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IDENTIFICATION

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MAINTAINER: DIAGNOSTIC ENGINEERING COLORADO
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1.0 GENERAL INFORMATION
-----1.1 PROGRAM ABSTRACT
-----1.1.1 STRUCTURE OF PROGRAM

THIS DIAGNOSTIC IS COMPATIBLE WITH BOTH XXDP+ AND ACT. IT CAN BE RUN STANDALONE UNDER XXDP+, AND CAN BE CHAINED UNDER XXDP+, ACT AND APT IN ACT MODE (SEE 2.2 "CHAIN MODE OPERATION" FOR DETAILS OF CHAINING PROCEDURE). IT IS A SINGLE PROGRAM FROM THE STANDPOINT OF THE DIAGNOSTIC USER, WHICH AT RUN TIME IS APPENDED TO A COMMON FRONT-END PIECE OF SUPERVISOR SOFTWARE THROUGH WHICH THE DIAGNOSTIC 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 COMMANDS AS DESCRIBED IN 2.0 "OPERATING INSTRUCTIONS".

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

1.1.2 DIAGNOSTIC INFORMATION

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

1.1.3 DIAGNOSTIC HISTORY

REVISION A UPDATE CZRLAB TO INCORPORATE THE RL02.

REVISION B MAKE PROGRAM XXDP+ COMPATABLE.

REVISION C CORRECT NUMEROUS AIDS REPORTS ISSUED AGAINST THE DIAGNOSTIC.

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

REVISION E FIX TESTS 21,22 FOR RLV CONTROLLERS

E1

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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:

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

- * LINE PRINTER (OPTIONAL)

1.2.2 SOFTWARE REQUIREMENTS

CZRLGEO RL11/RLV11 CTRL 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:

CVRLABO RLV11 RL01 DISKLESS TEST (RLV11 ONLY)

1.5 ASSUMPTIONS

THE HARDWARE OTHER THAN THE RL01/02 SUBSYSTEM IS ASSUMED TO WORK
 PROPERLY. FALSE ERRORS MAY BE REPORTED
 IF THE PROCESSOR, ETC., DO
 NOT FUNCTION PROPERLY.

2.0 OPERATING INSTRUCTIONS

2.1 HOW TO RUN THIS DIAGNOSTIC

2.1.1 THE FIVE STEPS OF EXECUTION

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

CHMDKAO XXDP+ DK MONITOR NNK
BOOTED VIA UNIT#: 0

ENTER DATE (DD MMM-YY):

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

50 HZ? N
LSI? N

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

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

* STEP 1 *

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

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

STA/PASS:1/FLAGS:HOE

THINGS TO NOTE HERE:

1. ONLY THE FIRST THREE CHARACTERS OF THIS OR ANY COMMAND AT THE "DR>" LEVEL NEED TO BE TYPED.
2. THE "PASS" SWITCH SPECIFIES HOW MANY PASSES YOU DESIRE. A PASS CONSISTS OF RUNNING THE FULL DIAGNOSTIC AGAINST ALL UNITS BEING TESTED (THIS WILL BE EXPLAINED SHORTLY). ONE PASS IS SPECIFIED IN THE ABOVE EXAMPLE.
3. THE "FLAGS" SWITCH MAY SPECIFY ANY OF A NUMBER OF FLAGS, BUT THE MAIN USEFUL ONES ARE:

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

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

* STEP 2 *

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

A WORD OF WARNING HERE: THE NUMBER OF UNITS DEPENDS ON THE TARGET DEVICE OF THE DIAGNOSTIC. FOR EXAMPLE, IF THE DIAGNOSTIC IS DIRECTED AT A DISK DRIVE, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF DRIVES TO BE TESTED. WHEREAS IF THE DIAGNOSTIC WAS DIRECTED AT THE DISK CONTROLLER, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF CONTROLLERS. THE TARGET DEVICE OF A DIAGNOSTIC CAN ALWAYS BE DETERMINED BY INSPECTING THE "HEADER" STATEMENT NEAR THE BEGINNING OF THE SOURCE CODE. ONE OF THE 0 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 FUTURE WILL NOT BE WRITTEN TO AUTOSIZE OR ASSUME STANDARD ADDRESSES. INSTEAD, THEY WILL ASK THE OPERATOR FOR ALL THE INFORMATION THEY NEED TO TEST THE DEVICE.

* STEP 4 *

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

* STEP 5 *

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

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

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

HOE SET: THE ERROR WILL BE REPORTED ON THE CONSOLE AND THE DIAGNOSTIC WILL RETURN TO COMMAND MODE.

LOE SET: THE DIAGNOSTIC WILL LOOP
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.

ENDLESSLY ON THE

2.1.2 SAMPLE RUN-THROUGH

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

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

1. ISSUE ANOTHER "START" COMMAND (THUS GOING THRU ALL OF STEPS 1, 2, 3, 4, AND 5 AGAIN).
2. ISSUE A "RESTART" COMMAND (SAME AS START COMMAND EXCEPT THAT THE HARDWARE QUESTIONS ARE NOT ASKED)
3. ISSUE A "CONTINUE" COMMAND (EXECUTION WILL RESUME AT THE BEGINNING OF THE PARTICULAR HARDWARE TEST (MOST DIAGNOSTICS CONSIST OF A NUMBER OF THESE) THAT IT WAS IN WHEN THE ERROR HALT OCCURRED. NO QUESTIONS ASKED).
4. ISSUE A "PROCEED" COMMAND: EXECUTION WILL RESUME AT THE INSTRUCTION FOLLOWING THE ERROR REPORT (THIS IS A SPECIAL COMMAND AND CAN BE ISSUED ONLY AT A HALT)

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

PRO/FLAGS:IER:LOE:HOE=0

THIS WILL DO THE FOLLOWING:

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

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

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

1. START
2. RESTART
3. CONTINUE

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

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

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

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

1. START
2. RESTART

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

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

	BY WHOM ENTERED:
.R CZRLGB	O
DRS LOADED	D
DIAG. RUN-TIME SERVICES REV D APR 79	D
CZRLG-B-0	
D	
CZRLG TESTS CONTROLLER FUNCTIONS, INTERFACE LOGIC, REGISTER OPERATION	D
UNIT IS RL01, RL02	D
DR>STA/PASS:1/FLAGS:HOE	D.O
# UNITS (D) ? 2	D.O
UNIT 0	D
RL11 (L) Y ?	D.O
BUS ADDRESS (O) 174400 ?	D.O
VECTOR (O) 160 ?	D.O
D.O	
BR LEVEL (O) 5 ?	D.O
DRIVE TYPE = RL01 (L) Y ?	D.O (N=RL02)
DRIVE (O) 0 ?	D.O
UNIT 1	D
RL11 (L) Y ?	D.O
BUS ADDRESS (O) 174400 ?	D.O
VECTOR (O) 160 ?	D.O
BR LEVEL (O) 5 ?	D.O
DRIVE TYPE = RL01 (L) ? Y	
D.O (N=RL02)	
DRIVE (O) 0 ? 1	D.O
CHANGE SW (L) ? Y	D.O
DROP ON ERROR LIMIT (L) N ?	D.O
CZRLG WRD ERR 00004 TST 003 SUB 002 PC:004130	
ERR HLT	
DR>PRO/FLAGS:IER:LOE:HOE=0	D.O

AT THIS POINT THE DIAGNOSTIC IS LOOPING ON THE
ERROR WITHOUT PRINTING ANYTHING. YOU CAN SCOPE
THE ERROR UN
TIL YOU HAVE LOCATED IT, THEN +C OUT.
TYPING +C ABORTS THE FUNCTION IN PROGRESS AND
RETURNS THE XXDP+ MONITOR TO COMMAND MODE.

```

'C                                0
DR>CON/FLAGS:H0E:IER:LOE=0
D,0
CHANGE SW (L) ? N                D,0
CZRLG EOP 1                      0
'C
DR>RESTART/PASS:1                D,0
CHANGE SW (L) ? N                D,0
-----
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-----

```

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

TO EXECUTE A CHAIN FILE THE USER TYPES:

C FILNAM <CR> OR

C FILNAM/QV<CR>

IN THE FIRST CASE THE PASS COUNT SPECIFIED IN THE CHAIN FILE

IS USED BY THE XXDP. MONITOR TO DETERMINE THE NUMBER OF PASSES TO 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 TERMINATION 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

START/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 "0 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 "0 UNITS?", THE HAR

WARE 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 DE

FAULT IS NON-ENDING TEST EXECUTION. "FLAG-LIST" IS A SEQUENCE OF ELEMENTS OF THE FORM <FLAG>, <FLAG=1>, OR <FLAG=0>, SEPARATED BY COLONS, WHERE <FLAG> HAS ONE OF THE FOLLOWING VALUES:

HOE 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, SUB

TES
T, OR TEST) CONTAINING THE ERROR

IER INHIBIT ERROR REPORTING
 IBE INHIBIT BASIC ERROR REPORTS
 IXE INHIBIT EXTENDED ERROR REPORTS
 PRI DIRECT ALL MESSAGES TO A LINE PRINTER
 PNT PRINT NUMBER OF TEST BEING EXECUTED

BOE BELL ON ERROR

UAM RUN IN UNATTENDED MODE, BYPASSING MANUAL INTERVENTION TESTS
 ISR INHIBIT STATISTICAL REPORTS
 IDU INHIBIT DROPPING OF UNITS BY DIAGNOSTIC
 ADR EXECUTE AUTODROP CODE
 LOT LOOP ON TEST
 EVL EVALUATE

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

THOSE THE FLAGS NAMED OR EQUATED TO 1 ARE SET
 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

FOR C)
 CONTROL/C.

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

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

2. ALL UNSPECIFIED FLAG SETTINGS ARE UNCHANGED.

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

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

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

1. DEFAULT FOR PASS CNT IS THE UNSATISFIED PASS-CNT FROM THE PREVIOUS START OR RESTART
2. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

PRO(CEED)/FLACS:<FLAG-LIST>

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

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

1. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

EXIT

RETURN TO
XXDP. PROMPT MODE.

DRO(P)/UNITS:UNIT-LIST

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

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

ADD/UNITS:UNIT-LIST

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

PRI(NT)

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

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

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

MAS WITH IN GIVING A STRING OF VALUES, COM
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).

T A NOW LET US SEE HOW WE COULD USE THESE CAPABILITIES TO CONSTRUCT
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 RLO1'S AND THE LAST 4 DRIVES ARE RLO2'S (ON THE SECOND CONTROLLER):

UNITS (D) ? 8

UNIT 0
RL11 (L) Y ?
BUS ADDRESS (0) 174400 ?
VECTOR (0) 160 ?
BR LEVEL (0) 5 ?
DRIVE TYPE = RLO1 (L) Y ?
DRIVE (0) ? 0-3

UNIT 4
RL11 (L) Y ?
BUS ADDRESS (0) 174400 ? 175400
VECTOR (0) 160 ? 164
BR LEVEL (0) 5 ?
DRIVE TYPE = RLO1 (L) Y ? N
DRIVE (0) ? 0-3

THE FIRST TIME THRU THE P TABLE QUESTIONS THE DEFAULT VALUES ARE USED FOR THE CONTROLLER TYPE (QUESTION #1), CSR ADDRESS OF THE CONTROLLER (QUESTION #2), THE CONTROLLER VECTOR ASSIGNMENT (QUESTION #3), THE DRIVE TYPE (QUESTION #5), AND THE "BR LEVEL" (QUESTION #4). THE ACTUAL UNIT NUMBERS OF THE RL01'S FOR QUESTION #6 WAS 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 ADDRESS FOR THE RL02 CONTROLLER (175400). THE SECOND CONTROLLER'S VECTOR WAS ALSO CHANGED TO 164 IN QUESTION #3. THE RL02 TEST UNIT NUMBERS WERE ASSIGNED VALUES 0 TO 3 IN QUESTION #6 AND THE DRIVE TYPE WAS SET FOR RL02'S FOR THE REMAINING 4 UNITS IN QUESTION #5. QUESTION #4 WAS DEFAULTED USING THE "BR LEVEL" FROM THE FIRST PASS.

2.5 HARDWARE PARAMETERS

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

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 (0) 174400?

ANSWER WITH THE BUS ADDRESS OF THE CONTROLLER.

VECTOR (0) 160?

ANSWER WITH THE INTERRUPT VECTOR OF THE CONTROLLER.

BR LEVEL (0) 5?

ANSWER WITH THE INTERRUPT PRIORITY OF THE CONTROLLER.

DRIVE TYPE = RL01 (L) ?

ANSWER NO (N) IF DRIVE IS AN RL02

DRIVE (0) 0?

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

2.6 SOFTWARE PARAMETERS

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

"CHANGE SW ?"

A YES ANSWER WILL ASK THE FOLLOWING SOFTWARE PARAMETER QUESTION, WITH THE PRESENT DEFAULT VALUE PRINTED TO THE LEFT OF THE QUESTION MARK. (THE LAST ANSWER GIVEN IS THE DEFAULT) THE DEFAULT IS TAKEN ON A <CR>.

"DROP ON
ERROR LIMIT (L) Y?"

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

3.0 ERROR INFORMATION

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

EXAMPLE:

ONE LINE DESCRIPTIO

(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 (XXXXX0)

BIT 15 - COMPOSITE ERROR
BIT 14 - DRIVE ERROR
BIT 13 - NON EXISTANT MEMORY ERROR
BIT 12 - HEADER NOT FOUND (WITH BIT 10 SET)
 - DATA LATE (WITH BIT 10 CLEAR)
BIT 11 - HEADER CRC (WITH BIT 10 SET)
 DATA CRC (WITH BIT 10 CLEAR)
BIT 10 - OPERATION INCOMPLETE
BIT 9/8 - DRIVE SELECT (0-3)
BIT 7 - 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

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

FOR GET STATUS FUNCTION

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

BIT 0 MUST BE ONE (1)

RLMP MULTIPURPOSE REGISTER

FOR READ/WRITE FUNCTION

BIT 15 0 WORD COUNT (TWO'S COMPLIMENT)

FOR READ HEADER FUNCTION

BIT 15 0 DISK HEADER OF SECTOR (FIRST READ)
ZERO WO

CZRLGEO RL11/RLV11 CTRL TST 1 MACRO V05.01a Tuesday 12 Feb 85 13:58
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2	76	GLOBAL DATA
2	207	PATTERNS FOR DIFFERENCE WORD
3	2	GLOBAL TEXT
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5	2	LOAD PROTECTION TABLE
5		
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5	107	AUTO DROP SECTION
6	2	GLOBAL SUBROUTINES
6	24	ROUTINE TO CHECK FOR CONTROLLER ERRORS
6	104	LOAD RLCS
6	206	ROUTINE TO CALCULATE CRC
7	1	**TEST 1** RLCS ADDRESSABILITY
7	26	**TEST 2** - RLBA ADDRESSABILITY
7	52	**TEST 3** - RLDA ADDRESSABILITY
7	77	**TEST 4** - RLMP ADDRESSABILITY
7	102	**TEST 5** READ WRITE OF RLCS
7	144	**TEST 6** - READ WRITE OF RLBA
8	11	**TEST 7** - READ WRITE OF RLDA
8	44	**TEST 8** - BIS OF RLCS
8	82	**TEST 9** BIC OF RLCS
8	118	**TEST 10** - BIS OF RLBA
8	153	**TEST 11** - BIC OF RLBA
8	185	**TEST 12** - BIS OF RLDA
8	216	**TEST 13** - BIC OF RLDA
8	248	**TEST 14** - BUS RESET OF RLCS
8	284	**TEST 15** - BUS RESET OF RLBA
8	310	**TEST 16** - BUS RESET OF RLDA
8	333	**TEST 17** - UNIQUENESS OF RLCS
8	375	**TEST 18** UNIQUENESS OF RLBA
8	417	**TEST 19** - UNIQUENESS OF RLDA
8	461	**TEST 20**
8	514	**TEST 21** - NOOP FUNCTION
8	556	**TEST 22** - TEST NOOP DOES NOTHING (RL11 ONLY)
8	610	**TEST 23** - TEST OF INTERRUPT (RL11 ONLY)
8	647	**TEST 24** TEST PRIORITY BR LEVEL
8	698	**TEST 25** - GET STATUS FUNCTION
8	723	**TEST 26** - GET STATUS FUNCTION INTERRUPT
8	756	**TEST 27** - GET STATUS FUNCTION GENERATES OPI W/O GS BIT
8	786	**TEST 28** OPI UNDER INTERRUPT
8	820	**TEST 29** - READ HEADER FUNCTION
8	836	**TEST
8	862	**TEST 31** - REPEATED RD HDRS YIELD SAME CYL AND HD
8	910	**TEST 32** - CHECK OF HEADER CRC
8	953	**TEST 33** - CHECK CONSECUTIVE HEADERS
8	1027	**TEST 34** SEEK FUNCTION
8	1051	**TEST 35** - CHECK DRIVE READY ON SEEK
8	1081	**TEST 36** - SEEK FUNCTION INTERRUPT
8	1127	**TEST 37** - TEST DIFFERENCE WORD TRANSMISSION
8	1250	**TEST 38** - VERIFY HEAD SELECT 0 VIA RD HDR
8	1298	**TEST 39** - VERIFY HEAD SELECT 1 VI
8	1345	**TEST 40** - VERIFY HEAD SELECT 0 VIA GET STATUS
8	1392	**TEST 41** - VERIFY HEAD SELECT 1 VIA GET STATUS
8	1440	**TEST 42** - TEST TIME AT WHICH DIF WD GETS TRANSMITTED
8	1539	**TEST 43** - EXTENSIVE CHECK OF HEADER CRC
8	1674	**TEST 44** - VERIFY GET STATUS WHILE DRDY IS LOW

```
1 .TITLE CZRLGEO RL11/RLV11 CTLR TST 1
2
3 000000 .ENABLE AMA
4 .ENABLE ABS
5 .NLIST ME,CND,MD
6 .MCALL SVC
7 000000 SVC
8 000000 SVCINS=0
9 000000 SVCTAG=0
10 002000 .=2000
11
12
13 002000 POINTER BGNSFT,BGNSW,BGNDU,BGNAU
14
15 002000 BGNMOD MDHEDR
16
17 002000 HEADER CZRLG,E,0,7,0
    002000 103 .ASCII /C/
    002001 132 .ASCII /Z/
    002002 122 .ASCII /R/
    002003 114 .ASCII /L/
002004 107 .ASCII /G/
    002005 000 .BYTE 0
    002006 000 .BYTE 0
    002007 000 .BYTE 0
    002010 105 .ASCII /E/
    002011 060 .ASCII /O/
    002012 000000 .WORD 0
    002014 000007 .WORD 7
    002016 026556 .WORD L$HARD
    002020 026762 .WORD L$SOFT
    002022 013654 .WORD L$HW
    002024 013672 .WORD L$SW
    002026 027050 .WORD L$LAST
    002030 000000 .WORD 0
    002032 000000 .WORD 0
    002034 000000 .WORD 0
    002036 000000 .WORD 0
    002040
    013702 .WORD L$DISPATCH
    002042 000000 .WORD 0
    002044 000000 .WORD 0
    002046 000000 .WORD 0
    002050 003 .BYTE C$REVISION
    002051 003 .BYTE C$EDIT
    002052 000000 .WORD 0
    002054 000000 .WORD 0
    002056 000000 .WORD 0
    002060 002230 .WORD L$DVTYP
    002062 000000 .WORD 0
    002064 000000 .WORD 0
    002066 000000 .WORD 0
    002070 015076 .WORD L$AU
    002072 015072 .WORD L$DU
    002074 000000 .WORD 0
    002076 002122 .WORD L$DESC
    00
2100 104035 EMT E$LOAD
    002102 000000 .WORD 0
```

```

002104 014040 .WORD L$INIT
002106 015024 .WORD L$CLEAN
002110 014602 .WORD L$AUTO
002112 014032 .WORD L$PROT
002114 000000 .WORD 0
002116 000000 .WORD 0
002120 000000 .WORD 0

18
19 002122 ENDMOD
20
21 002122 DESCRIPT <CZRLG TESTS CONTROLLER FUNCT
IONS. INTERFACE LOGIC, REGISTER OPERATION>
002122 103 132 122 .ASCIZ /CZRLG TESTS CONTROLLER FUNCTIONS, INTERFACE LOGIC, REGISTER OPERATION/
002125 114 107 040
002130 124 105 123
002133 124 123 040
002136 103 117 116
002141 124 122 117
002144 114 114 105
002147 122 040 106
002152 125 116 103
002155 124 111 117
002160 116 123 054
002163 040 111 116
00
2166 124 105 122
002171 106 101 103
002174 105 040 114
002177 117 107 111
002202 103 054 040
002205 122 105 107
002210 111 123 124
002213 105 122 040
002216 117 120 105
002221 122 101 124
002224 111 117 116
002227 000
22 002230 .EVEN
002230 122 114 060 DEVTYP <RL01,RL02>
002233 061 054 122 .ASCIZ /RL01,RL02/
002236
114 060 062
002241 000

.EVEN
23 002242 BGNMOD GLBEQAT
24
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.
000037      EF.RESTART== 31.
000036      EF.CONTINUE== 30.
000035      EF.NEW== 29.
000034      EF.PWR== 28.

```

```

; START COMMAND WAS ISSUED
; RESTART COMMAND WAS ISSUED
; CONTINUE COMMAND WAS ISSUED
; A NEW PASS HAS BEEN STARTED
; A POWER-FAIL/POWER-UP OCCURRED

```

```

;
; PRIORITY LEVEL DEFINITIONS

```

```

000340      PRI07== 340
000300      PRI06== 300
000240      PRI05== 240

```

```

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

```

```


```

```

00200

```

```

PRI04== 200

```

```

OE== 100000

```

27	000001	DRDY=BIT0	;DRIVE READY (RLCS)
28	000100	INTEN=BIT6	;INTERRUPT ENABLE (RLCS)
29	100000	ERR=BIT15	;RL11 ERROR (RLCS)
30	040000	DERR=BIT14	;RL01 DRIVE ERROR (RLCS)
31	002000	OPI=BIT10	;OPERATION INCOMPLETE (RLCS)
32	000200	CRDY=BIT7	;CONTROLLER READY (RLCS)
33	000040	BA17=BIT5	
;EXTENDED ADDRESS BIT 17 (RLCS)			
34	000020	BA16=BIT4	;EXTENDED ADDRESS BIT 16 (RLCS)
35	020000	NXM=BIT13	;NON-EXISTANT MEMORY (RLCS)
36	000000	DS0=0	;DRIVE SELECT 0 (RLCS)
37	000400	DS1=BIT8	;DRIVE SELECT 1 (RLCS)
38	001000	DS2=BIT9	;DRIVE SELECT 2 (RLCS)
39	001400	DS3=BIT8!BIT9	;DRIVE SELECT 3 (RLCS)
40	000000	NOOP0=0	;FUNCTION-NOOP(0)
41	000016	NOOP7=BIT1!BIT2!BIT3	;FUNCTION-NOOP(7)
42	000002	WRCHK=BIT1	;WRI
TE CHECK FUNCTION			
43	000004	GSTAT=BIT2	;GET STATUS FUNCTION
44	000006	SEEK=BIT2!BIT1	;SEEK FUNCTION
45	000010	RDHDR=BIT3	;READ HEADER FUNCTION
46	000012	WRITE=BIT3!BIT1	;WRITE DATA FUNCTION
47	000014	READ=BIT3!BIT2	;READ DATA FUNCTION
48	000202	GODRVR=BIT1!BIT7	;CRDY AND DRDY
49	000010	DRS1=BIT3	;DRIVE RESET (RLDA)
50	000002	GSBIT=BIT1	;GET STATUS BIT (RLDA)
51	000001	MK=BIT0	;MARKER BIT (RLDA)
52	00000		
4		SIGN=BIT2	;SIGN BIT (RLDA)
53	000100	RHMS=BIT6	;HEAD SELECT IN READ HEADER
54	000100	STHS=BIT6	;HEAD SELECT IN STATUS BACK
55	000020	DAHS=BIT4	;HEAD SELECT IN SEEK
56			
57			
58			
59	000C00	CSR=0	
60	000002	VECT=2	
61	000004	PRIOR=4	
62	000006	TYPDR=6	
63	000010	DRBT=10	
64	000012	CNT=12	
65			
66			
67			
68	000000		
69	000002	DLT=0	
70	000004	ELT=2	
71		SIZE=4	
72	002242	ENDMOD	
73			
74	002242	BGNMOD GLBDAT	
75			
76		.SBTTL GLOBAL DATA	
77			
78	002242	PWRFLG: .WORD 0	
79	002244	UUT: .WORD 0	
80	002246	UNITST: .WORD 0	
81	002250	RLCS: .WORD 0	;LOGICAL ADDRESS OF CS
82	002252	RLBA: .WORD 0	;LOGICAL ADDRESS OF BA
83	002254	RLDA: .WORD 0	;LOGICAL ADDRESS OF DA

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	0	
96	002306	000000	E.CS: .WORD	0	;CS - AT OCCURANCE OF ERROR
97	002310	000000	E.BA: .WORD	0	;BA - AT OCCURANCE OF ERROR
98	002312	000000	E.DA: .WORD	0	;DA - AT OCCURANCE OF ERROR
99	0023	000000			
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	SECMASK: .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.CNTRL: .WORD	0	;CONTROLLER TYPE
131	002412	000000	TMPFNC: .WORD	0	
132	002414	000000	DLVCNT: .WORD	0	;DELAY COUNTER
133	002416		DBUFF: .BLKW	512.	;WORDS ;DA
TA BUFFER					
134					
135					
136					
137	004416	000000	BEGPAT: 0		;GROWING 1
138	004420	000001	1		
139	004422	000003	3		
140	004424	000007	7		

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				
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					
262					
263	004772	000000			
264	004774	000002	CSPAT: .WORD	0	;SHIFTING 1
	BIT1		.WOR		
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					

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1 005774      BGNMOD GLB1xT
2
3      .SBTTL GLOBAL TEXT
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 HCRMES: .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 RHOMES: .ASCIZ /READ HEADER OPERATION-FLAG MODE/
23 006352      122      105      101 RHOINT: .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      105      124 GSTINT: .ASCIZ /GET STATUS OPERATION-INTR MODE/
07 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 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      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/

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J3

61	010325	123	105	105	EM47:	.ASCIZ	/SEEK WOULD NOT INTERRUPT/
62	010356	104	122	111	EM52:	.ASCIZ	/DRIVE READY CAUSED EXTRANEIOUS 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:	.ASCIZ	/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/
86							
87							
88							
89							
93	012226						
94							

