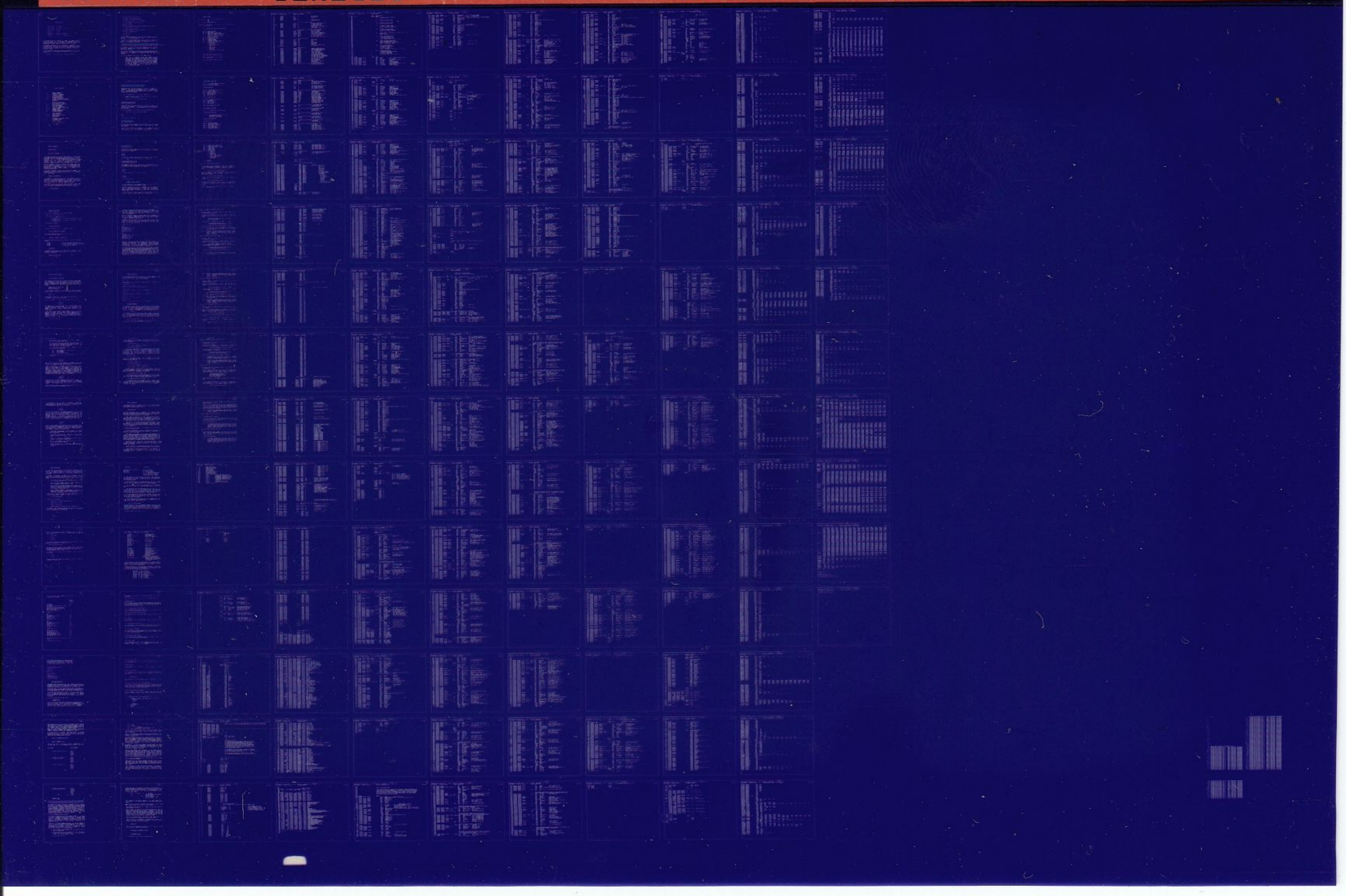
RL11,RLV11 RL01/02 DRIVE TEST 2 AH-F122B-MC
CZRLJB0 FICHE 1 OF 1



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IDENTIFICATION

PRODUCT CODE: AC-F123B-MC

PRODUCT NAME: CZRLJB0 RL01/02 DRIVE TEST 2

DATE CREATED: 5-JAN-79

REVISED: 7-DEC-79

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHORS: D. DEKNIS, C. CAMPBELL

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1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

1.1.1 STRUCTURE OF PROGRAM

THIS DIAGNOSTIC 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 DIAGNOSTICS PROGRAM INTERFACES TO THE ENVIRONMENT AS IT EXECUTES.

WHEN THIS DIAGNOSTIC IS STARTED AT ADDRESS 200, CONTROL GOES FIRST TO THE SUPERVISOR PORTION, WHICH WILL ASK CERTAIN ''HARD CORE'' QUESTIONS ABOUT THE ENVIRONMENT. THEN IT WILL ENTER COMMAND MODE, INDICATED BY A PROMPT CHARACTER (DR>). AT COMMAND MODE THE OPERATOR MAY ENTER ANY OF SEVERAL COMMANDS AS DESCRIBED IN 2.0 ''OPERATING INSTRUCTIONS''.

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

1.1.2 DIAGNOSTIC INFORMATION

THIS PROGRAM TESTS AND EXERCISES RL01/02 DISK DRIVES RL11/RLV11 CONTROLLERS (4 DRIVES PER CONTROLLER). THE ENTIRE PROGRAM IS RUN ON THE FIRST DRIVE BEFORE STARTING ON THE SECOND. THE PROGRAM STARTS BY TESTING THE SIMPLEST FUNCTIONS FIRST USING THE LOGIC TESTED IN EARLIER TESTS TO TEST MORE COMPLEX FUNCTIONS.

THIS PROGRAM TESTS THE RL01/02 OUTER AND INNER GUARD BAND DETECTION. SEEK OPERATIONS UNDERGO A BROAD RANGE OF TESTING USING SINGLE DIFFERENCES, PROCEEDING TO SEEKS OF GREATER DIFFERENCES.

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE REQUIREMENTS

* PDP-11/LSI-11 PROCESSOR WITH 16K OR MORE OF MEMORY
* CONSOLE DEVICE (LA30,LA36,VT50,ETC.)
* 1 OR 2 RL11/RLV11 CONTROLLER(S) WITH:

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

* LINE PRINTER (OPTIONAL)

1.2.2 SOFTWARE REQUIREMENTS

CZRLJB0 RL01/02 DRIVE TEST PART 2 (FORMERLY CZRLDB0)

1.3 RELATED DOCUMENTS AND STANDARDS

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

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

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

CVRLAB0	RLV11 RL01 DISKLESS TEST (RLV11 ONLY)
CZRLGB0	RL11/RLV11 RL01/02 CONTROLLER TEST (PART 1)
CZRLHB0	RL11/RLV11 RL01/02 CONTROLLER TEST (PART 2)
CZRLIB0	RL01/02 DRIVE TEST (PART 1)

1.5 ASSUMPTIONS

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

2.0 OPERATING INSTRUCTIONS

2.1 HOW TO RUN THIS DIAGNOSTIC

2.1.1 THE FIVE STEPS OF EXECUTION

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

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

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

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

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

WHEN THIS DIAGNOSTIC IS STARTED THE FOLLOWING STEPS WILL OCCUR:

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

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

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

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

THINGS TO NOTE HERE:

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

2. THE 'PASS' SWITCH SPECIFIES HOW MANY PASSES YOU DESIRE. A PASS CONSISTS OF RUNNING THE FULL DIAGNOSTIC AGAINST ALL UNITS BEING TESTED (THIS WILL BE EXPLAINED SHORTLY). ONE PASS IS SPECIFIED IN THE ABOVE EXAMPLE.

3. THE 'FLAGS' SWITCH MAY SPECIFY ANY OF A NUMBER OF FLAGS, BUT THE MAIN USEFUL ONES ARE:

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

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

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

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

A WORD OF WARNING HERE: THE NUMBER OF UNITS DEPENDS ON THE TARGET DEVICE OF THE DIAGNOSTIC. FOR EXAMPLE, IF THE DIAGNOSTIC IS DIRECTED AT A DISK DRIVE, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF DRIVES TO BE TESTED. WHEREAS IF THE DIAGNOSTIC WAS DIRECTED AT THE DISK CONTROLLER, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF CONTROLLERS. THE TARGET DEVICE OF A DIAGNOSTIC CAN ALWAYS BE DETERMINED BY INSPECTING THE 'HEADER' STATEMENT NEAR THE BEGINNING OF THE SOURCE CODE. ONE OF THE OPERANDS OF THIS 'HEADER' STATEMENT SHOULD BE THE DEVICE TYPE OF THE DIAGNOSTIC.

****
* STEP 3 *
****

WHEN YOU HAVE TYPED IN THE NUMBER OF UNITS TO BE TESTED, THE DIAGNOSTIC WILL ASK YOU THE 'HARDWARE QUESTIONS'. THE ANSWERS TO THESE QUESTIONS ARE USED TO BUILD TABLES IN CORE, CALLED 'HARDWARE P-TABLES'. ONE HARDWARE P-TABLE WILL BE BUILT FOR EACH UNIT TO BE TESTED.

THERE ARE SEVERAL HARDWARE QUESTIONS AND THE ENTIRE SERIES WILL BE POSED N TIMES, WHERE N IS THE NUMBER OF UNITS.

THIS REPRESENTS A NEW PHILOSOPHY IN DIAGNOSTIC ENGINEERING. DIAGNOSTICS IN THE FUTURE WILL NOT BE WRITTEN TO AUTOSIZE OR ASSUME STANDARD ADDRESSES: INSTEAD, THEY WILL ASK THE OPERATOR FOR ALL THE INFORMATION THEY NEED TO TEST THE DEVICE.

****
* STEP 4 *
****

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

****
* STEP 5 *
****

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

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

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

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

   LOE SET: THE DIAGNOSTIC WILL LOOP ENDLESSLY ON THE BLOCK OF CODE THAT DETECTED THE ERROR.

   NEITHER HOE NOR LOE SET: THE ERROR WILL BE REPORTED ON THE CONSOLE AND NORMAL EXECUTION WILL RESUME AS IF NO ERROR HAD OCCURRED.

2.1.2 SAMPLE RUN-THROUGH

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

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

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

2. ISSUE A ''RESTART'' COMMAND (SAME AS START COMMAND EXCEPT THAT THE HARDWARE QUESTIONS ARE NOT ASKED)

3. ISSUE A ''CONTINUE'' COMMAND (EXECUTION WILL RESUME AT THE BEGINNING OF THE PARTICULAR HARDWARE TEST (MOST DIAGNOSTICS CONSIST OF A NUMBER OF THESE) THAT IT WAS IN WHEN THE ERROR HALT OCCURRED. NO QUESTIONS ASKED.

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

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

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

THIS WILL DO THE FOLLOWING:

1. TURN ON THE IER (INHIBIT ERROR PRINTOUT) FLAG

2. TURN ON THE LOE FLAG

3. TURN OFF THE HOE FLAG

4. RESUME EXECUTION AT INSTRUCTION AFTER ERROR REPORT

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

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

1. START
2. RESTART
3. CONTINUE

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

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

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

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

1. START
2. RESTART

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

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

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

.R CZRLJB                               O
DRS LOADED                              D
DIAG. RUN-TIME SERVICES REV. D APR-79   D
CZRLJ-B-0                               D
CZRLJ TESTS OUTER & INNER GUARD         D
BAND DETECTION AND SEEK OPERATIONS
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
DRIVE (O) 0 ?                           D,O
DRIVE TYPE = RL01 (L) Y ?               D,O
BR LEVEL (O) 5 ?                        D,O

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

CHANGE SW (L) ? Y                       D,O

USE ALL CYL (L) N ?                     D,O
USE ALL SECT (L) N ?                    D,O
LOW SEEK LIMIT (L) N ?                  D,O
UPPER SEEK LIMIT (L) N ?                D,O
USE ONLY ONE SURF (L) N ?               D,O
INPUT ERROR LIMIT (D) 20 ?              D,O
DATA CMP ERR LMT (D) 10 ?               D,O


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

DR>PRO/FLAGS:IER:LOE:HOE=0              D,O
```

```
**************************************************
AT THIS POINT THE DIAGNOSTIC IS LOOPING ON THE
ERROR WITHOUT PRINTING ANYTHING.  YOU CAN SCOPE
THE ERROR UNTIL YOU HAVE LOCATED IT, THEN ^C OUT.
**************************************************

^C                                          O

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

CHANGE SW (L) ? N                           D,O

CZRLJ EOP 1                                 D
^C

DR>RESTART/PASS:1                           D,O

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

2.2 CHAIN MODE OPERATION

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

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

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

TO EXECUTE A CHAIN FILE THE USER TYPES:

```
C FILNAM <CR> OR
C FILNAM/QV  <CR>
```

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

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

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

2.3 DETAILS OF COMMANDS AND SYNTAX

2.3.1 TABLE OF COMMAND VALIDITY

THERE ARE FOUR WAYS OF ENTERING DIAGNOSTIC COMMAND MODE, AND DIFFERENT SUBSETS OF THE DIAG COMMAND SET ARE AVAILABLE WITH EACH:

	HOW ENTERED	LEGAL COMMANDS
1.	OPERATOR ENTERED 'RUN DIAG'	START PRINT DISPLAY FLAGS ZFLAGS EXIT
2.	DIAGNOSTIC HAS FINISHED ALL ITS REQUESTED PASSES	START RESTART PRINT DISPLAY FLAGS ZFLAGS EXIT
3.	OPERATOR INTERRUPTED THE	START PRINT DISPLAY FLAGS ZFLAGS EXIT

4.	AN ERROR WAS ENCOUNTERED WITH THE HOE FLAG SET SET	START RESTART CONTINUE PROCEED PRINT DISPLAY FLAGS ZFLAGS EXIT

2.3.2 COMMAND SYNTAX

****
STA(RT)/TESTS:TEST-LIST/PASS:PASS-CNT/FLAGS:FLAG-LIST/EOP:EOP-INCR
****

THE DIAGNOSTIC IN CORE IS EXECUTED IN ACCORDANCE WITH THE SWITCHES SPECIFIED. THE MESSAGE ''# UNITS?'' IS PRINTED. THE START COMMAND MAY BE ISSUED WHEN DIAGNOSTIC COMMAND MODE HAS BEEN ENTERED VIA ONE OF THE FOLLOWING: A) OPERATOR TYPED 'RUN DIAGNOSTIC'' B) DIAGNOSTIC FINISHED EXECUTING C) ERROR WAS ENCOUNTERED WITH HOE FLAG SET D) OPERATOR ENTERED CONTROL/C. AFTER THE OPERATOR RESPONDS TO ''# UNITS?'', THE HARDWARE DIALOGUE IS INITIATED. WHEN IT IS COMPLETED, THE QUESTIONS ''CHANGE SW?'' IS ISSUED, AND THE ANSWERS, IF GIVEN, BECOME THE NEW DEFAULTS. THEREFORE IT IS NECESSARY TO RELOAD THE PROGRAM IN ORDER TO RETURN TO THE LOAD DEFAULTS.

THE SWITCH ARGUMENTS ARE AS FOLLOWS:

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

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

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

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

IER INHIBIT ERROR REPORTING

IBE INHIBIT BASIC ERROR REPORTS

IXE INHIBIT EXTENDED ERROR REPORTS

PRI DIRECT ALL MESSAGES TO A LINE PRINTER

PNT PRINT NUMBER OF TEST BEING EXECUTED

BOE BELL ON ERROR

UAM RUN IN UNATTENDED MODE, BYPASSING MANUAL INTERVENTION TESTS

ISR INHIBIT STATISTICAL REPORTS

IDU INHIBIT DROPPING OF UNITS BY DIAGNOSTIC

ADR EXECUTE AUTODROP CODE

LOT LOOP ON TEST

EVL EVALUATE

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

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

****

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

****

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

THE QUESTION ''CHANGE SW?'' IS ASKED AND THE ANSWERS GIVEN BECOME THE NEW DEFAULTS. THE COMMAND MAY BE ISSUED WHEN COMAND MODE HAS BEEN ENTERED VIA A) DIAGNOSTIC IS FINISHED B) HALT ON ERROR C) CONTROL/C.

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

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

2. ALL UNSPECIFIED FLAG SETTINGS ARE UNCHANGED.

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

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

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

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

2. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

****
PRO(CEED)/FLAGS:<FLAG-LIST>
****

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

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

1. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

****
EXIT
****

RETURN TO XXDP+ PROMPT MODE.

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

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

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

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

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

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

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

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

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

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

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

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

ALL FLAGS ARE CLEARED.

2.4 EXTENDED P-TABLE DIALOGUE

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

AS SOON AS THE QUESTION "# UNITS?" IS ANSWERED (WITH THE NUMBER N), SPACE IN CORE IS ALLOCATED FOR "N" P-TABLES. ALL OF THE P-TABLES ARE OF THE SAME FORMAT, AND THERE IS A ONE-TO-ONE CORRESPONDENCE BETWEEN THE HARDWARE PARAMETER QUESTIONS AND THE SLOTS IN THE P-TABLE FORMAT.

IN GIVING A STRING OF VALUES, COMMAS WITHOUT INTERVENING VALUES MAY BE USED TO INDICATE A REPETITION OF THE LAST NAMED VALUE.

A STRING OF VALUES MAY BE GIVEN AS A RANGE (6-10 FOR EXAMPLE). IF THE VALUES REPRESENT PURE NUMERICAL DATA, THIS SAMPLE RANGE TRANSLATES TO THE STRING 6,7,8,9,10 (AN INCREMENT OF 1). IF THE VALUES ARE ADDRESSES, THE SAMPLE RANGE TRANSLATES TO THE STRING 6,8,10 (AN INCREMENT OF 2).

NOW LET US SEE HOW WE COULD USE THESE CAPABILITIES TO CONSTRUCT A SET OF P-TABLES. ASSUME THAT WE HAVE 8 RL UNITS, AND THAT THERE ARE FIVE (5) HARDWARE PARAMETERS FOR EACH (5 SLOTS IN THE P-TABLE, 5 HARDWARE QUESTIONS IN THE DIALOGUE).

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

```
# UNITS (D) ? 8

UNIT 0
RL11 (L) Y ?
BUS ADDDRESS (O) 174400 ?
VECTOR (O) 160 ?
DRIVE (O) 0 ? 0-3
DRIVE TYPE = RL01 (L) Y ?
BR LEVEL (O) 5 ?

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

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

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

2.5 HARDWARE PARAMETERS

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

RL11 (L) Y?

ANSWER YES(Y) IF YOU HAVE AN RL11 CONTROLLER, NO(N) IF YOU HAVE AN RLV11 CONTROLLER.

BUS ADDRESS (O) 174400?

ANSWER WITH THE BUS ADDRESS OF THE CONTROLLER.

VECTOR (O) 160?

ANSWER WITH THE INTERRUPT VECTOR OF THE CONTROLLER.

DRIVE (O) 0?

ANSWER WITH THE DRIVE(S) CONNECTED TO THE CONTROLLER

DRIVE TYPE = RL01 (L) ?

ANSWER NO (N) IF DRIVE IS AN RL02

BR LEVEL (O) 5?

ANSWER WITH THE INTERRUPT PRIORITY OF THE CONTROLLER.

2.6 SOFTWARE PARAMETERS

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

CHANGE S.W. ?

A YES ANSWER WILL ASK THE FOLLOWING SOFTWARE PARAMETER QUESTIONS, WITH THE PRESENT DEFAULT VALUE PRINTED TO THE LEFT OF THE QUESTION MARK. (THE LAST ANSWER GIVEN IS THE DEFAULT) THE DEFAULT IS TAKEN ON A <CR>. CONTROL Z (^Z) WILL DEFAULT ALL REMAINING QUESTIONS AND START THE TEST.

USE ALL CYLINDERS (N)?

IF "YES", THOSE TESTS THAT NORMALLY USE A SELECTED SET OF CYLINDERS WILL TEST EVERY CYLINDER ON THE CARTRIDGE.

USE ALL SECTORS (N)?

IF 'YES', THOSE TESTS THAT NORMALLY USE A SINGLE SECTOR TO TEST A GIVEN OPERATION (SUCH AS SEEK DESTINATION) WILL READ AND VERIFY EVERY SECTOR HEADER.

LOWER SEEK LIMIT (N)?

IF 'YES', THE NEXT PARAMETER IS REQUESTED.

ENTER VALUE (DECIMAL) (0)?

THIS LIMIT IS IMPOSED ON ALL SEEK OPERATIONS SUCH THAT TESTING IS NOT DONE BELOW THAT LIMIT. IN ADDITION, SETTING THIS LIMIT (OR THE UPPER LIMIT, SEE BELOW) CAUSES THE FORWORD AND REVERSE OSCILLATING SEEK TESTS TO PERFORM DIFFERENTLY (SEE TEST DESCRIPTION). TESTS THAT REQUIRE ACCESS TO A SPECIFIC CYLINDER THAT FALLS BELOW THE SPECIFIED LIMIT WILL IGNORE THE LIMIT (SEE WRITE/READ TEST PART 1).

UPPER SEEK LIMIT (N)?

IF 'YES', AN UPPER CYLINDER LIMIT IS IMPOSED IN THE SAME MANNER AS THE LOWER SEEK LIMIT. A 'YES' RESPONSE WILL CAUSE THE FOLLOWING PARAMETER REQUEST.

ENTER VALUE (DECIMAL) (255)?

USE ONLY ONE SURFACE (N)?

IF 'YES', THE NEXT PARAMETER IS REQUESTED.

SPECIFY SURFACE (0 OR 1) (DECIMAL) (0)?

WHICHEVER SURFACE IS SPECIFIED IS THE ONLY SURFACE TESTED IN THE ENTIRE PROGRAM. ANY TEST THAT IS DESIGNED TO TEST THE OTHER SURFACE IS AUTOMATICALLY BYPASSED. THE PROGRAM DOES NOT PRINT ANY INDICATION THAT A TEST IS BYPASSED IN THIS CASE.

SPECIFY ERROR LIMIT (DECIMAL) (20)?

THIS PARAMETER SPECIFIES THE MAXIMUM NUMBER OF ERRORS ALLOWED. THIS LIMIT IS ON A PER DRIVE BASIS IN A SINGLE PASS. IF THE ERROR LIMIT IS EXCEEDED, THE DRIVE IS DROPPED FROM FURTHUR TESTING.

DATA COMPARE ERROR LIMIT (DECIMAL) (20)?

THIS PARAMETER SPECIFIES THE NUMBER OF DATA COMPARE ERRORS THAT WILL BE LISTED FOR A GIVEN COMPARE OPERATION. AFTER THE LIMIT IS REACHED, THE DATA ERRORS ARE NOT PRINTED BUT THE COMPARE CONTINUES UNTIL THE END OF THE DATA FIELD. A TOTAL IS REPORTED AT THE END OF THE COMPARE.

3.0 ERROR INFORMATION

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

3.1 ERROR REPORTING

THE OPERATION MESSAGE (LINE 4) IS GENERATED IN A DYNAMIC MANNER BASED ON THE SUBSYSTEM FUNCTION BEING EXECUTED AT THE TIME OF THE ERROR AND THE STATE OF THE FLAGS IN THE LOCATION TAGGED 'OPFLAGS''. THE POSSIBLE OPERATION MESSAGES ARE GIVEN BELOW.

SEEK - FROM CYL NUM) DIFF (CYL DIFF) SGN (0 OR 1) HD (0 OR 1) WHERE THE VALUES ARE GIVEN IN OCTAL. THIS MESSAGE IS THE RESULT OF A SEEK OPERATION THAT WAS VERIFIED BY A READ HEADER AND THE HEAD POSITION AFTER A SEEK IS IN ERROR. (THE ACTUAL HEAD POSITION IN THIS ERROR SITUATION IS GIVEN IN THE RESULT LINE, LINE 5.)

READ DATA - IS A READ DATA OPERATION WHERE SOME FORM OF ERROR WAS DETECTED IN THE ACTUAL READ OPERATION. THIS ERROR COULD BE HARDWARE DETECTED SUCH AS DATA CRC, HEADER CRC, HEADER NOT FOUND, ETC., OR A SOFTWARE DETECTED ERROR SUCH AS DRIVE READY RESET AFTER A READ DATA COMPLETED.

READ DATA WITH DATA COMPARE - IS AN ERROR THAT WAS DETECTED AS BAD DATA IN THE BUFFER AFTER

A READ DATA OPERATION. WHEN THIS OPERATION IS REPORTED IT INDICATES THE ACTUAL READ DATA OPERATION COMPLETED WITH NO DETECTED ERRORS BUT THE DATA WAS WRONG.

READ HEADER - READ HEADER FOR 40 HEADERS - READ HEADER FOR 40 HEADERS WITH HEADER COMPARE - HAVE THE SAME GENERAL MEANING AS THE READ DATA AND READ DATA WITH DATA COMPARE. MESSAGES HAVING THE OPERATION OF READ HEADER OR READ HEADER FOR 40 HEADERS ARE THE RESULT OF ERRORS DETECTED IN THE ACTUAL OPERATION WHILE THE READ HEADER FOR 40 HEADERS WITH HEADER COMPARE INDICATES NO ERROR IN THE ACTUAL OPERATION BUT THE HEADER DATA ITSELF WAS IN ERROR.

WRITE DATA - RESET - GET STATUS - GET STATUS WITH RESET - ARE ALL BASIC OPERATIONS. AS BEFORE, THE ERROR DETECTION CAN BE EITHER HARDWARE OR SOFTWARE. THE RESULT LINE (LINE 5) WILL DEFINE THE REASON FOR THE REPORT.

LD DRV - UNLD DRV - ARE OPERATION MESSAGES THAT WILL APPEAR IN THE REPORT WHEN THE DRIVE LOAD AND UNLOAD SEQUENCE IS BEING TESTED.

ANOTHER GROUP OF OPERATION QUALIFIERS WILL BE REPORTED FOR OPERATIONS THAT FAIL IN SPECIFIC TESTS. THESE TESTS ARE THE WRITE/READ TEST PART 2, OVERWRITE TEST, AND THE ADJACENT CYLINDER INTERFERENCE TEST.

OPERATION	QUALIFIER
READ DATA WITH DATA COMPARE	FOL 0 TO CC SEEK
READ DATA	FOL 255 TO CC SEEK
WRITE DATA	FOL WRITE (NO SEEK)
READ HEADER	ADJ. CYL WRITTEN AFTER FWD SK
	ADJ. CYL WRITTEN AFTER REV SK
	SK FWD, WRT-SK REV, OVERWRT
	SK REV, WRT-SK FWD, OVERWRT

THE ABOVE OPERATIONS CAN BE REPORTED WITH ANY OF THE QUALIFIERS. THE QUALIFIERS IN THESE TESTS ARE AN ATTEMPT TO MAKE THE REPORT MORE MEANINGFUL BY PROVIDING INFORMATION ABOUT THE SEQUENCE OF OPERATIONS BEING DONE.

THE QUALIFIERS ''FOL 0 TO CC SEEK'' AND ''FOL 255 TO CC SEEK'' INDICATE THAT THE SEQUENCE OF OPERATIONS INCLUDED A SEEK OF A GIVEN DIRECTION TO THE CYLINDER WHERE THE TEST IS BEING PERFORMED.

THE ''FOL WRITE (NO SEEK)'' QUALIFIER MEANS THAT THE OPERATION WAS DONE AFTER A WRITE WITH NO HEAD MOVEMENT BETWEEN THE WRITE AND READ.

THE QUALIFIER ''ADJ CYL WRITTEN AFTER FWD SK'' AND ''ADJ CYL WRITTEN AFTER REV SK'' WILL BE REPORTED ONLY IN THE ADJACENT CYLINDER INTERFERENCE TEST. THESE QUALIFIERS ARE USED WHEN THE ERROR OCCURS ON THE CYLINDER UNDER TEST AND DEFINE THE DIRECTION THE HEADS WERE MOVED WHEN THE ADJACENT CYLINDER WAS WRITTEN.

THE QUALIFIERS ''SK FWD, WRT-SK REV, OVERWRT'' AND ''SK REV, WRT-SK FWD, OVERWRT'' WILL BE REPORTED ONLY IN THE OVERWRITE TEST. THESE QUALIFIERS DEFINE THE DIRECTION OF HEAD MOTION BEFORE THE INITIAL WRITE AND THE OVERWRITE.

THE QUALIFIER ''ON BAD SEC FILES'' WILL BE REPORTED WITH THE WRITE DATA COMMAND IF THE PROGRAM ABORTS THAT COMMAND BECAUSE THE WRITE WOULD BE ON THE BAD SECTOR FILES.

3.1.2 SPECIFIC RESULT MESSAGES

THE RESULT MESSAGE (LINE 5) IS GENERATED DYNAMICALLY BASED ON THE EXPECTED RESULT OF THE OPERATION BEING TESTED. SINCE OPERATIONS ARE MONITORED DURING EXECUTION THE RESULT MESSAGE MAY REPORT AN ERROR DETECTED DURING THE OPERATION AS WELL AS THE ERRORS SEEN AT THE END OF THE OPERATION. ONLY THE FIRST ERROR SEEN IS REPORTED IN ALL CASES.

THE GENERAL FORMAT FOR THE RESULT LINE IS:

```
RESULT:(VAR 1) IS (VAR 2) SB (VAR 3) (OPTIONAL QUALIFIER)
WHERE VARIABLE 1 CAN BE ONE OF THE FOLLOWING:

      CONT ERR                          (CONTROLLER ERROR)
      DRV ERR                           (DRIVE ERROR)
      NON-EXSTNT MEM                    (NON-EXISTANT MEMORY)
      HDR CRC                           (HEADER CRC ERROR)
      DATA CRC
      HDR NOT FND                       (HEADER NOT FOUND)
      DATA LATE
      HDR NOT FND/HDR CRC/OPI           (ALL 3 BITS SET)
      DRV RDY                           (DRIVE READY)
      SELECTED HEAD
      VOL CHK                           (VOLUME CHECK)
      COVER OPEN
      BRUSH HME                         (BRUCH HOME)
      WRT LCK                           (WRITE LOCK)

      HDS OUT                           (HEADER OUT)
      DRV SEL ERR                       (DRIVE SELECT ERROR)
      DRV STATE                         (DRIVE STATE)
      SPIN TIMEOUT                      (SPINDLE TIMEOUT SPD ERROR)
      WRT GAT ERR                       (WRITE GATE ERROR)
      SEEK TIMEOUT                      (SKTO ERROR)
      CUR HEAD ERR                      (CURRENT IN HEAD ERROR)
      WRT DAT ERR                       (WRITE DATA ERROR)
      OP INCOMPLETE                     (OPI ERROR)
      HDR/DAT ERR                       (HDR CRC OR DATA CRC ERROR
                                         BIT 11 OF CS REGISTER)
      HDR NOT FND/DAT LATE              (HDR NOT FOUND OR DATA LATE
                                         ERROR BIT 12 OF CS REGISTER)
      CYL                               (CYLINDER WHEN REPORTING A
                                         SEEK ERROR)
```

VARIABLE 2 WILL BE A VALUE THAT DEFINES WHAT THE RESULT ACTUALLY IS. THIS CAN BE A 1 OR 0 TO INDICATE A SET OF RESULT CONDITIONS, A NUMBER 0 TO 7 TO INDICATE THE DRIVE STATE, OR A NUMBER 0 TO 377 (OCTAL) TO IDENTIFY A CYLINDER NUMBER.

VARIABLE 3 DEFINES THAT THE VALUE GIVEN IS VARIABLE 2 SHOULD BE. THE OPTIONAL QUALIFIER IS PROVIDED WHEN IT IS USEFUL TO KNOW WHEN THE ERROR WAS DETECTED IN THE OPERATION BEING PERFORMED. THIS QUALIFIER IS USED TO REPORT RESULTS SUCH AS:

```
BRUSH HME IS 1 SB 0 IN STATE 2
HEADS OUT IS 0 SB 1 IN STATE 3
DRV RDY   IS 0 SB 1 IN DATA XFER
SELECTED HEAD IS 1 SB 0 IN CYCLE UP
DRV RDY   IS 0 SB 1 IN STATE 5
DRV RDY   IS 1 SB 0 IN SEEK W/O MOTION
DRV RDY   IS 0 SB 1 IN 10MS
DRV RDY   IS 0 SB 1 IN 500MS
DRV RDY   IS 0 SB 1 IN 5SECONDS
```

THESE RESULTS, WHEN SEEN WITH THE OPERATION MESSAGE, WILL BE SELF EXPLANATORY.

OTHER RESULT MESSAGES THAT CAN BE PART OF AN ERROR REPORT ARE:

''INTERRUPT TOO LATE''

WHICH INDICATES THAT THE OPERATION BEING PERFORMED DID NOT COMPLETE IN THE EXPECTED AMOUNT OF TIME. THIS RESULT CAN BE CAUSED BY THE DRIVE LOOSING READY BEFORE STARTING A READ HEADER AND THEREFORE NOT COMPLETING THE READ HEADER IN 1MS.

'FAIL TO RELOAD HEADS AFTER ERR CLEAR''

THIS IS REPORTED WHEN AN ERROR CAUSES HEADS TO UNLOAD AND AFTER THE ERROR IS CLEARED THE HEADS DO NOT RELOAD.

'UNKN DRV STATE-NO RDY, NO ERR, HDS OUT''

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

'WRITE ABORTED''

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

''COULD NOT RETRIEVE DRIVE STATUS''

THIS IS REPORTED IF THE GET STATUS COMMAND DOES NOT COMPLETE SUCCESSFULLY WHEN THE STATUS IS REQUIRED TO REPORT AN ERROR.

'OPI SET-NO DRIVE RESPONSE''

THIS IS REPORTED AS THE RESULT WHEN THE GET STATUS COMMAND IS TIMED OUT (OPI SETS) WHEN THAT COMMAND IS BEING USED IN THE EARLY TESTS TO CHECK THE DRIVE INTERFACE.

'NO INTERRUPT ON CMND COMPLETE''

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

'ERR DID NOT CLEAR''

THIS IS REPORTED WHEN THE RESET COMMAND DOES NOT CLEAR THE CONTROLLER ERRORS. THIS IS A CONTROLER RELATED PROBLEM BUT IS REPORTED IF SEEN IN THE DRIVE TEST PROGRAMS.

'DRV ERR IS NOT CLEARED''

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

'UNEXPECTED ERR''

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

'BAD SEC FILE FMT ERR''

THIS IS REPORTED IF THE CONTENTS OF THE FILES DO NO CORRESPOND TO THE EXPECTED FORMAT. (REFER TO DEC STANDARD 144 FOR FORMAT SPECIFICS.)

3.1.3 OTHER MESSAGES

OTHER INFORMATION IS REPORTED UNDER VARIOUS CIRCUMSTANCES. THESE ARE:

'BAD SEC FILES NOT STRD. ALL SEC ASSUMED GOOD.''

THIS MESSAGE IS PRINTED WHEN A PARTICULAR TEST REQUIRES THE BAD SECTOR FILES BUT THEY HAVE NOT BEEN STORED. THIS SITUATION WILL OCCUR IF THIS TEST IS STARTED OUT OF THE NORMAL PROGRAM SEQUENCE OR IF THE BAD SECTOR FILES COULD NOT BE READ.

'ERROR LIMIT EXCEEDED-UNIT DROPPED''

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

MOST ERROR REPORTS HAVE THE FOLLOWING FORMAT.

