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IDENTIFICATION

PRODUCT CODE: AC F111E-MC

PRODUCT NAME: CZRLGE0 RL11/RLV11 CONTROLLER TEST 1

DATE CREATED: 5-JAN-79

REVISED: 6-DEC 84

MAINTAINER: DIAGNOSTIC ENGINEERING COLORADO

AUTHORS: D. CLAFLIN

TABLE OF CONTENTS

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 CARTRID
GES 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.

```
CHMDKA0 XXDP+ DK MONITOR NNK
BOOTED VIA UNIT#: 0

   ENTER DATE (DD MMM-YY):
```

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

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

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

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

****
* STEP 1 *
****

THE DIAGNOSTIC WILL ISSUE THE PROMPT "DR>". FROM THIS POINT UNTIL THE TIME WHEN YOU RESTART XXDP+, YOU WILL BE TALKING TO THE DIAGNOSTIC, NOT XXDP+. WE WILL REFER TO THE PRESENCE OF THIS PROMPT AS BEING IN DIAGNOSTIC COMMAND MODE, AS OPPOSED TO XXDP+ COMMAND MODE.

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

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

THINGS TO NOTE HERE:

1. ONLY THE FIRST THREE CHARACTERS OF THIS OR ANY COMMAND AT THE "DR>" LEVEL NEED TO BE TYPED.

2. THE "PASS" SWITCH SPECIFIES HOW MANY PASSES YOU DESIRE. A PASS CONSISTS OF RUNNING THE FULL DIAGNOSTIC AGAINST ALL UNITS 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-0
                          D

        CZRLG TESTS CONTROLLER FUNCTIONS,       D
        INTERFACE LOGIC, REGISTER OPERATION

        UNIT IS RL01, RL02                      D
        DR>STA/PASS:1/FLAGS:HOE                 D.0
        # UNITS (D) ? 2                         D.0

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

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

        CHANGE SW (L) ? Y                       D.0

        DROP ON ERROR LIMIT (L) N ?             D.0


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

        DR>PRO/FLAGS:IER:LOE:HOE=0              D.0


        **************************************************
        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 PROGRAMS WITHOUT OPERATOR INTERVENTION. ONLY PROGRAMS THAT HAVE BEEN MODIFIED TO RUN IN CHAIN MODE CAN BE CHAINED. CHAINABLE PROGRAMS ARE IDENTIFIED IN THE DIRECTORY BY A BIC EXTENSION.

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

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

TO EXECUTE A CHAIN FILE THE USER TYPES:

```
C FILNAM <CR> OR

C FILNAM/QV<CR>
```

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

WHEN PROGRAMS ARE RUN IN CHAIN MODE, THE SOFTWARE SWITCH REGISTER SHOULD BE SET TO 000000. THE XXDP+ MONITOR PRINTS EACH COMMAND TAKEN FROM THE CHAIN FILE AND THEN EXECUTES THE COMMAND. WHEN THE LAST COMMAND OTHER THAN ANOTHER C COMMAND HAS BEEN EXECUTED THE XXDP+ MONITOR TERMINATES CHAIN MODE AND TYPES A PROMPT (.). IT IS READY TO ACCEPT ANOTHER COMMAND FROM THE CONSOLE. IF THE LAST COMMAND IS ANOTHER C COMMAND. THE CHAIN 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 HARDWARE DIALOGUE IS INITIATED. WHEN IT IS COMPLETED, THE QUESTIONS "CHANGE SW?" IS ISSUED, AND THE ANSWERS, IF GIVEN, BECOME THE NEW DEFAULTS. THEREFORE IT IS NECESSARY TO RELOAD THE PROGRAM IN ORDER TO RETURN TO THE LOAD DEFAULTS.

THE SWITCH ARGUMENTS ARE AS FOLLOWS:

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

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

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

LOE LOOP ON ERROR, CAUSING THE DIAGNOSTIC TO LOOP CONTINUOUSLY WITHIN THE SMALLEST DEFINED BLOCK OF CODING (SEGMENT, SUBTEST, OR TEST) CONTAINING THE ERROR

IER INHIBIT ERROR REPORTING

IBE INHIBIT BASIC ERROR REPORTS

IXE INHIBIT EXTENDED ERROR REPORTS

PRI DIRECT ALL MESSAGES TO A LINE PRINTER

PNT PRINT NUMBER OF TEST BEING EXECUTED

BOE BELL ON ERROR

UAM RUN IN UNATTENDED MODE, BYPASSING MANUAL INTERVENTION TESTS

ISR INHIBIT STATISTICAL REPORTS

IDU INHIBIT DROPPING OF UNITS BY DIAGNOSTIC

ADR EXECUTE AUTODROP CODE

LOT LOOP ON TEST

EVL EVALUATE

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

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

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

****

RES(TART)/TEST:TEST LIST/PASS:PASS-CNT/FLAGS:FLAG-LIST/EOP:EOP-INCR/

UNITS:UNIT-LIST

****

THE DIAGNOSTIC IN CORE IS EXECUTED IN ACCORDANCE WITH THE SWITCHES SPECIFIED. HOWEVER, NEW "P-TABLES" ARE NOT BUILT. INSTEAD, THE ONES IN CORE ARE USED.

THE QUESTION "CHANGE SW?" IS ASKED AND THE ANSWERS GIVEN BECOME THE NEW DEFAULTS. THE COMMAND MAY BE ISSUED WHEN COMAND MODE HAS BEEN ENTERED VIA A) DIAGNOSTIC IS FINISHED B) HALT ON 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 HE POSITION OF THE P-TABLE IN CORE, ACCORDING TO THE ORDER IN WHICH THEY WERE BUILT. THE UNITS SPECIFIED MUST NOT HAVE BEEN DROPPED BY THE OPERATOR DROP COMMAND. THE UNIT-LIST DEFAULTS TO "ALL THAT HAVE NOT BEEN DROPPED BY OPERATOR COMMAND". THE EFFECT OF THE UNIT-LIST LASTS UNTIL THE NEXT START (WHERE IT IS AUTOMATICALLY RESET TO "ALL") OR THE NEXT RESTART.

2. ALL UNSPECIFIED FLAG SETTINGS ARE UNCHANGED.

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

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

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

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

2. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

****
PRO(CEED)/FLACS:<F
LAG-LIST>
****

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

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

1. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

****
EXIT
****

RETURN TO
XXDP. PROMPT MODE.

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

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

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

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

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

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

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

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

THE HARDWARE P-TABLES FOR ALL UNITS UNDER TEST ARE PRINTED OUT IN THE FORMAT IN WHICH THEY WERE ENTERED. ANY UNITS THAT WERE DROPPED BY THE OPERATOR "DROP" COMMAND ARE SO 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 CON TROLLER (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 AS SIGNED 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 ADDRFSS 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) 0?

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 FRROR
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

@
CZRLGE0 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
000000                          .NLIST  ME,CND,MD
                                .MCALL SVC

000000                          SVC
          000000                SVCINS=0
          000000                SVCTAG=0
          002000                .=2000

002000                                  POINTER BGNSFT,BGNSW,BGNDU,BGNAU

002000                          BGNMOD  MDHEDR

002000                                  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  /0/
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
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
```

```
                                DRDY=BIT0               ;DRIVE READY (RLCS)
                                INTEN=BIT6              ;INTERRUPT ENABLE (RLCS)
                                ERR=BIT15               ;RL11 ERROR (RLCS)
                                DERR=BIT14              ;RL01 DRIVE ERROR (RLCS)
                                OPI=BIT10               ;OPERATION INCOMPLETE (RLCS)
                                CRDY=BIT7               ;CONTROLLER READY (RLCS)
                                BA17=BIT5
;EXTENDED ADDRESS BIT 17 (RLCS)
                                BA16=BIT4               ;EXTENDED ADDRESS BIT 16 (RLCS)
                                NXM=BIT13               ;NON-EXISTANT MEMORY (RLCS)
                                DS0=0                   ;DRIVE SELECT 0 (RLCS)
                                DS1=BIT8                ;DRIVE SELECT 1 (RLCS)
                                DS2=BIT9                ;DRIVE SELECT 2 (RLCS)
                                DS3=BIT8!BIT9           ;DRIVE SELECT 3 (RLCS)
                                NOOP0=0                 ;FUNCTION-NOOP(0)
                                NOOP7=BIT1!BIT2!BIT3    ;FUNCTION-NOOP(7)
                                WRCHK=BIT1              ;WRI
TE CHECK FUNCTION
                                GSTAT=BIT2              ;GET STATUS FUNCTION
                                SEEK=BIT2!BIT1          ;SEEK FUNCTION
                                RDHDR=BIT3              ;READ HEADER FUNCTION
                                WRITE=BIT3!BIT1         ;WRITE DATA FUNCTION
                                READ=BIT3!BIT2          ;READ DATA FUNCTION
                                GODRVR=BIT1!BIT7        ;CRDY AND DRDY
                                DRST=BIT3               ;DRIVE RESET (RLDA)
                                GSBIT=BIT1              ;GET STATUS BIT (RLDA)
                                MK=BIT0                 ;MARKER BIT (RLDA)
                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
```

GLOBAL DATA

