR,GDDAT ;SET WHEN WE READ IT.
020606  013777  002362  161434  99$:    MOV     GDDAT,@RLCS     ;LOAD RLCS
020614  012777  177777  161432          MOV     #-1,@RLDA       ;LOAD RLDA
020622  005077  161424                  CLR     @RLBA           ;CLEAR RLBA

                                        ;CHECK IF RLCS IS OKAY

020626  017737  161416  002364          MOV     @RLCS,BDDAT     ;READ RLCS
020634  042737
000001  002364          BIC     #DRDY,BDDAT     ;IGNORE DRIVE READY
020642  023737  002364  002362          CMP     BDDAT,GDDAT     ;CS OK?
020650  001404                          BEQ     1$              ;YES, GO CHECK DA

020652                                  ERRDF   18.,EM74,ERR2   ;BA MODIFIED CS
020652  104455                          TRAP    C$ERDF
020654  000022                          .WORD   18
020656  011551                          .WORD   EM74
020660  012256                          .WORD   ERR2
020662                          1$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
020662  104406                          TRAP    C$CLP1

020664  022777  177777  161362          CMP     #-1,@RLDA
;IS RLDA OKAY?

020672  001412                          BEQ     2$              ;IF OKAY BRANCH

020674  012737  177777  002362          MOV     #-1,GDDAT       ;SET UP EXPECTED
020702  017737  161346  002364          MOV     @RLDA,BDDAT     ;READ RLDA

020710                                  ERRDF   19.,EM75,ERR2   ;BA MODIFIED DA
020710  104455                          TRAP    C$ERDF
020712  000023                          .WORD   19
020714  011603                          .WORD   EM75
020716  012256                          .WORD   ERR2
020720                          2$:
020720                          ENDTST                          ;****END OF TEST****
020720                          L10042:
02072
0       104401                  TRAP    C$ETST


                                        .SBTTL  **TEST 19** - UNIQUENESS OF RLDA

020722                          BGNTST                          ;****START OF TEST****
```

```
                                        STARS
                                        ;;*****************************************************************
                                        ;TEST THE UNIQUENESS OF THE DISK ADDRESS REGISTER.  THE R
LCS
                                        ;AND RLBA ARE LOADED WITH XXX20X AND 177776
                                        ;RESPECTIVELY.  THE RLDA IS THEN WRITTEN TO INSURE
                                        ;THAT NEITHER THE RLCS OR THE RLBA ARE MODIFIED
                                        ;BY WRITING THE RLDA.
                                        STARS
                                        ;;*****************************************************************

 020722  012737  000200  002362          MOV     #CRDY,GDDAT     ;CONTROLLER READY
 020730  032777  040000  161312          BIT     #DERR,@RLCS     ;IF DRIVE ERROR SET
 020736  001403
                 BEQ     99$             ;THEN EXPECT IT LATER
 020740  052737  140000  002362          BIS     #ERR!DERR,GDDAT
 020746  013777  002362  161274  99$:     MOV     GDDAT,@RLCS     ;LOAD CS
 020754  012777  177776  161270          MOV     #-2,@RLBA       ;LOAD BA WITH ALL 1'S
 020762  005077  161266                  CLR     @RLDA           ;CLEAR RLDA

                                        ;CHECK IF RLCS IS OKAY

 020766  017737  161256  002364          MOV     @RLCS,BDDAT     ;READ RLCS
 020774  042737  000001  002364          BIC     #DRDY,BDDAT     ;IGNORE DRIVE READY
 02100
2        023737  002362  002364  CMP     GDDAT,BDDAT     ;RLCS OKAY?
 021010  001404                  BEQ     1$              ;YES, THEN BRANCH

 021012                          ERRDF   20.,EM76,ERR2   ;DA MODIFIED CS
 021012  104455                  TRAP    C$ERDF
 021014  000024                  .WORD   20
 021016  011635                  .WORD   EM76
 021020  012256                  .WORD   ERR2
 021022                  1$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
 021022  104406                  TRAP    C$CLP1

 021024  022777  177776  161220          CMP     #-2,@RLBA       ;IS RLBA OKAY?
 021032  001412                  BEQ     2$              ;BRANCH IF OK
AY

 021034  012737  177776  002362          MOV     #-2,GDDAT       ;SET UP EXPECTED
 021042  017737  161204  002364          MOV     @RLBA,BDDAT     ;READ RLBA

 021050                          ERRDF   21.,EM77,ERR2   ;DA MODIFIED BA
 021050  104455                  TRAP    C$ERDF
 021052  000025                  .WORD   21
 021054  011670                  .WORD   EM77
 021056  012256                  .WORD   ERR2
 021060                  2$:

 021060                  ENDTST                          ;****END OF TEST****
 021060                  L10043:
 021060  104401                  TRAP    C$ETST

                                 .SBTTL
**TEST 20** - UNIQUENESS OF RLMP

 021062                  BGNTST                          ;****START OF TEST****
```

```
                                        STARS
                                        ;;*****************************************************************
                                        ;TEST THE UNIQUENESS OF THE MULTI-PURPOSE REGISTER
                                        ;WE WILL WRITE THE RLCS, RLBA, AND THE RLDA, THEN THE

                                        ;RLMP IS WRITTEN. WE THEN GO BACK AN VERIFY THE CONTENTS
                                        ;OF THE RLCS, RLBA, RLDA.
                                        STARS
                                        ;;*****************************************************************

021062  012737  000200  002362          MOV     #CRDY,GDDAT     ;CONTROLLER READY
021070  032777  040000  161152          BIT     #DERR,@RLCS     ;IF DRIVE ERROR SET
021076  001403                        BEQ     99$             ;THE EXPECT IT LATER
021100  052737  140000  002362          BIS     #ERR!DERR,GDDAT
021106  0137
77      002362  161134  99$:    MOV     GDDAT,@RLCS     ;LOAD CS
021114  012777  177776  161130          MOV     #-2,@RLBA       ;LOAD BA WITH ALL 1'S
021122  012777  177777  161124          MOV     #-1,@RLDA       ;LOAD RLDA
021130  005077  161122                  CLR     @RLMP           ;WRITE RLMP

                                        ;CHECK IF RLCS IS OKAY

021134  017737  161110  002364          MOV     @RLCS,BDDAT     ;READ RLCS
021142  042737  000001  002364          BIC     #DRDY,BDDAT     ;IGNORE DRIVE READY
021150  023737  002362  002364          CMP     GDDAT,BDDAT     ;RLCS
OKAY?
021156  001404                          BEQ     1$              ;YES, THEN BRANCH

021160                                  ERRDF   201.,EM44,ERR2  ;MP MODIFIED CS
021160  104455                          TRAP    C$ERDF
021162  000311                          .WORD   201
021164  010204                          .WORD   EM44
021166  012256                          .WORD   ERR2
021170                          1$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
021170  104406                          TRAP    C$CLP1

021172  022777  177776  161052          CMP     #-2,@RLBA       ;IS RLBA OKAY?
021200  001412                          BEQ     2$              ;BRANCH IF OKAY

021202  012737  177776  002
362             MOV     #-2,GDDAT       ;SET UP EXPECTED
021210  017737  161036  002364          MOV     @RLBA,BDDAT     ;READ RLBA

021216                                  ERRDF   211.,EM45,ERR2  ;MP MODIFIED BA
021216  104455                          TRAP    C$ERDF
021220  000323                          .WORD   211
021222  010237                          .WORD   EM45
021224  012256                          .WORD   ERR2
021226                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
021226  104406                          TRAP    C$CLP1
021230  022777  177777  161016          CMP     #-1,@RLDA       ;DISK ADDRESS OKAY
021236  001412                          BEQ     3$              ;YES, CONTINUE

503
021240  017737  161010  002364          MOV     @RLDA,BDDAT     ;SET UP BAD
021246  012737  177777  002362          MOV     #-1,GDDAT       ;SET UP EXPECTED

021254                                  ERRDF   212.,EM46,ERR2  ;MP MODIFIED DA
021254  104455                          TRAP    C$ERDF
021256  000324                          .WORD   212
```

```
          021260  010272                          .WORD   EM46
          021262  012256                          .WORD   ERR2
    5
08
    509 021264                          3$:
    510
    511
    512 021264                          ENDTST                          ;****END OF TEST****
        021264                          L10044:
        021264  104401                          TRAP    C$ETST
    513
    514                                 .SBTTL  **TEST 21** - NOOP FUNCTION
    515
    516 021266                          BGNTST                          ;****START OF TEST****
    517
    518
    519
    520 021266                          STARS
                                        ;;*****************************************************************
    521                                 ;TEST THAT NOOP WILL FUNCTION.  WE WILL ISSUE THE
    522                                 ;NOOP AND WAIT FOR CONTROLLER READY TO SET.  A
    523                                 ;TIMEOUT OF 200 MILLISECS IS ALLOWED.  DRIVE 0 IS ALWAYS
    524                                 ;SELECTED SINCE THE DRIVE IS NOT NECESSARY.
    525 021266                          STARS
                                        ;;*****************************************************************
    526
    527
    528
    529 021266  012777  002416  160756          MOV     #DBUFF,@RLBA    ;SET UP RLBA FOR TRANSFER                       B
    530 021274  012700  000000                  MOV     #0,R0           ;                                               B
    531 021300  010077  160750                  MOV     R0,@RLDA        ;SET DISK ADDRESS                               B
    532 021304  012777  177001  160744          MOV     #-511
..,@RLMP ;WORD COUNT                            B
    533 021312  010046                          MOV     R0,-(SP)        ;SAVE R0
    534 021314  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    535 021320  000000                          NOOP0                   ;NOOP(0) FUNCTION
    536 021322  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    537 021326  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    538 021332  012600                          MOV     (SP)+,R0        ;RESTORE R0
    539 021334  020077  160714                  CMP     R0,@RLDA        ;SEE IF RLDA IS THE SAME FOR 'RL11'             B
    540
        021340  001417                          BEQ     99$             ;BRANCH IF SO,ELSE                              B
    541                                                                 ;ASSUME THAT PROCESSOR IS AN LSI11.             B
    542 021342  062700  000006                  ADD     #6,R0           ;GET EXPECTED RLDA AFTER RLV11 'NOP' COMMAND    B
    543 021346  020077  160702                  CMP     R0,@RLDA        ;THE RLDA SHOULD HAVE INCREMENTED BY 6          B
    544 021352  001412                          BEQ     99$             ;BRANCH IF SO,ELSE                              B
    545 021354  010037  002362                  MOV     R0,GDDAT        ;SAVE EXPECTED                                  B
    546 021360  017737  160670  002364          MOV     @RLDA,BDDAT     ;SAVE RESULTS                                   B
    547 021366
                ERRDF 213.,EM103,ERR2   ;PRINT RESULTS ERROR                                    B
        021366  104455                          TRAP    C$ERDF
        021370  000325                          .WORD   213
        021372  012160                          .WORD   EM103
        021374  012256                          .WORD   ERR2
    548 021376                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        021376  104406                          TRAP    C$CLP1
    549
    550
    551
    552 021400                          99$:
    553 021400                          ENDTST                          ;****END OF TEST****
```

```
**TEST 21**
- NOOP FUNCTION

        021400                          L10045:
        021400  104401                         TRAP    C$ETST
    554
    555
    556                                 .SBTTL  **TEST 22** - TEST NOOP DOES NOTHING (RL11 ONLY)
    557
    558 021402                          BGNTST                          ;****START OF TEST****
    559
    560 021402                          STARS
                                        ;;*****************************************************************
    561                                 ;TEST THAT ISSUING A NOOP FUNCTION DOES NOTHING.  THIS IS DONE BY WRITING
    562                                 ;THE RLBA, AND RLDA, READING THE RLMP AND MAKING SURE NOTHING CHANGES.
    563 021402
                STARS
                                        ;;*****************************************************************
    564
    565 021402  022737  000001  002410          CMP     #1,T.CNTLR      ;RLV11, OR RLV12?
    566 021410  001076                          BNE     3$              ;YES SKIP TEST.
    567
    568 021412  012777  000001  160634          MOV     #1,@RLDA        ;LOAD DISK ADDRESS
    569 021420  012777  002416  160624          MOV     #DBUFF,@RLBA    ;LOAD BUS ADDRESS               B
    570 021426  005077  160624                  CLR     @RLMP
    571 021432  017737  160620  002362          MOV     @RLMP,GDDAT     ;READ RLMP
    572
    573 021440
004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    574 021444  000000                  NOOPO
    575 021446  004537  016354          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    576 021452                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
        021452  104406                  TRAP    C$CLP1
    577
    578 021454  004537  015166          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    579 021460                          ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
        021460  104410                  TRAP    C$ESCAPE
        021462  000124                  .WORD   L10046-.
    580
    581 021464
017737  160566  002364          MOV     @RLMP,BDDAT     ;READ RLMP
    582 021472  023737  002362  002364          CMP     GDDAT,BDDAT     ;RLMP OK?
    583 021500  001404                          BEQ     1$
    584
    585 021502                          ERRDF   202.,EM14,ERR2
        021502  104455                  TRAP    C$ERDF
        021504  000312                  .WORD   202
        021506  007304                  .WORD   EM14
        021510  012256                  .WORD   ERR2
    586
    587 021512                  1$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        021512  104406                  TRAP    C$CLP1
    588
    589 021514  012737  002416  002362          MOV     #DBUFF,GDDAT    ;SET UP EXP'D BA

  590   021522  017737  160524  002364          MOV     @RLBA,BDDAT     ;READ BA
    591 021530  023737  002362  002364          CMP     GDDAT,BDDAT     ;BA OK?
    592 021536  001404                          BEQ     2$              ;YES
    593
    594 021540                          ERRDF   203.,EM15,ERR2
        021540  104455                  TRAP    C$ERDF
        021542  000313                  .WORD   203
        021544  007332                  .WORD   EM15
        021546  012256                  .WORD   ERR2
```

```
**TEST 22** - TEST NOOP DOES NOTHIN
G (RL11 ONLY)

    595
    596 021550                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        021550  104406                          TRAP    C$CLP1
    597
    598 021552  012737  000001  002362          MOV     #1,GDDAT        ;SET UP EXP'D DA
    599 021560  017737  160470  002364          MOV     @RLDA,BDDAT     ;READ DA
    600 021566  023737  002362  002364          CMP     GDDAT,BDDAT     ;DA OKAY
    601 021574  001404                          BEQ     3$
    602
    603 021576                                  ERRDF   204.,EM16,ERR2
        021576  104455                          TRAP    C$ERDF
        021600  000314                          .WORD   204
        021602  007360                          .WORD   EM16
        021604
012256                              .WORD   ERR2
    604
    605 021606                          3$:
    606
    607 021606                          ENDTST                          ;****END OF TEST****
        021606                          L10046:
        021606  104401                          TRAP    C$ETST
    608
    609
    610                                 .SBTTL  **TEST 23** - TEST OF INTERRUPT (RL11 ONLY)
    611
    612 021610                          BGNTST                          ;****START OF TEST****
    613
    614 021610                          STARS
                                        ;;**************************************************************
    615                                 ;CHECK THE INTERRUPT WITH A NOOP.  WE WILL SET UP THE
    616                                 ;INTERRUPT VECTOR,
 LOWER THE PSW TO ZERO AND ISSUE
    617                                 ;A NOOP.  THE INTERRUPT SERVICE ROUTINE WILL SET A
    618                                 ;FLAG UPON INTERRUPT AND RETURN IN LINE.  WE WAIT 200 MILLISECONDS
    619                                 ;LOOKING FOR THAT FLAG TO BE SET BEFORE CALLING IT
    620                                 ;AN ERROR.  IF THE INTERRUPT SENDS US TO ANOTHER
    621                                 ;VECTOR ADDRESS THEN THE ERROR HANDLER WILL REPORT
    622                                 ;"TRAP TO XXXX FROM YYYY" AND RETURN  TO DIAG SUP MONITOR.  IF THE
    623                                 ;INTERRUPT GOES TO ABOVE 1000 WHO KNOWS WHAT WILL HA
PPEN.
    624 021610                          STARS
                                        ;;**************************************************************
    625
    626
    627 021610  022737  000001  002410          CMP     #1,T.CNTLR      ;RLV11 OR RLV12?
    628 021616  001026                          BNE     99$             ;YES SKIP TEST.
    629
    630 021620  005037  002330                  CLR     INTFLG          ;CLEAR INTERRUPT OCCURRENCE FLAG
    631 021624                                  SETPRI  #PRI00          ;SET PSW TO 0
        021624  012700  000000                  MOV     #PRI00,R0
        021630  104441                          TRAP    C$SPRI
    632 021632  004537  015466                  JSR     R5,LDFUNC       ;ISSUE F
UNCTION OF FOLLOWING WORD
    633 021636  000100                          NOOPO!INTEN             ;NOOP AND INTERRUPT ENABLE
    634 021640  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    635 021644  005737  002330                  TST     INTFLG          ;DID INTERRUPT OCCUR
    636 021650  001004                          BNE     2$              ;IF SO BRANCH
    637 021652                                  ERRDF   22.,EM13,ERR0
        021652  104455                          TRAP    C$ERDF
        021654  000026                          .WORD   22
        021656  007252                          .WORD   EM13
```

```
**TEST 23** - TEST OF INTERRUPT (RL11 ONLY)

        021660  012226                          .WORD   ERR0
    638 021662  005037  002330          2$:     CLR     INTFLG
    639 021666                                  CKLOOP
        021666  104406                          TRAP    C$CLP1                  ;CHECK IF /FL:LOE IS SET
    640 021670  004537  015166                  JSR     R5,CHERR                ;CHECK CONTROLLER FOR ERRORS
    641
    642
    643 021674                          99$:
    644 021674                          ENDTST                                  ;****END OF TEST****
        021674                          L10047:
        021674  104401                          TRAP    C$ETST
    645
    646
    647                                 .SBTTL
        **TEST 24** - TEST PRIORITY BR LEVEL
    648
    649 021676                          BGNTST                                  ;****START OF TEST****
    650
    651 021676                          STARS
                                        ;;*****************************************************************
    652                                 ;TEST THAT PRIORITY GIVEN IS ACTUAL PRIORITY OF CONTROLLER.  WE KNOW
    653                                 ;THE BOARD WILL INTERRUPT.  WE WILL START TRYING TO INTERRUPT AT 7
    654                                 ;AND WORK DOWN TIL IT DOES INTERRUPT.
    655 021676                          STARS
                                        ;;*****************************************************************
**
    656
    657 021676  022737  000001  002410          CMP     #1,T.CNTLR                      ;RLV11 OR RLV12?
    658 021704  001056                          BNE     6$                      ;YES, SKIP TEST
    659
    660 021706  012737  000340  002364          MOV     #340,BDDAT              ;SET UP INITIAL OF 7
    661 021714  013737  002264  002362          MOV     BPRIOR,GDDAT            ;GET GIVEN PRIORITY
    662
    663 021722                          BGNSEG                                  ;****START OF SEGMENT****
        021722  104404                          TRAP    C$BSEG
    664
    665 021724  005037  002330          5$:     CLR     INTFLG                  ;CLEAR INTERRUPT OCCURRENCE
    666 021730                                  SETPRI  BD
DAT                     ;SET PRIORITY
        021730  013700  002364                  MOV     BDDAT,R0
        021734  104441                          TRAP    C$SPRI
    667
    668 021736  004537  015466                  JSR     R5,LDFUNC               ;ISSUE FUNCTION OF FOLLOWING WORD
    669 021742  000100                          NOOPO!INTEN
    670
    671 021744  004537  016354                  JSR     R5,WTCRDY               ;WAIT FOR CONTROLLER READY HIGH
    672 021750                                  ESCAPE  TST                     ;IF /FL:LOE SET LOOP, ELSE EXIT TST
        021750  104410                          TRAP    C$ESCAPE
        021752  000070                          .WORD   L10050-.
    673
    674 021754  004537  015166                  JSR     R5,CHERR                ;CHECK CO
NTROLLER FOR ERRORS
    675 021760                                  ESCAPE  TST                     ;IF /FL:LOE SET LOOP, ELSE EXIT TST
        021760  104410                          TRAP    C$ESCAPE
        021762  000060                          .WORD   L10050-.
    676
    677 021764  023737  002364  002362          CMP     BDDAT,GDDAT             ;SHOULD IT INTERRUPT
    678 021772  002012                          BGE     1$                      ;NO, BRANCH
    679
    680 021774  005737  002330                  TST     INTFLG                  ;DID INTERRUPT OCCUR
    681 022000  001004                          BNE     2$                      ;YES, OK
```