.EVEN

ENDMOD

:8

K3

1			.SBTTL	GLOBAL ERRORS	
2			BGNMOD	GLBERR	
3	012226		BGNMSG	ERRO	
4					
5	012226				
6					
7	012226	004737	JSR	PC,LINE1	
8	012232	004737	JSR	PC,LINE2	
9					
10	012236	004537	JSR	R5,CKERLT	;CHECK ERROR LIMIT
11	012242		ENDMSG		
	012242		L10000:		
	012242	104423	TRAP	C#MSG	
12			BGNMSG	ERR1	
13	012244				
14					
15	012244	004737	JSR	PC,LINE1	
16					
17	012250	004537	JSR	R5,CKERLT	;CHECK ERROR LIMIT
18	012254		ENDMSG		
	012254		L10001:		
	012254	104423	TRAP	C#MSG	
19			BGNMSG	ERR2	
20	012256				
21					
22	012256	004737	JSR	PC,LINE1	
23	012262		PRINTB	#FRMT4,GDDAT,BDDAT	
	012262	013746	MOV	BDDAT,-(SP)	
266	012		MOV	GDDAT,(SP)	
	013746	002362	MOV	#FRMT4,-(SP)	
	012272	012746	MOV	#3,-(SP)	
	012276	012746	MOV	SP,RO	
	012302	010600	TRAP	C#PNTB	
	012304	104414	ADD	#10,SP	
	012306	062706			
24					
25	012312	004537	JSR	R5,CKERLT	;CHECK ERROR LIMIT
26	012316		ENDMSG		
	012316		L10002:		
	012316	104423	TRAP	C#MSG	
27			BGNMSG	ERR3	
28	012320				
29					
30	012320	004737	JSR	PC,LINE1	
31	012324	004737	JSR	PC	
.LINE2					
32	012330		PRINTB	#FRMT5,TMPO,BDDAT,GDDAT	
	012330	013746	MOV	GDDAT,-(SP)	
	012334	013746	MOV	BDDAT,-(SP)	
	012340	013746	MOV	TMPO,-(SP)	
	012344	012746	MOV	#FRMT5,-(SP)	
	012350	012746	MOV	#4,-(SP)	
	012354	010600	MOV	SP,RO	
	012356	104414	TRAP	C#PNTB	
	012360	062706	ADD	#12,SP	
33					
34	012364	004537	JSR	R5,CKERLT	;CHECK ERROR LIMIT
35	012370	015102	ENDMSG		
	012370		L10003:		

36	012370	104423	TRAP	C#MSG	
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,RO	
	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	
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		14:	PRINTB	#FRMT99
	012466	012746 013240	MOV	#FRMT99, -(SP)	
	012472	012746 000001	MOV	#1, -(SP)	
	012476	010600	MOV	SP,RO	
	012500	104414	TRAP	C#PNTB	
	012502	062706 000004	ADD	#4,SP	
61	012506	004537 015102	JSR	R5,CKERLT	;CHECK ERROR LIMIT
62	0125				
	012512		ENDMSG		
	012512	104423	L10006:		
			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,RO	
	012536	104414	TRAP	C#PNTB	
	012540	062706 000006	ADD	#6,SP	

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GLOBAL ERRORS

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

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      013006 010600      MOV SP,RO
      013010 104414      TRAP C#PNTB
      013012 062706 000014 ADD #14,SP
7 80 013016 00020      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,RO
      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,RO
      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: #06#A DRIVE: #01/
91 013132      045      116      045 FRMT2: .ASCIZ /#N#T#T#06#T#06/
92 013151      045      124      045 FRMT2A: .ASCIZ /#T#06#T#06/
93 013164      045      124      045 FRMT2B: .ASCIZ /#T#06#T#06#/
94 013200      045      116      045 FRMT3: .ASCIZ /#N#T/
95 013205      045      116      045 FRMT4: .ASCIZ /#N#T/
II /#N#AEXP'D: #06#A REC'D: #06/
96 013240      045      116      000 FRMT99: .ASCIZ /#N/
97 013243      045      116      045 FRMT5: .ASCIZ /#N#ALAST: #06#A PRES: #06#A EXP'D: #06#N/
98 013314      045      116      045 FRMT6: .ASCIZ /#N#AAT PROCESSOR LEVEL #06#N/
99 013351      045      101      105 FRMT11: .ASCIZ /#AERROR LIMIT EXCEEDED-DROPPED#N/
100 013412      045      116      045 FRMT12: .ASCIZ /#N#ADRIE 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#ADRIE DROPPED - NO CONTROLLER#N/
103 013566      045      116      045 FRMT15: .ASCIZ /#N#ADRIE DROPPED - DID NOT RESPOND WITH "READY"#N/
104
105
106
107
111
112
113
114 013652      ENDMOD
115
116 013652      BGNMOD HPTCODE
117
118 013652      BGNHW
119 013652 000006      .WORD L10010 L#HW/2 ;DEFAULT HARDWARE TABLE
      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      ENDMW

```

127	013670	L10010:	
128	013670	ENDMOD	
129		BGNMOD	SPTCODE
130	013670	BGNSW	
131			:DEFAULT SOFTWARE TABLE
132	013670 000003	.WORD	L10011 L1SW/2
133		DROP:	.WORD 0
134	013672 000000	MERLMT:	.WORD 10.
135	013674 000012	T.SIZE:	.WORD 0
136	013676 000000		
137		ENDSW	
138	013700	L10011:	
139	013700	ENDMOD	
140	013700	BGNMOD	DSPCODE
141		DISPATCH	44
142	013700	.WORD	44
143			
144	013700	.WORD	T2
	013700 000054	.WORD	T3
	013702 016454	.WORD	T4
	.WORD T1	.WORD	T5
	013704 016550	.WORD	T6
	013706 016644	.WORD	T7
	013710 016740	.WORD	T8
	013712 017034	.WORD	T9
	013714 017154	.WORD	T10
	013716 017260	.WORD	T11
	013720 017346	.WORD	T12
	013722 017472	.WORD	T13
	013724 017616	.WORD	T14
	013726 017724	.WORD	T15
	013730 020024	.WORD	T16
	013732 020114	.WORD	T17
	013734 020214	.WORD	T18
	013736 020324	.WORD	T19
	013740 020400	.WORD	T20
	013742 020436	.WORD	T21
	013744 020562	.WORD	T22
		.WORD	T23
	013746 020722	.WORD	T24
	013750 021062	.WORD	T25
	013752 021266	.WORD	T26
	013754 021402	.WORD	T27
	013756 021610	.WORD	T28
	013760 021676	.WORD	T29
	013762 022044	.WORD	T30
	013764 022074	.WORD	T31
	013766 022246	.WORD	T32
	013770 022334	.WORD	T33
	013772 022462	.WORD	T34
	013774 022504	.WORD	T35
	013776 022564		
	014000 022730		
	014002 023066		
	014004 023404		
	014006 023500		

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
147
148

ENDMOD

```

1
2
3 014032 .SBTTL LOAD PROTECTION TABLE
4 014032 000000 BGNPROT
5 014034 177777 .WORD CSR ;P TABLE OFFSET OF CSR
6 014036 000011 .WORD -1 ;NOT A MASS-BUS DRIVE
7 014040 .WORD DRBT+1 ;P-TABLE OFFSET OF DRIVE NUMBER IN BYTES
8 ENDPROT
9
10 014040 .SBTTL INITIALIZATION CODE
11 BGNMOD INITCODE
12 014040 BGNINIT
13
14 014040 BRESET
15 014040 104433 TRAP C$RESET
16 014042 012700 000034 READEF #EF.PWR ;POWER UP?????
17 014046 104447 MOV #EF.PWR,RO
18 014050 103004 TRAP C$REFG
19 014052 013737 002012 002242 BNCOMPLETE NOPWR ;NO,BRANCH
20 014060 000475 BCC NOPWR
21 014062 01270 MOV L$UNIT,PWRFLG ;YES, SET POWER FLAG
22 014066 104447 BR CONT ;GO TO CONTINUE POINT
23 014070 103404 NOPWR: READEF #EF.RESTART ;RESTART?
24 014072 012700 000040 MOV #EF.RESTART,RO
25 014076 104447 TRAP C$REFG
26 014100 103010 BCOMPLETE START1
27 014102 012700 005074 BCS START1
28 014106 012701 000100 READEF #EF.START ;START???
29 014112 005020 MOV #EF.START,RO
30 014114 005301 TRAP C$REFG
31 014116 001375 BNCOMPLETE CONTINUE
32 014120 000407 BCC CONTINUE
33 014122 012700 000036 START1: MOV #ERCOUNT,RO
34 014126 104447 1$: MOV #64,R1
35 014130 103451 CLR (R0)+
36 014132 005737 002244 DEC R1
37 014136 001011 BNE 1$
38 014140 012737 177777 002246 BR START
39 014146 013737 002012 002244 CONTINUE: READEF #EF.CONTINUE ;CONTINUE???
40 014154 012737 005072 005072 MOV #EF.CONTINUE,RO
41 014162 005237 002246 TRAP C$REFG
42 014166 062737 000002 005072 BCOMPLETE CONT
43 014174 005337 002244 BCS CONT
44 014200 013700 002246 NXT: TST UUT ;DONE ALL UUT'S
45 014204 104442 BNE XXX ;NO
46 014206 013737 002012 002244 START: MOV #-1,UNITST
47 014208 013737 005072 005072 MOV L$UNIT,UUT
48 014210 013737 005072 005072 MOV #ERCOUNT-2,ERPOINT
49 014212 005237 002246 XXX: INC UNITST
50 014214 062737 000002 005072 ADD #2,ERPOINT
51 014216 005337 002244 DEC UUT
52 014218 013700 002246 REST: GPHARD UNITST,RO
53 014220 013700 002246 MOV UNITST,RO
54 014222 104442 TRAP C$GPHRD

```

```

43 014206 1#
BCOMPLETE 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.CNTRL ;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.CNTRL ;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 MOV #120.,R1 ;INITIALIZE WAIT COUNT
76 000170 165674 MOV #200.,@RLCS ;SET CRDY
77 014346 012777 000200 165666 BIS DRIVE,@RLCS ;SET IN DRIVE SELECT
78 014354 053777 002270 165660 DRVRDY: BIT @DRDY,@RLCS ;DRIVE READY???
79 014362 032777 000001 BNE BGNTST ;YES, THEN START TEST
80 014370 001042 000050 002414 MOV #40.,DLYCNT ;INITIALIZE DELAY COUNT
81 014400 012727 000001 WAITO: DELAY 1 ;IMPLEMENT 100-USEC DELAY
82 014404 000000 .WORD 0
83 014406 013727 002116 MOV L#DLY,(PC)+
84 014412 000000 .WORD 0
85 014414 005367 177772 DEC -6(PC)
86 014420 001375 -4
87 014422 005367 177756 DEC -22(PC)
88 014426 001367 -20
89 014430 005337 002414 DEC DLYCNT ;DECREMENT DELAY COUNT
90 014434 001361 BNE WAITO ;BRANCH IF TIME DELAY NOT EXPIRED
91 014436 005301 DEC R1 ;SIXTY SECONDS GONE BY
92 014440 001350 BNE DRVRDY ;NO, GO BACK
93 01444
2 PRINTB #FRMT12 ;DROPPING DRIVE - DRIVE DID NOT RECOVER
94 014442 012746 013412 MOV #FRMT12,-(SP)
95 014446 012746 000001 MOV #1,-(SP)
96 014452 010600 MOV SP,R0
97 014454 104414 TRAP C#PNTB

```

```

      014456 062706 000004          ADD    #4,SP
87
88 014462 004737 012552          6$: JSR    PC,LINE1          ;/FROM POWER FAILURE
89 014466 013700 002246          DODU    UNITST          ;GIVE DRIVE INFO
      014472 104451          MOV     UNITST,RO          ;TELL SUPERVISOR TO DROP IT
90 014474 104444          TRAP   C$DODU
      014476 012777 000013 165550 BGNTST: MOV    #13,@RLCS          ;FORCE AN ABORT
      014504 012777 000204 165536      MOV    #204,@RLCS          ;SETUP DR RST
91 014512 053777 002270 165530      BIS    DRIVE,@RLCS          ;GS FUNC
92 014520 042777 000200 165522      BIC    #200,@RLCS          ;SELECT DRIVE
93 014526 032          BIC    #200,@RLCS          ;ISSUE IT
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$:
103 014600          ENDINIT
      014600 104411          L10013: TRAP   C$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$SVEC
      014630 062706 000010          ADD    #10,SP
113 014634 012746 000340          MOV    #340,-(SP)
114 014640 012746 016252          MOV    @TRPHAN,-(SP)
115 014644 013746 002340          MOV    ERRVEC,-(SP)
116 014650 012746 000003          MOV    #3,-(SP)
117 014654 104037          MOV    C$SVEC
118 014656 0          EMT
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,RO
      014672 104436          TRAP   C$CVEC

```

```

122 014674 013700 002340      MOV      ERRVEC,RO
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,RO
      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,RO

      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,RO
      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,RO
      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,RO
      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,RO
      015054 104436      TRAP      C#CVEC
155
156
157
158 015056 005737 002242      TST      PWRFLG      ;TREAT POW
ER FAILURE

```

```

159 015062 001402          BEQ      24
160
161 015064 005337 002242    DEC      PWRFLG
162
163 015070          24:
164 015070          L10015:  ENDCLN
    015070          TRAP      C#CLEAN
    015070 104412          ENDMOD
165
166 015072          BGNMOD  DRPCODE
167
168
169
170 015072          BGNDU
171
172 015072          NOP
173
174 015072 000240          ENDDU
175
176 015074          L10016:  TRAP      C#DU
    015074 104453          ENDMOD
177
178 015076          BGNMOD  ADDCODE
179
180 015076          BGNAU
181
182 015076          NOP
183
184 015076 000240          ENDAU
185
186 015100          L10017:  TRAP      C#AU
    015100 104452          ENDMOD
    015100
187
188 015102
189
190
191

```

AUTO DROP SECTION

```

1
2
3
4 015102
5
6
7 015102
8 015102 104420
9 015104 103427 013672
10 015106 005737 013672
11 015112 001424
12 015114 005277 167752
13 015120 027737 167746 013674
14 015126 002416
15 015130
16 015130 012746 013351
17 015134 012746 000001
18 015140 010600
19 015142 104417
20 015144 062706 000004
21 015150 004737 012552
22 015154 013700 002246
23 015160 104451
24 015162 104444
25 015164 000205
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44 015166 005037 002304 002306
45 015172 032737 176000
46 015200 001001
47 015202 000205

.SBTTL GLOBAL SUBROUTINES
BGNMOD GLBSUB

CKERLT: INLOOP
TRAP C$INLP 99$
BCOMplete 99$
BCS 99$
TST DROP
BEQ 99$
INC @ERPOINT
CMP @ERPOINT,MERLMT
BLT 99$

PRINTF @FRMT11
MOV @FRMT11,-(SP)
MOV #1,-(SP)
MOV SP,R0
TRAP C$PNTF
ADD #4,SP
JSR PC,LINE1
DODU UNITST ;DROP THE UNIT
MOV UNITST,R0
TRAP C$DODU
DOCLN
TRAP C$DCLN
99$:
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
;*
;*
;*ROUTINE USES R0,R1 AND PICKS HEADER FROM R3
;*
;* CALL JSR R5,CHERR
;*
;*
CHERR: CLR DERFLG ;CLEAR OUT DRIVE ERROR FLAG
BIT #176000,E.CS ;ANY ERRORS SET
BNE 199$ ;IF YES, INVESTIGATE
RTS R5 ;NO, EXIT

```

RRUPT

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

SEQ 0048

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				DEMS		; "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				OPIES		; "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						
732						JSR	R5, FIX	;GO PUT "HCRC" IN STRING
80	015360	006013				HCRCMES		; "HCRC"
81	015362	032737	010000	002306	5:	BIT	#BIT12, E.CS	;HEADER NOT FOUND?
82	015370	001422				BEQ	8:	;NO, GO PUT "CRLF" IN STRING
83	015372	004537	015732			JSR	R5, FIX	;PUT "HNF" IN STRING
84	015376	006021				HNFMES		; "HNF"
85	015400	000416				BR	8:	;PUT "CRLF" IN STRING
86	015402	032737	004000	002306	6:	BIT	#BIT11, E.CS	;DATA CRC ERROR?
87	015410	001403				BEQ	7:	;N
O. GO CHECK DATA LATE								
88	015412	004537	015732			JSR	R5, FIX	;PUT "DCK" IN STRING
89	015416	006026				DCKMES		; "DCK"
90	015420	032737	010000	002306	7:	BIT	#BIT12, E.CS	;DATA LATE ERROR?
91	015426	001403				BEQ	8:	;NO, GO PUT IN "CRLF"
92	015430	004537	015732			JSR	R5, FIX	;PUT "DLT" IN STRING
93	015434	006033				DLTMES		; "DLT"
94	015436	004537	015732		8:	JSR	R5, FIX	
95	015442	006040				MSCRLF		
96	015444	004537	015732			JSR	R5, FIX	
97								
	015450	000000				RESTMS:	.WORD 0	;HEADER FROM TEST
98	015452	105011				CLRB	(R1)	;PUT TERMINATOR IN
99								
100	015454					ERRDF	300, .LF, ERR6	
	015454	104455				TRAP	C#ERDF	
	015456	000454				.WORD	300	
	015460	006043				.WORD	LF	
	015462	012452				.WORD	ERR6	


```
101
102 015464 000205          RTS      R5          ;EXIT ROUTIN
E
103
104      .SBTTL  LOAD RLCS
105      ;*****
106      ;* ROUTINE TO LOAD RLCS WITH FUNCTION TO BE PERFORMED
107      ;* CALL:      JSR      R5,LDFUNC
108      ;*          .WORD
109      ;*          ;BITS TO BE LOADED, FUNCTION
110      ;*          ;AND INTR ENABLE ONLY
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$:      CMP      (R3)+,(R3)+      ;BUMP R3 BY 4
133 015616 005337 015704      DEC
FNDFNC      ;FOUND IT
134 015622 001374            BNE      1$
135 015624 032737 000100 002332 2$: BIT      @INTEN,LDCSR      ;NO,KEEP LOOKING
136 015632 001401            BEQ      3$              ;YES,DO WE WANT FLAG OR INTR
137 015634 005723            TST      (R3)+          ;FLAG BRANCH
138 015636 011303            MOV      (R3),R3        ;INTR POINT TO THAT ONE
139 015640 010337 015450      MOV      R3,RESTMS      ;SET HEADER
140 015644 053737 002270 002332      BIS      DRIVE,LDCSR      ;SET UP HEADER
141 015652 052737 000200 002332 4$: BIS      #200,
LDCSR      ;CONTROLER READY
142 015660 013777 002332 164362      MOV      LDCSR,@RLCS
143 015666 004537 015744      JSR      R5,BEFORE
144 015672 042777 000200 164350 5$: 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
```

L4

```

158 015726 006312          RDMES
159 015730 006352          RMDINT
160
161
162
163
BEING BUILT
164
165
166
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
176
;LOAD REGISTERS BEFORE OPERATION
;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.CNTRL    ;IF THE CONTROLLER IS AN RLV12
183 016002 001003          BNE  1$              ;READ BE
184 016004 017737 164250 002302      MOV  @RLBE,B.BE
185
186 016012 000205          1$:
RTS  R5
187
188
189
190
;LOAD REGISTERS AT ERROR
;CALL:  JSR
R5,AFTER
191
192 016014 017737 164230 002306 AFTER: MOV  @RLCS,E.CS      ;READ CS
193 016022 017737 164224 002310      MOV  @RLBA,E.BA      ;READ BA
194 016030 017737 164220 002312      MOV  @RLDA,E.DA      ;READ DA
195 016036 017737 164214 002314      MOV  @RLMP,E.MP      ;READ MP
196 016044 017737 164206 002316      MOV  @RLMP,E.MP1     ;READ MP SECOND WORD IN SILO
197 016052 017737 164200 002320      MOV  @RLMP,E.MP
2
198 016060 022737 000003 002410      CMP   #3,T.CNTRL    ;IF THE CONTROLLER IS AN RLV12
199 016066 001003          BNE  1$              ;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
213
214
;      .WORD      ;NUMBER OF BITS (1-16)
;      .WORD      ;DATA FOR CRC CALCULATION
;      .WORD      ;PREVIOUS OR STARTING CRC

```

M4

```

215
216
217
218 016100 010046
219 016102 010146
R1 220 016104 010246
221
222 016106 012537 002346
223 016112 012537 002350
224 016116 012537 002352
225
226 016122 005037 002342
227 016126 013700 002352
228 016132 006037 002350
229 016136 005500
WITH OLD
230 016140 032700 000001
231 016144 001402
232 016146 005137 002342
233 016152 013700 002336
234 016156 005100
235 016160 040037 002342
236 016164 000241
237 016166 006037 002352
238 016172 013700 002342
239 016176 013701
002352 MOV TEMP4,R1
240 016202 010102
241 016204 040100
242 016206 043702 002342
243 016212 050200
244 016214 043737 002336 002352
245 016222 050037 002352
246 016226 005337 002346
247 016232 001333
248 016234 013737 002352 002344
249
250 016242 012602
251 01
6244 012601
252 016246 012600
253
254 016250 000205
255
256
257
258
259
260
261
262 016252 005237 002326
263 016256 0J0002
264
265 016260
266
267 016260 005237 002330
268
269 016264
ENDSRV
016264
016264 000002
; ROUTINE TO SET FLAG IF TRAP OCCURRED
; "TRPHAN" IS IN LOCATION 4.
TRPHAN: INC TRPFLG ;INDICATE TRAP
RTI ;RETURN
BGNSRV
INTSRV: INC INTFLG ;INDICATE INTERRUPT
L10020: RTI

```

(SHOULD BE ZEROED FOR START)

ROUTINE USES R0,F ,R2

SIMBCC: MOV R0, (SP) ;SAVE R0
MOV R1, (SP) ;SAVE
MOV R2, (SP) ;SAVE R2
MOV (R5)+,TEMP2 ;GET NUMBER OF BITS
MOV (R5)+,TEMP3 ;GET DATA FOR CRC CALCULATION
MOV (R5)+,TEMP4 ;GET STARTING CRC
14: CLR BCCFBK ;
MOV TEMP4,R0 ;GET PREVIOUS CRC
ROR TEMP3 ;ROTATE NEW DATA
ADC R0 ;MERGE NEW
BIT #1,R0 ;BIT 0 SET
BEQ 24 ;IF NOT CONTINUE
COM BCCFBK ;
24: MOV XPOLY,R0 ;GET CRC POLYNOMIAL (CRC 16)
COM R0 ;COMPLIMENT POLYNOMIAL
BIC R0,BCCFBK
CLC ;CLEAR CARRY
ROR TEMP4
MOV BCCFBK,R0
MOV R1,R2
BIC R1,R0
BIC BCCFBK,R2
BIS R2,R0
BIC XPOLY,TEMP4
BIS R0,TEMP4
DEC TEMP2
BNE 14
MOV TEMP4,CALBCC
MOV (SP)+,R2 ;RESTORE REGISTERS FROM STACK
MOV (SP)+,R1
MOV (SP)+,R0
RTS R5 ;RETURN

```

270
271 ;ROUTINE TO WAIT FOR DRIVE READY
272 016266 010146 WTRDY: MOV R1, (SP) ;SAVE R1
273 016270 012701 003720 MOV #2000, R1 ;TIME OUT OF 200 MILLISECONDS
274 016274 032777 J00001 163746 1#: BIT #DRDY, @RLCS ;DRIVE READY?
275 016302 001022 BNE 2# ;
YES, EXIT
276 016304 DELAY 1 ;WAIT A WHILE
016304 C12727 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 J4455 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 WTRDY: 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 BNE 2# ;YES, EXIT
001025
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

```

B5

SEQ 0053

ROUTINE TO CALCULATE CRC

303
304 016454
305
306

ENDMOD

```

1
2
3 016454
4 016454
5
TO SEE IF WE CAN ADDRESS THE CONTROL
6
7
8
9 016454
10
11
12 016454 005037 002326
13 016460 012746 000340
    016460 012746 016252
    016470 013746 002340
    016474 012746 000003
    016500 104437
    016502 062706 000010
14
15 016506 005777 163536
16 016512 013700 002340
    016512 104436
    016520 005737 002326
17 016524 001407
18
19 016526 013737 002250 002362
20
21 016534 104454
    016536 000000
    016540 006740
    016542 012244
22 016544 104406
23 016546 104401
24
25
26
** RLBA ADDRESSABILITY
27
28 016550
29
30
31 016550
32
33
34
35
36 016550
*****
37
38 016550 005037 002326

.SBTTL **TEST 1** RLCS ADDRESSABILITY
BGNTST
STARS
;*****
;TEST
;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
;*****

1$: CLR TRPFLG ;CLEAR TRAP OCCURANCE
2$: SETVEC ERRVEC, @TRPHAN, #340 ;SET TO CATCH TRAP
    MOV #340, -(SP)
    MOV @TRPHAN, -(SP)
    MOV ERRVEC, -(SP)
    MOV #3, (SP)
    TRAP C$SVEC
    ADD #10, SP

    TST @RLCS ;ADDRESS RLCS
    CLRVEC ERRVEC ;RELEASE TRAP VECTOR
    MOV ERRVEC, R0
    TRAP C$CVEC
    TST TRPFLG ;TRAP OCCURRED???
    BEQ 3$ ;NO, IKAY PROCEED

    MOV RLCS, GDDAT ;SET UP ERROR DATA

    ERRSF 0, EM1, ERR1 ;BUS TIMEOUT IN ADDRESSING RLCS
    TRAP C$ERSF
    .WORD 0
    .WORD EM1
    .WORD ERR1
3$: CKLOOP ;CHECK IF /FL:LOE IS SET
    TRAP C$CLP1
ENDTST
L10021: TRAP C$ETST

.SBTTL **TEST 2
BGNTST
;*****START OF TEST****
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.
STARS
;*****