```
(1)   PROG NAME   ERR NUM   TEST NUM   SUBTEST NUM   ERR PC
(2)   ROUTINE TRACE SEQ (IN SEQ CALLED)
         (ADDRESS)
         (ADDRESS)
             .
             .
             .
         (ADDRESS)
(3)   TEST DESCRIPTION
(4)   OPERATION:
(5)   RESULT:
(6)   ADDRESS OF UNIT UNDER TEST
```

```
(7)                 RLCS    RLDA    RLBA    RLMP    CYL     HD
(8)   OP INIT
(9)   CP DONE
(10)        DRIVE STATUS
(11)                WORD NUM IS (XXXXXX) SB (YYYYYY)
(12)   TOTAL COMPARE ERRS: (ZZZ) OF (128)
```

THE ONLY EXCEPTION TO THE ABOVE FORMAT IS PURE DATA COMPARE ERRORS (NOT DETECTED BY READ ERROR). THEN THE FORMAT DOES NOT INCLUDE LINES 5 THROUGH 10.

LINE 1 IS THE ERROR HEADER AND IS PROVIDED BY THE SUPERVISOR. THE PROGRAM IS IDENTIFIED BY NAME WITH THE NUMBER OF TEST AND SUBTEST PRESENTLY BEING EXECUTED.

THE SUBTEST NUMBER IS UNIQUE IN THIS PROGRAM IN THAT IT DOES NOT REFER TO A PHYSICAL SUBTEST WITHIN A GIVEN TEST. RATHER IT REFLECTS THE NUMBER OF TIMES A SUBTEST HAS BEEN EXECUTED WITHIN A TEST. CONSEQUENTLY, ON A TEST THAT TESTS AN INCREMENTAL TYPE OF OPERATION (SUCH A INCREMENTAL SEEKS, READ ALL HEADERS FROM BOTH SURFACES, ETC.) THE SUBTEST WILL BE DESCRIPTIVE OF WHERE IN THE TEST THE ERROR OCCURRED.

THE ERROR P.C. IS THE PHYSICAL MEMORY LOCATION WHERE THE ERROR REPORT WAS INITIATED. SINCE MANY FUNCTIONS ARE SUBROUTINED, AND ERRORS ARE REPORTED FROM SUBROUTINES, THE ERROR P.C. IS NOT SUFFICIENT TO IDENTIFY THE LOCATION OF THE ERROR CALL AND THE ROUTINE TRACE SEQUENCE IS PROVIDED.

LINE 2 IS THE ROUTINE TRACE SEQUENCE. IF THE ERROR CALL IS INITIATED FROM WITHIN THE TEST (AS OPPOSED TO WITHIN A ROUTINE), THIS PORTION OF THE REPORT IS OMITTED. IF THE CALL IS INITIATED FROM A ROUTINE (WHICH MAY BE CALLED BY ANOTHER ROUTINE, WHICH MAY BE CALLED BY ANOTHER ROUTINE, ETC. SEVERAL LEVELS DEEP) THE ROUTINE TRACE SEQUENCE PROVIDES A TRAIL TO THE ACTUAL LOCATION WITHIN THE TEST THAT CALLED THE FIRST ROUTINE. THE FIRST ENTRY LISTED IS THE LOCATION WHERE THE FIRST ROUTINE WAS CALLED.

LINE 3 IS THE TEST DESCRIPTION AND IS ROUGHLY IDENTICAL TO THE NAME OF THE TEST BEING PERFORMED.

LINE 4 IDENTIFIES THE ACTUAL HARDWARE FUNCTION THAT IS BEING PERFORMED. ADDITIONAL INFORMATION ON THIS LINE IS DESCRIPTIVE OF SPECIFIC USE OF THE FUNCTION. FOR EXAMPLE, THE OPERATION LINE WILL READ 'READ HEADERS FOR 40 HEADERS' WHEN ALL HEADERS ARE BEING READ FROM A TRACK.

LINE 5 IDENTIFIES THE ERROR THAT HAS BEEN DETECTED. THE CONTENT OF LINE 5 IDENTIFIES WHAT WAS BENG TESTED (SUCH AS DRIVE READY, CONTROLLER ERROR, DRIVE STATE, ETC.), WHAT IT IS AND WHAT IT SHOULD BE. LINE 5 MAY BE REPEATED IF MORE THAN ONE TESTED ITEM IS FOUND IN ERROR.

IN ADDITION LINE 5 WILL REPORT ANY HARDWARE DETECTED ERRORS SUCH AS OPERATION INCOMPLETE, HEADER CRC, ETC. IN THIS CASE THE FIRST LINE PRINTED AS RESULT WILL BE DETERMINED BY THE THREE ERROR BITS OPI, HNF/DLT, AND HCRC/DCRC. THE LINE WILL BE DETERMINED AS IN THE FOLLOWING TRUTH TABLE:

HNF/DLT	DCRC/HCRC	OPI	MESSAGE
1	1	1	HDR NOT FND/HDR CRC/OPI ERROR
0	1	1	HDR CRC ERROR
1	0	1	HDR NOT FND ERROR
0	1	0	DATA CRC ERROR
1	0	0	DATA LATE ERROR

LINE 6 IDENTIFIES THE PHYSICAL ADDRESS OF THE UNIT UNDER TEST. THIS ADDRESS IS BY UNIBUS ADDRESS OF THE CONTROLLER AND DRIVE NUMBER.

LINE 7 NAMES THE CONTROLLER REGISTERS (AND CYLINDER AND HEAD WHERE THESE ARE APPLICABLE IN THE REPORT) TO BE REPORTED.

LINE 8 PROVIDES THE CONTENTES OF CONTROLLER REGISTERS WHEN THE OPERATION WAS INITIATED.

LINE 9 PROVIDES THE CONTENTS OF THE CONTROLLER REGISTERS WHEN THE ERROR BEING REPORTED WAS DETECTED. FREQUENTLY THE REGISTER CONTENTS OF OP INIT AND OP DONE WILL BE DIFFERENT. OP INIT MAY INDICATE A SEEK WAS BEING PERFORMED BUT OP DONE MAY INDICATE THE ERROR WAS DETECTED BY A READ HEADER. THE REASON IS THAT A SEEK WAS EXECUTED AND DID NOT PROPERLY POSITION HEADS AND WHEN THE READ HEADER WAS DONE THE HEADS WERE ON THE WRONG CYLINDER.

LINE 10 IS THE DRIVE STATUS. THIS LINE IS ONLY REPORTED IF THE RLMP REGISTER DOES NOT CONTAIN THE ACTUAL DRIVE STATUS.

LINE 11 AND LINE 12 ARE REPORTED IF THE ERROR WAS DETECTED AS A COMPARE OPERATION, EITHER DATA OR HEADERS. IN ADDITION, GOOD AND BAD DATA IS REPORTED FOR ALL READ ERRORS.

3.2 ERROR HALTS

ERROR HALTS ARE SUPPORTED PER DESCRIBED IN THE PREVIOUS SECTION WITH /FLAG:HOE. THERE ARE NO OTHER HALTS.

4.0 PERFORMANCE AND PROGRESS REPORTS

4.1 PERFORMANCE REPORTS

THIS PROGRAM WILL NOT GIVE ANY PERFORMANCE REPORTS.

4.2 PROGRESS REPORTS

THIS PROGRAM WILL NOT GIVE ANY PROGRESS REPORTS.

5.0 DEVICE INFORMATION TABLES

THE RL11/RLV11 CONTROLLER HAS THE FOLLOWING FOUR(4) REGISTERS FOR CONTROL OF THE SUBSYSTEM.

RLCS - CONTROL AND STATUS REGISTER (XXXXX0)

BIT 15 - COMPOSITE ERROR
BIT 14 - DRIVE ERROR
BIT 13 - NON EXISTANT MEMORY ERROR
BIT 12 - HEADER NOT FOUND (WITH BIT 10 SET)
- DATA LATE (WITH BIT 10 CLEAR)
BIT 11 - HEADER CRC (WITH BIT 10 SET)
- DATA CRC (WITH BIT 10 CLEAR)
BIT 10 - OPERATION INCOMPLETE
BIT 9/8 - DRIVE SELECT (0-3)
BIT 7 - CONTROLLER READY
BIT 6 - INTERRUPT ENABLE
BIT 5 - EXTENDED BUS ADDRESS (BIT 17)
BIT 4 - EXTENDED BUS ADDRESS (BIT 16)
BIT 3-1 - FUNCTION CODE
0 - NOP (PDP-11) MAINT (LSI-11)
1 - WRITE CHECK
2 - GET DRIVE STATUS
3 - SEEK
4 - READ HEADER
5 - WRITE DATA
6 - READ DATA
7 - READ WITHOUT HEADER COMPARE

BIT 0 - DRIVE READY

RLBA - BUS ADDRESS REGISTER (XXXXX2)

BITS 15-1 BUS ADDRESS OF DATA TRANSFER
BIT 0 SHOULD BE 0

RLDA - DISK ADDRESS REGISTER (XXXXX4)

FOR READ/WRITE FUNCTIONS

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

FOR SEEK FUNCTION

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

FOR GET STATUS FUNCTION

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

RLMP - MULTIPURPOSE REGISTER

FOR READ/WRITE FUNCTION

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

FOR READ HEADER FUNCTION

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

FOR GET STATUS FUNCTION

HAS DRIVE STATUS

BIT 15 - WRITE DATA ERROR
BIT 14 - CURRENT HEAD ERROR (CHE)
BIT 13 - WRITE LOCK STATUS (WL)
BIT 12 - SEEK TIME OUT (SKTO)
BIT 11 - SPIN ERROR (SPE)
BIT 10 - WRITE GATE ERROR (WGE)
BIT 9 - VOLUME CHECK (VC)

BIT 8 - DRIVE SELECT ERROR (DSE)
BIT 7 - DRIVE TYPE IS RL02 IF SET
BIT 6 - SURFACE (0=UPPPER, 1=LOWER)
BIT 5 - COVER OPEN
BIT 4 - HEADS HOME
BIT 3 - BRUSHES HOME
BIT 2-0 -STATE BITS
0 - LOAD STATE
1 - SPIN UP
2 - BRUSH CYCLE
3 - LOAD HEADS
4 - SEEK - TRACK COUNTING
5 - SEEK - LINEAR MODE
6 - UNLOAD HEADS
7 - SPIN DOWN

6.0 TEST SUMMARIES

TEST 1 OUTER GUARD BAND DETECTION TEST
******

DO READ HEADER, WAIT FOR INTERRUPT. CHECK IF AT CYLINDER 0. IF NOT, SEEK REVERSE 1 CYLINDER AT A TIME UNTIL CYLINDER 0 IS REACHED. IF ANY REVERSE SEEK FAILS TO MOVE THE HEADS IN 10 TRIES:

DETECTION OF GUARD BAND PREMATURE.

WHEN AT CYLINDER 0, DO SEEK DIFFERENCE OF 1, SIGN 0, HEAD 0. WAIT FOR INTERRUPT, WAIT FOR READY. READY SHOULD SET IN 20MS>T>15MS. IF NOT:

FAILED TO DETECT GUARD BAND

DO READ HEADER. WAIT FOR INTERRUPT. CHECK FOR CYLINDER 0. IF NOT:

FAILED TO SEEK BACK TO ZERO

DO SEEK WITH DIFFERENCE OF 1, SIGN 0, HEAD 1. DO SAME TESTS AS ABOVE WITH REGARD TO READY VS TIME AND CYLINDER FOUND IN

HEADER.

NOTE: CHOOSING A SINGLE SURFACE WILL LIMIT THE TESTING TO THAT SURFACE.

TEST 2 INCREMENTAL FORWARD SEEK HEAD 0 TEST
******

POSITION HEADS AT CYLINDER 'LOLIMIT' USING SEEKS WITH DIFFERENCE OF ONE, HEAD 0.

DO SEEK WITH DIFFERENCE OF 1, SIGN 1, HEAD 0. WAIT FOR INTERRUPT, WAIT FOR DRIVE READY. CHECK READY IS SET IN 15 MS. IF NOT:

POSITIONING PROBLEM AT A SPECIFIC CYLINDER
MECHANICAL OBSTRUCTION

CHECK THAT THIS CYLINDER IS OLD CYLINDER + 1. IF NOT:

DIFFERENCE REGISTER OR COUNT LOGIC FAILURE
TRACK CROSSING DETECTION FAILURE

REPEAT SEEKS AND READS UNTIL CYLINDER READ IS 'HILIMIT'.

NOTE 1: IF THE 'USE ALL SECTORS' PARAMETER IS SPECIFIED AS 'Y', THE TEST WILL READ AND TEST ALL 40 HEADERS (CARTRIDGE VERIFY).

NOTE 2: TESTING WILL BE DONE BETWEEN UPPER AND LOWER CYLINDER LIMITS. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE. THIS TEST WILL BE BYPASSED IF SURFACE 1 IS CHOSEN.

TEST 3 INCREMENTAL REVERSE SEEK HEAD 0 TEST
******

POSITION HEADS AT CYLINDER 'HILIMIT' USING SEEKS WITH DIFFERENCE OF 1, HEAD 0.

DO SEEK WITH DIFFERENCE OF 1, SIGN 0, HEAD 0. WAIT FOR INTERRUPT, WAIT FOR DRIVE READY. CHECK READY SET IN 15 MS:

POSITIONING PROBLEM AT A SPECIFIC CYLINDER
DO READ HEADER, WAIT FOR INTERRUPT. CHECK THAT THIS CYLINDER IS OLD CYLINDER - 1. IF NOT:

DIFFERENCE REGISTER OR COUNT LOGIC FAILURE
TRACK CROSSING DETECTION FAILURE

REPEAT SEEK AND CHECKS UNTIL CYLINDER IS 'LOLIMIT'.

NOTE: IF THE 'USE ALL SECTORS' PARAMETER IS SPECIFIED AS 'Y', THE TEST WILL READ AND TEST ALL 40 HEADERS (CARTRIDGE VERIFY).

NOTE: TESTING WILL BE DONE BETWEEN UPPER AND LOWER CYLINDER LIMITS. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE. THIS TEST WILL BE BYPASSED IF SURFACE 1 IS CHOSEN.

TEST 4 INCREMENTAL FORWARD SEEK HEAD 1 TEST
******

POSITION HEADS AT CYLINDER 'HILIMIT' USING SEEKS WITH DIFFERENCE OF ONE, HEAD 0.

DO SEEK WITH DIFFERENCE OF 1, SIGN 1, HEAD 1. WAIT FOR INTERRUPT, WAIT FOR DRIVE READY. CHECK READY IS SET IN 15 MS. IF NOT:

POSITIONING PROBLEM AT A SPECIFIC CYLINDER

DO READ HEADER, WAIT FOR INTERRUPT. CHECK THAT THIS CYLINDER IS OLD CYLINDER + 1. IF NOT:

DIFFERENCE REGISTER OR COUNT LOGIC FAILURE
TRACK CROSSING DETECTION FAILURE

REPEAT SEEKS AND READS UNTIL CYLINDER READ IS 'HILIMIT'.

NOTE 1: IF THE 'USE ALL SECTORS' PARAMETER IS SPECIFIED AS 'Y', THE TEST WILL READ AND TEST ALL 40 HEADERS (CARTRIDGE VERIFY).

NOTE 2: TESTING WILL BE DONE BETWEEN UPPER AND LOWER CYLINDER LIMITS. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE. THIS TEST WILL BE BYPASSED IF SURFACE 0 IS CHOSEN.

TEST 5 INNER GUARD BAND DETECTION TEST
******

POSITION HEADS AT CYLINDER 'HILIMIT' USING SEEK WITH DIFFERENCE OF 1, HEAD 0.

WHEN AT MAX CYLINDER, DO SEEK WITH DIFFERENCE OF 1, SIGN 1, HEAD 0. WAIT FOR INTERRUPT, WAIT FOR DRIVE READY. READY SHOULD SET IN 20MS>T>15MS. IF NOT:

FAILED TO DETECT GUARD BAND

DO READ HEADER. WAIT FOR INTERRUPT. CHECK FOR MAX. CYLINDER IF NOT:

FAILED TO SEEK BACK TO MAX CYLINDER

DO SEEK WITH DIFFERENCE OF 1, SIGN 1, HEAD 1. DO SAME TESTS AS ABOVE.

NOTE: CHOOSING A SINGLE SURFACE WILL LIMIT THE TESTING TO

THAT SURFACE.

TEST 6 INCREMENTAL REVERSE SEEK HEAD 1 TEST
******

POSITION HEADS AT CYLINDER 'HILIMIT' USING SEEKS WITH DIFFERENCE OF 1, HEAD 0.

DO SEEK WITH DIFFERENCE OF 1, SIGN 0, HEAD 1. WAIT FOR INTERRUPT, WAIT FOR DRIVE READY. CHECK READY SET IN 15 MS:

POSITIONING PROBLEM AT A SPECIFIC CYLINDER

DO READ HEADER, WAIT FOR INTERRUPT. CHECK THAT THIS CYLINDER IS OLD CYLINDER - 1. IF NOT:

DIFFERENCE REGISTER OR COUNT LOGIC FAILURE
TRACK CROSSING DETECTION FAILURE

REPEAT SEEK AND CHECKS UNTIL CYLINDER IS 'LOLIMIT'.

NOTE 1: IF PROGRAM MODE 2 IS USED AND THE 'USE ALL SECTORS' PARAMETER IS SPECIFIED AS 'Y', THE TEST WILL READ AND TEST ALL 40 HEADERS (CARTRIDGE VERIFY).

NOTE 2: TESTING WILL BE DONE BETWEEN UPPER AND LOWER CYLINDER LIMITS. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE. THI TEST WILL BE BYPASSED IF SURFACE 0 IS CHOSEN.

TEST 7 SEEK TESTS
******

POSITION HEADS AT CYLINDER 'LOLIMIT' USING SEEKS WITH DIFFERENCE OF 1, HEAD 0.

DO READ HEADER, RECORD POSITION. DO SEEK WITH DIFFERENCE OF 2 (MAX DISTANCE AT 3 IPS), SIGN 1, HEAD 0. DO READ HEADER, CHECK NEW CYLINDER IS OLD CYLINDER + DISTANCE. IF NOT:

TRACK CROSSING DETECTION FAILURE
DIFFERENCE COUNTER FAILURE
COUNT PULSE GENERATION FAILUPE
VELOCITY ROM FAILURE

REPEAT ABOVE UNTIL OLD CYLINDER + DISTANCE > MAX. POSITION AT MAX.

DO READ HEADER, RECORD POSITION. DO SEEK WITH DIFFERENCE OF 2 (MAX DISTANCE AT 3 IPS), SIGN 0, HEAD 0. DO READ HEADER, CHECK NEW CYLINDER IS OLD CYLINDER - DISTANCE. IF NOT:

TRACK CROSSING DETECTION FAILURE

REPEAT UNTIL OLD CYLINDER - DISTANCE < 0. REPEAT ALL OF THE ABOVE USING HEAD 1.

REPEAT ALL OF THE ABOVE TESTS USING THE FOLLOWING DISTANCES: 2, 6, 9, 12, 17, 22, 27, 34, 41, 128, 256 FOR RL01 OR 4, 12, 18, 24, 34, 44, 54, 68, 82, 256, 512 FOR RL02. THESE DISTANCES ARE SPECIFIED BECAUSE THEY REPRESENT THE MAXIMUM DISTANCE FOR EACH VELOCITY LEVEL USED IN THE DRIVE.

NOTE: TESTING WILL BE DONE BETWEEN UPPER AND LOWER CYLINDER LIMITS. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE.

TEST 8 FORWARD OSCILLATING SEEK TEST
******

POSITION HEADS AT CYLINDER 0.

DO OSCILLATING SEEK USING HEAD 0 (SEEK FROM 0 TO 1 TO 0, 0 TO 2 TO 0, 0 TO 3 TO 0, ...0 TO MAX CYL TO 0). AFTER EACH SEEK READ HEADER AND VERIFY POSITION.

REPEAT TEST USING HEAD 1.

NOTE: IF EITHER CYLINDER LIMIT IS SPECIFIED, THE TEST WILL SEEK BETWEEN UPPER AND LOWER LIMITS FOR EACH SURFACE. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE. NOTE THAT LOOPING ON TEST THEN PROVIDES A FIXED DISTANCE SEEK LOOP.

TEST 9 REVERSE OSCILLATING SEEK TEST
******

POSITION HEADS AT MAX CYLINDER. DO OSCILLATING SEEK USING HEAD 0. (IF RL01 SEEK FROM 255 TO 254 TO 255, 255 TO 253 TO 255,....255 TO 0 TO 255.) AFTER EACH SEEK READ HEADER AND VERIFY POSITION.

REPEAT TEST USING HEAD 1.

NOTE: IF EITHER CYLINDER LIMIT IS SPECIFIED, THE TEST WILL SEEK BETWEEN UPPER AND LOWER LIMITS FOR EACH SURFACE. CHOOSING A SINGLE SURFACE WILL LIMIT TESTING TO THAT SURFACE. NOTE THAT LOOPING ON TEST THEN PROVIDES A FIXED DISTANCE SEEK LOOP.

@

.MAIN. MACY11 30A(1052) 08-FEB-80 14:49
CZRLJB.MAC   07-DEC-79 09:06   TABLE OF CONTENTS   SEQ 0034

```
     1
     2          000001                  PART2==1
     3                                          .ENABLE ABS
     4                                          .ENABLE AMA
     5          002000                          .=2000
     6                                          .MCALL  SVC
     7
     8  002000                                  SVC
     9          000001                          SVCTST=1
    10          000001                          SVCSUB=1
    11          000001                          SVCBGL=1
    12          000000                          SVCINS=0
    13          000000                          SVCTAG=0
    14
    15
```

```
                        .SBTTL  MACRO DEFINITIONS

                        .MACRO  WAITUS  ARG             ;MACRO MICRO-SEC WAIT
                                MOV     ARG,XDELAY      ;SAVE ARGUMENT
                                JSR     PC,TIME         ;CALL TIMING ROUTINE
                        .ENDM

                        .MACRO  WAITMS  ARG             ;MACRO MILLI-SEC WAIT
                                MOV     ARG,YDELAY      ;SAVE ARGUMENT
                                JSR     PC,XTIME        ;CALL TIMING ROUTINE
                        .ENDM

                        .MACRO  ABORTWAIT               ;MACRO CLEAR UNELAPSED TIME
                                MOV     XDELAY,TEMPO    ;SAVE MICRO-SEC RUN TIME
                                MOV     YDELAY,TEMP     ;SAVE MILLI-SEC RUN TIME
                                CLR     XDELAY          ;ABORT MICRO-SEC WAIT
                                CLR     YDELAY          ;ABORT MILLI-SEC WAIT
                        .ENDM

                        .MACRO  GETTIM  ARG             ;MACRO GET ELAPSED TIME
                                MOV     @#CLKCTR,ARG    ;STORE CLOCK COUNTER CONTENTS
                                CLR     @#CLKCSR        ;EVENT FINISHED, STOP CLOCK
                        .ENDM

                        .MACRO  STCLK                   ;MACRO START P-CLOCK
                                CLR     @#CLKCSB        ;CLEAR CLOCK COUNT SET BUFFER
                                CLR     @#CLKCTR        ;CLEAR CLOCK COUNTER
                                MOV     #23,@#CLKCSR    ;INITIALIZE CLOCK FOR COUNT-UP MODE,
                                                        ;/10 KHZ RATE, AND START CLOCK
                        .ENDM
```

```
    52
    53                                  .NLIST  CND,MD,ME
    54
    55
    56  002000                                  POINTER BGNSW,BGNSFT,BGNDU
    57
    58  002000                          BGNMOD  MDHEDR
    63  002000                          HEADER  CZRLJ,B,0,30000,0
(4) 002000      103                             .ASCII /C/
(4) 002001      132                             .ASCII /Z/
(4) 002002      122                             .ASCII /R/
(4) 002003      114                             .ASCII /L/
(4) 002004      112                             .ASCII /J/
(6) 002005      000                             .BYTE   0
(6) 002006      000                             .BYTE   0
(5) 002007      000                             .BYTE   0
(4) 002010      102                             .ASCII  /B/
(4) 002011      060                             .ASCII  /0/
(4) 002012  000000                              .WORD   0
(4) 002014  030000                              .WORD   30000
(4) 002016  030624                              .WORD   L$HARD
(4) 002020  031000                              .WORD   L$SOFT
(4) 002022  013540                              .WORD   L$HW
(4) 002024  013556                              .WORD   L$SW
(4) 002026  031342                              .WORD   L$LAST
(4) 002030  000000                              .WORD   0
(4) 002032  000000                              .WORD   0
(4) 002034  000000                              .WORD   0
(4) 002036  000000                              .WORD   0
(4) 002040  013574                              .WORD   L$DISPATCH
(4) 002042  000000                              .WORD   0
(4) 002044  000000                              .WORD   0
(4) 002046  000000                              .WORD   0
(4) 002050      003                             .BYTE   C$REVISION
(3) 002051      003                             .BYTE   C$EDIT
(4) 002052  000000                              .WORD   0
(5) 002054  000000                              .WORD   0
(4) 002056  000000                              .WORD   0
(4) 002060  002226                              .WORD   L$DVTYP
(4) 002062  000000                              .WORD   0
(4) 002064  000000                              .WORD   0
(4) 002066  000000                              .WORD   0
(4) 002070  000000                              .WORD   0
(4) 002072  015252                              .WORD   L$DU
(4) 002074  000000                              .WORD   0
(4) 002076  002122                              .WORD   L$DESC
(4) 002100  104035                              EMT     E$LOAD
(4) 002102  000000                              .WORD   0
(4) 002104  013616                              .WORD   L$INIT
(4) 002106  015124                              .WORD   L$CLEAN
(4) 002110  014566                              .WORD   L$AUTO
(4) 002112  013530                              .WORD   L$PROT
(4) 002114  000000                              .WORD   0
(4) 002116  000000                              .WORD   0
(4) 002120  000000                              .WORD   0
 65 002122                          ENDMOD
```

```
 66  002122                                 DESCRIPT <CZRLJ TESTS OUTER & INNER GUARD BAND DETECTION AND SEEK OPERATIONS>
(3)  002122  055103  046122  020112         .ASCIZ  /CZRLJ TESTS OUTER & INNER GUARD BAND DETECTION AND SEEK OPERATIONS/
(3)  002130  042524  052123  020123
(3)  002136  052517  042524  020122
(3)  002144  020046  047111  042516
(3)  002152  020122  052507  051101
(3)  002160  020104  040502  042116
(3)  002166  042040  052105  041505
(3)  002174  044524  047117  040440
(3)  002202  042116  051440  042505
(3)  002210  020113  050117  051105
(3)  002216  052101  047511  051516
(3)  002224     000
(2)          002226                         .EVEN
 67  002226                                 DEVTYP  <RL01,RL02>
(3)  002226  046122  030460  051054         .ASCIZ  /RL01,RL02/
(3)  002234  030114  000062
(2)                                         .EVEN
 68
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 85
 86
 87
 88                                     .SBTTL  GLOBAL DATA SECTION
 89
 90  002240                             BGNMOD  GLBEQAT
 91
 92  002240                             EQUALS
(1)                                     ;
(1)                                     ; BIT DIFINITIONS
(1)                                     ;
(1)            100000                   BIT15== 100000
(1)            040000                   BIT14== 40000
(1)            020000                   BIT13== 20000
(1)            010000                   BIT12== 10000
(1)            004000                   BIT11== 4000
(1)            002000                   BIT10== 2000
(1)            001000                   BIT09== 1000
(1)            000400                   BIT08== 400
(1)            000200                   BIT07== 200
(1)            000100                   BIT06== 100
```

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

```
                        CSR     =0                      ;BUS ADDRESS
                        VECT    =2                      ;VECTOR ADDRESS
                        PRIOR   =4                      ;PRIORITY
                        TYPDR=6
                        DRSB    =10                     ;DRIVE SELECT BIT
                        CNT     =12                     ;CONTROLLER TYPE

                        ;       OFFSET FOR SOFTWARE P-TABLE
                        MISWI   =0                      ;SOFTWARE PARAMETERS SWITCHES
                        LOLIM   =2                      ;CYLINDER LOWER LIMIT
                        HILIM   =4                      ;CYLINDER HIGH LIMIT
                        HEAD    =6                      ;SELECTED HEAD FOR RUNNING TESTS
                        ERLIM   =10                     ;ERROR LIMIT
                        DCLIM   =12                     ;DATA COMPARE ERROR LIMIT

                        ;       BIT ASSIGNMENT FOR SOFTWARE P-TABLE SWITCHES
                        ALLCYL  =BIT00                  ;USE ALL CYLINDERS
                        ALLSEC  =BIT01                  ;USE ALL SECTORS
                        DRSELT  =BIT02                  ;EXECUTE DRIVE SELECT TEST
                        HDALIGN =BIT03                  ;EXECUTE HEAD ALIGNMENT TEST
                        HEADLM  =BIT12                  ;HEAD LIMIT SPECIFIED FLAG
                        HICYL   =BIT13                  ;HI LIMIT SPECIFIED FLAG
                        LOCYL   =BIT14                  ;LO LIMIT SPECIFIED
                        MITEST  =BIT15                  ;EXECUTE MANUAL INTERVENTION TESTS

                        ;       SUBSYSTEM FUNCTIONS
                        CKDATA  =102                    ;WRITE CHECK
                        GTSTAT  =104                    ;GET STATUS
                        SEEK    =106                    ;SEEK
                        RDHEAD  =110                    ;READ HEADER
                        WTDATA  =112                    ;WRITE DATA
                        RDDATA  =114                    ;READ DATA
                        RDNOHR  =116                    ;READ DATA, IGNORE HEADERS
                        NOOP    =100                    ;NO OPERATION

                        ;       OPERATION FLAGS
                        COMPOP  =7777                   ;COMPOSITE OPERATION FLAGS
                        HDRCMP  =BIT0                   ;HEADER COMPARE OPERATION
                        DATACMP =BIT00                  ;DATA COMPARE OPERATION
                        CYLUP   =BIT02                  ;CYCLE UP OPERATION
                        ULOAD   =BIT03                  ;UNLOAD OPERATION
                        INOUTS  =BIT04                  ;IN-OUT SEEK OPERATION
                        OUTINS  =BIT05                  ;OUT-IN SEEK OPERATION
                        FOLWRT  =BIT06                  ;FOLLOWING WRITE OPERATION
                        REVSKS  =BIT07                  ;REV SEEK SEQ (ADJ INTERFERENCE)
                        FWDSKS  =BIT08                  ;FWD SEEK SEQ (ADJ INTERFERENCE)
                        REVSKO  =BIT09                  ;REV SEEK SEQ (OVERWRITE)
                        FWDSKO  =BIT10                  ;FWD SEEK SEQ (OVERWRITE)
                        BADADD  =BIT11                  ;BAD DISK ADDRESS
                        SEEKOP  =BIT12                  ;SEEK OPERATION
                        RORWOP  =BIT13                  ;READ OR WRITE OPERATION
                        RELDWT  =BIT14                  ;RELOAD WAIT
                        HDR40   =BIT15                  ;40 HEADER OPERATION
                        MQUALS  =OUTINS!INOUTS!FOLWRT!REVSKS!FWDSKS!REVSKO!FWDSKO
                                                        ;MESSAGE QUALIFIER BITS
```

```
                        ;       ERROR FLAGS FROM SUBROUTINES
000001          TOSLOW  =BIT00                  ;OPERATION TOOK TOO LONG
000002          NOIRPT  =BIT01                  ;NO INTERRUPT FROM OPERATION
000004          CONHNG  =BIT02                  ;CONTROLLER HUNG
000010          NOCLR   =BIT03                  ;BAD CONTROLLER CLEAR

000000          RLCS    =0                      ;CONTROL AND STATUS REGISTER
000002          RLBA    =2                      ;BUS ADDRESS REGISTER
000004          RLDA    =4                      ;DISK ADDRESS REGISTER
000006          RLMP    =6                      ;MULTI-PURPOSE REGISTER

                        ;       REGISTER BIT DEFINITIONS - CONTROL STATUS REGISTER
000000          RLCSR   =0                      ;CONTROL AND STATUS REGISTER
100000          ANYERR  =100000                 ;ANY ERROR BIT
040000          DRVERR  =40000                  ;DRIVE ERROR BIT
020000          NXMERR  =20000                  ;NON-EXISTANT MEMORY ERROR
010000          DLTERR  =10000                  ;DATA LATE ERROR
010000          HNFERR  =10000                  ;HEADER NOT FOUND ERROR
004000          DCKERR  =4000                   ;DATA CHECK ERROR
004000          HCRCERR =4000                   ;HEADER CHECK ERROR
002000          OPIERR  =2000                   ;OPERATION INCOMPLETE ERROR
001400          DSMSK   =1400                   ;DRIVE SELECT MASK
000200          CRDYMSK =200                    ;CONTROLLER READY MASK
000100          INTEBL  =100                    ;INTERRUPT ENABLE MASK
000060          BAMSK   =60                     ;BUS ADDRESS UPPER MASK
000001          DRDYMSK =1                      ;DRIVE READY MASK

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

                        ;       REGISTER BIT DEFINITIONS - DISK ADDRESS FOR SEEK
000001          MBSET0  =1                      ;MUST BE SET, BIT 0
000004          DIRBIT  =4                      ;DIRECTION BIT
000020          HDSEL   =20                     ;HEAD SELECT BIT