```
**TEST 24** - TEST PRIORITY BR LEVEL

    682
    683 022002                          3$:     ERRDF   204.,EM17,ERR7
        022002  104455                          TRAP    C$ERDF
        022004  000314                          .WORD   204
        022006  007406                          .WORD   EM17
        022010  012514                          .WORD   ERR7
    684
    685 022012                          2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
        022012  104410                          TRAP    C$ESCAPE
        022014  000014                          .WORD   10000$-.
    686 022016  000405                          BR      4$
    687 022020  005737  002330      1$:         TST     INTFLG          ;DID INTERRUPT OCCUR
    688 0
22024   001772                              BEQ     2$                  ;NO, OK
    689 022026  000765                      BR      3$                  ;YES, ERROR
    690
    691 022030                          ENDSEG                          ;****END OF SEGMENT****
        022030                          10000$:
        022030  104405                          TRAP    C$ESEG
    692 022032  162737  000040  002364  4$:     SUB     #40,BDDAT       ;NEXT LEVEL
    693 022040  100331                      BPL     5$
    694
    695 022042                          6$:
    696 022042                          ENDTST                          ;****END OF TEST****
        022042                          L10050:
        022042  104401                          TRAP    C$ETST
    697
    698                                 .SBTTL  **TEST 25** - GET STATUS FUNCTION
    699
    700
022044                          BGNTST                                  ;****START OF TEST****
    701
    702
    703 022044                          STARS
                                        ;;**********************************************************************
    704                                 ;TEST GET STATUS FUNCTION.  THE GET STATUS FUNCTION WILL
    705                                 ;WORK IF DRIVE IS LOADED AND READY OR NOT.  THE RLDA
    706                                 ;IS LOADED WITH THE GET STATUS AND MARKER BITS (BITS 1,0)
    707                                 ;AND THE FUNCTION IS ISSUED.  WE WAIT 200 MILLISECONDS
    708                                 ;FOR CONTROLLER READY.  VERIFY THAT NO ERRORS OCCUR.
    709 0220
44                              STARS
                                        ;;**********************************************************************
    710
    711
    712 022044  012777  000013  160202          MOV     #GSBIT!MK!DRST,@RLDA    ;SET GET STATUS AND MARKER BIT
    713 022052  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    714 022056  000004                          GSTAT                   ;GET STATUS
    715 022060  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    716 022064                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        022064  104406                          TRAP    C$CLP1
    717
    7
18      022066  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    719
    720 022072                          ENDTST                          ;****END OF TEST****
        022072                          L10051:
        022072  104401                          TRAP    C$ETST
    721
    722
    723                                 .SBTTL  **TEST 26** - GET STATUS FUNCTION INTERRUPT
```

```
    724
    725 022074                          BGNTST                          ;****START OF TEST****
    72
6
    727                                 ;CHECK GET STATUS UNDER INTERRUPT
    728
    729 022074  005037  002330                  CLR     INTFLG          ;CLEAR INTERRUPT OCCURANCE
    730 022100                                  SETPRI  #PRI00          ;PSW TO LEVEL 0
        022100  012700  000000                  MOV     #PRI00,R0
        022104  104441                          TRAP    C$SPRI
    731 022106  012777  000003  160140          MOV     #GSBIT!MK,@RLDA ;SET UP DA
    732 022114  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    733 022120  000104                          GSTAT!INTEN             ;GET STATUS, INT ENABLE
    734 022122  004537  016354                  JSR     R
5,WTCRDY            ;WAIT FOR CONTROLLER READY HIGH
    735 022126                                  SETPRI  #PRI07
        022126  012700  000340                  MOV     #PRI07,R0
        022132  104441                          TRAP    C$SPRI
    736 022134  005737  002330                  TST     INTFLG          ;DID INTERRUPT OCCUR
    737 022140  001004                          BNE     2$              ;YES-BRANCH
    738 022142                                  ERRDF   28.,EM30,ERR0
        022142  104455                          TRAP    C$ERDF
        022144  000034                          .WORD   28
        022146  007441                          .WORD   EM30
        022150  012226                          .WORD   ERR0
    739 022152                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        022152  104406                          TRAP    C$CLP
1
    740 022154  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    741 022160  005037  002330                  CLR     INTFLG          ;CLEAR INTERRUPT OCCURANCE
    742 022164                                  SETPRI  #PRI00          ;PSW TO LEVEL 0
        022164  012700  000000                  MOV     #PRI00,R0
        022170  104441                          TRAP    C$SPRI
    743 022172  012777  000003  160054          MOV     #GSBIT!MK,@RLDA ;SET UP DA FOR GET STATUS CMD
    744 022200  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    745 022204  000004                          GSTAT                   ;GET STATUS - SHOULD NOT CAUS
E AN INTERRUPT
    746 022206  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    747 022212                                  SETPRI  #PRI07
        022212  012700  000340                  MOV     #PRI07,R0
        022216  104441                          TRAP    C$SPRI
    748 022220  005737  002330                  TST     INTFLG          ;DID INTERRUPT OCCUR (SHOULD NOT)
    749 022224  001404                          BEQ     3$              ;NO - BRANCH (OK)
    750 022226                                  ERRDF   281.,EM30A,ERR0
        022226  104455                          TRAP    C$ERDF
        022230  000431                          .WORD   281
        022232  007500                          .WORD   EM30A
        022234  012226                          .WORD   ERR0
    751 0
22236                               3$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        022236  104406                          TRAP    C$CLP1
    752 022240  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    753 022244                          ENDTST                          ;****END OF TEST****
        022244                          L10052:
        022244  104401                          TRAP    C$ETST
    754
    755
    756                                 .SBTTL  **TEST 27** - GET STATUS FUNCTION GENERATES OPI W/O GS BIT
    757
    758 022246                          BGNTST                          ;****START OF TEST****
    759
    760 022246                          STARS
```

```
                                        ;;*************************************************************************
                                        ;VERIFY THAT GET STATUS FUNCTION WILL NOT COMPLETE
                                        ;WITHOUT SENDING OUT THE GET STATUS BIT IN THE RLDA.
                                        ;WE SET MARKER BUT NO GET STATUS BIT IN THE RLDA AND
                                        ;ISSUE A GET STATUS WE SHOULD RECIEVE AN OPI ERROR.
                                        ;VERIFY THAT CONTROLLER READY SET
S AND OPI SETS
                                        STARS
                                        ;;*************************************************************************

022246  012777  000001  160000          MOV     #MK,@RLDA       ;SET ONLY MARKER BIT!!
022254  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
022260  000004                          GSTAT                   ;GET STATUS
022262  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
022266  032737  074000  002306          BIT #74000,E.CS
022274  001405                          BEQ     1$

022276  012737  006053  015450          MOV     #OPIERR,RESTMS
022304  004537  015166                  JSR     R5,CHERR
022310                          1$:     CKLOOP
022310  104406                          TRAP    C$CLP1
022312  032737  002000  002306          BIT     #OPI,E.CS       ;IS OPI SET?
022320  001004                          BNE     2$              ;YES-BRANCH NO-CHECK TIMEOUT
022322                                  ERRDF   29.,EM33,ERRO
022322  104455                          TRAP    C$ERDF
022324  000035                          .WORD   29
022326  007574                          .WORD   EM33
022330  012226                          .WORD   ERRO
022332                          2$:

022332                                  E
NDTST                   ;****END OF TEST****
022332                          L10053:
022332  104401                          TRAP    C$ETST


                                        .SBTTL  **TEST 28** - OPI UNDER INTERRUPT

022334                                  BGNTST                          ;****START OF TEST****
022334                                  STARS
                                        ;;*************************************************************************
                                        ;FORCE AN OPI ERROR UNDER INTERRUPT TO VERIFY THAT
                                        ;AN INTERRUPT WILL OCCUR FROM OPI.  THE OPI IS FORCED
                                        ;USING A GET STATUS WITHOUT THE GET STATUS BIT SET

                                        ;IN RLDA.
                                        STARS
                                        ;;*************************************************************************


022334                                  SETPRI  #PRI00
022334  012700  000000                  MOV     #PRI00,R0
022340  104441                          TRAP    C$SPRI
022342  005037  002330                  CLR     INTFLG
022346  012777  000001  157700          MOV     #MK,@RLDA       ;SET ONLY MARKER BIT!!
022354  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
022360  000104                          GSTAT!INTEN             ;GET STATUS
022362
004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
022366                                  SETPRI  #PRI07
022366  012700  000340                  MOV     #PRI07,R0
```

```
                022372  104441
     804        022374  005737  002330                  TRAP    C$SPRI
     805        022400  001004                          TST     INTFLG          ;INTERRUPT OCCUR
     806        022402                                  BNE     2$
                022402  104455                          ERRDF   30.,EM11,ERRO
                                                        TRAP    C$ERDF

                022404  000036                          .WORD   30
                022406  007211                          .WORD   EM11
                022410  012226                          .WORD   ERRO
     807        022412                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
                022412  104406                          TRAP    C$CLP1
     808        022414  032737  074000  002306          BIT     #74000,E.CS
     809        022422  001405                          BEQ     1$
     810        022424  012737  006053  015450          MOV     #OPIERR,RESTMS
     811        022432  004537  015166                  JSR     R5,CHERR
     812        022436                          1$:     CKLOOP
                022436  104406                          TRAP    C$CLP1
     813        022440  032737  002000  002306          BIT     #OPI,E.CS       ;IS OPI SET?

814             022446  001004                          BNE     3$              ;YES-BRANCH NO-CHECK TIMEOUT
     815        022450                                  ERRDF   31.,EM33,ERRO
                022450  104455                          TRAP    C$ERDF
                022452  000037                          .WORD   31
                022454  007574                          .WORD   EM33
                022456  012226                          .WORD   ERRO
     816        022460                          3$:
     817
     818        022460                          ENDTST                          ;****END OF TEST****
                022460                          L10054:
                022460  104401                          TRAP    C$ETST
     819
     820                                        .SBTTL  **TEST 29** - READ HEADER FUNCTION
     821
     822        022462                          BGNTST                          ;****START OF TEST****
     823        022462                          STARS

     ;;*****************************************************************
     824                                        ;CHECK THAT READ HEADER WORKS, THAT WE CAN ISSUE
     825                                        ;IT, GET READY BACK WITHOUT ANY ERRORS SETTING.
     826        022462                          STARS
                                                ;;*****************************************************************
     827
     828        022462  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
     829        022466  000010                          RDHDR                   ;READ HEADER
     830        022470  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH READY

     831        022474                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
                022474  104406                          TRAP    C$CLP1
     832        022476  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
     833
     834        022502                          ENDTST                          ;****END OF TEST****
                022502                          L10055:
                022502  104401                          TRAP    C$ETST
     835
     836                                        .SBTTL  **TEST 30** - READ HEADER FUNCTION INTERRUPT
     837
     838        022504                          BGNTST                          ;****START OF TEST****
     839
     840        022504                          STARS
                                                ;;*****************************************************************
****
     841                                        ;CHECK THAT READ HEADER WILL GENERATE AN INTERRRUPT
```

```
                                        ;UPON COMPLETION WITHOUT ANY ERRORS SETTING
022504                                  STARS
                                        ;;*****************************************************************

                                                SETPRI  #PRIOO          ;PSW TO 0
022504  012700  000000                          MOV     #PRIOO,RO

022510  104441                         TRAP    C$SPRI
022512  005037  002330                          CLR     INTFLG          ;CLEAR INTERRUPT OCCURENCE
022516  004537  015466                          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
022522  000110                                  RDHDR!INTEN             ;READ HEADER, INTR. ENA
022524  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
022530                                          SETPRI  #PRIO7
022530  012700  000340                          MOV     #PRIO7,RO
022534  104441                                  TRAP    C$SPRI
022536  005737  002330                          TST     INTFLG          ;INTERRUPT HAPPEN
022
001004                                  BNE     2$                      ;YES-CONTINUE
022544                                          ERRDF   35.,EM37,ERRO
022544  104455                                  TRAP    C$ERDF
022546  000043                                  .WORD   35
022550  007716                                  .WORD   EM37
022552  012226                                  .WORD   ERRO
022554                                  2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
022554  104406                                  TRAP    C$CLP1

022556  004537  015166                          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS

022562                                  ENDTST                          ;****END OF TEST****
022562                                  L10056:
022562  104401                                  TRAP    C$ETST


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

022564                                  BGNTST                          ;****START OF TEST****


022564                                  STARS
                                        ;;*****************************************************************
                                        ;CHECK THAT READ HEADERS WILL RELIABLY READ THE SAME
                                        ;CYLINDER AND HEAD SELECT.  WE WILL READ HEADERS VERIFYING
                                        ;THAT WE ALWAYS READ THE SAME CYLINDER AND HEAD SELECT.
                                        STARS
                                        ;;**********************************
**********************************

022564  012701  000144                          MOV     #100.,R1        ;SET UP TO DO 100 RD HDR'S
022570  004537  015466                          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
022574  000010                                  RDHDR                   ;READ HEADER
022576  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
022602                                  99$:    ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
022602  104410                                  TRAP    C$ESCAPE
022604  000122                                  .WORD   L10057-.

022606  004537  0151
66                                      JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
022612                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
022612  104410                                  TRAP    C$ESCAPE
```

```
                022614  000112                          .WORD   L10057-.
    882
    883 022616  013737  002314  002362                  MOV     E.MP,GDDAT      ;READ FIRST HEADER (ASSUME GOOD)
    884 022624  043737  002334  002362
                BIC     SECMSK,GDDAT    ;MASK AWAY SECTOR BITS
    885 022632
                022632  104404          BGNSEG          TRAP    C$BSEG          ;****START OF SEGMENT****
    886 022634                          2$:
    887 022634  004537  015466                          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
                                                        RDHDR
    888 022640  000010
    889 022642  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    890 022646                          97$:    ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
                022646  104410                  TRAP    C$ESCAPE
                022650  000054                  .WORD   10000$-.
    891
    892 022652
                004537  015166          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    893 022656                          ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
                022656  104410          TRAP    C$ESCAPE
                022660  000044          .WORD   10000$-.
    894
    895 022662  013737  002314  002364          MOV     E.MP,BDDAT      ;READ HEADER
    896 022670  043737  002334  002364          BIC     SECMSK,BDDAT    ;MASK AWAY SECTOR BITS
    897 022676  023737  002362  002364          CMP     GDDAT,BDDAT     ;IS HEADER CORRECT
    898 022704  001404                          BEQ     4$
    899
    900 022706                          ERRDF   36.,EM41,E
RR4
                022706  104455          TRAP    C$ERDF
                022710  000044          .WORD   36
                022712  007756          .WORD   EM41
                022714  012372          .WORD   ERR4
    901
    902 022716                          4$:     CKLOOP                  ;CONSTANT CYL & HS
                022716  104406                  TRAP    C$CLP1          ;CHECK IF /FL:LOE IS SET
    903
    904 022720  005301                          DEC     R1              ;PERFORM ALL READ HDR'S
    905 022722  001344                          BNE     2$              ;IF NOT GO BACK AND DO ANOTHER
    906 022724                          ENDSEG                          ;****END OF SEGMENT****
                022724                  10000$:
                022724  104405                  TRAP    C$ESEG
    907 022726                          EN
DTST                                ;****END OF TEST****
                022726                  L10057:
                022726  104401                  TRAP    C$ETST
    908
    909
    910                                 .SBTTL  **TEST 32** - CHECK OF HEADER CRC
    911
    912 022730                          BGNTST                          ;****START OF TEST****
    913
    914 022730                          STARS
                                        ;;**************************************************************************
    915                                 ;CHECK THAT WE CAN READ THE HDCRC AFTER A
    916                                 ;READ HEADER AND THAT IT IS THE CORRECT CRC
    917                                 ;FOR THE HEADER.
    918 022730                          STARS
                                        ;;******************
**********************************************
    919
    920
    921 022730  005037  023000                      CLR     3$
```

```
     922 022734  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
     923 022740  000010                           RDHDR                   ;READ HEADER
     924 022742  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
     925 022746                                   ESCAP
E         TST                ;IF /FL:LOE SET LOOP, ELSE EXIT TST
          022746  104410                         TRAP    C$ESCAPE
          022750  000114                         .WORD   L10060-.
     926
     927 022752  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
     928 022756                                   ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
          022756  104410                         TRAP    C$ESCAPE
          022760  000104                         .WORD   L10060-.
     929
     930 022762  013737  002314  022776          MOV     E.MP,2$         ;READ HEADER WORD CONTAINS SEC, HD, CYL
     931
     932 022770  004537  016100                  JSR     R5,SIMBCC       ;GO CALCULATE CRC

     933 022774  000020                           16.                     ;16 BITS
     934 022776  000000                    2$:    .WORD   0               ;HEADER GOES HERE
     935 023000  000000                    3$:    .WORD   0               ;START WITH 0 CRC
     936 023002  013737  002344  023026          MOV     CALBCC,5$
     937 023010  013737  002316  023024          MOV     E.MP1,4$        ;GET SECOND WORD IN SILO, CONTAINS 0'S
     938 023016  004537  016100                  JSR     R5,SIMBCC
     939 023022  000020                           16.
     940 023024  000000                    4$:    .WORD   0
     941 023026  000000                    5$:    .WORD   0
     942 023030  013737  002344  002362          MOV     CALBCC,G
DDAT      ;STORE CALCULATED CRC AS GOOD
     943 023036  013737  002320  002364          MOV     E.MP2,BDDAT     ;THIRD READ OF MP SILO GETS CRC
     944 023044  023737  002362  002364          CMP     GDDAT,BDDAT     ;IS CRC CORRECT?
     945 023052  001404                          BEQ     6$              ;IF SO CONTINUE
     946
     947 023054                                   ERRDF   37.,EM42,ERR4
          023054  104455                         TRAP    C$ERDF
          023056  000045                         .WORD   37
          023060  010047                         .WORD   EM42
          023062  012372                         .WORD   ERR4
     948 023064                             6$:
     949
     950 023064                             ENDTST                          ;****END OF TEST****
          023064
                            L10060:
          023064  104401                                 TRAP    C$ETST
     951
     952
     953                                    .SBTTL  **TEST 33** - CHECK CONSECUTIVE HEADERS
     954
     955 023066                             BGNTST                          ;****START OF TEST****
     956
     957
     958 023066                             STARS
                                            ;;*************************************************************
                                            ;CHECK THAT THE HEADERS ARE CONSECUTIVE.  WE WILL DO
     959                                    ;40 (FORTY) READ HEADERS AND STORE EACH.  AFTER WE HAVE
     960                                    ;READ THE FORTIETH HEADER WE WILL VERIFY THAT
     961                                    ;THEY CA
     962
ME IN SEQUENTIAL, THAT 0 FOLLOWS 39,
                                            ;THAT THERE WERE NO ERRORS.
     963
     964 023066                             STARS
                                            ;;*************************************************************
     965
     966
```