1$: CLR TRPFLG ;CLEAR TRAP OCCURANCE

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```

39 016554      24:  SETVEC  ERRVEC, #TRPHAN, #340 ;SET TO CATCH TRAP
   016554      MOV      #340, (SP)
   016560      MOV      #TRPHAN, (SP)
   016564      MOV      ERRVEC, (SP)
   016570      MOV      #3, (SP)
   016574      10
4437 016576      062706 000010 TRAP C$SVEC ADD #10, SP
40 016602      005777 163444 TST @RLBA ;ADDRESS RLBA
42 016606      013700 002340 CLRVEC ERRVEC ;RELEASE TRAP VECTOR
   016612      104436 MOV ERRVEC, R0
43 016614      005737 002326 TRAP C$CVEC
44 016620      001407 BEQ TRPFLG ;TRAP OCCURRED???
45 016622      013737 002252 002362 MOV 34 ;NO, CONTINUE
   016622      RLBA, GDDAT ;SETUP ERROR DATA
46
47 016630      ERRSF 1., EM2, ERR1 ;BUS TIMEOUT IN ADDRESS
SING RLBA
   016630      104454 TRAP C$ERSF
   016632      000001 .WORD 1
   016634      006765 .WORD EM2
   016636      012244 .WORD ERR1
48 016640      34:  CKLOOP TRAP C$CLP1 ;CHECK IF /FL:LOE IS SET
   016640      104406
49 016642      ENDTST L10022: ;****END OF TEST****
   016642      104401 TRAP C$ETST
50
51
52
53
54 016644      .SBTTL **TEST 3** - RLDA ADDRESSABILITY
55 016644      BGNST ;****START OF TEST****
   016644      STARS
   ;*****
*****
56 ;TEST TO SEE IF WE CAN ADDRESS THE DISK ADDRESS
57 ;REGISTER IF WE TRAP WE WILL REPORT THE ERROR
58 ;AND ABORT. AFTER THIS TEST WE ONLY KNOW THAT
59 ;WE CAN ADDRESS THE REGISTER.
60 016644      STARS
   016644      ;*****
61
62
63 016644      005037 002326 14:  CLR TRPFLG ;CLEAR TRAP OCCURANCE
64 016650      24:  SETVEC ERRVEC, #TRPHAN, #340 ;SET TO CATCH
   016650      MOV      #340, -(SP)
   016654      MOV      #TRPHAN, -(SP)
   016660      MOV      ERRVEC, -(SP)
   016664      MOV      #3, -(SP)
   016670      TRAP C$SVEC
   016672      ADD      #10, SP
65
66 016676      005777 163352 TST @RLDA ;ADDRESS RLDA
67 016702      013700 002340 CLRVEC ERRVEC ;RELEASE TRAP VECTOR
   016702      104436 MOV ERRVEC, R0
   016706      005737 002326 TRAP C$CVEC
68 016710      001407 BEQ TRPFLG ;TRAP OCCURRED???
69 016714      001407 BEQ 34 ;NO, CONTINUE
70

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```

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      BGNST      ;****START OF TEST****
80 016740      STARS
    ;*****
    ;TEST TO SEE IF WE CAN ADDRESS THE MULTIPURPOSE
    ;REGISTER. IF WE TRAP WE WILL REPORT THE
    ;ABORT. AFTER THIS TEST WE ONLY KNOW THAT WE CAN
    ;ADDRESS THE REGISTER.
    STARS
    ;*****
81
82
83 ERROR AND
84
85 016740
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      3,EM4,ERR1 ;BUS TIMEOUT IN ADDRESSING RLMP
ERRSF      TRAP    C$ERSF
    017020      104454      .WORD    3
    017022      000003      .WORD    EM4
    017024      007037      .WORD    ERR1
    017026      012244      .WORD
98 017030      3$:    CKLOOP      ;CHECK IF /FL:LOE IS SET
    017030      104406      TRAP    C$CLP1
99 017032      ENDTST      ;****END OF TEST****
    017032      L10024:
    017032      104401      TRAP    C$ETST

100
101
102      .SBTTL  **TEST 5** - READ WRITE OF RLCS
103

```


TEST 5 - READ WRITE OF RLCS

```

104 017034          BGNTST                      ;****START OF TEST****
105
106
107
108 017034          STARS
                      ;*****
109                  ;TEST THAT WE CAN WRITE/READ BITS 8,9 AND BITS 6-1
110                  ;OF THE CONTROL AND STATUS REGISTER, BITS 15-10 AND 0
111                  ;ARE DON'T CARE BITS AT THIS TIME AND BIT 7
112                  ;(CONTROLLER READY) IS ALWAYS WRITTE
N TO A ONE.
113 017034          STARS
                      ;*****
114
115
116 017034 012703 004772      MOV      #CSPAT,R3          ;SET UP TABLE POINTER OF PATTERNS
117
118 017040          BGNSEG                      ;****START OF SEGMENT****
119 017040 104404      TRAP      C#BSEG
120 017042
121 017042          CSTEST:
122 017046 011337 002362      MOV      (R3),GDDAT          ;GET PATTERN INTO GDDAT
123 017054 052737 000200 002362      BIS      #200,GDDAT      ;INSURE GO IS SET
124 017062 013777      MOV      GDDAT,#RLCS              ;LOAD RLCS (CONTROL AND STATUS)
125 017070 032777 040000 163160      BIT      #DERR,#RLCS      ;IF DRIVE ERROR PRESENT
126 017072 001403      BEQ      99$                      ;THEN EXPECT DRIVE AND
127 017100 052737 140000 002362      BIS      #ERR!DERR,GDDAT  ;COMPOSITE ERROR
128 017106 017737 163144 002364 99$:      MOV      #RLCS,BDDAT  ;READ RLCS BACK
129 017114 042737 000001 002364      BIC      #DRDY,BDDAT      ;IGNORE DRIVE READY
130 017122 023737 002362 002364      CMP      GDDAT,BDDAT      ;DID WE READ WHAT
WE LOADED
131
132 017124          BEQ      1$                          ;YES, THEN BRANCH
133 017124 104455      ERRDF      4,EM5,ERR2              ;WRONG DATA IN RLCS
134 017126 000004      TRAP      C#ERRDF
135 017130 007064      .WORD      4
136 017132 012256      .WORD      EM5
137 017134          .WORD      ERR2
138 017134 104410      1$:      ESCAPE      SEG              ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
139 017136 000012      TRAP      C$ESCAPE
140 017136          .WORD      10000$-
141
142
143
144
145
146 017140          TST      (R3)+                      ;BUMP FOR NEXT PATTERN
147 017142 005723 005070      CMP      R3,#0
148 017146 020327      BNE      CSTEST                  ;NOT END, LOAD NEXT PATTERN
149 017150          ;CHECK FOR END
150 017152 001335      ENDSEG
151 017150 104405      10000$:      TRAP      C#ESEG          ;****END OF SEGMENT****
152 017152          ENDTST
153 017152 104401      L10025:      TRAP      C#ETST          ;****END OF TEST****
154
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200

```

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

BGNTST

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

```

148 017154
149
150
151
152
153 017154
*****
154
155
156 017154 012703 004416
157 017160
158 017160 104404
159 017162
160 017162 011337 002362
161 017166 022737 000001 002410
162 017174 002403
163 017176 042737 000001 002362
164 017212 017737 163034 002364
165 017220 023737 002362 002364
166 017226 001404
167
168 017230
169 017240
OP, ELSE EXIT SEG
170 017240 104410
171 017242 000012

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

BGNSEG MOV #BEGPAT,R3 ;GLT START OF PATTERN LIST
;****START OF SEGMENT****
BATEST: TRAP C#BSEG
MOV (R3),GDDAT ;GET PATTERN TO SEND
CMP #1,T.CNTRLR ;RL11??
BLT 2# ;NO,
BIC #BIT0,GDDAT ;KEEP RLBA EVEN (UNIBUS)
MOV GDDAT,@RLBA ;LOAD PATTERN TO BUS ADDRESS
MOV @RLBA,BDDAT ;READ IT BACK
CMP GDDAT,BDDAT ;IS IT CORRECT?
BEQ 1# ;IF SO, BRANCH
ERRDF 5,EM6,ERR2 ;DATA WRONG IN RLBA
TRAP C#ERDF
WORD 5
WORD EM6
WORD ERR2
1#: ESCAPE SEG ;IF /FL:LOE SET LO
TRAP C$ESCAPE
WORD 10000$-.
```

H5

```

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 0
F SEGMENT****
  017254          100004:
  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
  ;*****
  ;TEST THAT WE CAN WRITE/READ THE DISK ADDRESS REGISTER
  ;ALL BIT POSITIONS ARE WRI
16
17          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      14         ;BRANCH IF CORRECT
31
32 017316          ERROF  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          14:      ESCAPE            ;IF /FL·LOE SET LOOP, ELSE EXIT SEG
  017326 104410      TRAP      C#ESCAPE
  017330 000012      .WORD     100004-.
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          100004:
  017342 104405      TRAP      C#ESEG
41 017344          ENDTST                      ;****END OF TEST****
  017344          L10027:
  
```

TEST 7 - READ WRITE OF RLDA

```

017344 104401          TRAP    C#ETST
42
43
44          .SBTTL  **TEST 8** - BIS OF RLCS
45
46 017346          BGNSTST          ;****START OF TEST****
47 017346          STARS
48          ;*****
49          ;TEST THAT WE CAN USE THE "BIS" INSTRUCTION ON THE CONTROL
50          ;AND STATUS REGISTER. BITS 8,9 AND 6-1 ARE TESTED TO
51          ;SET INDIVIDUALLY
52 017346          ;ANY PREVIOUS DATA PATTERN
53          STARS
54          ;*****
55 017346 012703 004772          BGNSEG  MOV    #CSPAT,R3          ;GET BEGINNING OF LIST
56 017352          TRAP    C#BSEG          ;****START OF SEGMENT****
57 017354          1$:
58 017354 012777 000207 162666  MOV    #CRDY,@RLCS          ;INSURE GO IS THERE
59 017362 011337 002362          MOV    (R3),GDDAT          ;SET U
P EXPECTED RLCS
60 017366 052737 000200 002362          BIS    #CRDY,GDDAT          ;IN GDDAT
61 017374 051377 162650          BIS    (R3),@RLCS          ;BIT SET PATTERN IN RLCS
62 017400 032777 040000 162642          BIT    @DERR,@RLCS          ;IF ERROR BIT SET THEN
63 017406 001403          BEQ    99$          ;EXPECT IT ON THE READ
64 017410 052737 140000 002362          BIS    @ERR!DERR,GDDAT          ;BACK
65 017416 017737 162626 002364 99$:  MOV    @RLCS,BDDAT          ;READ RLCS TO CHECK "BIS"
66 017424 042737 C00001 002364          BIC    @CRDY,BDDAT          ;CLEA
R OUT DRIVE READY
67 017432 023737 002364 002362          CMP    BDDAT,GDDAT          ;DID BIS WORK?
68 017440 001404          BEQ    2$          ;BRANCH IF OKAY
69
70 017442          ERROF  7,EM61,ERP2          ;WRONG DATA IN RLCS
71 017442 104455          TRAP    C#EROF
72 017444 000007          .WORD  7
73 017446 010660          .WORD  EM61
74 017450 012256          .WORD  ERR2
75 017452          2$:  ESCAPE SEG          ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
76 017452 104410          TRAP    C#ESCAPE
77 017454 000012          .WORD  10000$-
78
79 017456 005723          TST    (R3)+          ;GET NEXT PATTERN
80 017460 022703 005070          CMP    #CSEND,R3          ;AT END OF LIST
81 017464 001333          BNE    1$          ;NO GO BACK FOR TEST OF
82          ;NEXT PATTERN
83          ;****END OF SEGMENT****
84 017         ENDSEG  10000$:
85          TRAP    C#ESEG
86          ;****END OF TEST****
87          ENDTST  L10030:
88          TRAP    C#ETST
89
90          .SBTTL  **TEST 9** - BIC OF RLCS
91
92          ;****START OF TEST****

```

```

85
86 017472          STARS
                      ;*****
87                  ;TEST THAT THE "BIC" INSTRUCTION WILL WORK ON THE
88                  ;CONTROL AND STATUS REGISTER. BITS 8-9 AND 6-1 ARE
89                  ;TESTED.
90 017472          STARS
                      ;*****
*****
91
92
93 017472 012703 004772          MOV    #CSPAT,R3          ;GET BEGINNING OF PATTERNS
94 017476          BGNSEG      TRAP    C#BSEG              ;*****START OF SEGMENT****
95 017500          1$:
96 017500 012777 001776 162542    MOV    #1776,@RLCS      ;SET ALL SETTABLE BITS
97 017506 012737 001776 002362    MOV    #1776,GDDAT      ;SET UP EXPECT DATA IN
98 017514 041337 002362          BIC    (R3),GDDAT        ;GDDAT
99 017520 041377 162524          BIC    (R3),@RLCS        ;
CLEAR BITS IN RLCS VIA "BIC"
100 017524 032777 040000 162516    BIT    @DERR,@RLCS     ;IF DRIVE ERROR BIT SET
101 017532 001403          BEQ    99$                      ;EXPECT IT SET WHEN WE
102 017534 052737 140000 002362    BIS    @ERR:DERR,GDDAT ;READ IT BACK
103 017542 017737 162502 002364    MOV    @RLCS,BDDAT     ;MOVE RLCS TO BDDAT FOR COMPARE
104 017550 042737 000001 002364    BIC    @DRDY,BDDAT     ;CLEAR DRIVE READY
105 017556 023737 002364 002362    CMP    BDDAT,GDDAT     ;DID "BIC" WORK PROPERLY
106 017564 0          BEQ    2$                          ;BRANCH IF OKAY
01404
107
108 017566          ERRDF      8.,EM62,ERR2              ;WRONG DATA IN RLCS
109 017570 104455          TRAP    C#ERRDF
110 017572 000010          .WORD   8
111 017574 010741          .WORD   EM62
112 017576 012256          .WORD   ERR2
113 017576          2$:      ESCAPE  SEG                ;IF /FL:LOE SET LOOP. ELSE EXIT SEG
114 017576 104410          TRAP    C#ESCAPE
115 017600 000012          .WORD   10000$-
116
117
118
119
120 017602 005723          TST     (R3),                  ;GET NEXT PATTERN
121 017604 020327 005070    CMP     R3,@CSEND             ;AT END OF LIST
122 017610 001          BNE      1$                        ;NO. GO BACK WITH NEXT PATTERN
333
123 017612          1$      ENDSEG      ;*****END OF SEGMENT****
124 017612 10000$:          TRAP    C#ESEG
125 017614 104405          ENDTST      ;*****END OF TEST****
126 017614 L10031:          TRAP    C#ETST
127 017614 1C4401
116
117
118          .SBTTL  **TEST 10** - BIS OF RLBA
119
120 BGNTST          ;*****START OF TEST****
121
122 STARS
                      ;*****
123                  ;TEST THAT THE
124                  ;ADDRESS REGISTER. BITS 15-0 ARE LOADED. ONLY BITS 15-1
125                  ;ARE EXPECTED BACK. FOUR PATTERNS ARE USED: GROWING 1, SHIFTING 1,
126                  ;GROWING 0, AND SHIFTING 0.
127 017616          STARS

```

K5

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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$:
133 017624 005077 162422      CLR    @RLBA      ;CLEAR "BA"
134 017630 011337 002362      MOV    (R3),GDDAT      ;SET EXPECTED
135 017634 022737 000001 002410  CMP    @1,T.CNTRL      ;RL11
136 017642 002403      BLT     3$      ;NO
137 017644 042737 000001 002362  BIC    @1,GDDAT      ;BIT 0 CAN'T SET IN RLBA (UNIBUS)
138 017652 051377 16
2374 3$:
139 017656 017737 162370 002364      BIS    (R3),@RLBA      ;BIS RLBA WITH PATTERN
140 017664 023737 002364 002362      MOV    @RLBA,BDDAT      ;READ "BA"
141 017672 001404      CMP    BDDAT,GDDAT      ;DID RLBA LOAD PROPERLY?
142      BEQ     2$      ;BRANCH IF YES
143 017674      ERDF     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$:
017704 104410      ESCAPE  SEG      ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
017706 000012      TRAP    C#ESCAPE
    .WORD 10000$-.
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   10000$:      ;****END OF SEGMENT****
    017720 104405      TRAP    C#ESEG
    017722      ENDTST   ;****END OF TEST****
    017722 L10032:      TRAP    C#ETST
    017722 104401
151
152
153      .SBTTL  **TEST
11** - BIC OF RLBA
154
155 017724      BGNTST      ;****START OF TEST****
156
157 017724      STARS
158      ;*****1*****
159      ;TEST THAT THE "BIC" INSTRUCTION WILL WORK ON THE BUS
160      ;ADDRESS REGISTER. BITS 15-1 ARE TESTED WITH 4 PATTERNS
161 017724      ;GROWING 1, SHIFTING 1, GROWING 0 AND SHIFTING 0.
162      STARS
163      ;*****
164 0
17724 012703 004416      MOV    #BEGPAT,R3      ;GET START OF LIST
165 017730      BGNSEG      ;****START OF SEGMENT****
    017730 104404      TRAP    C#BSEG
166 017732      1$:
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

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SEQ 0063

TEST 11 BIC OF RLBA

```

      170 017752 041377 162274      BIC      (R3),@RLBA      ;BIC RLBA
      171 017756 017737 162270 002364  MOV      @RLBA,BDDAT      ;READ RLBA
      172 017764 023737 002364 002362  CMP      BDDAT,GDDAT      ;BIC WORK OKAY?
      173 017772 001404      BEQ      24      ;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
APF 176 020004      ESC      ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
      SEG      TRAP      C#ESCAPE
      020004 104410      .WORD      10000$.
      020006 000012
      177
      178 020010 005723      TST      (R3).      ;GET NEXT PATTERN
      179 020012 020327 004624      CMP      R3,@ENDPAT      ;HAVE WE COMPLETED LIST
      180 020016 001345      BNE      14      ;NO, GO BACK FOR NEXT
      181 020020      ENDSEG      ;****END OF SEGMENT****
      020020 10000$.
      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      BGNST      ;****START OF TEST****
      188
      189 020024      STARS
      190      ;*****~*****
      191      ;TEST THAT THE "BIS" INSTRUCTION WILL WORK ON THE DISK ADDRESS
      192      ;REGISTER. BITS 15-0 ARE TESTED WITH 4 PATTERNS, GROWING 1,
      193 020024      ;SHIFTING 1, GROWING 0, AND SHIFTING 0.
      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      14:
      199 020032 005077 162216      CLR      @RLDA      ;CLEAR "DA"
      200 020036 011337 002362      MOV      (R3),GDDAT      ;SET EXPECTED
      201 020042 051377 162206      BIS      (R3),@RLDA      ;BIS RLDA
      202 020046 017737 162202 002364  MOV      @RLDA,BDDAT      ;READ RLDA
      203 020054 023737 002364 002362  CMP      B
      DOAT,GDDAT      ;IS RLDA CORRECT
      204 020062 001404      BEQ      24      ;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      24:      ESCAPE      SEG      ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
      020074 104410      TRAP      C#ESCAPE
      020076 000012      .WORD      10000$.

```

TEST 12 BIS OF RLDA

```

208
209 020100 005723
210 020102 020327 004624
211 020106 001351
212 020110
    020110
    020110 104405
213 020112
    020112
    020112 104401
214
215
216
    .SBTTL **TEST 13** BIC OF RLDA

217
218 020114
219
220 020114
    STARS
    ;*****
    ;TEST THAT THE "BIC" INSTRUCTION WORKS ON THE DISK
    ;ADDRESS REGISTER. ALL BITS ARE TESTED WITH FOUR
    ;PATTERNS: GROWING 1, SHIFTING 1, GROWING 0 AND SHIFTING 0
    STARS
    ;*****

225
226
227 020114 012703 004416
    MOV @BEGPAT,R3 ;GET START OF LIST
228 020120 104404
    BGNSEG TRAP C#BSEG ;*****START OF SEGMENT****
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
    ERDF 12,EM66,ERR2 ;WRONG DATA IN RLDA
    TRAP C#ERDF
    .WORD 12
    .WORD EM66
    .WORD ERR2
239 0, J174
    ^, J174 104410
    J20176 000012
    2$:
    ESCAPE TRAP C#ESCAPE ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
    .WORD 10000$

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 10000$:
    020210 104405
    TRAP C#ESEG ;*****END OF SEGMENT****
245 020212
    ENDTST L10035:
    020212 104401
    TRAP C#ETST ;*****END OF TEST****

246
247

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248
**TEST 14** - BUS RESET OF RLCS          .SBTTL
249
250 020214          BGNTST                  ;****START OF TEST****
251
252 020214          STARS
253          ;*****
254          ;TEST THAT A BUS RESET WILL CLEAR THE PROPER BITS
255          ;OF THE CONTROL AND STATUS REGISTER.  THOSE BITS ARE
256          ;BITS 6-1,8,9,10,11,12,13,15.  BIT 15 WILL CLEAR ONLY
257          ;IF BIT 14 (DRIVE ERROR IS NOT SET).  BIT 0 (DRIVE READY)
T UP THIS TEST BIT          ;IS A DON'T CARE.  IF AT THE STAR
258          ;14 (DRIVE ERROR) IS SET WE WILL INSIST IF IS THERE AFTER
259          ;THE "RESET" ALONG WITH BIT 15 (COMPOSITE ERROR).  BITS
260          ;15-10 ARE NOT WRITEABLE.
261 020214          STARS
262          ;*****
263
264 020214          SETPRI  #PRI07          ;PRIORITY TO SEVEN
265 020214          MOV     #PRI07,R0
266 020220          TRAP    C#SPRI
267 020222          MOV     #377,RLCS      ;LOAD ALL RLCS L
268 020222          OADABLE BITS
269 020230          MOV     #CRDY,GDDAT    ;SETUP EXPECTED
270 020236          BIT     #DERR,RLCS    ;DRIVE ERR SET?
271 020244          BEQ     1$            ;IF NOT DON'T EXPECT IT
272 020246          BIS     #DERR,ERR,GDDAT ;IT'S SET, INIT BETTER NOT CLR
273 020254          MOV     #100,R0       ;SET UP A WAIT LOOP
274 020260          BRESET          ;BUS RESET
275 020260          TRAP    C#RESET
276 020262          DEC     R0            ;WAIT IN CASE OF DRI
277 020262          VE ERROR
278 020264          BNE     2$            ;
279 020266          MOV     #RLCS,BDDAT    ;READ RLCS
280 020274          BIC     #DRDY,BDDAT    ;CLEAR OUT DRDY - DON'T CARE
281 020302          CMP     BDDAT,GDDAT    ;DID INIT WORK
282 020310          BEQ     3$            ;YES, BRANCH
283 020312          ERRDF  13,EM67,ERR2    ;WRONG DATA IN RLCS
284 020312          TRAP    C#ERDF
285 020314          .WORD   13
286 020316          .WORD   EM67
287 020320          .WORD   ERR2
288 020322          3$:
289 020322          ENDTST
290 020322          L10036:
291 020322          TRAP    C#ETST
292 020322          104401
293
294          .SBTTL  **TEST 15** - BUS RESET OF RLBA
295          LNTST
296          ;****START OF TEST****
297          STARS
298          ;*****
299          ;TEST THAT A BUS RESET WILL CLEAR THE ENTIRE
300          ;BUS ADDRESS REGISTER.  THE BUS ADDRESS IS LOADED WITH 177776
301          ;AND
IS EXPECTED TO BE ZERO AFTER THE RESET
302 020324          STARS

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B6

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293
294
295 020324 012777 177776 161720      MOV    #2,RLBA      ;SET BA TO ALL 1'S
296 020332 022737 000001 002410      CMP     #1,T.CNTRL  ;RL11??
297 020340 002403                      BLT     2$          ;NO
298 0
20342 052777 000001 161702          RTS     #1,RLBA
299 020350 005077 002362          2$:   CLR     GDDAT      ;CLEAR EXPECTED DATA
300 020354                      BRESET                     ;ISSUE BUS INIT
      020354 104433                      TRAP    C$RESET
301 020356 017737 161670 002364      MOV     RLBA,BDDAT  ;READ RLBA
302 020364 001404                      BEQ     1$          ;IF CLEAR BRANCH
303
304 020366                      ERRDF  14,,EM70,ERR2 ;WRONG DATA IN RLBA
      020366 104455                      TRAP    C$ERDF
      020370 000016                      .WORD   14
      020372 011371                      .WORD   EM70
      020374 012256                      .WORD   ERR2
305
020376                      1$:
306
307 020376                      ENDTST                     ;****END OF TEST****
      020376 104401                      L10037:
      020376                      TRAP    C$ETST
308
309
310                      .SBTTL  **TEST 16**  BUS RESET OF RLDA
311
312 020400                      BGNTST                     ;****START OF TEST****
313
314 020400                      STARS
      ;*****
      ;TEST THAT A BUS RESET WILL CLEAR THE ENTIRE
      ;DISK ADDRESS REGISTER.  THE DISK ADDRESS IS LOADED WITH 17777
      ;A
NG IS EXPECTED TO BE ZERO AFTER THE RESET.
318 020400                      STARS
      ;*****
319
320
321 020400 012777 177777 161646      MOV     #1,RLDA      ;SET DA TO ALL 1'S
322 020406 005037 002362      CLR     GDDAT      ;CLEAR EXPECTED
323 020412                      BRESET                     ;ISSUE BUS INIT
      020412 104433                      TRAP    C$RESET
324 020414 017737 161634 002364      MOV     RLDA,BDDAT  ;READ RLDA
325 020422 001404                      BEQ     1$          ;IF CLEAR BRANCH
326
327 020                      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 104401                      L10040:
      020434                      TRAP    C$ETST
331
332