                        ;       REGISTER BIT DEFINITIONS - DISK ADDRESS FOR GET STATUS
000003          GETSTAT =3                      ;GET STATUS SETUP
000010          DRSET   =10                     ;DRIVE RESET MASK

                        ;       REGISTER BIT DEFINITIONS - MP FOR DATA XFER
017777          WCMSK   =17777                  ;WORD COUNT MASK
160000          WCRNG   =160000                 ;WORD COUNT RANGE MASK

                        ;       REGISTER BIT DEFINITIONS - MP FOR READ HEADER
000077          HDSEC   =77                     ;SECTOR MASK
000100          HDHSEL  =100                    ;HEAD SELECT MASK

                        ;       REGISTER BIT DEFINITIONS - MP FOR GET STATUS
000007          STAMSK  =7                      ;STATE MASK
000010          BHSTAT  =10                     ;BRUSH HOME STATUS
000020          HOSTAT  =20                     ;HEADS OUT STATUS
000040          COSTAT  =40                     ;COVER OPEN STATUS
000100          HSSTAT  =100                    ;HEAD SELECT STATUS
000400          DSESTAT =400                    ;DRIVE SELECT ERROR STATUS
001000          VCSTAT  =1000                   ;VOLUME CHECK STATUS
```

```
                002000          WGESTAT =2000                   ;WRITE GATE ERROR STATUS
                004000          SPDSTAT =4000                   ;SPIN ERROR STATUS
                010000          STOSTAT =10000                  ;SEEK TIMEOUT ERROR STATUS
                020000          WLSTAT  =20000                  ;WRITE LOCK STATUS
                040000          HCESTAT =40000                  ;HEAD CURRENT ERROR STATUS
                100000          WDESTAT =100000                 ;WRITE DATA ERROR STATUS

                                ;       P-CLOCK REGISTERS
                172540          CLKCSR  =172540                 ;CLOCK CONTROL AND STATUS REG.STER
                172542          CLKCSB  =172542                 ;CLOCK COUNT SET BUFFER
                172544          CLKCTR  =172544                 ;CLOCK COUNTER

002240                          ENDMOD



                                .SBTTL  GLOBAL DATA SECTION

002240                          BGNMOD  GLBDAT

                                ;       TABLE OF OPERATION MESSAGES

002240  000000                  OPMSGS: .WORD   0               ;FILLER
002242  005405                          .WORD   MWRCHK          ;MESSAGE FOR WRITE CHECK
002244  005430                          .WORD   MGTSTA          ;               GET STATUS
002246  005360                          .WORD   MSEEK           ;               SEEK
002250  005375                          .WORD   MREADH          ;               READ HEADER
002252  005416                          .WORD   MWRITE          ;               WRITE DATA
002254  005364                          .WORD   MREAD           ;               READ DATA
002256  005513                          .WORD   MWRSET          ;               WITH RESET
002260  005442                          .WORD   MDATCP          ;               WITH DATA COMPARE
002262  005461                          .WORD   MHDRCP          ;               WITH HEADER COMPARE
002264  005560                          .WORD   MCYLUP          ;               LOAD HEADS
002266  005547                          .WORD   MULOAD          ;               UNLOAD HEADS
002270  005607                          .WORD   MINOUT          ;                  IN-OUT SEQ
002272  005570                          .WORD   MOUTIN          ;                  OUT-IN SEQ
002274  005630                          .WORD   MFOLWRT         ;                  FOLLOWING WRITE
002276  005650                          .WORD   MREVSK          ;                  REV SEEK
002300  005701                          .WORD   MFWDSK          ;                  FWD SEEK
002302  005766                          .WORD   MRESKO          ;                  REV SEEK
002304  005732                          .WORD   MFWSKO          ;                  FWD SEEK
002306  006022                          .WORD   MBADAD          ;                  BAD DISK ADD FOR WRITE
002310  005477                          .WORD   M40HDR          ;               40 HEADER OPERATION
002312  000000          T.DRIVE: .WORD  0
002314  000000          JJJ:     .WORD  0
002316  000000          HLMTW:   .WORD  0
002320  000000          CLRBYT:  .WORD  0
002322  000000          NXTHL:   .WORD  0
002324  000000          GBND:    .WORD  0
002326  000000          CAMSK:   .WORD  0
002330  000000          DIRMSK:  .WORD  0
002332  000000          HDCYL:   .WORD  0

                                ;       TABLE OF RESULT NAME MESSAGE ADDRESSES
002334  007771          RESTBL: .WORD   MCERR            ;CONTROLLER ERROR
002336  010102                  .WORD   MDRERR           ;DRIVE ERROR
```

```
  262  002340  010320                    .WORD   MNEERR          ;NON-EXISTANT MEMORY ERROR
  263  002342  010272                    .WORD   MFLERR          ;HEADER NOT FOUND-DATA LATE
  264  002344  010255                    .WORD   MHDERR          ;HEADER OR DATA ERROR
  265  002346  010245                    .WORD   MOPERR          ;OPERATION INCOMPLETE
  266  002350  010352                    .WORD   MNDRST          ;NO DRIVE STATUS AVAILABLE
  267  002352  000000                    .WORD   0
  268  002354  010230                    .WORD   MWDERR          ;WRITE DATA ERROR
  269  002356  010212                    .WORD   MHCERR          ;HEAD CURRENT ERROR
  270  002360  000000                    .WORD   0
  271  002362  010176                    .WORD   MSTERR          ;SEEK TIMEOUT ERROR
  272  002364  010143                    .WORD   MSPERR          ;SPINDLE ERROR
  273  002366  010161                    .WORD   MWGERR          ;WRITE GATE ERROR
  274  002370  000000                    .WORD   0
  275  002372  010113                    .WORD   MDSERR          ;DRIVE SELECT ERROR
  276
  277                              ;       PATTERN TABLE
  278  002374  005102              PATTBL: .WORD   PAT1
  279  002376  005104                      .WORD   PAT2
  280  002400  005144                      .WORD   PAT3
  281  002402  005204                      .WORD   PAT4
  282  002404  005244                      .WORD   PAT5
  283  002406  005252                      .WORD   PAT6
  284  002410  005312                      .WORD   PAT7
  285  002412  005314                      .WORD   PAT8
  286  002414  005354                      .WORD   PAT9
  287  002416  005356                      .WORD   PAT10
  288
  289
  290                              ;       SUBROUTINE CALLING STACK
  291  002420  000000              SUBSTK: .WORD   0               ;STACK IS 12 WORDS LONG
  292  002422  000000                      .WORD   0
  293  002424  000000                      .WORD   0
  294  002426  000000                      .WORD   0
  295  002430  000000                      .WORD   0
  296  002432  000000                      .WORD   0
  297  002434  000000                      .WORD   0
  298  002436  000000                      .WORD   0
  299  002440  000000                      .WORD   0
  300  002442  000000                      .WORD   0
  301
  302                              ;RL01 TABLE OF CYLINDERS
  303  002444  000002              T25TBL: .WORD   2               ;TABLE OF DIFFERENCES
  304  002446  000006                      .WORD   6
  305  002450  000011                      .WORD   9.
  306  002452  000014                      .WORD   12.
  307  002454  000021                      .WORD   17.
  308  002456  000026                      .WORD   22.
  309  002460  000033                      .WORD   27.
  310  002462  000042                      .WORD   34.
  311  002464  000051                      .WORD   41.
  312  002466  000200                      .WORD   128.
  313  002470  000377                      .WORD   255.
  314
  315                              ;RL02 TABLE OF CYLINDERS
  316  002472  000004              T25TB2: .WORD   4
  317  002474  000014                      .WORD   12.
```

```
                                .WORD   18.
                                .WORD   24.
                                .WORD   34.
                                .WORD   44.
                                .WORD   54.
                                .WORD   68.
                                .WORD   82.
                                .WORD   256.
                                .WORD   511.

                        ;       TABLE TO BE USED TO BUILD AND STORE THE CYLINDERS

                        T33TBL: .BLKW   16.
                        TBT:    .BLKW   16.


                        CYLTBL: .BYTE   2               ;TABLE OF DEFAULT CYLINDERS
                                .BYTE   7.
                                .BYTE   14.
                                .BYTE   20.
                                .BYTE   27.
                                .BYTE   33.
                                .BYTE   38.
                                .BYTE   45.
                                .BYTE   52.
                                .BYTE   58.
                                .BYTE   65.
                                .BYTE   72.
                                .BYTE   77.
                                .BYTE   84.
                                .BYTE   91.
                                .BYTE   97.
                                .BYTE   102.
                                .BYTE   108.
                                .BYTE   113.
                                .BYTE   120.
                                .BYTE   127.
                                .BYTE   134.
                                .BYTE   139.
                                .BYTE   146.
                                .BYTE   152.
                                .BYTE   157.
                                .BYTE   164.
                                .BYTE   170.
                                .BYTE   177.
                                .BYTE   184.
                                .BYTE   189.
                                .BYTE   195.
                                .BYTE   202.
                                .BYTE   207.
                                .BYTE   214.
                                .BYTE   220.
                                .BYTE   227.
                                .BYTE   234.
                                .BYTE   241.
                                .BYTE   247.
```

```
  374  002670    375                    .BYTE   253.
  375  002671    000                    .BYTE   0
  376  002672  000401                   .WORD   257.
  377  002674  000406                   .WORD   262.
  378  002676  000415                   .WORD   269.
  379  002700  000423                   .WORD   275.
  380  002702  000432                   .WORD   282.
  381  002704  000445                   .WORD   293.
  382  002706  000454                   .WORD   300.
  383  002710  000463                   .WORD   307.
  384  002712  000471                   .WORD   313.
  385  002714  000500                   .WORD   320.
  386  002716  000507                   .WORD   327.
  387  002720  000514                   .WORD   332.
  388  002722  000523                   .WORD   339.
  389  002724  000532                   .WORD   346.
  390  002726  000540                   .WORD   352.
  391  002730  000545                   .WORD   357.
  392  002732  000553                   .WORD   363.
  393  002734  000560                   .WORD   368.
  394  002736  000567                   .WORD   375.
  395  002740  000576                   .WORD   382.
  396  002742  000605                   .WORD   389.
  397  002744  000612                   .WORD   394.
  398  002746  000621                   .WORD   401.
  399  002750  000627                   .WORD   407.
  400  002752  000634                   .WORD   412.
  401  002754  000643                   .WORD   419.
  402  002756  000651                   .WORD   425.
  403  002760  000660                   .WORD   432.
  404  002762  000667                   .WORD   439.
  405  002764  000674                   .WORD   444.
  406  002766  000702                   .WORD   450.
  407  002770  000711                   .WORD   457.
  408  002772  000716                   .WORD   462.
  409  002774  000725                   .WORD   469.
  410  002776  000733                   .WORD   475.
  411  003000  000742                   .WORD   482.
  412  003002  000751                   .WORD   489.
  413  003004  000760                   .WORD   496.
  414  003006  000766                   .WORD   502.
  415  003010  000774                   .WORD   508.
  416  003012  000774                   .WORD   508.
  417  003014  000000                   .WORD   0
  418  003016  000000          SSINDX:  .WORD   0              ;SUBROUTINE STACK INDEX POINTER
  419
  420                          ;        OPERATIONAL FLAGS
  421  003020  000000          OPFLAG:  .WORD   0              ;OPERATION FLAGS
  422  003022  000000          DONE:    .WORD   0              ;OPERATION COMPLETE FLAG
  423  003024  000000          HADONE:  .WORD   0              ;HEAD ALIGNMENT DONE FLAG
  424  003026  000000          ERHEAD:  .WORD   0              ;ADDRESS OF ERROR HEADER
  425  003030  000000          MORECE:  .WORD   0              ;MORE THAN 1 COMPARE ERROR
  426  003032  000000          ERRSWI:  .WORD   0              ;ERROR RETURN SWITCH
  427  003034  000000          BSFLAG:  .WORD   0              ;BAD SECTOR FLAGS
  428  003036  000000          WRTSWI:  .WORD   0              ;WRITE SWITCH
  429  003040  000000          TBLSTR:  .WORD   0              ;TABLE STORAGE
```

```
                                
003042  000000          RLBAS:  .WORD   0               ;RL11 BASE ADDRESS
003044  000000          RLVEC:  .WORD   0               ;RL11 VECTOR ADDRESS
003046  000000          RLDRV:  .WORD   0               ;DRIVE NUMBER UNDER TEST
                                
003050  000000          L.CS:   .WORD   0               ;CONTROLLER REGISTER STORAGE
003052  000000          L.BA:   .WORD   0               ;BEFORE OPERATION
003054  000000          L.DA:   .WORD   0
003056  000000          L.MP:   .WORD   0
003060  000000          T.CS:   .WORD   0               ;CONTROLLER REGISTER STORAGE
003062  000000          T.BA:   .WORD   0               ;   AFTER OPFRATION
003064  000000          T.DA:   .WORD   0
003066                  T.MP:
003066  000000          HDWRD1: .WORD   0               ;HEADER WORD STORAGE
003070  000000          HDWRD2: .WORD   0
003072  000000          HDWRD3: .WORD   0
                                
003074  000000          T.STAT: .WORD   0               ;DRIVE STATE STORAGE
                                
003076  000000          RESPARM: .WORD  0               ;PARAM BLOCK FOR REASON REPORT
003100  000000                  .WORD   0
003102  000000                  .WORD   0
003104  000000                  .WORD   0
003106  000000                  .WORD   0
                                
003110  000000          DRVCNT: .WORD   0               ;DRIVE COUNT FOR DRIVES UNDER TEST
003112  000000          DIFAUG: .WORD   0               ;DIFFERENCE AUGMENT FOR SEEK
003114  000000          OLDCYL: .WORD   0               ;OLD CYLINDER
003116  000000          NEWCYL: .WORD   0               ;NEW CYLINDER
003120  000000          CURCYL: .WORD   0               ;CURRENT CYLINDER
003122  000000          DESDIF: .WORD   0               ;DESIRED DIFFERENCE
003124  000000          DESSGN: .WORD   0               ;DESIRED SIGN
003126  000000          DESHD:  .WORD   0               ;DESIRED HEAD
003130  000000          DESSEC: .WORD   0               ;DESIRED SECTOR
003132  000000          TEMP0:  .WORD   0               ;TEMPORARY STORAGE
003134  000000          TEMP1:  .WORD   0               ;TEMPORARY STARAGE
003136  000000          TEMP2:  .WORD   0               ;TEMPORARY STORAGE
003140  000000          TEMP3:  .WORD   0               ;TEMPORARY STORAGE
003142  000000          TEMP4:  .WORD   0               ;TEMPORARY STORAGE
003144  000000          TEMP5:  .WORD   0               ;TEMPORARY STORAGE
003146  000000          TEMP6:  .WORD   0               ;TEMPORARY STORAGE
003150  000000          TEMP7:  .WORD   0               ;TEMPORARY STORAGE
003152  000000          TEMP8:  .WORD   0               ;TEMPORARY STORAGE
                        ;       TIMER STORAGE
003154  000000          OFIN:   .WORD   0               ;ONE CYLINDER FORWARD INNER
003156  000000          OFINU:  .WORD   0               ;       UPPER
003160  000000          OFMID:  .WORD   0               ;ONE CYLINDER FORWARD MIDDLE
003162  000000          OFMIDU: .WORD   0               ;       UPPER
003164  000000          OFOUT:  .WORD   0               ;ONE CYLINDER FORWARD OUTER
003166  000000          OFOUTU: .WORD   0               ;       UPPER
003170  000000          ORIN:   .WORD   0               ;ONE CYLINDER REVERSE INNER
003172  000000          ORINU:  .WORD   0               ;       UPPER
003174  000000          ORMID:  .WORD   0               ;ONE CYLINDER REVERSE MIDDLE
003176  000000          ORMIDU: .WORD   0               ;       UPPER
003200  000000          OROUT:  .WORD   0               ;ONE CYLINDER REVERSE OUTER
003202  000000          OROUTU: .WORD   0               ;       UPPER
```

```
 487  003204  000000                HFIN:    .WORD   0               ;128 CYLINDER FORWARD INNER
 488  003206  000000                HFINU:   .WORD   0               ;       UPPER
 489  003210  000000                HFOUT:   .WORD   0               ;128 CYLINDER FORWARD OUTER
 490  003212  000000                HFOUTU:  .WORD   0               ;       UPPER
 491  003214  000000                HRIN:    .WORD   0               ;128 CYLINDER REVERSE INNER
 492  003216  000000                HRINU:   .WORD   0               ;       UPPER
 493  003220  000000                HROUT:   .WORD   0               ;128 CYLINDER REVERSE OUTER
 494  003222  000000                HROUTU:  .WORD   0               ;       UPPER
 495  003224  000000                AFMID:   .WORD   0               ;256 CYLINDER FORWARD
 496  003226  000000                AFMIDU:  .WORD   0               ;       UPPER
 497  003230  000000                ARMID:   .WORD   0               ;256 CYLINDER REVERSE
 498  003232  000000                ARMIDU:  .WORD   0               ;       UPPER
 499
 500  003234  000226                EXOCYL:  .WORD   150.            ;EXPECTED TIME ONE CYLINDER
 501  003236  001046                EXHCYL:  .WORD   550.            ;EXPECTED TIME 128 CYLINDER
 502  003240  001750                EXACYL:  .WORD   1000.           ;EXPECTED TIME 256 CYLINDER
 503  003242  000372                EXROT:   .WORD   250.            ;EXPECTED ROTATION TIME
 505  003244  000004                ERRVEC:  .WORD   4               ;ERROR VECTOR
 506
 507                                ;       MISCELLANEOUS COUNTERS
 508  003246  000000                PASCNT:  .WORD   0               ;PASS COUNTER (LOCAL TO A TEST)
 509  003250  000000                COUNT:   .WORD   0               ;A COUNTER (LOCAL TO A TEST)
 510  003252  000000                ERRPOINT: .WORD  0               ;ERROR POINTER
 511  003254  000100                ERRCNT:  .BLKW   64.             ;ERROR COUNTER FOR PROGRAM
 512  003454  000000                PASNUM:  .WORD   0               ;PASS NUMBER FOR PROGRAM
 513  003456  000000                PSETNM:  .WORD   0               ;COUNTER FOR PARAMETER SET NUMBER IN USE
 514  003460     000                LOCERR:  .BYTE   0               ;LOCAL ERROR COUNTER
 515  003461     000                NOERCT:  .BYTE   0               ;INHIBIT ERROR COUNTING FLAG
 516  003462  000000                TRPFLG:  .WORD   0               ;HARDWARE TRAP OCCURANCE
 517  003464  000000                PWRFLG:  .WORD   0               ;POWER FAILURE OCCURANCE
 518  003466  000000                XDELAY:  .WORD   0
 519  003470  000000                YDELAY:  .WORD   0
 520  003472  000000                MININC:  .WORD   0
 521  003474  000000                TEMP:    .WORD   0
 522  003476  000000                TIM.US:  .WORD   0
 523  003500  000000                TAG:     .WORD   0
 524  003502  000000                MAJINC:  .WORD   0
 525  003504  000000                CLKFLG:  .WORD   0               ;FLAG INDICATING PRESENCE OF A P-CLOCK
 526  003506  000000                CLKADR:  .WORD   0               ;POINTER TO DIAGNOSTIC MONITOR CLOCK TABLE
 527
 528
 529                                ;       BAD SECTOR TABLES AND POINTERS
 530  003510  000000                BSFVAL:  .WORD   0               ;BAD SECTORS FILES VALID FLAG
 531
 532  003512  000076                SBSFIL:  .BLKW   76              ;SOFTWARE BAD SECTOR FILE
 533  003706  000076                FBSFIL:  .BLKW   76              ;FACTORY BAD SECTOR FILE
 534
 535  004102  000200                IBUFF:   .BLKW   200             ;INPUT BUFFER
 536  004502  000200                OBUFF:   .BLKW   200             ;OUTPUT BUFFER
 537
 538  005102  000000                PAT1:    .WORD   0               ;PATTERN 1 (ALL ZEROS)
 539  005104  177772                PAT2:    .WORD   177772
 540  005106  177777                         .WORD   177777
 541  005110  177777                         .WORD   177777
 542  005112  052525                         .WORD   052525
 543  005114  052525                         .WORD   052525
```

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  544  005116  052525                    .WORD   052525
  545  005120  177777                    .WORD   177777
  546  005122  177777                    .WORD   177777
  547  005124  052525                    .WORD   052525
  548  005126  052525                    .WORD   052525
  549  005130  177777                    .WORD   177777
  550  005132  052525                    .WORD   052525
  551  005134  177252                    .WORD   177252
  552  005136  177252                    .WORD   177252
  553  005140  172765                    .WORD   172765
  554  005142  172765                    .WORD   172765
  555
  556  005144  000003            PAT3:   .WORD   000003
  557  005146  000000                    .WORD   000000
  558  005150  000000                    .WORD   000000
  559  005152  177777                    .WORD   177777
  560  005154  177777                    .WORD   177777
  561  005156  177777                    .WORD   177777
  562  005160  000000                    .WORD   000000
  563  005162  000000                    .WORD   000000
  564  005164  177777                    .WORD   177777
  565  005166  177777                    .WORD   177777
  566  005170  000000                    .WORD   000000
  567  005172  177777                    .WORD   177777
  568  005174  000000                    .WORD   000000
  569  005176  177777                    .WORD   177777
  570  005200  000000                    .WORD   000000
  571  005202  177777                    .WORD   177777
  572
  573  005204  025252            PAT4:   .WORD   025252
  574  005206  052525                    .WORD   052525
  575  005210  052525                    .WORD   052525
  576  005212  125252                    .WORD   125252
  577  005214  125252                    .WORD   125252
  578  005216  125252                    .WORD   125252
  579  005220  052525                    .WORD   052525
  580  005222  052525                    .WORD   052525
  581  005224  125252                    .WORD   125252
  582  005226  125252                    .WORD   125252
  583  005230  052525                    .WORD   052525
  584  005232  125252                    .WORD   125252
  585  005234  052525                    .WORD   052525
  586  005236  125252                    .WORD   125252
  587  005240  052525                    .WORD   052525
  588  005242  125252                    .WORD   125252
  589
  590  005244  155555            PAT5:   .WORD   155555
  591  005246  133333                    .WORD   133333
  592  005250  066666                    .WORD   066666
  593
  594  005252  121105            PAT6:   .WORD   121105
  595  005254  150442                    .WORD   150442
  596  005256  064221                    .WORD   064221
  597  005260  132110                    .WORD   132110
  598  005262  055044                    .WORD   055044
  599  005264  026442                    .WORD   026442
```