```
     967 023066  005037  002366                    CLR     FIRST           ;CLEAR FIRST READ DONE FLAG
     968 023072  012703  005274                    MOV     #HDRBUF,R3      ;STORE HEADERS

969       023076  012701  000050                    MOV     #40.,R1         ;FORTY HEADERS
     970 023102  012737  000210  002272            MOV     #RDHDR!CRDY,B.CS
     971 023110  053737  002270  002272            BIS     DRIVE,B.CS
     972 023116  013777  002272  157124            MOV     B.CS,@RLCS
     973 023124  042777  000200  157116  2$:       BIC     #200,@RLCS
     974 023132  032777  000200  157110  1$:       BIT     #200,@RLCS      ;DONE?
     975 023140  001774                            BEQ     1$
     976 023142  017723  157102                    MOV     @RLCS,(R3)+
     977 023146  017723  157104                    MOV     @RLMP,(R3)+
     978 023152  017723
         157100                      MOV     @RLMP,(R3)+
     979 023156  017723  157074                    MOV     @RLMP,(R3)+
     980 023162  005301                            DEC     R1              ;HAVE WE READ FORTY HEADERS
     981 023164  001357                            BNE     2$              ;GO BACK UNTIL FOURTY DONE
     982 023166  012703  005274                    MOV     #HDRBUF,R3      ;GET LIST OF HEADERS
     983 023172  012701  000050                    MOV     #40.,R1         ;CHECK FORTY OF THEM
     984 023176  011337  002306                    MOV     (R3),E.CS
     985 023202  005737  002306                    TST     E.CS
     986 023206  100016                            BPL     99$
     987 023210  012737  006312  015450            MOV
#RHDMES,RESTMS
     988 023216  005723                            TST     (R3)+
     989 023220  012337  002314                    MOV     (R3)+,E.MP
     990 023224  012337  002316                    MOV     (R3)+,E.MP1
     991 023230  012337  002320                    MOV     (R3)+,E.MP2
     992 023234  004537  015166                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
     993 023240  000137  023402                    JMP     7$
     994 023244  005723                99$:       TST     (R3)+
     995 023246  011337  002364                    MOV     (R3),BDDAT      ;GET HEADER
     996 023252  005737  002366                    TST     FIRST           ;IS THIS FIRST READ?
     997 023256  001007
         BNE     4$                  ;NO, BRANCH
     998 023260  012737  000001  002366            MOV     #1,FIRST        ;SET FIRST READ DONE FLAG
     999 023266  013737  002364  002362  3$:       MOV     BDDAT,GDDAT     ;SET UP NEXT READ EXPECTED
    1000 023274  000435                            BR      6$              ;GO SEE IF TEST IS DONE
    1001 023276  005237  002362                4$:       INC     GDDAT           ;INCREMENT EXP'D HEADER
    1002 023302  023737  002364  002362            CMP     BDDAT,GDDAT     ;IS NEW HEADER SEQUENTIAL?
    1003 023310  001766                            BEQ     3$              ;YES THEN BRANCH
    1004 023312  033737  002334  002364            BIT     SECMSK,BDDAT
;IS NEW HEADER ZERO?
    1005 023320  001015                            BNE     5$              ;NO, THEN ERROR GO REPORT IT
    1006 023322  013737  002362  002346            MOV     GDDAT,TEMP2     ;YES, CHECK IF LAST HEADER WAS
    1007 023330  043737  002370  002346            BIC     CYLMSK,TEMP2    ;MAX ADDRESS, IF SO BRANCH
    1008 023336  023737  002372  002346            CMP     MXSEC1,TEMP2    ;STORE NEW DATA AS OLD
    1009 023344  001750                            BEQ     3$              ;AND PERFORM NEW RD HDR
    1010 023346  043737  002334  002362            BIC     SECMSK,GDDAT    ;EXPECTING ZERO SECTOR
    1011
    1012 023354                                5$:
    1013
    1014 023354  005037  002366                    CLR     FIRST           ;ERROR WILL MAKE US MISS
    1015                                                                    ;NEXT SECTOR SEQUENTIALLY
    1016                                                                    ;START OVER; CLEAR FIRST FLAG
    1017 023360                                    ERRDF   38.,EM43,ERR2
         023360  104455                            TRAP    C$ERDF
         023362  000046                            .WORD   38
         023364  010105                            .WORD   EM43
         023366  012256                            .WORD   ERR2
    1018 023370                                6$:       CKLOOP          ;CHECK IF /FL:LOE IS SET
         023370  104406                            TRAP    C$CLP1
```

```
**TEST 33** - CHECK CONSECUTIVE HEADERS

 1019
 1020 023372  062703  000006                ADD     #6,R3
 1021 023376  005301                        DEC     R1              ;HAVE WE DONE THIS ENOUGH
 1022 023400  001321                        BNE     99$             ;NO, GO BACK DO IT AGAIN
 1023 023402                          7$:
 1024 023402                          ENDTST                          ;****END OF TEST****
      023402                          L10061:
      023402  104401                        TRAP    C$ETST
 1025
 1026
 1027                                 .SBTTL  **TEST 34** - SEEK FUNCTION
 1028
 1029 023404                          BGNTST                          ;****START OF TEST****

 1030 023404                          STARS
                                      ;;*****************************************************************
 1031                                 ;CHECK THE SEEK FUNCTION RETURNS CONTROLLER READY
 1032                                 ;WITH NO ERRORS   WE ISSUE A ONE TRACK IN WORD SEEK.
 1033                                 ;WE DO NOT CHECK THE RESULT FOR POSITION
 1034 023404                          STARS
                                      ;;*****************************************************************
 1035
 1036
 1037 023404  012777  000205  156642        MOV     #BIT7!MK!SIGN,@RLDA  ;SET UP DA-DIFF=1,MARKER,TOWARDS
 1038 023412  00
4537  015466                    JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
 1039 023416  000006                        SEEK                    ;SEEK
 1040 023420  004537  016354                JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1041 023424  012737  000010  002414        MOV     #8.,DLYCNT      ;INITIALIZE DELAY COUNT
 1042 023432                          WAIT1:  DELAY   250.            ;IMPLEMENT TIME DELAY
      023432  012727  000372                MOV     #250.,(PC)+
      023436  000000                        .WORD   0
      023440  013727  002116                MOV     L$DLY,(PC)+
      023444  000000                        .WORD   0
      023446  005367  177772                DEC     -6(PC)
      023452
      001375                          BNE     .-4
      023454  005367  177756                DEC     -22(PC)
      023460  001367                        BNE     .-20
 1043 023462  005337  002414                DEC     DLYCNT          ;DECREMENT DELAY COUNT
 1044 023466  001361                        BNE     WAIT1           ;BRANCH IF DELAY NOT EXPIRED
 1045 023470                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
      023470  104406                        TRAP    C$CLP1
 1046 023472  004537  015166                JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1047
 1048 023476                          ENDTST                          ;****END OF TEST****
      023476                          L10062:
      023476  104401                        TRAP    C$ETST
 1049