```
     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
```

```
     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
```

```
      1 005774                          BGNMOD  GLB1xT
      2
                                .SBTTL  GLOBAL TEXT
      3
      7 005774     040     104     122  DEMES:  .ASCIZ  / DRV/
      8 006001     040     116     130  NXMMES: .ASCIZ  / NXM/
      9 006006     040     117     120  OPIMES: .ASCIZ  / OPI/
     10 006013     040     110     103  HCRCMES:.ASCIZ  / HCRC/
     11 006021     040     110     116  HNFMES: .ASCIZ  / HNF/
     12 006026     040     104     103  DCKMES: .ASCIZ  / DCK/
     13 006033     040     104     114  DLTMES: .ASCIZ  / DLT/
     14 006040     015     012     000  MSCRLF
:        .ASCIZ  <15><12>
     15 006043     015     000          LF:     .ASCIZ  <15>
     16 006045     040     103     117  COMP:   .ASCIZ  / COMP/
     17 006053     106     117     122  OPIERR: .ASCIZ  /FORCED OPI(GET STATUS) CAUSED OTHER ERRORS/
     18 006126     116     117     117  NOPMES: .ASCIZ  /NOOP OPERATION-FLAG MODE/
     19 006157     116     117     117  NOPINT: .ASCIZ  /NOOP OPERATION-INTR. MODE/
     20 006211     127     122     111  WCKMES: .ASCIZ  /WRITE CHECK OPERATION-FLAG MODE/
     21 006251     127     122
         111  WCKINT:  ASCIZ  /WRITE CHECK OPERATION-INTR. MODE/
     22 006312     122     105     101  RHDMES: .ASCIZ  /READ HEADER OPERATION-FLAG MODE/
     23 006352     122     105     101  RHDINT: .ASCIZ  /READ HEADER OPERATION-INTR. MODE/
     24 006413     123     105     105  SEKMES: .ASCIZ  /SEEK OPERATION-FLAG MODE/
     25 006444     123     105     105  SEKINT: .ASCIZ  /SEEK OPERATION-INTR. MODE/
     26 006476     107     105     124  GSTMES: .ASCIZ  /GET STATUS OPERATION-FLAG MODE/
     27 006535     1
07       105     124  GSTINT: .ASCIZ  /GET STATUS OPERATION-INTR MODE/
     28 006574     103     123     072  ARLCS:  .ASCIZ  /CS: /
     29 006601     040     102     101  ARLBA:  .ASCIZ  / BA: /
     30 006607     040     104     101  ARLDA:  .ASCIZ  / DA: /
     31 006615     040     115     120  ARLMP:  .ASCIZ  / MP: /
     32 006623     102     105     106  BEREG:  .ASCIZ  /BEFORE COMMAND: /
     33 006644     124     111     115  AFREG:  .ASCIZ  /TIME OF ERROR:  /
     34 006665     103     117     116  CRTIM:  .ASC
IZ       /CONTROLLER TIMED OUT/
     35 006712     104     122     111  DRTIM:  .ASCIZ  /DRIVE READY TIMED OUT/
     36 006740     103     101     116  EM1:    .ASCIZ  /CAN NOT ADDRESS RLCS/
     37 006765     103     101     116  EM2:    .ASCIZ  /CAN NOT ADDRESS RLBA/
     38 007012     103     101     116  EM3:    .ASCIZ  /CAN NOT ADDRESS RLDA/
     39 007037     103     101     116  EM4:    .ASCIZ  /CAN NOT ADDRESS RLMP/
     40 007064     122     114     103  EM5:    .ASCIZ  %RLCS READ/WRITE ERROR (BIT 0 DON'T CARE)%
     41 0071
35       122     114     102  EM6:    .ASCIZ  %RLBA READ/WRITE ERROR%
     42 007163     122     114     104  EM7:    .ASCIZ  %RLDA READ/WRITE ERROR%
     43 007211     117     120     111  EM11:   .ASCIZ  /OPI WOULD NOT GENERATE INTERRUPT/
     44 007252     116     117     040  EM13:   .ASCIZ  /NO INTERRUPT FROM NOOP(0)/
     45 007304     116     117     117  EM14:   .ASCIZ  /NOOP(0) MODIFIED RLMP/
     46 007332     116     117     117  EM15:   .ASCIZ  /NOOP(0) MODIFIED RLBA/
     47 007360     116     117     117  EM16:   .ASC
IZ       /NOOP(0) MODIFIED RLDA/
     48 007406     111     116     124  EM17:   .ASCIZ  /INTERRUPT PRIORITY FAILURE/
     49 007441     107     105     124  EM30:   .ASCIZ  /GET STATUS WOULD NOT INTERRUPT/
     50 007500     107     105     124  EM30A:  .ASCIZ  /GET STATUS SHOULD NOT INTERRUPT/
     51 007540     122     114     115  EM32:   .ASCIZ  /RLMP CONTAINED WRONG STATUS/
     52 007574     117     120     111  EM33:   .ASCIZ  /OPI DID NOT SET-GSTAT WITHOUT GS BIT/
     53 007641     117     120     111  EM34:   .ASCIZ  /
OPI DID NOT SET-GSTAT WITHOUT GS AND MK BITS/
     54 007716     122     105     101  EM37:   .ASCIZ  /READ HEADER WOULD NOT INTERRUPT/
     55 007756     102     101     104  EM41:   .ASCIZ  /BAD CYLINDER OR HEAD SELECT IN REPEATED READ HEADER TEST/
     56 010047     102     101     104  EM42:   .ASCIZ  /BAD HEADER CRC ON READ HEADER/
     57 010105     123     105     103  EM43:   .ASCIZ  /SECTOR ADDRESS OUT OF SEQUENCE DURING CONSECUTIVE READ HEADERS/
     58 010204     127     122     111  EM44:   .ASCIZ  /WRITING RL
MP MODIFIED RLCS/
     59 010237     127     122     111  EM45:   .ASCIZ  /WRITING RLMP MODIFIED RLBA/
     60 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/                    ;8
     86
     87

   88                                      .EVEN
     89
     93 012226                             ENDMOD
     94
```

```
                                        .SBTTL  GLOBAL ERRORS
                                
                                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$MSG
     63
     64 012514                          BGNMSG  ERR7
     65
     66 012514  004737  012552                          JSR     PC,LINE1
     67 012520                                          PPINTB  @FRMT6,BDDAT
        012520  013746  002364                          MC/     BDDAT,-(SP)
        012524  012746  013314                          MOV     @FRMT6,-(SP)
        012530  012746  000002                          MOV     #2,(SP)
        012534  010600                                  MOV     SP,R0
        012536  104414                                  TRAP    C$PNTB
        012540  062706  000006                          ADD     #6,SP
```

GLOBAL ERRORS

```
      68
      69 012544  004537  015102                    JSR     R5,CKERLT
      70
      71 012550                                    ENDMSG
         012550                                L10007:
         012550  104423                            TRAP    C$MSG
      72
      73 012552                                LINE1: PRINTB  @FRMT1,RLCS,<B.DRIVE+1>
         012552  005046                            CLR     -(SP)
         012554  153716  002271                    BISB    DRIVE+1,(SP)
         012560  013746  002250                    MOV     RLCS,-(SP)
         012564  012746  013072                    MOV     @FRMT1,-(SP)
         012570  012746  000003                    MOV     #3, (SP)
         012574  010600                            MOV     SP,R0
         012
                                                TRAP    C$PNTB
576      104414
         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
                                                TRAP    C$PNTB
12644    104414
         012646  062706  000016                    ADD     #16,SP
      77 012652                                    PRINTB  @FRMT2A,@ARLDA,B.DA,@ARLMP,B.MP
         012652  013746  002300                    MOV     B.MP,-(SP)
         012656  012746  006615                    MOV     @ARLMP,-(SP)
         012662  013746  002276                    MOV     B.DA,-(SP)
         012666  012746  006607                    MOV     @ARLDA,-(SP)
         012672  012746  013151                    MOV     @FRMT2A,-(SP)
         012676  012746  000005                    MOV     #5,-(SP)
         012702  010600                            MOV     SP,R0
         012704  104414                            TRAP    C$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)
```

GLOBAL ERRORS

```
         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
```

GLOBAL ERRORS

```
                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                                  .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

014122                                  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$:     TST     PWRFLG                  ;RECENT POWER FAILURE?
     70 014340  001476                     BEQ     END                     ;NO
     71
     72                                     ;THERE WAS A RECENT POWER FAILURE, THEREFORE WE WILL WAIT
     73                                     ;FOR THE DRIVE TO COME READY
     74
     75 014342  012701
          000170               MOV     #120.,R1                ;INITIALIZE WAIT COUNT
     76 014346  012777  000200  165674          MOV     #200,@RLCS              ;SET CRDY
     77 014354  053777  002270  165666          BIS     DRIVE,@RLCS             ;SET IN DRIVE SELECT
     78 014362  032777  000001  165660  DRVRDY: BIT     #DRDY,@RLCS             ;DRIVE READY???
     79 014370  001042                     BNE     BGNTST                  ;YES, THEN START TEST
     80 014372  012737  000050  002414             MOV     #40.,DLYCNT             ;INITIALIZE DELAY COUNT
     81 014400                      WAITO:  DELAY   1                       ;IMPLEMENT 100-USEC DELAY
          014400  012727  000001             MOV
          #1,(PC)+
          014404  000000                     .WORD   0
          014406  013727  002116             MOV     L$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     WAITO                   ;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  #PRI07
        015024  012700  000340                  MOV     #PRI07,R0
        015030  104441                          TRAP    C$SPRI
    .48
    149 015032  032777  000200  165210  1$:     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
```

AUTO DROP SECTION

```
                                        .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
```

```
CZRLGEO RL11/RLV11 CTLR TST 1 MAC                                                    SEQ 0048
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ROUTINE TO CHECK FOR CONTROLLER ERRORS

     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$:     JSR     R5,FIX
     95 015442  006040                          MSCRLF
     96 015444  004537  015732                  JSR     R5,FIX
     97
     98 015450  000000                  RESTMS: .WORD   0               ;HEADER FROM TEST
     99 015452  105011                          CLRB    (R1)            ;PUT TERMINATOR IN
    100 015454                                   ERRDF   300.,LF,ERR6
        015454  104455                          TRAP    C$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
```

```
LOAD RLCS

    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 0 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

 016100  010046                         SIMBCC: MOV     R0,(SP)         ;SAVE R0
 016102  010146                                 MOV     R1,(SP)         ;SAVE
R1
 016104  010246                                 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
```

```
**TEST 2**   RLBA ADDRESSABILITY

     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          ;RELEASF 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
```

```
**TEST 3** - RLDA ADDRESSABILITY

     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
     83                                 ;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
```

```
CZRLGE0 RL11/RLV11 CTLR TST 1 MACRO V05.01a Tuesday 12-Feb-85 13:58 P
age 7-3                                                  SEQ 0057
**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
```

```
CZRLGEO RL11/RLV11 CTLR TST 1 MACRO V05.01a Tuesday 12 Feb 85 13:5
8 Page 7-4                                                SEQ 0058
**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$ESCAPE
         017242  000012                               .WORD   10000$-.
```

```
**TEST 6** - READ WRITE OF RLDA

        1
        2
        3 017244  005723                          TST     (R3)+           ;BUMP FOR NEXT PATTERN
        4 017246  020327  004624                  CMP     R3,#ENDPAT      ;CHECK FOR END
        5 017252  001343                          BNE     BATEST          ;NOT END, BRANCH FOR NEXT
        6
        7 017254                          ENDSEG                          ;****END O
F SEGMENT****
          017254                          10000$:
          017254  104405                          TRAP    C$ESEG
        8 017256                          ENDTST                          ;****END OF TEST****
          017256                          L10026:
          017256  104401                          TRAP    C$ETST
        9
       10
       11                                 .SBTTL  **TEST 7** - READ WRITE OF RLDA
       12
       13 017260                          BGNTST                          ;****START OF TEST****
       14
       15 017260                          STARS
                                          ;;*****************************************************************
       16                                 ;TEST THAT WE CAN WRITE/READ THE DISK ADDRESS REGISTER
       17                                 ;ALL BIT POSITIONS ARE WRI
TTEN USING FOUR PATTERNS:
       18                                 ;GROWING 1, SHIFTING 1, GROWING 0 AND SHIFTING 0
       19 017260                          STARS
                                          ;;*****************************************************************