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                                                                    K 4
 600  005266  013211                          .WORD   013211
 601  005270  105504                          .WORD   105504
 602  005272  042642                          .WORD   042642
 603  005274  021321                          .WORD   021321
 604  005276  110550                          .WORD   110550
 605  005300  044264                          .WORD   044264
 606  005302  022132                          .WORD   022132
 607  005304  011055                          .WORD   011055
 608  005306  104426                          .WORD   104426
 609  005310  042213                          .WORD   042213
 610
 611  005312  177777                PAT7:     .WORD   177777
 612
 613  005314  045513                PAT8:     .WORD   045513
 614  005316  122645                          .WORD   122645
 615  005320  151322                          .WORD   151322
 616  005322  064551                          .WORD   064551
 617  005324  132264                          .WORD   132264
 618  005326  055132                          .WORD   055132
 619  005330  026455                          .WORD   026455
 620  005332  113226                          .WORD   113226
 621  005334  045513                          .WORD   045513
 622  005336  122645                          .WORD   122645
 623  005340  151322                          .WORD   151322
 624  005342  064551                          .WORD   064551
 625  005344  132264                          .WORD   132264
 626  005346  055132                          .WORD   055132
 627  005350  026455                          .WORD   026455
 628  005352  113226                          .WORD   113226
 629
 630  005354  125252                PAT9:     .WORD   125252
 631
 632  005356  155555                PAT10:    .WORD   155555
 633
 634  005360                        ENDMOD
 635
 636
 637
 641
 642
 643                                .SBTTL  GLOBAL MESSAGES
 644
 645  005360                        BGNMOD  GLBTXT
 646
 647  005360  045523  000040       MSEEK:  .ASCIZ  /SK /
 648  005364  042122  042040  052101  MREAD:  .ASCIZ  /RD DATA /
 649  005375     122  020104  042110  MREADH: .ASCIZ  /RD HDR /
 650  005405     127  052122  041440  MWRCHK: .ASCIZ  /WRT CHCK/
 651  005416  051127  020124  040504  MWRITE: .ASCIZ  /WRT DATA /
 652  005430  042507  020124  052123  MGTSTA: .ASCIZ  /GET STAT /
 653  005442  044527  044124  042040  MDATCP: .ASCIZ  /WITH DATA CMP /
 654  005461     127  052111  020110  MHDRCP: .ASCIZ  /WITH HDR CMP /
 655  005477     106  051117  032040  M40HDR: .ASCIZ  /FOR 40 HDRS/
 656  005513     127  052111  020110  MWRSET: .ASCIZ  /WITH RESET /
 657  005527     117  042520  035122  MOPER:  .ASCIZ  /OPER: /
 658  005536  042522  052523  052114  MRSLT:  .ASCIZ  /RESULT:        /
```

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659  005547    125  046116  020104  MULOAD: .ASCIZ  /UNLD DRV/
660  005560  042114  042040  053122  MCYLUP: .ASCIZ  /LD DRV /
661  005570  047506  020114  020060  MOUTIN: .ASCIZ  /FOL 0 TO CC SK/
662  005607    106  046117  031040  MINOUT: .ASCIZ  /FOL 255 TO CC SK/
663  005630  047500  020114  051127  MFOLWRT:        .ASCIZ  /FOL WRT (NO SK)/
664  005650  042101  020112  054503  MREVSK: .ASCIZ  /ADJ CYL WRTTN AFT REV SK/
665  005701    101  045104  041440  MFWDSK: .ASCIZ  /ADJ CYL WRTTN AFT FWD SK/
666  005732  045523  043040  042127  MFWSKO: .ASCIZ  /SK FWD,WRT - SK REV,OVERWRT/
667  005766  045523  051040  053105  MRESKO: .ASCIZ  /SK REV,WRT - SK FWD,OVERWRT/
668  006022  047117  041040  042101  MBADAD: .ASCIZ  /ON BAD SEC FILES/
669  006043    103  047101  052047  MBADSF: .ASCIZ  /CAN'T GET BAD SEC FILES/
670  006073    102  042101  051440  MFMTER: .ASCIZ  /BAD SEC FILE FMT ERR/
671  006120  047524  046440  047101  MTMBS:  .ASCIZ  /TO MANY BAD SEC /
672  006141    102  051525  040440  BASADD: .ASCIZ  /BUS ADD=/
673  006152  051104  036526     000  DRVNAM: .ASCIZ  /DRV=/
674  006157    116  020117  051104  DRVNAV: .ASCIZ  /NO DRV FOR TST/
675  006176  051104  020126  044504  NOPWR:  .ASCIZ  /DRV DID NOT REC'R FROM PWR FAIL/
676  006236  046122  051503     000  CSNAM:  .ASCIZ  /RLCS/
677  006243    122  041114  000101  BANAM:  .ASCIZ  /RLBA/
678  006250  046122  040504     000  DANAM:  .ASCIZ  /RLDA/
679  006255    122  046514  000120  MPNAM:  .ASCIZ  /RLMP/
680  006262  050117  044440  044516  LAB1:   .ASCIZ  /OP INIT = /
681  006275    117  020120  047504  LAB2:   .ASCIZ  /OP DONE = /
682  006310  047527  042122  000040  MWORD:  .ASCIZ  /WORD /
683  006316  047111  051124  052120  MTOSLOW: .ASCIZ /INTRPT TOO LATE/
684  006336  047516  042040  053122  MDRRES: .ASCIZ  /NO DRV RSPNSE/
685  006354  047516  044440  052116  MNOINT: .ASCIZ  /NO INTRPT ON CMND COMPLETE/
686  006407    103  052116  051114  MCONHNG: .ASCIZ /CNTLR HUNG /
687  006423    105  051122  042040  MNOCLR: .ASCIZ  /ERR DID NOT CLR/
688  006443    126  046117  041440  VCNRST: .ASCIZ  /VOL CHK NOT RSET/
689  006464  047125  050130  052103  UNXERR: .ASCIZ  /UNXPCTED ERR/
690  006501     40  042524  052123  TSTLAB: .ASCIZ  / TEST/
708  006507    117  052125  043440  P2T03E: .ASCIZ  /OUT GRD BAND /
709  006525    111  041516  051440  P2T04E: .ASCIZ  /INC SK FWD HD 0/
710  006545    111  041516  051440  P2T05E: .ASCIZ  /INC SK REV HD 0/
711  006565    111  041516  051440  P2T06E: .ASCIZ  /INC SK FWD HD 1/
712  006605    111  047116  043440  P2T07E: .ASCIZ  /INN GRD BAND /
713  006623    111  041516  051440  P2T08E: .ASCIZ  /INC SK REV HD 1/
714  006643    123  000113          P2T09E: .ASCIZ  /SK/
715  006646  053506  020104  051517  P2T10E: .ASCIZ  /FWD OSC SK/
716  006661    122  053105  047440  P2T11E: .ASCIZ  /REV OSC SK/
717  006674  045523  052040  046511  P2T12E: .ASCIZ  /SK TIMING/
718  006706  051502  020103  042122  P2T13E: .ASCIZ  /BSC RD DATA/
719  006722  051127  027524  042122  P2T14E: .ASCIZ  &WRT/RD DATA (P1)&
720  006743    123  044520  042116  P2T15E: .ASCIZ  /SPINDLE ROT TIMING/
721  006766  051127  027524  042122  P2T16E: .ASCIZ  &WRT/RD DATA (P2)&
722  007007    127  052122  046040  P2T17E: .ASCIZ  /WRT LCK ERR AND DATA PROT/
723  007041    101  045104  041440  P2T18E: .ASCIZ  /ADJ CYL INTERFNCE/
724  007063    117  042526  053522  P2T19E: .ASCIZ  /OVERWRT/
725  007073    123  020113  044524  SKTMES: .ASCIZ  /SK TIMES /
726  007105    123  044520  042116  SRTMES: .ASCIZ  /SPINDLE ROT TIME /
727  007127    050  047111  030440  VALDES: .ASCIZ  /(IN 100'S OF U-SEC)/
728  007153    101  050120  047522  MAPROX: .ASCIZ  /APPROX /
729  007163    111  047116  051105  LABIN:  .ASCIZ  /INNER/
730  007171    115  042111  046104  LABMID: .ASCIZ  /MIDDLE/
731  007200  052517  042524  000122  LABOUT: .ASCIZ  /OUTER/
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 732  007206  040515  020130  044524  LABEXP: .ASCIZ  /MAX TIME/
 733  007217     061  041440  046131  LABOCF: .ASCIZ  /1 CYL FWD/
 734  007231     061  041440  046131  LABOCR: .ASCIZ  /1 CYL REV/
 735  007243     115  042111  041440  LABHCF: .ASCIZ  /MID CYL FWD/
 736  007257     115  042111  041440  LABHCR: .ASCIZ  /MID CYL REV/
 737  007273     115  054101  041440  LABACF: .ASCIZ  /MAX CYL FWD/
 738  007307     115  054101  041440  LABACR: .ASCIZ  /MAX CYL REV/
 740  007323     110  051504  043040  HDMOVF: .ASCIZ  /HDS FAILED TO MV IN 10 TRYS/
 758  007357     122  051505  052105  OPR12:  .ASCIZ  /RESET WRT LCK /
 759  007376  047117  000040          OPR1A:  .ASCIZ  /ON /
 760  007402  047117  042040  053122  OPR1B:  .ASCIZ  /ON DRV /
 761  007412  047125  042504  020122  UNDTST: .ASCIZ  /UNDER TEST/
 762  007425     123  052105  053440  OPR004: .ASCIZ  /SET WRT LCK /
 763  007442  044504  043106  000040  DIFWD:  .ASCIZ  /DIFF /
 764  007450  043523  020116     000  SGNWD:  .ASCIZ  /SGN /
 765  007455     110  020104     000  HDWD:   .ASCIZ  /HD /
 766  007461     123  041505  000040  SECWD:  .ASCIZ  /SEC /
 767  007466  054503  020114     000  CYLWD:  .ASCIZ  /CYL /
 768  007473     106  047522  020115  FRMWD:  .ASCIZ  /FROM /
 769  007501     040  054502  040520  BYPSNM: .ASCIZ  / BYPASSED /
 770  007514  047522  052125  047111  SEQMES: .ASCIZ  /ROUTINE TRACE SEQ:/
 771  007537     104  053122  051440  STAMES: .ASCIZ  /DRV STAT/
 772  007550  040502  020104  042523  BSNSTR: .ASCIZ  /BAD SEC FILES NOT STRD. ALL SEC ASSUMED OK./
 773  007624  047524  040524  020114  TCERR:  .ASCIZ  /TOTAL CMP ERRS: /
 774  007645     104  044522  042526  NOCTLR: .ASCIZ  /DRIVE DROPPED - NO CONTROLLER/
 775  007703     104  044522  042526  NOTRDY: .ASCIZ  /DRIVE DROPPED - DID NOT RESPOND WITH 'READY'/
 776
 777
 778                                  ;       RESULT NAMES
 779  007760  051104  020126  042122  MDRDY:  .ASCIZ  /DRV RDY /
 780  007771     103  047117  020124  MCERR:  .ASCIZ  /CONT ERR /
 781  010003     110  051104  041440  MHCRC:  .ASCIZ  /HDR CRC/
 782  010013     104  052101  020101  MDCRC:  .ASCIZ  /DATA CRC/
 783  010024  042110  020122  047516  MHNF:   .ASCIZ  /HDR NOT FND/
 784  010040  040504  040524  046040  MDLT:   .ASCIZ  /DATA LATE/
 785  010052  042110  020122  047516  MHFCRC: .ASCIZ  &HDR NOT FND/HDR CRC/OPI&
 786  010102  051104  020126  051105  MDRERR: .ASCIZ  /DRV ERR /
 795  010113     104  053122  051440  MDSERR: .ASCIZ  /DRV SEL ERR /
 796  010130  051104  020126  052123  MDRVST: .ASCIZ  /DRV STATE /
 797  010143     123  044520  020116  MSPERR: .ASCIZ  /SPIN TIMEOUT /
 798  010161     127  052122  043440  MWGERR: .ASCIZ  /WRT GAT ERR /
 799  010176  045523  052040  046511  MSTERR: .ASCIZ  /SK TIMEOUT /
 800  010212  042510  042101  041440  MHCERR: .ASCIZ  /HEAD CUR ERR /
 801  010230  051127  020124  040504  MWDERR: .ASCIZ  /WRT DAT ERR /
 802  010245     117  051120  044455  MOPERR: .ASCIZ  /OPR-INC/
 803  010255     110  051104  042057  MHDERR: .ASCIZ  &HDR/DAT ERR &
 804  010272  042110  020122  047516  MFLERR: .ASCIZ  &HDR NOT FND/DAT LATE &
 805  010320  047516  026516  054105  MNEERR: .ASCIZ  /NON-EXISTENT MEMORY /
 806  010345     103  046131  000040  MCYLOC: .ASCIZ  /CYL /
 807  010352  040503  023516  020124  MNDRST: .ASCIZ  /CAN'T GET DRV STAT/
 808  010375     125  045516  020116  MUNDEF: .ASCIZ  /UNKN DRV STATE-NO RDY,NO ERR,HDS OUT/
 809  010442  040506  046111  052040  MRLFAL: .ASCIZ  /FAIL TO RELD HDS AFTER ERR CLR/
 810  010501     127  052122  040440  MWRTAB: .ASCIZ  /WRT ABRTD/
 811  010513     040  053117  020122  MEXERS: .ASCIZ  / OVR ERR LIMIT - UNIT DRPPD /
 812  010550  042440  051122     000  MERRS:  .ASCIZ  / ERR/
 813  010555     207  177777     000  BELL:   .ASCIZ  <207><377><377>
```

```
814
815                                          ;       RESULT SETTINGS
816  010561     111  020123     000  RESE3:  .ASCIZ  /IS /
817  010565     040  041123  000040  RESE4:  .ASCIZ  / SB /
818
819                                          ;       RESULT CONDITIONS
820  010572  044440  020116     000  RESE5:  .ASCIZ  / IN /
821  010577     040  043117  000040  RESE6:  .ASCIZ  / OF /
822  010604  052123  052101  020105  STATE2: .ASCIZ  /STATE 2/
823  010614  052123  052101  020105  STATE3: .ASCIZ  /STATE 3/
824  010624  052123  052101  020105  STATE5: .ASCIZ  /STATE 5/
828  010634  051461  020124  020063  C10MS:  .ASCIZ  /1ST 3 MS/
829  010645     065  030060  051515  C500MS: .ASCIZ  /500MS/
830  010653     103  041531  052440  CCYLUP: .ASCIZ  /CYC UP/
831  010662  040504  040524  054040  CAFDT:  .ASCIZ  /DATA XFR/
832  010673     065  051440  041505  C5SEC:  .ASCIZ  /5 SEC/
833
834  010701     045  022516  022524  FMTOP1: .ASCIZ  /%N%T%N%T%T%06%S%T%01%N/
835  010730  047045  052045  047445  FMTOP2: .ASCIZ  /%N%T%01%S1%T%01%N/
836  010752  047045  052045  047445  FMTOP3: .ASCIZ  /%N%T%01%S1%T%T%N/
837  010773     045  022524  000124  FMT1:   .ASCIZ  /%T%T/
838  011000  047045  052045  052045  FMT1.1: .ASCIZ  /%N%T%T/
839  011007     045  000124          FMT2:   .ASCIZ  /%T/
840  011012  047045     000          FMT3:   .ASCIZ  /%N/
841  011015     045  022516  022524  FMT4:   .ASCIZ  /%N%T%T%N/
842  011026  047045  052045  047445  FMT5:   .ASCIZ  /%N%T%06%S1%T%01/
843  011046  047045  051445  030461  FMT6:   .ASCIZ  /%N%S11%T%S4%T%S4%T%S4%T%S4%T%S2%T/
844  011110  047045  052045  047445  FMT7:   .ASCIZ  /%N%T%06%S2%06%S2%06%S2%06%S3%03%S2%01%N/
845  011160  047045  052045  047445  FMT8:   .ASCIZ  /%N%T%06%S2%06%S2%06%S2%06/
846  011212  047045  052045     000  FMT9:   .ASCIZ  /%N%T/
847  011217     045  022524  030517  FMT11:  .ASCIZ  /%T%01/
848  011225     045  022524  031517  FMT12:  .ASCIZ  /%T%03/
849  011233     045  022516  030523  FMT13:  .ASCIZ  /%N%S11%T%03%S1%T%03%S1%T%01%S1%T%01/
850  011277     045  022516  022524  FMT14:  .ASCIZ  /%N%T%T%D3%S1%T%06%S1%T%06/
851  011331     045  022516  030523  FMT15:  .ASCIZ  /%N%S11%T%D3%S1%T%06%S1%T%06/
852  011365     045  022516  032523  FMT16:  .ASCIZ  /%N%S5%06/
853  011376  051445  030061  052045  FMT17:  .ASCIZ  /%S10%T%N%S11%06%N/
854  011420  047045  051445  032461  FMT18:  .ASCIZ  /%N%S15%T%S5%T%S4%T%S5%T%N/
855  011452  052045  051445  022464  FMT19:  .ASCIZ  /%T%S4%D6%S4%D6%S4%D6%S4%D6%N/
856  011507     045  022524  031123  FMT20:  .ASCIZ  /%T%S2%D6%S14%D6%S4%D6%N/
857  011537     045  022524  030523  FMT21:  .ASCIZ  /%T%S12%D6%S14%D6%N/
858  011562  047045  051445  030461  FMT22:  .ASCIZ  /%N%S11%T%03%S1%T%01%S1%T%02/
859  011616  052045  052045  052045  FMT23:  .ASCIZ  /%T%T%T%01%N/
860  011632  047045  052045     000  FMT24:  .ASCIZ  /%N%T/
861  011637     045  022516  031104  FMT25:  .ASCIZ  /%N%D2%T/
862  011647     045  022516  030523  FMT26:  .ASCIZ  /%N%S1%T%D4%T%T%D3%N/
863  011673     045  022516  022524  FMT27:  .ASCIZ  /%N%T%D3%T%D3%N/
864  011712  047045  052045  052045  FMT28:  .ASCIZ  /%N%T%T%T/
865
866  011723                          ENDMOD
867
872
```

```
                                .SBTTL  ERROR MESSAGES
011724                          BGNMOD  GLBERR
                                ;       ERR1    R3 POINTS TO RESULT MESSAGE
                                ;               RESULT: (R3)
                                ;
                                ;       ERR2    R3 POINTS TO RESULT NAME
                                ;               RESULT: (R3) IS 1 SB 0
                                ;
                                ;       ERR3    R3 POINTS TO RESULT NAME
                                ;               RESULT: (R3) IS 0 SB 1
                                ;
                                ;       ERR4    R3 POINTS TO RESULT NAME
                                ;               R4 POINTS TO RESULT CONDITIONS
                                ;               RESULT: (R3) IS 1 SB 0 (R4)
                                ;
                                ;       ERR5    R3 POINTS TO RESULT NAME
                                ;               R4 POINTS TO RESULT CONDITIONS
                                ;               RESULT: (R3) IS 0 SB 1 (R4)
                                ;
                                ;       ERR6    RESULT ROUTINE DETERMINES WHICH ERROR(S) ARE SET AND
                                ;               REPORTS ALL
                                ;               RESULT: 'ERROR'' IS 1 SB 0
                                ;
                                ;       ERR7    DRIVE STATE ERROR REPORT
                                ;               R3 CONTAINS EXPECTED STATE
                                ;               T.STAT CONTAINS BAD STATE
                                ;               RESULT: DRIVE STATE IS (T.STAT) SB (R3)
                                ;
                                ;       ERR8    HEAD POSITIONING ERROR REPORT
                                ;               NEWCYL CONTAINS EXPECTED CYLINDER
                                ;               HDWRD1 CONTAINS BAD CYLINDER
                                ;               RESULT: CYLINDER IS (HDWRD1) SB (NEWCYL)
                                ;
                                ;       ERR9    UTILITY RESULT REPORT
                                ;               R3 POINTS TO RESULT NAME
                                ;               R4 POINTS TO VALUE 1
                                ;               R5 POINTS TO VALUE 2
                                ;               RESULT: (R3-NAME) IS (R4-VALUE 1) SB (R5-VALUE 2)
                                ;
                                ;       ERR10   COMPARE ERROR REPORT
                                ;               R3 CONTAINS THE BAD WORD NUMBER
                                ;               R4 POINTS TO BAD WORD
                                ;               R5 POINTS TO GOOD WORD
                                ;               RESULT: WORD (R3) IS (R4) SB (R5)
011724                          BGNMSG  ERR1
011724  105737  003461                  TSTB    NOERCT          ;TEST IF ERROR COUNTING INHIBITED
011730  001002                          BNE     1$              ;YES - SKIP
011732  005277  171314                  INC     @ERRPOINT       ;ELSE BUMP ERROR COUNT
011736  010146                  1$:     MOV     R1,-(SP)        ;STORE R1
011740  004737  024514                  JSR     PC,RPTOP        ;REPORT OPERATION
011744  012721  000001                  MOV     #1,(R1)+        ;SET PARAM NUMBER
011750  010321                          MOV     R3,(R1)+        ;INSERT MESSAGE ADDRESS POINTER
011752  004737  025302                  JSR     PC,RPTRES       ;REPORT RESULTS
011756  004737  025510                  JSR     PC,RPTREM       ;REPORT REMAINDER
```

```
930  011762  012601                          MOV     (SP)+,R1        ;RESTORE R1
931  011764  004737  015664                  JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
932  011770                          ENDMSG
(3)  011770                          L10000:
(3)  011770  104423                          TRAP    C$MSG
933
934  011772                          BGNMSG  ERR2
935  011772  005277  171254                  INC     @ERRPOINT       ;BUMP ERROR COUNT
936  011776  010146                          MOV     R1,-(SP)        ;STORE R1
937  012000  004737  024514                  JSR     PC,RPTOP        ;REPORT OPERATION
938  012004  012721  000003                  MOV     #3,(R1)+        ;SET PARAM NUMBER
939  012010  010321                          MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
940  012012  012721  000001                  MOV     #1,(R1)+        ;SET IS VALUE
941  012016  005021                          CLR     (R1)+           ;SET SB VALUE
942  012020  004737  025302                  JSR     PC,RPTRES       ;REPORT RESULTS
943  012024  004737  025510                  JSR     PC,RPTREM       ;REPORT REMAINDER
944  012030  012601                          MOV     (SP)+,R1        ;RESTORE R1
945  012032  004737  015664                  JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
946  012036                          ENDMSG
(3)  012036                          L10001:
(3)  012036  104423                          TRAP    C$MSG
947
948  012040                          BGNMSG  ERR3
949  012040  005277  171206                  INC     @ERRPOINT       ;BUMP ERROR COUNT
950  012044  010146                          MOV     R1,-(SP)        ;STORE R1
951  012046  004737  024514                  JSR     PC,RPTOP        ;REPORT OPERATION
952  012052  012721  000003                  MOV     #3,(R1)+        ;SET PARAM NUMBER
953  012056  010321                          MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
954  012060  005021                          CLR     (R1)+           ;SET IS VALUE
955  012062  012721  000001                  MOV     #1,(R1)+        ;SET SB VALUE
956  012066  004737  025302                  JSR     PC,RPTRES       ;REPORT RESULTS
957  012072  004737  025510                  JSR     PC,RPTREM       ;REPORT REMAINDER
958  012076  012601                          MOV     (SP)+,R1        ;RESTORE R1
959  012100  004737  015664                  JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
960  012104                          ENDMSG
(3)  012104                          L10002:
(3)  012104  104423                          TRAP    C$MSG
961
962  012106                          BGNMSG  ERR4
963  012106  005277  171140                  INC     @ERRPOINT       ;BUMP ERROR COUNT
964  012112  010146                          MOV     R1,-(SP)        ;STORE R1
965  012114  004737  024514                  JSR     PC,RPTOP        ;REPORT OPERATION
966  012120  012721  000004                  MOV     #4,(R1)+        ;SET PARAM NUMBER
967  012124  010321                          MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
968  012126  012721  000001                  MOV     #1,(R1)+        ;SET IS VALUE
969  012132  005021                          CLR     (R1)+           ;SET SB VALUE
970  012134  010411                          MOV     R4,(R1)         ;INSERT ADD OF CONDITION POINTER
971  012136  004737  025302                  JSR     PC,RPTRES       ;REPORT RESULTS
972  012142  004737  025510                  JSR     PC,RPTREM       ;REPORT REMAINDER
973  012146  012601                          MOV     (SP)+,R1        ;RESTORE R1
974  012150  004737  015664                  JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
975  012154                          ENDMSG
(3)  012154                          L10003:
(3)  012154  104423                          TRAP    C$MSG
976
977  012156                          BGNMSG  ERR5
```

```
  978  012156  005277  171070                 INC     @ERRPOINT       ;BUMP ERROR COUNT
  979  012162  010146                         MOV     R1,-(SP)        ;STORE R1
  980  012164  004737  024514                 JSR     PC,RPTOP        ;REPORT OPERATION
  981  012170  012721  000004                 MOV     #4,(R1)+        ;SET PARAM NUMBER
  982  012174  010321                         MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
  983  012176  005021                         CLR     (R1)+           ;SET IS VALUE
  984  012200  012721  000001                 MOV     #1,(R1)+        ;SET SB VALUE
  985  012204  010411                         MOV     R4,(R1)         ;INSERT ADD OF CONDITION POINTER
  986  012206  004737  025302                 JSR     PC,RPTRES       ;REPORT RESULTS
  987  012212  004737  025510                 JSR     PC,RPTREM       ;REPORT REMAINDER
  988  012216  012601                         MOV     (SP)+,R1        ;RESTORE R1
  989  012220  004737  015664                 JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
  990  012224                  ENDMSG
(3)    012224                  L10004:
(3)    012224  104423                 TRAP    C$MSG
  991
  992  012226                  BGNMSG  ERR6
  993  012226  105737  003461                 TSTB    NOERCT          ;TEST IF ERROR COUNTING INHIBITED
  994  012232  001002                         BNE     17$             ;YES - SKIP
  995  012234  005277  171012                 INC     @ERRPOINT       ;ELSE BUMP ERROR COUNT
  996  012240  010146          17$:    MOV     R1,-(SP)        ;STORE R1
  997  012242  010346                         MOV     R3,-(SP)        ;STORE R3
  998  012244  010446                         MOV     R4,-(SP)        ;STORE R4
  999  012246  010546                         MOV     R5,-(SP)        ;STORE R5
 1000  012250  004737  024514                 JSR     PC,RPTOP        ;REPORT OPERATION
 1001  012254  012721  000003                 MOV     #3,(R1)+        ;SET PARAM NUMBER
 1002  012260  012761  000001  000002         MOV     #1,2(R1)        ;INSERT IS VALUE
 1003  012266  005037  003140                 CLR     TEMP3           ;CLEAR FOR STATUS STORAGE
 1004  012272  013703  003060                 MOV     T.CS,R3         ;GET T.CS
 1005  012276  042703  177761                 BIC     #177761,R3      ;AND CLEAR ALL BUT FUNCTION
 1006  012302  022703  000004                 CMP     #4,R3           ;CHECK IF IT WAS GET STATUS
 1007  012306  001434                         BEQ     1$              ;YES - STATUS IS IN T.MP, SKIP
 1008  012310  012762  000003  000004         MOV     #GETSTAT,RLDA(R2) ;ELSE DO GET STATUS
 1009  012316  012703  000004                 MOV     #4,R3
 1010  012322  053703  003046                 BIS     RLDRV,R3
 1011  012326  010362  000000                 MOV     R3,RLCS(R2)
 1012  012332                          WAITUS  #10.            ;WAIT FOR CONTROLLER READY
 1013  012344  032762  000200  000000         BIT     #CRDYMSK,RLCS(R2)       ;TEST IF READY
 1014  012352  001003                         BNE     10$             ;YES - SKIP
 1015  012354  012703  001000          9$:    MOV     #BIT9,R3        ;ELSE SET NO DRIVE STATUS BIT
 1016  012360  000413                         BR      2$              ;IN MESSAGE WORD AND SKIP
 1017  012362  016203  000006          10$:   MOV     RLMP(R2),R3     ;STORE STATUS FOR REPORT
 1018  012366  010337  003140                 MOV     R3,TEMP3
 1019  012372  113703  003141                 MOVB    TEMP3+1,R3      ;GET ERROR BITS IN PROPER POSITION
 1020  012376  000402                         BR      13$
 1021  012400  113703  003067          1$:    MOVB    T.MP+1,R3       ;GET ERROR BITS FROM MP REG
 1022  012404  042703  177442          13$:   BIC     #177442,R3      ;CLEAR UNUSED BITS
 1023  012410  013704  003060          2$:    MOV     T.CS,R4         ;GET ERROR BITS FROM CS REG
 1024  012414  042704  001777                 BIC     #1777,R4        ;CLEAR UNUSED BITS
 1025  012420  050403                         BIS     R4,R3           ;MAKE ONE WORD OF POSSIBLE ERRORS
 1026  012422  032703  002000                 BIT     #OPIERR,R3      ;TEST IF OPI SET
 1027  012426  001442                         BEQ     115$            ;NO - SKIP
 1028  012430  032703  010000                 BIT     #HNFERR,R3      ;TEST IF HDR NOT FOUND ERROR
 1029  012434  001026                         BNE     107$            ;YES - SKIP
 1030  012436  032703  004000                 BIT     #HCRCERR,R3     ;TEST IF HDR CRC ERR
 1031  012442  001020                         BNE     105$            ;YES - SKIP
```

```
 1032  012444  012704  010245                 MOV     #MOPERR,R4      ;SET OPI ALONE MESSAGE
 1033  012450                         100$:   PRINTB  #FMT28,#MRSLT,R4,#MERRS ;REPORT ERROR
  (10) 012450  012746  010550                 MOV     #MERRS,-(SP)
  (9)  012454  010446                         MOV     R4,-(SP)
  (8)  012456  012746  005536                 MOV     #MRSLT,-(SP)
  (7)  012462  012746  011712                 MOV     #FMT28,-(SP)
  (6)  012466  012746  000004                 MOV     #4,-(SP)
  (3)  012472  010600                         MOV     SP,R0
  (4)  012474  104414                         TRAP    C$PNTB
  (4)  012476  062706  000012                 ADD     #12,SP
 1034  012502  000430                         BR      120$            ;SKIP
 1035  012504  012704  010003         105$:   MOV     #MHCRC,R4       ;HDR CRC MESSAGE
 1036  012510  000757                         BR      100$
*1037  012512  032703  004000         107$:   BIT     #HCRCERR,R3     ;TEST IF HCRC WITH HDR NOT FND
 1038  012516  001003                         BNE     109$            ;YES - SKIP
 1039  012520  012704  010024                 MOV     #MHNF,R4        ;MESSAGE HEADER NOT FOUND
 1040  012524  000751                         BR      100$
 1041  012526  012704  010052         109$:   MOV     #MHFCRC,R4      ;HNF AND HCRC MESSAGE
 1042  012532  000746                         BR      100$            ;SKIP
 1043  012534  032703  004000         115$:   BIT     #DCKERR,R3      ;TEST IF DATA CHECK SET, NOT OPI
 1044  012540  001403                         BEQ     118$            ;NO - SKIP
 1045  012542  012704  010013                 MOV     #MDCRC,R4       ;SET MESSAGE DATA CHECK
 1046  012546  000740                         BR      100$            ;SKIP
 1047  012550  032703  010000         118$:   BIT     #DLTERR,R3      ;TEST IF DATA LATE ERROR
 1048  012554  001403                         BEQ     120$            ;NO - SKIP
 1049  012556  012704  010040                 MOV     #MDLT,R4        ;SET MESSAGE DATA LATE
 1050  012562  000732                         BR      100$            ;SKIP
 1051  012564  012705  100000         120$:   MOV     #BIT15,R5       ;SET BIT POINTER FOR TEST
 1052  012570  005004                         CLR     R4              ;CLEAR R4 FOR TABLE COUNT
 1053  012572  030503                 3$:     BIT     R5,R3           ;TEST IF BIT IS SET
 1054  012574  001005                         BNE     6$              ;YES - SKIP TO REPORT
 1055  012576  005724                 4$:     TST     (R4)+           ;ELSE BUMP TABLE POINTER
 1056  012600  000241                         CLC                     ;CLEAR CARRY
 1057  012602  006005                         ROR     R5              ;SHIFT BIT POINTER TO NEXT BIT
 1058  012604  001372                         BNE     3$              ;LOOP IF NOT 0
 1059  012606  000405                         BR      7$              ;ELSE REPORT REMAINDER
 1060  012610  016411  002334         6$:     MOV     RESTBL(R4),(R1) ;INSERT NAME ADDRESS
 1061  012614  004737  025302                 JSR     PC,RPTRES       ;REPORT RESULTS
 1062  012620  000766                         BR      4$              ;GET NEXT BIT
 1063  012622  004737  025510         7$:     JSR     PC,RPTREM       ;REPORT REMAINDER
 1064  012626  005737  003140                 TST     TEMP3           ;TEST IF ANY NEW STATUS
 1065  012632  001414                         BEQ     15$             ;NO - SKIP
 1066  012634                                 PRINTB  #FMT17,#STAMES,TEMP3
  (9)  012634  013746  003140                 MOV     TEMP3,-(SP)
  (8)  012640  012746  007537                 MOV     #STAMES,-(SP)
  (7)  012644  012746  011376                 MOV     #FMT17,-(SP)
  (6)  012650  012746  000003                 MOV     #3,-(SP)
  (3)  012654  010600                         MOV     SP,R0
  (4)  012656  104414                         TRAP    C$PNTB
  (4)  012660  062706  000010                 ADD     #10,SP
 1067  012664  032737  004000  003060 15$:    BIT     #DCKERR,T.CS    ;TEST IF DATA CHECK ERROR
 1068  012672  001453                         BEQ     25$             ;NO - SKIP
 1069  012674  032737  002000  003060         BIT     #OPIERR,T.CS    ;TEST IF OPI SET
 1070  012702  001047                         BNE     25$             ;YES - SKIP
 1071  012704  005037  003030                 CLR     MORECE          ;CLEAR COMPARE ERROR COUNT
 1072  012710  012701  000200                 MOV     #128.,R1        ;SET COMPARE LENGTH
```

```
 1073  012714  012703  000001                    MOV     #1,R3               ;SET WORD COUNT
 1074  012720  012705  004502                    MOV     #OBUFF,R5           ;SET GOOD WORD POINTER
 1075  012724  012704  004102                    MOV     #IBUFF,R4           ;SET TEST WORD POINTER
 1076  012730  021514                    18$:    CMP     (R5),(R4)           ;CHECK WORD
 1077  012732  001427                            BEQ     19$                 ;GOOD - SKIP
 1078  012734  023727  003030  000012            CMP     MORECE,#10.         ;TEST IF COMPARE LIMIT REACHED
 1079  012742  003021                            BGT     20$                 ;YES - SKIP
 1080  012744                                    PRINTB  #FMT15,#MWORD,R3,#RESE3,(R4),#RESE4,(R5)
  (13) 012744  011546                            MOV     (R5),-(SP)
  (12) 012746  012746  010565                    MOV     #RESE4,-(SP)
  (11) 012752  011446                            MOV     (R4),-(SP)
  (10) 012754  012746  010561                    MOV     #RESE3,-(SP)
  (9)  012760  010346                            MOV     R3,-(SP)
  (8)  012762  012746  006310                    MOV     #MWORD,-(SP)
  (7)  012766  012746  011331                    MOV     #FMT15,-(SP)
  (6)  012772  012746  000007                    MOV     #7,-(SP)
  (3)  012776  010600                            MOV     SP,R0
  (4)  013000  104414                            TRAP    C$PNTB
  (4)  013002  062706  000020                    ADD     #20,SP
 1081  013006  005237  003030            20$:    INC     MORECE              ;BUMP ERROR COUNTER
 1082  013012  022524                    19$:    CMP     (R5)+,(R4)+         ;BUMP POINTERS
 1083  013014  005203                            INC     R3                  ;BUMP COUNTER
 1084  013016  005301                            DEC     R1                  ;DEC LENGTH COUNT
 1085  013020  001343                            BNE     18$                 ;LOOP IF NOT DONE
 1086  013022  005737  003030            25$:    TST     MORECE              ;TEST IF ANY COMPARE ERRORS
 1087  013026  001421                            BEQ     27$                 ;NO - SKIP
 1088  013030  012701  000200                    MOV     #128.,R1            ;SET COMPARE LENGTH
 1089  013034                                    PRINTB  #FMT27,#TCERR,MORECE,#RESE6,R1
  (11) 013034  010146                            MOV     R1,-(SP)
  (10) 013036  012746  010577                    MOV     #RESE6,-(SP)
  (9)  013042  013746  003030                    MOV     MORECE,-(SP)
  (8)  013046  012746  007624                    MOV     #TCERR,-(SP)
  (7)  013052  012746  011673                    MOV     #FMT27,-(SP)
  (6)  013056  012746  000005                    MOV     #5,-(SP)
  (3)  013062  010600                            MOV     SP,R0
  (4)  013064  104414                            TRAP    C$PNTB
  (4)  013066  062706  000014                    ADD     #14,SP
 1090  013072  012605                    27$:    MOV     (SP)+,R5            ;RESTORE R5, 4, 3, 1
 1091  013074  012604                            MOV     (SP)+,R4
 1092  013076  012603                            MOV     (SP)+,R3
 1093  013100  012601                            MOV     (SP)+,R1
 1094  013102  004737  015664                    JSR     PC,CKERLM           ;GO CHECK IF ERROR COUNT EXCEEDED
 1095  013106                            ENDMSG
  (3)  013106                            L10005:
  (3)  013106  104423                            TRAP    C$MSG
 1096
 1097  013110                            BGNMSG  ERR7
 1098  013110  005277  170136                    INC     @ERRPOINT           ;BUMP ERROR COUNT
 1099  013114  010146                            MOV     R1,-(SP)            ;STORE R1
 1100  013116  004737  024514                    JSR     PC,RPTOP            ;REPORT OPERATION
 1101  013122  012721  000003                    MOV     #3,(R1)+            ;SET PARAM NUMBER
 1102  013126  012721  010130                    MOV     #MDRVST,(R1)+       ;INSERT NAME ADD POINTER
 1103  013132  013721  003074                    MOV     T.STAT,(R1)+        ;INSERT IS VALUE
 1104  013136  010311                            MOV     R3,(R1) ;INSERT SB VALUE
 1105  013140  004737  025302                    JSR     PC,RPTRES           ;REPORT RESULTS
 1106  013144  004737  025510                    JSR     PC,RPTREM           ;REPORT REMAINDER
```

```
1107  013150  012601                    MOV     (SP)+,R1        ;RESTORE R1
1108  013152  004737  015664            JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
1109  013156                    ENDMSG
 (3)  013156                    L10006:
 (3)  013156  104423                    TRAP    C$MSG
1110
1111  013160                    BGNMSG  ERR8
1112  013160  005277  170066            INC     @ERRPOINT       ;BUMP ERROR COUNT
1113  013164  010146                    MOV     R1,-(SP)        ;STORE R1
1114  013166  010346                    MOV     R3,-(SP)        ;STORE R3
1115  013170  004737  024514            JSR     PC,RPTOP        ;REPORT OPERATION
1116  013174  012721  000003            MOV     #3,(R1)+        ;SET PARAM NUMBER
1117  013200  012721  010345            MOV     #MCYLOC,(R1)+   ;INSERT NAME ADD POINTER
1118  013204  013711  003066            MOV     HDWRD1,(R1)     ;GET HEADER WORD
1119  013210  012703  000007            MOV     #7,R3           ;SET SHIFT COUNT
1120  013214  000241            3$:     CLC
1121  013216  006011                    ROR     (R1)            ;ALIGN CHAR FOR PRINTING
1122  013220  005303                    DEC     R3              ;  AS IS VALUE
1123  013222  001374                    BNE     3$
1124  013224  005721                    TST     (R1)+           ;BUMP PARAM POINTER
1125  013226  013711  003116            MOV     NEWCYL,(R1)     ;INSERT SB VALUE
1126  013232  004737  025302            JSR     PC,RPTRES       ;REPORT RESULTS
1127  013236  004737  025510            JSR     PC,RPTREM       ;REPORT REMAINDER
1128  013242  012603                    MOV     (SP)+,R3        ;RESTORE R3
1129  013244  012601                    MOV     (SP)+,R1        ;RESTORE R1
1130  013246  004737  015664            JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
1131  013252                    ENDMSG
 (3)  013252                    L10007:
 (3)  013252  104423                    TRAP    C$MSG
1132
1133  013254                    BGNMSG  ERR9
1134  013254  005277  167772            INC     @ERRPOINT       ;BUMP ERROR COUNT
1135  013260  010146                    MOV     R1,-(SP)        ;STORE R1
1136  013262  004737  024514            JSR     PC,RPTOP        ;REPORT OPERATION
1137  013266  012721  000003            MOV     #3,(R1)+        ;SET PARAM NUMBER
1138  013272  010321                    MOV     R3,(R1)+        ;INSERT NAME ADD POINTER
1139  013274  010421                    MOV     R4,(R1)+        ;SET IS VALUE
1140  013276  010521                    MOV     R5,(R1)+        ;SET SB VALUE
1141  013300  004737  025302            JSR     PC,RPTRES       ;REPORT RESULTS
1142  013304  004737  025510            JSR     PC,RPTREM       ;REPORT REMAINDER
1143  013310  012601                    MOV     (SP)+,R1        ;RESTORE R1
1144  013312  004737  015664            JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
1145  013316                    ENDMSG
 (3)  013316                    L10010:
 (3)  013316  104423                    TRAP    C$MSG
1146  013320                    BGNMSG  ERR10
1147  013320  010146                    MOV     R1,-(SP)        ;STORE R1
1148  013322  005737  003030            TST     MORECE          ;TEST IF 2ND BAD LINE
1149  013326  001051                    BNE     3$              ;YES - SKIP
1150  013330  005277  167716            INC     @ERRPOINT       ;BUMP ERROR COUNT
1151  013334  004737  024514            JSR     PC,RPTOP        ;REPORT OPERATION
1152  013340                    PRINTB  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1> ;REPORT ID
 (11) 013340  005046                    CLR     -(SP)
 (11) 013342  153716  003047            BISB    RLDRV+1,(SP)
 (10) 013346  012746  006152            MOV     #DRVNAM,-(SP)
 (9)  013352  013746  003042            MOV     RLBAS,-(SP)
```

```
  (8)  013356  012746  006141                    MOV     #BASADD,-(SP)
  (7)  013362  012746  011026                    MOV     #FMT5,-(SP)
  (6)  013366  012746  000005                    MOV     #5,-(SP)
  (3)  013372  010600                            MOV     SP,R0
  (4)  013374  104414                            TRAP    C$PNTB
  (4)  013376  062706  000014                    ADD     #14,SP
1153   013402                                    PRINTB  #FMT14,#MRSLT,#MWORD,R3,#RESE3,(R4),#RESE4,(R5)
  (14) 013402  011546                            MOV     (R5),-(SP)
  (13) 013404  012746  010565                    MOV     #RESE4,-(SP)
  (12) 013410  011446                            MOV     (R4),-(SP)
  (11) 013412  012746  010561                    MOV     #RESE3,-(SP)
  (10) 013416  010346                            MOV     R3,-(SP)
  (9)  013420  012746  006310                    MOV     #MWORD,-(SP)
  (8)  013424  012746  005536                    MOV     #MRSLT,-(SP)
  (7)  013430  012746  011277                    MOV     #FMT14,-(SP)
  (6)  013434  012746  000010                    MOV     #10,-(SP)
  (3)  013440  010600                            MOV     SP,R0
  (4)  013442  104414                            TRAP    C$PNTB
  (4)  013444  062706  000022                    ADD     #22,SP
1154   013450  000421                            BR      4$
1155   013452                            3$:     PRINTB  #FMT15,#MWORD,R3,#RESE3,(R4),#RESE4,(R5) ;REPORT DATA
  (13) 013452  011546                            MOV     (R5),-(SP)
  (12) 013454  012746  010565                    MOV     #RESE4,-(SP)
  (11) 013460  011446                            MOV     (R4),-(SP)
  (10) 013462  012746  010561                    MOV     #RESE3,-(SP)
  (9)  013466  010346                            MOV     R3,-(SP)
  (8)  013470  012746  006310                    MOV     #MWORD,-(SP)
  (7)  013474  012746  011331                    MOV     #FMT15,-(SP)
  (6)  013500  012746  000007                    MOV     #7,-(SP)
  (3)  013504  010600                            MOV     SP,R0
  (4)  013506  104414                            TRAP    C$PNTB
  (4)  013510  062706  000020                    ADD     #20,SP
1156   013514  005237  003030            4$:     INC     MORECE          ;INC COMPARE ERROR COUNT
1157   013520  012601                            MOV     (SP)+,R1        ;RESTORE R1
1158   013522  004737  015664                    JSR     PC,CKERLM       ;GO CHECK IF ERROR COUNT EXCEEDED
1159   013526                            ENDMSG
  (3)  013526                            L10011:
  (3)  013526  104423                            TRAP    C$MSG
1160   013530                            ENDMOD
1161
1162                                    ;LOAD PROTECTION TABLE
1163   013530                            BGNPROT
1164   013530  000000                            .WORD    0              ;OFFSET OF CSR IN P-TABLE
1165   013532  177777                            .WORD   -1              ;NOT A MASS-BUS DRIVE
1166   013534  000010                            .WORD   10              ;OFFSET OF DRIVE IN P-TABLE
1167   013536                            ENDPROT
1168
1169                                            .EVEN
1170
1171   013536                            BGNMOD  HPTCODE
1172   013536                            BGNHW
  (3)  013536  000006                            .WORD   L10013-L$HW/2
1173   013540  174400                            .WORD   174400          ;CSR BASE ADDRESS DEFAULT
1174   013542  000160                            .WORD   160             ;VECTOR DEFAULT
1175   013544  000240                            .WORD   240             ;PRIORITY DEFAULT
1176   013546  000001                            .WORD   1               ;TYPE OF DRIVE
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 1177  013550  000000                        .WORD   0               ;DRIVE NUMBER DEFAULT
 1178  013552  000001                        .WORD   1               ;RL11 CONTROLLER
 1179  013554                        ENDHW
  (3)  013554                        L10013:
 1180  013554                        ENDMOD
 1181
 1182  013554                        BGNMOD  SPTCODE
 1183  013554                        BGNSW
  (3)  013554  000006                        .WORD   L10014-L$SW/2
 1184  013556  000000                MISWIW: .WORD   0               ;BIT 0 = USE ALL CYLINDERS
 1185                                                                ;BIT 1 = USE ALL SECTORS
 1186                                                                ;BIT 2 = EXECUTE DRIVE SELECT TEST
 1187                                                                ;BIT 3 = EXECUTE HEAD ALIGNMENT
 1188                                                                ;BIT 12 = HEAD SELECT SUPPLIED FLAG
 1189                                                                ;BIT 13 = HILIMIT SPECIFIED FLAG
 1190                                                                ;BIT 14 = LO LIMIT SPECIFIED FLAG
 1191  013560  000000                LOLIMW: .WORD   0
 1192  013562  000377                HILIMW: .WORD   255.
 1193  013564  000000                HEADW:  .WORD   0
 1194  013566  000024                ERLIMW: .WORD   20.              ;ERROR LIMIT
 1195  013570  000012                DCLIMW: .WORD   10.              ;COMPARE ERROR LIMIT
 1196  013572                        ENDSW
  (3)  013572                        L10014:
 1197  013572                        ENDMOD
 1198
 1199  013572                        BGNMOD  DSPCODE
 1204  013572                        DISPATCH        9
  (4)  013572  000011                        .WORD   9
  (6)  013574  025774                        .WORD   T1
  (6)  013576  026216                        .WORD   T2
  (6)  013600  026426                        .WORD   T3
  (6)  013602  026636                        .WORD   T4
  (6)  013604  027062                        .WORD   T5
  (6)  013606  027270                        .WORD   T6
  (6)  013610  027516                        .WORD   T7
  (6)  013612  030026                        .WORD   T8
  (6)  013614  030324                        .WORD   T9
 1206  013616                        ENDMOD
 1207
 1208
```

```
                        .SBTTL  INITIALIZATION SECTION

                        BGNMOD  INITCODE
                        BGNINIT

                        ;CHECK FOR PRESENCE OF A P-CLOCK
                                CLR     CLKFLG          ;CLEAR CLOCK FLAG
                                CLOCK   P,CLKADR        ;P-CLOCK?
 (3)                            MOV     #'P,R0
 (3)                            TRAP    C$CLCK
 (3)                            MOV     R0,CLKADR
                                BNCOMPLETE      1$      ;BRANCH IF NO P-CLOCK
 (2)                            BCC     1$
                                INC     CLKFLG          ;INDICATE PRESENCE OF A P-CLOCK
1$:                             SETPRI  #340            ;SET PRIORITY TO 7 TO INHIBIT ALL INTERRUPTS
 (3)                            MOV     #340,R0
 (3)                            TRAP    C$SPRI
                                BRESET                  ;FOR LSI-11 CPU'S
 (3)                            TRAP    C$RESET
                                BIC     #MITEST!DRSELT!HDALIGN,MISWIW ;CLEAR ALL MANUAL
                                                        ; INTERVENTION FLAGS
                                CLR     SSINDX          ;CLEAR SUBROUTINE STACK INDEX
                                READEF  #EF.PWR         ;POWER FAILURE
 (3)                            MOV     #EF.PWR,R0
 (3)                            TRAP    C$REFG
                                BNCOMPLETE  4$          ;NO, GO CHECK NEW PASS
 (2)                            BCC     4$
                                MOV     L$UNIT,PWRFLG   ;SET POWER FAIL FLAG
                                JMP     PWCON           ;GO SERVICE POWER FAIL
4$:                             READEF  #EF.START       ;CHECK IF START
 (3)                            MOV     #EF.START,R0
 (3)                            TRAP    C$REFG
                                BNCOMPLETE      RESTART ;NO - SKIP
 (2)                            BCC     RESTART

;       ON START INITIALIZE TO START AT FIRST DRIVE, CLEAR INTERNAL
;       PASS COUNT, AND ERROR COUNT.

                                MOV     L$UNIT,DRVCNT   ;SET UP UNIT COUNT
RSTRT:                          CLR     PASNUM          ;CLEAR PASS NUMBER
                                MOV     #ERRCNT,R0
                                MOV     #64.,R1         ;GET A COUNT
1$:                             CLR     (R0)+           ;CLEAR AN ERROR COUNTER STORAGE AREA
                                DEC     R1
                                BNE     1$              ;LOOP TILL ALL CLEARED
                                MOV     #ERRCNT-2,ERRPOINT ;INIT ERROR POINTER
                                MOV     #-1,PSETNM      ;SET PARAM SELECT TO INITIAL VALUE
                                MOV     #-1,HADONE      ;PRESET HEAD ALIGN DONE FLAG
LAB:                            BIT     #LOCYL,MISWIW   ;TEST IF LO LIMIT SET
                                BNE     5$              ;YES - SKIP
                                CLR     LOLIMW          ;ELSE CLEAR LO LIMIT
5$:                             BR      SETDON
RESTART:
                                READEF  #EF.RESTART     ;CHECK IF RESTART
 (3)                            MOV     #EF.RESTART,R0
 (3)                            TRAP    C$REFG
```

```
 1251  014014                                    BCOMPLETE       RSTRT   ;NO - SKIP
  (2)  014014  103743                            BCS     RSTRT
 1252  014016                              CONTINUE:
 1253  014016                                    READEF  #EF.CONTINUE    ;TEST IF CONTINUE
  (3)  014016  012700  000036                    MOV     #EF.CONTINUE,R0
  (3)  014022  104447                            TRAP    C$REFG
 1254  014024                                    BCOMPLETE       PWCON
  (2)  014024  103533                            BCS     PWCON
 1255                                       ;    ON CONTINUE PICK UP UNIT LAST UNDER TEST
 1256  014026                                    READEF  #EF.NEW         ;CHECK IF STARTING NEW PASS
  (3)  014026  012700  000035                    MOV     #EF.NEW,R0
  (3)  014032  104447                            TRAP    C$REFG
 1257  014034                                    BCOMPLETE       PASNEW
  (2)  014034  103403                            BCS     PASNEW
 1258  014036                              NXTPAS:
 1259  014036  005737  003110                    TST     DRVCNT          ;TEST IF ALL UNITS CHECKED
 1260  014042  001013                            BNE     SETDON          ;NO - SKIP
 1261  014044  005237  003454              PASNEW: INC     PASNUM          ;ELSE BUMP PASS COUNT
 1262  014050  012737  003252  003252            MOV     #ERRCNT-2,ERRPOINT ;INIT ERROR POINTER
 1263  014056  013737  002012  003110            MOV     L$UNIT,DRVCNT   ;GET ALL DRIVES
 1264  014064  012737  177777  003456            MOV     #-1,PSETNM      ;SET PARAM SELECT TO INITIAL
 1265  014072  005237  003456              SETDON: INC     PSETNM          ;NEXT SET OF PARAMETERS
 1266  014076  005337  003110                    DEC     DRVCNT          ;DOWN COUNT DRIVE TOTAL
 1267  014102  062737  000002  003252            ADD     #2,ERRPOINT     ;UPDATE THE ERROR POINTER
 1268  014110  013700  003456                    MOV     PSETNM,R0       ;SET UP TO GET PARAMETERS
 1269  014114  012702  003042                    MOV     #RLBAS,R2
 1270  014120                                    GPHARD  R0,R1
  (3)  014120  104442                            TRAP    C$GPHRD
  (3)  014122  010001                            MOV     R0,R1
 1271  014124                                    BCOMPLETE       7$      ;SKIP IF GOOD PARAM
  (2)  014124  103406                            BCS     7$
 1272  014126  005737  003464                    TST     PWRFLG          ;RECENT POWER FAILURE
 1273  014132  001741                            BEQ     NXTPAS  ;NO
 1274  014134  005337  003464                    DEC     PWRFLG          ;ACCOUNT FOR DRIVE
 1275  014140  000736                            BR      NXTPAS
 1276  014142  012122                      7$:   MOV     (R1)+,(R2)+     ;STORE PARAMETERS CSR
 1277  014144  012122                            MOV     (R1)+,(R2)+     ;                 VECTOR
 1278  014146  005721                            TST     (R1)+           ;BUMP PAST PRIORITY
 1279  014150  012137  002312                    MOV     (R1)+,T.DRIVE
 1280  014154  012122                            MOV     (R1)+,(R2)+
 1281  014156  022737  000001  002312            CMP     #1,T.DRIVE
 1282  014164  001426                            BEQ     65$
 1283  014166  012737  000776  002322            MOV     #510.,NXTHL
 1284  014174  012737  000777  002316            MOV     #511.,HLMTW
 1285  014202  012737  001000  002324            MOV     #512.,GBND
 1286  014210  012737  177600  002326            MOV     #177600,CAMSK
 1287  014216  012737  177600  002330            MOV     #177600,DIRMSK
 1288  014224  012737  177600  002332            MOV     #177600,HDCYL
 1289  014232  012737  177000  002320            MOV     #177000 CLRBYT
 1290  014240  000425                            BR      PWCON
 1291
 1292  014242  012737  000377  002316  65$:     MOV     #255.,HLMTW
 1293  014250  012737  000400  002324            MOV     #256.,GBND
 1294  014256  012737  077600  002326            MOV     #77600,CAMSK
 1295  014264  012737  077600  002330            MOV     #77600,DIRMSK
 1296  014272  012737  077600  002332            MOV     #77600,HDCYL
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 1297  014300  012737  000376  002322          MOV     #254.,NXTHL
 1298  014306  012737  177400  002320          MOV     #177400,CLRBYT
 1299
 1300  014314  032737  020000  013556  PWCON:  BIT     #HICYL,MISWIW
 1301  014322  001003                          BNE     1$
 1302  014324  013737  002316  013562          MOV     HLMTW,HILIMW
 1303  014332                          1$:     SETVEC  RLVEC,#INTHLR,#340      ;SET UP VECTOR
  (7)  014332  012746  000340                  MOV     #340,-(SP)
  (6)  014336  012746  015604                  MOV     #INTHLR,-(SP)
  (5)  014342  013746  003044                  MOV     RLVEC,-(SP)
  (4)  014346  012746  000003                  MOV     #3,-(SP)
  (3)  014352  104437                          TRAP    C$SVEC
  (2)  014354  062706  000010                  ADD     #10,SP
 1304  014360                                  SETPRI  #0              ;SET PRIORITY
  (3)  014360  012700  000000                  MOV     #0,R0
  (3)  014364  104441                          TRAP    C$SPR
 1305  014366  013702  003042                  MOV     RLBAS,R2        ;SET RL11 BASE ADDRESS POINTER
 1316                                  ;CHECK IF POWER FAILURE WAIT IS NEEDED
 1317
 1318  014372  005737  003464                  TST     PWRFLG          ;NEEDED???
 1319  014376  001472                          BEQ     8$              ;NO, SKIP
 1320
 1321  014400  013705  003046                  MOV     RLDRV,R5        ;DRIVE SELECT
 1322  014404  052705  000200                  BIS     #CRDYMSK,R5     ;SET CRDY
 1323  014410  010562  000000                  MOV     R5,RLCS(R2)     ;SELECT DRIVE
 1324  014414  012701  000170                  MOV     #120.,R1        ;INITIALIZE WAIT COUNT
 1325  014420  032762  000001  000000  9$:     BIT     #DRDYMSK,RLCS(R2)       ;DRIVE UP YET?
 1326  014426  001056                          BNE     8$              ;YES START TEST
 1327
 1328  014430                                  WAITMS  #10.            ;WAIT A SECOND
 1329  014442  005301                          DEC     R1              ;SIXTY GONE BY
 1330  014444  001365                          BNE     9$              ;NO
 1331  014446                                  PRINTF  #FMT24,#NOPWR
  (8)  014446  012746  006176                  MOV     #NOPWR,-(SP)
  (7)  014452  012746  011632                  MOV     #FMT24,-(SP)
  (6)  014456  012746  000002                  MOV     #2,-(SP)
  (3)  014462  010600                          MOV     SP,R0
  (4)  014464  104417                          TRAP    C$PNTF
  (4)  014466  062706  000006                  ADD     #6,SP
 1332  014472                                  PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
 (11)  014472  005046                          CLR     -(SP)
 (11)  014474  153716  003047                  BISB    RLDRV+1,(SP)
 (10)  014500  012746  006152                  MOV     #DRVNAM,-(SP)
  (9)  014504  013746  003042                  MOV     RLBAS,-(SP)
  (8)  014510  012746  006141                  MOV     #BASADD,-(SP)
  (7)  014514  012746  011026                  MOV     #FMT5,-(SP)
  (6)  014520  012746  000005                  MOV     #5,-(SP)
  (3)  014524  010600                          MOV     SP,R0
  (4)  014526  104417                          TRAP    C$PNTF
  (4)  014530  062706  000014                  ADD     #14,SP
 1333  014534                                  PRINTF  #FMT3
  (7)  014534  012746  011012                  MOV     #FMT3,-(SP)
  (6)  014540  012746  000001                  MOV     #1,-(SP)
  (3)  014544  010600                          MOV     SP,R0
  (4)  014546  104417                          TRAP    C$PNTF
  (4)  014550  062706  000004                  ADD     #4,SP
```

```
 1334  014554                                    DODU    PSETNM          ;DROP DRIVE
  (3)  014554  013700  003456                    MOV     PSETNM,R0
  (3)  014560  104451                            TRAP    C$DODU
 1335  014562                                    DOCLN
  (3)  014562  104444                            TRAP    C$DCLN
 1336  014564                              8$:
 1337
 1338  014564                              ENDINIT
  (3)  014564                              L10015:
  (3)  014564  104411                            TRAP    C$INIT
 1339  014566                              ENDMOD
 1340
```

```
1342
1343                                    .SBTTL  AUTO DROP SECTION
1344
1345                                    ;THE AUTO DROP SECTION IS INVOKED BY THE DIAGNOSTIC SUPERVISOR WHENEVER THE
1346                                    ;"ADR" FLAG IS SET BY THE OPERATOR. IT IS EXECUTED AFTER THE INITIALIZATION
1347                                    ;CODE AND CHECKS THE DRIVE TO DETERMINE IF IT IS READY TO RECEIVE A COMMAND.
1348                                    ;IF THE DRIVE IS NOT READY IT IS DROPPED FROM THE TEST CYCLE AND THE NEXT
1349                                    ;DRIVE IS ACCESSED. IF THE DRIVE IS READY THE HARDWARE TESTS ARE PERFORMED
1350                                    ;AFTER WHICH THE NEXT DRIVE IS ACCESSED.
1351
1352  014566                            BGNAUTO
1353  014566  005037  003462                   CLR     TRPFLG          ;CLEAR TRAP FLAG
1354  014572                                    SETVEC  ERRVEC,#TRPHAN,#340     ;SET UP TRAP VECTOR TO DETECT
 (7)  014572  012746  000340                    MOV     #340,-(SP)
 (6)  014576  012746  015576                    MOV     #TRPHAN,-(SP)
 (5)  014602  013746  003244                    MOV     ERRVEC,-(SP)
 (4)  014606  012746  000003                    MOV     #3,-(SP)
 (3)  014612  104437                            TRAP    C$SVEC
 (2)  014614  062706  000010                    ADD     #10,SP
1355                                                                    ;/NON-EXISTENT CONTROLLER
1356  014620  013702  003042                   MOV     RLBAS,R2        ;GET RL11 BASE ADDRESS
1357  014624  005762  000000                   TST     RLCS(R2)        ;ACCESS DRIVE CONTROLLER ADDRESS
1358  014630  005737  003462                   TST     TRPFLG          ;DID TRAP OCCUR?
1359  014634  001447                           BEQ     1$              ;BRANCH TO CHECK DRIVE IF TRAP DID NOT OCCUR
1360  014636                                   PRINTF  #FMT24,#NOCTLR  ;ELSE, PRINT MSG. 'DRIVE DROPPED - NO CONTROLLER'
 (8)  014636  012746  007645                    MOV     #NOCTLR,-(SP)
 (7)  014642  012746  011632                    MOV     #FMT24,-(SP)
 (6)  014646  012746  000002                    MOV     #2,-(SP)
 (3)  014652  010600                            MOV     SP,R0
 (4)  014654  104417                            TRAP    C$PNTF
 (4)  014656  062706  000006                    ADD     #6,SP
1361  014662                                   PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
(11)  014662  005046                            CLR     -(SP)
(11)  014664  153716  003047                    BISB    RLDRV+1,(SP)
(10)  014670  012746  006152                    MOV     #DRVNAM,-(SP)
 (9)  014674  013746  003042                    MOV     RLBAS,-(SP)
 (8)  014700  012746  006141                    MOV     #BASADD,-(SP)
 (7)  014704  012746  011026                    MOV     #FMT5,-(SP)
 (6)  014710  012746  000005                    MOV     #5,-(SP)
 (3)  014714  010600                            MOV     SP,R0
 (4)  014716  104417                            TRAP    C$PNTF
 (4)  014720  062706  000014                    ADD     #14,SP
1362                                                                    ;PRINT DRIVE INFORMATION
1363  014724                                   PRINTF  #FMT3
 (7)  014724  012746  011012                    MOV     #FMT3,-(SP)
 (6)  014730  012746  000001                    MOV     #1,-(SP)
 (3)  014734  010600                            MOV     SP,R0
 (4)  014736  104417                            TRAP    C$PNTF
 (4)  014740  062706  000004                    ADD     #4,SP
1364
1365  014744                                   DODU    PSETNM          ;DO DROP UNIT ON DRIVE
 (3)  014744  013700  003456                    MOV     PSETNM,R0
 (3)  014750  104451                            TRAP    C$DODU
1366  014752  000460                           BR      2$              ;BRANCH TO EXIT
1367  014754  013705  003046          1$:      MOV     RLDRV,R5        ;ELSE, GET DRIVE NUMBER
1368  014760  052705  000200                   BIS     #CRDYMSK,R5     ;SET CONTROLLER READY
```

```
 1369  014764  010562  000000                  MOV     R5,RLCS(R2)     ;LOAD IN THE DRIVE NUMBER
 1370  014770  032762  000001  000000          BIT     #DRDYMSK,RLCS(R2)       ;IS DRIVE READY?
 1371  014776  001046                          BNE     2$              ;BRANCH TO PERFORM TESTS IF DRIVE IS READY
 1372  015000                                  PRINTF  #FMT24,#NOTRDY  ;PRINT MSG. 'DRIVE DROPPED - DID NOT RESPOND
   (8) 015000  012746  007703                  MOV     #NOTRDY,-(SP)
   (7) 015004  012746  011632                  MOV     #FMT24,-(SP)
   (6) 015010  012746  000002                  MOV     #2,-(SP)
   (3) 015014  010600                          MOV     SP,R0
   (4) 015016  104417                          TRAP    C$PNTF
   (4) 015020  062706  000006                  ADD     #6,SP
 1373                                                    ;/WITH 'READY'''
 1374  015024                                  PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<8,RLDRV+1>
  (11) 015024  005046                          CLR     -(SP)
  (11) 015026  153716  003047                  BISB    RLDRV+1,(SP)
  (10) 015032  012746  006152                  MOV     #DRVNAM,-(SP)
   (9) 015036  013746  003042                  MOV     RLBAS,-(SP)
   (8) 015042  012746  006141                  MOV     #BASADD,-(SP)
   (7) 015046  012746  011026                  MOV     #FMT5,-(SP)
   (6) 015052  012746  000005                  MOV     #5,-(SP)
   (3) 015056  010600                          MOV     SP,R0
   (4) 015060  104417                          TRAP    C$PNTF
   (4) 015062  062706  000014                  ADD     #14,SP
 1375                                                    ;PRINT DRIVE INFORMATION
 1376  015066                                  PRINTF  #FMT3
   (7) 015066  012746  011012                  MOV     #FMT3,-(SP)
   (6) 015072  012746  000001                  MOV     #1,-(SP)
   (3) 015076  010600                          MOV     SP,R0
   (4) 015100  104417                          TRAP    C$PNTF
   (4) 015102  062706  000004                  ADD     #4,SP
 1377  015106                                  DODU    PSETNM          ;DO DROP UNIT ON DRIVE
   (3) 015106  013700  003456                  MOV     PSETNM,R0
   (3) 015112  104451                          TRAP    C$DODU
 1378  015114                          2$:     CLRVEC  ERRVEC          ;RELEASE ERROR VECTOR
   (3) 015114  013700  003244                  MOV     ERRVEC,R0
   (3) 015120  104436                          TRAP    C$CVEC
 1379  015122                          ENDAUTO
   (3) 015122                          L10016:
   (3) 015122  104461                          TRAP    C$AUTO
 1380
```

```
1382
1383                                    .SBTTL  CLEANUP CODE SECTION
1384
1385  015124                            BGNMOD  CLNCODE
1386  015124                            BGNCLN
1387
1388  015124                                    SETVEC  ERRVEC,#TRPHAN,#340
 (7)  015124  012746  000340                     MOV     #340,-(SP)
 (6)  015130  012746  015576                     MOV     #TRPHAN,-(SP)
 (5)  015134  013746  003244                     MOV     ERRVEC,-(SP)
 (4)  015140  012746  000003                     MOV     #3,-(SP)
 (3)  015144  104437                             TRAP    C$SVEC
 (2)  015146  062706  000010                     ADD     #10,SP
1389
1390  015152                                    SETPRI #7                 ;SET PRIORITY TO 7
 (3)  015152  012700  000007                     MOV     #7,R0
 (3)  015156  104441                             TRAP    C$SPRI
1391  015160  032762  000200  000000  2$:       BIT     #CRDYMSK,RLCS(R2)       ;TEST IF CONTROLLER READY
1392  015166  001407                           BEQ     3$                ;NO LOOP UNTIL READY
1393  015170  053762  003046  000000           BIS     RLDRV,RLCS(R2)    ;SET DRIVE NUMBER
1394  015176  032762  000001  000000           BIT     #DRDYMSK,RLCS(R2)       ;TEST IF DRIVE BUSY
1395  015204  001005                           BNE     5$                ;NO - SKIP
1396  015206                            3$:     WAITMS  #3                ;WAIT 300 MS
1397  015220                            5$:     CLRVEC  RLVEC             ;RELEASE VEC
 (3)  015220  013700  003044                     MOV     RLVEC,R0
 (3)  015224  104436                             TRAP    C$CVEC
1398  015226  005737  003464                   TST     PWRFLG            ;PWR FAIL SET
1399  015232  001402                           BEQ     7$                ;NO
1400  015234  005337  003464                   DEC     PWRFLG
1401  015240                            7$:     CLRVEC  ERRVEC
 (3)  015240  013700  003244                     MOV     ERRVEC,R0
 (3)  015244  104436                             TRAP    C$CVEC
1402  015246                                    BRESET                    ;TAKE CARE OF LSI-11
 (3)  015246  104433                             TRAP    C$RESET
1403
1404  015250                            ENDCLN
 (3)  015250                            L10017:
 (3)  015250  104412                             TRAP    C$CLEAN
1405
1406  015252                            BGNDU
1407  015252  000240                             NOP
1408  015254                            ENDDU
 (3)  015254                            L10020:
 (3)  015254  104453                             TRAP    C$DU
1409
1410  015256                            ENDMOD
1411
```

```
 1413                                   .SBTTL  GLOBAL SUBROUTINES
 1414
 1415  015256                           BGNMOD  GLBSUB
 1416
 1417
 1418  015256  012737  000160  002116  TIME:   MOV     #160,L$DLY              ;GET OUTER DELAY LOOP
 1419  015264  005237  003476                  INC     TIM.US                  ;US-WAIT ROUTINE INDICATOR
 1420  015270  013737  003466  003472          MOV     XDELAY,MININC           ;SAVE ORIGINAL US-WAIT
 1421  015276  005437  003466                  NEG     XDELAY                  ;GET NEGATIVE OF FACTOR
 1422  015302                                  READBUS                         ;Q - BUS?
   (3) 015302  104407                          TRAP    C$RDBU
 1423  015304                                  BCOMPLETE 2$                    ;BRANCH - IF YES
   (2) 015304  103420                          BCS     2$
 1424  015306                           1$:    DELAY   #1.                     ;WAIT
   (2) 015306  012727  000001                  MOV     ##1.,(PC)+
   (2) 015312  000000                          .WORD   0
   (2) 015314  013727  002116                  MOV     L$DLY,(PC)+
   (2) 015320  000000                          .WORD   0
   (2) 015322  005367  177772                  DEC     -6(PC)
   (2) 015326  001375                          BNE     .-4
   (2) 015330  005367  177756                  DEC     -22(PC)
   (2) 015334  001367                          BNE     .-20
 1425  015336  005237  003466                  INC     XDELAY                  ;WAIT FACTOR EXPIRED?
 1426  015342  002761                          BLT     1$                      ;BRANCH - IF NO
 1427  015344  000422                          BR      4$                      ;GET TIME
 1428  015346  012737  000065  002116  2$:     MOV     #65,L$DLY               ;GET OUTER DELAY LOOP
 1429  015354                           3$:    DELAY   #1.                     ;WAIT WITH RESPECT TO FONZ BUS
   (2) 015354  012727  000001                  MOV     ##1.,(PC)+
   (2) 015360  000000                          .WORD   0
   (2) 015362  013727  002116                  MOV     L$DLY,(PC)+
   (2) 015366  000000                          .WORD   0
   (2) 015370  005367  177772                  DEC     -6(PC)
   (2) 015374  001375                          BNE     .-4
   (2) 015376  005367  177756                  DEC     -22(PC)
   (2) 015402  001367                          BNE     .-20
 1430  015404  005237  003466                  INC     XDELAY                  ;WAIT FACTOR EXPIRED?
 1431  015410  002761                          BLT     3$                      ;BRANCH - IF NO
 1432  015412  063737  003472  003132  4$:     ADD     MININC,TEMPO            ;GET TIME EXPIRED
 1433  015420  000207                          RTS     PC                      ;RETURN
 1434
 1435
 1436  015422  012737  000160  002116  XTIME:  MOV     #160,L$DLY              ;GET OUTER DELAY LOOP
 1437  015430  005037  003476                  CLR     TIM.US                  ;MS. WAIT INDICATOR
 1438  015434  013737  003470  003502          MOV     YDELAY,MAJINC           ;SAVE ORIGINAL WAIT MS
 1439  015442  006337  003470                  ASL     YDELAY                  ;MULTIPLY BY FACTOR 4
 1440  015446  006337  003470                  ASL     YDELAY                  ;---------
 1441  015452  005437  003470                  NEG     YDELAY                  ;GET NEGATIVE OF RESULT
 1442  015456                                  READBUS                         ;Q - BUS?
   (3) 015456  104407                          TRAP    C$RDBU
 1443  015460                                  BNCOMPLETE      1$              ;BRANCH - IF NO
   (2) 015460  103023                          BCC     1$
 1444  015462  012737  000150  002116          MOV     #150,L$DLY              ;GET OUTER DELAY LOOP
 1445  015470                           2$:    DELAY   #20                     ;WAIT WITH RESPECT TO FONZ BUS
   (2) 015470  012727  000020                  MOV     ##20,(PC)+
   (2) 015474  000000                          .WORD   0
   (2) 015476  013727  002116                  MOV     L$DLY,(PC)+
```

```
 (2) 015502 000000                        .WORD   0
 (2) 015504 005367 177772                 DEC     -6(PC)
 (2) 015510 001375                        BNE     .-4
 (2) 015512 005367 177756                 DEC     -22(PC)
 (2) 015516 001367                        BNE     .-20
1446 015520 005237 003470                 INC     YDELAY                  ;WAIT FACTOR EXPIRED
1447 015524 002761                        BLT     2$                      ;BRANCH - IF NO
1448 015526 000417                        BR      3$                      ;GET TIME
1449 015530                       1$:     DELAY   #10                     ;WAIT
 (2) 015530 012727 000010                 MOV     ##10,(PC)+
 (2) 015534 000000                        .WORD   0
 (2) 015536 013727 002116                 MOV     L$DLY,(PC)+
 (2) 015542 000000                        .WORD   0
 (2) 015544 005367 177772                 DEC     -6(PC)
 (2) 015550 001375                        BNE     .-4
 (2) 015552 005367 177756                 DEC     -22(PC)
 (2) 015556 001367                        BNE     .-20
1450 015560 005237 003470                 INC     YDELAY                  ;WAIT FACTOR EXPIRED?
1451 015564 002761                        BLT     1$                      ;BRANCH - IF NO
1452 015566 063737 003502 003474  3$:     ADD     MAJINC,TEMP             ;GET EXPIRED TIME
1453 015574 000207                        RTS     PC                      ;RETURN
1454
1455
1456
1457 015576                               BGNSRV
1458
1459                                      ;TRAP HANDLER. INDICATES OCCURRENCE OF A TRAP.
1460
1461 015576 005237 003462                 TRPHAN: INC     TRPFLG
1462
1463 015602                               ENDSRV
 (3) 015602                               L10021:
 (2) 015602 000002                                RTI
1464
1465 015604                               BGNSRV
1466
1467                                      ;INTERRUPT HANDLER. ABORTS WAIT TIMER AND STORES RL11 REGISTERS.
1468
1469 015604                               INTHLR:
1470
1471 015604 012237 003060                         MOV     (R2)+,T.CS      ;STORE RL REGISTERS
1472 015610 012237 003062                         MOV     (R2)+,T.BA
1473 015614 012237 003064                         MOV     (R2)+,T.DA
1474 015620 011237 003066                         MOV     (R2),T.MP
1475 015624 012737 177777 003022                  MOV     #-1,DONE        ;SET DONE FLAG
1476 015632 013702 003042                         MOV     RLBAS,R2        ;RESTORE R2
1477 015636                                       ABORTWAIT
1478
1479 015662                               ENDSRV
 (3) 015662                               L10022:
 (2) 015662 000002                                RTI
1480
```

```
 1482
 1483                                   ;       ERROR LIMIT CHECKING ROUTINE
 1484                                   ;       DROPS DRIVE IF ERROR LIMIT EXCEEDED
 1485
 1486
 1487  015664  027737  165362  013566  CKERLM: CMP     @ERRPOINT,ERLIMW        ;TEST IF ERROR LIMIT EXCEEDED
 1488  015672  002453                          BLT     1$                      ;NO - SKIP
 1489  015674                                  INLOOP                          ;CHECK IF IN ERROR LOOP
  (3)  015674  104420                          TRAP    C$INLP
 1490  015676                                  BCOMPLETE       1$              ;YES - SKIP
  (2)  015676  103451                          BCS     1$
 1491  015700                                  PRINTF  #FMT25,ERLIMW,#MEXERS
  (9)  015700  012746  010513                  MOV     #MEXERS,-(SP)
  (8)  015704  013746  013566                  MOV     ERLIMW,-(SP)
  (7)  015710  012746  011637                  MOV     #FMT25,-(SP)
  (6)  015714  012746  000003                  MOV     #3,-(SP)
  (3)  015720  010600                          MOV     SP,R0
  (4)  015722  104417                          TRAP    C$PNTF
  (4)  015724  062706  000010                  ADD     #10,SP
 1492  015730                                  PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
 (11)  015730  005046                          CLR     -(SP)
 (11)  015732  153716  003047                  BISB    RLDRV+1,(SP)
 (10)  015736  012746  006152                  MOV     #DRVNAM,-(SP)
  (9)  015742  013746  003042                  MOV     RLBAS,-(SP)
  (8)  015746  012746  006141                  MOV     #BASADD,-(SP)
  (7)  015752  012746  011026                  MOV     #FMT5,-(SP)
  (6)  015756  012746  000005                  MOV     #5,-(SP)
  (3)  015762  010600                          MOV     SP,R0
  (4)  015764  104417                          TRAP    C$PNTF
  (4)  015766  062706  000014                  ADD     #14,SP
 1493  015772                                  PRINTF  #FMT3
  (7)  015772  012746  011012                  MOV     #FMT3,-(SP)
  (6)  015776  012746  000001                  MOV     #1,-(SP)
  (3)  016002  010600                          MOV     SP,R0
  (4)  016004  104417                          TRAP    C$PNTF
  (4)  016006  062706  000004                  ADD     #4,SP
 1494  016012                                  DODU    PSETNM                  ;DROP DRIVE
  (3)  016012  013700  003456                  MOV     PSETNM,R0
  (3)  016016  104451                          TRAP    C$DODU
 1495  016020                                  DOCLN                           ;GO TO CLEAN UP
  (3)  016020  104444                          TRAP    C$DCLN
 1496  016022  000207                  1$:     RTS     PC
 1497
 1498                                   ;       READ AND STORE ALL RL11 REGISTERS
 1499  016024  016237  000000  003060  READRL: MOV     RLCSR(R2),T.CS  ;GET CS REG
 1500  016032  016237  000002  003062          MOV     RLBA(R2),T.BA   ;GET BUS ADDRESS REG
 1501  016040  016237  000004  003064          MOV     RLDA(R2),T.DA   ;GET DISK ADDRESS
 1502  016046  016237  000006  003066          MOV     RLMP(R2),T.MP   ;GET MULTI-PURPOSE REG
 1503  016054  000207                          RTS     PC              ;RETURN
 1504
 1505                                   ;       WAIT FOR CONTROLLER TIMEOUT TO FORCE INTERRUPT ROUTINE
 1506  016056  011646                  WAITIN: MOV     (SP),-(SP)      ;MAKE ROOM FOR ERROR POINTER
 1507  016060  005066  000002                  CLR     2(SP)           ;CLEAR FOR POINTER
 1508  016064  032762  000200  000000          BIT     #CRDYMSK,RLCSR(R2)      ;TEST IF CONTROLLER READY
 1509  016072  001420                          BEQ     4$              ;NO - SKIP TO WAIT
 1510  016074  004737  016024                  JSR     PC,READRL       ;READ ALL RL REGS
```

```
1511  016100  005737  003022            TST     DONE            ;TEST IF INTERRUPT OCCURRED
1512  016104  001435                    BEQ     5$              ;NO - GO SET NO INTERRUPT ERR FLAG
1513  016106  012766  006316  000002  1$:       MOV     #MTOSLOW,2(SP)  ;ELSE SET TOO SLOW ERROR POINTER
1514  016114  032737  002000  003060            BIT     #OPIERR,T.CS    ;TEST IF OPI SET
1515  016122  001403                    BEQ     2$              ;NO - SKIP
1516  016124  012766  006336  000002            MOV     #MDRRES,2(SP)   ;SET MESSAGE FOR NO DRIVE RESPONSE
1517  016132  000207                  2$:       RTS     PC              ;RETURN
1518  016134                           4$:       WAITMS  #3              ;WAIT 300 MS FOR TIMEOUT
1519  016146  032762  000200  000000            BIT     #CRDYMSK,RLCS(R2)       ;TEST IF READY NOW SET
1520  016154  001006                    BNE     3$              ;YES - SKIP
1521  016156  004737  016024                    JSR     PC,READRL       ;READ RL REGS
1522  016162  012766  006407  000002            MOV     #MCONHNG,2(SP)  ;SET MESSAGE FOR CONTROLLER HUNG
1523  016170  000760                    BR      2$              ;SKIP
1524  016172  005737  003022          3$:       TST     DONE            ;ELSE CHECK IF INTERRUPT OCCURRED
1525  016176  001343                    BNE     1$              ;YES - SKIP TO SET TOO SLOW
1526  016200  004737  016024          5$:       JSR     PC,READRL       ;READ RL REGS
1527  016204  012766  006354  000002            MOV     #MNOINT,2(SP)   ;ELSE SET NO INTERRUPT FLAG
1528  016212  000747                    BR      2$              ;GO TO RETURN
1529
1530                                   ;       OPERATION AND TEST INITIALIZE ROUTINE
1531  016214  005037  003020          TSTINT:   CLR     OPFLAG          ;CLEAR OPERATION FLAGS
1532  016220  105037  003461                    CLRB    NOERCT          ;RESET INHIBIT ERROR COUNTING
1533  016224  005037  003030                    CLR     MORECE          ;RESET MORE COMPARE ERRORS
1534  016230  000207                    RTS     PC
1535
1536                                   ;       GET STATUS AND GET STATUS WITH RESET ROUTINE
1537  016232  013746  003142          GSTAT2:   MOV     TEMP4,-(SP)     ;STORE TEMP4
1538  016236  012737  000013  003142            MOV     #GETSTAT!DRSET,TEMP4    ;SET FOR RESET
1539  016244  000412                    BR      GSTATG
1540  016246  013746  003142          GSTATC:   MOV     TEMP4,-(SP)     ;STORE TEMP4
1541  016252  012737  000003  003142            MOV     #GETSTAT,TEMP4  ;SET FOR NO RESET
1542  016260  000404                    BR      GSTATG
1543  016262  013746  003142          GSTAT:    MOV     TEMP4,-(SP)     ;STORE TEMP4
1544  016266  005037  003142                    CLR     TEMP4           ;SET FOR SAVE L. AND T. REGS
1545  016272  010346                  GSTATG:   MOV     R3,-(SP)        ;STORE R3
1546  016274  013703  003016                    MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
1547  016300  005723                    TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
1548  016302  016663  000004  002420            MOV     4(SP),SUBSTK(R3) ;INSERT THIS CALL
1549  016310  162763  000004  002420            SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
1550  016316  010337  003016                    MOV     R3,SSINDX       ;STORE IT BACK
1551  016322  010046                    MOV     R0,-(SP)        ;STORE R0
1552  016324  010146                    MOV     R1,-(SP)        ;STORE R1
1553  016326  012737  000002  003032            MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
1554  016334  032737  000010  003142            BIT     #DRSET,TEMP4    ;TEST IF DRIVE RESET
1555  016342  001460                    BEQ     11$             ;NO - SKIP
1556  016344  032762  040000  000000            BIT     #DRVERR,RLCS(R2) ;TEST IF DRIVE ERROR SET
1557  016352  001405                    BEQ     49$             ;NO - SKIP
1558  016354                           WAITMS  #3              ;WAIT FOR 300 MS FOR DRIVE TO SETTLE
1559  016366  012701  000062          49$:      MOV     #50.,R1         ;INITIALIZE WAIT COUNT
1560  016372  004737  016262          50$:      JSR     PC,GSTAT        ;GET DRIVE STATUS
1561  016376  017062                    3$
1562  016400  032737  000001  003060            BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY
1563  016406  001054                    BNE     5$              ;YES - GO DO CLEAR
1564  016410  032737  000020  003066            BIT     #HOSTAT,T.MP    ;ELSE TEST IF HEADS OUT
1565  016416  001010                    BNE     51$             ;YES - BYPASS RELOAD WAIT FLAG SETTING
1566  016420  032737  144000  003066            BIT     #SPDSTAT!HCESTAT!WDESTAT,T.MP ;TEST IF DRIVE HAS ERROR
```