1050
 1051                                 .SBTTL  **TEST 35** - CHECK DRIVE READY ON SEEK
 1052
 1053 023500                          BGNTST                          ;****START OF TEST****
 1054
 1055
 1056 023500                          STARS
                                      ;;*****************************************************************
 1057                                 ;CHECK THE SEEK FUNCTION RETURNS DRIVE READY WITH
 1058                                 ;NO ERRORS.  WE ISSUE A ONE TRACK INWARD SEEK.  WE DO
 1059                                 ;NOT CHECK THE RESULT FOR POSITION
```

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

   1060 023500                                  STARS
                                                ;;*****************************************************************

   1061
   1062
   1063
   1064 023500  012777  000201  156546          MOV     #BIT7!MK,@RLDA  ;SET DA, MARKER, DIFF=1.
   1065 023506  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1066 023512  000006                          SEEK                    ;SEEK
   1067 023514  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1068 023520                          CKLOOP                          ;CHECK IF /FL:LOE IS SET
        023520  104406                          TRAP    C$CLP1
   1069
   1070 023522  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1071 023526                          CKLOOP                          ;CHECK IF /FL:LOE IS SET
        023526  104406                          TRAP    C$CLP1
   1072
   1073 023530  004537  016266                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
   1074 023534                          CKLOOP                          ;CHECK IF /FL:LOE IS SET
        023534  104406                          TRAP    C$CLP1
   1075
   1076 023536  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1077
   1078 023
542                                     ENDTST                          ;****END OF TEST****
        023542                          L10063:
        023542  104401                          TRAP    C$ETST
   1079
   1080
   1081                                         .SBTTL  **TEST 36** - SEEK FUNCTION INTERRUPT
   1082
   1083 023544                                  BGNTST                  ;****START OF TEST****
   1084
   1085
   1086 023544                                  STARS
                                                ;;*****************************************************************
   1087                                         ;CHECK THAT CONTROLLER READY RESETTING WHEN THE SEEK IS
   1088                                         ;INITIATED CAUSES AN INTERRUPT BUT DRIVE READY WILL
   1089                                         ;NOT.  WE ALSO MONITOR
FOR ANY ERROR BITS SETTING.
   1090 023544                                  STARS
                                                ;;*****************************************************************

   1091
   1092
   1093
   1094
   1095 023544  005037  002330                  CLR     INTFLG
   1096 023550                                  SETPRI  #PRI00          ;SET PSW TO 0
        023550  012700  000000                  MOV     #PRI00,R0
        023554  10444                           TRAP    C$SPRI
   1097 023556  012777  000205  156470          MOV     #BIT7!MK!SIGN,@RLDA  ;SET UP RLDA
   1098 023564  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1099 023570  000106                          SEEK!INTEN              ;SEEK AND INTR. ENA.
   1100 023572  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1101 023576  000240                          NOP                     ;
   1102 023600  005737  002330          1$:     TST     INTFLG          ;DID INTERRUPT OCCUR
   1103 023604  001004                          BNE     2$              ;YES, GO CHECK DRDY
   1104 023606                                  ERRDF   40.,EM47,ERR0
        023606  104455                          TRAP    C$ERDF
        023610  000050                          .WORD   40
```

```
**TEST 36** - SEEK FUNCTION INTERRUPT

        023612  010325                          .WORD   EM47
        023614  012226                          .WORD   ERRO
  1105  023616                          2$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        023616  104406                          TRAP    C$CLP1
  1106
  1107
  1108  023620  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
  1109  023624                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        023624  104406                          TRAP    C$CLP1
  1110
  1111  023626  005037  002330                  CLR     INTFLG          ;CLEAR INTERRUPT OCCURANCE
  1112
  1113
  1114  023632  004537  016266                  JSR     R5
,WTDRDY ;WAIT FOR DRIVE READY
  1115  023636                          5$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        023636  104406                          TRAP    C$CLP1
  1116
  1117  023640                                  SETPRI  #PRIO7
        023640  012700  000340                  MOV     #PRIO7,R0
        023644  104441                          TRAP    C$SPRI
  1118  023646  005737  002330                  TST     INTFLG          ;DID DRIVE READY CAUSE INTERRUPT
  1119  023652  001404                          BEQ     6$              ;NO, CONTINUE
  1120
  1121  023654                                  ERRDF   42.,EM52,ERRO
        023654  104455                          TRAP    C$ERDF
        023656  000052                          .WORD   42
        023660  010356                          .WORD   EM52
        023662
        012226                          .WORD   ERRO
  1122  023664                          6$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        023664  104406                          TRAP    C$CLP1
  1123
  1124  023666                          ENDTST                          ;****END OF TEST****
        023666                          L10064:
        023666  104401                          TRAP    C$ETST
  1125
  1126
  1127                                  .SBTTL  **TEST 37** - TEST DIFFERENCE WORD TRANSMISSION
  1128
  1129  023670                          BGNTST                          ;****START OF TEST****
  1130
  1131
  1132
  1133
  1134  023670                          STARS
                                        ;;**********************************************************************
  1135
                                ;VERIFY THAT THE DIFFERENCE WORD LOADS AND IS
  1136                                  ;TRANSMITTED CORRECTLY.  WE WILL ISSUE SEEKS WITH THE
  1137                                  ;DIFFERENCE WORD CONTAINING ALL OF THE BIT PATTERNS FLOATING 1,
  1138                                  ;GROWING 1, GROWING 0 AND SHITING 0.  THE SEEK WILL
  1139                                  ;START FROM TRACK 0 EACH TIME AND WILL RETURN THERE
  1140                                  ;EACH, THUS BOTH DIRECTIONS FOR PATTERNS WILL BE CHECKED.
  1141                                  ;READ HEADERS ARE USED TO VERIFY THE SEEK CORRECTNESS.
  1142                                  ;ERRORS ARE MONITORED AND REPORTED.
  1143  023670                          STARS
                                        ;;**********************************************************************
  1144
  1145
```

```
   1146 023670  012703  004626                    MOV     #SKLST,R3       ;GET LIST OF DIFFERENCE WORDS
   1147 023674                             BGNSEG                          ;****START OF SEGMENT****
        023674  104404                             TRAP    C$BSEG
   1148 023676                             1$:
   1149 023676  004537
015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1150 023702  000010                             RDHDR                   ;READ HEADER
   1151 023704  004537  016354                     JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1152 023710                             98$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        023710  104406                             TRAP    C$CLP1
   1153
   1154 023712  004537  015166                     JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1155 023716                                     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        023716  104406                             TRAP    C$CLP1
   1156
   1157 023720  013737  002314  002364             MOV     E.MP,BDDAT
;READ HEADER
   1158 023726  043737  002334  002364             BIC     SECMSK,BDDAT    ;CLEAR OUT SECTOR
   1159 023734  001462                             BEQ     99$             ;IF ON TRACK ZERO, H.S. ZERO, OK
   1160
   1161                                     ;NOT ON TRACK ZERO CALCULATE DIFFERENCE WORD AND PUT IT BACK
   1162                                     ;ON ZERO.
   1163
   1164 023736  042737  000100  002364             BIC     #RHHS,BDDAT     ;CLEAR OUT HEAD SELECT
   1165 023744  013777  002364  156302             MOV     BDDAT,@RLDA     ;PUT CYLINDER AS DIFFERENCE WORD
   1166 023752  052777  000001  156274             BIS     #MK,@RLDA       ;SET MARKER BI
T
   1167 023760  004537  015466                     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1168 023764  000006                             SEEK                    ;SEEK
   1169 023766  004537  016354                     JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1170 023772                                     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        023772  104406                             TRAP    C$CLP1
   1171
   1172 023774  004537  015166                     JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1173 024000                                     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024000  104406                             TRAP    C$CLP1
   1174
   1175 024002  004537  016266                     JSR     R5,W
TDRDY   ;WAIT FOR DRIVE READY
   1176 024006                             89$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024006  104406                             TRAP    C$CLP1
   1177
   1178 024010  004537  015166                     JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1179 024014                                     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024014  104406                             TRAP    C$CLP1
   1180
   1181 024016  004537  015466                     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1182 024022  000010                             RDHDR                   ;READ HEADER
   1183 024024  004537  016354                     JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH

1184    024030                             96$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024030  104406                             TRAP    C$CLP1
   1185
   1186 024032  004537  015166                     JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1187 024036                                     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024036  104406                             TRAP    C$CLP1
   1188
   1189 024040  005037  002362                     CLR     GDDAT           ;CLEAR EXPECTED
   1190 024044  013737  002364  002376             MOV     BDDAT,DWORD     ;SAVE DIFFERENCE WORD
   1191 024052  013737  002314  002364             MOV     E.MP,BDDAT      ;READ HEADER
   1192 024060  043737  002334  00236
4               BIC     SECMSK,BDDAT    ;MASK OUT SECTOR BITS
   1193 024066  001404                             BEQ     5$              ;BRANCH IF ON ZERO TRACK
```

```
 1194
 1195 024070                                        ERRDF   43.,EM54,ERR3
      024070  104455                                TRAP    C$ERDF
      024072  000053                                .WORD   43
      024074  010426                                .WORD   EM54
      024076  012320                                .WORD   ERR3
 1196 024100                                5$:     CKLOOP                  ;CHECK IF /FL:LOE IS
SET
      024100  104406                                TRAP    C$CLP1
 1197
 1198 024102  011377  156146                99$:    MOV     (R3),@RLDA      ;GET DIFFERENCE WORD
 1199 024106  052777  000005  156140               BIS     #SIGN!MK,@RLDA  ;SET SIGN (TOWARDS SPINDLE) AND MARKER
 1200 024114  004537  015466                        JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
 1201 024120  000006                                SEEK                    ;SEEK
 1202 024122  004537  016354                        JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1203 024126                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
      024126  104406                                TRAP    C$CLP1
  1
204
 1205 024130  004537  015166                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1206 024134                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
      024134  104406                                TRAP    C$CLP1
 1207
 1208 024136  004537  016266                        JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
 1209 024142                                87$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
      024142  104406                                TRAP    C$CLP1
 1210
 1211 024144  004537  015166                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1212 024150                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
      024150  104406                                TRAP    C$CLP1
  12
13
 1214 024152  004537  015466                        JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
 1215 024156  000010                                RDHDR                   ;READ HEADER
 1216
 1217 024160  004537  016354                        JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1218 024164                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
      024164  104406                                TRAP    C$CLP1
 1219
 1220 024166  004537  015166                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1221 024172                                        ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
      024172  104410                                TRAP    C$ESCAPE
      024174  000106
                       .WORD   10000$-.
 1222
 1223 024176  011337  002362                8$:     MOV     (R3),GDDAT      ;GET EXPECTED CYLINDER
 1224 024202  011337  002376                        MOV     (R3),DWORD      ;SET UP DIFFERENCE FOR SEEK
 1225 024206  013737  002314  002364                MOV     E.MP,BDDAT      ;READ HEADER FROM RLMP
 1226 024214  043737  002334  002364                BIC     SECMSK,BDDAT    ;CLEAR OUT SECTOR BITS
 1227 024222  023737  002362  002364                CMP     GDDAT,BDDAT     ;DID SEEK GO TO THE RIGHT
 1228 024230  001404                                BEQ     9$              ;TRACK, IF SO, GO GET NEXT
 1229
 1230 024232
      ERRDF   44.,EM54,ERR3
      024232  104455                                TRAP    C$ERDF
      024234  000054                                .WORD   44
      024236  010426                                .WORD   EM54
      024240  012320                                .WORD   ERR3
 1231 024242                                9$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
      024242  104406                                TRAP    C$CLP1
 1232
 1233 024244  005723                                TST     (R3)+           ;BUMP PATTERN
```

```
   1234 024246  023727  002406  0
00001           CMP     T.DRIVE,#1
   1235 024254  001005                          BNE     2$
   1236 024256  020327  004726                  CMP     R3,#SKEND
   1237 024262  001407                          BEQ     10$
   1238 024264  000137  023676                  JMP     1$
   1239
   1240 024270  020327  004770          2$:     CMP     R3,#SKEEND
   1241 024274  001402                          BEQ     10$
   1242 024276  000137  023676                  JMP     1$
   1243
   1244 024302                          10$:
   1245
   1246 024302                          ENDSEG                          ;****END OF SEGMENT****
        024302                          10000$:
        024302  104405                          TRAP    C$ESEG
   1247 024304                          ENDTST                          ;****END OF TEST**
**
        024304                          L10065:
        024304  104401                          TRAP    C$ETST
   1248
   1249
   1250                                 .SBTTL  **TEST 38** - VERIFY HEAD SELECT 0 VIA RD HDR
   1251
   1252 024306                          BGNTST                          ;****START OF TEST****
   1253
   1254                                 ;
   1255
   1256 024306                          STARS
                                        ;;*************************************************************************
   1257                                 ;CHECK THAT WE CAN SELECT HEAD SELECT ZERO.  ISSUE
   1258                                 ;SEEK TO HEAD SELECT 0 AND VERIFY WITH READ HEADER.
   1259 024306                          STARS
                                        ;;*********************
*****************************************
   1260
   1261 024306  012777  000001  155740  99$:    MOV     #MK,@RLDA       ;SET MARKER IN RLDA
   1262 024314  005037  002362                  CLR     GDDAT           ;SET EXPECTED
   1263                                                                 ;LOAD HS=0 INTO RLDA
   1264 024320                          2$:
   1265 024320  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1266 024324  000006                          SEEK                    ;SEEK
   1267 024326  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1268 024332                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        02
4332    104406                          TRAP    C$CLP1
   1269
   1270 024334  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1271 024340                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024340  104406                          TRAP    C$CLP1
   1272
   1273 024342  004537  016266                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
   1274 024346                          89$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024346  104406                          TRAP    C$CLP1
   1275
   1276 024350  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1277 024354                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024
354     104406                          TRAP    C$CLP1
   1278
   1279 024356  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1280 024362  000010                          RDHDR                   ;READ HEADER
```

```
   1281 024364  004537  016354                    JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1282 024370                             96$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024370  104406                             TRAP
C$CLP1
   1283
   1284 024372  004537  015166                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1285 024376                                     ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
        024376  104410                             TRAP    C$ESCAPE
        024400  000036                             .WORD   L10066-.
   1286
   1287 024402  013737  002314  002364             MOV     E.MP,BDDAT      ;READ HEADER FOR HEAD SELECT
   1288 024410  042737  177677  002364             BIC     #177677,BDDAT   ;MASK ONLY HEAD SELECT
   1289 024416  023737  002362  002364             CMP     GDDAT,BDDAT     ;COMPARE HEAD SELECTS
   1290 024424  001404                             B
EQ      5$              ;IF EQUAL CONTINUE
   1291
   1292 024426                                     ERRDF   45.,EM55,ERR4
        024426  104455                             TRAP    C$ERDF
        024430  000055                             .WORD   45
        024432  010465                             .WORD   EM55
        024434  012372                             .WORD   ERR4
   1293 024436                             5$:
   1294
   1295 024436                             ENDTST                          ;****END OF TEST****
        024436                             L10066:
        024436  104401                             TRAP    C$ETST
   1296
   1297
   1298                                    .SBTTL  **TEST 39** - VERIFY HEAD SELECT 1 VIA RD HDR
   1299
   1300 024440                             BGNTST                          ;****START OF TEST****
   1301
   1302
   1303 024440
                STARS
                                           ;;*************************************************************
   1304                                    ;CHECK THAT WE CAN SELECT HEAD SELECT ONE.  ISSUE
   1305                                    ;SEEK TO HEAD SELECT 1 AND VERIFY WITH READ HEADER.
   1306 024440                             STARS
                                           ;;*************************************************************
   1307
   1308
   1309 024440  012777  000001  155606     99$:    MOV     #MK,@RLDA       ;SET MARKER IN RLDA
   1310 024446  052777  000020  155600             BIS     #DAHS,@RLDA     ;LOAD HS=1 INTO RLDA
   1311 024454  004537  015466
        2$:     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1312 024460  000006                             SEEK                    ;SEEK
   1313 024462  004537  016354                     JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1314 024466                                     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024466  104406                             TRAP    C$CLP1
   1315
   1316 024470  004537  015166                     JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1317 024474                                     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024474  104406                             TRAP    C$CLP1
   1318
   1319 024476  004537  016266                     JSR     R5,WTDRDY       ;WAIT FOR DRIVE CLEAR

1320    024502                             89$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024502  104406                             TRAP    C$CLP1
   1321
   1322 024504  004537  015166                     JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1323 024510                                     CKLOOP                  ;CHECK IF /FL:LOE IS SET
```

```
                024510  104406                          TRAP    C$CLP1
     1324
     1325       024512  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTIO
N OF FOLLOWING WORD
     1326       024516  000010                          RDHDR                   ;READ HEADER
     1327       024520  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
     1328       024524                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
                024524  104406                          TRAP    C$CLP1
     1329
     1330       024526  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
     1331       024532                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
                024532  104410                          TRAP    C$ESCAPE
                024534  000044                          .WORD   L10067-.
     1332
     1333       024536  013737  002314  002364          MOV     E.
MP,BDDAT                ;READ HEADER
     1334       024544  042737  177677  002364          BIC     #177677,BDDAT   ;MASK FOR H.S.
     1335       024552  012737  000100  002362          MOV     #RHHS,GDDAT     ;SET EXPECTED
     1336       024560  023737  002362  002364          CMP     GDDAT,BDDAT     ;CORRECT HEAD
     1337       024566  001404                          BEQ     5$              ;YES, CONTINUE
     1338
     1339       024570                                  ERRDF   46.,EM55,ERR4
                024570  104455                          TRAP    C$ERDF
                024572  000056                          .WORD   46
                024574  010465                          .WORD   EM55
                024576  012372                          .WORD   ERR4
     1340       024600                          5$:
     1341
     1342       024600                          E
NDTST
                024600                          L10067:
                024600  104401                          TRAP    C$ETST
     1343
     1344
     1345                                       .SBTTL  **TEST 40** - VERIFY HEAD SELECT 0 VIA GET STATUS
     1346
     1347       024602                          BGNTST                          ;****START OF TEST****
     1348
     1349       024602                          STARS
                                                ;;**************************************************************************
     1350                                       ;CHECK THAT WE CAN READ BACK HEAD SELECT 0 WITH
     1351                                       ;A GET STATUS FUNCTION.  SELECT H.S. 0 WITH A SEEK
     1352                                       ;VERIFY WITH GET STATUS
     1353       0246
02                                      STARS
                                                ;;**************************************************************************
     1354
     1355       024602  012777  000001  155444          MOV     #MK,@RLDA       ;SET MARKER IN RLDA
     1356                                                                          ;LOAD HS=0 INTO RLDA
     1357       024610  005037  002362          2$:     CLR     GDDAT           ;SET UP EXP'D
     1358       024614  004537  015466          3$:     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
     1359       024620  000006                          SEEK                    ;SEEK
     1360       024622  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
     1361       024626                                  CKLOOP                  ;CHECK IF
/FL:LOE IS SET
                024626  104406                          TRAP    C$CLP1
     1362
     1363       024630  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
     1364       024634                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
                024634  104406                          TRAP    C$CLP1
     1365
     1366       024636  004537  016266                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
```

```
   1367 024642                                          CKLOOP
        ;CHECK IF /FL:LOE IS SET
        024642  104406                                  TRAP    C$CLP1
   1368
   1369 024644  004537  015166                          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1370 024650                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024650  104406                                  TRAP    C$CLP1
   1371
   1372 024652  012777  000003  155374                  MOV     #GSBIT!MK,@RLDA ;SET UP FOR GET STATUS IN DA
   1373 024660  004537  015466                          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1374 024664  000004                                  GSTAT                   ;GET STATUS
   1375 024666  004537  016354                          JSR     R5,WTCRDY       ;WAIT F
OR CONTROLLER READY HIGH
   1376 024672                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024672  104406                                  TRAP    C$CLP1
   1377
   1378 024674  004537  015166                          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1379 024700                                          ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
        024700  104410                                  TRAP    C$ESCAPE
        024702  000036                                  .WORD   L10070-.
   1380
   1381 024704  013737  002314  002364                  MOV     E.MP,BDDAT      ;READ STATUS FOR HEAD SELECT BIT
   1382 024712  042737  177677  002364                  BIC     #177677,BDDAT   ;LEAVE ONLY H.S. BIT
   1383 024720  023737  002362  002364                  CMP     GDDAT,BDDAT     ;IS HEAD SELECT CORRECT?
   1384 024726  001404                                  BEQ     6$              ;YES, CONTINUE
   1385
   1386 024730                                          ERRDF   47.,EM56,ERR4
        024730  104455                                  TRAP    C$ERDF
        024732  000057                                  .WORD   47
        024734  010520                                  .WORD   EM56
        024736  012372                                  .WORD   ERR4
   1387 024740                          6$:
   1388
   1389 024740                          ENDTST                                  ;****END OF TEST****
        024740                          L10070:
        024740  104401                                  TRAP    C$ETST
   1390
   1391
   1392                                 .SBTTL  **TEST 41** - VERIFY HEAD SELECT 1 VI
A GET STATUS
   1393
   1394 024742                          BGNTST                                  ;****START OF TEST****
   1395
   1396 024742                          STARS
                                        ;;*************************************************************************
   1397                                 ;CHECK THAT WE CAN READ BACK HEAD SELECT 1 WITH A GET
   1398                                 ;STATUS FUNCTION.  SELECT H.S. 1 WITH A SEEK AND VERIFIY WITH
   1399                                 ;GET STATUS
   1400 024742                          STARS
                                        ;;*************************************************************************
   1401
   1402
   1403 024742  012777  000001  155304          MOV     #MK,@
RLDA    ;SET MARKER IN RLDA
   1404 024750  052777  000020  155276          BIS     #DAHS,@RLDA     ;LOAD HS=1 INTO RLDA
   1405 024756  012737  000100  002362  2$:     MOV     #STHS,GDDAT     ;SET UP EXP'D
   1406 024764  004537  015466          3$:     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1407 024770  000006                          SEEK                    ;SEEK
   1408 024772  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1409 024776                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        024776  104406                          TRAP    C$CLP1
```

```
   1410
   1411 025000  004537  015166                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1412 025004                                    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        025004  104406                            TRAP    C$CLP1
   1413
   1414 025006  004537  016266                    JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
   1415 025012                                    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        025012  104406                            TRAP    C$CLP1
   1416
   1417 025014  004537
015166          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1418 025020                                    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        025020  104406                            TRAP    C$CLP1
   1419
   1420 025022  012777  000003  155224            MOV     #GSBIT!MK,@RLDA ;SET UP FOR GET STATUS IN DA
   1421 025030  004537  015466                    JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1422 025034  000004                            GSTAT                   ;GET STATUS
   1423 025036  004537  016354                    JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1424 025042                                    ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TS
T
        025042  104410                            TRAP    C$ESCAPE
        025044  000046                            .WORD   L10071-.
   1425
   1426 025046  004537  015166                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1427 025052                                    ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT TST
        025052  104410                            TRAP    C$ESCAPE
        025054  000036                            .WORD   L10071-.
   1428
   1429 025056  013737  002314  002364            MOV     E.MP,BDDAT      ;READ STATUS FOR HEAD SELECT BIT
   1430 025064  042737  177677  002364            BIC     #177677,BDDAT   ;LEAVE ONLY H.S. BIT
   1431 025072  023737  002362  002364
CMP     GDDAT,BDDAT     ;IS HEAD SELECT CORRECT?
   1432 025100  001404                            BEQ     6$              ;YES, CONTINUE
   1433
   1434 025102                                    ERRDF   48.,EM56,ERR4
        025102  104455                            TRAP    C$ERDF
        025104  000060                            .WORD   48
        025106  010520                            .WORD   EM56
        025110  012372                            .WORD   ERR4
   1435 025112                          6$:
   1436
   1437 025112                          ENDTST                          ;****END OF TEST****
        025112                          L10071:
        025112  104401                          TRAP    C$ETST
   1438
   1439
   1440                                 .SBTTL  **TEST 42** - TEST TIME AT WHICH DIF WD GETS TRANSMITTED
   1441
   1442 02
5114                            BGNTST                                  ;****START OF TEST****
   1443
   1444
   1445 025114                          STARS
                                        ;;**************************************************************************
   1446                                 ;VERIFY THAT THE DIFFERENCE WORD ON A SEEK IS
   1447                                 ;TRANSMITTED PRIOR TO CONTROLLER READY SETTING.  THIS
   1448                                 ;IS DONE BY SETTING A KNOWN DIFFERENCE WORD IN
   1449                                 ;THE RLDA ISSUING A A SEEK, WAITING FOR CONTROLLER READY
   1450                                 ;(BUT NOT DRIVE READY), WRITING A DIFFERENT RLDA AND WAITING
   1451                                 ;FOR DRIVE RE
ADY.  THE RESULTANT POSITION SHOULD BE THAT
   1452                                 ;OF THE FIRST RLDA ONLY.
```

```
   1453 025114                                  STARS
                                                ;;*****************************************************************

   1454
   1455
   1456 025114  004537  015466                          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1457 025120  000010                                  RDHDR                   ;REA
D HEADER
   1458 025122  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1459 025126                                  99$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        025126  104406                                  TRAP    C$CLP1
   1460
   1461 025130  004537  015166                          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1462 025134                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
        025134  104406                                  TRAP    C$CLP1
   1463
   1464 025136  013737  002314  002362                  MOV     E.MP,GDDAT      ;READ HEADER
   1465 025144  043737  002334  002362                  BIC     SECMSK,GDDAT    ;CLEAR SECTOR BITS
   146
6       025152  012777  000001  155074                  MOV     #MK,@RLDA       ;SET MARKER IN RLDA
   1467 025160  032737  000100  002362                  BIT     #RHHS,GDDAT     ;TEST H.S.
   1468 025166  001403                                  BEQ     2$              ;IF ZERO, CONTINUE
   1469 025170  052777  000020  155056                  BIS     #DAHS,@RLDA     ;ONE, SET SO WE WILL REMAIN THERE
   1470 025176  013737  002362  002354          2$:     MOV     GDDAT,TMPO      ;STORE HEADER
   1471 025204  042737  000100  002354                  BIC     #RHHS,TMPO      ;CLEAR H.S. FROM STORED WORD
   1472 025212  023727  002406  000001                  CMP     T.DRIVE,#1
   1473 025220  0
01034                                           BNE     12$
   1474 025222  023737  002354  004704                  CMP     TMPO,HALMAX
   1475 025230  101007                                  BHI     3$
   1476 025232  052777  000004  155014                  BIS     #SIGN,@RLDA
   1477 025240  063737  004702  002362                  ADD     QUAMAX,GDDAT
   1478 025246  000403                                  BR      4$
   1479 025250  163737  004702  002362          3$:     SUB     QUAMAX,GDDAT
   1480 025256  053777  004702  154770          4$:     BIS     QUAMAX,@RLDA
   1481 025264  012737  000001  002356                  MOV     #MK,TMP1
   1482 025272  032777  000020  154754                  BIT     #DAHS,@RLDA
   1483 025300  001037
                                                BNE     5$
   1484 025302  052737  000020  002356                  BIS     #DAHS,TMP1
   1485 025310  000433                                  BR      5$
   1486 025312  023737  002354  004734          12$:    CMP     TMPO,HMAX
   1487 025320  101007                                  BHI     13$
   1488 025322  052777  000004  154724                  BIS     #SIGN,@RLDA
   1489 025330  063737  004732  002362                  ADD     QMAX,GDDAT
   1490 025336  000403                                  BR      14$
   1491 025340  163737  004732  002362          13$:    SUB     QMAX,GDDAT
   1492 025346  053777  004732  154700          14$:    BIS     QMAX,@RLDA
   1493 025354  012737  000001  002356                  MOV     #MK,T
MP1
   1494 025362  032777  000020  154664                  BIT     #DAHS,@RLDA
   1495 025370  001003                                  BNE     5$
   1496 025372  052737  000020  002356                  BIS     #DAHS,TMP1
   1497 025400  004537  015466                  5$:     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1498 025404  000006                                  SEEK                    ;SEEK
   1499 025406  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1500 025412                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
        025412  104406                                  TRAP    C$CLP1
   1501
   1502
   1503 025414  004537  015166                          JSR     R5,CHERR        ;CHEC
K CONTROLLER FOR ERRORS
   1504 025420                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
        025420  104406                                  TRAP    C$CLP1
```

```
 1505
 1506 025422  013777  002356  154624          MOV     TMP1,@RLDA      ;SEND IN NEW DIFFERENCE WORD
 1507 025430  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1508 025434                                  CKLOOP                  ;CHEC
K IF /FL:LOE IS SET
      025434  104406                          TRAP    C$CLP1
 1509
 1510 025436  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1511 025442                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025442  104406                          TRAP    C$CLP1
 1512
 1513 025444  004537  016266                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
 1514 025450                          8$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025450  104406                          TRAP    C$CLP1
 1515
 1516
 1517 025452  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1518 025456                                  CKLOOP
                      ;CHECK IF /FL:LOE IS SET
      025456  104406                          TRAP    C$CLP1
 1519
 1520 025460  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
 1521 025464  000010                          RDHDR                   ;READ HEADER
 1522 025466  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1523 025472                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025472  104406                          TRAP    C$CLP1
 1524
 1525 025474  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1526 025500                                  ESCAPE  TST             ;IF /FL:LOE SET LOOP, ELSE EXIT
TST
      025500  104410                          TRAP    C$ESCAPE
      025502  000036                          .WORD   L10072-.
 1527
 1528 025504  013737  002314  002364          MOV     E.MP,BDDAT      ;READ HEADER
 1529 025512  043737  002334  002364          BIC     SECMSK,BDDAT    ;CLEAR SECTOR ADDRESS
 1530 025520  023737  002362  002364          CMP     GDDAT,BDDAT     ;IS HEADER CORRECT?
 1531 025526  001404                          BEQ     10$             ;IF SO BRANCH
 1532
 1533 025530                                  ERRDF   50.,EM57,ERR4
      025530  104455                          TRAP    C$ERDF
      025532  000062                          .WORD   50
      025534  010557                          .WORD   EM57
      025536  012
372                           .WORD   ERR4
 1534 025540                          10$:
 1535
 1536 025540                          ENDTST                          ;****END OF TEST****
      025540                          L10072:
      025540  104401                          TRAP    C$ETST
 1537
 1538
 1539                                 .SBTTL  **TEST 43** - EXTENSIVE CHECK OF HEADER CRC
 1540
 1541 025542                          BGNTST                          ;****START OF TEST****
 1542 025542                          STARS
                                      ;;*****************************************************************
 1543                                 ;MORE EXTENSIVE CHECK OF HEADER CRC.  WE WILL SEEK
 1544                                 ;AND READ HEADERS VERIFYING HDR CRC ACROS
S THE
 1545                                 ;PLATTER USING THE GROWING 0, GROWING 1, SHIFTING 0 AND
 1546                                 ;GROWING 0 PATTERNS FOR TRACK ADDRESSES.
 1547 025542                          STARS
```

```
                                        ;;*****************************************************************
 1548
 1549
 1550 025542  012703  004626                    MOV     #SKLST,R3       ;GET LIST OF DIFFERENCE WORDS
 1551
025546                          BGNSEG                          ;****START OF SEGMENT****
      025546  104404                            TRAP    C$BSEG
 1552 025550                                1$:
 1553 025550  004537  015466                    JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
 1554 025554  000010                            RDHDR                   ;READ HEADER
 1555 025556  004537  016354                    JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1556 025562                                98$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025562  104406                            TRAP    C$CLP1
 1557
 1558 025564  004537  015166                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1559 025570                                    CKLOOP
                        ;CHECK IF /FL:LOE IS SET
      025570  104406                            TRAP    C$CLP1
 1560
 1561 025572  013737  002314  002364            MOV     E.MP,BDDAT      ;READ HEADER
 1562 025600  043737  002334  002364            BIC     SECMSK,BDDAT    ;CLEAR OUT SECTOR
 1563 025606  001461                            BEQ     5$              ;IF ON TRACK ZERO, H.S. ZERO, OK
 1564
 1565                                   ;NOT ON TRACK ZERO CALCULATE DIFFERENCE WORD AND PUT IT BACK
 1566                                   ;ON ZERO.
 1567
 1568 025610  042737  000100  002364            BIC     #RHHS,BDDAT     ;CLEAR OUT HEAD SELECT
 1569 025616  013777  002364  154
430                     MOV     BDDAT,@RLDA     ;PUT CYLINDER AS DIFFERENCE WORD
 1570 025624  052777  000001  154422            BIS     #MK,@RLDA       ;SET MARKER BIT
 1571 025632  004537  015466                    JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
 1572 025636  000006                            SEEK                    ;SEEK
 1573 025640  004537  016354                    JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1574 025644                                    CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025644  104406                            TRAP    C$CLP1
 1575
 1576 025646  004537  015166                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1577 0256
52                                      CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025652  104406                            TRAP    C$CLP1
 1578
 1579 025654  004537  016266                    JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
 1580 025660                                89$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025660  104406                            TRAP    C$CLP1
 1581
 1582 025662  004537  015166                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1583 025666                                    CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025666  104406                            TRAP    C$CLP1
 1584
 1585
 1586 025670  004537  015466                    JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
 1587 025674  000010                            RDHDR                   ;READ HEADER
 1588 025676  004537  016354                    JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1589 025702                                96$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025702  104406                            TRAP    C$CLP1
 1590
 1591 025704  004537  015166                    JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1592 025710                                    CKLOOP                  ;CHECK IF /FL:LOE IS SET
      025710  104406                            TRAP    C$CLP1
 1593
 1594 025712  005037  002362                    CLR     GDDAT           ;CLEAR EXPECTED
```

```
CZRLGEO RL11/RLV11 CTLR TST 1 MACRO V05.01a Tuesda
y 12-Feb-85 13:58 Page 8-37                                    SEQ 0096
**TEST 43** - EXTENSIVE CHECK OF HEADER CRC

   1595 025716  013737  002364  002376          MOV     BDDAT,DWORD     ;SAVE DIFFERENCE WORD
   1596 025724  013737  002314  002364          MOV     E.MP,BDDAT      ;READ HEADER
   1597 025732  043737  002334  002364          BIC     SECMSK,BDDAT    ;MASK OUT SECTOR BITS
   1598 025740  001404                          BEQ     5$              ;BRANCH IF ON ZERO TRACK
   1599
   1600 025742                                  ERRDF   51.,EM54,ERR3
        025742  104455                          TRAP    C$ERDF
        025744  00006
3                               .WORD   51
        025746  010426                          .WORD   EM54
        025750  012320                          .WORD   ERR3
   1601 025752                          5$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        025752  104406                          TRAP    C$CLP1
   1602
   1603 025754  011377  154274                  MOV     (R3),@RLDA      ;GET DIFFERENCE WORD
   1604 025760  052777  000005  154266          BIS     #SIGN!MK,@RLDA  ;SET SIGN (TOWARDS SPINDLE) AND MARKER
   1605 025766  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1606 025772  000006                          SEEK                    ;SEEK
   1607 025774  004537  016354                  JSR     R5,WTCRD
Y       ;WAIT FOR CONTROLLER READY HIGH
   1608 026000                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026002  104406                          TRAP    C$CLP1
   1609
   1610 026002  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1611 026006                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026006  104406                          TRAP    C$CLP1
   1612
   1613 026010  004537  016266                  JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
   1614 026014                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026014  104406                          TRAP    C$CLP1
   1615
   1616
   1617 026016  004537  015166                  JSR
R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
   1618 026022                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026022  104406                          TRAP    C$CLP1
   1619
   1620 026024  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1621 026030  000010                          RDHDR                   ;READ HEADER
   1622 026032  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1623 026036                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026036  104406                          TRAP    C$CLP1
   1624
   1625
   1626 026040  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER
FOR ERRORS
   1627 026044                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026044  104406                          TRAP    C$CLP1
   1628
   1629 026046  011337  002362                  MOV     (R3),GDDAT      ;GET EXPECTED CYLINDER
   1630 026052  011337  002376          8$:     MOV     (R3),DWORD      ;SET UP DIFFERENCE FOR SEEK
   1631 026056  013737  002314  002364          MOV     E.MP,BDDAT      ;READ HEADER FROM RLMP
   1632 026064  043737  002334  002364          BIC     SECMSK,BDDAT    ;CLEAR OUT SECTOR BITS
   1633 026072  023737  002362  002364          CMP     GDDAT,BDDAT     ;DID SEEK GO TO THE RIGHT
   1634 02
6100    001404                          BEQ     9$              ;TRACK, IF SO, GO GET NEXT
   1635
   1636 026102                                  ERRDF   52.,EM54,ERR3
        026102  104455                          TRAP    C$ERDF
        026104  000064                          .WORD   52
        026106  010426                          .WORD   EM54
        026110  012320                          .WORD   ERR3
```

```
   1637 026112                          9$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026112  104406                          TRAP    C$CLP1
   1638
   1639 0
26114   013737  002314  026130          MOV     E.MP,10$        ;GET HEADER WORD
   1640 026122  004537  016100                  JSR     R5,SIMBCC       ;GO CALCULATE HEADER CRC
   1641 026126  000020                          16.                     ;16 BITS
   1642 026130  000000                  10$:    .WORD   0               ;HEADER GOES HERE
   1643 026132  000000                          .WORD   0               ;START WITH ZERO CRC
   1644 026134  013737  002344  026160          MOV     CALBCC,20$
   1645 026142  013737  002316  026156          MOV     E.MP1,21$
   1646 026150  004537  016100                  JSR     R5,SIMBCC
   1647 026154  000020                          16.
   1648 026156  000000                  21$:
.WORD   0
   1649 026160  000000                  20$:    .WORD   0
   1650 026162  013737  002344  002362          MOV     CALBCC,GDDAT    ;MOVE CALCULATED CRC TO GDDAT
   1651 026170  013737  002320  002364          MOV     E.MP2,BDDAT     ;GET HEADER CRC FROM RLMP
   1652 026176  023737  002362  002364          CMP     GDDAT,BDDAT     ;IS CRC CORRECT?
   1653 026204  001404                          BEQ     11$             ;IF SO CONTINUE
   1654
   1655 026206                          ERRDF   53.,EM42,ERR4
        026206  104455                  TRAP    C$ERDF
        026210  000065                  .WORD   53
        026212  010047                  .WORD   EM42
        026214  012372                  .WORD   E
RR4
   1656 026216                          11$:    CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026216  104406                          TRAP    C$CLP1
   1657
   1658
   1659 026220  005723                          TST     (R3)+           ;BUMP PATTERN
   1660 026222  023727  002406  000001          CMP     T.DRIVE,#1
   1661 026230  001005                          BNE     2$
   1662 026232  020327  004726                  CMP     R3,#SKEND
   1663 026236  001407                          BEQ     12$
   1664 026240  000137  025550                  JMP     1$
   1665 026244  020327  004770          2$:     CMP     R3,#SKEEND
   1666 026250  001402                          BEQ     12$
   1667 026252  000137  025550                  JMP     1$
   16
68      026256                          12$:
   1669
   1670 026256                          ENDSEG                          ;****END OF SEGMENT****
        026256                          10000$:
        026256  104405                          TRAP    C$ESEG
   1671 026260                          ENDTST                          ;****END OF TEST****
        026260                          L10073:
        026260  104401                          TRAP    C$ETST
   1672
   167.
   1674                                 .SBTTL  **TEST 44** - VERIFY GET STATUS WHILE DRDY IS LOW
   1675
   1676 026262                          BGNTST                          ;****START OF TEST****
   1677
   1678 026262                          STARS
                                        ;;*****************************************************************
   1679                                 ;VERIFY TH
AT WE CAN ISSUE GET STATUS AND RECIEVE
   1680                                 ;THE STATUS WORD WHILE THE DRIVE IS IN NOTION SEEKING
   1681 026262                          STARS
                                        ;;*****************************************************************
```

```
     026262                                1$:
     026262  004537  015466                        JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD

     026266  000010                                RDHDR                   ;READ HEADER
     026270  004537  016354                        JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
     026274                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
     026274  104406                                TRAP    C$CLP1

     026276  004537  015166                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
     026302                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
     026302  104406                                TRAP    C$CLP1

     026304  013737  002314  002364                MOV     E.MP,BDDAT      ;READ HEADER
     026312  043737  002334  002364                BIC     SEC
MSK,BDDAT        ;CLEAR OUT SECTOR
     026320  001461                                BEQ     5$              ;IF ON TRACK ZERO, H.S. ZERO, OK

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

     026322  042737  000100  002364                BIC     #RHHS,BDDAT     ;CLEAR OUT HEAD SELECT
     026330  013777  002364  153716                MOV     BDDAT,@RLDA     ;PUT CYLINDER AS DIFFERENCE WORD
     026336  052777  000001  153710                BIS     #MK,@RLDA       ;SET MARKER BIT
     026344  004537  015466                        JSR     R5,LDFUNC       ;ISSUE FUNCT
ION OF FOLLOWING WORD
     026350  000006                                SEEK                    ;SEEK
     026352  004537  016354                        JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
     026356                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
     026356  104406                                TRAP    C$CLP1

     026360  004537  015166                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
     026364                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
     026364  104406                                TRAP    C$CLP1

     026366  004537  016266                        JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
     026372                                        CKLOOP                  ;CHEC
K IF /FL:LOE IS SET
     026372  104406                                TRAP    C$CLP1

     026374  004537  015166                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
     026400                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
     026400  104406                                TRAP    C$CLP1


     026402  004537  015466                        JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
     026406  000010                                RDHDR                   ;READ HEADER
     026410  004537  016354                        JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
     026414                                        CKLOOP                  ;CHECK IF /FL:LOF IS SET
     02641
4    104406                             TRAP    C$CLP1

     026416  004537  015166                        JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
     026422                                        CKLOOP                  ;CHECK IF /FL:LOE IS SET
     026422  104406                                TRAP    C$CLP1

     026424  005037  002362                        CLR     GDDAT           ;CLEAR EXPECTED
     026430  013737  002364  002376                MOV     BDDAT,DWORD     ;SAVE DIFFERENCE WORD
     026436  013737  002314  002364                MOV     E.MP,BDDAT      ;READ HEADER
     026444  043737  002334  002364                BIC     SECMSK,BDDAT    ;MASK OUT SECTOR BITS
     026452  00
1404                            BEQ     5$              ;BRANCH IF ON ZERO TRACK
```

```
   1731
   1732 026454                                          ERRDF   54.,EM54,ERR3
        026454  104455                                  TRAP    C$ERDF
        026456  000066                                  .WORD   54
        026460  010426                                  .WORD   EM54
        026462  012320                                  .WORD   ERR3
   1733 026464                              5$:         CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026464  104406                                  TRAP    C$CLP1
   1734
   1735 0264
66      012777  077601  153560             MOV         #77601,@RLDA    ;GET DIFFERENCE WORD
   1736 026474  052777  000005  153552                  BIS     #SIGN!MK,@RLDA  ;SET SIGN (TOWARDS SPINDLE) AND MARKER
   1737 026502  004537  015466                          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1738 026506  000006                                  SEEK                    ;SEEK
   1739 026510  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1740 026514                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026514  104406                                  TRAP    C$CLP1
   1741
   1742
   1743 026516  004537  015166                          JSR     R5,
CHERR   ;CHECK CONTROLLER FOR ERRORS
   1744 026522                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026522  104406                                  TRAP    C$CLP1
   1745 026524  012777  000003  153522                  MOV     #MK!GSBIT,@RLDA
   1746 026532  004537  015466                          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
   1747 026536  000004                                  GSTAT
   1748 026540  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
   1749 026544                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
        026544  104406                                  TRAP    C$CLP1
   1750 026546  004537  015166                          JSR     R5,CHERR        ;C
HECK CONTROLLER FOR ERRORS
   1751
   1752 026552                              ENDTST                              ;****END OF TEST****
        026552                              L10074:
        026552  104401                                  TRAP    C$ETST
   1753
   1754 026554                              BGNMOD      HRDPRM
   1755
   1756 026554                                          BGNHRD
        026554  000032                                  .WORD L10075-L$HARD/2
   1757                                                                         ;WHAT TYPE OF CONTROLLER
   1758                                                                         ;RL11=1, RLV11=2, RLV12=3
   1759 026556                                          GPRMD   CNTMSG,CNT,0,3,1,3,NO
        026556  005022                                  .WORD   T$CODE
        026560  026656                                  .WORD   CNTMSG
        026562  000003                                  .WORD   3
        026564  000001                                  .WO
RD      T$LOLIM
        026566  000003                                  .WORD   T$HILIM
   1760                                                                         ;CONTOLLER BUS ADDRESS
   1761 026570                                          GPRMA   CSRMSG,CSR,0,160000,177776,YES
        026570  000031                                  .WORD   T$CODE
        026572  026642                                  .WORD   CSRMSG
        026574  160000                                  .WORD   T$LOLIM
        026576  177776                                  .WORD   T$HILIM
   1762                                                                         ;INTERRUPT VECTOR
   1763 026600                                          GPRMA   VECMSG,VECT,0,0,776,YES
        026600  001031                                  .WORD   T$CODE
        026602  026720                                  .WORD   VECMSG
        026604  000000                                  .WORD   T$LOLIM
        026606  000776                                  .WORD   T$HILIM
```

```
   1764
   1765 026610                                          GPRMD   DRMSG,DRBT,0,03400,0,7,YES      ;DRIVE NUMBER
        026610  004032                                  .WORD   T$CODE
        026612  026751                                  .WORD   DRMSG
        026614  003400                                  .WORD   03400
        026616  000000                                  .WORD   T$LOLIM
        026620  000007                                  .WORD   T$HILIM
   1766
   1767 026622                                          GPRML   DRTYPE,TYPDR,1,YES      ;DRIVE TYPE
        026622  00
3130                                .WORD   T$CODE
        026624  026727                                  .WORD   DRTYPE
        026626  000001                                  .WORD   1
   1768
   1769 026630                                          GPRMD   BRMSG,PRIOR,0,340,0,7,YES      ;BREAK LEVEL
        026630  002032                                  .WORD   T$CODE
        026632  026707                                  .WORD   BRMSG
        026634  000340                                  .WORD   340
        026636  000000                                  .WORD   T$LOLIM
        026640  000007                                  .WORD   T$HILIM
   1770
   1771 026642                                          ENDHRD
                                                        .EVEN
        026642                              L10075:
   1772
   1773 026642     102     125     123     CSRMSG: .ASCIZ  /BUS ADDRESS/
        026645     040     101     104
        0
26650      104     122     105
        026653     123     123     000
   1774 026656     122     114     061     CNTMSG: .ASCIZ  /RL11=1, RLV11=2, RLV12=3/
        026661     061     075     061
        026664     054     040     122
        026667     114     126     061
        026672     061     075     062
        026675     054     040     122
        026700     114     126     061
        026703     062     075     063
        026706     000
   1775 026707     102     122     040     BRMSG:  .ASCIZ  /BR LEVEL/
        026712     114     105     126
        026715     105     114     000

   1776 026720     126     105     103     VECMSG: .ASCIZ  /VECTOR/
        026723     124     117     122
        026726     000
   1777 026727     104     122     111     DRTYPE: .ASCIZ  /DRIVE TYPE = RL01/
        026732     126     105     040
        026735     124     131     120
        026740     105     040     075
        026743     040     122     114
        026746     060     061     000
   1778 026751     104     122     111     DRMSG:  .ASCIZ  /DRIVE/
        026754     126     105     000
   1779                                                 .EVEN
   1780
   1781 026760                                                  ENDMOD
   1782
   178
3
   1784
```

```
 1785 026760                            BGNMOD  SFTPRM
 1786
 1787 026760                                    BGNSFT
      026760  000011                            .WORD L10076-L$SOFT/2
 1788 026762                                    GPRML   DMSG,DLT,1,YES
      026762  000130                            .WORD   T$CODE
      026764  027004                            .WORD   DMSG
      026766  000001                            .WORD   1
 1789 026770                                    XFERF   1$
      026770  006044                            .WORD   T$CODE
 1790
      026772                                    GPRMD   EMSG,ELT,0,177777,0,177777,YES
      026772  001032                            .WORD   T$CODE
      026774  027030                            .WORD   EMSG
      026776  177777                            .WORD   177777
      027000  000000                            .WORD   T$LOLIM
      027002  177777                            .WORD   T$HILIM
 1791 027004                            1$:     ENDSFT
                                                .EVEN
      027004                            L10076:
 1792
 1796
 1797 027004     104     122     117    DMSG:   .ASCIZ  /DROP ON ERROR LIMIT/
 1798 027030     105     122     122    EMSG:   .ASCIZ  /ERROR LIMIT/
 1799
 1803
 1804                                   .EVEN
 1805
 1806 027044                                    ENDMOD

 1807  027044                           LASTAD
                                                .EVEN
      027044  000000                            .WORD   0
      027046  000000                            .WORD   0
      027050                            L$LAST::
 1808
 1809         000001                    .END
```