       20
       21
       22 017260  012703  004416                  MOV     #BEGPAT,R3      ;SET UP POINTER TO PATTERN LIST
       23 017264                          BGNSEG                          ;****START OF SEGMENT****
          017264  104404                          TRAP    C$BSEG
       24 017266                          DATEST:
       25 017266  011337  002362                  MOV     (R3),GDDAT      ;GET PATTERN
       26 017272  013777  002362  162754          MOV     GDDAT,@
RLDA      ;LOAD PATTERN IN DA
       27
       28 017300  017737  162750  002364          MOV     @RLDA,BDDAT     ;READ PATTERN BACK
       29 017306  023737  002362  002364          CMP     GDDAT,BDDAT     ;IS IT CORRECT?
       30 017314  001404                          BEQ     1$              ;BRANCH IF CORRECT
       31
       32 017316                                  ERRDF   6.,EM7,ERR2     ;WRONG DATA IN RLDA
          017316  104455                          TRAP    C$ERDF
          017320  000006                          .WORD   6
          017322  007163                          .WORD   EM7
          017324  012256                          .WORD   ERR2
       33 017326                          1$:     ESCAPE  SEG             ;IF /FL·LOE SET LOOP, ELSE EXIT SEG
          017326  104410
                                     TRAP    C$ESCAPE
          017330  000012                          .WORD   10000$-.
       34
       35
       36 017332  005723                          TST     (R3)+           ;BUMP POINTER
       37 017334  020327  004624                  CMP     R3,#ENDPAT      ;AT END OF PATTERNS?
       38 017340  001352                          BNE     DATEST          ;NO, BRANCH BACK
       39
       40 017342                          ENDSEG                          ;****END OF SEGMENT****
          017342                          10000$:
          017342  104405                          TRAP    C$ESEG
       41 017344                          ENDTST                          ;****END OF TEST****
          017344                          L10027:
```

```
CZRLGEO RL11/RL V11 CTLR TST 1 MACRO V05.01a Tuesday 12 Feb 85 13:58 Page 8 1
                                                SEQ 0060
**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  040000  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****
```

```
                                        STARS
                                        ;;*****************************************************************
                                        ;TEST THAT THE "BIC" INSTRUCTION WILL WORK ON THE
                                        ;CONTROL AND STATUS REGISTER.  BITS 8-9 AND 6-1 ARE
                                        ;TESTED.
017472                                  STARS
                                        ;;**********************
*****************************************
017472  012703  004772                  MOV     #CSPAT,R3       ;GET BEGINNING OF PATTERNS
017476                          BGNSEG                          ;****START OF SEGMENT****
017476  104404                          TRAP    C$BSEG
017500                          1$:
017500  012777  001776  162542          MOV     #1776,@RLCS     ;SET ALL SETTABLE BITS
017506  012737  001776  002362          MOV     #1776,GDDAT     ;SET UP EXPECT DATA IN
017514  041337  002362                  BIC     (R3),GDDAT      ;GDDAT
017520  041377  162524                  BIC     (R3),@RLCS      ;
CLEAR BITS IN RLCS VIA "BIC"
017524  032777  040000  162516          BIT     #DERR,@RLCS     ;IF DRIVE ERROR BIT SET
017532  001403                          BEQ     99$             ;EXPECT IT SET WHEN WE
017534  052737  140000  002362          BIS     #ERR!DERR,GDDAT ;READ IT BACK
017542  017737  162502  002364  99$:    MOV     @RLCS,BDDAT     ;MOVE RLCS TO BDDAT FOR COMPARE
017550  042737  000001  002364          BIC     #DRDY,BDDAT     ;CLEAR DRIVE READY
017556  023737  002364  002362          CMP     BDDAT,GDDAT     ;DID "BIC" WORK PROPERLY
017564  0
01404                           BEQ     2$              ;BRANCH IF OKAY
017566                                  ERRDF   8.,EM62,ERR2    ;WRONG DATA IN RLCS
017566  104455                          TRAP    C$ERDF
017570  000010                          .WORD   8
017572  010741                          .WORD   EM62
017574  012256                          .WORD   ERR2
017576                          2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
017576  104410                          TRAP    C$ESCAPE
017600  000012                          .WORD   10000$-.
017602  005723                          TST     (R3)+           ;GET NEXT PATTERN
017604  020327  005070                  CMP     R3,#CSEND       ;AT END OF LIST
017610  001
333                             BNE     1$              ;NO, GO BACK WITH NEXT PATTERN
017612                          ENDSEG                          ;****END OF SEGMENT****
017612                          10000$:
017612  104405                          TRAP    C$ESEG
017614                          ENDTST                          ;****END OF TEST****
017614                          L10031:
017614  104401                          TRAP    C$ETST

                                        .SBTTL  **TEST 10** - BIS OF RLBA

017616                          BGNTST                          ;****START OF TEST****

017616                                  STARS
                                        ;;*****************************************************************
                                        ;TEST THAT THE
"BIS" INSTRUCTION WILL WORK ON THE BUS
                                        ;ADDRESS REGISTER.  BITS 15-0 ARE LOADED, ONLY BITS 15-1
                                        ;ARE EXPECTED BACK.  FOUR PATTERNS ARE USED: GROWING 1, SHIFTING 1,
                                        ;GROWING 0, AND SHIFTING 0.
017616                                  STARS
```

```
                                        ;;*****************************************************************
    128
    129

    130 017616  012703  004416                  MOV     #BEGPAT,R3      ;GET START OF LIST
    131 017622                          BGNSEG                          ;****START OF SEGMENT****
        017622  104404                          TRAP    C$BSEG
    132 017624                          1$:
    133 017624  005077  162422                  CLR     @RLBA           ;CLEAR "BA"
    134 017630  011337  002362                  MOV     (R3),GDDAT      ;SET EXPECTED
    135 017634  022737  000001  002410          CMP     #1,T.CNTLR              ;RL11
    136 017642  002403                          BLT     3$              ;NO
    137 017644  042737  000001  002362          BIC     #1,GDDAT        ;BIT 0 CAN'T SET IN RLBA (UNIBUS)
    138 017652  051377  16
2374                    3$:     BIS     (R3),@RLBA      ;BIS RLBA WITH PATTERN
    139 017656  017737  162370  002364          MOV     @RLBA,BDDAT     ;READ "BA"
    140 017664  023737  002364  002362          CMP     BDDAT,GDDAT     ;DID RLBA LOAD PROPERLY?
    141 017672  001404                          BEQ     2$              ;BRANCH IF YES
    142
    143 017674                                  ERRDF   9.,EM63,ERR2    ;WRONG DATA IN RLBA
        017674  104455                          TRAP    C$ERDF
        017676  000011                          .WORD   9
        017700  011024                          .WORD   EM63
        017702  012256                          .WORD   ERR2
    144 017704                          2$:     ESCAPE  SEG             ;IF /FL:LOE SET LOOP, ELSE EXIT SEG

017704  104410                          TRAP    C$ESCAPE
        017706  000012                          .WORD   10000$-.
    145
    146 017710  005723                          TST     (R3)+           ;GET NEXT PATTERN
    147 017712  020327  004624                  CMP     R3,#ENDPAT      ;DID WE COMPLETE LIST
    148 017716  001342                          BNE     1$              ;NO, GO BACK FOR NEXT.
    149 017720                          ENDSEG                          ;****END OF SEGMENT****
        017720                          10000$:
        017720  104405                          TRAP    C$ESEG
    150 017722                          ENDTST                          ;****END OF TEST****
        017722                          L10032:
        017722  104401                          TRAP    C$ETST
    151
    152
    153                                 .SBTTL  **TEST
 11** - BIC OF RLBA
    154
    155 017724                          BGNTST                          ;****START OF TEST****
    156
    157 017724                          STARS
                                        ;;*****************************************************************
    158                                 ;TEST THAT THE "BIC" INSTRUCTION WILL WORK ON THE BUS
    159                                 ;ADDRESS REGISTER.  BITS 15-1 ARE TESTED WITH 4 PATTERNS
    160                                 ;GROWING 1, SHIFTING 1, GROWING 0 AND SHIFTING 0.
    161 017724                          STARS
                                        ;;*****************************************************************
    162
    163
    164 0
17724   012703  004416                  MOV     #BEGPAT,R3      ;GET START OF LIST
    165 017730                          BGNSEG                          ;****START OF SEGMENT****
        017730  104404                          TRAP    C$BSEG
    166 017732                          1$:
    167 017732  012777  177776  162312          MOV     #-2,@RLBA       ;SET RLBA TO ALL 1'S (BIT 0-0)
    168 017740  012737  177776  002362          MOV     #-2,GDDAT       ;SET UP EXPECTED RESULTS
    169 017746  041337  002362                  BIC     (R3),GDDAT      ;IN GDDAT
```

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

     '70 017752  041377  162274                BIC     (R3),@RLBA      ;BIC RLBA
      71 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
APF      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$:
     199 020032  005077  162216                CLR     @RLDA           ;CLEAR "DA"
     200 020036  011337  002362                MOV     (R3),GDDAT      ;SET EXPECTED
     201 020042  051377  162206                BIS     (R3),@RLDA      ;BIS RLDA
     202 020046  017737  162202  002364        MOV     @RLDA,BDDAT     ;READ RLDA
     203 020054  023737  002364  002362        CMP     @
,DOAT,GDDAT      ;IS RLDA CORRECT
     204 020062  001404                        BEQ     2$              ;IF OKAY BRANCH
     205
     206 020064                                ERRDF   11.,EM65,CRR2   ;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$ESCAPE
         020076  000012                        .WORD   10000$ .
```

```
CZRLGE0 RL11/RLV11 CTLR TST 1 MACRO V05.01a Tuesday 12 Feb 85 13:58 Page 8 5
                    SEQ 0064
••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
```

TEST 14 BUS RESET OF RLCS

```
                                        .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
```