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1567                                                                    ;THAT CAUSED HEADS TO
1568                                                                    ;UNLOAD
1569  016426  001444                        BEQ     5$                ;NO - SKIP
1570  016430  052737  040000  003020        BIS     #RELDWT,OPFLAG    ;ELSE SET WAIT FLAG
1571  016436  000440                        BR      5$                ;SKIP TO CLEAR
1572  016440  032737  040000  003060  51$:  BIT     #DRVERR,T.CS      ;TEST IF DRIVE ERROR NOW
1573  016446  001034                        BNE     5$                ;YES - SKIP TO CLEAR
1574  016450                                WAITMS  #1                ;WAIT FOR DRIVE TO GET ERROR, RDY, OR HEADS OUT
1575  016462  005301                        DEC     R1                ;DEC WAIT COUNTER
1576  016464  001342                        BNE     50$               ;IF NOT DONE, LOOP
1577  016466  012703  010375                MOV     #MUNDEF,R3        ;MESSAGE FOR UNDEFINED STATE
1578  016472                                ERRHRD  10001.,,ERR1
 (4)  016472  104456                        TRAP    C$ERHRD
 (5)  016474  023421                        .WORD   10001
 (5)  016476  000000                        .WORD   0
 (5)  016500  011724                        .WORD   ERR1
1579  016502  000565                        BR      14$               ;EXIT
1580  016504  005737  003142        11$:    TST     TEMP4             ;TEST IF SAVE REGISTERS
1581  016510  001013                        BNE     5$                ;NO SKIP
1582  016512  012701  000004                MOV     #4,R1             ;SET SAVE COUNT
1583  016516  012703  003060                MOV     #L.MP+2,R3        ;SET ADDRESS OF FIRST SAVE
1584  016522  014346                8$:     MOV     -(R3),-(SP)       ;PUT REG ON STACK
1585  016524  005301                        DEC     R1                ;DEC COUNT
1586  016526  001375                        BNE     8$                ;LOOP UNTIL ALL SAVED
1587  016530  012737  000003  003054        MOV     #GETSTAT,L.DA     ;SET FOR GET STATUS
1588  016536  000403                        BR      6$                ;SKIP
1589  016540  013737  003142  003054  5$:   MOV     TEMP4,L.DA        ;INSERT PRESET FOR STATUS
1590  016546                          6$:
1591  016546  005037  003022                CLR     DONE              ;CLEAR INTERRUPT FLAG
1592  016552  013737  003046  003050        MOV     RLDRV,L.CS        ;SET UP TO GET STATUS
1593  016560  042737  002000  003050        BIC     #BIT10,L.CS       ;CLEAR FOR DRIVE 4 - 7 SPEC'D
1594  016566  052737  000104  003050        BIS     #GTSTAT,L.CS
1595  016574  013762  003054  000004        MOV     L.DA,RLDA(R2)     ;LOAD RL REGS
1596  016602  013762  003050  000000        MOV     L.CS,RLCSR(R2)    ;LOAD CS REG
1597  016610                                WAITUS  #1                ;WAIT 100 US FOR INTERRUPT
1598  016622  005737  003022                TST     DONE              ;CHECK IF INTERRUPT OCCURRED
1599  016626  001504                        BEQ     1$                ;NO - SKIP
1600  016630  013737  003066  003074  4$:   MOV     T.MP,T.STAT       ;STORE MP REGISTER
1601  016636  042737  177770  003074        BIC     #^C<STAMSK>,T.STAT ;CLEAR ALL BUT STATE
1602  016644  032737  000010  003054        BIT     #DRSET,L.DA       ;TEST IF RESET WAS SPECIFIED
1603  016652  001503                        BEQ     3$                ;NO - SKIP TO EXIT
1604  016654  032737  040000  003020        BIT     #RELDWT,OPFLAG    ;TEST IF RELOAD WAIT FLAG SET
1605  016662  001427                        BEQ     12$               ;NO - SKIP
1606  016664  012701  001130                MOV     #600.,R1          ;SET WAIT COUNT FOR 60 SECONDS
1607  016670  032762  000001  000000  13$:   BIT     #DRDYMSK,RLCS(R2) ;TEST IF DRIVE NOW READY
1608  016676  001021                        BNE     12$               ;YES - SKIP
1609  016700                                WAITMS  #1                ;CALL WAIT
1610  016712  005301                        DEC     R1                ;DEC COUNT
1611  016714  001365                        BNE     13$               ;LOOP IF NOT 0
1612  016716  004737  016262                JSR     PC,GSTAT          ;GET DRIVE STATUS
1613  016722  017062                        3$                        ;ERROR RETURN
1614  016724  012703  010442                MOV     #MRLFAL,R3        ;SET RESULT MESSAGE POINTER
1615  016730                                ERRHRD  10003.,,ERR1
 (4)  016730  104456                        TRAP    C$ERHRD
 (5)  016732  023423                        .WORD   10003
 (5)  016734  000000                        .WORD   0
```