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06

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333 .SBTTL
334 **TEST 17** - UNIQUENESS OF RLCS
335 020436 BGNTST ;****START OF TEST****
336
337 020436 STARS
338 ;*****
339 ;TEST THE UNIQUENESS OF THE CONTROL AND STATUS
340 ;REGISTER. THE RLBA AND RLDA ARE PRELOADED WITH
341 ;17776 AND 17777 RESPECTIVELY. THE RLCS IS THEN
342 ;LOADED TO INSURE THAT NEITHER THE RLBA OR RLDA
343 ;ARE MODIFIED BY THE WRITING OF THE RLCS.
020436 STARS ;*****
344
345
346 020436 012737 000201 002332 MOV #DRDY!CRDY,LDCSR ;SET DRIVE AND CONTROLLER READY
347 020444 012777 177776 161600 MOV #2,@RLBA ;SET RLBA TO ALL 1'S
348 020452 012777 177777 161574 MOV #1,@RLDA ;SET RLDA TO ALL 1'S
349 020460 013777 002332 161562 MOV LDCSR,@RLCS ;WRITE RLCS
350
351 ;CHECK THAT RLBA REMAINS UNAFFECTED
352
353 020466 022777 177776 161556 CMP #2,@RLBA ;RLBA OKAY?
354 020474 001412 BEQ 1$ ;YES, GO CHECK DA
355
356 020476 012737 177776 002362 MOV #2,GDDAT ;SET UP EXPECTED
357 020504 017737 161542 002364 MOV @RLBA,BDDAT ;READ RLBA
358
359 020512 104455 ERDF 16,EM72,ERR2 ;CS MODIFIED BA
360 020512 000020 TRAP C$ERDF
361 020514 011463 .WORD 16
362 020516 012256 .WORD EM72
363 020522 104406 1$: CKLOOP ;CHECK IF /FL·LOE IS SET
364 020522 C$CLP1
365 020524 022777 177777 161522 CMP #1,@RLDA ;RLDA OKAY?
366 020532 001412 BEQ 2$ ;YES, CONTINUE
367
368 020534 012737 177777 002362 MOV #1,GDDAT ;SET UP EXPECTED
369 020542 017737 161506 002364 MOV @RLDA,BDDAT ;READ DA
370
371 020550 104455 ERDF 17,EM73,ERR2 ;CS MODIFIED DA
372 020550 000021 TRAP C$ERDF
373 020552 011516 .WORD 17
374 020554 012256 .WORD EM73
375 020556 2$: ERR2
376
377 020560 104401
378
379 020560 104401
380
381 020560 104401
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383 020560 104401
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D6

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377 020562      BGNTST                      ;****START OF TEST****
378 020562      STARS
379              ;:*****
380              ;TEST THE UNIQUENESS OF THE BUS ADDRESS REGISTER.  THE
381              ;RLCS AND RLDA ARE LOADED WITH XXX20X AND 177777
382              ;RESPECTIVELY.  THE RLBA IS THEN WRITTEN TO INSURE
383              ;THAT NEITHER THE RLCS OR RLDA ARE MODIFIED
384 020562      ;BY WRITING THE RLBA.
385              STARS
386              ;:*****
387 020562 012737 000200 002362      MOV      #CRDY,GDDAT      ;CONTROLLER READY
388 020570 032777 040000 161452      BIT
389 020576 001403      ;IF DRIVE ERROR IS
390 020600 052737 140000 002362      BEQ      99$
391 020606 013777 002362 161434      BIS      @ERR!DERR,GDDAT  ;SET THEN EXPECT IT
392 020614 012777 177777 161432      MOV      GDDAT,@RLCS      ;SET WHEN WE READ IT.
393 020622 005077 161424 161432      MOV      #-1,@RLDA      ;LOAD RLCS
394              CLR      @RLBA      ;LOAD RLDA
395              ;CHECK IF RLCS IS OKAY
396              ;
397 020626 017737 161416 002364      MOV      @RLCS,BDDAT      ;CLEAR RLBA
398 020634 042737      ;
000001 002364      BIC      @DRDY,BDDAT      ;CHECK IF RLCS IS OKAY
399 020642 023737 002364 002362      CMP      BDDAT,GDDAT      ;READ RLCS
400 020650 001404      BEQ      1$
401              ;CS OK?
402 020652      ERRDF      18.,EM74,ERR2      ;YES, GO CHECK DA
403 020652 104455      TRAP      C$ERDF
404 020654 000022      .WORD      18
405 020656 011551      .WORD      EM74
406 020660 012256      .WORD      ERR2
407 020662      1$:      CKLOOP
408 020662 104406      TRAP      C$CLP1      ;CHECK IF /FL:LOE IS SET
409 020664 022777 177777 161362      CMP      #-1,@RLDA
410 020672 001412      BEQ      2$
411 020674 012737 177777 002362      MOV      #-1,GDDAT      ;IF OKAY BRANCH
412 020702 017737 161346 002364      MOV      @RLDA,BDDAT      ;SET UP EXPECTED
413 020710      ERRDF      19.,EM75,ERR2      ;READ RLDA
414 020710 104455      TRAP      C$ERDF
415 020712 000023      .WORD      19
416 020714 011603      .WORD      EM75
417 020716 012256      .WORD      ERR2
418 020720      2$:
419 020720      ENDTST
420 020722      L10042:
0          TRAP      C$ETST
          .SBTTL  **TEST 19** - UNIQUENESS OF RLDA
          BGNTST                      ;****START OF TEST****
  
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E6

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431 020722 012737 000200 002362      MOV    #CRDY,GDDAT    ;CONTROLLER READY
432 020730 032777 040000 161312      BIT     #DERR,RLCS    ;IF DRIVE ERROR SET
433 020736 001403      BEQ     99$      ;THEN EXPECT IT LATER
434 020740 052737 140000 002362      BIS     #ERR!DERR,GDDAT
435 020746 013777 002362 161274 99$: MOV     GDDAT,RLCS    ;LOAD CS
436 020754 012777 177776 161270      MOV     #-2,RLBA     ;LOAD BA WITH ALL 1'S
437 020762 005077 161266      CLR     RLDA      ;CLEAR RLDA
438
439      ;CHECK IF RLCS IS OKAY
440
441 020766 017737 161256 002364      MOV     RLCS,BDDAT    ;READ RLCS
442 020774 042737 000001 002364      BIC     #DRDY,BDDAT    ;IGNORE DRIVE READY
443 021000
444 023737 002362 002364      CMP     GDDAT,BDDAT    ;RLCS OKAY?
445 021010 001404      BEQ     1$      ;YES, THEN BRANCH
446 021012
021012 104455      ERDF    20,EM76,ERR2    ;DA MODIFIED CS
021014 000024      TRAP   C$ERDF
021016 011635      .WORD  20
021020 012256      .WORD  EM76
447 021022      1$: CKLOOP   ERR2
021022 104406      TRAP   C$CLP1      ;CHECK IF /FL:LOE IS SET
448
449 021024 022777 177776 161220      CMP     #-2,RLBA     ;IS RLBA OKAY?
450 021032 001412      BEQ     2$      ;BRANCH IF OK
AY 451
452 021034 012737 177776 002362      MOV     #-2,GDDAT    ;SET UP EXPECTED
453 021042 017737 161204 002364      MOV     RLBA,BDDAT    ;READ RLBA
454
455 021050
021050 104455      ERDF    21,EM77,ERR2    ;DA MODIFIED BA
021052 000025      TRAP   C$ERDF
021054 011670      .WORD  21
021056 012256      .WORD  EM77
456 021060      2$:
457
458
459 021060      ENDTST
021060      L10043:
021060 104401      TRAP   C$ETST
460
461      .SBTTL
**TEST 20** - UNIQUENESS OF RLMP
462
463 021062      BGNTST
464
;****END OF TEST****
;****START OF TEST****
  
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F6

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466 021062
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471 021062
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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 021106 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
491 021160 104455                      TRAP      C$ERDF
492 021162 000311                      .WORD      201
493 021164 010204                      .WORD      EM44
494 021166 012256                      .WORD      ERR2
495
496 021170                      1$:      CKLOOP      ;CHECK IF /FL:LOE IS SET
497 021170 104406                      TRAP      C$CLP1
498
499 021172 022777 177776 161052      CMP      @-2,@RLBA      ;IS RLBA OKAY?
500 021200 001412                      BEQ      2$              ;BRANCH IF OKAY
501
362 021202 012737 177776 002      ;SET UP EXPECTED
502 021210 017737 161036 002364      MOV      @RLBA,BDDAT      ;READ RLBA
503
504 021216                      ERRDF      211,,EM45,ERR2      ;MP MODIFIED BA
505 021216 104455                      TRAP      C$ERDF
506 021220 000323                      .WORD      211
507 021222 010237                      .WORD      EM45
508 021224 012256                      .WORD      ERR2
509
510 021226                      2$:      CKLOOP      ;CHECK IF 'FL:LOE IS SET
511 021226 104406                      TRAP      C$CLP1
512 021230 022777 177777 161016      CMP      @-1,@RLDA      ;DISK ADDRESS OKAY
513 021236 001412                      BEQ      3$              ;YES, CONTINUE
514
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
508 021254 104455                      TRAP      C$ERDF
509 021256 000324                      .WORD      212

```

```

08 5          021260 010272          .WORD EM46
      021262 012256          .WORD ERR2

509 021264          3$:
510
511
512 021264          ENDTST          ;****END OF TEST****
      021264          L10044:
      021264 104401          TRAP C$ETST

513          .SBTTL **TEST 21** - NOOP FUNCTION
514
515          BGNST          ;****START OF TEST****
516 021266
517
518
519
520 021266          STARS
      ;*****
      ;TEST THAT NOOP WILL FUNCTION. WE WILL ISSUE THE
      ;NOOP AND WAIT FOR CONTROLLER READY TO SET. A
      ;TIMEOUT OF 200 MILLISECS IS ALLOWED. DRIVE 0 IS ALWAYS
      ;SELECTED SINCE THE DRIVE IS NOT NECESSARY.
      STARS
      ;*****

521
522
523
524
525 021266          ;*****
      ;*****

526
527
528
529 021266 012777 002416 160756          MOV #DBUFF, @RLBA          ;SET UP RLBA FOR TRANSFER          B
530 021274 012700 000000          MOV #0, R0          ;          B
531 021300 010077 160750          MOV R0, @RLDA          ;SET DISK ADDRESS          B
532 021304 012777 177001 160744          MOV #-511          ;
      ;RLMP ;WORD COUNT          B
533 021312 010046          MOV R0, -(SP)          ;SAVE R0
534 021314 004537 015466          JSR R5, LDFUNC          ;ISSUE FUNCTION OF FOLLOWING WORD
535 021320 000000          NOOP0          ;NOOP(0) FUNCTION
536 021322 004537 016354          JSR R5, WTCRDY          ;WAIT FOR CONTROLLER READY HIGH
537 021326 004537 015166          JSR R5, CHERR          ;CHECK CONTROLLER FOR ERRORS
538 021332 012600          MOV (SP)+, R0          ;RESTORE R0
539 021334 020077 160714          CMP R0, @RLDA          ;SEE IF RLDA IS THE SAME FOR 'RL11'          E
540          BEQ 99$          ;BRANCH IF SO, ELSE          B
      021340 001417          ADD #6, R0          ;ASSUME THAT PROCESSOR IS AN LSI11.          B
541          ADD #6, R0          ;GET EXPECTED RLDA AFTER RLV11 'NOP' COMMAND          B
542 021342 062700 000006          CMP R0, @RLDA          ;THE RLDA SHOULD HAVE INCREMENTED BY 6          B
543 021346 020077 160702          BEQ 99$          ;BRANCH IF SO, ELSE          B
544 021352 001412          MOV R0, GDDAT          ;SAVE EXPECTED          B
545 021354 010037 002362          MOV @RLDA, BDDAT          ;SAVE RESULTS          B
546 021360 017737 160670 002364
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      ;*****
562      ;TEST THAT ISSUING A NOOP FUNCTION DOES NOTHING. THIS IS DONE BY WRITING
563 021402      ;THE RLBA, AND RLDA, READING THE RLMP AND MAKING SURE NOTHING CHANGES.
      STARS
      ;*****

564
565 021402 022737 000001 002410      CMP      #1,T.CNTRL      ;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
577 021452 104406      TRAP      C#CLP1
578 021454 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
579 021460      ESCAPE      TST      ;IF /FL:LOE SET LOOP, ELSE EXIT TST
580 021460 104410      TRAP      C#ESCAPE
581 021462 000124      .WORD      L10046-.
582
583 021464
017737 021464 160566 002364 002362 002364      MOV      @RLMP,BDDAT      ;READ RLMP
584 021472 023737 002362      CMP      GDDAT,BDDAT      ;RLMP OK?
585 021500 001404      BEQ      1$
586
587 021502      ERRDF      202.,EM14,ERR2
588 021502 104455      TRAP      C#ERDF
589 021504 000312      .WORD      202
590 021506 007304      .WORD      EM14
591 021510 012256      .WORD      ERR2
592
593 021512      1$:      CKLOOP      ;CHECK IF /FL:LOE IS SET
594 021512 104406      TRAP      C#CLP1
595
596 021514 012737 002416 002362      MOV      @DBUFF,GDDAT      ;SET UP EXP'D BA
597
598 021522 017737 160524 002364      MOV      @RLBA,BDDAT      ;READ BA
599 021530 023737 002362 002364      CMP      GDDAT,BDDAT      ;BA OK?
600 021536 001404      BEQ      2$      ;YES
601
602 021540
594 021540 104455      ERRDF      203.,EM15,ERR2
595 021542 000313      TRAP      C#ERDF
596 021544 007332      .WORD      203
597 021546 012256      .WORD      EM15
598      .WORD      ERR2

```



```

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$ETST
608
609
610          .SBTTL  **TEST 23** - TEST OF INTERRUPT (RL11 ONLY)
611
612 021610          BGMTST          ;****START OF TEST****
613
614 021610          STARS
    615          ;*****
    616          ;CHECK THE INTERRUPT WITH A NOOP. WE WILL SET UP THE
          ;INTERRUPT VECTOR,
          ;A NOOP. THE INTERRUPT SERVICE ROUTINE WILL SET A
          ;FLAG UPON INTERRUPT AND RETURN IN LINE. WE WAIT 200 MILLISECONDS
          ;LOOKING FOR THAT FLAG TO BE SET BEFORE CALLING IT
          ;AN ERROR. IF THE INTERRUPT SENDS US TO ANOTHER
          ;VECTOR ADDRESS THEN THE ERROR HANDLER WILL REPORT
          ;"TRAP TO XXXX FROM YYYY" AND RETURN TO DIAG SUP MONITOR. IF THE
          ;INTERRUPT GOES TO ABOVE 1000 WHO KNOWS WHAT WILL HA
          ;*****
          STARS
          ;*****
624 021611
625
626
627 021611 022737 000001 002410   CMP      #1,T.CNTRL      ;RLV11 OR RLV12?
628 021616 001026          BNE      99$          ;YES SKIP TEST.
629
630 021620 005037 002330          CLR      INTFLG          ;CLEAR INTERRUPT OCCURRENCE FLAG
631 021624          SETPRI      #PRI00          ;SET PSW TO 0
    021624 012700 000000          MOV      #PRI00,R0
    021630 104441          TRAP      C$SPRI
632 021632 004537 015466          JSR      R5,LDFUNC          ;ISSUE F
UNCTION OF FOLLOWING WORD
633 021636 000100          NOOPO!INTEN          ;NOOP AND INTERRUPT ENABLE
634 021640 004537 016354          JSR      R5,WTCRDY          ;WAIT FOR CONTROLLER READY HIGH
635 021644 005737 002330          TST      INTFLG          ;DID INTERRUPT OCCUR
636 021650 001004          BNE      2$          ;IF SO BRANCH
637 021652          ERRDF      22.,EM13,ERRO
    021652 104455   TRAP      C$ERDF
    021654 000026   .WORD     22
    021656 007252   .WORD     EM13
  
```

J6

SEQ 0074
 TEST 23 - TEST OF INTERRUPT (RL11 ONLY)

```

638 021660 012226 002330 2$: .WORD ERRO
639 021662 005037 021666 021666 021666 104406 015166 CLR INTFLG
021666 004537 015166 TRAP C$CLP1 ;CHECK IF /FL:LOE IS SET
021670 004537 015166 JSR R5,CHERR ;CHECK CONTROLLER FOR ERRORS
641
642
643 021674 99$:
644 021674 021674 021674 021674 104401 ENDTST L10047: ;****END OF TEST****
645 TRAP C$ETST
646
647
```

SBTTL
 TEST 24 - TEST PRIORITY BR LEVEL

```

648 BGNTST ;****START OF TEST****
649 021676
650 STARS
651 021676 ;*****
;TEST THAT PRIORITY GIVEN IS ACTUAL PRIORITY OF CONTROLLER. WE KNOW
;THE BOARD WILL INTERRUPT. WE WILL START TRYING TO INTERRUPT AT 7
;AND WORK DOWN TIL IT DOES INTERRUPT.
652 STARS
653 ;*****
654
655 021676
```

```

**
656
657 021676 022737 000001 002410 CMP #1,T.CNTRL ;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****
664 021722 104404 TRAP C$BSEG
665 021724 005037 002330 5$: CLR INTFLG ;CLEAR INTERRUPT OCCURRENCE
666 021730 021730 013700 002364 SETPRI BD
;SET PRIORITY
021730 013700 002364 MOV BDDAT,R0
021734 104441 TRAP C$SPRI
667
668 021736 004537 015466 JSR R5,LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
669 021742 000100 NOOP0!INTEN
670
671 021744 004537 016354 JSR R5,WTCRDY ;WAIT FOR CONTROLLER READY HIGH
672 021750 021750 104410 000070 ESCAPE TST ;IF /FL:LOE SET LOOP, ELSE EXIT TST
021752 000070 TRAP C$ESCAPE
;WORD L10050-.
673
674 021754 004537 015166 JSR R5,CHERR ;CHECK CO
675 021760 021760 104410 000060 ESCAPE TST ;IF /FL:LOE SET LOOP, ELSE EXIT TST
021762 000060 TRAP C$ESCAPE
;WORD L10050-.
676
677 021764 023737 002364 002362 CMP BDDAT,GDDAT ;SHOULD IT INTERRUPT
678 021772 002012 BGE 1$ ;NO, BRANCH
679
680 021774 005737 002330 TST INTFLG ;DID INTERRUPT OCCUR
681 022000 001004 BNE 2$ ;YES, OK
```

SEQ 0075

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$-.
      022016 000405 BR      4$
686 022020 005737 002330 1$:  TST    INTFLG          ;DID INTERRUPT OCCUR
687 0
688 001772          BEQ    2$          ;NO, OK
22024 022026 000765 BR      3$          ;YES, ERROR
689
690
691 022030          ENDSEG          ;****END OF SEGMENT****
      022030 10000$
      022030 104405
692 022032 162737 000040 002364 4$:  TRAP    C$ESEG
693 022040 100331 SUB     #40,BDDAT          ;NEXT LEVEL
694
695 022042          6$:
696 022042          ENDTST          ;****END OF TEST****
      022042 104401 L10050:
      TRAP    C$ETST

697
698
699
700
022044          .SBTTL  **TEST 25** - GET STATUS FUNCTION
701
702          BGNTST          ;****START OF TEST****
703 022044
704          STARS
705          ;*****
706          ;TEST GET STATUS FUNCTION. THE GET STATUS FUNCTION WILL
707          ;WORK IF DRIVE IS LOADED AND READY OR NOT. THE RLDA
708          ;IS LOADED WITH THE GET STATUS AND MARKER BITS (BITS 1,0)
709 0220          ;AND THE FUNCTION IS ISSUED. WE WAIT 200 MILLISECONDS
710          ;FOR CONTROLLER READY. VERIFY THAT NO ERRORS OCCUR.
711          ;*****
44          STARS
712          ;*****
713 022044 012777 000013 160202 MOV     #GSBIT!MK!DRST,BRLDA ;SET GET STATUS AND MARKER BIT
714 022052 004537 015466 JSR     R5,LDFUNC          ;ISSUE FUNCTION OF FOLLOWING WORD
715 022056 000004 GSTAT          ;GET STATUS
716 022060 004537 016354 JSR     R5,WTCRDY          ;WAIT FOR CONTROLLER READY HIGH
717 022064 104406 2$:  CKLOOP TRAP    C$CLP1          ;CHECK IF /FL:LOE IS SET
718
719 022066 004537 015166 JSR     R5,CHERR          ;CHECK CONTROLLER FOR ERRORS
720 022072          ENDTST          ;****END OF TEST****
      022072 104401 L10051:
      TRAP    C$ETST

721
722
723          .SBTTL  **TEST 26** - GET STATUS FUNCTION INTERRUPT

```

```

724
725 022074          BGNTST                      ;****START OF TEST****
726
6
727                ;CHECK GET STATUS UNDER INTERRUPT
728
729 022074 005037 002330      CLR      INTFLG      ;CLEAR INTERRUPT OCCURANCE
730 022100                SETPRI  #PRI00          ;PSW TO LEVEL 0
731 022100 012700 000000      MOV      #PRI00,RO
732 022104 104441            TRAP      C$SPRI
733 022106 012777 000003 160140  MOV      #GSBIT!MK,@RLDA ;SET UP DA
734 022114 004537 015466      JSR      R5,LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
735 022120 000104            GSTAT!INTEN ;GET STATUS, INT ENABLE
736 022122 004537 016354      JSR      R
5,WTCRDY ;WAIT FOR CONTROLLER READY HIGH
737 022126                SETPRI  #PRI07
738 022126 012700 000340      MOV      #PRI07,RO
739 022132 104441            TRAP      C$SPRI
740 022134 005737 002330      TST      INTFLG      ;DID INTERRUPT OCCUR
741 022140 001004            BNE      2$          ;YES-BRANCH
742 022142            ERDF      28,EM30,ERRO
743 022142 104455            TRAP      C$ERDF
744 022144 000034            .WORD    28
745 022146 007441            .WORD    EM30
746 022150 012226            .WORD    ERRO
747 022152                2$: CKLOOP
748 022152 104406            TRAP      C$CLP      ;CHECK IF /FL:LOE IS SET
1
749 022154 004537 015166      JSR      R5,CHERR    ;CHECK CONTROLLER FOR ERRORS
750 022160 005037 002330      CLR      INTFLG      ;CLEAR INTERRUPT OCCURANCE
751 022164                SETPRI  #PRI00          ;PSW TO LEVEL 0
752 022164 012700 000000      MOV      #PRI00,RO
753 022170 104441            TRAP      C$SPRI
754 022172 012777 000003 160054  MOV      #GSBIT!MK,@RLDA ;SET UP DA FOR GET STATUS CMD
755 022200 004537 015466      JSR      R5,LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
756 022204 000004            GSTAT      ;GET STATUS - SHOULD NOT CAUS
E AN INTERRUPT
757 022206 004537 016354      JSR      R5,WTCRDY    ;WAIT FOR CONTROLLER READY HIGH
758 022212                SETPRI  #PRI07
759 022212 012700 000340      MOV      #PRI07,RO
760 022216 104441            TRAP      C$SPRI
761 022220 005737 002330      TST      INTFLG      ;DID INTERRUPT OCCUR (SHOULD NOT)
762 022224 001404            BEQ      3$          ;NO - BRANCH (OK)
763 022226            ERDF      281,EM30A,ERRO
764 022226 104455            TRAP      C$ERDF
765 022230 000431            .WORD    281
766 022232 007500            .WORD    EM30A
767 022234 012226            .WORD    ERRO
768 022236 0          3$: CKLOOP ;CHECK IF /FL:LOE IS SET
22236 022236 104406            TRAP      C$CLP1
769 022240 004537 015166      JSR      R5,CHERR    ;CHECK CONTROLLER FOR ERRORS
770 022244                ENDTST L10052:
771 022244 104401            TRAP      C$ETST      ;****END OF TEST****
772
773                .SBTTL  **TEST 27** - GET STATUS FUNCTION GENERATES OPI W/O GS BIT
774
775                BGNTST                      ;****START OF TEST****
776
777                STARS
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
  
```

TEST 27 GET STATUS FUNCTION GENERATES OPI W/O GS BIT

```

761                                     ;*****
762                                     ;VERIFY THAT GET STATUS FUNCTION WILL NOT COMPLETE
763                                     ;WITHOUT SENDING OUT THE GET STATUS BIT IN THE RLDA.
764                                     ;WE SET MARKER BUT NO GET STATUS BIT IN THE RLDA AND
765                                     ;ISSUE A GET STATUS WE SHOULD RECIEVE AN OPI ERROR.
766                                     ;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 J12737 006053 015450          MOV    #OPIERR, RESTMS
776 022304 004537 015166                JSR    R5, CHERR
777 022310                                1$: CKLOOP
778 022312 104406                        TRAP    C4CLP1
779 022320 032737 002000 002306          BIT    #OPI, E.CS          ;IS OPI SET?
780 022322 001004                        BNE     2$                    ;YES-BRANCH NO-CHECK TIMEOUT
781 022322 104455                        ERDF    29, EM33, ERRO
782 022324 000035                        TRAP    C4ERDF
783 022326 007574                        .WORD   29
784 022330 012226                        .WORD   EM33
785                                     .WORD   ERRO
786
787                                     2$:
788                                     E
789 022332                                     ;****END OF TEST****
790 022332 L10053: TRAP    C4ETST
791 022332 104401
792
793                                     .SBTTL **TEST 28** - OPI UNDER INTERRUPT
794 022334 BGNTST                                     ;****START OF TEST****
795 022334 STARS
796                                     ;*****
797                                     ;FORCE AN OPI ERROR UNDER INTERRUPT TO VERIFY THAT
798                                     ;AN INTERRUPT WILL OCCUR FROM OPI. THE OPI IS FORCED
799                                     ;USING A GET STATUS WITHOUT THE GET STATUS BIT SET
800                                     ;IN RLDA.
801 022334 STARS
802                                     ;*****
803
804 022334 SETPRI #PRI00
805 022334 012700 000000          MOV    #PRI00, R0
806 022340 104441                TRAP    C4SPRI
807 022342 005037 002330          CLR     INTFLG
808 022346 012777 000001 157700          MOV    #MK, @RLDA          ;SET ONLY MARKER BIT!!
809 022354 004537 015466                JSR    R5, LDFUNC          ;ISSUE FUNCTION OF FOLLOWING WORD
810 022360 000104                        GSTAT!INTEN                ;GET STATUS
811 022362                                JSR    R5, WTCRDY          ;WAIT FOR CONTROLLER READY HIGH
812 022366 004537 016354                SETPRI #PRI07
813 022366 012700 000340          MOV    #PRI07, R0