TEST 15 - BUS RESET OF RLBA

```
                                        ;.*****************************************************************
    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          2$:     BIS     #1,@RLBA
    299 020350  005067  002362                  CLR     GDDAT           ;CLEAR EXPECTED DATA
    300 020354                                  BRESET                  ;ISSUE BUS INIT
        020354  104433                          TRAP    C$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$ETST
    308
    309
    310                                 .SBTTL  **TEST 16**   BUS RESET OF RLDA
    311
    312 020400                          BGNTST                          ;****START OF TEST****
    313
    314 020400                          STARS
                                        ;;*****************************************************************
    315                                 ;TEST THAT A BUS RESET WILL CLEAR THE ENTIRE
    316                                 ;DISK ADDRESS REGISTER.  THE DISK ADDRESS IS LOADED WITH 177777
    317                                 ;A
NO IS EXPECTED TO BE ZERO AFTER THE RESET.
    318 020400                          STARS
                                        ;;*****************************************************************
    319
    320
    321 020400  012777  177777  161646          MOV     #-1,@RLDA       ;SET DA TO ALL 1'S
    322 020406  005037  002362                  CLR     GDDAT           ;CLEAR EXPECTED
    323 020412                                  BRESET                  ;ISSUE BUS INIT
        020412  104433                          TRAP    C$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
```

```
                                .SBTTL  **TEST 17** - UNIQUENESS OF RLCS

020436                          BGNTST                          ;****START OF TEST****

020436                          STARS
                                ;;*****************************************************************
                                ;TEST THE UNIQUENESS OF THE CONTROL AND STATUS
                                ;REGISTER.  THE RLBA AND RLDA ARE PRELOADED WITH
                                ;177776 AND 177777 RESPECTIVELY.  THE RLCS IS THEN
                                ;LOADED TO INSURE THAT NEITHER THE RLBA OR RLDA
                                ;ARE MODIFIED BY THE WRITING OF THE RLCS.

020436                  STARS
                                ;;*****************************************************************

020436  012737  000201  002332          MOV     #DRDY!CRDY,LDCSR        ;SET DRIVE AND CONTROLLER READY
020444  012777  177776  161600          MOV     #-2,@RLBA               ;SET RLBA TO ALL 1'S
020452  012777  177777  161574          MOV     #-1,@RLDA               ;SET RLDA TO ALL 1'S
020460  013777  002332  161562          MOV     LDCSR,@RLCS             ;WRITE RLCS

                                ;CHECK THAT RLBA REMAINS UNAFFECTED

020466  02277
7       177776  161556          CMP     #-2,@RLBA       ;RLBA OKAY?
020474  001412                  BEQ     1$              ;YES, GO CHECK DA

020476  012737  177776  002362          MOV     # 2,GDDAT       ;SET UP EXPECTED
020504  017737  161542  002364          MOV     @RLBA,BDDAT     ;READ RLBA

020512                          ERRDF   16.,EM72,ERR2   ;CS MODIFIED BA
020512  104455                  TRAP    C$ERDF
020514  000020                  .WORD   16
020516  011463                  .WORD   EM72
020520  012256                  .WORD   ERR2
020522                  1$:     CKLOOP                  ;CHECK IF /FL-LOE IS SET
020522  104406
        TRAP    C$CLP1

020524  022777  177777  161522          CMP     #-1,@RLDA       ;RLDA OKAY?
020532  001412                  BEQ     2$              ;YES, CONTINUE

020534  012737  177777  002362          MOV     #-1,GDDAT       ;SET UP EXPECTED
020542  017737  161506  002364          MOV     @RLDA,BDDAT     ;READ DA

020550                          ERRDF   17.,EM73,ERR2   ;CS MODIFIED DA
020550  104455                  TRAP    C$ERDF
020552  000021                  .WORD   17
020554  011516                  .WORD   EM73
020556  012256                  .WORD   ERR2
020560                  2$:

3
71
372 020560                      ENDTST                          ;****END OF TEST****
020560                          L10041:
020560  104401                  TRAP    C$ETST

                                .SBTTL  **TEST 18**   UNIQUENESS OF RLBA
```

```
     377 020562                             BGNTST                          ;****START OF TEST****
     378 020562                             STARS
                                            ;;**************************************************************
     379
                                            ;TEST THE UNIQUENESS OF THE BUS ADDRESS REGISTER.  THE
     380                                    ;RLCS AND RLDA ARE LOADED WITH XXX20X AND 177777
     381                                    ;RESPECTIVELY.  THE RLBA IS THEN WRITTEN TO INSURE
     382                                    ;THAT NEITHER THE RLCS OR RLDA ARE MODIFIED
     383                                    ;BY WRITING THE RLBA.
     384 020562                             STARS
                                            ;;**************************************************************
     385
     386
     387 020562  012737  000200  002362          MOV     #CRDY,GDDAT     ;CONTROLLER READY
     388 020570  032777  040000  161452          BIT
         #DERR,@RLCS     ;IF DRIVE ERROR IS
     389 020576  001403                          BEQ     99$             ;SET THEN EXPECT IT
     390 020600  052737  140000  002362          BIS     #ERR!DERR,GDDAT ;SET WHEN WE READ IT.
     391 020606  013777  002362  161434  99$:    MOV     GDDAT,@RLCS     ;LOAD RLCS
     392 020614  012777  177777  161432          MOV     #-1,@RLDA       ;LOAD RLDA
     393 020622  005077  161424                  CLR     @RLBA           ;CLEAR RLBA
     394
     395                                    ;CHECK IF RLCS IS OKAY
     396
     397 020626  017737  161416  002364          MOV     @RLCS,BDDAT     ;READ RLCS
     398 020634  042737
000001   002364          BIC     #DRDY,BDDAT     ;IGNORE DRIVE READY
     399 020642  023737  002364  002362          CMP     BDDAT,GDDAT     ;CS OK?
     400 020650  001404                          BEQ     1$              ;YES, GO CHECK DA
     401
     402 020652                                  ERRDF   18.,EM74,ERR2   ;BA MODIFIED CS
         020652  104455                          TRAP    C$ERDF
         020654  000022                          .WORD   18
         020656  011551                          .WORD   EM74
         020660  012256                          .WORD   ERR2
     403 020662                          1$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
         020662  104406                          TRAP    C$CLP1
     404
     405 020664  022777  177777  161362          CMP     #-1,@RLDA
;IS RLDA OKAY?
     406
     407 020672  001412                          BEQ     2$              ;IF OKAY BRANCH
     408
     409 020674  012737  177777  002362          MOV     #-1,GDDAT       ;SET UP EXPECTED
     410 020702  017737  161346  002364          MOV     @RLDA,BDDAT     ;READ RLDA
     411
     412 020710                                  ERRDF   19.,EM75,ERR2   ;BA MODIFIED DA
         020710  104455                          TRAP    C$ERDF
         020712  000023                          .WORD   19
         020714  011603                          .WORD   EM75
         020716  012256                          .WORD   ERR2
     413 020720                          2$:
     414 020720                          ENDTST                          ;****END OF TEST****
         020720                          L10042:
         02072
0        104401                         TRAP    C$ETST
     415
     416
     417                                    .SBTTL  **TEST 19** - UNIQUENESS OF RLDA
     418
     419 020722                             BGNTST                          ;****START OF TEST****
     420
```

```
                                        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****
```

```
    465
    466 021062                                     STARS
                                                   ;;**************************************************************
    467                                            ;TEST THE UN?    ?SS OF THE MULTI-PURPOSE REGISTER
    468                                            ;WE WILL WRI ?     RLCS, RLBA, AND THE RLDA, THEN THE

    469                                            ;RLMP IS WRI      WE THEN GO BACK AN VERIFY THE CONTENTS
    470                                            ;OF THE RLCS         RLDA.
    471 021062                                     STARS
                                                   ;;*************    ******************************************
    472
    473
    474 021062  012737  000200  002362                     MOV     #CRDY,GDDAT      ;CONTROLLER READY
    475 021070  032777  040000  161152                     BIT     #DERR,@RLCS      ;IF DRIVE ERROR SET
    476 021076  001403                                     BEQ     99$              ;THE EXPECT IT LATER
    477 021100  052737  140000  002362                     BIS     #ERR!DERR,GDDAT
    478 021106  0137
77      002362  161134  99$:    MOV              GDDAT,@RLCS      ;LOAD CS
    479 021114  012777  177776  161130                     MOV     #-2,@RLBA        ;LOAD BA WITH ALL 1'S
    480 021122  012777  177777  161124                     MOV     #-1,@RLDA        ;LOAD RLDA
    481 021130  005077  161122                             CLR     @RLMP            ;WRITE RLMP
    482
    483                                            ;CHECK IF RLCS IS OKAY
    484
    485 021134  017737  161110  002364                     MOV     @RLCS,BDDAT      ;READ RLCS
    486 021142  042737  000001  002364                     BIC     #DRDY,BDDAT      ;IGNORE DRIVE READY
    487 021150  023737  002362  002364                     CMP     GDDAT,BDDAT      ;RLCS
OKAY?
    488 021156  001404                                     BEQ     1$               ;YES, THEN BRANCH
    489
    490 021160                                             ERRDF   201.,EM44,ERR2   ;MP MODIFIED CS
        021160  104455                                     TRAP    C$ERDF
        021162  000311                                     .WORD   201
        021164  010204                                     .WORD   EM44
        021166  012256                                     .WORD   ERR2
    491 021170                                     1$:     CKLOOP                   ;CHECK IF /FL:LOE IS SET
        021170  104406                                     TRAP    C$CLP1
    492
    493 021172  022777  177776  161052                     CMP     #-2,@RLBA        ;IS RLBA OKAY?
    494 021200  001412                                     BEQ     2$               ;BRANCH IF OKAY
    495
    496 021202  012737  177776  002
362             MOV     #-2,GDDAT                  ;SET UP EXPECTED
    497 021210  017737  161036  002364                     MOV     @RLBA,BDDAT      ;READ RLBA
    498
    499 021216                                             ERRDF   211.,EM45,ERR2   ;MP MODIFIED BA
        021216  104455                                     TRAP    C$ERDF
        021220  000323                                     .WORD   211
        021222  010237                                     .WORD   EM45
        021224  012256                                     .WORD   ERR2
    500 021226                                     2$:     CKLOOP                   ;CHECK IF /FL:LOE IS SET
        021226  104406                                     TRAP    C$CLP1
    501 021230  022777  177777  161016                     CMP     #-1,@RLDA        ;DISK ADDRESS OKAY
    502 021236  001412                                     BEQ     3$               ;YES, CONTINUE

    503
    504 021240  017737  161010  002364                     MOV     @RLDA,BDDAT      ;SET UP BAD
    505 021246  012737  177777  002362                     MOV     #-1,GDDAT        ;SET UP EXPECTED
    506
    507 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 FOP ERRORS
    538 021332  012600                          MOV     (SP)+,R0        ;RESTORE R0
    539 021334  020077  160714                  CMP     R0,@RLDA        ;SEE IF RLDA IS THE SAME FOR 'RL11'             E
    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$ETST
     608
     609
     610                                    .SBTTL  **TEST 23** - TEST OF INTERRUPT (RL11 ONLY)
     611
     612 021610                             BGNTST                          ;****START OF TEST****
     613
     614 021610                             STARS
                                            ;;*****************************************************************
     615                                    ;CHECK THE INTERRUPT WITH A NOOP.  WE WILL SET UP THE
     616                                    ;INTERRUPT VECTOR,
 LOWER THE PSW TO ZERO AND ISSUE
     617                                    ;A NOOP.  THE INTERRUPT SERVICE ROUTINE WILL SET A
      18                                    ;FLAG UPON INTERRUPT AND RETURN IN LINE.  WE WAIT 200 MILLISECONDS
     619                                    ;LOOKING FOR THAT FLAG TO BE SET BEFORE CALLING IT
     620                                    ;AN ERROR.  IF THE INTERRUPT SENDS US TO ANOTHER
     621                                    ;VECTOR ADDRESS THEN THE ERROR HANDLER WILL REPORT
     622                                    ;"TRAP TO XXXX FROM YYYY" AND RETURN  TO DIAG SUP MONITOR.  IF THE
     623                                    ;INTERRUPT GOES TO ABOVE 1000 WHO KNOWS WHAT WILL HA
PPEN.
     624 021[illegible]                     STARS
                                            ;;*****************************************************************
     625
     626
     627 021[illegible]  022737  000001  002410     CMP     #1,T.CNTLR      ;RLV11 OR RLV12?
     628 021616  001026                             BNE     99$             ;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$SPRI
     632 021632  004537  015466                     JSR     R5,LDFUNC       ;ISSUE F
UNCTION OF FOLLOWING WORD
     633 021636  000100                             NOOP!INTEN              ;NOOP AND INTERRUPT ENABLE
     634 021640  004537  016354                     JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
     635 021644  005737  002330                     TST     INTFLG          ;DID INTERRUPT OCCUR
     636 021650  001004                             BNE     2$              ;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   ERRO
 638 021662  005037  002330          2$:     CLR     INTFLG
 639 021666                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
     021666  104406                          TRAP    C$CLP1
 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
```