Symbol table

```
ADDCOD  015076 G        CLNCOD  015024 G        C$RDBU= 000007          EM30    007441          E.DA    002312
ADR   = 000020 G        CNT   = 000012          C$REFG= 000047          EM30A   007500          E.MP    002314
AFREG   006644          CNTMSG  026656          C
$RESE= 000033           EM32    007540          E.MP1   002316
AFTER   016014          COMP    006045          C$REVI= 000003          EM33    007574          E.MP2   002320
ARLBA   006601          CONT    014254          C$RFLA= 000021          EM34    007641          FIRST   002366
ARLCS   006574          CONTIN  014122          C$RPT = 000025          EM37    007716          FIX     015732
ARLDA   006607          CRDY  = 000200          C$SEFG= 000046          EM4     007037          FNDFNC  015704
ARLMP   006615          CRTIM   006665          C$SPRI= 000041          EM41    007756          FRMT1   013072
ASSEMB= 000010          CSE
ND   005070     C$SVEC= 000037          EM42    010047          FRMT11  013351
BATEST  017162          CSPAT   004772          C$TPRI= 000013          EM43    010105          FRMT12  013412
BA16  = 000020          CSR   = 000000          DAHS  = 000020          EM44    010204          FRMT13  013471
BA17  = 000040          CSRMSG  026642          DATEST  017266          EM45    010237          FRMT14  013522
BCCFBK  002342          CSTEST  017042          DBUFF   002416 G        EM46    010272          FRMT15  013566
BCSR    002262          CYLMSK  002370          DCKMES  006026          EM47    010325          FRMT2   013132
BDDAT
   002364       C$AU  = 000052          DEMES   005774          EM5     007064          FRMT2A  013151
BEFORE  015744          C$AUTO= 000061          DERFLG  002304          EM52    010356          FRMT2B  013164
BEGPAT  004416          C$BRK = 000022          DERR  = 040000          EM54    010426          FRMT3   013200
BEREG   006623          C$BSEG= 000004          DIAGMC= 000000          EM55    010465          FRMT4   013205
BGNTST  014476          C$BSUB= 000002          DLT   = 000000          EM56    010520          FRMT5   013243
BIT0  = 000001 G        C$CEFG= 000045          DLTMES  006033          EM57    010557          FRMT6
   013314
BIT00 = 000001 G        C$CLCK= 000062          DLYCNT  002414          EM6     007135          FRMT99  013240
BIT01 = 000002 G        C$CLEA= 000012          DMSG    027004          EM61    010660          F$AU  = 000015
BIT02 = 000004 G        C$CLOS= 000035          DRBT  = 000010          EM62    010741          F$AUTO= 000020
BIT03 = 000010 G        C$CLP1= 000006          DRDY  = 000001          EM63    011024          F$BGN = 000040
BIT04 = 000020 G        C$CVEC= 000036          DRIVE   002270          EM64    011105          F$CLEA= 000007
BIT05 = 000040 G        C$DCLN= 000044          DRMSG   026751          EM65
  011170         F$DU  = 000016
BIT06 = 000100 G        C$DODU= 000051          DROP    013672          EM66    011251          F$END = 000041
BIT07 = 000200 G        C$DRPT= 000024          DRPCOD  015072 G        EM67    011334          F$HARD= 000004
BIT08 = 000400 G        C$DU  = 000053          DRST  = 000010          EM7     007163          F$HW  = 000013
BIT09 = 001000 G        C$EDIT= 000003          DRTIM   006712          EM70    011371          F$INIT= 000006
BIT1  = 000002 G        C$ERDF= 000055          DRTYPE  026727          EM71    011426          F$JMP = 000050
BIT10 = 002000 G        C$ERHR= 000056          DRVRDY  0
14362           EM72    011463          F$MOD = 000000
BIT11 = 004000 G        C$ERRO= 000060          DSPCOD  013700 G        EM73    011516          F$MSG = 000011
BIT12 = 010000 G        C$ERSF= 000054          DS0   = 000000          EM74    011551          F$PROT= 000021
BIT13 = 020000 G        C$ERSO= 000057          DS1   = 000400          EM75    011603          F$PWR = 000017
BIT14 = 040000 G        C$ESCA= 000010          DS2   = 001000          EM76    011635          F$RPT = 000012
BIT15 = 100000 G        C$ESEG= 000005          DS3   = 001400          EM77    011670          F$SEG = 000003
BIT2  = 000004 G        C$ESUB= 000
003     DWORD   002376          END     014536          F$SOFT= 000005
BIT3  = 000010 G        C$ETST= 000001          EF.CON= 000036 G        ENDPAT  004624          F$SRV = 000010
BIT4  = 000020 G        C$EXIT= 000032          EF.NEW= 000035 G        ERCOUN  005074          F$SUB = 000002
BIT5  = 000040 G        C$GETB= 000026          EF.PWR= 000034 G        ERPOIN  005072          F$SW  = 000014
BIT6  = 000100 G        C$GETW= 000027          EF.RES= 000037 G        ERR   = 100000          F$TEST= 000001
BIT7  = 000200 G        C$GMAN= 000043          EF.STA= 000040 G        ERRVEC  002340          GDDAT   002362
BIT8  = 00040
0 G     C$GPHR= 000042          ELT   = 000002          ERRO    012226 G        GLBDAT  002242 G
BIT9  = 001000 G        C$GPLO= 000030          EMSG    027030          ERR1    012244 G        GLBEQA  002242 G
BOE   = 000400 G        C$GPRI= 000040          EM1     006740          ERR2    012256 G        GLBERR  012226 G
BPRIOR  002264          C$INIT= 000011          EM101   011723          ERR3    012320 G        GLBSUB  015102 G
BRMSG   026707          C$INLP= 000020          EM102   011770          ERR4    012372 G        GLBTXT  005774 G
BVEC    002266          C$MANI= 000050          EM103   012160          ERR5    012440 G        GOD
RVR= 000202
B.BA    002274          C$MEM = 000031          EM11    007211          ERR6    012452 G        GSBIT = 000002
B.BE    002302          C$MSG = 000023          EM13    007252          ERR7    012514 G        GSTAT = 000004
B.CS    002272          C$OPEN= 000034          EM14    007304          EVL   = 000004 G        GSTINT  006535
B.DA    002276          C$PNTB= 000014          EM15    007332          E$END = 002100          GSTMES  006476
B.MP    002300          C$PNTF= 000017          EM16    007360          E$LOAD= 000035          G$CNTO= 000200
CALBCC  002344          C$PNTS= 000016          EM17    007406          E.BA
   002310       G$DELM= 000372
CHERR   015166          C$PNTX= 000015          EM2     006765          E.BE    002322          G$DISP= 000003
CKERLT  015102          C$QIO = 000377          EM3     007012          E.CS    002306          G$EXCP= 000400
```