```
  (5)  016736  011724                          .WORD   ERR1
1616   016740  000446                          BR      14$             ;GO TO EXIT
1617   016742                          12$:    WAITUS  #10.            ;WAIT FOR 1MS
1618   016754  004737  016262                  JSR     PC,GSTAT        ;GET DRIVE STATUS
1619   016760  017062                          3$
1620   016762  032737  100000  003060          BIT     #ANYERR,T.CS    ;TEST IF ANY ERROR
1621   016770  001434                          BEQ     3$              ;NO - SKIP
1622   016772  032737  001000  003066          BIT     #VCSTAT,T.MP    ;CHECK IF VOLUME CHECK RESET
1623   017000  001403                          BEQ     7$              ;YES SKIP
1624   017002  012703  006443                  MOV     #VCNRST,R3      ;SET REASON POINTER
1625   017006  000417                          BR      2$              ;EXIT
1626   017010  032737  040000  003060  7$:     BIT     #DRVERR,T.CS    ;CHECK IF DRIVE ERROR
1627   017016  001405                          BEQ     9$              ;NO - SKIP
1628   017020                                  ERRHRD  10004.,,ERR6
  (4)  017020  104456                          TRAP    C$ERHRD
  (5)  017022  023424                          .WORD   10004
  (5)  017024  000000                          .WORD   0
  (5)  017026  012226                          .WORD   ERR6
1629   017030  000412                          BR      14$             ;EXIT
1630   017032  012703  006464          9$:     MOV     #UNXERR,R3      ;SET REASON POINTER
1631   017036  000403                          BR      2$              ;EXIT
1632   017040  004737  016056          1$:     JSR     PC,WAITIN       ;WAIT FOR INTERRUPT
1633   017044  012603                          MOV     (SP)+,R3        ;STORE REASON POINTER FOR RETURN
1634   017046                          2$:     ERRHRD  10002..,ERR1
  (4)  017046  104456                          TRAP    C$ERHRD
  (5)  017050  023422                          .WORD   10002
  (5)  017052  000000                          .WORD   0
  (5)  017054  011724                          .WORD   ERR1
1635   017056  005037  003032          14$:    CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
1636   017062  005737  003142          3$:     TST     TEMP4           ;TEST IF REGISTERS WERE SAVED
1637   017066  001007                          BNE     22$             ;NO - SKIP
1638   017070  012703  003050                  MOV     #L.CS,R3        ;SET POINTER TO RESTORE
1639   017074  012701  000004                  MOV     #4,R1           ;SET REGISTER COUNT
1640   017100  012623                  20$:    MOV     (SP)+,(R3)+     ;RESTORE REG
1641   017102  005301                          DEC     R1              ;DEC COUNT
1642   017104  001375                          BNE     20$             ;LOOP UNTIL ALL ARE RESTORED
1643   017106  162737  000002  003016  22$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
1644   017114  012601                          MOV     (SP)+,R1        ;RESTORE R1
1645   017116  012600                          MOV     (SP)+,R0        ;RESTORE R0
1646   017120  012603                          MOV     (SP)+,R3        ;RESTORE R3
1647   017122  012637  003142                  MOV     (SP)+,TEMP4     ;RESTORE TEMP4
1648   017126  005737  003032                  TST     ERRSWI          ;TEST IF ERROR RETURN
1649   017132  001403                          BEQ     99$             ;YES - SKIP
1650   017134  063716  003032                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
1651   017140  000207                          RTS     PC
1652   017142  017616  000000          99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
1653   017146  000207                          RTS     PC
1654
1655
1656                                  ;       SEEK ROUTINE
1657   017150  012737  177777  003134  XSEEKT: MOV     #-1,TEMP1       ;SET SPECIAL TIMING SEEK FLAG
1658   017156  000402                          BR      XSEEK1
1659   017160  005037  003134          XSEEK:  CLR     TEMP1           ;CLEAR SPECIAL SEEK FOR TIMING FLAG
1660   017164  010346                  XSEEK1: MOV     R3,-(SP)        ;STORE R3
1661   017166  013703  003016                  MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
1662   017172  005723                          TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
```

```
1663  017174  016663  000002  002420          MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
1664  017202  162763  000004  002420          SUB     #4,SUBSTK(R3)    ;ADJUST IT TO CALLING LOCATION
1665  017210  010337  003016                  MOV     R3,SSINDX        ;STORE IT BACK
1666  017214  010046                          MOV     R0,-(SP)
1667  017216  010146                          MOV     R1,-(SP)
1668  017220  010546                          MOV     R5,-(SP)         ;STORE REG
1669  017222  012737  000002  003032          MOV     #2,ERRSWI        ;SET FOR NO ERROR RETURN
1670  017230  005037  003112                  CLR     DIFAUG           ;CLEAR DIFFERENCE AUGMENT (FOR SEEKING
1671                                                                   ;   PAST GUARD BAND)
1672  017234  004737  022340                  JSR     PC,GETPOS        ;GET PRESENT POSITION
1673  017240  017672                          65$
1674  017242  013737  003120  003114          MOV     CURCYL,OLDCYL    ;MOVE CURRENT TO OLD CYLINDER
1675  017250  023737  003116  002316          CMP     NEWCYL,HLMTW     ;TEST IF NEW IS GREATER THAN 255
1676  017256  003427                          BLE     3$               ;NO - SKIP
1677  017260  163737  002316  003116          SUB     HLMTW,NEWCYL     ;ELSE SUBTRACT 255.
1678  017266  013737  003116  003112          MOV     NEWCYL,DIFAUG    ;STORE DIFFERENCE AS AUGMENT
1679  017274  013737  002316  003116          MOV     HLMTW,NEWCYL     ;SET NEWCYL AS 255.
1680  017302  022737  000001  002312          CMP     #1,T.DRIVE
1681  017310  001424                          BEQ     6$
1682  017312  162737  000001  003116          SUB     #1,NEWCYL
1683  017320  012737  000001  003124          MOV     #1,DESSGN
1684  017326  012737  000001  003122          MOV     #1,DESDIF
1685  017334  000451                          BR      18$
1686  017336  005737  003116          3$:     TST     NEWCYL           ;TEST IF NEWCYL HAS NEGATIVE VALUE
1687  017342  100007                          BPL     6$               ;NO - SKIP
1688  017344  005437  003116                  NEG     NEWCYL           ;ELSE MAKE IT POSITIVE
1689  017350  013737  003116  003112          MOV     NEWCYL,DIFAUG    ;AND STORE IT AS AUGMENT
1690  017356  005037  003116                  CLR     NEWCYL           ;AND SET NEWCYL TO 0
1691  017362  013705  003120          6$:     MOV     CURCYL,R5        ;COMPUTE DIFFERENCE AND NEW CYLINDER
1692  017366  163705  003116                  SUB     NEWCYL,R5        ;SUB NEWCYL FROM CURCYL
1693  017372  100005                          BPL     13$              ;IF DIFF IS POSITIVE - SKIP(REV SEEK)
1694  017374  012737  000001  003124          MOV     #1,DESSGN        ;ELSE SET SIGN FOR FORWARD
1695  017402  005405                          NEG     R5               ;MAKE DIFFERENCE POSITIVE
1696  017404  000402                          BR      14$              ;SKIP
1697  017406  005037  003124          13$:    CLR     DESSGN           ;SET SIGN FOR REVERSE
1698  017412  010537  003122          14$:    MOV     R5,DESDIF        ;STORE DIFFERENCE
1699  017416  005737  003112                  TST     DIFAUG           ;IS THERE A DIFFERENCE AUGMENT
1700  017422  001416                          BEQ     18$              ;NO - SKIP
1701  017424  023737  003116  002316          CMP     NEWCYL,HLMTW     ;CHECK IF NEW CYL IS 255.
1702  017432  001007                          BNE     17$              ;NO - SKIP
1703  017434  012737  000001  003124          MOV     #1,DESSGN        ;ELSE FORCE SIGN FOR FORWARD
1704                                                                   ;(INNER GUARD BAND)
1705  017442  022737  000001  002312          CMP     #1,T.DRIVE
1706  017450  001003                          BNE     18$
1707  017452  063737  003112  003122  17$:    ADD     DIFAUG,DESDIF
1708  017460                          18$:
1709  017460  012705  003050                  MOV     #L.CS,R5         ;GET L REG ADDRESS
1710  017464  012715  000106                  MOV     #SEEK,(R5)       ;SET FOR SEEK
1711  017470  053715  003046                  BIS     RLDRV,(R5)       ;INSERT DRIVE NUMBER
1712  017474  042725  002000                  BIC     #BIT10,(R5)+     ;CLEAR IF DRIVE 4 - 7 SPEC'D
1713  017500  005025                          CLR     (R5)+            ;CLEAR BUS ADDRESS
1714  017502  013715  003122                  MOV     DESDIF,(R5)      ;LOAD DIFFERENCE
1715  017506  012700  000007                  MOV     #7,R0            ;SET TO SHIFT DIFFERENCE
1716  017512  006315                  21$:    ASL     (R5)
1717  017514  005300                          DEC     R0
1718  017516  001375                          BNE     21$              ;LOOP UNTIL ALIGNED
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 1719  017520  005737  003124                 TST     DESSGN          ;TEST SIGN
 1720  017524  001402                         BEQ     23$             ;SKIP IF 0
 1721  017526  052715  000004                 BIS     #DIRBIT,(R5)    ;ELSE INSERT SIGN
 1722  017532  005737  003126         23$:    TST     DESHD           ;TEST IF HEAD 0
 1723  017536  001402                         BEQ     25$             ;YES - SKIP
 1724  017540  052715  000020                 BIS     #HDSEL,(R5)     ;ELSE SET HEAD BIT
 1725  017544  052725  000001         25$:    BIS     #MBSET0,(R5)+   ;INSERT MARKER BIT
 1726  017550  004737  020276                 JSR     PC,RDYCHK       ;CHECK IF DRIVE READY
 1727  017554  017672                         65$
 1728  017556  005037  003022                 CLR     DONE            ;CLEAR INTERRUPT FLAG
 1729  017562  005737  003134                 TST     TEMP1           ;CHECK IF SPECIAL SEEK FLAG SET
 1730  017566  001041                         BNE     65$             ;YES - SKIP, DO NOT START SEEK
 1731  017570  014562  000004                 MOV     -(R5),RLDA(R2)  ;LOAD RL REGISTERS
 1732  017574  014562  000002                 MOV     -(R5),RLBA(R2)
 1733  017600  014562  000000                 MOV     -(R5),RLCS(R2)
 1734  017604                         30$:    WAITUS  #10.
 1735  017616  005737  003022                 TST     DONE            ;TEST IF INTERRUPT DONE
 1736  017622  001012                         BNE     32$             ;YES - SKIP
 1737  017624  004737  016056                 JSR     PC,WAITIN       ;GO WAIT FOR INTERRUPT
 1738  017630  012603                         MOV     (SP)+,R3        ;GET RESULT MESSAGE POINTER
 1739  017632                                 ERRHRD  10005.,,ERR1
   (4) 017632  104456                         TRAP    C$ERHRD
   (5) 017634  023425                         .WORD   10005
   (5) 017636  000000                         .WORD   0
   (5) 017640  011724                         .WORD   ERR1
 1740  017642  005037  003032                 CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
 1741  017646  000411                         BR      65$
 1742  017650  005737  003060         32$:    TST     T.CS            ;TEST IF ANY ERROR
 1743  017654  100006                         BPL     65$             ;NO - SKIP
 1744  017656                                 ERRHRD  10006.,,ERR6
   (4) 017656  104456                         TRAP    C$ERHRD
   (5) 017660  023426                         .WORD   10006
   (5) 017662  000000                         .WORD   0
   (5) 017664  012226                         .WORD   ERR6
 1745  017666  005037  003032                 CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
 1746  017672  162737  000002  003016 65$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
 1747  017700  012605                         MOV     (SP)+,R5        ;RESTORE REGISTERS
 1748  017702  012601                         MOV     (SP)+,R1
 1749  017704  012600                         MOV     (SP)+,R0
 1750  017706  012603                         MOV     (SP)+,R3
 1751  017710  005737  003032                 TST     ERRSWI          ;TEST IF ERROR RETURN
 1752  017714  001403                         BEQ     99$             ;YES - SKIP
 1753  017716  063716  003032                 ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
 1754  017722  000207                         RTS     PC
 1755  017724  017616  000000         99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
 1756  017730  000207                         RTS     PC
 1757
 1814
 1816                                 ;       POSITION HEADS ROUTINE. POSITIONS HEADS USING 1 CYLINDER SEEKS
 1817                                 ;       TO CYLINDER SPECIFIED IN R5 BY THE CALLING ROUTINE
 1818  017732  010346                 POSHDS: MOV     R3,-(SP)        ;SAVE REGS
 1819  017734  013703  003016                 MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
 1820  017740  005723                         TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
 1821  017742  016663  000002  002420         MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
 1822  017750  162763  000004  002420         SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
 1823  017756  010337  003016                 MOV     R3,SSINDX       ;STORE IT BACK
```

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 1824  017762  010346                          MOV     R3,-(SP)
 1825  017764  010446                          MOV     R4,-(SP)
 1826  017766  012737  000002  003032          MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
 1827  017774  004737  022340                  JSR     PC,GETPOS       ;GET CURRENT POSITION
 1828  020000  020240                          PH65$
 1829  020002  012704  000012                  MOV     #10.,R4         ;SET RETRY COUNT
 1830  020006                          BGNSEG
   (3) 020006  104404                          TRAP    C$BSEG
 1831  020010                          1$:     INLOOP                  ;CHECK IF IN ERROR LOOP
   (3) 020010  104420                          TRAP    C$INLP
 1832  020012                                  BNCOMPLETE      5$      ;NO - SKIP
   (2) 020012  103012                          BCC     5$
 1833  020014  004737  022340                  JSR     PC,GETPOS       ;ELSE GET POSITION
 1834  020020  020236                          60$
 1835  020022  023737  003120  003116          CMP     CURCYL,NEWCYL   ;CHECK IF AT INTENDED POSITION
 1836  020030  001017                          BNE     8$              ;NO - SKIP
 1837  020032  004737  020636                  JSR     PC,ONSWAP       ;SWAP OLDCYL AND NEWCYL
 1838  020036  000414                          BR      8$              ;SKIP
 1839  020040  013737  003120  003114  5$:     MOV     CURCYL,OLDCYL   ;IN NOT LOOPING, STORE CURCYL AS OLDCYL
 1840  020046  023705  003120                  CMP     CURCYL,R5       ;CHECK IF HDS AT FINAL POSITION
 1841  020052  001471                          BEQ     60$             ;YES - GO TO EXIT
 1842  020054  003003                          BGT     7$              ;IF CURCYL > FINAL POSITION - SKIP
 1843  020056  005237  003116                  INC     NEWCYL          ;ELSE BUMP NEWCYL (MOVE HDS IN)
 1844  020062  000402                          BR      8$              ;SKIP
 1845  020064  005337  003116          7$:     DEC     NEWCYL          ;DEC NEWCYL (MOVE HDS OUT)
 1846  020070  004737  017160          8$:     JSR     PC,XSEEK        ;DO SEEK
 1847  020074  020236                          60$
 1848  020076  012701  005670                  MOV     #3000.,R1       ;SET WAIT COUNT 300 MS
 1849  020102  004737  022054                  JSR     PC,RDYWAIT      ;WAIT FOR DRIVE READY
 1850  020106  020236                          60$
 1851  020110  005737  003060                  TST     T.CS            ;TEST IF ANY ERROR
 1852  020114  100007                          BPL     10$             ;NO - SKIP
 1853  020116                                  ERRHRD  10008.,,ERR6
   (4) 020116  104456                          TRAP    C$ERHRD
   (5) 020120  023430                          .WORD   10008
   (5) 020122  000000                          .WORD   0
   (5) 020124  012226                          .WORD   ERR6
 1854  020126  005037  003032                  CLR     ERRSWI          ;CLEAR FOR ERROR ERROR RETURN
 1855  020132  000441                          BR      60$
 1856  020134  004737  022340          10$:    JSR     PC,GETPOS       ;GET POSITION
 1857  020140  020236                          60$
 1858  020142  023737  003120  003116          CMP     CURCYL,NEWCYL   ;CHECK IF ARRIVED AT DESIRED PLACE
 1859  020150  001003                          BNE     15$             ;NO - SKIP
 1860  020152  012704  000012          14$:    MOV     #10.,R4         ;ELSE INIT RETRY COUNT
 1861  020156  000714                          BR      1$              ;GO DO NEXT SEEK
 1862  020160  005737  003124          15$:    TST     DESSGN          ;TEST IF GOING IN
 1863  020164  001017                          BNE     17$             ;YES - SKIP
 1864  020166  023737  003120  003116          CMP     CURCYL,NEWCYL   ;CHECK IF HEADS DID NOT MOVE IN
 1865  020174  003366                          BGT     14$             ;YES - SKIP
 1866  020176  005304                  16$:    DEC     R4              ;DEC RETRY COUNT
 1867  020200  001333                          BNE     8$              ;DO ANOTHER SEEK IF NOT 0
 1868  020202  012703  007323                  MOV     #HDMOVF,R3      ;ELSE SET RESULT MESSAGE POINTER
 1869  020206                                  ERRHRD  10009.,,ERR1
   (4) 020206  104456                          TRAP    C$ERHRD
   (5) 020210  023431                          .WORD   10009
   (5) 020212  000000                          .WORD   0
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  (5)  020214  011724                          .WORD   ERR1
1870   020216  005037  003032                  CLR     ERRSWI          ;CLEAR FOR ERROR ERROR RETURN
1871   020222  000405                          BR      60$
1872   020224  023737  003120  003116  17$:    CMP     CURCYL,NEWCYL   ;HDS SHOULD MOVE OUT, CHK THEY DID
1873   020232  002747                          BLT     14$             ;YES - SKIP
1874   020234  000760                          BR      16$             ;ELSE GO DEC AND RETRY
1875   020236                          20$:
1876   020236                          60$:
1877   020236                          ENDSEG
  (3)  020236                          10000$:
  (3)  020236  104405                          TRAP    C$ESEG
1878   020240  162737  000002  003016  PH65$:  SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
1879   020246  012604                          MOV     (SP)+,R4        ;RESTORE REGISTERS
1880   020250  012600                          MOV     (SP)+,R0
1881   020252  012603                          MOV     (SP)+,R3
1882   020254  005737  003032                  TST     ERRSWI          ;TEST IF ERROR RETURN
1883   020260  001403                          BEQ     99$             ;YES - SKIP
1884   020262  063716  003032                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
1885   020266  000207                          RTS     PC
1886   020270  017616  000000          99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
1887   020274  000207                          RTS     PC
1888
1890                                  ;       DRIVE READY TEST ROUTINE. CHECKS DRIVE IS READY. IF NOT, WAIT
1891                                  ;       500MS FOR READY TO SET.
1892   020276  010346                  ;RDYCHK: MOV     R3,-(SP)        ;STORE REGS
1893   020300  013703  003016                  MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
1894   020304  005723                          TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
1895   020306  016663  000002  002420          MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
1896   020314  162763  000004  002420          SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
1897   020322  010337  003016                  MOV     R3,SSINDX       ;STORE IT BACK
1898   020326  010046                          MOV     R0,-(SP)
1899   020330  010146                          MOV     R1,-(SP)
1900   020332  010446                          MOV     R4,-(SP)
1901   020334  012737  000002  003032          MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
1902   020342  012701  011610                  MOV     #5000.,R1       ;SET WAIT COUNT
1903   020346  004737  016262          1$:     JSR     PC,GSTAT        ;GET DRIVE STATUS
1904   020352  020506                          4$
1905   020354  032737  000001  003060          BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY
1906   020362  001053                          BNE     5$              ;YES - EXIT
1907   020364                                  WAITUS  #1
1908   020376  005301                          DEC     R1              ;DEC WAIT COUNT
1909   020400  001362                          BNE     1$              ;LOOP IF NOT 0
1910   020402  012703  007760                  MOV     #MDRDY,R3       ;SET RESULT MESSAGE POINTER
1911   020406  012704  010645                  MOV     #C500MS,R4      ;SET CONDITION MESSAGE POINTER
1912   020412                                  ERRHRD  10010.,,ERR5
  (4)  020412  104456                          TRAP    C$ERHRD
  (5)  020414  023432                          .WORD   10010
  (5)  020416  000000                          .WORD   0
  (5)  020420  012156                          .WORD   ERR5
1913   020422  012701  000062                  MOV     #50.,R1         ;SET WAIT COUNT FOR 5 SECONDS
1914   020426  004737  016262          2$:     JSR     PC,GSTAT        ;GET DRIVE STATUS
1915   020432  020506                          4$
1916   020434  032737  000001  003060          BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY
1917   020442  001007                          BNE     3$              ;YES - SKIP
1918   020444                                  WAITMS  #1              ;WAIT FOR 100MS
1919   020456  005301                          DEC     R1              ;DEC WAIT COUNTER
```