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

                                        ;CHECK GET STATUS UNDER INTERRUPT

022074  005037  002330                  CLR     INTFLG                  ;CLEAR INTERRUPT OCCURANCE
022100                                  SETPRI  #PRI00                  ;PSW TO LEVEL 0
022100  012700  000000                  MOV     #PRI00,R0
022104  104441                          TRAP    C$SPRI
022106  012777  000003  160140          MOV     #GSBIT!MK,@RLDA         ;SET UP DA
022114  004537  015466                  JSR     R5,LDFUNC               ;ISSUE FUNCTION OF FOLLOWING WORD
022120  000104                          GSTAT!INTEN                     ;GET STATUS, INT ENABLE
022122  004537  016354                  JSR     R
5,WTCRDY        ;WAIT FOR CONTROLLER READY HIGH
022126                                  SETPRI  #PRI07
022126  012700  000340                  MOV     #PRI07,R0
022132  104441                          TRAP    C$SPRI
022134  005737  002330                  TST     INTFLG                  ;DID INTERRUPT OCCUR
022140  001004                          BNE     2$                      ;YES-BRANCH
022142                                  ERRDF   28.,EM30,ERR0
022142  104455                          TRAP    C$ERDF
022144  000034                          .WORD   28
022146  007441                          .WORD   EM30
022150  012226                          .WORD   ERR0
022152                          2$:     CKLOOP                          ;CHECK IF /FL:LOE IS SET
022152  104406                          TRAP    C$CLP
1
022154  004537  015166                  JSR     R5,CHERR                ;CHECK CONTROLLER FOR ERRORS
022160  005037  002330                  CLR     INTFLG                  ;CLEAR INTERRUPT OCCURANCE
022164                                  SETPRI  #PRI00                  ;PSW TO LEVEL 0
022164  012700  000000                  MOV     #PRI00,R0
022170  104441                          TRAP    C$SPRI
022172  012777  000003  160054          MOV     #GSBIT!MK,@RLDA         ;SET UP DA FOR GET STATUS CMD
022200  004537  015466                  JSR     R5,LDFUNC               ;ISSUE FUNCTION OF FOLLOWING WORD
022204  000004                          GSTAT                           ;GET STATUS - SHOULD NOT CAUS
E AN INTERRUPT
022206  004537  016354                  JSR     R5,WTCRDY               ;WAIT FOR CONTROLLER READY HIGH
022212                                  SETPRI  #PRI07
022212  012700  000340                  MOV     #PRI07,R0
022216  104441                          TRAP    C$SPRI
022220  005737  002330                  TST     INTFLG                  ;DID INTERRUPT OCCUR (SHOULD NOT)
022224  001404                          BEQ     3$                      ;NO - BRANCH (OK)
022226                                  ERRDF   281.,EM30A,ERR0
022226  104455                          TRAP    C$ERDF
022230  000431                          .WORD   281
022232  007500                          .WORD   EM30A
022234  012226                          .WORD   ERR0
0
                                3$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
22236
022236  104406                          TRAP    C$CLP1
022240  004537  015166                  JSR     R5,CHERR                ;CHECK CONTROLLER FOR ERRORS
022244                          ENDTST                          ;****END OF TEST****
022244                          L10052:
022244  104401                          TRAP    C$ETST


                                        .SBTTL  **TEST 27** - GET STATUS FUNCTION GENERATES OPI W/O GS BIT

022246                                  BGNTST                          ;****START OF TEST****

022246                                  STARS
```

```
CZRLGEO RL11/RLV11 CTLR TST 1 MACRO V05.01a Tuesday 12 Feb 85
 13:58 Page 8 18                                          SEQ 0077
••TEST 27••   GET STATUS FUNCTION GENERATES OPI W/O GS BIT

                                        ;;*****************************************************************
    761                                 ;VERIFY THAT GET STATUS FUNCTION WILL NOT COMPLETE
    762                                 ;WITHOUT SENDING OUT THE GET STATUS BIT IN THE RLDA.
    763                                 ;WE SET MARKER BUT NO GET STATUS BIT IN THE RLDA AND
    764                                 ;ISSUE A GET STATUS WE SHOULD RECIEVE AN OPI ERROR.
    765                                 ;VERIFY THAT CONTROLLER READY SET
S AND OPI SETS
    766 022246                          STARS
                                        ;;*****************************************************************
    767
    768
    769 022246  012777  000001  160000          MOV     #MK,@RLDA       ;SET ONLY MARKER BIT!!
    770 022254  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    771 022260  000004                          GSTAT                   ;GET STATUS
    772 022262  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    773 022266  032737  074000  002306          BIT #74000,E.CS
    774 022274  001405                          BEQ     1$

 775    022276  012737  006053  015450          MOV     #OPIERR,RESTMS
    776 022304  004537  015166                  JSR     R5,CHERR
    777 022310                          1$:     CKLOOP
        022310  104406                          TRAP    C$CLP1
    778 022312  032737  002000  002306          BIT     #OPI,E.CS       ;IS OPI SET?
    779 022320  001004                          BNE     2$              ;YES-BRANCH NO-CHECK TIMEOUT
    780 022322                                  ERRDF   29.,EM33,ERR0
        022322  104455                          TRAP    C$ERDF
        022324  000035                          .WORD   29
        022326  007574                          .WORD   EM33
        022330  012226                          .WORD   ERR0
    781 022332                          2$:
    782
    783 022332                          E
NDTST                                   ;••••END OF TEST••••
        022332                          L10053:
        022332  104401                          TRAP    C$ETST
    784
    785
    786                                 .SBTTL  ••TEST 28•• - OPI UNDER INTERRUPT
    787
    788 022334                          BGNTST                          ;••••START OF TEST••••
    789 022334                          STARS
                                        ;;*****************************************************************
    790                                 ;FORCE AN OPI ERROR UNDER INTERRUPT TO VERIFY THAT
    791                                 ;AN INTERRUPT WILL OCCUR FROM OPI.  THE OPI IS FORCED
    792                                 ;USING A GET STATUS WITHOUT THE GET STATUS BIT SET

793                                     ;IN RLDA.
    794 022334                          STARS
                                        ;;*****************************************************************
    795
    796
    797 022334                                  SETPRI  #PRI00
        022334  012700  000000                  MOV     #PRI00,R0
        022340  104441                          TRAP    C$SPRI
    798 022342  005037  002330                  CLR     INTFLG
    799 022346  012777  000001  157700          MOV     #MK,@RLDA       ;SET ONLY MARKER BIT!!
    800 022354  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    801 022360  000104                          GSTAT!INTEN             ;GET STATUS
    802 022362
        004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    803 022366                                  SETPRI  #PRI07
        022366  012700  000340                  MOV     #PRI07,R0
```

```
                022372  104441                          TRAP    C$SPRI
     804        022374  005737  002330                  TST     INTFLG          ;INTERRUPT OCCUR
     805        022400  001004                          BNE     2$
     806        022402                                  ERRDF   30.,EM11,ERRO
                022402  104455                          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  @PRI00          ;PSW TO 0
022504  012700  000000                  MOV     @PRI00,R0

022510  104441                         TRAP    C$SPRI
022512  005037  002330                  CLR     INTFLG          ;CLEAR INTERRUPT OCCURENCE
022516  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
022522  000110                          RDHDR!INTEN             ;READ HEADER, INTR. ENA
022524  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
022530                                  SETPRI  @PRI07
022530  012700  000340                  MOV     @PRI07,R0
022534  104441                          TRAP    C$SPRI
022536  005737  002330                  TST     INTFLG          ;INTERRUPT HAPPEN
022
001004                                  BNE     2$              ;YES CONTINUE
022544                                  ERRDF   35.,EM37,ERR0
022544  104455                          TRAP    C$ERDF
022546  000043                          .WORD   35
022550  007716                          .WORD   EM37
022552  012226                          .WORD   ERR0
022554                          2$:     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.
022564                                  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                          BGNSEG                          ;****START OF SEGMENT****
        022632  104404                          TRAP    C$BSEG
    886 022634                          2$:
    887 022634  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    888 022640  000010                          RDHDR
    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$ERDF
        022710  000044                          .WORD   36
        022712  007756                          .WORD   EM41
        022714  012372                          .WORD   ERR4
    901                                                                 ;CONSTANT CYL & HS
    902 022716                          4$:     CKLOOP                  ;CHECK IF /FL:LOE IS SET
        022716  104406                          TRAP    C$CLP1
    903
    904 022720  005301                          DEC     R1              ;PERFORM ALL READ HDR S
    905 022722  001344                          BNE     2$              ;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
                                         ;;**************************************************************
     959                                 ;CHECK THAT THE HEADERS ARE CONSECUTIVE.  WE WILL DO
     960                                 ;40 (FORTY) READ HEADERS AND STORE EACH.  AFTER WE HAVE
     961                                 ;READ THE FORTIETH HEADER WE WILL VERIFY THAT
     962                                 ;THEY CA
MF IN SEQUENTIAL, THAT 0 FOLLOWS 39,
     963                                 ;THAT THERE WERE NO ERRORS.
     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$DLY,(PC)+
      023444  000000                        .WORD   0
      023446  005367  177772                DEC     -6(PC)
      023452                                 BNE     .-4
      001375
      023454  005367  177756                DEC     -22(PC)
      023460  001367                        BNE     .-20
 1043 023462  005337  002414                DEC     DLYCNT          ;DECREMENT DELAY COUNT
 1044 023466  001361                        BNE     WAIT1           ;BRANCH IF DELAY NOT EXPIRED
 1045 023470                          2$:     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  1044                            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,ERRO
        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$CLP1
   1188
   1189 024040  005037  002362                     CLR     GDDAT           ;CLEAR EXPECTED
   1190 024044  013737  002364  002376             MOV     BDDAT,DWORD     ;SAVE DIFFERENCE WORD
   1191 024052  013737  002314  002364             MOV     E.MP,GDDAT      ;READ HEADER
   1192 024060  043737  002334  00236
4                  BIC     SECMSK,BDDAT    ;MASK OUT SECTOR BITS
   1193 024066  001404                             BEQ     5$              ;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$:         MOV     (R3),GDDAT      ;GET EXPECTED CYLINDER
 1224 024202  011337  002376                        MOV     (R3),DWORD      ;SET UP DIFFERENCE FOR SEEK
 1225 024206  013737  002314  002364                MOV     E.MP,@DDAT      ;READ HEADER FROM RLMP
 1226 024214  043737  002334  002364                BIC     SECMSK,@DDAT    ;CLEAR OUT SECTOR BITS
 1227 024222  023737  002362  002364                CMP     GDDAT,@DDAT     ;DID SEEK GO TO THE RIGHT
 1228 024230  001404                                BEQ     9$              ;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
```