```

```

      022372 104441
804 022374 005737 002330      TRAP      C#SPRI
805 022400 001004              TST      INTFLG      ;INTERRUPT OCCUR
806 022402              BNE      2#
      022402 104455              ERDF      30.,EM11,ERRO
      022404 000036              TRAP      C#ERDF
      022406 007211              .WORD      30
      022410 012226              .WORD      EM11
807 022412              .WORD      ERRO
      022412 104406      2#:      CKLOOP
      022414 032737 074000 002306      TRAP      C#CLP1      ;CHECK IF /FL:LOE IS SET
808 022422 001405              BIT      074000,E.CS
809 022424 012737 006053 015450      BEQ      1#
810 022432 004537 015166              MOV      0OPIERR,RESTMS
811 022436              JSR      R5,CHERR
812 022436 104406      1#:      CKLOOP
      022440 032737 002000 002306      TRAP      C#CLP1
      022440 032737 002000 002306      BIT      0OPI,E.CS      ;IS OPI SET?
814 022446 001004              BNE      3#
815 022450              ERDF      31.,EM33,ERRO      ;YES-BRANCH NO CHECK TIMEOUT
      022450 104455              TRAP      C#ERDF
      022452 000037              .WORD      31
      022454 007574              .WORD      EM33
      022456 012226              .WORD      ERRO
816 022460      3#:
817
818 022460      ENDTST
      022460 L10054:      ;****END OF TEST****
      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
830 022470 004537 016354              JSR      R5,WTCRDY      ;READ HEADER
      ;WAIT FOR CONTROLLER READY HIGH READY
831 022474              2#:      CKLOOP
      022474 104406              TRAP      C#CLP1      ;CHECK IF /FL:LOE IS SET
832 022476 004537 015166              JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
833
834 022502      ENDTST
      022502 L10055:      ;****END OF TEST****
      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 INTERRUPT

```

```

842                                     ;UPON COMPLETION WITHOUT ANY ERRORS SETTING
843 022504 STARS
844                                     ;:*****
845
846 022504 012700 000000 SETPRI #PRI00 ;PSW TO 0
      022504 MOV #PRI00,R0

022510 104441 TRAP C$SPRI
847 022512 005037 002330 CLR INTFLG ;CLEAR INTERRUPT OCCURENCE
848 022516 004537 015466 JSR R5,LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
849 022522 000110 RDHDR!INTEN ;READ HEADER, INTR. ENA
850 022524 004537 016354 JSR R5,WTCRDY ;WAIT FOR CONTROLLER READY HIGH
851 022530 SETPRI #PRI07
      022530 MOV #PRI07,R0
      022534 104441 TRAP C$SPRI
852 022536 005737 002330 TST INTFLG ;INTERRUPT HAPPEN
853 022 BNE 2$ ;YES CONTINUE
542 854 022544 ERRDF 35,EM37,ERR0
      022544 TRAP C$ERDF
      022546 000043 .WORD 35
      022550 007716 .WORD EM37
      022552 012226 .WORD ERRO
855 022554 2$: CKLOOP ;CHECK IF /FL:LOE IS SET
      022554 104406 TRAP C$CLP1
856 857 022556 004537 015166 JSR R5,CHERR ;CHECK CONTROLLER FOR ERRORS
858
859 022562 ENDTST ;****END OF TEST****
      022562 L10056: TRAP C$ETST
      022562 104401

860
861
862 .SBTTL **TEST 31** - REPEATED RD HDRS YIELD SAME CYL AND HD
863 BGNST ;****START OF TEST****
864 022564
865
866 STARS
867 022564 ;:*****
868 ;CHECK THAT READ HEADERS WILL RELIABLY READ THE SAME
869 ;CYLINDER AND HEAD SELECT. WE WILL READ HEADERS VERIFYING
870 ;THAT WE ALWAYS READ THE SAME CYLINDER AND HEAD SELECT.
871 022564 STARS
      ;:*****

*****
872
873 874 022564 012701 000144 MOV #100,R1 ;SET UP TO DO 100 RD HDR'S
875 022570 004537 015466 JSR R5,LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
876 022574 000010 RDHDR ;READ HEADER
877 022576 004537 016354 JSR R5,WTCRDY ;WAIT FOR CONTROLLER READY HIGH
878 022602 99$: ESCAPE TST ;IF /FL:LOE SET LOOP, ELSE EXIT TST
      022602 104410 TRAP C$ESCAPE
      022604 000122 .WORD L10057-.

879
880 022606 004537 0151 JSR R5,CHERR ;CHECK CONTROLLER FOR ERRORS
66 881 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      2$:  TRAP  C#BSEG
886 022634          JSR   R5,LDFUNC      ;ISSUE FUNCTION OF FOLLOWING WORD
887 022634 004537 015466      RDHDR
888 022640 000010          JSR   R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
889 022642 004537 016354      ESCAPE SEG      ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
890 022646          TRAP  C#ESCAPE
      022646 104410      .WORD  10000$- .
      022650 000054
891
892 022652          JSR   R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
      004537 015166      ESCAPE SEG      ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
893 022656          TRAP  C#ESCAPE
      022656 104410      .WORD  10000$- .
      022660 000044
894
895 022662 013737 002314 002364      MOV  E.MP,BDDAT      ;READ HEADER
896 022670 043737 002334 002364      BIC   SECMSK,BDDAT    ;MASK AWAY SECTOR BITS
897 022676 023737 002362 002364      CMP  GDDAT,BDDAT      ;IS HEADER CORRECT
898 022704 001404      BEQ  4$
899
900 022706      ERRDF  36 ,EM41,E
RR4
      022706 104455      TRAP  C#ERDF
      022710 000044      .WORD  36
      022712 007756      .WORD  EM41
      022714 012372      .WORD  ERR4
901
902 022716          4$:  CKLOOP          ;CONSTANT CYL & HS
      022716 104406      TRAP  C#CLP1      ;CHECK IF /FL:LOE IS SET
903
904 022720 005301      DEC  R1          ;PERFORM ALL READ HDR S
905 022722 001344      BNE  2$          ;IF NOT GO BACK AND DO ANOTHER
906 022724          ENDSEG          ;*****END OF SEGMENT****
      022724 10000$:  TRAP  C#ESEG
      022724 104405
907 022726          EN
DTST          ;*****END OF TEST****
      022726          L10057:  TRAP  C#ETST
      022726 104401
908
909          .SBTTL  **TEST 32** - CHECK OF HEADER CRC
910
911          BGNST          ;*****START OF TEST****
912 022730
913          STARS
914 022730          ;*****
          ;CHECK THAT WE CAN READ THE HDCRC AFTER A
          ;READ HEADER AND THAT IT IS THE CORRECT CRC
          ;FOR THE HEADER.
          STARS
          ;*****
*****
919
920
921 022730 005037 023000      CLR  3$

```


TCST 32 - CHECK OF HEADER CRC

```

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$ERDF
    023056 000045          .WORD     37
    023060 010C47          .WORD     EM42
    023062 012372          .WORD     ERR4
948 023064          6$:
949
950 023064          ENDTST                      ;*****END OF TEST****
    023064          L10060:
    023064 104401          TRAP      C$ETST

951
952          .SBTTL  **TEST 33** - CHECK CONSECUTIVE HEADERS
953
954          BGNTST                      ;*****START OF TEST****
955 023066
956
957          STARS
958 023066          ;*****
          ;CHECK THAT THE HEADERS ARE CONSECUTIVE. WE WILL DO
          ;40 (FORTY) READ HEADERS AND STORE EACH. AFTER WE HAVE
          ;READ THE FORTIETH HEADER WE WILL VERIFY THAT
          ;THEY CA
          ;THAT THERE WERE NO ERRORS.
          STARS
          ;*****
MF IN SEQUENTIAL, THAT 0 FOLLOWS 39.
963
964 023066
965
966

```

E/

967	023066	005037	002366	CLR	FIRST	;CLEAR FIRST READ DONE FLAG
968	023072	012703	005274	MOV	#HORBUIF,R3	;STORE HEADERS
969	023076	012701	000050	MOV	#40.,R1	;FORTY HEADERS
970	023102	012737	000210	MOV	#RDHDI:CRDY,B.CS	
971	023110	053737	002270	BIS	DRIVE,B.CS	
972	023116	013777	002272	MOV	B.CS,@RLCS	
973	023124	042777	000200	BIC	#200,@RLCS	
974	023132	032777	000200	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		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	#HORBUIF,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	MOV		
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		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\$	
998	023260	012737	000001	MOV	#1,FIRST	;SET FIRST READ DONE FLAG
999	023266	013737	002364	MOV	BDDAT,GDDAT	;SET UP NEXT READ EXPECTED
1000	023274	000435		BR	6\$;GO SEE IF TEST IS DONE
1001	023276	005237	002362	INC	GDDAT	;INCREMENT EXP'D HEADER
1002	023302	023737	002364	CMP	GDDAT,GDDAT	;IS NEW HEADER SEQUENTIAL?
1003	023310	001766		BEQ	3\$;YES THEN BRANCH
1004	023312	033737	002334	BIT	SECMASK,BDDAT	
1005	023320	001015		BNE	5\$;NO, THEN ERROR GO REPORT IT
1006	023322	013737	002362	MOV	GDDAT,TEMP2	;YES, CHECK IF LAST HEADER WAS
1007	023330	043737	002370	BIC	CYLSK,TEMP2	;MAX ADDRESS, IF SO BRANCH
1008	023336	023737	002372	CMP	MXSEC1,TEMP2	;STORE NEW DATA AS OLD
1009	023344	001750		BEQ	3\$;AND PERFORM NEW RD HDR
1010	023346	043737	002334	BIC	SECMASK,GDDAT	;EXPECTING ZERO SECTOR
1011						
1012	023354					
1013						
1014	023354	005037	002366	CLR	FIRST	;ERROR WILL MAKE US MISS
1015						;NEXT SECTOR SEQUENTIALY
1016						;START OVER; CLEAR FIRST FLAG
1017	023360			ERRDF	38.,EM43,ERR2	
	023360	104455		TRAP	C\$ERRDF	
	023362	000046		.WORD	38	
	023364	010105		.WORD	EM43	
	023366	012256		.WORD	ERR2	
1018	023370			CKLOOP		;CHECK IF /FL:LOE IS SET
	023370	104406		TRAP	C\$CLP1	

SEQ 0083
 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    C4ETST

1025
1026
1027          .SBTTL  **TEST 34** - SEEK FUNCTION
1028
1029 023404          BGNTST          ;****START OF TEST****

1030 023404          STARS
      ;*****
      ;CHECK THE SEEK FUNCTION RETURNS CONTROLLER READY
      ;WITH NO ERRORS WE ISSUE A ONE TRACK IN WORD SEEK.
      ;WE DO NOT CHECK THE RESULT FOR POSITION
      STARS
      ;*****

1035
1036
1037 023404 012777 000205 156642          MOV    #BIT7!MK!SIGN, @RLDA ;SET UP DA-DIFF=1, MARKER, TOWARDS
1038 023412 00          JSR      R5, LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
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:          250. ;IMPLEMENT TIME DELAY
      023432          MOV    #250., (PC)+
      023436          .WORD    0
      023440          MOV    L#DLY, (PC)+
      023444          .WORD    0
      023446          005367 177772          DEC    -6(PC)
      023452
      001375          BNE    .-4
      023454          005367 177756          DEC    -22(PC)
      023460          001367          BNE    .-20
1043 023462 005337 002414          DEC    DLYCNT ;DECREMENT DELAY COUNT
1044 023466          001361          BNE    WAIT1 ;BRANCH IF DELAY NOT EXPIRED
1045 023470          2$:          CKLOOP ;CHECK IF /FL:LOE IS SET
      023470          TRAP    C4CLP1
1046 023472 004537 015166          JSR      R5, CHERR ;CHECK CONTROLLER FOR ERRORS
1047
1048 023476          ENDTST          ;****END OF TEST****
      023476          L10062:
      023476 104401          TRAP    C4ETST

1049

1050
1051          .SBTTL  **TEST 35** - CHECK DRIVE READY ON SEEK
1052
1053 023500          BGNTST          ;****START OF TEST****

1054
1055
1056 023500          STARS
      ;*****
      ;CHECK THE SEEK FUNCTION RETURNS DRIVE READY WITH
      ;NO ERRORS. WE ISSUE A ONE TRACK INWARD SEEK. WE DO
      ;NOT CHECK THE RESULT FOR POSITION
1057
1058
1059

```

SEQ 0084

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
1067 023514 004537 016354              JSR    R5,WTCRDY ;WAIT FOR CONTROLLER READY HIGH
1068 023520
          CKLOOP
1069 023520 104406          TRAP    ;CHECK IF /FL:LOE IS SET
          C#CLP1
1070 023522 004537 015166          JSR    R5,CHERR ;CHECK CONTROLLER FOR ERRORS
1071 023526          CKLOOP          TRAP    ;CHECK IF /FL:LOE IS SET
          C#CLP1
1072
1073 023530 004537 016266          JSR    R5,WTCRDY ;WAIT FOR DRIVE READY
1074 023534          CKLOOP          TRAP    ;CHECK IF /FL:LOE IS SET
          C#CLP1
1075
1076 023536 004537 015166          JSR    R5,CHERR ;CHECK CONTROLLER FOR ERRORS
1077
1078 023
542          ENDTST          ;****END OF TEST****
          L10063:
          TRAP    C#ETST
1079
1080
1081          .SBTTL **TEST 36** - SEEK FUNCTION INTERRUPT
1082
1083 023544          BGMTST          ;****START OF TEST****
1084
1085
1086 023544          STARS
          ;:*****
          ;CHECK THAT CONTROLLER READY RESETING WHEN THE SEEK IS
          ;INITIATED CAUSES AN INTERRUPT BUT DRIVE READY WILL
          ;NOT. WE ALSO MONITOR
1087
1088
1089          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 104406          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
1100 023572 004537 016354          JSR    R5,WTCRDY ;SEEK AND INTR. ENA.
          1101 023576 000240          NOP
          1102 023600 005737 002330          TST    INTFLG ;DID INTERRUPT OCCUR
          1103 023604 001004          BNE    2# ;YES, GO CHECK DRDY
          1104 023606          ERRDF    40.,EM47,ERRO
          023606          TRAP    C#ERDF
          023610 000050          .WORD    40

```

TEST 36 SEEK FUNCTION INTERRUPT

```

1105 023612 010325 .WORD EM47
      023614 012226 .WORD ERRO
      023616 104406 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 104406 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 104406 5$: CKLOOP ;CHECK IF /FL:LOE IS SET
      023636 104406 TRAP C$CLP1

1116
1117 023640 012700 000340 SETPRI #PRI07
      023640 104441 MOV #PRI07,R0
      023644 005737 002330 TRAP C$SPRI
1118 023646 001404 TST INTFLG ;DID DRIVE READY CAUSE INTERRUPT
1119 023652 001404 BEQ 6$ ;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: TRAP C$ETST
      023666 104401

1125
1126
1127 .SBTTL **TEST 37** - TEST DIFFERENCE WORD TRANSMISSION
1128
1129 023670 BGNSTST ;****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      TRAP      C#BSEG      ;****START OF SEGMENT****
      023674 104404
1148 023676      1$:
1149 023676 004537      JSR      R5,LDFUNC      ;ISSUE FUNCTION OF FOLLOWING WORD
015466      RDHDR      ;READ HEADER
1150 023702 000010      JSR      R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
1151 023704 004537 016354      CKLCOP      ;CHECK IF /FL:LOE IS SET
1152 023710      98$:      TRAP      C#CLP1
      023710 104406
1153
1154 023712 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1155 023716      CKLOOP      ;CHECK IF /FL:LOE IS SET
      023716 104406
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
      ;NOT ON TRACK ZERO CALCULATE DIFFERENCE WORD AND PUT IT BACK
1161      ;ON ZERO.
1162
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
1171
1172 023774 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1173 024000      CKLOOP      ;CHECK IF /FL:LOE IS SET
      024000 104406
1174
1175 024002 004537 016266      JSR      R5,W
TDRDY ;WAIT FOR DRIVE READY
1176 024006      89$:      CKLOOP      ;CHECK IF /FL:LOE IS SET
      024006 104406
1177
1178 024010 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1179 024014      CKLOOP      ;CHECK IF /FL:LOE IS SET
      024014 104406
1180
1181 024016 004537 015466      JSR      R5,LDFUNC      ;ISSUE FUNCTION OF FOLLOWING WORD
1182 024022 000010      RDHDR      ;READ HEADER
1183 024024 004537 016354      JSR      R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
1184      96$:      CKLOOP      ;CHECK IF /FL:LOE IS SET
      024030      TRAP      C#CLP1
      024030 104406
1185
1186 024032 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1187 024036      CKLOOP      ;CHECK IF /FL:LOE IS SET
      024036 104406
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,CDDAT      ;READ HEADER
1192 024060 043737 002334 00236      BIC      SECMSK,BDDAT      ;MASK OUT SECTOR BITS
4      001404      BEQ      5$      ;BRANCH IF ON ZERO TRACK
1193 024066

```

```

1194
1195 024070 104455 ERRDF 43.,EM54,ERR3
      024070 000053 TRAP C#ERDF
      024072 010426 .WORD 43
      024074 012320 .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 104406 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 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
      024134 104406 TRAP C#CLP1
1207
1208 024136 004537 016266 87$: JSR R5,WTCRDY ;WAIT FOR DRIVE READY
1209 024142 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
      024142 104406 TRAP C#CLP1
1210
1211 024144 004537 015166 JSR R5,CHERR ;CHECK CONTROLLER FOR ERRORS
1212 024150 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
      024150 104406 TRAP C#CLP1
12
13
1214 024152 004537 015466 JSR R5,LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
1215 024156 000010 RDHDR ;READ HEADER
1216
1217 024160 004537 016354 JSR R5,WTCRDY ;WAIT FOR CONTROLLER READY HIGH
1218 024164 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
      024164 104406 TRAP C#CLP1
1219
1220 024166 004537 015166 JSR R5,CHERR ;CHECK CONTROLLER FOR ERRORS
1221 024172 104410 ESCAPE SEG ;IF /FL:LOE SET LOOP, ELSE EXIT SEG
      024172 000106 TRAP C#ESCAPE
      024174 000106 .WORD 10000$-.
1222
1223 024176 011337 002362 8$: MOV (R3),GDDAT ;GET EXPECTED CYLINDER
1224 024202 011337 002376 MOV (R3),DWORD ;SET UP DIFFERENCE FOR SEEK
1225 024206 013737 002314 002364 MOV E.MP,BDDAT ;READ HEADER FROM RLMP
1226 024214 043737 002334 002364 BIC SECM$K,BDDAT ;CLEAR OUT SECTOR BITS
1227 024222 023737 002362 002364 CMP GDDAT,BDDAT ;DID SEEK GO TO THE RIGHT
1228 024230 001404 BEQ 9$ ;TRACK, IF SO, GO GET NEXT
1229
1230 024232 44.,EM54,ERR3
      ERRDF 104455
      024232 000054 TRAP C#ERDF
      024234 010426 .WORD 44
      024236 012320 .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
  
```

```

00001 1234 024246 023727 002406 0
      1235 024254 001005 T.DRIVE,01
      1236 024256 020327 004726      BNE      24
      1237 024262 001407 004726      CMP      R3,#SKEND
      1238 024264 000137 023676      BEQ      104
      1239                                JMP      14
      1240 024270 020327 004770      24:      CMP      R3,#SKEEND
      1241 024274 001402 004770      BEQ      104
      1242 024276 000137 023676      JMP      14
      1243
      1244 024302      104:
      1245
      1246 024302      ENDSEG
      1247 024302 104405 100004:      ;****END OF SEGMENT****
      1248 024304      ENDTST      ;****END OF TEST**
      1249
      1250 024304 104401 L10065:      TRAP      C#ESEG
      1251                                TRAP      C#ETST
      1252
      1253 .SBTTL **TEST 38** - VERIFY HEAD SELECT 0 VIA RD HDR
      1254 BGNSTST      ;****START OF TEST****
      1255
      1256 024306
      1257 STARS
      1258 ;:*****
      1259 024306 ;CHECK THAT WE CAN SELECT HEAD SELECT ZERO. ISSUE
      ;SEEK TO HEAD SELECT 0 AND VERIFY WITH READ HEADER.
      STARS
      ;:*****
      *****
      1260
      1261 024306 012777 000001 155740 994:      MOV      #MK,0RLDA      ;SET MARKER IN RLDA
      1262 024314 005037 002362      CLR      GDDAT      ;SET EXPECTED
      1263                                ;LOAD HS=0 INTO RLDA
      1264 024320      24:
      1265 024320 004537 015466      JSR      R5,LDFUNC      ;ISSUE FUNCTION OF FOLLOWING WORD
      1266 024324 000006      SEEK
      1267 024326 004537 016354      JSR      R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
      1268 024332      CKLOOP      ;CHECK IF /FL:LOE IS SET
      1269 02      TRAP      C#CLP1
      1270 024334 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
      1271 024340 104406      CKLOOP      ;CHECK IF /FL:LOE IS SET
      1272                                TRAP      C#CLP1
      1273 024342 004537 016266      JSR      R5,WTCRDY      ;WAIT FOR DRIVE READY
      1274 024346 104406      CKLOOP      ;CHECK IF /FL:LOE IS SET
      1275                                TRAP      C#CLP1
      1276 024350 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
      1277 024354      CKLOOP      ;CHECK IF /FL:LOE IS SET
      1278 024      TRAP      C#CLP1
      1279 024356 004537 015466      JSR      R5,LDFUNC      ;ISSUE FUNCTION OF FOLLOWING WORD
      1280 024362 000010      RDHDR      ;READ HEADER

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1281 024364 004537 016354          96+: JSR    R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
1282 024370          CKLOOP          ;CHECK IF /FL:LOE IS SET
      024370 104406          TRAP

C#CLP1
1283          JSR    R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1284 024372 004537 015166          TST          ;IF /FL:LOE SET LOOP, ELSE EXIT TST
1285 024376          ESCAPE          C#ESCAPE
      024376 104410          TRAP      L10066-.
      024400 000036          .WORD    L10066-.

1286          MOV    E,MP,BDDAT     ;READ HEADER FOR HEAD SELECT
1287 024402 013737 002314 002364    BIC    #177677,BDDAT ;MASK ONLY HEAD SELECT
1288 024410 042737 177677 002364    CMP    GDDAT,BDDAT   ;COMPARE HEAD SELECTS
1289 024416 023737 002362 002364    B
1290 024424 001404          ;IF EQUAL CONTINUE
EQ 5:

1291          ERRDF 45.,EM55,ERR4
1292 024426          TRAP C#ERDF
      024426 104455          .WORD    45
      024430 000055          .WORD    EM55
      024432 010465          .WORD    ERR4
      024434 012372          .WORD

1293 024436          5+:
1294          ENDTST                ;****END OF TEST****
1295 024436          L10066:        TRAP    C#ETST
      024436 104401

1296          .SBTTL **TEST 39** - VERIFY HEAD SELECT 1 VIA RD HDR
1297          BGMTST                ;****START OF TEST****
1298
1299 024440
1300
1301
1302
1303 024440          STARS
      ;*****
      ;CHECK THAT WE CAN SELECT HEAD SELECT ONE. ISSUE
      ;SEEK TO HEAD SELECT 1 AND VERIFY WITH READ HEADER.
      STARS
      ;*****

1304
1305
1306 024440

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          ;ISSUE FUNCTION OF FOLLOWING WORD
      2: JSR    R5,LDFUNC          SEEK
1312 024460 000006          JSR    R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
1313 024462 004537 016354          CKLOOP          ;CHECK IF /FL:LOE IS SET
1314 024466          TRAP      C#CLP1
      024466 104406

1315          JSR    R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1316 024470 004537 015166          CKLOOP          ;CHECK IF /FL:LOE IS SET
1317 024474          TRAP      C#CLP1
      024474 104406

1318          JSR    R5,WTCRDY      ;WAIT FOR DRIVE CLEAR
1319 024476 004537 016266          CKLOOP          ;CHECK IF /FL:LOE IS SET
89+: TRAP      C#CLP1

1320 024502          JSR    R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
      024502 104406          CKLOOP          ;CHECK IF /FL:LOE IS SET

1321
1322 024504 004537 015166
1323 024510

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```

    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      #RHMS,GDDAT      ;SET EXPECTED
1336 024560 023737 002362 002364    CMP      GDDAT,BDDAT      ;CORRECT HEAD
1337 024566 001404          BEQ      S#          ;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          S#;
1341
1342 024600          E
NDTST          ;****END OF TEST****
    024600          L10067:
    024600 104401          TRAP      C#ETST
1343
1344          .SBTTL **TEST 40** - VERIFY HEAD SELECT 0 VIA GET STATUS
1345          BGNST          ;****START OF TEST****
1346          STARS
1347 024602          ;*****
1348          ;CHECK THAT WE CAN READ BACK HEAD SELECT 0 WITH
1349 024602          ;A GET STATUS FUNCTION. SELECT H.S. 0 WITH A SEEK
1350          ;VERIFY WITH GET STATUS
1351
1352          STARS
02          ;*****
1353 0246          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,WTCRDY      ;WAIT FOR DRIVE READY

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1367 024642          CKLOOP
      ;CHECK IF /FL:LOE IS SET
      024642 104406   TRAP      C4CLP1
1368
1369 024644 004537 015166   JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1370 024650          CKLOOP   ;CHECK IF /FL:LOE IS SET
      024650 104406   TRAP      C4CLP1
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      C4CLP1
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      C4ESCAPE
      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      64      ;YES, CONTINUE
1385
1386 024730          ERRDF      47.,EM56,ERR4
      024730 104455   TRAP      C4ERDF
      024732 000057   .WORD     47
      024734 010520   .WORD     EM56
      024736 012372   .WORD     ERR4
1387 024740          64:
1388
1389 024740          ENDTST      ;****END OF TEST****
      024740          L10070:
      024740 104401   TRAP      C4ETST
1390
1391          .SBTTL **TEST 41** - VERIFY HEAD SELECT 1 VI
1392
A GET STATUS
1393
1394 024742          BGNTST      ;****START OF TEST****
1395
1396 024742          STARS
      ;*****
      ;CHECK THAT WE CAN READ BACK HEAD SELECT 1 WITH A GET
      ;STATUS FUNCTION. SELECT H.S. 1 WITH A SEEK AND VERIFY WITH
      ;GET STATUS
      STARS
      ;*****
1397
1398
1399
1400 024742
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 24:   MOV      #STHS,GDDAT   ;SET UP EXP'D
1406 024764 004537 015466          34:   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      C4CLP1

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TEST 41 VERIFY HEAD SELECT 1 VIA GET STATUS

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1410
1411 025000 004537 015166 JSR R5,CHERR ;CHECK CONTROLLER FOR ERRORS
1412 025004 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
1413 TRAP C$CLP1
1414 025006 004537 016266 JSR R5,WTDRDY ;WAIT FOR DRIVE READY
1415 025012 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
1416 TRAP C$CLP1
1417 025014 004537 JSR R5,CHERR ;CHECK CONTROLLER FOR ERRORS
015166 1418 025020 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
1419 TRAP C$CLP1
1420 025022 012777 000003 155224 MOV #GSBIT:MK,RLDA ;SET UP FOR GET STATUS IN DA
1421 025030 004537 015466 JSR R5,LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
1422 025034 000004 GSTAT ;GET STATUS
1423 025036 004537 016354 JSR R5,WTCDY ;WAIT FOR CONTROLLER READY HIGH
1424 025042 ESCAPE TST ;IF /FL:LOE SET LOOP, ELSE EXIT TS
T 025042 104410 TRAP C$ESCAPE
025044 000046 .WORD L10071-
1425
1426 025046 004537 015166 JSR R5,CHERR ;CHECK CONTROLLER FOR ERRORS
1427 025052 104410 ESCAPE TST ;IF /FL:LOE SET LOOP, ELSE EXIT TST
025054 000036 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$ERRDF
025104 000060 .WORD 48
025106 010520 .WORD EM56
025110 012372 .WORD ERR4
1435 025112 6$:
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 ;*****
1447 ;VERIFY THAT THE DIFFERENCE WORD ON A SEEK IS
1448 ;TRANSMITTED PRIOR TO CONTROLLER READY SETTING. THIS
1449 ;IS DONE BY SETTING A KNOWN DIFFERENCE WORD IN
1450 ;THE RLDA ISSUING A A SEEK, WAITING FOR CONTROLLER READY
1451 ;(BUT NOT DRIVE READY), WRITING A DIFFERENT RLDA AND WAITING
1452 ;FOR DRIVE RE
ADY: THE RESULTANT POSITION SHOULD BE THAT
;OF THE FIRST RLDA ONLY.

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C8

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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 104406 CKLOOP 99: ;CHECK IF /FL:LOE IS SET
      025126 104406 TRAP C4CLP1
1460
1461 025130 004537 015166 JSR R5,CHERR ;CHECK CONTROLLER FOR ERRORS
1462 025134 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
      025134 104406 TRAP C4CLP1
1463
1464 025136 013737 002314 002362 MOV E.MP,GDDAT ;READ HEADER
1465 025144 043737 002334 002362 BIC SECMASK,GDDAT ;CLEAR SECTOR BITS
146
6 025152 012777 000001 155074 MOV #MK,RLDA ;SET MARKER IN RLDA
1467 025160 032737 000100 002362 BIT #RHMS,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,TMP0 ;STORE HEADER
1471 025204 042737 000100 002354 BIC #RHMS,TMP0 ;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 TMP0,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 TMP0,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 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 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
      025412 104406 TRAP C4CLP1
1501
1502
1503 025414 004537 015166 JSR R5,CHERR ;CHEC
K CONTROLLER FOR ERRORS
1504 025420 104406 CKLOOP ;CHECK IF /FL:LOE IS SET
      025420 104406 TRAP C4CLP1
  