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1920  020460  001362                          BNE     2$              ;LOOP UNTIL TIME DONE
1921  020462  032737  100000  003060  3$:     BIT     #ANYERR,T.CS    ;TEST IF ANYERR SET
1922  020470  001406                          BEQ     4$              ;NO - SKIP
1923  020472                                  ERRHRD  10011.,,ERR6    ;REPORT ALL ERRORS
 (4)  020472  104456                          TRAP    C$ERHRD
 (5)  020474  023433                          .WORD   10011
 (5)  020476  000000                          .WORD   0
 (5)  020500  012226                          .WORD   ERR6
1924  020502  005337  003254                  DEC     ERRCNT          ;REDUCE ERROR COUNT FOR DUAL ERRORS
1925  020506  005037  003032          4$:     CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
1926  020512  162737  000002  003016  5$:     SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
1927  020520  012604                          MOV     (SP)+,R4        ;RESTORE REGS
1928  020522  012601                          MOV     (SP)+,R1
1929  020524  012600                          MOV     (SP)+,R0
1930  020526  012603                          MOV     (SP)+,R3
1931  020530  005737  003032                  TST     ERRSWI          ;TEST IF ERROR RETURN
1932  020534  001403                          BEQ     99$             ;YES - SKIP
1933  020536  063716  003032                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
1934  020542  000207                          RTS     PC
1935  020544  017616  000000          99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
1936  020550  000207                          RTS     PC
1937
1938                                  ;       CHOOSE HEAD ROUTINE. PICKS HEAD 0 UNLESS SPECIFIC HEAD IS
1939                                  ;       SELECTED BY SOFTWARE PARAMETER.
1940  020552  005037  003126          CHOSHD: CLR     DESHD           ;CLEAR TO HEAD 0
1941  020556  032737  010000  013556          BIT     #HEADLM,MISWIW  ;TEST IF HEAD SPECIFIED
1942  020564  001403                          BEQ     1$              ;NO - SKIP
1943  020566  013737  013564  003126          MOV     HEADW,DESHD     ;INSERT SPECIFIED HEAD
1944  020574  000207                  1$:     RTS     PC
1945
1946                                  ;       SWAP HEAD ROUTINE. CHANGES SELECTED HEAD TO HEAD 1
1947                                  ;       UNLESS HEAD 0 SPECIFICALLY SELECTED BY SOFTWARE PARAMETER.
1948  020576  032737  010000  013556  SWAPHD: BIT     #HEADLM,MISWIW  ;TEST IF HEAD SPECIFIED
1949  020604  001011                          BNE     2$              ;YES - TAKE ABORT EXIT
1950  020606  005737  003126                  TST     DESHD           ;TEST IF HEAD ONE USED
1951  020612  001006                          BNE     2$              ;YES - TAKE ABORT EXIT
1952  020614  012737  000001  003126          MOV     #1,DESHD        ;ELSE SET FOR HEAD ONE
1953  020622  062716  000002                  ADD     #2,(SP)         ;BUMP PAST ABORT RETURN
1954  020626  000207                          RTS     PC              ;RETURN
1955  020630  017616  000000          2$:     MOV     @(SP),(SP)      ;GET ABORT DESTINATION
1956  020634  000207                  3$:     RTS     PC
1957
1958                                  ;       SWAP OLD CYLINDER AND NEW CYLINDER ROUTINE.
1959  020636  010046                  ONSWAP: MOV     R0,-(SP)        ;STORE R0
1960  020640  013700  003114                  MOV     OLDCYL,R0       ;MOVE OLD TO R0
1961  020644  013737  003116  003114          MOV     NEWCYL,OLDCYL   ;MOVE NEW TO OLD
1962  020652  010037  003116                  MOV     R0,NEWCYL       ;PUT OLD IN NEW
1963  020656  012600                          MOV     (SP)+,R0        ;RESTORE R0
1964  020660  000207                          RTS     PC
1965
1967                                  ;       BAD SECTOR FILES VALID CHECK ROUTINE. CHECKS IF BAD SECTOR
1968                                  ;       FILES HAVE BEEN READ AND STORED. IF NOT, REPORT AND FORCE
1969                                  ;       FILES TO LOOK LIKE ALL SECTORS OK.
1970  020662  005737  003510          CKBSVD: TST     BSFVAL          ;TEST IF BAD SECTORS STORED
1971  020666  001051                          BNE     5$              ;YES - EXIT
1972  020670                                  PRINTF  #FMT9,#BSNSTR   ;REPORT
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 (8)  020670  012746  007550                    MOV     #BSNSTR,-(SP)
 (7)  020674  012746  011212                    MOV     #FMT9,-(SP)
 (6)  020700  012746  000002                    MOV     #2,-(SP)
 (3)  020704  010600                            MOV     SP,R0
 (4)  020706  104417                            TRAP    C$PNTF
 (4)  020710  062706  000006                    ADD     #6,SP
1973  020714                                    PRINTF  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
 (11) 020714  005046                            CLR     -(SP)
 (11) 020716  153716  003047                    BISB    RLDRV+1,(SP)
 (10) 020722  012746  006152                    MOV     #DRVNAM,-(SP)
 (9)  020726  013746  003042                    MOV     RLBAS,-(SP)
 (8)  020732  012746  006141                    MOV     #BASADD,-(SP)
 (7)  020736  012746  011026                    MOV     #FMT5,-(SP)
 (6)  020742  012746  000005                    MOV     #5,-(SP)
 (3)  020746  010600                            MOV     SP,R0
 (4)  020750  104417                            TRAP    C$PNTF
 (4)  020752  062706  000014                    ADD     #14,SP
1974  020756                                    PRINTF  #FMT3
 (7)  020756  012746  011012                    MOV     #FMT3,-(SP)
 (6)  020762  012746  000001                    MOV     #1,-(SP)
 (3)  020766  010600                            MOV     SP,R0
 (4)  020770  104417                            TRAP    C$PNTF
 (4)  020772  062706  000004                    ADD     #4,SP
1975  020776  012737  177777  003512            MOV     #-1,SBSFIL      ;FORCE FILES TO NO ENTRIES
1976  021004  012737  177777  003706            MOV     #-1,FBSFIL
1977  021012  000207                  5$:       RTS     PC
1978
1980                                            ;       READ HEADERS ROUTINE.
1981  021014  012737  000001  003142  XRDHDC:   MOV     #1,TEMP4        ;SET FLAG TO BYPASS REG STORAGE
1982  021022  000402                            BR      XRDHDG          ;GO DO IT
1983  021024  005037  003142          XRDHD:    CLR     TEMP4           ;SET FLAG TO SAVE T. AMD L. REGS
1984  021030  010346                  XRDHDG:   MOV     R3,-(SP)        ;STORE REGISTERS
1985  021032  013703  003016                    MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
1986  021036  005723                            TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
1987  021040  016663  000002  002420            MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
1988  021046  162763  000004  002420            SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
1989  021054  010337  003016                    MOV     R3,SSINDX       ;STORE IT BACK
1990  021060  010046                            MOV     R0,-(SP)
1991  021062  010146                            MOV     R1,-(SP)
1992  021064  010446                            MOV     R4,-(SP)
1993  021066  012737  000002  003032            MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
1994  021074  005737  003142                    TST     TEMP4           ;TEST IF REGISTERS TO BE SAVED
1995  021100  001007                            BNE     2$              ;NO - SKIP
1996  021102  012703  003060                    MOV     #L.MP+2,R3      ;SET POINTER FOR REGS
1997  021106  012701  000004                    MOV     #4,R1           ;SET COUNT
1998  021112  014346                  1$:       MOV     -(R3),-(SP)     ;SAVE REGISTER
1999  021114  005301                            DEC     R1              ;DEC COUNT
2000  021116  001375                            BNE     1$              ;LOOP UNTIL ALL ARE SAVED
2001  021120  004737  020276          2$:       JSR     PC,RDYCHK       ;CHECK DRIVE READY
2002  021124  021374                            65$
2003  021126  005037  003022                    CLR     DONE            ;CLEAR INTERRUPT FLAG
2004  021132  012701  003050                    MOV     #L.CS,R1        ;GET ADDRESS OF LOAD REGS
2005  021136  013711  003046                    MOV     RLDRV,(R1)      ;LOAD DRIVE NUMBER
2006  021142  042711  002000                    BIC     #BIT10,(R1)     ;CLEAR FOR DRIVE 4 - 7 SPEC'D
2007  021146  052721  000110                    BIS     #RDHEAD,(R1)+   ;INSERT COMMAND
2008  021152  005021                            CLR     (R1)+           ;CLEAR BA
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2009  021154  005021                          CLR     (R1)+               ;CLEAR DA
2010  021156  014162  000004                  MOV     -(R1),RLDA(R2)      ;LOAD RL11 REGS
2011  021162  014162  000002                  MOV     -(R1),RLBA(R2)
2012  021166  014162  000000                  MOV     -(R1),RLCSR(R2)
2013  021172                          3$:     WAITUS  #10.                ;WAIT 1MS FOR INTERRUPT
2014  021204  005737  003022                  TST     DONE                ;TEST IN INTERRUPT FLAG SET
2015  021210  001460                          BEQ     14$                 ;NO - SKIP
2016  021212  032737  000001  003060  5$:     BIT     #DRDYMSK,T.CS       ;TEST IF DRIVE READY
2017  021220  001035                          BNE     10$                 ;YES - SKIP
2018  021222  012703  007760                  MOV     #MDRDY,R3           ;SET NO READY MESSAGE
2019  021226  012704  010662                  MOV     #CAFDT,R4           ;CONDITION OF AFTER DATA XFER
2020  021232                                  ERRHRD  10017.,,ERR5
  (4) 021232  104456                          TRAP    C$ERHRD
  (5) 021234  023441                          .WORD   10017
  (5) 021236  000000                          .WORD   0
  (5) 021240  012156                          .WORD   ERR5
2021  021242  012701  000062                  MOV     #50.,R1             ;SET WAIT COUNT FOR 5 SECONDS
2022  021246  004737  016262          4$:     JSR     PC,GSTAT            ;GET STATUS
2023  021252  021370                          60$
2024  021254  032737  000001  003060          BIT     #DRDYMSK,T.CS       ;TEST IF DRIVE HAS COME READY
2025  021262  001403                          BEQ     11$                 ;NO - SKIP
2026  021264  005037  003032                  CLR     ERRSWI              ;CLEAR ERROR SWITCH
2027  021270  000411                          BR      10$                 ;SKIP
2028  021272  005301                  11$:    DEC     R1                  ;DEC WAIT COUNT
2029  021274  001364                          BNE     4$                  ;LOOP UNTIL TIME DONE
2030  021276  012704  010673                  MOV     #C5SEC,R4           ;SET CONDITION AFTER 5 SECONDS
2031  021302                                  ERRHRD  10014.,,ERR5
  (4) 021302  104456                          TRAP    C$ERHRD
  (5) 021304  023436                          .WORD   10014
  (5) 021306  000000                          .WORD   0
  (5) 021310  012156                          .WORD   ERR5
2032  021312  000426                          BR      60$                 ;EXIT
2033  021314  005737  003060          10$:    TST     T.CS                ;CHECK FOR ANY ERRORS
2034  021320  100005                          BPL     12$                 ;NO - SKIP
2035  021322                                  ERRHRD  10016.,,ERR6        ;REPORT ALL ERRORS
  (.) 021322  104456                          TRAP    C$ERHRD
  (5) 021324  023440                          .WORD   10016
  (5) 021326  000000                          .WORD   0
  (5) 021330  012226                          .WORD   ERR6
2036  021332  000416                          BR      60$
2037  021334  012701  003070          12$:    MOV     #HDWRD2,R1          ;GET POINTER
2038  021340  016221  000006                  MOV     RLMP(R2),(R1)+      ;STORE LAST TWO HEADER WORDS
2039  021344  016221  000006                  MOV     RLMP(R2),(R1)+
2040  021350  000411                          BR      65$                 ;EXIT
2041  021352  004737  016056          14$:    JSR     PC,WAITIN           ;WAIT FOR INTERRUPT
2042  021356  012603                          MOV     (SP)+,R3            ;GET RESULTS
2043  021360                                  ERRHRD  10015.,,ERR1        ;REPORT
  (4) 021360  104456                          TRAP    C$ERHRD
  (5) 021362  023437                          .WORD   10015
  (5) 021364  000000                          .WORD   0
  (5) 021366  011724                          .WORD   ERR1
2044  021370  005037  003032          60$:    CLR     ERRSWI              ;CLEAR FOR ERROR ERROR RETURN
2045  021374  005737  003142          65$:    TST     TEMP4               ;TEST IF REGISTERS WERE SAVED
2046  021400  001007                          BNE     22$                 ;NO - SKIP
2047  021402  012703  003050                  MOV     #L.CS,R3            ;SET POINTER TO RESTORE REGS
2048  021406  012701  000004                  MOV     #4,R1               ;SET COUNT
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 2049  021412  012623                    20$:    MOV     (SP)+,(R3)+     ;RESTORE REGISTER
 2050  021414  005301                            DEC     R1              ;DEC COUNT
 2051  021416  001375                            BNE     20$             ;LOOP UNTIL ALL ARE RESTORED
 2052  021420  162737  000002  003016    22$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
 2053  021426  012604                            MOV     (SP)+,R4        ;RESTORE REGS
 2054  021430  012601                            MOV     (SP)+,R1
 2055  021432  012600                            MOV     (SP)+,R0
 2056  021434  012603                            MOV     (SP)+,R3
 2057  021436  005737  003032                    TST     ERRSWI          ;TEST IF ERROR RETURN
 2058  021442  001403                            BEQ     99$             ;YES - SKIP
 2059  021444  063716  003032                    ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
 2060  021450  000207                            RTS     PC
 2061  021452  017616  000000            99$:    MOV     @(SP),(SP)      ;GET ERROR RETURN ADDRESS
 2062  021456  000207                            RTS     PC
 2063
 2065                                    ;       VERIFY HEADERS ROUTINE. COMPARES 40 HEADERS FOR CONTENT AND
 2066                                    ;       SEQUENCE.
 2067  021460  010346                    VERHDR: MOV     R3,-(SP)        ;STORE REGS
 2068  021462  013703  003016                    MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
 2069  021466  005723                            TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
 2070  021470  016663  000002  002420            MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
 2071  021476  162763  000004  002420            SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
 2072  021504  010337  003016                    MOV     R3,SSINDX       ;STORE IT BACK
 2073  021510  010046                            MOV     R0,-(SP)
 2074  021512  010146                            MOV     R1,-(SP)
 2075  021514  010446                            MOV     R4,-(SP)
 2076  021516  010546                            MOV     R5,-(SP)
 2077  021520  012737  000002  003032            MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
 2078  021526  052737  000002  003020            BIS     #HDRCMP,OPFLAG  ;SET HEADER COMPARE FLAG
 2079  021534  005037  003030                    CLR     MORECE          ;CLEAR MORE ERRORS FLAG
 2080  021540  012704  004102                    MOV     #IBUFF,R4       ;SET POINTER TO HEADERS
 2081  021544  012705  003132                    MOV     #TEMP0,R5       ;SET POINTER TO WORK AREA
 2082  021550  005003                            CLR     R3              ;CLEAR FOR WORD COUNTER
 2083  021552  011415                            MOV     (R4),(R5)       ;MOVE HDR WORD TO WORK AREA
 2084  021554  011401                            MOV     (R4),R1         ;PUT WORD IN REG 1
 2085  021556  042701  000177                    BIC     #177,R1 ;CLEAR ALL BUT CYLINDER
 2086  021562  012700  000007                    MOV     #7,R0           ;SET SHIFT COUNT
 2087  021566  006201                    3$:     ASR     R1              ;SHIFT
 2088  021570  005300                            DEC     R0              ;DEC
 2089  021572  001375                            BNE     3$              ;LOOP
 2090  021574  020137  003116                    CMP     R1,NEWCYL       ;CHECK IF CYLINDER PART GOOD
 2091  021600  001407                            BEQ     4$              ;YES - SKIP
 2092  021602                                    ERRHRD  10018.,,ERR10   ;REPORT ERROR
  (4)  021602  104456                            TRAP    C$ERHRD
  (5)  021604  023442                            .WORD   10018
  (5)  021606  000000                            .WORD   0
  (5)  021610  013320                            .WORD   ERR10
 2093  021612  005037  003032                    CLR     ERRSWI          ;CLEAR FOR ERROR ERROR RETURN
 2094  021616  000456                            BR      65$
 2095  021620  012701  000050            4$:     MOV     #40.,R1         ;SET HEADER COUNT
 2096  021624  042715  000100                    BIC     #HDHSEL,(R5)    ;CLEAR HEAD SELECT AND 0 BIT
 2097  021630  005737  003126                    TST     DESHD           ;ARE WE USING HD 0?
 2098  021634  001402                            BEQ     5$              ;YES - SKIP
 2099  021636  052715  000100                    BIS     #HDHSEL,(R5)    ;INSERT HEAD BIT
 2100  021642  005065  000002            5$:     CLR     2(R5)           ;CLEAR 2ND WORD OF WORK AREA
 2101  021646  021524                    6$:     CMP     (R5),(R4)+      ;TEST FIRST WORD OK
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2102  021650  001410                        BEQ     6$              ;YES - SKIP
2103  021652  005744                        TST     -(R4)           ;ELSE SET POINTER FOR ERROR
2104  021654                                ERRHRD  10018.,,ERR10   ;REPORT
 (4)  021654  104456                        TRAP    C$ERHRD
 (5)  021656  023442                        .WORD   10018
 (5)  021660  000000                        .WORD   0
 (5)  021662  013320                        .WORD   ERR10
2105  021664  005037  003032                CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
2106  021670  005724                        TST     (R4)+           ;RESET POINTER
2107  021672  005203                8$:     INC     R3              ;BUMP WORD COUNTER
2108  021674  005724                        TST     (R4)+           ;TEST 2ND WORD IS 0
2109  021676  001410                        BEQ     12$             ;YES - SKIP
2110  021700  022544                        CMP     (R5)+,-(R4)     ;ADJUST POINTERS FOR REPORT
2111  021702                                ERRHRD  10018.,,ERR10   ;REPORT
 (4)  021702  104456                        TRAP    C$ERHRD
 (5)  021704  023442                        .WORD   10018
 (5)  021706  000000                        .WORD   0
 (5)  021710  013320                        .WORD   ERR10
2112  021712  005037  003032                CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
2113  021716  024524                        CMP     -(R5),(R4)+     ;RESET POINTERS
2114  021720  005724                12$:    TST     (R4)+           ;BUMP PAST ECC WORD
2115  021722  005203                        INC     R3              ;BUMP WORD COUNTER
2116  021724  005215                        INC     (R5)            ;BUMP SECTOR OF EXPECTED HEADER
2117  021726  011500                        MOV     (R5),R0         ;MOVE EXPECTED HDR TO R0
2118  021730  042700  177700                BIC     #^CHDSEC,R0     ;CLEAR ALL BUT SECTOR
2119  021734  022700  000050                CMP     #40.,R0         ;TEST IF AT SECTOR 40
2120  021740  001002                        BNE     15$             ;NO - SKIP
2121  021742  042715  000077                BIC     #HDSEC,(R5)     ;CLEAR SECTOR TO 0
2122  021746  005203                15$:    INC     R3              ;BUMP HDR WORD COUNTER
2123  021750  005301                        DEC     R1              ;DEC HEADER COUNT
2124  021752  001335                        BNE     6$              ;LOOP IF NOT YET DONE
2125  021754  162737  000002  003016  65$:  SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
2126  021762  012605                        MOV     (SP)+,R5        ;RESTORE REGISTERS
2127  021764  012604                        MOV     (SP)+,R4
2128  021766  012601                        MOV     (SP)+,R1
2129  021770  012600                        MOV     (SP)+,R0
2130  021772  012603                        MOV     (SP)+,R3
2131  021774  005737  003032                TST     ERRSWI          ;TEST IF ERROR RETURN
2132  022000  001403                        BEQ     99$             ;YES - SKIP
2133  022002  063716  003032                ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
2134  022006  000207                        RTS     PC
2135  022010  017616  000000          99$:  MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
2136  022014  000207                        RTS     PC
2137
2139                                    ;       POSITION HEAD BIT FROM HEADER OR MULTIPURPOSE REGISTER TO LSB.
2140  022016  013705  003066          POSHW1: MOV     HDWRD1,R5       ;START FOR POSITION HD BIT IN WD 1
2141  022022  000402                        BR      POSHD0          ;SKIP
2142  022024  013705  003066          POSHSB: MOV     T.MP,R5 ;START FOR POSITION HD BIT IN MP
2143  022030  010146                POSHD0: MOV     R1,-(SP)        ;STORE R1
2144  022032  042705  177677                BIC     #^CHSSTAT,R5    ;CLEAR ALL BUT HEAD SEL BIT
2145  022036  012701  000006                MOV     #6,R1           ;SET SHIFT COUNT
2146  022042  006205                1$:     ASR     R5              ;SHIFT FOR RIGHT JUSTIFY
2147  022044  005301                        DEC     R1
2148  022046  001375                        BNE     1$
2149  022050  012601                        MOV     (SP)+,R1        ;RESTORE R1
2150  022052  000207                        RTS     PC              ;RETURN
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2151
2152                                    ;       WAIT FOR READY ROUTINE. DURATION OF WAIT PASSED TO THE ROUTINE
2153                                    ;       FROM THE CALLING ROUTINE IN R1.
2154  022054  010346                    RDYWAIT:        MOV     R3,-(SP)        ;STORE R3
2155  022056  013703  003016                            MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
2156  022062  005723                            TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
2157  022064  016663  000002  002420            MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
2158  022072  162763  000004  002420            SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
2159  022100  010337  003016                    MOV     R3,SSINDX       ;STORE IT BACK
2160  022104  010046                            MOV     R0,-(SP)
2161  022106  010146                            MOV     R1,-(SP)
2162  022110  010446                            MOV     R4,-(SP)
2163  022112  012737  000002  003032            MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
2164  022120  004737  016262            5$:     JSR     PC,GSTAT        ;GET DRIVE STATUS
2165  022124  022274                            10$
2166  022126  032737  000001  003060            BIT     #DRDYMSK,T.CS   ;CHECK IF READY
2167  022134  001061                            BNE     9$              ;YES - SKIP
2168  022136  005301                            DEC     R1              ;DEC WAIT COUNT
2169  022140  001406                            BEQ     7$              ;SKIP IF 0
2170  022142                                    WAITUS  #1
2171  022154  000761                            BR      5$
2172  022156  012703  007760            7$:     MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
2173  022162                                    ERRHRD  10020.,,ERR3    ;REPORT READY ERROR
  (4) 022162  104456                            TRAP    C$ERHRD
  (5) 022164  023  4                            .WORD   10020
  (5) 022166  000000                            .WORD   0
  (5) 022170  012040                            .WORD   ERR3
2174  022172  012701  000062                    MOV     #50.,R1         ;SET WAIT COUNT FOR 5 SECONDS
2175  022176  004737  016262            6$:     JSR     PC,GSTAT        ;GET DRIVE STATUS
2176  022202  022274                            10$
2177  022204  032737  000001  003060            BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY
2178  022212  001016                            BNE     8$              ;YES - SKIP
2179  022214                                    WAITMS  #1              ;WAIT 100 MS
2180  022226  005301                            DEC     R1              ;DEC WAIT COUNT
2181  022230  001362                            BNE     6$              ;LOOP UNTIL TIME DONE
2182  022232  012704  010673                    MOV     #C5SEC,R4       ;SET CONDITION AFTER 5 SECDS
2183  022236                                    ERRHRD  10021.,,ERR5
  (4) 022236  104456                            TRAP    C$ERHRD
  (5) 022240  023445                            .WORD   10021
  (5) 022242  000000                            .WORD   0
  (5) 022244  012156                            .WORD   ERR5
2184  022246  000410                            BR      11$             ;EXIT
2185  022250  032737  100000  003060  8$:       BIT     #ANYERR,T.CS    ;TEST IF ANY ERROR SET
2186  022256  001406                            BEQ     10$             ;NO - SKIP
2187  022260                                    ERRHRD  10022.,,ERR6    ;REPORT ALL ERRORS
  (4) 022260  104456                            TRAP    C$ERHRD
  (5) 022262  023446                            .WORD   10022
  (5) 022264  000000                            .WORD   0
  (5) 022266  012226                            .WORD   ERR6
2188  022270  005337  003254            11$:    DEC     ERRCNT          ;DEC FOR DOUBLE ERROR REPORT
2189  022274  005037  003032            10$:    CLR     ERRSWI          ;CLEAR FOR ERROR ERROR RETURN
2190  022300  162737  000002  003016    9$:     SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
2191  022306  012604                            MOV     (SP)+,R4        ;RESTORE REGISTERS
2192  022310  012601                            MOV     (SP)+,R1
2193  022312  012600                            MOV     (SP)+,R0
2194  022314  012603                            MOV     (SP)+,R3        ;RESTORE R3
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 2195  022316  005737  003032                TST     ERRSWI          ;TEST IF ERROR RETURN
 2196  022322  001403                        BEQ     99$             ;YES - SKIP
 2197  022324  063716  003032                ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
 2198  022330  000207                        RTS     PC
 2199  022332  017616  000000        99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
 2200  022336  000207                        RTS     PC
 2201
 2202                                  ;       GET POSITION ROUTINE. READS A HEADER FROM CURRENT CYLINDER
 2203                                  ;       (WHERE IT IS PRESENTLY POSITIONED) AND STORES CYLINDER
 2204                                  ;       NUMBER IN CURCYL.
 2205  022340  010346                GETPOS: MOV     R3,-(SP)        ;STORE REGISTERS
 2206  022342  013703  003016                MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
 2207  022346  005723                        TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
 2208  022350  016663  000002  002420        MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
 2209  022356  162763  000004  002420        SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
 2210  022364  010337  003016                MOV     R3,SSINDX       ;STORE IT BACK
 2211  022370  010046                        MOV     R0,-(SP)
 2212  022372  010546                        MOV     R5,-(SP)
 2213  022374  004737  021024                JSR     PC,XRDHD        ;DO READ HEADER
 2214  022400  022430                        65$
 2215  022402  013703  003066                MOV     HDWRD1,R3       ;GET HEADER WORD
 2216  022406  012705  000007                MOV     #7,R5           ;SET SHIFT COUNT
 2217  022412  006203                4$:     ASR     R3              ;SHIFT TO RIGHT JUSTIFY
 2218  022414  005305                        DEC     R5
 2219  022416  001375                        BNE     4$
 2220  022420  042703  177000                BIC     #177000,R3
 2221  022424  010337  003120                MOV     R3,CURCYL       ;STORE AS CURRENT CYLINDER
 2222  022430  162737  000002  003016  65$:  SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
 2223  022436  012605                        MOV     (SP)+,R5        ;RESTORE REGISTERS
 2224  022440  012600                        MOV     (SP)+,R0
 2225  022442  012603                        MOV     (SP)+,R3
 2226  022444  005737  003032                TST     ERRSWI          ;TEST IF ERROR RETURN
 2227  022450  001403                        BEQ     99$             ;YES - SKIP
 2228  022452  063716  003032                ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
 2229  022456  000207                        RTS     PC
 2230  022460  017616  000000        99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
 2231  022464  000207                        RTS     PC
 2232
 2234                                  ;       VERIFY POSITION ROUTINE. READS A HEADER (USING GETPOS) AND
 2235                                  ;       CHECKS HEADS ARE POSITIONED AT NEW CYLINDER (CURCYL = NEWCYL).
 2236  022466  010346                VERPOS: MOV     R3,-(SP)        ;STORE R3
 2237  022470  013703  003016                MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
 2238  022474  005723                        TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
 2239  022476  016663  000002  002420        MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
 2240  022504  162763  000004  002420        SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
 2241  022512  010337  003016                MOV     R3,SSINDX       ;STORE IT BACK
 2242
 2243  022516  012737  000002  003032        MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
 2244  022524  004737  022340                JSR     PC,GETPOS       ;GET POSITION
 2245  022530  022556                        65$
 2246  022532  023737  003116  003120        CMP     NEWCYL,CURCYL   ;CHECK IF CURRENT CYL IS NEW CYL
 2247  022540  001406                        BEQ     1$              ;YES - SKIP
 2248  022542                                ERRHRD  10022,,ERR8
  (4)  022542  104456                        TRAP    C$ERHRD
  (5)  022544  023446                        .WORD   10022
  (5)  022546  000000                        .WORD   0
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  (5)  022550  013160                          .WORD   ERR8
2249   022552  005037  003032                  CLR     ERRSWI          ;CLEAR FOR ERROR ERROR RETURN
2250   022556                          1$:
2251   022556  162737  000002  003016  65$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
2252   022564  012603                          MOV     (SP)+,R3        ;RESTORE R3
2253   022566  005737  003032                  TST     ERRSWI          ;TEST IF ERROR RETURN
2254   022572  001403                          BEQ     99$             ;YES - SKIP
2255   022574  063716  003032                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
2256   022600  000207                          RTS     PC
2257   022602  017616  000000          99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
2258   022606  000207                          RTS     PC
2259
2261                                   ;       READ ALL HEADERS ROUTINE. 40 HEADERS ARE READ AND STORED
2262                                   ;       IN IBUFF.
2263   022610  010346                  RDALHD: MOV     R3,-(SP)        ;STORE REGISTERS
2264   022612  013703  003016                  MOV     SSINDX,R3       ;GET SUBROUTINE INDEX
2265   022616  005723                          TST     (R3)+           ;BUMP IT FOR NEXT ENTRY
2266   022620  016663  000002  002420          MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
2267   022626  162763  000004  002420          SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
2268   022634  010337  003016                  MOV     R3,SSINDX       ;STORE IT BACK
2269   022640  010046                          MOV     R0,-(SP)
2270   022642  010146                          MOV     R1,-(SP)
2271   022644  010446                          MOV     R4,-(SP)
2272   022646  012737  000002  003032          MOV     #2,ERRSWI       ;SET FOR NO ERROR RETURN
2273   022654  012701  000050                  MOV     #40.,R1         ;SET HEADER COUNT
2274   022660  052737  100000  003020          BIS     #HDR40,OPFLAG   ;SET 40 HDR OP FLAG
2275   022666  012703  004102                  MOV     #IBUFF,R3       ;SET POINTER TO STORE HDRS
2276   022672  013704  003042                  MOV     RLBAS,R4        ;GET BASE ADDRESS
2277   022676  062704  000006                  ADD     #RLMP,R4        ;MAKE IT POINT TO MP REG
2278   022702  012737  000010  003050          MOV     #10,L.CS        ;LOAD FOR READ HEADER, NO INTERRUPT
2279   022710  053737  003046  003050          BIS     RLDRV,L.CS      ;INSERT DRIVE NUMBER
2280   022716  042737  002000  003050          BIC     #BIT10,L.CS     ;CLEAR FOR DRIVE 4 - 7 SPEC'D
2281   022724  005037  003052                  CLR     L.BA            ;CLEAR BA
2282   022730  005037  003054                  CLR     L.DA            ;CLEAR DA
2283   022734  005737  003126                  TST     DESHD           ;TEST IF HEAD 0
2284   022740  001403                          BEQ     3$              ;YES - SKIP
2285   022742  052737  000020  003054          BIS     #HDSEL,L.DA     ;ELSE INSERT HEAD 0
2286   022750  013762  003054  000004  3$:     MOV     L.DA,RLDA(R2)   ;LOAD RLDA REG
2287   022756  013762  003052  000002          MOV     L.BA,RLBA(R2)   ;LOAD RLBA
2288   022764  032762  000200  000000          BIT     #CRDYMSK,RLCS(R2)       ;TEST IF CONTROLLER READY
2289   022772  001003                          BNE     6$              ;YES - SKIP
2290   022774  004737  020276                  JSR     PC,RDYCHK       ;ELSE CHECK READY
2291   023000  023116                          65$
2292   023002  013762  003050  000000  6$:     MOV     L.CS,RLCS(R2)   ;LOAD RLCS REG
2293   023010  012700  077777                  MOV     #77777,R0       ;SET COUNT FOR WAIT
2294   023014  032762  000200  000000  7$:     BIT     #CRDYMSK,RLCS(R2) ;CHECK THAT OPERATION COMPLETED
2295   023022  001016                          BNE     8$              ;YES - SKIP
2296   023024  005300                          DEC     R0              ;DEC COUNT
2297   023026  001372                          BNE     7$              ;SKIP IF NOT YET 0
2298   023030  004737  016024                  JSR     PC,READRL       ;ELSE GET ALL REGISTERS
2299   023034  004737  016056                  JSR     PC,WAITIN       ;ELSE WAIT FOR TIMEOUT
2300   023040  012603                          MOV     (SP)+,R3        ;GET RESULT MESSAGE POINTER
2301   023042                                  ERRHRD  10025.,,ERR1
  (4)  023042  104456                          TRAP    C$ERHRD
  (5)  023044  023451                          .WORD   10025
  (5)  023046  000000                          .WORD   0
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  (5)  023050  011724                          .WORD   ERR1
2302   023052  005037  003032                  CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
2303   023056  000417                          BR      65$
2304   023060  005737  003060          8$:     TST     T.CS            ;TEST FOR ANY ERRORS
2305   023064  100007                          BPL     12$             ;NO - SKIP
2306   023066                                  ERRHRD  10026.,,ERR6
  (4)  023066  104456                          TRAP    C$ERHRD
  (5)  023070  023452                          .WORD   10026
  (5)  023072  000000                          .WORD   0
  (5)  023074  012226                          .WORD   ERR6
2307   023076  005037  003032                  CLR     ERRSWI          ;CLEAR FOR ERROR RETURN
2308   023102  000405                          BR      65$
2309   023104  011423                  12$:    MOV     (R4),(R3)+      ;STORE HEADER WORDS
2310   023106  011423                          MOV     (R4),(R3)+
2311   023110  011423                          MOV     (R4),(R3)+
2312   023112  005301                          DEC     R1              ;DEC HEADER COUNT
2313   023114  001332                          BNE     6$
2314   023116  162737  000002  003016  65$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
2315   023124  012604                          MOV     (SP)+,R4        ;RESTORE REGISTERS
2316   023126  012601                          MOV     (SP)+,R1
2317   023130  012600                          MOV     (SP)+,R0
2318   023132  012603                          MOV     (SP)+,R3
2319   023134  005737  003032                  TST     ERPSWI          ;TEST IF ERROR RETURN
2320   023140  001403                          BEQ     99$             ;YES - SKIP
2321   023142  063716  003032                  ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
2322   023146  000207                          RTS     PC
2323   023150  017616  000000          99$:    MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
2324   023154  000207                          RTS     PC
2325
2326
2328                                   ;      GENERATE DATA ROUTINE. PATTERN TO BE GENERATED IS GIVEN
2329                                   ;      IN THE WORD FOLLOWING THE CALL. 128 WORDS ARE GENERATED
2330                                   ;      IN OBUFF.
2331   023156  010146                  DATGEN: MOV     R1,-(SP)        ;STORE REGISTERS
2332   023160  010346                          MOV     R3,-(SP)
2333   023162  010446                          MOV     R4,-(SP)
2334   023164  012701  004502                  MOV     #OBUFF,R1       ;SET POINTER TO OBUFF
2335   023170  012504                          MOV     (R5)+,R4        ;GET DATA PATTERN SELECTOR
2336   023172  006304                          ASL     R4              ;ADJUST IT FOR INDEXING
2337   023174  016403  002374                  MOV     PATTBL(R4),R3   ;GET ADDRESS OF PATTERN
2338   023200  011321                          MOV     (R3),(R1)+      ;MOVE FIRST PATTERN WORD
2339   023202  001421                          BEQ     5$              ;SKIP IF PATTERN IS 0
2340   023204  021327  177777                  CMP     (R3),#-1        ;CHECK IF PATTERN IS ALL 1'S
2341   023210  001416                          BEQ     5$              ;YES - SKIP
2342   023212  020427  000010                  CMP     R4,#8.          ;TEST IF PATTERN 5
2343   023216  001403                          BEQ     3$              ;YES - SKIP
2344   023220  020427  000020                  CMP     R4,#16.         ;CHECK IF PATTERN 9 OR 10
2345   023224  002413                          BLT     6$              ;NO - SKIP
2346   023226  005723                  3$:     TST     (R3)+           ;BUMP SOURCE POINTER
2347   023230  012321                          MOV     (R3)+,(R1)+     ;MOVE TWO MORE WORDS FORM SOURCE
2348   023232  012321                          MOV     (R3)+,(R1)+
2349   023234  012704  000015                  MOV     #13.,R4         ;SET COUNT
2350   023240  012703  004502                  MOV     #OBUFF,R3       ;RESET POINTER
2351   023244  000406                          BR      8$
2352   023246  012703  004502          5$:     MOV     #OBUFF,R3       ;ELSE SET OBUFF AS PATTERN SOURCE
2353   023252  000401                          BR      7$              ;GO TO FILL
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 2354  023254  005723                    6$:     TST     (R3)+           ;BUMP SOURCE POINTER
 2355  023256  012704  000017              7$:     MOV     #15.,R4         ;SET MOVE COUNT
 2356  023262  012321                      8$:     MOV     (R3)+,(R1)+     ;MOVE 15 WORDS INTO BUFFER
 2357  023264  005304                              DEC     R4
 2358  023266  001375                              BNE     8$
 2359  023270  012703  004502                      MOV     #OBUFF,R3       ;SET SOURCE TO TOP OF OBUFF
 2360  023274  012704  000160                      MOV     #112.,R4        ;SET COUNT FOR REST OF BUFFER
 2361  023300  012321                      10$:    MOV     (R3)+,(R1)+     ;REPEAT PATTERN IN BUFFER
 2362  023302  005304                              DEC     R4
 2363  023304  001375                              BNE     10$
 2364  023306  012604                              MOV     (SP)+,R4        ;RESTORE REGISTERS
 2365  023310  012603                              MOV     (SP)+,R3
 2366  023312  012601                              MOV     (SP)+,R1
 2367  023314  000205                              RTS     R5              ;RETURN
 2368
 2369                                  ;       DATA COMPARE ROUTINE. COMPARES THE CONTENTS OF IBUFF AND OBUFF.
 2370                                  ;       ERROR REPORTING IS LIMITED BY SOFTWARE PARAMETER.
 2371  023316  010346                  DATCOM: MOV     R3,-(SP)        ;STORE R3
 2372  023320  013703  003016                  MOV     SSINDX,R3       ;GET SUBROUTINE STACK INDEX
 2373  023324  005723                          TST     (R3)+           ;BUMP INDEX TO NEXT ENTRY
 2374  023326  016663  000002  002420          MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
 2375  023334  162763  000004  002420          SUB     #4,SUBSTK(R3)   ;ADJUST IT TO CALLING LOCATION
 2376  023342  010337  003016                  MOV     R3,SSINDX       ;STORE IT BACK
 2377  023346  010146                          MOV     R1,-(SP)        ;STORE OTHER REGISTERS
 2378  023350  010446                          MOV     R4,-(SP)
 2379  023352  010546                          MOV     R5,-(SP)
 2380  023354  052737  000001  003020          BIS     #DATACMP,OPFLAG ;SET DATA COMPARE FLAG
 2381  023362  005037  003030                  CLR     MORECE          ;CLEAR MORE ERROR FLAG
 2382  023366  012705  004502                  MOV     #OBUFF,R5       ;SET POINTERS TO DATA FOR COMPARE
 2383  023372  012704  004102                  MOV     #IBUFF,R4
 2384  023376  012703  000001                  MOV     #1,R3           ;SET WORD COUNTER
 2385  023402  012701  000200                  MOV     #128.,R1        ;SET COMPARE COUNT
 2386  023406  022425                  5$:     CMP     (R4)+,(R5)+     ;COMPARE DATA
 2387  023410  001052                          BNE     10$             ;ERROR - SKIP TO REPORT
 2388  023412  005203                  7$:     INC     R3              ;BUMP WORD COUNT
 2389  023414  005301                          DEC     R1              ;DEC COMPARE COUNT
 2390  023416  001373                          BNE     5$              ;LOOP IF NOT 0
 2391  023420  042737  000001  003020  9$:     BIC     #DATACMP,OPFLAG ;CLEAR DATA COMPARE FLAG
 2392  023426  005737  003032                  TST     ERRSWI          ;TEST IF ANY COMPARE ERRORS
 2393  023432  001021                          BNE     15$             ;NO - SKIP
 2394  023434  012701  000200                  MOV     #128.,R1        ;SET REPORT VALUE
 2395  023440                                  PRINTB  #FMT27,#TCERR,MORECE,#RESE6,R1
  (11) 023440  010146                          MOV     R1,-(SP)
  (10) 023442  012746  010577                  MOV     #RESE6,-(SP)
  (9)  023446  013746  003030                  MOV     MORECE,-(SP)
  (8)  023452  012746  007624                  MOV     #TCERR,-(SP)
  (7)  023456  012746  011673                  MOV     #FMT27,-(SP)
  (6)  023462  012746  000005                  MOV     #5,-(SP)
  (3)  023466  010600                          MOV     SP,R0
  (4)  023470  104414                          TRAP    C$PNTB
  (4)  023472  062706  000014                  ADD     #14,SP
 2396  023476  162737  000002  003016  15$:    SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
 2397  023504  012605                          MOV     (SP)+,R5        ;RESTORE REGS
 2398  023506  012604                          MOV     (SP)+,R4
 2399  023510  012601                          MOV     (SP)+,R1
 2400  023512  012603                          MOV     (SP)+,R3
```