```
**TEST 38**   VERIFY HEAD SELECT 0 VIA RD HDR

 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$:     JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
      024460  000006                          SEEK                    ;SEEK
 1312 024462  004537  016354                  JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
 1313 024466                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
      024466  104406                          TRAP    C$CLP1
 1314
 1315 024470  004537  015166                  JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
 1316 024474                                  CKLOOP                  ;CHECK IF /FL:LOE IS SET
      024474  104406                          TRAP    C$CLP1
 1317
 1318 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
```

```
**TEST 39**   VERIFY HEAD SELECT 1 VIA RD HDR

        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                           ;****END OF TEST****
        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      .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
```

```
CZRLGE0 RL11/RLV11 CTLR TST 1 MACRO V05.01                                    SEQ 0092
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**TEST 41**   VERIFY HEAD SELECT 1 VIA GET STATUS

    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                              SEQ 0096
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**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$CLP1
    1602
    1603 025754  011377  154274                  MOV     (R3),@RLDA      ;GET DIFFERENCE WORD
    1604 025760  052777  000005  154266          BIS     #SIGN!MK,@RLDA  ;SET SIGN (TOWARDS SPINDLE) AND MARKER
    1605 025766  004537  015466                  JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    1606 025772  000006                          SEEK                    ;SEEK
    1607 0257 .  004537  016354                  JSR     R5,WTCRD
Y       ;WAI  F R CONTROLLER READY HIGH
    1608 026 0                                   CKLOOP                  ;CHECK IF /FL:LOE IS SET
         026 .   104406                          TRAP    C$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
   1673
   1674
   1675
   1676 026262                                  .SBTTL  **TEST 44** - VERIFY GET STATUS WHILE DRDY IS LOW
   1677
   1678 026262                                  BGNTST                          ;****START OF TEST****

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

```
    1682
    1683
    1684 026262                                    1$:
    1685 026262  004537  015466                          JSP     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD

    1686 026266  000010                                  RDHDR                   ;READ HEADER
    1687 026270  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    1688 026274                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
         026274  104406                                 TRAP    C$CLP1
    1689
    1690 026276  004537  015166                          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    1691 026302                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
         026302  104406                                 TRAP    C$CLP1
    1692
    1693 026304  013737  002314  002364                  MOV     E.MP,BDDAT      ;READ HEADER
    1694 026312  043737  002334  002364                  BIC     SEC
MSK,BDDAT       ;CLEAR OUT SECTOR
    1695 026320  001461                                  BEQ     5$              ;IF ON TRACK ZERO, H.S. ZERO, OK
    1696
    1697                                        ;NOT ON TRACK ZERO CALCULATE DIFFERENCE WORD AND PUT IT BACK
    1698                                        ;ON ZERO.
    1699
    1700 026322  042737  000100  002364                  BIC     @RHHS,BDDAT     ;CLEAR OUT HEAD SELECT
    1701 026330  013777  002364  153716                  MOV     BDDAT,@RLDA     ;PUT CYLINDER AS DIFFERENCE WORD
    1702 026336  052777  000001  153710                  BIS     @MK,@RLDA       ;SET MARKER BIT
    1703 026344  004537  015466                          JSR     R5,LDFUNC       ;ISSUE FUNCT
ION OF FOLLOWING WORD
    1704 026350  000006                                  SEEK                    ;SEEK
    1705 026352  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    1706 026356                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
         026356  104406                                 TRAP    C$CLP1
    1707
    1708 026360  004537  015166                          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    1709 026364                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
         026364  104406                                 TRAP    C$CLP1
    1710
    1711 026366  004537  016266                          JSR     R5,WTDRDY       ;WAIT FOR DRIVE READY
    1712 026372                                          CKLOOP                  ;CHEC
K IF /FL.LOE IS SET
         026372  104406                                 TRAP    C$CLP1
    1713
    1714 026374  004537  015166                          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    1715 026400                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
         026400  104406                                 TRAP    C$CLP1
    1716
    1717
    1718 026402  004537  015466                          JSR     R5,LDFUNC       ;ISSUE FUNCTION OF FOLLOWING WORD
    1719 026406  000010                                  RDHDR                   ;READ HEADER
    1720 026410  004537  016354                          JSR     R5,WTCRDY       ;WAIT FOR CONTROLLER READY HIGH
    1721 026414                                          CKLOOP                  ;CHECK IF /FL:LOF IS SET
         02641
4        104406                                 TRAP    C$CLP1
    1722
    1723 026416  004537  015166                          JSR     R5,CHERR        ;CHECK CONTROLLER FOR ERRORS
    1724 026422                                          CKLOOP                  ;CHECK IF /FL:LOE IS SET
         026422  104406                                 TRAP    C$CLP1
    1725
    1726 026424  005037  002362                          CLR     GDDAT           ;CLEAR EXPECTED
    1727 026430  013737  002364  002376                  MOV     BDDAT,DWORD     ;SAVE DIFFERENCE WORD
    1728 026436  013737  002314  002364                  MOV     E.MP,BDDAT      ;READ HEADER
    1729 026444  043737  002334  002364                  BIC     SECMSK,BDDAT    ;MASK OUT SECTOR BITS
    1730 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                                                                   ;DRIVE NUMBER
 1765 026610                                    GPRMD   DRMSG,DRBT,0,03400,0,7,YES
      026610  004032                            .WORD   T$CODE
      026612  026751                            .WORD   DRMSG
      026614  003400                            .WORD   03400
      026616  000000                            .WORD   T$LOLIM
      026620  000007                            .WORD   T$HILIM
 1766                                                                   ;DRIVE TYPE
 1767 026622                                    GPRML   DRTYPE,TYPDR,1,YES
      026622  00
3130                          .WORD    T$CODE
      026624  026727                            .WORD   DRTYPE
      026626  000001                            .WORD   1
 1768                                                                   ;BREAK LEVEL
 1769 026630                                    GPRMD   BRMSG,PRIOR,0,340,0,7,YES
      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$BRK = 000022          DERR  = 000000          EM54    010426          FRMT3   013200
BEREG   006623          C$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$GPHR= 000042          ELT   = 000002          ERR0    012226 G        GLBDAT  002242 G
BIT9  = 001000 G        C$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
CKFRLT  015102          C$QIO = 000377          EM3     007012          E.CS    002306          G$EXCP= 000400
```

Symbol table

```
G$HILI= 000002          LINE3   013020          L10002  012316          L10074  026552          RIMP    002256
G$LOLI= 000001          LOE   = 040000 G        L10003  012370          L10075  026642
        RL2     004730
G$NO  = 000000          LOT   = 000010 G        L10004  012436          L10076  027004          _MSK    002334
G$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$CO    002032 G        L10015  015070          NOOP0 = 000000          SKEEND  004770
G$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$GNSW= 000001          TMP0    002354
INTFLG  002330          L$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          PRIO0 = 000000 G        T$CODE= 001032
I$DU  = 000041          L$LAST  027050 G        L10047  021674          PRI
O1 = 000040 G   T$ERRN= 000066
I$HRD = 000041          L$LOAD  002100 G        L10050  022042          PRIO2 = 000100 G        T$EXCP= 000000
I$INIT= 000041          L$LUN   002074 G        L10051  022072          PRIO3 = 000140 G        T$FLAG= 000040
I$MOD = 000041          L$MREV  002050 G        L10052  022244          PRIO4 = 000200 G        T$GMAN= 000000
I$MSG = 000041          L$NAME  002000 G        L10053  022332          PRIO5 = 000240 G        T$HILI= 177777
I$PROT= 000040          L$PRIO  002042 G        L10054  022460          PRIO6 = 000300 G        T$LAST= 000001
I$PTAB= 000041          L$PROT  014032 G        L1005
5  022502       PRIO7 = 000340 G        T$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
```

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
```

Cross reference table (CREF V05.01)

```
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   7-15A#    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#
BITO     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
```

```
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$ERDF   2-7#     6-100    6-280    6-296    7-132    7-168    8-32     8-70     8-108    8-143    8 175    8 206    8-238    8-279
         8-304    8-327    8-359    8-368    8-402    8-412    8-446    8-455    8-490    8-499    8-507    8-547    8 585    8 594
         8-603    8-637    8-683    8-738    8-750    8-780    8-806    8-815    8-854    8-900    8-947    8-:17    8-;04    8 ;21
         8-;95    8-<30    8-<92    8 =39    8-=86    8->34    8-?33    8-@00
   8-@36    8-@55    8-A32
C$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#     7-153    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 ;#
C$MSG    2 7#     4-11     4 18     4-26     4 35     4 44     4 51     4 62     4-71
```

Cross reference table (CREF V05.01)