Symbol table

```
G$HILI= 000002          LINE3   013020          L10002  012316          L10074  026552          RLMP    002256
G$LOLI= 000001          LOE   = 040000 G        L10003  012370          L10075  026642
        RL2     004730
G$NO  = 000000          LOT   = 000010 G        L10004  012436          L10076  027004          RMSK    002334
G$OFFS= 000400          L$ACP   002110 G        L10005  012450          MAXCYL  002400          SEEK  = 000006
G$OFSI= 000376          L$APT   002036 G        L10006  012512          MAXSEC  002374          SEKINT  006444
G$PRMA= 000001          L$AU    015076 G        L10007  012550          MDHEDR  002000 G        SEKMES  006413
G$PRMD= 000002          L$AUT   002070 G        L10010  013670          MERLMT  013674          SFTPRM  026760 G
G$PRML= 000000          L$AUTO  014602 G        L10011  013700
        MK    = 000001          SIGN  = 000004
G$RADA= 000140          L$CCP   002106 G        L10013  014600          MSCRLF  006040          SIMBCC  016100
G$RADB= 000000          L$CLEA  015024 G        L10014  015022          MXSEC1  002372          SIZE  = 000004
G$RADD= 000040          L$CO    002032 G        L10015  015070          NOOPO = 000000          SKEEND  004770
G$RADL= 000120          L$DEPO  002011 G        L10016  015074          NOOP7 = 000016          SKEND   004726
G$RADO= 000020          L$DESC  002122 G        L10017  015100          NOPINT  006157          SKLST   004626
G$XFER= 000004          L$DESP  002076 G
        L10020  016264          NOPMES  006126          SPTCOD  013670 G
G$YES = 000010          L$DEVP  002060 G        L10021  016546          NOPWR   014062          START   014140
HALMAX  004704          L$DISP  013702 G        L10022  016642          NXM   = 020000          START1  014102
HCRCME  006013          L$DLY   002116 G        L10023  016736          NXMMES  006001          STHS  = 000100
HDRBUF  005274          L$DTP   002040 G        L10024  017032          NXT     014132          SVCGBL= 000000
HDRLST  015706          L$DTYP  002034 G        L10025  017152          OKHDR   015716          SVCINS= 000000
HMAX    004734
        L$DU    015072 G        L10026  017256          OPI   = 002000          SVCSUB= 177777
HNFMES  006021          L$DUT   002072 G        L10027  017344          OPIERR  006053          SVCTAG= 000000
HOE   = 100000 G        L$DVTY  002230 G        L10030  017470          OPIMES  006006          SVCTST= 177777
HPTCOD  013652 G        L$EF    002052 G        L10031  017614          O$APTS= 000000          SVHD    002402
HRDPRM  026554 G        L$ENVI  002044 G        L10032  017722          O$AU  = 000001          S$LSYM= 010000
IBE   = 010000 G        L$ETP   002102 G        L10033  020022          O$BGNR= 000000          TEMP2   002346
I
DU    = 000040 G        L$EXP1  002046 G        L10034  020112          O$BGNS= 000001          TEMP3   002350
IER   = 020000 G        L$EXP4  002064 G        L10035  020212          O$DU  = 000001          TEMP4   002352
INITCO  014040 G        L$EXP5  002066 G        L10036  020322          O$ERRT= 000000          TMPFNC  002412
INTEN = 000100          L$HARD  026556 G        L10037  020376          O$GNSW= 000001          TMPO    002354
INTFLG  002330          L$HIME  002120 G        L10040  020434          O$POIN= 000001          TMP1    002356
INTSRV  016260          L$HPCP  002016 G        L10041  020560          O$SETU= 000000          T
MP2     002360
ISR   = 000100 G        L$HPTP  002022 G        L10042  020720          PFLG    002324          TRPFLG  002326
IXE   = 004000 G        L$HW    013654 G        L10043  021060          PNT   = 001000 G        TRPHAN  016252
I$AU  = 000041          L$ICP   002104 G        L10044  021264          PRI   = 002000 G        TYPDR = 000006
I$AUTO= 000041          L$INIT  014040 G        L10045  021400          PRIOR = 000004          T$ARGC= 000001
I$CLN = 000041          L$LADP  002026 G        L10046  021606          PRI00 = 000000 G        T$CODE= 001032
I$DU  = 000041          L$LAST  027050 G        L10047  021674          PRI
01 = 000040 G     T$ERRN= 000066
I$HRD = 000041          L$LOAD  002100 G        L10050  022042          PRI02 = 000100 G        T$EXCP= 000000
I$INIT= 000041          L$LUN   002074 G        L10051  022072          PRI03 = 000140 G        T$FLAG= 000040
I$MOD = 000041          L$MREV  002050 G        L10052  022244          PRI04 = 000200 G        T$GMAN= 000000
I$MSG = 000041          L$NAME  002000 G        L10053  022332          PRI05 = 000240 G        T$HILI= 177777
I$PROT= 000040          L$PRIO  002042 G        L10054  022460          PRI06 = 000300 G        T$LAST= 000001
I$PTAB= 000041          L$PROT  014032 G        L1005
5   022502      PRI07 = 000340 G          T$LOLI= 000000
I$PWR = 000041          L$PRT   002112 G        L10056  022562          PWRFLG  002242          T$LSYM= 010000
I$RPT = 000041          L$REPP  002062 G        L10057  022726          QMAX    004732          T$LTNO= 000054
I$SEG = 000041          L$REV   002010 G        L10060  023064          QUAMAX  004702          T$NEST= 177777
I$SETU= 000041          L$SOFT  026762 G        L10061  023402          RDHDR = 000010          T$NS0 = 000000
I$SFT = 000041          L$SPC   002056 G        L10062  023476          READ  = 000014          T$NS1 = 000005
I$SRV = 000041          L$SPCP
  002020 G      L10063  023542          REST    014200          T$PTNU= 000000
I$SUB = 000041          L$SPTP  002024 G        L10064  023666          RESTMS  015450          T$SAVL= 177777
I$TST = 000041          L$STA   002030 G        L10065  024304          RHDINT  006352          T$SEGL= 177777
J$JMP = 000167          L$SW    013672 G        L10066  024436          RHDMES  006312          T$SEKO= 010000
LDCSR   002332          L$TEST  002114 G        L10067  024600          RHHS  = 000100          T$SUBN= 000000
LDFUNC  015466          L$TIML  002014 G        L10070  024740          RLBA    002252          T$TAGL= 177777
LF      0
06043           L$UNIT  002012 G        L10071  025112          RLBE    002260          T$TAGN= 010077
LINE1   012552          L10000  012242          L10072  025540          RLCS    002250          T$TEMP= 000000
LINE2   012606          L10001  012254          L10073  026260          RLDA    002254          T$TEST= 000054
```

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CZRLGEO RL11/RLV11 CTLR TST 1 MACRO V05.01a Tuesday 12-Feb-85 13:58 Page 8-45                SEQ 0104
Symbol table

T$TSTM= 177777          T.DRIV  002406          T23     021610 G        T39     024440 G        VECT  = 000002
T$TSTS= 000001          T
.SIZE  013676           T24     021676 G        T4      016740 G        WAITO   014400
T$$AU = 010017          T1      016454 G        T25     022044 G        T40     024602 G        WAIT1   023432
T$$AUT= 010014          T10     017616 G        T26     022074 G        T41     024742 G        WCKINT  006251
T$$CLE= 010015          T11     017724 G        T27     022246 G        T42     025114 G        WCKMES  006211
T$$DU = 010016          T12     020024 G        T28     022334 G        T43     025542 G        WHY     002404
T$$HAR= 010075          T13     020114 G        T29     022462 G        T44     026262 G        WRCHK = 000002
T$$
HW = 010010     T14     020214 G        T3      016644 G        T5      017034 G        WRITE = 000012
T$$INI= 010013          T15     020324 G        T30     022504 G        T6      017154 G        WTCRDY  016354
T$$MSG= 010007          T16     020400 G        T31     022564 G        T7      017260 G        WTDRDY  016266
T$$PRO= 010012          T17     020436 G        T32     022730 G        T8      017346 G        XPOLY   002336
T$$SEG= 010000          T18     020562 G        T33     023066 G        T9      017472 G        XXX     014162
T$$SOF= 010076          T19     020722 G        T34     023404 G        UAM   = 000200 G        X$A
LWA= 000000
T$$SRV= 010020          T2      016550 G        T35     023500 G        UNITST  002246          X$FALS= 000040
T$$SW = 010011          T20     021062 G        T36     023544 G        UUT     002244          X$OFFS= 000400
T$$TES= 010074          T21     021266 G        T37     023670 G        VECMSG  026720          X$TRUE= 000020
T.CNTL  002410          T22     021402 G        T38     024306 G

. ABS.  027050    000   (RW,I,GBL,ABS,OVR)
        000000    001   (RW,I,LCL,REL,CON)
Errors detected:  0

*** Assembler statistics


Work  file  reads: 303
Work  file writes: 3
05
Size of work file: 27969 Words  ( 110 Pages)
Size of core pool: 17152 Words  ( 67 Pages)
Operating  system: RT-11 (Under RSTS/E)

Elapsed time: 00:05:38.03
CZRLGE.BIC,CZRLGE/C=SY:[20,0]SVC34R.MLB,CZRLGE.MAC
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Cross reference table (CREF V05.01)

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ADDCOD    5-180#
ADR       2-26#
AFREG     3-33#     4-78
AFTER     6-192#    6-294     6-300
ARLBA     3-29#     4-76
  4-78
ARLCS     3-28#     4-76      4-78
ARLDA     3-30#     4-77      4-79
ARLMP     3-31#     4-77      4-79
ASSEMB    2-7       2-7
B.BA      2-91#     4-76      6-179*
B.BE      2-94#     6-184*
B.CS      2-90#     4-76      6-116     6-118*    6-119*    6-120     6-121*    6-178*    8-970*    8-971*    8-972
B.DA      2-92#     4-77      6-180*
B.MP      2-93#     4-77      6-181*
BA16      2-34#
BA17      2-33#
BATEST    7-158#    8-5
BCCFBK    2-110#    6-226*    6-232*    6-235*    6-238     6-242
BCSR      2-
86#     5-49*     5-56
BDDAT     2-119#    4-23      4-32      4-41      4-67      7-127*    7-128*    7-129     7-164*    7-165     8-28*     8-29      8-65*     8-66*
          8-67      8-103*    8-104*    8-105     8-139*    8-140     8-171*    8-172     8-202*    8-203     8-234*    8-235     8-274*    8-275*
          8-276     8-301*    8-324*    8-357*    8-366*    8-397*    8-398*    8-399     8-410*    8-441*    8-442*    8-443     8-453*    8-485*
          8-486*    8-487     8-497*    8-504*    8-546*    8-581*    8-582     8-590*    8-591
     8-599*    8-600     8-660*    8-666     8-677
          8-692*    8-895*    8-896*    8-897     8-943*    8-944     8-995*    8-999     8-:02     8-:04     8-;57*    8-;58*    8-;64*    8-;65
          8-;90     8-;91*    8-;92*    8-<25*    8-<26*    8-<27     8-<87*    8-<88*    8-<89     8-=33*    8-=34*    8-=36     8-=81*    8-=82*
          8-=83     8->29*    8->30*    8->31     8-?28*    8-?29*    8-?30     8-?61*    8-?62*    8-?68*    8-?69     8-?95     8-?96*    8-?97*
          8-@31*    8-@32*    8-@33     8-@51*    8-@52     8-@93*
  8-@94*    8-A00*    8-A01     8-A27     8-A28*    8-A29*
BEFORE    6-143     6-178#
BEGPAT    2-137#    7-156     8-22      8-130     8-164     8-196     8-227
BEREG     3-32#     4-76
BGNTST    5-79      5-91#
BIT0      2-26#     2-27      2-51      7-162
BIT00     2-26      2-26#
BIT01     2-26      2-26#
BIT02     2-26      2-26#
BIT03     2-26      2-26#
BIT04     2-26      2-26#
BIT05     2-26      2-26#
BIT06     2-26      2-26#
BIT07     2-26      2-26#
BIT08     2-26      2-26#
BIT09     2-26      2-26#
BIT1
     2-26#     2-41      2-42      2-44      2-46      2-48      2-50      2-264
BIT10     2-26#     2-31      2-212
BIT11     2-26#     2-213     6-77      6-86
BIT12     2-26#     2-214     6-81      6-90
BIT13     2-26#     2-35      2-215
BIT14     2-26#     2-30      2-216
BIT15     2-26#     2-29      2-242
BIT2      2-26#     2-41      2-43      2-44      2-47      2-52      2-265
BIT3      2-26#     2-41      2-45      2-46      2-47      2-49      2-266
BIT4      2-26#     2-34      2-55      2-267
BIT5      2-26#     2-33
     2-268
BIT6      2-26#     2-28      2-53      2-54      2-269
BIT7      2-26#     2-32      2-48      2-209     8-:37     8-:64     8-:97
BIT8      2-26#     2-37      2-39      2-210     2-270
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BIT9      2-26#     2-38      2-39      2-211     2-271
BOE       2-26#
BPRIOR    2-87#     5-51*     8-661
BRMSG     8-A69     8-A75#
BVEC      2-88#     5
-50*      5-97      5-154
C$AU      2-7#      5-186
C$AUTO    2-7#      5-141
C$BRK     2-7#
C$BSEG    2-7#      7-118     7-157     8-23      8-56      8-94      8-131     8-165     8-197     8-228     8-663     8-885     8-;47     8-?51
C$BSUB    2-7#
C$CEFG    2-7#
C$CLCK    2-7#
C$CLEA    2-7#      5-164
C$CLOS    2-7#
C$CLP1    2-7#      7-22      7-48      7-73      7-98      8-360     8-403     8-447     8-491     8-500     8-548     8-576     8-587     8-596
          8-639     8-716     8-739     8-751     8-777     8-
807       8-812     8-831     8-855     8-902     8-:18     8-:45     8-:68     8-:71
          8-:74     8-;05     8-;09     8-;15     8-;22     8-;52     8-;55     8-;70     8-;73     8-;76     8-;79     8-;84     8-;87     8-;96
          8-<03     8-<06     8-<09     8-<12     8-<18     8-<31     8-<68     8-<71     8-<74     8-<77     8-<82     8-=14     8-=17     8-=20
          8-=23     8-=28     8-=61     8-=64     8-=67     8-=70     8-=76     8->09     8->12     8->15     8->18     8->59     8->62     8-?00
          8-?04     8-?08     8-?11
     8-?14     8-?18     8-?23     8-?56     8-?59     8-?74     8-?77     8-?80     8-?83     8-?89     8-?92
          8-@01     8-@08     8-@11     8-@14     8-@18     8-@23     8-@27     8-@37     8-@56     8-@88     8-@91     8-A06     8-A09     8-A12
          8-A15     8-A21     8-A24     8-A33     8-A40     8-A44     8-A49
C$CVEC    2-7#      5-121     5-123     5-154     7-16      7-42      7-67      7-92
C$DCLN    2-7#      5-90      6-18
C$DODU    2-7#      5-89      5-128     5-139     6-17
C$DRPT    2-7#
C$DU      2-7#      5-
176
C$EDIT    2-7#      2-17
C$ERDF    2-7#      6-100     6-280     6-296     7-132     7-168     8-32      8-70      8-108     8-143     8-175     8-206     8-238     8-279
          8-304     8-327     8-359     8-368     8-402     8-412     8-446     8-455     8-490     8-499     8-507     8-547     8-585     8-594
          8-603     8-683     8-738     8-750     8-780     8-806     8-815     8-854     8-900     8-947     8-:17     8-;04     8-;21
          8-;95     8-<30     8-<92     8-=39     8-=86     8->34     8-?33     8-@00
   8-@36     8-@55     8-A32
C$ERHR    2-7#
C$ERRO    2-7#
C$ERSF    2-7#      7-21      7-47      7-72      7-97
C$ERSO    2-7#
C$ESCA    2-7#      7-133     7-169     8-33      8-71      8-109     8-144     8-176     8-207     8-239     8-579     8-672     8-675     8-685
          8-878     8-881     8-890     8-893     8-925     8-928     8-<21     8-<85     8-=31     8-=79     8->24     8->27     8-?26
C$ESEG    2-7#      7-140     8-7       8-40      8-78      8-114     8-149     8-181     8-212     8-244     8-691     8-906     8-<
46     8-@70
C$ESUB    2-7#
C$ETST    2-7#      7-23      7-49      7-74      7-99      7-141     8-8       8-41      8-79      8-115     8-150     8-182     8-213     8-245
          8-281     8-307     8-330     8-372     8-414     8-459     8-512     8-553     8-607     8-644     8-696     8-720     8-753     8-783
          8-818     8-834     8-859     8-907     8-950     8-:24     8-:48     8-:78     8-;24     8-<47     8-<95     8-=42     8-=89     8->37
          8-?36     8-@71     8-A52
C$EXIT    2-7#
C$GETB    2-7#
C$GETW    2
-7#
C$GMAN    2-7#
C$GPHR    2-7#      5-42
C$GPLO    2-7#
C$GPRI    2-7#
C$INIT    2-7#      5-103
C$INLP    2-7#      6-7
C$MANI    2-7#
C$MEM     2-7#
C$MSG     2-7#      4-11      4-18      4-26      4-35      4-44      4-51      4-62      4-71
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EM52      3-62#   8-;21
EM54      3-63#   8-;95   8-<30   8-@00   8-@36   8-A32
EM55      3-64#   8-<92   8-=39
EM56      3-65#   8-=86   8->34
EM57      3-66#   8-?33
EM6       3-41#   7-168
EM61      3-68#   8-70