```

08

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

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```

1548
1549
1550 025542 012703 004626      MOV      #SKLST,R3      ;GET LIST OF DIFFERENCE WORDS
1551
025546      BGNSEG      ;****START OF SEGMENT****
1552 025546 104404      TRAP      C4BSEG
1553 025550 004537 015466      14:      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
1557 025562 104406      TRAP      C4CLP1
1558 025564 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1559 025570      CKLOOP
      ;CHECK IF /FL:LOE IS SET
1560 025570 104406      TRAP      C4CLP1
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      S4      ;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      #RHMS,BDDAT      ;CLEAR OUT HEAD SELECT
1569 025616 013777 002364 154      MOV      BDDAT,BRLDA
430 1570 025624 052777 000001 154422      ;PUT CYLINDER AS DIFFERENCE WORD
1571 025632 004537 015466      BIS      #MK,BRLDA      ;SET MARKER BIT
1572 025636 000006      JSR      R5,LDFUNC      ;ISSUE FUNCTION OF FOLLOWING WORD
1573 025640 004537 016354      SEEK      ;SEEK
1574 025644      JSR      R5,WTCRDY      ;WAIT FOR CONTROLLER READY HIGH
1575 025644 104406      CKLOOP      ;CHECK IF /FL:LOE IS SET
1576 025646 004537 015166      TRAP      C4CLP1
1577 0256      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
52 025652 104406      CKLOOP      ;CHECK IF /FL:LOE IS SET
1578 025652 104406      TRAP      C4CLP1
1579 025654 004537 016266      89:      JSR      R5,WTCRDY      ;WAIT FOR DRIVE READY
1580 025660      CKLOOP      ;CHECK IF /FL:LOE IS SET
1581 025660 104406      TRAP      C4CLP1
1582 025662 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1583 025666      CKLOOP      ;CHECK IF /FL:LOE IS SET
1584 025666 104406      TRAP      C4CLP1
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
1590 025702 104406      TRAP      C4CLP1
1591 025704 004537 015166      JSR      R5,CHERR      ;CHECK CONTROLLER FOR ERRORS
1592 025710      CKLOOP      ;CHECK IF /FL:LOE IS SET
1593 025710 104406      TRAP      C4CLP1
1594 025712 005037 002362      CLR      GDDAT      ;CLEAR EXPECTED
  
```

CZRLGEO RL11/RLV11 CTLR TST 1 MACRO V05.01a Tuesda
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TEST 43 - EXTENSIVE CHECK OF HEADER CRC

SEQ 0096

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	SECMASK,BDDAT	;MASK OUT SECTOR BITS
1598	025740	001404			BEQ	54	;BRANCH IF ON ZERO TRACK
1599							
1600	025742				ERRDF	S1,EM54,ERR3	
	025742	104455			TRAP	C#ERDF	
	025744	00006					
3			.WORD	51			
	025746	010426			.WORD	EM54	
	025750	012320			.WORD	ERR3	
1601	025752				CKLOOP		
	025752	104406			TRAP	C#CLP1	;CHECK IF /FL:LOE IS SET
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	025772	004537	016354		JSR	R5,WTCRD	
Y	1608	025772					
	025772				CKLOOP		
	025772	104406			TRAP	C#CLP1	;CHECK IF /FL:LOE IS SET
1609							
1610	026002	004537	015166		JSR	R5,CHERR	;CHECK CONTROLLER FOR ERRORS
1611	026006				CKLOOP		
	026006	104406			TRAP	C#CLP1	;CHECK IF /FL:LOE IS SET
1612							
1613	026010	004537	016266		JSR	R5,WTCRDY	;WAIT FOR DRIVE READY
1614	026014				CKLOOP		
	026014	104406			TRAP	C#CLP1	;CHECK IF /FL:LOE IS SET
1615							
1616							
1617	026016	004537	015166		JSR		
RS,CHERR							
1618	026022				CKLOOP		
	026022	104406			TRAP	C#CLP1	;CHECK IF /FL:LOE IS SET
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		
	026036	104406			TRAP	C#CLP1	;CHECK IF /FL:LOE IS SET
1624							
1625							
1626	026040	004537	015166		JSR	R5,CHERR	;CHECK CONTROLLER
FOR ERRORS							
1627	026044				CKLOOP		
	026044	104406			TRAP	C#CLP1	;CHECK IF /FL:LOE IS SET
1628							
1629	026046	011337	002362		MOV	(R3),GDDAT	;GET EXPECTED CYLINDER
1630	026052	011337	002376		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	SECMASK,BDDAT	;CLEAR OUT SECTOR BITS
1633	026072	023737	002362	002364	CMP	GDDAT,BDDAT	;DID SEEK GO TO THE RIGHT
1634	02						
6100	001404				BEQ	94	;TRACK, IF SO, GO GET NEXT
1635							
1636	026102				ERRDF	S2,EM54,ERR3	
	026102	104455			TRAP	C#ERDF	
	026104	000064			.WORD	S2	
	026106	010426			.WORD	EM54	
	026110	012320			.WORD	ERR3	


```

1637 026112          94:      CKLOOP          ;CHECK IF /FL:LOE IS SET
      026112 104406      TRAP      C4CLP1
1638
1639 0
26114 013737 002314 026130      MOV      E.MP,104      ;GET HEADER WORD
      026122 004537 016100      JSR      R5,SIMBCC      ;GO CALCULATE HEADER CRC
1640 026126 000020      16.      ;16 BITS
1641 026130 000000      104:      .WORD      0      ;HEADER GOES HERE
      026132 000000      .WORD      0      ;START WITH ZERO CRC
1644 026134 013737 002344 026160      MOV      CALBCC,204
1645 026142 013737 002316 026156      MOV      E.MP1,214
1646 026150 004537 016100      JSR      R5,SIMBCC
1647 026154 000020      16.
1648 026156 000000      214:
      .WORD      0
1649 026160 000000      204:      .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      114      ;IF SO CONTINUE
1654
1655 026206      ERRDF      53. ,EM42,ERR4
      026206 104455      TRAP      C4ERDF
      026210 000065      .WORD      53
      026212 010047      .WORD      EM42
      026214 012372      .WORD      E
RR4
1656 026216          114:      CKLOOP          ;CHECK IF /FL:LOE IS SET
      026216 104406      TRAP      C4CLP1
1657
1658
1659 026220 005723          TST      (R3).      ;BUMP PATTERN
1660 026222 023727 002406 000001      CMP      T.DRIVE,#1
1661 026230 001005      BNE      24
1662 026232 020327 004726      CMP      R3,#SKEND
1663 026236 001407      BEQ      124
1664 026240 000137 025550      JMP      14
1665 026244 020327 004770      24:      CMP      R3,#SKEEND
1666 026250 001402      BEQ      124
1667 026252 000137 025550      JMP      14
16
68 026256          124:
1669      ENDSEG
1670 026256 100004:          ;*****END OF SEGMENT*****
      026256 104405      TRAP      C4ESEG
1671 026260          ENDTST
      026260 104401      L10073:      ;*****END OF TEST*****
      026260          TRAP      C4ETST
1672
1673      .SBTTL  **TEST 44** - VERIFY GET STATUS WHILE DRDY IS LOW
1674
1675      BGNTST          ;*****START OF TEST*****
1676 026262
1677
1678 026262      STARS
      ;*****
      ;VERIFY TH
      ;THE STATUS WORD WHILE THE DRIVE IS IN NOTION SEEKING
      STARS
      ;*****
AT WE CAN ISSUE GET STATUS AND RECIEVE
1680
1681 026262

```

H8

1682								
1683								
1684	026262							
1685	026262	004537	015466	14:	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	C4CLP1		
1689								
1690	026276	004537	015166		JSR	R5,CHERR		;CHECK CONTROLLER FOR ERRORS
1691	026302				CKLOOP			;CHECK IF /FL:LOE IS SET
	026302	104406			TRAP	C4CLP1		
1692								
1693	026304	013737	002314 002364		MOV	E.MP,BDDAT		;READ HEADER
1694	026312	043737	002334 002364		BIC	SEC		
MSK,BDDAT								
1695	026320	001461			BEQ	54		;IF ON TRACK ZERO, H.S. ZERO, OK
1696								
1697								
1698								;NOT ON TRACK ZERO CALCULATE DIFFERENCE WORD AND PUT IT BACK
1699								;ON ZERO.
1700	026322	042737	000100 002364		BIC	#RHHS,BDDAT		;CLEAR OUT HEAD SELECT
1701	026330	013777	002364 153716		MOV	BDDAT,BRLDA		;PUT CYLINDER AS DIFFERENCE WORD
1702	026336	052777	000001 153710		BIS	#MK,BRLDA		;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	C4CLP1		
1707								
1708	026360	004537	015166		JSR	R5,CHERR		;CHECK CONTROLLER FOR ERRORS
1709	026364				CKLOOP			;CHECK IF /FL:LOE IS SET
	026364	104406			TRAP	C4CLP1		
1710								
1711	026366	004537	016266		JSR	R5,WTDYD		;WAIT FOR DRIVE READY
1712	026372				CKLOOP			;CHEC
K IF /FL:LOE IS SET								
	026372	104406			TRAP	C4CLP1		
1713								
1714	026374	004537	015166		JSR	R5,CHERR		;CHECK CONTROLLER FOR ERRORS
1715	026400				CKLOOP			;CHECK IF /FL:LOE IS SET
	026400	104406			TRAP	C4CLP1		
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:LOE IS SET
	02641							
4	104406				TRAP	C4CLP1		
1722								
1723	026416	004537	015166		JSR	R5,CHERR		;CHECK CONTROLLER FOR ERRORS
1724	026422				CKLOOP			;CHECK IF /FL:LOE IS SET
	026422	104406			TRAP	C4CLP1		
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	SECMK,BDDAT		;MASK OUT SECTOR BITS
1730	026452	00						
1404					BEQ	54		;BRANCH IF ON ZERO TRACK

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1731
1732 026454      ERRDF      S4.,EMS4,ERR3
      026454      104455      TRAP      C$ERDF
      026456      000066      .WORD      S4
      026460      010426      .WORD      EMS4
      026462      012320      .WORD      ERR3
1733 026464      S$:      CKLOOP      ;CHECK IF /FL:LOE IS SET
      026464      104406      TRAP      C$CLP1
1734
1735 0264      66
      012777      077601      153560      MOV      #77601,0RLDA ;GET DIFFERENCE WORD
      026474      052777      000005      153552      BIS      #SIGN!MK,0RLDA ;SET SIGN (TOWARDS SPINDLE) AND MARKER
      026502      004537      015466      JSR      R5,LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
      026506      000006      SEEK      ;SEEK
      026510      004537      016354      JSR      R5,WTCRDY ;WAIT FOR CONTROLLER READY HIGH
      026514      CKLOOP      ;CHECK IF /FL:LOE IS SET
      026514      104406      TRAP      C$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$CLP1
      026524      012777      000003      153522      MOV      #MK!GSBIT,0RLDA
      026532      004537      015466      JSR      R5,LDFUNC ;ISSUE FUNCTION OF FOLLOWING WORD
      026536      000004      GSTAT
      026540      004537      016354      JSR      R5,WTCRDY ;WAIT FOR CONTROLLER READY HIGH
      026544      CKLOOP      ;CHECK IF /FL:LOE IS SET
      026544      104406      TRAP      C$CLP1
1750 026546      004537      015166      JSR      R5,CHERR ;C
HECK CONTROLLER FOR ERRORS
1751
1752 026552      ENDTST      ;****END OF TEST****
      026552      L10074:      TRAP      C$ETST
      026552      104401
1753
1754 026554      BGNMOD      HRDPRM
1755
1756 026554      BGNHRD
      026554      000032      .WORD      L10075-L$HARD/2
1757
1758
1759 026556      GPRMD      CNTMSG,CNT,0,3,1,3,NO ;WHAT TYPE OF CONTROLLER
      026556      005022      .WORD      T$CODE ;RL11=1, RLV11=2, RLV12=3
      026560      026656      .WORD      CNTMSG
      026562      000003      .WORD      3
      026564      000001      .WO
RD T$LOLIM
      026566      000003      .WORD      T$HILIM ;CONTOLLER BUS ADDRESS
1760
1761 026570      GPRMA      CSRMSG,CSR,0,160000,177776,YES
      026570      000031      .WORD      T$CODE
      026572      026642      .WORD      CSRMSG
      026574      160000      .WORD      T$LOLIM
      026576      177776      .WORD      T$HILIM ;INTERRUPT VECTOR
1762
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

```

Line	Address	Word	Code	Label	Comment
1764	026610		GPRMD	DRMSG, DRBT, 0, 03400, 0, 7, YES	:DRIVE NUMBER
1765	026610	004032	.WORD	T\$CODE	
	026612	026751	.WORD	DRMSG	
	026614	003400	.WORD	03400	
	026616	000000	.WORD	T\$LOLIM	
	026620	000007	.WORD	T\$HILIM	
1766					
1767	026622		GPRML	DRTYPE, TYPDR, 1, YES	:DRIVE TYPE
	026622	00			
3130			.WORD	T\$CODE	
	026624	026727	.WORD	DRTYPE	
	026626	000001	.WORD	1	
1768					
1769	026630		GPRMD	BRMSG, PRIOR, 0, 340, 0, 7, YES	:BREAK LEVEL
	026630	002032	.WORD	T\$CODE	
	026632	026707	.WORD	BRMSG	
	026634	000340	.WORD	340	
	026636	000000	.WORD	T\$LOLIM	
	026640	000007	.WORD	T\$HILIM	
1770					
1771	026642		ENDHRD		
			.EVEN		
	026642		L10075:		
1772					
1773	026642	102	125	123	CSRMSG: .ASCIZ /BUS ADDRESS/
	026645	040	101	104	
	0				
26650	104	122	105		
	026653	123	123	000	
1774	026656	122	114	061	CNTMSG: .ASCIZ /RL11=1, RLV11=2, RLV12=3/
	026661	061	075	061	
	026664	054	040	122	
	026667	114	126	061	
	026672	061	075	062	
	026675	054	040	122	
	026700	114	126	061	
	026703	062	075	063	
	026706	000			
1775	026707	102	122	040	BRMSG: .ASCIZ /BR LEVEL/
	026712	114	105	126	
	026715	105	114	000	
1776	026720	126	105	103	VECMMSG: .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					
1784					