```
C$OPEN   2-7#
C$PNTB   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
C$PNTF   2-7#     6-15
C$PNTS   2-7#
C$PNTX   2-7#
C$QIO    2-7#
C$RDBU   2-7#     5-99
C$REFG   2-7#     5-15     5-19     5-21     5-30
C$RESE   2-7#     2-7#     5-14     8 271    8-300    8-323
C$REVI   2-7#     2-17
C$RFLA   2-7#
C$RPT    2-7#
C$SEFG   2-7#
C$SPRI   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 8
51   8-:96
         8-;17
C$SVEC   2-7#     5-97     5-112    5-117    7-13     7-39     7-64     7-89
C$TPRI   2-7#
CALBCC   2-111#   6-248*   8-936    8-942    8-@44    8-@50
CHERR    6-44#    8-537    8-578    8-640    8-674    8-718    8-740    8-752    8-776    8-811    8 832    8-857    8 880    8 892
         8-927    8-992    8-:46    8-:70    8-:76    8-;08    8-;54    8-;72    8-;78    8-;86    8-<05    8-<11    8 <20    8 <70
         8-<76    8-<84    8-=16    8-=22    8-=30
8-=63    8-=69    8-=78    8->11    8->17    8->26    8->61    8-?03    8-?10
         8-?17    8-?25    8-?58    8-?76    8-?82    8-?91    8 @10    8-@17    8-@26    8-@90    8-A08    8 A14    8 A23    8 A43
         8-A50
CKERLT   4-10     4-17     4-25     4-34     4-43     4-50     4-61     4-69     6-7#
CLNCOD   5-143#
CNT      2-64#    8-A59    8-A59    8-A59
CNTMSG   8-A59    8-A74#
COMP     3-16#    6-63
CONT     5-18     5-31     5-56#
CONTIN   5-22     5-30#
CRDY     2-32#
5-149    6-288    8-58     8-60     8-266    8-346    8-387    8-431    8 474    8 970
CRTIM    3-34#    6-296
CSEND    2-294#   7-137    8-75     8-112
CSPAT    2-263#   7-116    8-55     8-93
CSR      2-59#    5-4      8-A61    8-A61    8-A61
CSRMSG   8-A61    8-A73#
CSTEST   7-120#   7-138
CYLMSK   2-121#   8-:07
DAHS     2-55#    8-=10    8->04    8->69    8->82    8->84    8->94    8->96
DATEST   8-24#    8-38
DBUFF    2-133#   8-529    8-569    8-589
DCKMES   3-12#    6-89
DE
MES  3-7#    6-68
DERFLG   2-95#    6-44*    6 66*    6-114
DERR     2-30#    6-64     7-124    7-126    8-62     8-64     8-100    8-102    8-267    8-269    8-388    8-390    8 432    8 434
         8-475    8-477
DIAGMC   2-7      2-7
DLT      2-68#    8-A88    8-A88    8-A88
DLTMES   3-13#    6-93
DLYCNT   2-132#   5-80*    5 82*    8-:41*   8-:43*
DMSG     8-A88    8-A97#
DRBT     2-63#    5-6      8-A65    8-A65    8-A65
DRDY     2-27#    5-78     6-274    7-128    8-66     8-
104  8-275    8-346    8-398    8-442    8-486
DRIVE    2-89#    4-73     5-53*    5-77     5-93     5-132    6-119    6-140    8-971
DRMSG    8-A65    8-A78#
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DROP      4-134#    6-9
DRPCOD    5-170#
DRST      2-49#     8-712
DRTIM     3-35#     6-280
DRTYPE    8-A67     8-A77#
DRVRDY    5-78#     5-85
DSO       2-36#
DS1
2-37#
DS2       2-38#
DS3       2-39#
DSPCOD    4-142#
DWORD     2-124#    8-;90*    8-<24*    8-?95*    8-@30*    8-A27*
E$END     2-7#
E$LOAD    2-7#      2-17
E.BA      2-97#     4-78      6-193*
E.BE      2-102#    6-200*
E.CS      2-96#     4-78      6-45      6-53      6-60      6-64      6 69      6-73      6-77      6-81      6-86      6-90      6 192*    8-773
          8-778     8-808     8-813     8-984*    8-985
E.DA      2-98#     4-79      6-194*
E.MP      2-99#     4-79      6-195*    8-883     8-895     8-930     8-
989*    8-;57     8-;91     8-<25     8-<87     8-=33     8-=81     8->29
          8->64     8-?28     8-?61     8-?96     8-@31     8-@39     8-@93     8-A28
E.MP1     2-100#    6-196*    8-937     8-990*    8-@45
E.MP2     2-101#    6-197*    8-943     8-991*    8-@51
EF.CON    2-26#     5-30
EF.NEW    2-26#
EF.PWR    2-26#     5-15
EF.RES    2-26#     5-19
EF.STA    2-26#     5-21
ELT       2-69#     8-A90     8-A90     8-A90
EM1       3-36#     7-21
EM101     3-83#     4-82
EM102     3-84#     4-83      6-59
EM103
     3-85#     8-547
EM11      3-43#     8-806
EM13      3-44#     8-637
EM14      3-45#     8-585
EM15      3-46#     8-594
EM16      3-47#     8-603
EM17      3-48#     8-683
EM2       3-37#     7-47
EM3       3-38#     7-72
EM30      3-49#     8-738
EM30A     3-50#     8-750
EM32      3-51#
EM33      3-52#     8-780     8-815
EM34      3-53#
EM37      3-54#     8-854
EM4       3-39#     7-97
EM41      3-55#     8-900
EM42      3-56#     8-947     8-@55
EM43      3-57#     8-;17
EM44      3-58#     8-490

EM45      3-59#     8-499
EM46      3-60#     8-507
EM47      3-61#     8-;04
EM5       3-40#     7-132
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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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FRMT2    4-76     4-78     4-91#
FRMT2A   4-77     4-92#
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*
         8-677    8-883*   8-884*   8-897    8-942*   8-944    8-999*   8-:01*   8-:02    8-:06    8-:10*   8
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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#
HPTCOD   4-116#
HRDPRM   8-A54#
I$AU     2-7#     5-182#   5 186#
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108#   5-141#
I$CLN    2-7#     5-145#   5-164#
I$DU     2-7#     5-172#   5 176#
I$HRD    8-A56#   8-A71#
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
         3-1#     3-93     3-93#    4-3      4-3#     4-114    4-114#   4-116    4-116#   4-128    4-128#   4-130    4-130#   4 140
         4-140#   4-142    4-142#   4-146    4 146#   5-10     5-10#    5-105    5-105#   5-143
 5-143#    5-166     5-166#    5-170
         5-170#   5-178    5-178#   5-180    5-180#   5-188    5-188#   6-4      6-4#     6-304    6-304#   8-A54    8-A54#   8-A81
         8-A81#   8-A85    8-A85#   8-B06    8-B06#
I$MSG    2-7#     4-5#     4-11#    4-13#    4-18#    4-20#    4 26#    4-28#    4-35#    4-37#    4-44#    4-46#    4-51#    4-53#
         4-62#    4-64#    4-71#
I$PROT   2-7#     5-3#
I$PTAB   2-7#
I$PWR    2-7#
I$RPT    2-7#
I$SEG    2-7#     7-3      7-28     7-54
  7-79      7-104     7-118#    7-133     7-140#    7-146     7-157#    7-169     8-7#      8-13
         8-23#    8-33     8-40#    8-46     8-56#    8-71     8-78#    8-84     8-94#    8-109    8-114#   8-120    8-131#   8-144
         8-149#   8-155    8-165#   8-176    8-181#   8-187    8-197#   8-207    8-212#   8-218    8-228#   8-239    8-244#   8-250
         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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I$SFT    8-A87#   8-A91#
I$SRV    2-7#     6-265#   6-269#
I$SUB    2-7#     7-3      7-28     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
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7-146#
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         8-281#   8-286    8-286#   8-307    8-307#   8-307#   8-312    8-312#   8-330    8-330#   8-3
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         8-372#   8-372#   8-377    8-377#   8-414    8-414#   8-414#   8-419    8-419#   8-459    8-459#   8-459#   8-463    8-463#
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         8-612    8-612#   8-644    8-644#   8-644#   8-649    8-649#   8-672    8-675    8-696    8-696#   8-696#   8-700    8-700#
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         8-788#   8-818    8-818#   8-818#   8-822    8-822#   8-834    8-834#   8-834#   8-838    8-838#   8-859    8-859#   8-859#
         8-864    8-864#   8-878    8-881    8-907    8-907#   8-907#   8-912    8-912#   8-925    8-928    8-950    8-950#   8-950#
         8-955    8-955#   8-:24    8-:24#   8-:24#   8-:29    8-:29#   8-:48    8-:48#   8-:48#   8 :53    8-:53#   8-:78    8-:78#
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         8-?41    8-?41#   8-@71    8-@71#   8-@71#   8-@76    8-@76#   8-A52    8-A52#   8-A52#
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
         8-847*   8-852    8-:95*   8-;02    8-;11*   8-;18
INTSRV   5-97     6-267#
ISR      2-26#
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Cross reference table
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L$CLEA   2-17     5-145#
L$CO     2-17#
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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#
L$ETP    2-17#
L$EXP
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L$EXP4   2-17#
L$EXP5   2-17#
L$HARD   2-17     8-A56    8-A56#
L$HIME   2-17#
L$HPCP   2-17#
L$HPTP   2-17#
L$HW     2-17     4-118    4-118#
L$ICP    2-17#
L$INIT   2-17     5-12#
L$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#
L$PROT   2-17     5-3#
L$PRT    2-17#
L$REPP   2-17#
L$REV    2-17#
L$SOFT   2-17     8-A87    8-A87#
L$SPC    2-17#
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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L10011    4-132     4-138#
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  5-164#
L10016    5-176#
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L10020    6-269#
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L10023    7-74#
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L10066    8-<85     8-<95#
L10067    8-=31     8-=42#
L10070    8-=79     8-=89#
L10071    8 >24     8->27     8->37#
L10072    8-?26     8-?36#
L10073    8-@71#
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Cross reference table (CREF V05.01)