EM62      3-69#   8-108
EM63      3-70#   8-143
EM64      3-71#   8-175
EM65      3-72#   8-206
EM66      3-73#   8-238
EM67      3-74#   8-279
EM7       3-42#   8-32
EM70      3-75#   8-304
EM71      3-76#   8-327
EM72      3-77#   8-359
EM73      3-78#   8-368
EM74      3-79#   8-402
EM75      3-80#   8-412
EM76      3-81#   8-446
EM77      3-82#   8-455
EMSG      8-A90   8-A98#
END       5-70    5-97#
ENDPAT    2-205#  8-4     8-37    8-147   8-179   8-210   8-2
42
ERCOUN    2-296#  5-23    5-37
ERPOIN    2-295#  5-37*   5-40*   6-11*   6-12
ERR       2-29#   7-126   8-64    8-102   8-269   8-390   8-434   8-477
ERR0      4-5#    8-637   8-738   8-750   8-780   8-806   8-815   8-854   8-;04   8-;21
ERR1      4-13#   7-21    7-47    7-72    7-97
ERR2      4-20#   7-132   7-168   8-32    8-70    8-108   8-143   8-175   8-206   8-238   8-279   8-304   8-327   8-359
          8-368   8-402   8-412   8-446   8-455
8-490     8-499   8-507   8-547   8-585   8-594   8-603   8-:17
ERR3      4-28#   8-;95   8-<30   8-@00   8-@36   8-A32
ERR4      4-37#   8-900   8-947   8-<92   8-=39   8-=86   8->34   8-?33   8-@55
ERR5      4-46#   6-280
ERR6      4-53#   6-100   6-296
ERR7      4-64#   8-683
ERRVEC    2-109#  5-112   5-115   5-121   5-122   7-13    7-16    7-39    7-42    7-64    7-67    7-89    7-92
EVL       2-26#
F$AU      2-7#    5-182   5-186
F$AUTO    2-7#    5-108
 5-141
F$BGN     2-7#    2-15    2-19    2-24    2-72    2-74    2-298   3-1     3-93    4-3     4-5     4-13    4-20    4-28
          4-37    4-46    4-53    4-64    4-114   4-116   4-128   4-130   4-140   4-142   4-146   5-3     5-10    5-12
          5-105   5-108   5-143   5-145   5-166   5-170   5-172   5-178   5-180   5-182   5-188   6-4     6-265   6-304
          7-3     7-23    7-28    7-49    7-54    7-74    7-79    7-99    7-104   7-118   7-
133     7-141   7-146   7-157
          7-169   8-8     8-13    8-23    8-33    8-41    8-46    8-56    8-71    8-79    8-84    8-94    8-109   8-115
          8-120   8-131   8-144   8-150   8-155   8-165   8-176   8-182   8-187   8-197   8-207   8-213   8-218   8-228
          8-239   8-245   8-250   8-281   8-286   8-307   8-312   8-330   8-335   8-372   8-377   8-414   8-419   8-459
          8-463   8-512   8-516   8-553   8-558   8-579   8-607   8-612
     8-644   8-649   8-663   8-672   8-675   8-685
          8-696   8-700   8-720   8-725   8-753   8-758   8-783   8-788   8-818   8-822   8-834   8-838   8-859   8-864
          8-878   8-881   8-885   8-890   8-893   8-907   8-912   8-925   8-928   8-950   8-955   8-:24   8-:29   8-:48
          8-:53   8-:78   8-:83   8-;24   8-;29   8-;47   8-<21   8-<47   8-<52   8-<85   8-<95   8-=00   8-=31   8-=42
          8-=47   8-=79   8-=89   8-=94   8->24
 8->27    8->37   8->42   8-?26   8-?36   8-?41   8-?51   8-@71   8-@76
          8-A52   8-A54   8-A56   8-A81   8-A85   8-A87   8-B06
F$CLEA    2-7#    5-145   5-164
F$DU      2-7#    5-172   5-176
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F$END    2-7     2-7     2-7     2-7     2-7     2-7     2-7     2-7     2-7     2-7     2-7     2-7
2-7      2-7
         2-7     2-7     2-7#    2-15    2-19    2-24    2-72    2-74    2-298   3-1     3-93    4-3     4-11    4-18
         4-26    4-35    4-44    4-51    4-62    4-71    4-114   4-116   4-128   4-130   4-140   4-142   4-146   5-10
         5-103   5-105   5-141   5-143   5-164   5-166   5-170   5-176   5-178   5-180   5-186   5-188   6-4     6-269
         6-304   7-3     7-3     7-3     7-23    7-23    7-28    7-28    7-28    7-4
9        7-49    7-54    7-54    7-54
         7-74    7-74    7-79    7-79    7-79    7-99    7-99    7-104   7-104   7-104   7-133   7-140   7-141   7-141
         7-146   7-146   7-146   7-169   8-7     8-8     8-8     8-13    8-13    8-13    8-33    8-40    8-41    8-41
         8-46    8-46    8-46    8-71    8-78    8-79    8-79    8-84    8-84    8-84    8-109   8-114   8-115   8-115
         8-120   8-120   8-120   8-144   8-149   8-150   8-150
   8-155   8-155   8-155   8-176   8-181   8-182   8-182
         8-187   8-187   8-187   8-207   8-212   8-213   8-213   8-218   8-218   8-218   8-239   8-244   8-245   8-245
         8-250   8-250   8-250   8-281   8-281   8-286   8-286   8-286   8-307   8-307   8-312   8-312   8-312   8-330
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         8-459   8-459   8-463   8-463
8-463    8-512   8-512   8-516   8-516   8-516   8-553   8-553   8-558   8-558
         8-558   8-579   8-607   8-607   8-612   8-612   8-612   8-644   8-644   8-649   8-649   8-649   8-672   8-675
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         8-834   8-8
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         8-907   8-907   8-912   8-912   8-912   8-925   8-928   8-950   8-950   8-955   8-955   8-955   8-:24   8-:24
         8-:29   8-:29   8-:48   8-:48   8-:53   8-:53   8-:53   8-:78   8-:78   8-:83   8-:83   8-:83   8-:24   8-;24
         8-;24   8-;29   8-;29   8-;29   8-<21   8-<46   8-<47   8-<47   8-<52   8-<52   8-<52   8-<85   8-<95   8-<95

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         8-=94   8->24   8->27   8->37   8->37   8->42   8->42   8->42   8-?26   8-?36   8-?36   8-?41   8-?41   8-?41
         8-@70   8-@71   8-@71   8-@76   8-@76   8-@76   8-A52   8-A52   8-A54   8-A71   8-A81   8-A85   8-A91   8-B06
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F$JMP    2-7#
F$MOD    2-7#    2-15    2-19    2-24    2-72    2-74    2-298   3-1     3-93    4-3     4-114   4-116   4-128   4-130
         4-140   4-142   4-146   5-10    5-105   5-143   5-166   5-170   5-178   5-180   5-188   6-4     6-304   8-A54
         8-A81   8-A85   8-B06
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         4-62    4-64    4-71
F$PROT   2-7#
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F$PWR    2-7#
F$RPT    2-7#
F$SEG    2-7#    7-118   7-140   7-157   8-7     8-23    8-40    8-56    8-78    8-94    8-114   8-131   8-149   8-165
         8-181   8-197   8-212   8-228   8-244   8-663   8-691   8-885   8-906   8-;47   8-<46   8-?51   8-@70
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F$SUB    2-7#
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F$TEST   2-7#    7-3     7-23    7-28    7-49    7-54    7-74
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         8-553   8-558   8-607   8-612   8-644   8-649   8-696   8-700   8-720   8-725   8-753   8-758   8-783   8-788
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8-859    8-864   8-907   8-912   8-950   8-955   8-:24   8-:29   8-:48   8-:53
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         8-?36   8-?41   8-@71   8-@76   8-A52
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FIX      6-62    6-67    6-71    6-75    6-79    6-83    6-88    6-92    6-94    6-96    6-168#
FNDFNC   6-126*  6-127*  6-128   6-130*  6-133*  6-148#
FRMT1    4-73
   4-90#
FRMT11   4-99#   6-15
FRMT12   4-100#  5-86
FRMT13   4-101#
FRMT14   4-102#  5-126
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FRMT2B    4-79    4-93#
FRMT3     4-82    4-83    4-94#
FRMT4     4-23    4-41    4-95#
FRMT5     4-32    4-97#
FRMT6     4-67    4-98#

FRMT99    4-60    4-96#
G$CNTO    2-7#
G$DELM    2-7#    5-81    6-276   6-290   8-:42
G$DISP    2-7#
G$EXCP    2-7#
G$HILI    2-7#
G$LOLI    2-7#
G$NO      2-7#    8-A59
G$OFFS    2-7#    8-A59   8-A61   8-A63   8-A65   8-A67   8-A69   8-A88   8-A90
G$OFSI    2-7#    8-A59   8-A61   8-A63   8-A65   8-A67   8-A69   8-A88   8-A90
G$PRMA    2-7#    8-A61   8-A63
G$PRMD    2-7#    8-A59   8-A65   8-A69   8-A90
G$PRML    2-7#    8-A67   8-A88
G$RADA    2-7#
G
$RADB   2-7#
G$RADD    2-7#
G$RADL    2-7#    8-A67   8-A88
G$RADO    2-7#    8-A59   8-A61   8-A63   8-A65   8-A69   8-A90
G$XFER    2-7#    8-A89
G$YES     2-7#    8-A61   8-A63   8-A65   8-A67   8-A69   8-A88   8-A90
GDDAT     2-118#  4-23    4-32    4-41    7-19*   7-45*   7-71*   7-95*   7-121*  7-122*  7-123   7-126*  7-129   7-159*
          7-162*  7-163   7-165   8-25*   8-26    8-29    8-59*   8-60*   8-64*   8-67    8-97*   8-98*   8-102*  8-105
          8-134*  8-137*  8-140   8-168*  8-169*  8-172   8-200*  8-203   8-231*  8-232*  8-235   8-266*  8-269*  8-276
          8-299*  8-322*  8-356*  8-365*  8-387*  8-390*  8-391   8-399   8-409*  8-431*  8-434*  8-435   8-443   8-452*
          8-474*  8-477*  8-478   8-487   8-496*  8-505*  8-545*  8-571*  8-582   8-589*  8-591   8-598*  8-600   8-661*
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          8-<62*  8-<89   8-=35*  8-=36   8-=57*  8-=83   8->05*  8->31   8->64*  8->65*  8->67   8->70   8->77*  8->79*
          8->89*  8->91*  8-?30   8-?94*  8-@29*  8-@33   8-@50*  8-@52   8-A26*
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GLBEQA    2-24#
GLBERR    4-3#
GLBSUB    6-4#
GLBTXT    3-1#
GODRVR    2-48#
GSBIT     2-50#   8-712   8-731   8-743   8-=72   8->20   8-A45
GSTAT     2-43#   6-48    6-118   8-714   8-733   8-745   8-771   8-801   8-=74   8
->22    8-A47
GSTINT    3-27#   6-155
GSTMES    3-26#   6-154
HALMAX    2-232#  8->74
HCRCME    3-10#   6-80
HDRBUF    2-297#  8-968   8-982
HDRLST    6-129   6-150#
HMAX      2-244#  8->86
HNFMES    3-11#   6-84
HOE       2-26#
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HRDPRM    8-A54#
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I$INIT   2-7#      5-12#     5-103#
I$MOD    2-7#      2-15      2-15#     2-19      2-19#     2-24      2-24#     2-72      2-72#     2-74      2-74#     2-298     2-298#    3-1
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I$RPT    2-7#
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         8-286     8-312     8-335     8-377     8-419     8-463     8-516     8-558     8-612     8-649     8-663#    8-685     8-691#    8-700
         8-725     8
-758     8-788     8-822     8-838     8-864     8-885#    8-890     8-893     8-906#    8-912     8-955     8-:29     8-:53
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    8-419     8-463     8-516     8-558     8-612     8-649     8-700     8-725     8-758
         8-788     8-822     8-838     8-864     8-912     8-955     8-:29     8-:53     8-:83     8-;29     8-<52     8-=00     8-=47     8-=94
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7-146#
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IBE      2-26#
IDU      2-26#
IER      2-26#
INITCO   5-10#

INTEN    2-28#     5-:52     6-127     6-135     8-633     8-669     8-733     8-801     8-849     8-:99
INTFLG   2-105#    6-267*    8-630*    8-635     8-638*    8-665*    8-680     8-687     8-729*    8-736     8-741*    8-748     8-798*    8-804
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Cross reference table
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L$DESC    2-17      2-21#
L$DESP    2-17#
L$DEVP    2-17#
L$DISP    2-17      4-144#
L$DLY     2-17#     5-81      6-276     6-290     8-:42
L$DTP     2-17#
L$DTYP    2-17#
L$DU      2-17      5-172#
L$DUT     2-17#
L$DVTY    2-17      2-22#
L$EF      2-17#
L$ENVI    2-17#
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L$EXP5    2-17#
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L$HPCP    2-17#
L$HPTP    2-17#
L$HW      2-17      4-118     4-118#
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L$LADP    2-17#
L$LAST    2-17      8-B07#
L$LOAD    2-17#
L$LUN     2-17#
L$MREV    2-17#
L$NAME    2-17#
L$PRIO    2-17#
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L$REPP    2-17#
L$REV     2-17#
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L$SPCP    2-17#
L$SPTP    2-17#
L$STA     2-
17#
L$SW      2-17      4-132     4-132#
L$TEST    2-17#
L$TIML    2-17#
L$UNIT    2-17#     5-17      5-36
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L10001    4-18#
L10002    4-26#
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L10014    5-141#
L10015
  5-164#
L10016    5-176#
L10017    5-186#
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L10022    7-49#
L10023    7-74#
L10024    7-99#
L10025    7-141#
L10026    8-8#
L10027    8-41#
L10030    8-79#
L10031    8-115#
L10032    8-150#
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L10034    8-213#
L10035    8-245#
L10036    8-281#
L10037    8-307#
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L10041    8-372#
L10042    8-414#
L10043    8-459#
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L10045    8-553#
L10046    8-579     8-607#
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L10062    8-:48#
L10063    8-:78#
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L10073    8-@71#
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         8-922     8-:38     8-:65     8-:98     8-;49     8-;67     8-;81     8-<00     8-<14     8-<65     8-<79     8-=11     8-=25     8-=58
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         8-A37     8-A46
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LINE3    4-56      4-82#
LOE      2-26#
LOT      2-26#
MAXCYL   2-125#
MAXSEC   2-123#
MDHEDR   2-15#
MERLMT   4-135#    6-12
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         8-=72     8->03     8->20     8->66     8->81     8->93     8-?70     8-@04     8-A02     8-A36     8-A45
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NOPMES   3-18#     6-150
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NXMMES   3-8#      6-72
NXT      5-33#     5-45      5-47
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O$BGNR   2-7#      2-17
O$BGNS   2-7#      2-13#     2-17
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O$GNSW   2-7#      2-13#     2-17
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O$SETU   2-7#      2-17      8-807
OKHDR    6-154#
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OPIERR   3-17#     8-775     8-810
OPIMES   3-9#      6-76
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PNT      2-26#
PRI      2-26#
PRIOO    2-
26#    8-631     8-730     8-742     8-797     8-846     8-:96
PRIO1    2-26#
PRIO2    2-26#
PRIO3    2-26#
PRIO4    2-26#
PRIO5    2-26#
PRIO6    2-26#
PRIO7    2-26#     5-147     8-264     8-735     8-747     8-803     8-851     8-;17
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PWRFLG   2-78#     5-17*     5-44      5-46*     5-69      5-158     5-161*
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Cross reference table
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          8-?54   8-?87   8-@21   8-@86   8-A19
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REST      5-42#
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RHDMES    3-22#   6-158   8-987
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          8-569*  8-590
RLBE      2-85#   5-67*   6-184   6-200
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          8-391*  8-397   8-432   8-435*  8-441   8-475   8-478*  8-485   8-972*  8-973*  8-974   8-976
RLDA      2-83#   5-61*   5-91*   6-117*  6-180   6-194   7-66    7-71    8-26*   8-28    8-199*  8-201*  8-202   8-230*
          8-233*
 8-234     8-321*   8-324   8-348*   8-362   8-366   8-392*   8-405   8-410   8-437*   8-480*   8-501   8-504
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-A35*
          8-A36*  8-A45*
RLMP      2-84#   5-63*   6-181   6-195   6-196   6-197   7-91    7-95    8-481*  8-532*  8-570*  8-571   8-581   8-977
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SEKMES    3-24#   6-156
SFTPRM
  8-A85#
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Cross reference table (CREF V05.01)