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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$CODE
1790
    026772          GPRMD  EMSG,ELT,0,177777,G,177777,YES
    026772 001032      .WORD  T$CODE
    026774 027030      .WORD  EMSG
    026776 177777      .WORD  177777
    027000 000000      .WORD  T$LOLIM
    027002 177777      .WORD  T$HILIM
1791 027004          1$:  ENDSFT
    027004          .EVEN
    027004          L10076:
1792
1796
1797 027004          104    122    117  DMSG:  .ASCIZ  /DROP ON ERROR LIMIT/
1798 027030          105    122    122  EMSG:  .ASCIZ  /ERROR LIMIT/
1799
1803
1804          .EVEN
1805
1806 027044          ENDMOD
1807 027044          LASTAD
    027044 000000      .EVEN
    027046 000000      .WORD  0
    027050          .WORD  0
    L$LAST::
1808
1809          000001      .END

```

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			
#RESE = 000033	EM32 = 007540	E.MP1 = 002316		
AFTER = 016014	COMP = 006045	C#REVI = 000003	EM33 = 007574	E.MP2 = 002320
ARLBA = 006601	CONT = 014254	C#FLA = 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	CRIM = 006665	C#SPRI = 000041	EM41 = 007756	FRMT1 = 013072
ASSEMB = 000010	CSE = 000037			
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	CYLSK = 002370	DCKMES = 006026	EM47 = 010325	FRMT2 = 013132
BDDAT = 002364				
BEFORE = 015744	C#AU = 000052	DEMES = 005774	EM5 = 007064	FRMT2A = 013151
BEGPAT = 004416	C#AUTO = 000061	DERFLG = 002304	EM52 = 010356	FRMT2B = 013164
BEREG = 006623	C#BRK = 000022	DERR = 040000	EM54 = 010426	FRMT3 = 013200
BGNTST = 014476	C#BSEG = 000004	DIAGMC = 000000	EM55 = 010465	FRMT4 = 013205
BIT0 = 000001 G	C#BSUB = 000002	DLT = 000000	EM56 = 010520	FRMT5 = 013243
	C#CEFG = 000045	DLTMES = 006033	EM57 = 010557	FRMT6 = 013243
BIT00 = 000001 G	C#CLK = 000062	DLYCNT = 002414	EM6 = 007135	FRMT99 = 013240
BIT01 = 000002 G	C#CLEA = 000012	DMG = 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 = 011251	F#END = 000041
	F#DU = 000016	DROP = 013672	EM66 = 011334	F#HARD = 000004
BIT06 = 000100 G	C#DODU = 000051	DRPCOD = 015072 G	EM67 = 007163	F#HW = 000013
BIT07 = 000200 G	C#DRPT = 000024	DRST = 000010	EM7 = 011371	F#INIT = 000006
BIT08 = 000400 G	C#DU = 000053	DRTIM = 006712	EM71 = 011426	F#JMP = 000050
BIT09 = 001000 G	C#EDIT = 000003	DRTYPE = 026727		
BIT1 = 000002 G	C#ERDF = 000055	DRVRDY = 0		
BIT10 = 002000 G	C#ERHR = 000056			
14362	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#PRG = 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	END			
BIT3 = 000010 G	C#ETST = 000001	014536	F#SOFT = 000005	F#SRV = 000010
BIT4 = 000020 G	C#EXIT = 000032	EF.CON = 000036 G	ENDPAT = 004624	F#SUB = 000002
BIT5 = 000040 G	C#GETB = 000026	EF.NEW = 000035 G	ERCOUN = 005074	F#SW = 000014
BIT6 = 000100 G	C#GETW = 000027	EF.PWR = 000034 G	ERPOIN = 005072	F#TEST = 000001
BIT7 = 000200 G	C#GMAN = 000043	EF.RES = 000037 G	ERR = 100000	GDDAT = 002362
BIT8 = 00040		EF.STA = 000040 G	ERRVEC = 002340	
0 G	C#GPHR = 000042			
BIT9 = 001000 G	C#GLO = 000030	012226 G	GLBDAT = 002242 G	
BOE = 000400 G	C#GPRI = 000040	EMSG = 027030	ERR1 = 012244 G	GLBEQA = 002242 G
BPRIOR = 002264	C#INIT = 000011	EM1 = 006740	ERR2 = 012256 G	GLBERR = 012226 G
BRMSG = 026707	C#INLP = 000020	EM101 = 011723	ERR3 = 012320 G	GLBSUB = 015102 G
BVEC = 002266	C#MANI = 000050	EM102 = 011770	ERR4 = 012372 G	GLBTXT = 005774 G
RVR = 000202		EM103 = 012160	ERR5 = 012440 G	GDD = 000000
B.BA = 002274	C#MEM = 000031	EM11 = 007211	ERR6 = 012452 G	GSDIT = 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#CNT0 = 000200
CALBCC = 002344	C#PNTS = 000016	EM17 = 007406	E.BA = 000000	
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

G#HILI- 000002	LINE3 013020	L10002 012316	L10074 026552	RIMP 002256
G#LOLI- 000001	LOE - 040000 G	L10003 012370	L10075 026642	
RL2				
G#NO - 000000	LOT - 000010 G	L10004 012436	L10076 027004	MSK 002334
G#OFFS- 000400	L#ACP 002110 G	L10005 012450	MAXCYL 002400	JEK - 000006
G#OFST- 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	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	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
HCRME 006013	L#DLY 002116 G	L10023 016736	NXMMES 006001	STHS - 000100
HORBUF 005274	L#DTP 002040 G	L10024 017032	NXT 014132	SVCGBL - 000000
HORLST 015706	L#DTP 002034 G	L10025 017152	OKHDR 015716	SVCINS - 000000
HMAX 004734				
L#DU 015072 G	L10026 017256	OPI - 002000	SVCSUB - 177777	
HMFES 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
HDPDM 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#BGSN - 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	TM#FNC 002412
INTEN - 000100	L#HARD 026556 G	L10037 020376	O#GNSW - 000001	TMPO 002354
INTFLG 002330	L#HIME 002120 G	L10040 020434	O#POIN - 000001	TMPI 002356
INTSRV 016260	L#HPCP 002016 G	L10041 020560	O#SETU - 000000	T
MP2 002360				
ISR - 000100 G	L#HPTP 002022 G	L10042 020720	PFLG 002324	TRPFLG 002326
IXE - 004000 G	L#HW 013654 G	L10043 021060	PNT - 001000 G	TRPHAN 016252
I#AU - 000041	L#ICP 002104 G	L10044 021264	PRI - 002000 G	TYPDR - 000006
I#AUTO- 000041	L#INIT 014040 G	L10045 021400	PRIOR - 000004	T#ARGC - 000001
I#CLN - 000041	L#LADP 002026 G	L10046 021606	PRI00 - 000000 G	T#CODE - 001032
I#DU - 000041	L#LAST 027050 G	L10047 021674	PRI	
O1 - 000040 G	L#LOAD 002100 G	L10050 022042	PRI02 - 000100 G	T#EXCP - 000000
I#HRD - 000041	L#LUN 002074 G	L10051 022072	PRI03 - 000140 G	T#FLAG - 000040
I#INIT- 000041	L#MREV 002050 G	L10052 022244	PRI04 - 000200 G	T#GMAN - 000000
I#MOD - 000041	L#NAME 002000 G	L10053 022332	PRI05 - 000240 G	T#HILI - 177777
I#MSG - 000041	L#PRIO 002042 G	L10054 022460	PRI06 - 000300 G	T#LAST - 000001
I#PROT- 000040	L#PROT 014032 G	L1005		
I#PTAB- 000041	L#PRTP 002112 G	L10056 022562	PURFLG 002242	T#LSYM - 010000
S 022502	L#REPP 002062 G	L10057 022726	QMAX 004732	T#LTNO - 000054
I#PWR - 000041	L#REV 002010 G	L10060 023064	QUAMAX 004702	T#NEST - 177777
I#RPT - 000041	L#SOFT 026762 G	L10061 023402	RDHDR - 000010	T#NSO - 000000
I#SEG - 000041	L#SPC 002056 G	L10062 023476	READ - 000014	T#NS1 - 000005
I#SETU- 000041	L#SPCP 023542			
I#SFT - 000041	L#SPTP 002024 G	REST 014200	T#PTNU - 000000	T#SAVL - 177777
I#SRV - 000041	L#STA 002030 G	L10064 023666	RESTMS 015450	T#SEGL - 177777
002020 G	L#SW 013672 G	L10065 024304	RHDINT 006352	T#SEKO - 010000
I#SUB - 000041	L#TEST 002114 G	L10066 024436	RHMES 006312	T#SUBN - 000000
I#TST - 000041	L#TIML 002014 G	L10067 024600	RHMS - 000100	T#TAGL - 177777
J#JMP - 000167		L10070 024740	RLBA 002252	
LDCSR 002332				
LDFUNC 015466				
LF 0				
06043				
LINE1 012552	L#UNIT 002012 G	L10071 025112	RLBE 002260	T#TAGN - 010077
LINE2 012606	L10000 012242	L10072 025540	RLCS 002250	T#TEMP - 000000
	L10001 012254	L10073 026260	RLDA 002254	T#TEST - 000054

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	WAIT0	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	WTDYDY 016266
T#PRG= 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	VECMG	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

[illegible]

[illegible]

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Cross reference table
(CREF V05.01)

L#JMP	2-70				
L#ACP	2-170				
L#APT	2-170				
L#AU	2-17	5-1820			
L#AUT	2-170				
L#AUTO	2-17	5-1080			
L#CCP	2-170				
L#CLEA	2-17	5-1450			
L#CO	2-170				
L#DEPO	2-170				
L#DESC	2-17	2-210			
L#DESP	2-170				
L#DEVP	2-170				
L#DISP	2-17	4-1440			
L#DLY	2-170	5-81	6-276	6-290	8-:42
L#DTP	2-170				
L#DTYP	2-170				
L#DU	2-17	5-1720			
L#DUT	2-170				
L#DVTY	2-17	2-220			
L#EF	2-170				
L#ENVI	2-170				
L#ETP	2-170				
L#EXP					
1	2-170				
L#EXP4	2-170				
L#EXP5	2-170				
L#HARD	2-17	8-A56	8-A560		
L#HIME	2-170				
L#HPCP	2-170				
L#HPTP	2-170				
L#HW	2-17	4-118	4-1180		
L#ICP	2-170				
L#INIT	2-17	5-120			
L#LADP	2-170				
L#LAST	2-17	8-8070			
L#LOAD	2-170				
L#LUN	2-170				
L#MREV	2-170				
L#NAME	2-170				
L#PRIO	2-170				
L#PROT	2-17	5-30			
L#PRT	2-170				
L#REPP	2-170				
L#REV	2-170				
L#SOFT	2-17	8-A87	8-A870		
L#SPC	2-170				
L#SPCP	2-170				
L#SPTP	2-170				
L#STA	2-				
170					
L#SW	2-17	4-132	4-1320		
L#TEST	2-170				
L#TIML	2-170				
L#UNIT	2-170	5-17	5-36		
L10000	4-110				
L10001	4-180				
L10002	4-260				

L10003	4 35#		
L10004	4-44#		
L10005	4 51#		
L10006	4-62#		
L10007	4-71#		
L10010	4-118	4-126#	
L10011	4-132	4-138#	
L10013	5-103#		
L10014	5-141#		
L10015	5-164#		
L10016	5-176#		
L10017	5-186#		
L10020	6-269#		
L10021	7-23#		
L10022	7-49#		
L10023	7-74#		
L10024	7-99#		
L10025	7-141#		
L10026	8-8#		
L10027	8-41#		
L10030	8-79#		
L10031	8-115#		
L10032	8-150#		
L10033	8-182#		
L10034	8-213#		
L10035	8-245#		
L10036	8-281#		
L10037	8-307#		
L10040	8-330#		
L10041	8-372#		
L10042	8-414#		
L10043	8-459#		
L10044	8-512#		
L10045	8-553#		
L10046	8-579	8-607#	
L10047	8-644#		
L10050	8-672	8-675	8-696#
L10051	8-720#		
L10052	8-753#		
L10053	8-783#		
L10054	8-818#		
L10055	8-834#		
L10056	8-859#		
L10057	8-878	8-881	8-907#
L10060	8-925	8-928	8-950#
L10061	8-:24#		
L10062	8-:48#		
L10063	8-:78#		
L10064	8-:24#		
L10065	8-<47#		
L10066	8-<85	8-<95#	
L10067	8-#31	8-#42#	
L10070	8-#79	8-#89#	
L10071	8->24	8->27	8->37#
L10072	8-726	8-736#	
L10073	8-@71#		

Cross reference table (CREF V05.01)

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	8-720	8-753	8-771	8-786	8-a05	8-a20	8-a85	8-A03	8-A18		
LF	8-A37	8-A46												
LINE1	3-15#	6-100												
LINE2	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	
LINE3	4-8	4-31	4-40	4-57	4-76#									
LOE	4-56	4-82#												
LOT	2-26#													
MAXCYL	2-26#													
MAXSEC	2-125#													
MDWEDR	2-123#													
MERLMT	2-15#													
MK	4-135#	6-12												
31	2-51#	8-712	8-7											
	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	8-770	8-a04	8-A02	8-A36	8-A45			
MSCRLF	3-14#	6-95												
MXSEC1	2-122#	8-:08												
NOOPO	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-B07											
OKMOR	6-154#													
OPI	2-31#	6-73	8-778	8-813										
OPIERR	3-17#	8-775	8-810											
OPIMES	3-9#	6-76												

QMAX	2 243*	8->89	8->91	8->92										
QUAMAX	2-231*	8->77	8->79	8->80										
RDMDR	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
	8-754	8-787	8-821	8 886	8-A19									
READ	2 47*													
REST	5-42*													
RESTMS	6-97*	6-139*	8-775*	8-810*	8-987*									
RMDINT	3 23*	6-159												
RMDMES	3 22*	6-158	8-987											
RMS	2 53*	8 :64	8-35	8->67	8->71	8-768	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
RLDA	8-391*	8-397	8-432	8-435*	8-441	8-475	8-478*	8-485	8-972*	8-973*	8-974	8 976	8-202	8 230*
	2-83*	5-61*	5-91*	6-117*	6-180	6-194	7-66	7-71	8-26*	8-28	8-199*	8-201*		
	8-233*													
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*
	8-:65*	8-:66*	8-:98*	8-:99*	8-:61*	8-:09*	8-:10*	8-:55*	8-:72*	8-:03*	8-:04*	8 >20*	8-:66*	8 >69*
	8 >76*	8 >80*	8 >82	8 >88*	8 >92*	8 >94	8-706*	8-769*	8-770*	8-803*	8-804*	8-A01*	8-A02*	8
A35*														
RLMP	8-A36*	8-A45*												
	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*									
8 56	8-56	8-56*	8-79*	8-94	8-94	8-94*	8-115*	8-131						
	8-131	8-131*	8-150*	8-165	8-165	8-165*	8-182*	8-197	8 197	8-197*	8-213*	8-228	8 228	8 228*
	8-245*	8-281*	8-307*	8-330*	8-372*	8-414*	8-459*	8-512*	8-553*	8-607*	8-644*	8-663	8-663	8 663*
	8-696*	8-720*	8 753*	8-783*										

0117

Cross reference table (CREF V05.01)

[illegible]

[illegible]

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SVHD	8->42	8-741	8-741	8-741	8-076	8-076	8-076							
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T#AUT	5-182#	5-186												
T#CLE	5-108#	5-141												
T#DU	5-145#	5-164												
T#HAR	5-172#	5-176												
8-A56	8-A56#	8-A71												
T#HM	4-118	4-118#	4-126											
T#INI	5-12#	5-103												
T#MSG	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												
T#PRO	5-3#													
T#SEG	7-118	7-118#	7-133	7-140	7-140#	7-157	7-157#	7-169	8-7	8-7#	8-23	8-23#	8-33	8-40
1	8-131#	8-144												
	8-149	8-149#	8-165	8-165#	8-176	8-181	8-181#	8-197	8-197#	8-207	8-212	8-212#	8-228	8-228#
	8-239	8-244	8-244#	8-663	8-663#	8-685	8-691	8-691#	8-885	8-885#	8-890	8-893	8-906	8-906#
	8-147	8-147#	8-21	8-46	8-46#	8-751	8-751#	8-070	8-070#					
T#SOF	8-A87	8-A67#	8-A91											
T#SRV	6-265#	6-269												
T#SW	4-132	4-132#	4-138											
T#TES	7-3#	7-23	7-28#	7										
-49	7-54#	7-74	7-79#	7-99	7-104#	7-141	7-146#	8-8	8-13#	8-41				
	8-46#	8-79	8-84#	8-115	8-120#	8-150	8-155#	8-182	8-187#	8-213	8-218#	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#	8-672	8-675	8-696	8-700#	8-720	8-725#	8-753	8-758#
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	8-950	8-955#	8-124	8-129#	8-148	8-153#	8-178	8-183#	8-124	8-129#	8-147	8-152#	8-165	8-195
	8-00#	8-31	8-42	8-47#	8-79	8-89	8-94#	8-24	8-27	8-37	8-42#	8-726	8-736	8-741#
	8-071	8-076#	8-A52											
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	4-32	4-32#	4-32#	4-32#	4-32#	4-41	4-41	4-41	4-41	4-41#	4-41#	4-41#	4-60	4-60
	4-60#	4-67	4-67	4-67	4-67#	4-67#	4-73	4-73	4-73	4-73	4-73#	4-73#	4-73#	4-76
	4-76	4-76	4-76	4-76	4-76	4-76	4							
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	4-77	4-77	4-77	4-77	4-77#	4-77#	4-77#	4-77#	4-77#	4-77#	4-78	4-78	4-78	4-78
	4-78	4-78	4-78#	4-78#	4-78#	4-78#	4-78#	4-78#	4-78#	4-78#	4-79	4-79	4-79	4-79
	4-79#	4-79#	4-79#	4-79#	4-79#	4-79#	4-82	4-82	4-82#	4-82#	4-83	4-83	4-83	4-83#
	4-83#	5-86	5-86	5-86										
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	8-175#	8-206	8-206#	8-238	8-238#	8-279	8-279#	8-304	8-304#	8-327	8-327#	8		
359	8-359#	8-368												
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	8-507#	8-547	8-547#	8-585	8-585#	8-594	8-594#	8-603	8-603#	8-637	8-637#	8-683	8-683#	8-738
	8-738#	8-750	8-750#	8-780	8-780#	8-806	8-806#	8-815	8-815#	8-854	8-854#	8-900	8-900#	8-947
	8-947#	8-117	8-117#	8-104	8-104#	8-121	8-121#	8-195	8-195					
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	8-A32#													
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	8-109#	8-144	8-144#	8-144#	8-176	8-176#								
8-176#	8-207	8-207#	8-207#	8-239	8-239#	8-239#	8-579	8-675#	8-675#	8-685	8-685#	8-685#	8-685#	8-685#
	8-579#	8-579#	8-672	8-672#	8-672#	8-675	8-675#	8-675#	8-675#	8-685	8-685#	8-685#	8-685#	8-685#

	8-881	8-881#	8-881#	8-890	8-890#	8-890#	8-893	8-893#	8-893#	8-925	8-925#	8-925#	8-928	8-928#
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	5-164	5-176	5-186	6-269	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	8-736	8-871	8-A52	8-A71	8-A91						
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	3-93#	4-3	4-3	4-3#	4-5	4-5	4-5#	4-11	4-11	4-11	4-11#	4-13	4-13	4-13#
	4-													
18	4-18	4-18	4-18#	4-20	4-20	4-20#	4-26	4-26	4-26	4-26#	4-28	4-28	4-28#	
	4-35	4-35	4-35	4-35#	4-37	4-37	4-37#	4-44	4-44	4-44	4-44#	4-46	4-46	4-46#
	4-51	4-51	4-51	4-51#	4-53	4-53	4-53#	4-62	4-62	4-62	4-62#	4-64	4-64	4-64#
	4-71	4-71	4-71	4-71#	4-114	4-114	4-114	4-114#	4-116	4-116	4-116#	4-118	4-11	
8	4-118#													
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	4-138	4-138	4-138	4-138#	4-140	4-140	4-140	4-140#	4-142	4-142	4-142#	4-146	4-146	4-146#
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	5-103	5-103	5-103	5-103#	5-105	5-105	5-105	5-105#	5-108	5-108				
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	5-166#	5-170	5-170	5-170#	5-172	5-172	5-172#	5-176	5-176	5-176	5-176#	5-178	5-178	5-178
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	7-99#	7-104	7-104	7-104#	7-118	7-118	7-118#	7-140	7-140	7-140	7-140#	7-141	7-141	7-141
	7-141#	7-146	7-146	7-146#	7-15	7-15								
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	8-41#	8-46	8-46	8-46#	8-56	8-56	8-56#	8-78	8-78	8-78	8-78#	8-79	8-79	8-79
	8-79#	8-84	8-84	8-84#	8-94	8-94	8-94#	8-114	8-114	8-114	8-114#	8-115	8-115	8-115
	8-115#	8-120												
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	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-:726	8-:726#	8-:736	8-:736#	8-:742	8-:742#
	8-:747	8-:747#	8-:770	8-:770#	8-:771	8-:771#	8-:778	8-:778#	8-:781	8-:781#	8-:781#	8-:781#	8-:781#	8-:781#
	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	8-163	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#	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	8-46#	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
	8													
-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#	8-788
	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	8-838	8-838	8-838#	8-864	8-864	8-864#	8-912	8-912	8-912#	8-955	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
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#	8-741	8-741	8-741#	8-741#	8-741#	8-741#	8-741#	8-741#	8-741#	8-741#	8-741#	8-741#	8-741#
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

SEQ 0124
Cross reference table (CREF V05.01)

SEQ 0124

Cross reference table (CREF V05.01)

[illegible]

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Cross reference table (CREF V05.01)

[illegible]

BOMPL	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				
BGNMSG	6-4	8-A54	8-A85														
BGNPRO	1-98#	2-7#	4-5	4-13	4-20	4-28	4-37	4-46	4-53	4-64							
BGNPTA	1-106#	2-7#	5-3														
BGNRPT	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			
BGNSET	8-751																
-7#	1-161#	2															
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															
BNCOMP	8-;94	8-;42	8-741	8-;76	5-100												
BNERRO	1-266#	2-7#	5-16	5-22													
BREAK	1-270#	2-7#															
BRESET	1-274#	2-7#															
CKLOOP	1-278#	2-7#	5-14	8-271	8-300	8-323											
	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</														

Cross reference table (CREF V05.01)

ENDHWH	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	8-736	8-@71	8-A52																
EQUALS	1-642#	2-7#	2-26																	
ERRDF	1-714#	2-7#	6-100	6-280	6-296	7-132	7-168	8-32	8-70	8-108	8-143	8-175	8-206	8-238						
	8-279	8-304	8-327	8-359	8-368	8-402	8-412	8-44f	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- i21	8- i95	8-<30	8-<92	8-=39	8-=86	8->34	8-733	8-@00	8-@36	8 @55	8-A32								
ERRHRD	1-718#	2-7#																		
ERROR	1-722#	2-7#																		
ERRSF	1-726#	2-7#	7-21	7-47	7-72	7-97														
ERRSOF	1-730#	2-7#																		
ERRTBL	1-734#	2-7#																		
ESCAPE	1-744#	2-7#	7-133	7-169	8-33	8-71	8-109	8-144	8-17											
6	8-207	8-239	8-579	8-672	8-675															
	8-685	8-878	8-881	8-890	8-893	8-925	8-928	8-<21	8 <85	8-=31	8 =79	8 >24	8- >27	8-726						
EXIT	1-771#	2-7#																		
FEQUAL	1-810#	2-7#																		
GETBYT	1-824#	2-7#																		
GETPRI	1-834#	2-7#																		
GETWOR	1-829#	2-7#																		
GMANIA	1-839#	2-7#																		
GMANID	1-848#	2-7#																		
GMANIL	1-859#	2-7#																		
GPHARD	1-868#	2-7#	5-42																	
GPRMA	1-874#	2-7#	8-A61	8-A63																
GPRMD	1-903#	2-7#	8-A59	8-A65																
8-A69		8-A90																		
GPRML	1-934#	2-7#	8-A67	8-A88																
HEADER	1-954#	2-7#	2-17																	
INLOOP	1-962#	2-7#	6-7																	
IOSETU	1-966#	2-7#																		
IOSTAR	1-974#	2-7#																		
KT11	1-982#	2-7#																		
LASTAD	1- i47#	2-7#	8-B07																	
M#BYTE	1 D00#	2-7#	2-17	2-17	2-17	2-17#														
M#CHEC	1-E18#	2-7#																		
M#CNT0	1-E82#	2-7#	8-A59	8-A59#	8-A61	8-A61#	8-A63	8-A63#	8-A65	8-A65#	8-A67	8 A67#	8 A69	8 A69#						
	8-A88	8-A88#	8 A90	8-A90#																
M#COUN	1-D66#	2-7#	4-23	4-23	4-23#	4-32	4 32	4-32	4-32#	4-41	4 41	4 41#	4-60	4 60#						
	4-67	4-67#	4-73	4-73	4-73#	4-76	4-76	4-76	4-76	4 76	4 76#	4-77	4 77	4 77						
	4-77	4-77#	4-78	4-78	4-78	4-78	4-78	4-78#	4-79	4-79	4 79	4 79	4 79#	4 82						

SEQ 0128

Cross reference table (CREF V05.01)

M#DATA	4-82#	4-83	4-83#	5-86	5-66#	5-126	5-126#	5-137	5-137#	6-15	6-15#	2-17	2-17	2-17
	1-867#	2-7#	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
17	2-17	2-17	2-17	2-17#	2-17#	2-21	2-17	2	2-17	2-17	2-17	2-17	2-17	2-17
M#DECR	2-21#	2-22	2-22#											
	1-029#	2-7#	2-19	2-19#	2-72	2-72#	2-298	2-298#	3-93	3-93#	4-11	4-11#	4-18	4-18#
	4-26	4-26#	4-35	4-35#	4-44	4-44#	4-51	4-51#	4-62	4-62#	4-71	4-71#	4-114	4-114#
	4-126	4-126#	4-128	4-128#	4-138	4-138#	4-140	4-140#	4-146	4-146#	5-7	5-7#	5-103	5-103#
	5-105													
5 105#	5-141	5-141#	5-164	5-164#	5-166	5-166#	5-176	5-176#	5-178	5-178#	5-186	5-186#		
	5-188	5-188#	6-269	6-269#	6-304	6-304#	7-23	7-23#	7-49	7-49#	7-74	7-74#	7-99	7-99#
	7-140	7-140#	7-140#	7-140#	7-141	7-141#	8-7	8-7#	8-7#	8-7#	8-8	8-8#	8-40	8-40#
8-114#	8-40#	8-40#	8-41	8-41#	8-78	8-78#	8-78#	8-78#	8-79	8-79#	8-114	8-114#	8-114#	
	8-115	8-115#	8-149	8-149#	8-149#	8-149#	8-150	8-150#	8-181	8-181#	8-181#	8-181#	8-182	8-182#
	8-212	8-212#	8-212#	8-212#	8-213	8-213#	8-244	8-244#	8-244#	8-244#	8-245	8-245#	8-281	8-281#
	8-307	8-307#	8-330	8-330#	8-372	8-372#	8-414	8-414#	8-459	8-459#	8-512	8-512#	8-553	8-553#
	8-607	8-607#	8-644	8-644#	8-691	8-691#	8-691#	8-691#	8-696	8-696#	8			