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L10074   8-A52#
L10075   8-A56     8-A71#
L10076   8 A87     8-A91#
LDCSR    2-106#    6-113*    6-125*    6-126     6-135     6-140*    6 141*    6 142     8-346*    8 349
LDFUNC   6-113#    8-534     8-573     8-632     8-668     8-713     8-732     8 744     8-770     8 800     8-828     8-848     8-875     8 887
         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
         8-=73     8
  >06    8->21     8->56     8->97     8-?20     8-?53     8 ?71     8-?86     8-@05     8-@20     8-@85     8-A03     8-A18
         8-A37     8-A46
LF       3-15#     6-100
LINE1    4-7       4-15      4-22      4-30      4-39      4-48      4-55      4 66      4-73#     5-88      5-127     5-138     6-16
LINE2    4-8       4-31      4-40      4 57      4-76#
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
MK       2-51#     8-712     8-7
31     8-743     8-769     8-799     8 :37     8-:64     8-:97     8-;66     8-;99     8-<61     8-=09     8-=55
         8-=72     8->03     8->20     8->66     8->81     8->93     8-?70     8-@04     8-A02     8-A36     8 A45
MSCRLF   3-14#     6-95
MXSEC1   2-122#    8-:08
NOOP0    2-40#     8-535     8-574     8-633     8-669
NOOP7    2-41#
NOPINT   3-19#     6-151
NOPMES   3-18#     6-150
NOPWR    5-16      5-19#
NXM      2-35#     6-69
NXMMES   3-8#      6-72
NXT      5-33#     5-45      5-47
O$APTS   2-7#
     2-17
O$AU     2-7#      2-13#     2-17
O$BGNR   2-7#      2-17
O$BGNS   2-7#      2-13#     2-17
O$DU     2-7#      2-13#     2-17
O$ERRT   2-7#      2-17
O$GNSW   2-7#      2-13#     2-17
O$POIN   2-7#      2-13      2-13#     2-13#     2-13#     2-13#     2-17
O$SETU   2-7#      2-17      8-807
OKHDR    6-154#
OPI      2-31#     6-73      8-778     8-813
OPIERR   3-17#     8-775     8-810
OPIMES   3-9#      6 76
PFLG     2-103#    5-98*     5-101*
PNT      2-26#
PRI      2-26#
PRI00    2-
26#    8 631     8 730     8-742     8 797     8-846     8-:96
PRI01    2-26#
PRI02    2-26#
PRI03    2-26#
PRI04    2 26#
PRI05    2-26#
PRI06    2-26#
PRI07    2 26#     5-147     8 264     8-735     8-747     8-803     8-851     8-;17
PRIOR    2 61#     8 A69     8 A69     8 A69
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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QMAX      2 243#    8-#89     8 #91     8-#92
QUAMAX    2-231#    8-#77     8-#79     8-#80
RDHDR     2 45#     8-829     8 849     8-876     8 888     8-923     8 970     8 ;50     8 ;82     8 <15     8 <80     8 *26     8 #57     8 ?21
          8-?54     8-?87     8-@21     8 @86     8-A19
READ      2 47#
REST      5-42#
RESTMS    6-97#     6-139*    8-775*    8-810*    8-987*
RHDINT    3 23#     6-159
RHDMES    3 22#     6-158     8-987
RHHS      2 53#     8 ;64     8-*35     8-#67     8-#71     8-?68     8-A00
RL2       2 242#
RLBA      2 82#     5-59*     6-179     6-193     7-41      7-45      7-163*    7-164     8-133*    8-138*    8-139     8-167*    8 170*    8 171
          8 295*    8-298*    8-301     8-347*    8-353     8-357     8-393*    8 436*    8-449     8-453     8-479*    8-493     8 497     8 529*
          8-569*    8-590
RLBE      2-85#     5-67*     6-184     6-200
RLCS      2 81#     4-73      5-57*     5-76*     5 77*     5-78      5-92*     5-93*     5-94*     5-95      5-120     5-131*    5 132*    5 133
          5-149     5-152
*  6-120*  6-122    6-142*    6-144*    6-178     6-192     6-274     6-288     7-15      7-19      7-123*    7-124
          7-127     8-58*     8-61*     8-62      8 65      8-96*     8-99*     8-100     8-103     8-265*    8-267     8-274     8 349*    8-388
          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
          8-531*    8 539     8-543     8-546     8-568*    8-599     8-712*    8-731*    8-743*    8-769*    8-799*    8-;37*    8 :64*    8 ;97*
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          8 #76*    8-#80*    8-#82     8-#88*    8-#92*    8-#94     8-?06*    8-?69*    8-?70*    8-@03*    8-@04*    8-A01*    8-A02*    8
 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
          8-978     8-979
S#LSYM    2-7#      4-11#     4-18#     4-26#     4-35#     4-44#     4-51#     4-62#     4-71#     4-126#    4-138#    5-103#    5 141#    5 164#
          5 176#    5-186#    6-269#    7 23#     7-49#     7-74#     7-99#     7-118     7-118     7-118#    7-141#    7-157     7-157     7 157#
          8-8#      8-23      8 23      8-23#     8-41#
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8 ;47     8-;47     8-;47#    8-<47#    8 <95#    8-*42#    8-*89#    8-#37#    8-?36#    8 ?51     8-?51     8 ?51#
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SECMSK    2-107#    8-884     8-896     8-:04     8-:10     8-;58     8-;92     8-<26     8-#65     8-?29     8 ?62     8 ?97     8 @32     8 @94
          8-A29
SEEK      2 44#     8-:39     8 :66     8-·99     8-;68     8 <01     8-<66     8-*12     8-*59     8-#07     8 #98     8 ?72     8 @06     8 A04
          8-A38
SEKINT    3-25#     6 157
SEKMES    3-24#     6 156
SFTPRM
  8-A85#
SIGN      2-52#     8-:37     8 :97     8 ;99     8-#76     8-#88     8 @04     8 A36
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SIZE      2-70#
SKEEND    2-259#    8-<40     8 @65
SKEND     2-241#    8-<36     8 @62
SKLST     2-209#    8-;46     8 ?50
SPTCOD    4-130#
START     5-28      5 35#
START1    5-20      5-23#
STHS      2-54#     8-#05
SVCGBL    2-7#      2-15      2 15      2-15      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 17      2-17      2-17      2-17      2-17      2 17      2 17      2 17      2 17      2 17      2 17
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T$$CLE          5-145@    5-164
T$$DU           5-172@    5-176
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Cross reference table (CREF V05.01)

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 8-150#   8-157    8-157#   8-161    8-161#   8-176    8-176#   8-176#   8-181    8-181#   8-182    8-182#
          8-189    8-189#   8-193    8-193#   8-207    8-207#   8-207#   8-212    8-212#   8-213    8-213#   8-220    8-220#   8-224
          8-224#   8-239    8-239#   8-239#   8-244    8-244#   8-245    8-245#   8-252    8-252#   8-261    8-261#   8-281    8-281#
          8-288    8-288#   8-292    8-292#   8-307    8-307#   8-314    8-314#   8-318    8-318#   8-330    8-330#   8-337    8-337#

        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#
          8-A88#   8-A88#   8-A90    8-A90    8-A90    8-A90#   8-A90#   8-A90#   8-A91    8-A91#   8-B06    8 B06#
T$TEST    2-7#     7-3      7-3
  7-3#     7-28     7-28     7-28#    7-54     7-54     7-54#    7-79     7-79     7-79?    7-104
          7-104    7-104#   7-146    7-146    7-146#   8-13     8-13     8-13#    8-46     8-46#    8-84     8-84     8-84#
          8-120    8-120    8-120#   8-155    8-155    8-155#   8-187    8-187    8-187#   8-218    8 218    8-218#   8-250    8-250
          8-250#   8-286    8-286    8-286#   8-312    8-312    8-312#   8-335    8-335    8-335#   8-377    8-377    8-377#   8-419
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-419     8-419#   8-463    8-463    8-463#   8-516    8-516    8-516#   8-558    8-558    8-558#   8-612    8-612    8-612#
          8-649    8-649    8-649#   8-700    8-700    8-700#   8-725    8-725    8-725#   8-758    8-758    8-758#   8-788    8-788
          8-788#   8-822    8-822    8-822#   8-838    8-838    8-838#   8-864    8-864    8-864#   8-912    8-912    8-912#   8-955
          8-955    8-955#   8-:29    8-:29    8-:29#   8-:53    8-:53    8-:53#   8-:83    8-:83    8-:83#   8-;29    8-;
29     8-;29#
          8-<52    8-<52    8-<52#   8-=00    8-=00    8-=00#   8-=47    8-=47    8-=47#   8-=94    8 =94    8-=94#   8->42    8->42
          8->42#   8-?41    8-?41    8-?41#   8-@76    8-@76    8-@76#   8-B07
T$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
          8-<03    8-<06    8-<09    8-<12    8-<18    8-<21    8-<30    8-<31    8-<46    8-<47    8-<68    8-<71    8-<74    8-<77
          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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```
T40       4-144     8-*47#
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
TMPO      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
WAITO     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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BCOMPL   1-15#    2-7#     5-20     5-31     5 43     6-8
BERROR   1-19#    2-7#
BGNAU    1-23#    2-7#     5-182
BGNAUT   1-31#    2-7#     5-108
BGNCLN   1-39#    2-7#     5-145
BGNDU    1-47#    2-7#     5-172
BGNHRD   1-55#    2-7#     8-A56
BGNHW    1-66#    2-7#     4-118
BGNINI   1-77#    2-7#     5-12
BGNMOD   1-8
5#    2-7#     2-15     2-24     2-74     3-1      4-3      4-116    4-130    4-142    5-10     5-143    5-170    5-180
         6-4      8-A54    8-A85
BGNMSG   1-98#    2-7#     4-5      4-13     4 20     4-28     4-37     4-46     4-53     4-64
BGNPRO   1-106#   2-7#     5-3
BGNPTA   1-114#   2-7#
BGNRPT   1-144#   2-7#
BGNSEG   1-152#   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
BGNSET   1-161#   2
-7#
BGNSFT   1-182#   2-7#     8-A87
BGNSRV   1-193#   2-7#     6-265
BGNSUB   1-201#   2-7#
BGNSW    1-225#   2-7#     4-132
BGNTST   1-236#   2-7#     7-3      7-28     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
BNCOMP   1-266#   2-7#     5 16     5-22     5-100
BNERRO   1-270#   2-7#
BREAK    1-274#   2-7#
BRESET   1-278#   2-7#     5 14     8-271    8-300    8-323
CKLOOP   1-282#   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
CLOCK    1-286#   2-7#
CLOSE    1-292#   2-7#
CLRVEC   1-296#   2-7#     5-121    5-154    7-16     7-42     7-67     7-92
COMMEN   1-301#   2-7#
DELAY    1-322#   2-7#     5-81     6-276    6-290    8-:42
DESCRI   1-317#   2-7#     2-21
DEVTYP   1-341#   2-7#
   2-22
DISPAT   1-346#   2-7#     4-144
DISPLA   1-360#   2-7#
DOCLN    1-376#   2-7#     5-90     6-18
DODU     1-380#   2-7#     5-89     5-128    5-139    6-17
DORPT    1-385#   2-7#
ENDAU    1-389#   2-7#     5-186
ENDAUT   1-401#   2-7#     5-141
ENDCLN   1-413#   2-7#     5 164
ENDCOM   1-425#   2-7#
ENDDU    1-441#   2-7#     5-176
ENDHRD   1-453#   2-7#     8-A71
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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
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         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
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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
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         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
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   8-A69    8-A90
GPRML    1-934#   2-7#     8-A67    8-A88
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IOSETU   1-966#   2-7#
IOSTAR   1-974#   2-7#
KT11     1-982#   2-7#
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Cross reference table (CREF V05.01)

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MEMORY    1-;66#    2-7#
OPEN      1-;71#    2 7#
POINTE    1-;76#    2-7#      2-13
PRINTB    1-<39
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          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
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 8-471
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XFER      1-@12#    2-7#
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