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       8-343    8-343#   8-372    8-372#   8-378    8-378#   8-384    8-384#   8-414    8-414#   8-422    8-422#   8-428    8-428#
          8-459    8-459#   8-466    8-466#   8-471    8-471#   8-512    8-512#   8-520    8-520#   8-525    8-525#   8-553    8-553#
          8-560    8-560#   8-563    8-563#   8-579    8-579#   8-607    8-607#   8-614    8-614#   8-624    8-624#   8-644    8-644#
          8-651    8-651#   8-655    8-655#   8-672    8-672#   8-675    8-675#   8-685    8-685#   8-685#   8-69
1      8-691#   8-696
          8-696#   8-703    8-703#   8-709    8-709#   8-720    8-720#   8-753    8-753#   8-760    8-760#   8-766    8-766#   8-783
          8-783#   8-789    8-789#   8-794    8-794#   8-818    8-818#   8-823    8-823#   8-826    8-826#   8-834    8-834#   8-840
          8-840#   8-843    8-843#   8-859    8-859#   8-867    8-867#   8-871    8-871#   8-878    8-878#   8-881    8-881#   8-890
          8-890#   8-890#   8-893    8-893#   8-893#   8-906    8-906#   8-907    8-907#
  8-914    8-914#   8-918    8-918#   8-925
          8-925#   8-928    8-928#   8-950    8-950#   8-958    8-958#   8-964    8-964#   8-:24    8-:24#   8-:30    8-:30#   8-:34
          8-:34#   8-:48    8-:48#   8-:56    8-:56#   8-:60    8-:60#   8-:78    8-:78#   8-:86    8-:86#   8-:90    8-:90#   8-;24
          8-;24#   8-;34    8-;34#   8-;43    8-;43#   8-<21    8-<21#   8-<21#   8-<46    8-<46#   8-<47    8-<47#   8-<56    8-<56#
          8-<59    8-<59#   8-<85    8-<85#   8-<95    8-<95#   8
-=03      8-=03#   8-=06    8-=06#   8-=31    8-=31#   8-=42    8-=42#
          8-=49    8-=49#   8-=53    8-=53#   8-=79    8-=79#   8-=89    8-=89#   8-=96    8-=96#   8->00    8->00#   8->24    8->24#
          8->27    8->27#   8->37    8->37#   8->45    8->45#   8->53    8->53#   8-?26    8-?26#   8-?36    8-?36#   8-?42    8-?42#
          8-?47    8-?47#   8-@70    8-@70#   8-@71    8-@71#   8-@78    8-@78#   8-@81    8-@81#   8-A52    8-A52#   8-A59    8-A59
          8-A59    8-A59#   8-A59#   8-A5
9#     8-A61    8-A61    8-A61    8-A61#   8-A61#   8-A61#   8-A63    8-A63    8-A63    8-A63#
          8-A63#   8-A63#   8-A65    8-A65    8-A65    8-A65#   8-A65#   8-A65#   8-A67    8-A67    8-A67    8-A67#   8-A67#   8-A67#
          8-A69    8-A69    8-A69    8-A69#   8-A69#   8-A69#   8-A71    8-A71#   8-A81    8-A81#   8-A88    8-A88    8-A88    8-A88#
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T$TEST    2-7#     7-3      7-3
  7-3#     7-28     7-28     7-28#    7-54     7-54     7-54#    7-79     7-79     7-79#    7-104
          7-104    7-104#   7-146    7-146    7-146#   8-13     8-13     8-13#    8-46     8-46     8-46#    8-84     8-84     8-84#
          8-120    8-120    8-120#   8-155    8-155    8-155#   8-187    8-187    8-187#   8-218    8-218    8-218#   8-250    8-250
          8-250#   8-286    8-286    8-286#   8-312    8-312    8-312#   8-335    8-335    8-335#   8-377    8-377    8-377#   8-419
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-419      8-419#   8-463    8-463    8-463#   8-516    8-516    8-516#   8-558    8-558    8-558#   8-612    8-612    8-612#
          8-649    8-649    8-649#   8-700    8-700    8-700#   8-725    8-725    8-725#   8-758    8-758    8-758#   8-788    8-788
          8-788#   8-822    8-822    8-822#   8-838    8-838    8-838#   8-864    8-864    8-864#   8-912    8-912    8-912#   8-955
          8-955    8-955#   8-:29    8-:29    8-:29#   8-:53    8-:53    8-:53#   8-:83    8-:83    8-:83#   8-;29    8-;
29     8-;29#
          8-<52    8-<52    8-<52#   8-=00    8-=00    8-=00#   8-=47    8-=47    8-=47#   8-=94    8-=94    8-=94#   8->42    8->42
          8->42#   8-?41    8-?41    8-?41#   8-@76    8-@76    8-@76#   8-B07
T$TSTM    2-7#     4-11     4-18     4-23     4-26     4-32     4-35     4-41     4-44     4-51     4-60     4-62     4-67     4-71
          4-73     4-76     4-77     4-78     4-79     4-82     4-83     5-14     5-15     5-19     5-21     5-30     5-42     5-86
          5-89
  5-90     5-97     5-99     5-103    5-112    5-121    5-126    5-128    5-137    5-139    5-141    5-147    5-154
          5-164    5-176    5-186    6-7      6-15     6-17     6-18     6-100    6-280    6-296    7-13     7-16     7-21     7-22
          7-23     7-39     7-42     7-47     7-48     7-49     7-64     7-67     7-72     7-73     7-74     7-89     7-92     7-97
          7-98     7-99     7-118    7-132    7-133    7-140    7-141    7-157    7-168    7-169    8-7      8-8      8-23
8-32
          8-33     8-40     8-41     8-56     8-70     8-71     8-78     8-79     8-94     8-108    8-109    8-114    8-115    8-131
          8-143    8-144    8-149    8-150    8-165    8-175    8-176    8-181    8-182    8-197    8-206    8-207    8-212    8-213
          8-228    8-238    8-239    8-244    8-245    8-264    8-271    8-279    8-281    8-300    8-304    8-307    8-323    8-327
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          8-330    8-359    8-360    8-368    8-372    8-402    8-403    8-412    8-414    8-446    8-447    8-455    8-459    8-490
          8-491    8-499    8-500    8-507    8-512    8-547    8-548    8-553    8-576    8-579    8-585    8-587    8-594    8-596
          8-603    8-607    8-631    8-637    8-639    8-644    8-663    8-666    8-672    8-675    8-683    8-685    8-691    8-696
          8-716    8-720    8-730    8-7
35    8-738    8-739    8-742    8-747    8-750    8-751    8-753    8-777    8-780    8-783
          8-797    8-803    8-806    8-807    8-812    8-815    8-818    8-831    8-834    8-846    8-851    8-854    8-855    8-859
          8-878    8-881    8-885    8-890    8-893    8-900    8-902    8-906    8-907    8-925    8-928    8-947    8-950    8-:17
          8-:18    8-:24    8-:45    8-:48    8-:68    8-:71    8-:74    8-:78    8-:96    8-;04    8-;05    8-;09    8-;15    8-;17
          8-;21
   8-;22    8-;24    8-;47    8-;52    8-;55    8-;70    8-;73    8-;76    8-;79    8-;84    8-;87    8-;95    8-;96
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          8-<82    8-<85    8-<92    8-<95    8-=14    8-=17    8-=20    8-=23    8-=28    8-=31    8-=39    8-=42    8-=61    8-=64
          8-=67    8-=70    8-=76    8-=79    8-=86    8-=89    8->09    8->12    8->15    8->18    8->24    8->27    8->34
 8->37
          8->59    8->62    8-?00    8-?04    8-?08    8-?11    8-?14    8-?18    8-?23    8-?26    8-?33    8-?36    8-?51    8-?56
          8-?59    8-?74    8-?77    8-?80    8-?83    8-?89    8-?92    8-@00    8-@01    8-@08    8-@11    8-@14    8-@18    8-@23
          8-@27    8-@36    8-@37    8-@55    8-@56    8-@70    8-@71    8-@88    8-@91    8-A06    8-A09    8-A12    8-A15    8-A21
          8-A24    8-A32    8-A33    8-A40    8-A44    8-A49    8-A52
T$TSTS    2-7#     7-3#     7-2
8#    7-54#    7-79#    7-104#   7-146#   8-13#    8-46#    8-84#    8-120#   8-155#   8-187#   8-218#
          8-250#   8-286#   8-312#   8-335#   8-377#   8-419#   8-463#   8-516#   8-558#   8-612#   8-649#   8-700#   8-725#   8-758#
          8-788#   8-822#   8-838#   8-864#   8-912#   8-955#   8-:29#   8-:53#   8-:83#   8-;29#   8-<52#   8-=00#   8-=47#   8-=94#
          8->42#   8-?41#   8-@76#
T.CNTL    2-130#   5-54*    5-64     6-182    6-198    7-160    8-135    8-296    8-565    8-627    8-657

T.DRIV    2-129#   5-52*    8-<34    8->72    8-@60
T.SIZE    4-136#
T1        4-144    7-3#
T10       4-144    8-120#
T11       4-144    8-155#
T12       4-144    8-187#
T13       4-144    8-218#
T14       4-144    8-250#
T15       4-144    8-286#
T16       4-144    8-312#
T17       4-144    8-335#
T18       4-144    8-377#
T19       4-144    8-419#
T2        4-144    7-28#
T20       4-144    8-463#
T21       4-144    8-516#
T22       4-144    8-558#
T23       4-144    8-612#
T24       4-144    8-649#

T25       4-144    8-700#
T26       4-144    8-725#
T27       4-144    8-758#
T28       4-144    8-788#
T29       4-144    8-822#
T3        4-144    7-54#
T30       4-144    8-838#
T31       4-144    8-864#
T32       4-144    8-912#
T33       4-144    8-955#
T34       4-144    8-:29#
T35       4-144    8-:53#
T36       4-144    8-:83#
T37       4-144    8-;29#
T38       4-144    8-<52#
T39       4-144    8-=00#
T4        4-144    7-79#
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T41       4-144     8-=94#
T42       4-144     8->42#
T43       4-144     8-?41#
T44       4-144     8-@76#
T5        4-144     7-104#
T6        4-144     7-146#
T7        4-144     8-13#
T8        4-144     8-46#
T9        4-144     8-84#
TEMP2     2-112#    6-222*    6-246*    8-:06*    8-:07*    8-:08
TEMP3     2-113#    6-223*    6-228*
TEMP4     2-114#    6-224*    6-227     6-237*    6-239
    6-244*    6-245*    6-248
TMP0      2-115#    4-32      8->70*    8->71*    8->74     8->86
TMP1      2-116#    8->81*    8->84*    8->93*    8->96*    8-?06
TMP2      2-117#
TMPFNC    2-131#    6-48      6-51      6-128*
TRPFLG    2-104#    5-109*    5-124     6-262*    7-12*     7-17      7-38*     7-43      7-63*     7-68      7-88*     7-93
TRPHAN    5-112     5-114     6-262#    7-13      7-39      7-64      7-89
TYPDR     2-62#     8-A67     8-A67     8-A67
UAM       2-26#
UNITST    2-80#     5-35*     5-39*     5-42      5-89
    5-128     5-139     6-17
UUT       2-79#     5-33      5-36*     5-41*
VECMSG    8-A63     8-A76#
VECT      2-60#     8-A63     8-A63     8-A63
WAIT0     5-81#     5-83
WAIT1     8-:42#    8-:44
WCKINT    3-21#     6-153
WCKMES    3-20#     6-152
WHY       2-127#
WRCHK     2-42#     6-51
WRITE     2-46#
WTCRDY    6-286#    8-536     8-575     8-634     8-671     8-715     8-734     8-746     8-772     8-802     8-830     8-850     8-877     8-889
          8-924     8-:40     8-:67     8-;00     8-;51     8-;69     8-;83
    8-<02     8-<17     8-<67     8-<81     8-=13     8-=27     8-=60
          8-=75     8-->08    8->23     8->58     8->99     8-?07     8-?22     8-?55     8-?73     8-?88     8-@07     8-@22     8-@87     8-A05
          8-A20     8-A39     8-A48
WTDRDY    6-272#    8-:73     8-;14     8-;75     8-<08     8-<73     8-=19     8-=66     8->14     8-?13     8-?79     8-@13     8-A11
X$ALWA    2-7#
X$FALS    2-7#      8-A89
X$OFFS    2-7#      8-A89
X$TRUE    2-7#
XPOLY     2-108#    6-233     6-244
XXX       5-34      5-39#
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ENDHW     1-465#    2-7#      4-126
ENDINI    1-475#    2-7#      5-103
ENDMOD    1-487#    2-7#      2-19      2-72      2-298     3-93      4-114     4-128     4-140     4-146     5-105     5-166     5-178     5-188
          6-304     8-A81     8-B06
ENDMSG    1-500#    2-7#      4-11      4-18      4-26      4-35      4-44      4-51      4-62      4-71
ENDPRO    1-512#    2-7#      5-7
ENDPTA    1-520#    2-7#
ENDRPT    1-529#    2-7#
ENDSEG    1-541#    2-7#
     7-140     8-7       8-40      8-78      8-114     8-149     8-181     8-212     8-244     8-691     8-906     8-<46
          8-@70
ENDSET    1-555#    2-7#
ENDSFT    1-568#    2-7#      8-A91
ENDSRV    1-580#    2-7#      6-269
ENDSUB    1-596#    2-7#
ENDSW     1-614#    2-7#      4-138
ENDTST    1-624#    2-7#      7-23      7-49      7-74      7-99      7-141     8-8       8-41      8-79      8-115     8-150     8-182     8-213
          8-245     8-281     8-307     8-330     8-372     8-414     8-459     8-512     8-553     8-
607  8-644     8-696     8-720     8-753
          8-783     8-818     8-834     8-859     8-907     8-950     8-:24     8-:48     8-:78     8-;24     8-<47     8-<95     8-=42     8-=89
          8-->37    8-?36     8-@71     8-A52
EQUALS    1-642#    2-7#      2-26
ERRDF     1-714#    2-7#      6-100     6-280     6-296     7-132     7-168     8-32      8-70      8-108     8-143     8-175     8-206     8-238
          8-279     8-304     8-327     8-359     8-368     8-402     8-412     8-44<     8-455     8-490     8-499     8-507     8-547
     8-585
          8-594     8-603     8-637     8-683     8-738     8-750     8-780     8-806     8-815     8-854     8-900     8-947     8-:17     8-;04
          8-;21     8-;95     8-<30     8-<92     8-=39     8-=86     8->34     8-?33     8-@00     8-@36     8-@55     8-A32
ERRHRD    1-718#    2-7#
ERROR     1-722#    2-7#
ERRSF     1-726#    2-7#      7-21      7-47      7-72      7-97
ERRSOF    1-730#    2-7#
ERRTBL    1-734#    2-7#
ESCAPE    1-744#    2-7#      7-133     7-169     8-33      8-71      8-109     8-144     8-17
6    8-207     8-239     8-579     8-672     8-675
          8-685     8-878     8-881     8-890     8-893     8-925     8-928     8-<21     8-<85     8-=31     8-=79     8->24     8->27     8-?26
EXIT      1-771#    2-7#
FEQUAL    1-810#    2-7#
GETBYT    1-824#    2-7#
GETPRI    1-834#    2-7#
GETWOR    1-829#    2-7#
GMANIA    1-839#    2-7#
GMANID    1-848#    2-7#
GMANIL    1-859#    2-7#
GPHARD    1-868#    2-7#      5-42
GPRMA     1-874#    2-7#      8-A61     8-A63
GPRMD     1-903#    2-7#      8-A59     8-A65
     8-A69     8-A90
GPRML     1-934#    2-7#      8-A67     8-A88
HEADER    1-954#    2-7#      2-17
INLOOP    1-962#    2-7#      6-7
IOSETU    1-966#    2-7#
IOSTAR    1-974#    2-7#
KT11      1-982#    2-7#
LASTAD    1-;47#    2-7#      8-B07
M$BYTE    1-D00#    2-7#      2-17      2-17      2-17      2-17#
M$CHEC    1-E18#    2-7#
M$CNTO    1-E82#    2-7#      8-A59     8-A59#    8-A61     8-A61#    8-A63     8-A63#    8-A65     8-A65#    8-A67     8-A67#    8-A69     8-A69#
          8-A88     8-A88#    8-A90     8-A90#

M$COUN    1-D66#    2-7#      4-23      4-23      4-23#     4-32      4-32      4-32      4-32#     4-41      4-41      4-41#     4-60      4-60#
          4-67      4-67#     4-73      4-73      4-73#     4-76      4-76      4-76      4-76      4-76      4-76#     4-77      4-77      4-77
          4-77      4-77#     4-78      4-78      4-78      4-78      4-78      4-78#     4-79      4-79      4-79      4-79      4-79#     4-92
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          2-17    2-17    2-17    2-17    2-17    2-17    2-17    2-17    2-17    2-17    2-17    2-17    2-17    2-17
          2-17    2-17    2-17    2-17    2-17    2-17    2-17    2
-17       2-17    2-17    2-17    2-17#   2-17#   2-21
          2-21#   2-22    2-22#
M$DECR    1-D29#  2-7#    2-19    2-19#   2-72    2-72#   2-298   2-298#  3-93    3-93#   4-11    4-11#   4-18    4-18#
          4-26    4-26#   4-35    4-35#   4-44    4-44#   4-51    4-51#   4-62    4-62#   4-71    4-71#   4-114   4-114#
          4-126   4-126#  4-128   4-128#  4-138   4-138#  4-140   4-140#  4-146   4-146#  5-7     5-7#    5-103   5-103#
          5-105
     5-105#  5-141   5-141#  5-164   5-164#  5-166   5-166#  5-176   5-176#  5-178   5-178#  5-186   5-186#
          5-188   5-188#  6-269   6-269#  6-304   6-304#  7-23    7-23#   7-49    7-49#   7-74    7-74#   7-99    7-99#
          7-140   7-140   7-140#  7-140#  7-141   7-141#  8-7     8-7     8-7#    8-7#    8-8     8-8#    8-40    8-40
  8-114#
          8-40#   8-40#   8-41    8-41#   8-78    8-78    8-78#   8-78#   8-79    8-79#   8-114   8-114   8-114#
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        8-@55#  8-@56#  8-@70#  8-@71#  8-@76   8-@76   8-@76   8-@76#  8-@76#  8-@76#  8-@88#  8-@91#  8-A06#  8-A09#
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Cross reference table (CREF V05.01)

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                8-A65   8-A65#  8-A67   8-A67#  8-A69   8-A69#  8-A88   8-A88#  8-A89   8-A89#  8-A90   8-A90#  8-B07   8-B07
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MANUAL  1-;62#  2-7#
MEMORY  1-;66#  2-7#
OPEN    1-;71#  2-7#
POINTE  1-;76#  2-7#     2-13
PRINTB  1-<39
#    2-7#      4-23      4-32      4-41      4-60      4-67      4-73      4-76      4-77      4-78      4-79      4-82      4-83
                5-86    5-126   5-137
PRINTF  1-<79#  2-7#     6-15
PRINTS  1-=19#  2-7#
PRINTX  1-=59#  2-7#
READBU  1-=99#  2-7#     5-99
READEF  1->03#  2-7#     5-15    5-19    5-21    5-30
RFLAGS  1->08#  2-7#
SETPRI  1->13#  2-7#     5-147   8-264   8-631   8-666   8-730   8-735   8-742   8-747   8-797   8-803   8-846   8-851
                8-:9
6    8-;17
SETVEC  1->18#  2-7#     5-97    5-112   7-13    7-39    7-64    7-89
SLASH   1->24#  2-7#
STARS   1->38#  2-7#     7-4     7-9     7-31    7-36    7-55    7-60    7-80    7-85    7-108   7-113   7-148   7-153
                8-15    8-19    8-47    8-52    8-86    8-90    8-122   8-127   8-157   8-161   8-189   8-193   8-220   8-224
                8-252   8-261   8-288   8-292   8-314   8-318   8-337   8-343   8-378   8-384   8-422   8-428   8-466
 8-471
                8-520   8-525   8-560   8-563   8-614   8-624   8-651   8-655   8-703   8-709   8-760   8-766   8-789   8-794
                8-823   8-826   8-840   8-843   8-867   8-871   8-914   8-918   8-958   8-964   8-:30   8-:34   8-:56   8-:60
                8-:86   8-:90   8-;34   8-;43   8-<56   8-<59   8-=03   8-=06   8-=49   8-=53   8-=96   8-->00  8-->45  8-->53
                8-?42   8-?47   8-@78   8-@81
SVC     1->52#  2-5#     2-7
XFER    1-@12#  2-7#
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XFERF    1-0160   2-70     8-A89
XFERT    1-0200   2-70
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