-720	8-720#	8-753	8-753#											
	8-783	8-783#	8-818	8-818#	8-834	8-834#	8-859	8-859#	8-906	8-906#	8-906#	8-906#	8-907	8-907#
	8-950	8-950#	8-:24	8-:24#	8-:48	8-:48#	8-:78	8-:78#	8-:24	8-:24#	8-:46	8-:46#	8-:46#	8-:46#
	8-:47	8-:47#	8-:95	8-:95#	8-:42	8-:42#	8-:89	8-:89#	8-:37	8-:37#	8-736	8-736#	8-:70	8-:70#
	8-:70#	8-:70#	8-:71	8-:71#	8-:52	8-:52#	8-:71	8-:71#						
1#	8-A81	8-A81#	8-A91	8-A91#	8-B06	8-B06#								
M#DEFA	1-E70#	2-7#	8-A59	8-A59#	8-A61	8-A61#	8-A63	8-A63#	8-A65	8-A65#	8-A67	8-A67#	8-A69	8-A69#
	8-A88	8-A88#	8-A90	8-A90#										
M#ENDE	1-074#	2-7#	2-19#	2-72#	2-298#	3-93#	4-11#	4-18#	4-26#	4-35#	4-44#	4-51#	4-62#	4-71#
	4-114#	4-126#	4-128#	4-138#	4-140#	4-146#	5-103#	5-105#	5-141#	5-164#	5-166#	5-176#	5-178#	5-186#
5-188#	6-269#	6-304#	7-23#	7-49#	7-74#	7-99#	7-140#	7-141#	8-7#	8-8#	8-40#	8-41#	8-78#	
	8-79#	8-114#	8-115#	8-149#	8-150#	8-181#	8-182#	8-212#	8-213#	8-244#	8-245#	8-281#	8-307#	8-330#
	8-372#	8-414#	8-459#	8-512#	8-553#	8-607#	8-644#	8-691#	8-696#	8-720#	8-753#	8-783#	8-818#	8-834#
	8-859#	8-906#	8-907#	8-950#	8-:24#	8-:48#	8-:78#	8-:24#	8-:46#	8-:47#	8-:95#	8-:42#	8	
-:89#	8-:37#													
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	7-97	7-97#	7-132	7-132#	7-168	7-168#	8-32	8-32#	8-70	8-70#	8-108	8-108#	8-143	8-143#
	8-175	8-175#	8-206	8-206#	8-238	8-238#	8-279	8-279#	8-304	8-304#	8-327	8-327#	8-359	8-359#
	8-368													
8-368#	8-402	8-402#	8-412	8-412#	8-446	8-446#	8-455	8-455#	8-490	8-490#	8-499	8-499#		
	8-507	8-507#	8-547	8-547#	8-585	8-585#	8-594	8-594#	8-603	8-603#	8-637	8-637#	8-683	8-683#
	8-738	8-738#	8-750	8-750#	8-780	8-780#	8-806	8-806#	8-815	8-815#	8-854	8-854#	8-900	8-900#
	8-947	8-947#	8-:17	8-:17#	8-:04	8-:04#	8-:21	8-:21#	8-:95	8-:95#	8-:30	8-:30#	8-:92	
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	8-672#	8-675	8-675#	8-685#	8-878	8-878#	8-881	8-881#	8-890#	8-893#	8-925	8-925#	8-928	8-928#
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>24	8-:24#	8-:27	8-:27#	8-:26	8-:26#									
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	8-176	8-176#	8-207	8-207#	8-239	8-239#	8-579#	8-672#	8-675#	8-685	8-685#	8-878#	8-881#	8-890
	8-890#	8-893	8-893#	8-925#	8-928#	8-:21	8-:21#	8-:85#	8-:31#	8-:79#	8-:24#	8-:27#	8-726#	
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	4-46	4-460	4-51	4-510	4-53	4-530	4 62	4-620	4 64	4-350	4-37	4-370	4 440
4 640	4-71	4 710	4-116	4-1160	4-126	4-1260	4 130	4-1300	4-132	4-1320	4-138	4-1380	4 142
	4 110	4-1100	4-1100	4-126	4-1260	4 130	4-1300	4-132	4-1320	4-138	4-1380	4 142	4 1420
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6 2650	6 269	6-2690	7-3	7-30	7-54	7-540	7-74	7-740	7-79	7-790	7-99	7-990	7 140
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8-855#	8-856	8-856#	8-856#	8-870	8-870#	8-871	8-871#	8-888	8-888#	8-891	8-891#	8-A06	8-A06#	8-A09
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8-A69	8-A69	8-A69	8-A69	8-A69	8-A69	8-A69	8-A69#	8-A71	8-A71#	8-A87	8-A87#	8-A88	8-A88	8-A88#
8-A89	8-A89#	8-A90	8-A90	8-A90	8-A90	8-A90	8-A90	8-A90#	8-A91	8-A91#	8-B07	8-B07	8	8
B07	8-B07#													
8-B07#	8-B07#													
MIGNLS	1-C13#	2-7#	7-140	7-140#	8-7	8-7#	8-40	8-40#	8-78	8-78#	8-114	8-114#	8-149	8-149#
8-181	8-181#	8-212	8-212#	8-244	8-244#	8-691	8-691#	8-906	8-906#	8-46	8-46#	8-46#	8-46#	8-46#
MIGNSU	1-B98#	2-7#												
MIGNTA	1-B90#	2-7#	4-11	4-11#	4-18	4-18#	4-26	4-26#	4-35	4-35#	4-44	4-44#	4-51	4-51#
4-62	4-62#	4-71	4-71#											
4-126	4-126#	4-138	4-138#	5-103	5-103#	5-141	5-141#	5-164	5-164#					
5-176	5-176#	5-186	5-186#	6-269	6-269#	7-23	7-23#	7-49	7-49#	7-74	7-74#	7-99	7-99#	7-99#
7-141	7-141#	8-8	8-8#	8-41	8-41#	8-79	8-79#	8-115	8-115#	8-150	8-150#	8-182	8-182#	8-182#
8-213	8-213#	8-245	8-245#	8-281	8-281#	8-307	8-307#	8-330	8-330#	8-372	8-372#	8-414	8-414#	8-414#
8-459#	8-512	8-512#	8-553	8-553#	8-607	8-607#	8-644	8-644#	8-696	8-696#	8-720	8-720#	8-720#	8-720#
8-753	8-753#	8-783	8-783#	8-818	8-818#	8-834	8-834#	8-859	8-859#	8-907	8-907#	8-950	8-950#	8-950#
8-24	8-24#	8-48	8-48#	8-78	8-78#	8-24	8-24#	8-47	8-47#	8-95	8-95#	8-42	8-42#	8-42#
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MIGNTE	8-13	8-13#	8-46	8-46#	8-84	8-84#	8-120	8-120#	8-155	8-155#	8-187	8-187#	8-218	8-218#
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8-516	8-516#	8-558	8-558#	8-612	8-612#	8-649	8-649#	8-700	8-700#	8-725	8-725#			
8-725#	8-758	8-758#												
8-788	8-788#	8-822	8-822#	8-838	8-838#	8-864	8-864#	8-912	8-912#	8-955	8-955#	8-955#	8-955#	8-955#
8-53	8-53#	8-83	8-83#	8-29	8-29#	8-52	8-52#	8-00	8-00#	8-47	8-47#	8-94	8-94#	8-94#
8-42	8-42#	8-741	8-741#	8-876	8-876#									
MHAPT	1-A39#	2-7#	2-17	2-17#										
MHNAP	1-B24#	2-7#	2-17	2-17#										
MINCR	1-D26#	2-7#	2-15	2-15#	2-24	2-24#	2							
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4-28	4-28#	4-28#	4-28#	4-32#	4-35#	4-37	4-37#	4-37#	4-37#	4-37#	4-41#	4-44#	4-46	4-46#
4-46#	4-46#	4-51#	4-53	4-53#	4-53#	4-53#	4-53#	4-60#	4-62#	4-64	4-64#	4-64#	4-64#	4-67#
4-71#	4-73#	4-76#	4-77											
4-78#	4-79#	4-82#	4-83#	4-116	4-116#	4-118	4-118#	4-118#	4-118#	4-118#	4-118#			
4-130	4-130#	4-132	4-132#	4-132#	4-132#	4-142	4-142#	5-3	5-3#	5-3#	5-3#	5-3#	5-10	5-10#
5-12	5-12#	5-12#	5-12#	5-14#	5-15#	5-19#	5-21#	5-30#	5-42#	5-86#	5-89#	5-90#	5-97#	5-97#
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5-143#														
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8-32#	8-33#	8-40#	8-41#	8-46	8-46#	8-46	8-46#	8-46#	8-46#	8-46#	8-56	8-56#	8-56#	8-56#
8-56#	8-56#	8-56#	8-70#	8-71#	8-78#	8-79#	8-84	8-84#	8-84#	8-84#	8-84#	8-84#	8-84#	8-84#
8-94	8-94#	8-94#	8-94#	8-94#	8-94#	8-94#	8-108#	8-109#						
8-114#	8-115#	8-120	8-120#	8-120#	8-120#	8-131#	8-131#	8-131#	8-131#	8-143#	8-144#	8-149#	8-150#	8-155
8-120#	8-120#	8-131	8-131#	8-131	8-131#	8-165	8-165#	8-165#	8-165#	8-165#	8-165#	8-165#	8-175#	8-176#
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	8-264#	8-271#	8-279#	8-281#	8-286	8-286	8-286	8-286#	8-286#	8-286#	8-300#	8-304#	8-307#
8-312	8-312	8-312	8-312#	8-312#	8-312#	8-323#	8-327#	8-330#	8-335	8-335	8-335	8-335#	8-335#
	8-359#	8-360#	8-368#	8-372#	8-377	8-377	8-377	8-377#	8-377#	8-377#	8-402#	8-403#	8-412#
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	8-675#	8-683#	8-685#	8-691#	8-696#	8-700	8-700	8-700	8-700	8-700	8-700	8-700	8-700
8-700#	8-700#	8-700#	8-716#	8-720#	8-725	8-730#	8-735#	8-738#	8-739#	8-742#	8-747#	8-750#	8-751#
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	8-788#	8-797#	8-803#	8-806#	8-807#	8-812#	8-815#	8-818#	8-822	8-822	8-822	8-822#	8-822#
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	8-;29#	8-;29#	-	-	-	-	-	-	-	-	-	-	-
:29#	8-;45#	8-;48#	8-;53	8-;53	8-;53	8-;53#	8-;53#	8-;53#	8-;53#	8-;68#	8-;71#	8-;74#	8-;74#
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	8-;22#	8-;24#	8-;29	8-;29	8-;29	8-;29#	8-;29#	8-;29#	8-;29#	8-;47	8-;47	8-;47	8-;47#
	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-<12#	8-<18#	8-<21#	8-<30#	8-<31#	8-<46#	8-<47#	8-<52	8-<52	8-<52	8-<52#	8-<52#	8-<68#
	8-<71#	8-<74#	8-<77#	8-<82#	8-<85#	8-<92#	8-<95#	8-=00	8-=00	8-=00	8-=00#	8-=00#	8-=14#
	8-=17#	8=-20#	8=-23#	8=-28#	8=-31#	8=-39#	8=-42#	8-=47	8-=47	8-=47	8-=47#	8-=47#	8=-61#
	8-64#	8=67#	8=70#	8=76#	8=79#	8=86#	8=89#	8=94	8=94	8=94	8=94#	8=94#	8=94#

M\$PRIN	1-836#	2-7#	4-23	4-23#	4-32	4-32#	4-41	4-41#	4-60	4-60#	4-67	4-67#	4-73	4-73#
	4-76	4-76#	4-77	4-77#	4-78	4-78#	4-79	4-79#	4-82	4-82#	4-83	4-83#	5-86	5-86#
M\$PUSH	5-126	5-126#	5-137	5-137#	6-15	6-15#								
	1-831#	2-7#	2-15	2-15#	2-24	2-24								
	2-24#	2-7#	2-7#	3-1	3-1#	4-3	4-3#	4-5	4-5#					
	4-13	4-13#	4-20	4-20#	4-28	4-28#	4-37	4-37#	4-46	4-46#	4-53	4-53#	4-64	4-64#
	4-116	4-116#	4-118	4-118#	4-130	4-130#	4-132	4-132#	4-142	4-142#	5-3	5-3#	5-10	5-10#
	5-12	5-12#	5-108	5-108#	5-143	5-143#	5-145	5-145#	5-170	5-170#	5-172	5-172#	5-180	5-180#
	5-182	5-182#												
6 4	6-4#	6-265	6-265#	7-3	7-3#	7-28	7-28#	7-54	7-54#	7-79	7-79#			
	7-104	7-104#	7-118	7-118#	7-146	7-146#	7-157	7-157#	7-157#	8-13	8-13#	8-23	8-23#	
	8-23#	8-46	8-46#	8-56	8-56#	8-84	8-84#	8-94	8-94#	8-120	8-120#	8-131	8-131#	
	8-131	8-131#	8-155	8-155#	8-165	8-165#	8-187	8-187#	8-197	8-197#	8-218	8-218#		
	8-228	8-228#	8-228#	8-250	8-250#	8-286	8-286#	8-312	8-312#	8-335	8-335#	8-377	8-377#	8-419
	8-419#	8-463	8-463#	8-516	8-516#	8-558	8-558#	8-612	8-612#	8-649	8-649#	8-663	8-663#	8-663#
	8-700	8-700#	8-725	8-725#	8-758	8-758#	8-788	8-788#	8-822	8-822#	8-838	8-838#	8-864	8-864#
	8-885	8-885#	8-885#	8-912	8-912#	8-955	8-955#	8-:29	8-:29#	8-:53	8-:53#	8-:83		
	8-:83#	8-:29	8-:47	8-:47#	8-:52	8-:52#	8-:00	8-:00#	8-:47	8-:47#	8-:94	8-:94#	8-:42	8-:42#
	8-741	8-741#	8-751	8-751#	8-751#	8-876	8-876#	8-A54	8-A54#	8-A56	8-A56#	8-A85	8-A85#	8-A87
M\$PUT	1-C72#	2-7#	4-23	4-23	4-23	4-23	4-23#	4-32	4-32	4-32	4-32	4-32	4-32#	4-41
	4-41	4-41	4-41	4-41#	4-60	4-60	4-60#							
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	4-73	4-73#	4-76	4-76	4-76	4-76	4-76#	4-76	4-76	4-76	4-76#	4-77	4-77	4-77
	4-77	4-77	4-77#	4-78	4-78	4-78	4-78#	4-78	4-78	4-78	4-78#	4-79	4-79	4-79
	4-79	4-79	4-79#	4-82	4-82	4-82	4-82#	4-82	4-82#	4-83	4-83#	5-86	5-86	5-86
	5-86#	5-97	5-97	5-97	5-97	5-97	5-97#							
7	5-97#	5-112	5-112	5-112	5-112	5-112	5-112#	5-126	5-126	5-126	5-126#			
	5-137	5-137	5-137#	6-15	6-15	6-15	6-15#	7-13	7-13	7-13	7-13#	7-39	7-39	7-39
	7-39	7-39#	7-64	7-64	7-64	7-64	7-64#	7-89	7-89	7-89	7-89#	7-89#	7-89#	7-89
M\$PUT1	1-C81#	2-7#	4-23	4-23	4-23	4-23	4-23#	4-23#	4-23#	4-23#	4-32	4-32	4-32	4-32
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	5-86#	5-86#	5-97	5-97	5-97	5-97	5-97#	5-97#	5-97#	5-97#	5-112	5-112	5-112	5-112
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	6-15#	6-15#	7-13	7-13	7-13	7-13	7-13#	7-13#	7-13#	7-13#	7-13#	7-39	7-39	7-39
	7-39#	7-39#	7-39#	7-39#	7-64	7-64	7-64#	7-64#	7-64#	7-64#	7-64#	7-64#	7-64#	7-64#
	7-89	7-89	7-89#	7-89#	7-89#	7-89#	7-89#	7-89#	7-89#	7-89#	7-89#	7-89#	7-89#	7-89
M\$RADI	1-077#	2-7#	8-A59	8-A59#	8-A59#	8-A59#	8-A59#	8-A59#	8-A59#	8-A59#	8-A59#	8-A59#	8-A59#	8-A59#
	8-A61	8-A61#	8-A63	8-A63#	8-A65	8-A65#	8-A67	8-A67#	8-A69	8-A69#				
	8-A88	8-A88#	8-A90	8-A90#										
M\$RBRO	1-C52#	2-7#												
M\$RNRO	1-C62#	2-7#	5-42	5-42#										
M\$SETS	1-032#	2-7#	2-15	2-15#	2-24	2-24#	2-74	2-74#	3-1	3-1#	4-3	4-3#	4-5	4-5#
	4-13	4-13#	4-20	4-20#	4-28	4-28#	4-37	4-37#	4-46	4-46#	4-53	4-53#	4-64	4-64#
	4-116	4-116#	4-118	4-118#										
118#	4-130	4-130#	4-132	4-132#	4-142	4-142#	5-3	5-3#	5-10	5-10#				
	5-12	5-12#	5-108	5-108#	5-143	5-143#	5-145	5-145#	5-170	5-170#	5-172	5-172#	5-180	5-180#
	5-182	5-182#	6-4	6-4#	6-265	6-265#	7-3	7-3#	7-28	7-28#	7-54	7-54#	7-79	7-79#
	7-104	7-104#	7-118	7-118#	7-118#	7-118#	7-146	7-146#	7-157	7-157#	7-157#	7-157#	8-13	8-13#
	8-23													
8-23	8-23#	8-23#	8-23#	8-46	8-46#	8-56	8-56#	8-56#	8-56#	8-84	8-84#	8-94	8-94#	8-94
	8-94#	8-94#	8-94#	8-120	8-120#	8-131	8-131#	8-131#	8-131#	8-155	8-155#	8-165	8-165#	8-165#
	8-187	8-187#	8-197	8-197#	8-197#	8-197#	8-218	8-218#	8-228	8-228#	8-228#	8-228#	8-250	8-250#
	8-286	8-286#	8-312	8-312#	8-335	8-335#	8-377	8-377#	8-419	8-419#	8-463	8-463#	8-516	8-516#
8-516#	8-558	8-558#	8-612	8-612#	8-649	8-649#	8-663	8-663#	8-663#	8-663#	8-700	8-700#	8-725	8-725#
	8-758	8-758#	8-788	8-788#	8-822	8-822#	8-838	8-838#	8-864	8-864#	8-885	8-885#	8-885#	8-885#
	8-912	8-912#	8-955	8-955#	8-:29	8-:29#	8-:53	8-:53#	8-:83	8-:83#	8-:29	8-:29#	8-:47	8-:47#

Cross reference table (CREF V05.01)

	8-47#	8-47#	8-52	8-52#	8-00	8-00#	8-47	8-47#	8-94	8-94#	8-42	8-42#	8-741	8-741#
MSTAR	8-751	8-751	8-751#	8-751#	8-076	8-076#	8-A54	8-A54#	8-A56	8-A56#	8-A85	8-A85#	8-A87	8-A87#
M#SVC	1-A33#	2-7#												
	1-C33#	2-7#	4-11	4-11#	4-18	4-18#	4-23	4-23#	4-26	4-26#	4-32	4-32#	4-35	4-35#
41	4-41#	4-44	4-44#	4-51	4-51#	4-60	4-60#	4-62	4-62#	4-67	4-67#	4-71	4-71#	
	4-73	4-73#	4-76	4-76#	4-77	4-77#	4-78	4-78#	4-79	4-79#	4-82	4-82#	4-83	4-83#
	5-14	5-14#	5-15	5-15#	5-19	5-19#	5-21	5-21#	5-30	5-30#	5-42	5-42#	5-86	5-86#
1	5-89	5-89#	5-90	5-90#	5-97	5-97#	5-99	5-99#	5-103	5-103#	5-112	5-112#	5-12	
	5-126	5-126#	5-128	5-128#	5-137	5-137#	5-139	5-139#	5-141	5-141#	5-147	5-147#	5-154	5-154#
	5-164	5-164#	5-176	5-176#	5-186	5-186#	6-7	6-7#	6-15	6-15#	6-17	6-17#	6-18	6-18#
	6-100	6-280	6-296	7-13	7-13#	7-16	7-16#	7-21	7-22	7-22#	7-23	7-23#	7-39	7-39#
	7-42	7-42#	7-47	7-48	7-48#	7-49	7-49#	7-64	7-64#	7-67				
7-67#	7-72	7-73	7-73#											
	7-74	7-74#	7-89	7-89#	7-92	7-92#	7-97	7-98	7-98#	7-99	7-99#	7-118	7-118#	7-132
	7-133	7-133#	7-140	7-140#	7-141	7-141#	7-157	7-157#	7-168	7-169	7-169#	8-7	8-7#	8-8
	8-8#	8-23	8-23#	8-32	8-33	8-33#	8-40	8-40#	8-41	8-41#	8-56	8-56#	8-70	8-71
	8-71#	8-78	8-78#	8-79	8-79#	8-94	8-94#	8						
-108	8-109	8-109#	8-114	8-114#	8-115	8-115#	8-149#	8-150	8-150#	8-165	8-165#	8-175	8-176	8-176#
	8-131	8-131#	8-143	8-144	8-144#	8-149	8-149#	8-150	8-150#	8-165	8-165#	8-175	8-176	8-176#
	8-181	8-181#	8-182	8-182#	8-197	8-197#	8-206	8-207	8-207#	8-212	8-212#	8-213	8-213#	8-228
	8-228#	8-238	8-239	8-239#	8-244	8-244#	8-245	8-245#	8-264	8-264#	8-271	8-271#	8-279	8-281
	8-281#	8-300	8-300#	8-304	8-30									
7	8-307#	8-323	8-323#	8-327	8-330	8-330#	8-359	8-360	8-360#					
	8-368	8-372	8-372#	8-402	8-403	8-403#	8-412	8-414	8-414#	8-446	8-447	8-447#	8-455	8-459
	8-459#	8-490	8-491	8-491#	8-499	8-500	8-500#	8-507	8-512	8-512#	8-547	8-548	8-548#	8-553
	8-553#	8-576	8-576#	8-579	8-579#	8-585	8-587	8-587#	8-594	8-596	8-596#	8-603	8-607	8-607#
	8-631	8-631#												
8-637	8-639	8-639#	8-644	8-644#	8-663	8-663#	8-666	8-666#	8-672	8-672#	8-675			
	8-675#	8-683	8-685	8-685#	8-691	8-691#	8-696	8-696#	8-716	8-716#	8-720	8-720#	8-730	8-730#
	8-735	8-735#	8-738	8-739	8-739#	8-742	8-742#	8-747	8-747#	8-750	8-751	8-751#	8-753	8-753#
	8-777	8-777#	8-780	8-783	8-783#	8-797	8-797#	8-803	8-803#	8-806	8-807	8-807#	8-812	8-812#
	8-815	8-818	8-818#	8-831	8-831#	8-834	8-834#	8-846	8-846#	8-851	8-851#	8-854	8-855	8-855#
	8-859	8-859#	8-878	8-878#	8-881	8-881#	8-885	8-885#	8-890	8-890#	8-893	8-893#	8-900	8-902
	8-902#	8-906	8-906#	8-907	8-907#	8-925	8-925#	8-928	8-928#	8-947	8-950	8-950#	8-917	8-918
74	8-18#	8-24	8-24#	8-45	8-45#	8-48	8-48#	8-68	8-68#	8-71	8-71#	8-71#	8-71#	8-71#
	8-74#	8-78												
	8-78#	8-96	8-96#	8-104	8-105	8-105#	8-109	8-109#	8-115	8-115#	8-117	8-117#	8-121	8-122
	8-122#	8-124	8-124#	8-147	8-147#	8-152	8-152#	8-155	8-155#	8-170	8-170#	8-173	8-173#	8-176
	8-176#	8-179	8-179#	8-184	8-184#	8-187	8-187#	8-195	8-196	8-196#	8-203	8-203#	8-206	8-206#
	8-209	8-209#	8-212	8-212#	8-218	8-218#	8-221	8-221#	8-230					
8-31	8-31#	8-46	8-46#	8-47										
	8-47#	8-68	8-68#	8-71	8-71#	8-74	8-74#	8-77	8-77#	8-82	8-82#	8-85	8-85#	8-92
	8-95	8-95#	8-14	8-14#	8-17	8-17#	8-20	8-20#	8-23	8-23#	8-28	8-28#	8-31	8-31#
	8-39	8-42	8-42#	8-61	8-61#	8-64	8-64#	8-67	8-67#	8-70	8-70#	8-76	8-76#	8-79
	8-79#	8-86	8-89	8-89#	8-90	8-90#								
8-12	8-12#	8-15	8-15#	8-18	8-18#	8-24	8-24#							
	8-27	8-27#	8-34	8-37	8-37#	8-59	8-59#	8-62	8-62#	8-700	8-700#	8-704	8-704#	8-708
	8-708#	8-711	8-711#	8-714	8-714#	8-718	8-718#	8-723	8-723#	8-726	8-726#	8-733	8-736	8-736#
	8-751	8-751#	8-756	8-756#	8-759	8-759#	8-774	8-774#	8-777	8-777#	8-780	8-780#	8-783	8-783#
	8-789	8-789#	8-792	8-7										
92#	8-000	8-001	8-001#	8-008	8-008#	8-011	8-011#	8-014	8-014#	8-018				
	8-018#	8-023	8-023#	8-027	8-027#	8-036	8-037	8-037#	8-055	8-056	8-056#	8-070	8-070#	8-071
	8-071#	8-088	8-088#	8-091	8-091#	8-A06	8-A06#	8-A09	8-A09#	8-A12	8-A12#	8-A15	8-A15#	8-A21
	8-A21#	8-A24	8-A24#	8-A32	8-A33	8-A33#	8-A40	8-A40#	8-A44	8-A44#	8-A49	8-A49#	8-A52	8-A52#
M#TLAB	1-C29#													
	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#
7-21#	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#	
	7-22#	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#	8-330#	8-359#	8-360#	8-368#	8-372#	8-402#	8-412#	8-412#	8-414#	8-446#	8-447#	8-455#	8-459#

500#	8-490#	8-491#	8-499#	8-	8-507#	8-512#	8-547#	8-548#	8-553#	8-576#	8-579#	8-585#	8-587#	8-594#	8-675#	8-683#	8-685#	8-691#
	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#	8-751#	8-753#	8-777#	8-780#
	8-696#	8-716#	8-720#	8-730#	8-735#	8-738#	8-739#	8-742#	8-747#	8-750#	8-751#	8-753#	8-777#	8-780#	8-846#	8-851#	8-854#	8-855#
	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#																	
0	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-:104#	8-:105#	8-:109#	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-:70#	8-:70#	8-:70#	8-:71#	8-:71#	8-:71#	8-:72#	8-:72#	8-:73#	8-:73#	8-:75#				
	8-756#	8-759#	8-774#	8-777#	8-780#	8-783#	8-789#	8-792#	8-800#	8-801#	8							
-808#	8-811#	8-814#	8-818#	8-837#	8-855#	8-856#	8-870#	8-871#	8-888#	8-891#	8-A06#	8-A09#	8-A12#	8-A15#				
	8-823#	8-827#	8-836#	8-837#	8-855#	8-856#	8-870#	8-871#	8-888#	8-891#	8-A06#	8-A09#	8-A12#	8-A15#				
M+STL	8-A21#	8-A24#	8-A32#	8-A33#	8-A40#	8-A44#	8-A49#	8-A52#										
	1-C21#	2-7#	4-11	4-11#	4-18	4-18#	4-23	4-23#	4-26	4-26#	4-32	4-32#	4-35	4-35#				
	4-41	4-41#	4-44	4-44#	4-51	4-51#	4-60	4-60#	4-62	4-62#	4-67	4-67#	4-71	4-71#				
	4-73	4-73#	4-76	4-76#	4-77	4-77#	4-78	4-78#	4-79	4-79#	4-82	4-82#	4-83	4-83#				
	5-14	5-14#	5-15	5-15#	5-19	5-19#	5-21	5-21#	5-30	5-30#	5-42	5-42#	5-86	5-86#				
	5-89	5-89#	5-90	5-90#	5-97	5-97#	5-99	5-99#	5-103	5-103#	5-112	5-112#	5-121	5-121#				
	5-126	5-126#	5-128	5-128#	5-137	5-137#	5-139	5-139#	5-141	5-141#	5-147							
5-147#	5-154	5-154#																
	5-164	5-164#	5-176	5-176#	5-186	5-186#	6-7	6-7#	6-15	6-15#	6-17	6-17#	6-18	6-18#				
	6-100	6-100#	6-100#	6-280	6-280#	6-280#	6-296	6-296#	6-296#	7-13	7-13#	7-16	7-16#	7-21				
	7-21#	7-21#	7-22	7-22#	7-23	7-23#	7-39	7-39#	7-42	7-42#	7-47	7-47#	7-47#	7-48				
	7-48#	7-49	7-49#	7-64	7-64#	7-67	7-67#	7-72	7									
-72#	7-72#	7-73	7-73#	7-74	7-74#													
	7-89	7-89#	7-92	7-92#	7-97	7-97#	7-97#	7-98	7-98#	7-99	7-99#	7-118	7-118#	7-132				
	7-132#	7-132#	7-133	7-133#	7-140	7-140#	7-141	7-141#	7-157	7-157#	7-168	7-168#	7-168#	7-169				
	7-169#	8-7	8-7#	8-8	8-8#	8-23	8-23#	8-32	8-32#	8-32#	8-33	8-33#	8-40	8-40#				
	8-41	8-41#	8-56	8-56#	8-70	8-70												
0	8-70#	8-71	8-71#	8-78	8-78#	8-79	8-79#	8-94										
	8-94#	8-108	8-108#	8-108#	8-109	8-109#	8-114	8-114#	8-115	8-115#	8-131	8-131#	8-143	8-143#				
	8-143#	8-144	8-144#	8-149	8-149#	8-150	8-150#	8-165	8-165#	8-175	8-175#	8-175#	8-176	8-176#				
	8-181	8-181#	8-182	8-182#	8-197	8-197#	8-206	8-206#	8-206#	8-207	8-207#	8-212	8-212#	8-213				
	8-213#	8-228	8-228#															
8-238	8-238#	8-238#	8-239	8-239#	8-244	8-244#	8-245	8-245#	8-264	8-264#								
	8-271	8-271#	8-279	8-279#	8-279#	8-281	8-281#	8-300	8-300#	8-304	8-304#	8-304#	8-307	8-307#				
	8-323	8-323#	8-327	8-327#	8-327#	8-330	8-330#	8-359	8-359#	8-359#	8-360	8-360#	8-368	8-368#				
	8-368#	8-372	8-372#	8-402	8-402#	8-402#	8-403	8-403#	8-412	8-412#	8-414	8-414#	8-446					
	8																	
-446#	8-446#	8-447	8-447#	8-455	8-455#	8-455#	8-459	8-459#	8-490	8-490#	8-490#	8-491	8-491#	8-548				
	8-499	8-499#	8-499#	8-500	8-500#	8-507	8-507#	8-507#	8-512	8-512#	8-547	8-547#	8-547#	8-548				
	8-548#	8-553	8-553#	8-576	8-576#	8-579	8-579#	8-585	8-585#	8-585#	8-587	8-587#	8-594	8-594#				
	8-594#	8-596	8-596#	8-603	8-603#	8-603#	8-607	8-607#	8-631	8-631#	8-637	8-637#	8-6					
37#	8-639																	
	8-639#	8-644	8-644#	8-663	8-663#	8-666	8-666#	8-672	8-672#	8-675	8-675#	8-683	8-683#	8-683#				
	8-685	8-685#	8-691	8-691#	8-696	8-696#	8-716	8-716#	8-720	8-720#	8-730	8-730#	8-735	8-735#				
	8-738	8-738#	8-738#	8-739	8-739#	8-742	8-742#	8-747	8-747#	8-750	8-750#	8-750#	8-751	8-751#				
	8-753	8-753#	8-777	8-777#	8-780	8-780#	8-780#	8-783	8-783#	8-797								
8-797#	8-803	8-803#	8-806															
	8-806#	8-806#	8-807	8-807#	8-812	8-812#	8-815	8-815#	8-815#	8-818	8-818#	8-831	8-831#	8-834				
	8-834#	8-846	8-846#	8-851	8-851#	8-854	8-854#	8-854#	8-855	8-855#	8-859	8-859#	8-878	8-878#				
	8-881	8-881#	8-885	8-885#	8-890	8-890#	8-893	8-893#	8-900	8-900#	8-900#	8-902	8-902#	8-906				
8-947	8-906#	8-907	8-907#	8-925	8-925#	8-928	8-928#											
	8-947#	8-947#	8-950	8-950#	8-:17	8-:17#												
	8-:17#	8-:18	8-:18#	8-:24	8-:24#	8-:45	8-:45#	8-:48	8-:48#	8-:68	8-:68#	8-:71	8-:71#	8-:74				
	8-:74#	8-:78	8-:78#	8-:96	8-:96#	8-:04	8-:04#	8-:04#	8-:05	8-:05#	8-:09	8-:09#	8-:15	8-:15#				
	8-:17	8-:17#	8-:21	8-:21#	8-:21#	8-:22	8-:22#	8-:24	8-:24#	8-:47	8-:47#	8-:52	8-:52#	8-:55				
	8-:55#	8-:70	8-:70#	8-:73	8-:73													
73#	8-:76	8-:76#	8-:79	8-:79#	8-:84	8-:84#	8-:87	8-:87#	8-:95									
	8-:95#	8-:95#	8-:96	8-:96#	8-:03	8-:03#	8-:06	8-:06#	8-:09	8-:09#	8-:12	8-:12#	8-:18	8-:18#				
	8-:21	8-:21#	8-:30	8-:30#	8-:30#	8-:31	8-:31#	8-:46	8-:46#	8-:47	8-:47#	8-:68	8-:68#	8-:71				
	8-:71#	8-:74	8-:74#	8-:77	8-:77#	8-:82	8-:82#	8-:85	8-:85#	8-:92	8-:92#	8-:92#	8-:95	8-:95#				
	8-:14	8-:14#																
8-:17	8-:17#	8-:20	8-:20#	8-:23	8-:23#	8-:28	8-:28#	8-:31	8-:31#	8-:39	8-:39#	8-:39#	8-:76	8-:76#				
	8-:39#	8-:42	8-:42#	8-:61	8-:61#	8-:64	8-:64#	8-:67	8-:67#	8-:70	8-:70#	8-:76	8-:76#	8-:79				

[illegible]

XFERT	1-0160	2-70	8-A89
XFERT	1-0200	2-70	