```
 2401  023514  005737  003032                    TST     ERRSWI          ;TEST IF ERROR RETURN
 2402  023520  001403                            BEQ     99$             ;YES - SKIP
 2403  023522  063716  003032                    ADD     ERRSWI,(SP)     ;ADD IN ERROR RETURN
 2404  023526  000207                            RTS     PC
 2405  023530  017616  000000          99$:      MOV     @(SP),(SP)      ;SET ERROR RETURN ADDRESS
 2406  023534  000207                            RTS     PC
 2407  023536  023737  003030  013570  10$:      CMP     MORECE,DCLIMW   ;TEST IF COMPARE ERRORS LIMIT EXCEEDED
 2408  023544  002011                            BGE     13$             ;YES - SKIP
 2409  023546  024445                            CMP     -(R4),-(R5)     ;SET PTRS BACK TO ERROR WORDS
 2410  023550                                    ERRHRD  10035.,,ERR10   ;REPORT ERROR
   (4) 023550  104456                            TRAP    L$ERHRD
   (5) 023552  023463                            .WORD   10035
   (5) 023554  000000                            .WORD   0
   (5) 023556  013320                            .WORD   ERR10
 2411  023560  005037  003032                    CLR     ERRSWI          ;CLEAR ERROR SWITCH
 2412  023564  022425                            CMP     (R4)+,(R5)+     ;BUMP PTRS PAST ERROR WORDS
 2413  023566  000711                            BR      7$              ;DO NEXT COMPARE
 2414  023570  005237  003030          13$:      INC     MORECE          ;BUMP ERROR COUNTER
 2415  023574  000706                            BR      7$              ;DO NEXT COMPARE
```

```
2417
2418                                    ;       WRITE AND READ DATA ROUTINE.
2419
2420  023576  012737  177777  003134  XWRITT: MOV     #-1,TEMP1       ;SET SPECIAL WRITE FOR TIMING FLAG
2421  023604  000402                  BP      XWRIT1
2422  023606  005037  003134          XWRITE: CLR     TEMP1           ;CLEAR SPECIAL WRITE FLAG
2423  023612  012737  000112  003150  XWRIT1: MOV     #WTDATA,TEMP7   ;SET FOR WRITE
2424  023620  023737  002316  003120          CMP     HLMTW,CURCYL    ;TEST IF CYLINDER 255 (BAD SEC)
2425  023626  001006                  BNE     1$              ;NO - SKIP
2426  023630  005737  003126          TST     DESHD           ;TEST IF HEAD 1 (BAD SECTOR FILES)
2427  023634  001403                  BEQ     1$              ;NO - SKIP
2428  023636  052737  004000  003020  BIS     #BADADD,OPFLAG  ;SET BAD ADDRESS FLAG
2429  023644  000403          1$:     BR      XREADG          ;SKIP TO EXECUTE
2430  023646  012737  000114  003150  XREAD:  MOV     #RDDATA,TEMP7   ;SET FOR READ
2431  023654  010346          XREADG: MOV     R3,-(SP)        ;STORE R3
2432  023656  013703  003016          MOV     SSINDX,R3       ;SET SUBROUTINE INDEX
2433  023662  005723                  TST     (R3)+           ;BUMP TO NEXT STACK ENTRY
2434  023664  016663  000002  002420  MOV     2(SP),SUBSTK(R3) ;INSERT THIS CALL
2435  023672  162763  000004  002420  SUB     #4,SUBSTK(R3)   ;ADJUST TO POINT TO CALL
2436  023700  010337  003016          MOV     R3,SSINDX       ;STORE IT BACK
2437  023704  010046                  MOV     R0,-(SP)
2438  023706  010146                  MOV     R1,-(SP)        ;STORE OTHER REGISTERS
2439  023710  010446                  MOV     R4,-(SP)
2440  023712  004737  020276          JSR     PC,RDYCHK       ;CHECK IF DRIVE READY
2441  023716  024304                  65$
2442  023720  012703  003050          MOV     #L.CS,R3        ;GET ADDRESS OF LOAD REGS
2443  023724  013713  003150          MOV     TEMP7,(R3)      ;SET COMMAND
2444  023730  053713  003046          BIS     RLDRV,(R3)      ;INSERT DRIVE NUMBER
2445  023734  042713  002000          BIC     #BIT10,(R3)     ;CLEAR FOR DRIVE 4 - 7 SPEC'D
2446  023740  032723  000004          BIT     #BIT2,(R3)+     ;TEST IF WRITE DATA
2447  023744  001403                  BEQ     3$              ;YES - SKIP
2448  023746  012723  004102          MOV     #IBUFF,(R3)+    ;ELSE SET BA FOR READ
2449  023752  000402                  BR      4$
2450  023754  012723  004502  3$:     MOV     #OBUFF,(R3)+    ;SET BA FOR WRITE
2451  023760  013713  003120  4$:     MOV     CURCYL,(R3)     ;GET CURRENT CYLINDER
2452  023764  012704  000007          MOV     #7,R4           ;ALIGN IT IN DA
2453  023770  006313          5$:     ASL     (R3)
2454  023772  005304                  DEC     R4
2455  023774  001375                  BNE     5$
2456  023776  005737  003126          TST     DESHD           ;TEST IF HEAD 0
2457  024002  001402                  BEQ     7$              ;YES - SKIP
2458  024004  052713  000100          BIS     #HSMSK,(R3)     ;SET FOR HEAD 1
2459  024010  053723  003130  7$:     BIS     DESSEC,(R3)+    ;INSERT DESIRED SECTOR
2460  024014  012713  177600          MOV     #177600,(R3)    ;INSERT WORD COUNT
2461  024020  005737  003134          TST     TEMP1           ;CHECK IF SPECIAL WRITE FOR TIMING
2462  024024  001402                  BEQ     8$              ;NO - SKIP
2463  024026  012713  177777          MOV     #177777,(R3)    ;ELSE SET FOR 1 WORD TRANSFER
2464  024032  032737  004000  003020  8$:     BIT     #BADADD,OPFLAG  ;TEST IF BAD ADDRESS FLAG SET
2465  024040  001414                  BEQ     2$              ;NO - SKIP
2466  024042  042737  173777  003020          BIC     #^CBADADD,OPFLAG  ;CLEAR ALL BUT THIS FLAG
2467  024050  012703  010501          MOV     #MWRTAB,R3      ;SET RESULT MESSAGE POINTER
2468  024054                          ERRHRD  10032.,,ERR1
 (4)  024054  104456                  TRAP    C$ERHRD
 (5)  024056  023460                  .WORD   10032
 (5)  024060  000000                  .WORD   0
 (5)  024062  011724                  .WORD   ERR1
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 2469  024064  005037  003020                    CLR     OPFLAG          ;CLEAR ALL FLAGS
 2470  024070  000503                            BR      64$
 2471  024072  005037  003022            2$:     CLR     DONE            ;CLEAR INTERRUPT FLAG
 2472  024076  005737  003134                    TST     TEMP1           ;CHECK IF SPECIAL WRITE FLAG SET
 2473  024102  001100                            BNE     65$             ;YES - DO NOT START WRITE
 2474  024104  011362  000006                    MOV     (R3),RLMP(R2)   ;LOAD RL REGS
 2475  024110  014362  000004                    MOV     -(R3),RLDA(R2)
 2476  024114  014362  000002                    MOV     -(R3),RLBA(R2)
 2477  024120  014362  000000                    MOV     -(R3),RLCS(R2)
 2478  024124                            10$:    WAITUS  #3000.          ;WAIT 300MS FOR INTERRUPT
 2479  024136  005737  003022                    TST     DONE            ;CHECK IF INTERRUPT
 2480  024142  001010                            BNE     14$             ;YES - SKIP
 2481  024144  004737  016056                    JSR     PC,WAITIN       ;WAIT FOR INTERRUPT
 2482  024150  012603                            MOV     (SP)+,R3        ;GET RESULT MESSAGE
 2483  024152                                    ERRHRD  10030.,,ERR1
   (4) 024152  104456                            TRAP    C$ERHRD
   (5) 024154  023456                            .WORD   10030
   (5) 024156  000000                            .WORD   0
   (5) 024160  011724                            .WORD   ERR1
 2484  024162  000446                            BR      64$
 2485  024164  032737  000001  003060  14$:     BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY
 2486  024172  001033                            BNE     20$             ;YES - SKIP
 2487  024174  012703  007760                    MOV     #MDRDY,R3       ;SET RESULT MESSAGE
 2488  024200  012704  010662                    MOV     #CAFDT,R4       ;CONDITION AFTER DATA XFER
 2489  024204                                    ERRHRD  10032.,,ERR5
   (4) 024204  104456                            TRAP    C$ERHRD
   (5) 024206  023460                            .WORD   10032
   (5) 024210  000000                            .WORD   0
   (5) 024212  012156                            .WORD   ERR5
 2490  024214  012701  000062                    MOV     #50.,R1         ;SET WAIT COUNT FOR 5 SECDS
 2491  024220  004737  016262            17$:    JSR     PC,GSTAT        ;GET DRIVE STATUS
 2492  024224  024300                            64$
 2493  024226  032737  000001  003060            BIT     #DRDYMSK,T.CS   ;TEST IF DRIVE READY NOW
 2494  024234  001012                            BNE     20$             ;YES - SKIP
 2495  024236  005301                            DEC     R1              ;DEC WAIT COUNT
 2496  024240  001367                            BNE     17$             ;LOOP IF NOT TIME DONE
 2497  024242  012704  010673                    MOV     #C5SEC,R4       ;SET CONDITION 5 SECONDS
 2498  024246                                    ERRHRD  10033.,,ERR5
   (4) 024246  104456                            TRAP    C$ERHRD
   (5) 024250  023461                            .WORD   10033
   (5) 024252  000000                            .WORD   0
   (5) 024254  012156                            .WORD   ERR5
 2499  024256  005037  003032                    CLR     ERRSWI          ;CLEAR ERROR SWITCH
 2500  024262  005737  003060            20$:    TST     T.CS            ;CHECK IF ANY ERROR
 2501  024266  100006                            BPL     65$             ;NO - SKIP
 2502  024270                                    ERRHRD  10031.,,ERR6
   (4) 024270  104456                            TRAP    C$ERHRD
   (5) 024272  023457                            .WORD   10031
   (5) 024274  000000                            .WORD   0
   (5) 024276  012226                            .WORD   ERR6
 2503  024300  005037  003032            64$:    CLR     ERRSWI          ;CLEAR ERROR SWITCH
 2504  024304  162737  000002  003016  65$:     SUB     #2,SSINDX       ;REMOVE ENTRY FROM SUBROUT STACK
 2505  024312  012604                            MOV     (SP)+,R4        ;RESTORE REGISTERS
 2506  024314  012601                            MOV     (SP)+,R1
 2507  024316  012600                            MOV     (SP)+,R0
 2508  024320  012603                            MOV     (SP)+,R3
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 2509  024322  005737  003032                 TST     ERRSWI          ;TEST IF ERROR RETURN
 2510  024326  001403                         BEQ     99$             ;YES - SKIP
 2511  024330  063716  003032                 ADD     ERRSWI,(SP)     ;FLSE ADD IN ERROR RETURN
 2512  024334  000207                         RTS     PC
 2513  024336  017616  000000         99$:    MOV     @(SP),(SP)      ;ADJUST FOR ERROR RETURN
 2514  024342  000207                         RTS     PC
 2515
 2516                                 ;       BAD SECTOR CHECK ROUTINE. CHECKS IF SECTOR SPECIFIED IN CURCYL,
 2517                                 ;       DESHD, AND DESSEC IS LISTED AS BAD IN THE BAD SECTOR FILES.
 2518  024344  010046                 BSCHK:  MOV     R0,-(SP)        ;STORE REGISTERS
 2519  024346  010146                         MOV     R1,-(SP)
 2520  024350  010346                         MOV     R3,-(SP)
 2521  024352  005037  003034                 CLR     BSFLAG          ;CLEAR FLAG
 2522  024356  012703  003706                 MOV     #FBSFIL,R3      ;GET POINTER TO FACTORY FILE
 2523  024362  022713  177777                 CMP     #-1,(R3)        ;CHECK IF ALL ONES
 2524  024366  001005                         BNE     4$              ;NO SKIP TO TEST
 2525  024370  012703  003512         2$:     MOV     #SBSFIL,R3      ;ELSE SET POINTER TO SOFTWARE FILE
 2526  024374  022713  177777                 CMP     #-1,(R3)        ;CHECK IF ALL ONES
 2527  024400  001431                         BEQ     20$             ;YES - EXIT
 2528  024402  013700  003116         4$:     MOV     NEWCYL,R0       ;BUILD HEADER OF ADDRESS IN QUESTION
 2529  024406  012701  000007                 MOV     #7,R1           ;POSITION CYLINDER
 2530  024412  006300                 5$:     ASL     R0
 2531  024414  005301                         DEC     R1
 2532  024416  001375                         BNE     5$
 2533  024420  005737  003126                 TST     DESHD           ;CHECK IF HEAD 0
 2534  024424  001402                         BEQ     7$              ;YES - SKIP
 2535  024426  052700  000100                 BIS     #BIT6,R0        ;INSERT HEAD 1
 2536  024432  053700  003130         7$:     BIS     DESSEC,R0       ;INSERT SECTOR
 2537  024436  022300                 8$:     CMP     (R3)+,R0        ;CHECK THIS WORD IN FILE
 2538  024440  001402                         BEQ     12$             ;YES - EXIT,ERROR
 2539  024442  101005                         BHI     15$             ;EXIT- NO ERROR
 2540  024444  000774                         BR      8$
 2541  024446  012737  000001  003034 12$:     MOV     #1,BSFLAG       ;SET ERROR FLAG
 2542  024454  000403                         BR      20$             ;GO TO EXIT
 2543  024456  020327  003706         15$:    CMP     R3,#FBSFIL      ;DONE BOTH FILES?
 2544  024462  003342                         BGT     2$              ;NO GO DO SOFTWARE FILE
 2545  024464  012603                 20$:    MOV     (SP)+,R3        ;ELSE RESTORE REGISTERS
 2546  024466  012601                         MOV     (SP)+,R1
 2547  024470  012600                         MOV     (SP)+,R0
 2548  024472  005737  003034                 TST     BSFLAG          ;CHECK IF ERROR
 2549  024476  001003                         BNE     99$             ;YES - SKIP
 2550  024500  062716  000002                 ADD     #2,(SP)         ;ELSE BUMP ERROR RETURN
 2551  024504  000207                         RTS     PC
 2552  024506  017616  000000         99$:    MOV     @(SP),(SP)      ;SET FOR ERROR RETURN
 2553  024512  000207                         RTS     PC
 2554
 2556                                 ;       REPORT OPERATION ROUTINE. PRINTS SUBROUTINE TRACE SEQUENCE AND
 2557                                 ;       OPERATION BEING PERFORMED PORTION OF ALL
 2558                                 ;       ERROR MESSAGES.
 2559  024514  010446                 RPTOP:  MOV     R4,-(SP)
 2560  024516  005737  003016                 TST     SSINDX          ;TEST SUBROUTINE INDEX 0
 2561  024522  001433                         BEQ     1$              ;SKIP IF 0
 2562  024524  012704  000002                 MOV     #2,R4           ;SET INDEXER TO FIRST ENTRY
 2563  024530                                 PRINTB  #FMT9,#SEQMES   ;PRINT ''SUBROUTINE CALL SEQ''
  (8)  024530  012746  007514                 MOV     #SEQMES,-(SP)
  (7)  024534  012746  011212                 MOV     #FMT9,-(SP)
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                (6)  024540  012746  000002                    MOV     #2.-(SP)
                (3)  024544  010600                            MOV     SP,R0
                (4)  024546  104414                            TRAP    C$PNTB
                (4)  024550  062706  000006                    ADD     #6,SP
             2564    024554                          3$:       PRINTB  #FMT16,SUBSTK(R4)       ;PRINT CALLING LOCATION
                (8)  024554  016446  002420                    MOV     SUBSTK(R4),-(SP)
                (7)  024560  012746  011365                    MOV     #FMT16,-(SP)
                (6)  024564  012746  000002                    MOV     #2,-(SP)
                (3)  024570  010600                            MOV     SP,R0
                (4)  024572  104414                            TRAP    C$PNTB
                (4)  024574  062706  000006                    ADD     #6,SP
             2565    024600  062704  000002                    ADD     #2,R4           ;BUMP INDEX
             2566    024604  020437  003016                    CMP     R4,SSINDX       ;CHECK IF ALL PRINTED
             2567    024610  003761                            BLE     3$              ;LOOP IF NOT ALL PRINTED YET
             2568    024612                          1$:       PRINTB  #FMT4,ERHEAD,#TSTLAB    ;PRINT ERROR HEADER
                (9)  024612  012746  006501                    MOV     #TSTLAB,-(SP)
                (8)  024616  013746  003026                    MOV     ERHEAD,-(SP)
                (7)  024622  012746  011015                    MOV     #FMT4,-(SP)
                (6)  024626  012746  000003                    MOV     #3,-(SP)
                (3)  024632  010600                            MOV     SP,R0
                (4)  024634  104414                            TRAP    C$PNTB
                (4)  024636  062706  000010                    ADD     #10,SP
             2569    024642  042737  030000  003020            BIC     #SEEKOP!RORWOP,OPFLAG   ;CLEAR SK & RD OR WRT FLAG
             2570    024650  013701  003050                    MOV     L.CS,R1         ;GET COMMAND EXECUTED
             2571    024654  042701  177741                    BIC     #177741,R1      ;STRIP ALL BUT FUNCTION CODE
             2572    024660  022701  000006                    CMP     #6,R1   ;TEST IF SEEK OPERATION
             2573    024664  001003                            BNE     2$              ;NO - SKIP
             2574    024666  052737  010000  003020            BIS     #SEEKOP,OPFLAG  ;ELSE SET SEEK FLAG
             2575    024674  022701  000012          2$:       CMP     #12,R1          ;TEST IF WRITE
             2576    024700  001003                            BNE     20$             ;NO - SKIP
             2577    024702  052737  020000  003020            BIS     #RORWOP,OPFLAG  ;SET RD OR WRT FLAG
             2578    024710  022701  000014          20$:      CMP     #14,R1          ;TEST IF READ
             2579    024714  001003                            BNE     22$             ;NO - SKIP
             2580    024716  052737  020000  003020            BIS     #RORWOP,OPFLAG  ;SET RD OR WRT FLAG
             2581    024724                          22$:      PRINTB  #FMT1,#MOPER,OPMSGS(R1) ;PRINT OPERATION
                (9)  024724  016146  002240                    MOV     OPMSGS(R1),-(SP)
                (8)  024730  012746  005527                    MOV     #MOPER,-(SP)
                (7)  024734  012746  010773                    MOV     #FMT1,-(SP)
                (6)  024740  012746  000003                    MOV     #3,-(SP)
                (3)  024744  010600                            MOV     SP,R0
                (4)  024746  104414                            TRAP    C$PNTB
                (4)  024750  062706  000010                    ADD     #10,SP
             2582    024754  020127  000004                    CMP     R1,#4           ;CHECK IF GET STATUS
             2583    024760  001007                            BNE     4$              ;NO - SKIP
             2584    024762  032737  000010  003054            BIT     #DRSET,L.DA     ;TEST IF RESET INCLUDED
             2585    024770  001403                            BEQ     4$              ;NO - SKIP
             2586    024772  012701  000016                    MOV     #16,R1          ;SET TO PRINT WITH RESET
             2587    024776  000436                            BR      9$
             2588    025000  032737  007777  003020  4$:       BIT     #COMPOP,OPFLAG  ;TEST IF ANY OTHER OPERATION
             2589    025006  001424                            BEQ     8$              ;NO - SKIP
             2590    025010  013704  003020                    MOV     OPFLAG,R4       ;SET UP TO DETERMINE WHICH ONE
             2591    025014  012701  000020                    MOV     #20,R1          ;PRESET THE POINTER
             2592    025020  032704  000001          5$:       BIT     #BIT00,R4       ;CHECK THE BIT
             2593    025024  001003                            BNE     6$              ;IF SET - SKIP
             2594    025026  005721                            TST     (R1)+           ;BUMP POINTER
             2595    025030  006204                            ASR     R4
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 2596  025032  000772                          BR      5$
 2597  025034                          6$:     PRINTB  #FMT2,OPMSGS(R1)
   (8) 025034  016146  002240                  MOV     OPMSGS(R1),-(SP)
   (7) 025040  012746  011007                  MOV     #FMT2,-(SP)
   (6) 025044  012746  000002                  MOV     #2,-(SP)
   (3) 025050  010600                          MOV     SP,R0
   (4) 025052  104414                          TRAP    C$PNTB
   (4) 025054  062706  000006                  ADD     #6,SP
 2598  025060  032737  100000  003020  8$:     BIT     #HDR40,OPFLAG   ;TEST IF 40 HEADER OPERATION
 2599  025066  001415                          BEQ     10$             ;NO - SKIP
 2600  025070  012701  000050                  MOV     #50,R1          ;ELSE PRINT IT
 2601  025074                          9$:     PRINTB  #FMT2,OPMSGS(R1)
   (8) 025074  016146  002240                  MOV     OPMSGS(R1),-(SP)
   (7) 025100  012746  011007                  MOV     #FMT2,-(SP)
   (6) 025104  012746  000002                  MOV     #2,-(SP)
   (3) 025110  010600                          MOV     SP,R0
   (4) 025112  104414                          TRAP    C$PNTB
   (4) 025114  062706  000006                  ADD     #6,SP
 2602  025120  000434                          BR      15$             ;SKIP
 2603  025122  032737  010000  003020  10$:    BIT     #SEEKOP,OPFLAG  ;TEST IF SEEK
 2604  025130  001430                          BEQ     15$             ;NO - SKIP
 2605  025132                                  PRINTB  #FMT13,#FRMWD,OLDCYL,#DIFWD,DESDIF,#SGNWD,DESSGN,#HDWD,DESHD
  (15) 025132  013746  003126                  MOV     DESHD,-(SP)
  (14) 025136  012746  007455                  MOV     #HDWD,-(SP)
  (13) 025142  013746  003124                  MOV     DESSGN,-(SP)
  (12) 025146  012746  007450                  MOV     #SGNWD,-(SP)
  (11) 025152  013746  003122                  MOV     DESDIF,-(SP)
  (10) 025156  012746  007442                  MOV     #DIFWD,-(SP)
   (9) 025162  013746  003114                  MOV     OLDCYL,-(SP)
   (8) 025166  012746  007473                  MOV     #FRMWD,-(SP)
   (7) 025172  012746  011233                  MOV     #FMT13,-(SP)
   (6) 025176  012746  000011                  MOV     #11,-(SP)
   (3) 025202  010600                          MOV     SP,R0
   (4) 025204  104414                          TRAP    C$PNTB
   (4) 025206  062706  000024                  ADD     #24,SP
 2606  025212  032737  020000  003020  15$:    BIT     #RORWOP,OPFLAG  ;TEST IF READ OR WRITE SET
 2607  025220  001424                          BEQ     17$             ;NO - SKIP
 2608  025222                                  PRINTB  #FMT22,#CYLWD,CURCYL,#HDWD,DESHD,#SECWD,DESSEC
  (13) 025222  013746  003130                  MOV     DESSEC,-(SP)
  (12) 025226  012746  007461                  MOV     #SECWD,-(SP)
  (11) 025232  013746  003126                  MOV     DESHD,-(SP)
  (10) 025236  012746  007455                  MOV     #HDWD,-(SP)
   (9) 025242  013746  003120                  MOV     CURCYL,-(SP)
   (8) 025246  012746  007466                  MOV     #CYLWD,-(SP)
   (7) 025252  012746  011562                  MOV     #FMT22,-(SP)
   (6) 025256  012746  000007                  MOV     #7,-(SP)
   (3) 025262  010600                          MOV     SP,R0
   (4) 025264  104414                          TRAP    C$PNTB
   (4) 025266  062706  000020                  ADD     #20,SP
 2609  025272  004737  025744          17$:    JSR     PC,CLRPARM      ;CLEAR PARAM TABLE
 2610  025276  012604                          MOV     (SP)+,R4        ;RESTORE R4
 2611  025300  000207                          RTS     PC
 2612
 2613                                  ;       REPORT REASON ROUTINE
 2614                                  ;       PRINTS REASON PORTION FOR ALL ERROR REPORTS.
 2615  025302  010146                  RPTRES: MOV     R1,-(SP)        ;STORE R1
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2616  025304  010346                      MOV     R3,-(SP)          ;STORE R3
2617  025306  010446                      MOV     R4,-(SP)          ;STORE R4
2618  025310  012701  003076              MOV     #RESPARM,R1       ;GET START OF PARAM
2619  025314  012103                      MOV     (R1)+,R3          ;GET NUMBER OF PARAM
2620  025316                              PRINTB  #FMT1.1,#MRSLT,(R1)     ;PRINT NAME
 (9)  025316  011146                      MOV     (R1),-(SP)
 (8)  025320  012746  005536              MOV     #MRSLT,-(SP)
 (7)  025324  012746  011000              MOV     #FMT1.1,-(SP)
 (6)  025330  012746  000003              MOV     #3,-(SP)
 (3)  025334  010600                      MOV     SP,R0
 (4)  025336  104414                      TRAP    C$PNTB
 (4)  025340  062706  000010              ADD     #10,SP
2621  025344  021127  010352              CMP     (R1),#MNDRST      ;TEST IF MESSAGE IS NO DRV STATUS
2622  025350  001453                      BEQ     6$                ;YES - SKIP REST OF REPORT
2623  025352  012704  011217              MOV     #FMT11,R4         ;PRISET FOR FORMAT 11
2624  025356  022127  010345              CMP     (R1)+,#MCYLOC     ;CHECK IF REPORTING CYLINDER LOC
2625  025362  001002                      BNE     3$                ;NO - SKIP
2626  025364  012704  011225              MOV     #FMT12,R4         ;ELSE CHANGE TO FORMAT 12
2627  025370  005303              3$:     DEC     R3                ;DEC PARAM COUNT
2628  025372  001442                      BEQ     6$                ;IF 0 - EXIT
2629  025374                              PRINTB  R4,#RESE3,(R1)+   ;REPORT IS VALUE
 (9)  025374  012146                      MOV     (R1)+,-(SP)
 (8)  025376  012746  010561              MOV     #RESE3,-(SP)
 (7)  025402  010446                      MOV     R4,-(SP)
 (6)  025404  012746  000003              MOV     #3,-(SP)
 (3)  025410  010600                      MOV     SP,R0
 (4)  025412  104414                      TRAP    C$PNTB
 (4)  025414  062706  000010              ADD     #10,SP
2630  025420                              PRINTB  R4,#RESE4,(R1)+   ;REPORT SB VALUE
 (9)  025420  012146                      MOV     (R1)+,-(SP)
 (8)  025422  012746  010565              MOV     #RESE4,-(SP)
 (7)  025426  010446                      MOV     R4,-(SP)
 (6)  025430  012746  000003              MOV     #3,-(SP)
 (3)  025434  010600                      MOV     SP,R0
 (4)  025436  104414                      TRAP    C$PNTB
 (4)  025440  062706  000010              ADD     #10,SP
2631  025444  162703  000002              SUB     #2,R3             ;DEC PARAM COUNT
2632  025450  001413                      BEQ     6$                ;IF 0 - EXIT
2633  025452                              PRINTB  #FMT1,#RESE5,(R1)+  ;REPORT CONDITION
 (9)  025452  012146                      MOV     (R1)+,-(SP)
 (8)  025454  012746  010572              MOV     #RESE5,-(SP)
 (7)  025460  012746  010773              MOV     #FMT1,-(SP)
 (6)  025464  012746  000003              MOV     #3,-(SP)
 (3)  025470  010600                      MOV     SP,R0
 (4)  025472  104414                      TRAP    C$PNTB
 (4)  025474  062706  000010              ADD     #10,SP
2634  025500  012604              6$:     MOV     (SP)+,R4          ;RESTORE REGS
2635  025502  012603                      MOV     (SP)+,R3
2636  025504  012601                      MOV     (SP)+,R1
2637  025506  000207                      RTS     PC                ;RETURN
2638
2639                              ;       REPORT PHYSICAL ADDRESS OF DEVICE UNDER TEST
2640                              ;       AND ALL REGISTER CONTENTS.
2641  025510              RPTREM: PRINTB  #FMT5,#BASADD,RLBAS,#DRVNAM,<B,RLDRV+1>
 (11) 025510  005046                      CLR     -(SP)
 (11) 025512  153716  003047              BISB    RLDRV+1,(SP)
```

```
  (10) 025516  012746  006152                    MOV     #DRVNAM,-(SP)
  (9)  025522  013746  003042                    MOV     RLBAS,-(SP)
  (8)  025526  012746  006141                    MOV     #BASADD,-(SP)
  (7)  025532  012746  011026                    MOV     #FMT5,-(SP)
  (6)  025536  012746  000005                    MOV     #5,-(SP)
  (3)  025542  010600                            MOV     SP,R0
  (4)  025544  104414                            TRAP    C$PNTB
  (4)  025546  062706  000014                    ADD     #14,SP
2642                                    ;        REPORT RL11 REGISTERS
2643   025552                                    PRINTB  #FMT6,#CSNAM,#DANAM,#BANAM,#MPNAM,#CYLWD,#HDWD
  (13) 025552  012746  007455                    MOV     #HDWD,-(SP)
  (12) 025556  012746  007466                    MOV     #CYLWD,-(SP)
  (11) 025562  012746  006255                    MOV     #MPNAM,-(SP)
  (10) 025566  012746  006243                    MOV     #BANAM,-(SP)
  (9)  025572  012746  006250                    MOV     #DANAM,-(SP)
  (8)  025576  012746  006236                    MOV     #CSNAM,-(SP)
  (7)  025602  012746  011046                    MOV     #FMT6,-(SP)
  (6)  025606  012746  000007                    MOV     #7,-(SP)
  (3)  025612  010600                            MOV     SP,R0
  (4)  025614  104414                            TRAP    C$PNTB
  (4)  025616  062706  000020                    ADD     #20,SP
2644   025622                                    PRINTB  #FMT8,#LAB1,L.CS,L.DA,L.BA,L.MP
  (12) 025622  013746  003056                    MOV     L.MP,-(SP)
  (11) 025626  013746  003052                    MOV     L.BA,-(SP)
  (10) 025632  013746  003054                    MOV     L.DA,-(SP)
  (9)  025636  013746  003050                    MOV     L.CS,-(SP)
  (8)  025642  012746  006262                    MOV     #LAB1,-(SP)
  (7)  025646  012746  011160                    MOV     #FMT8,-(SP)
  (6)  025652  012746  000006                    MOV     #6,-(SP)
  (3)  025656  010600                            MOV     SP,R0
  (4)  025660  104414                            TRAP    C$PNTB
  (4)  025662  062706  000016                    ADD     #16,SP
2645   025666                                    PRINTB  #FMT7,#LAB2,T.CS,T.DA,T.BA,T.MP,CURCYL,DESHD
  (14) 025666  013746  003126                    MOV     DESHD,-(SP)
  (13) 025672  013746  003120                    MOV     CURCYL,-(SP)
  (12) 025676  013746  003066                    MOV     T.MP,-(SP)
  (11) 025702  013746  003062                    MOV     T.BA,-(SP)
  (10) 025706  013746  003064                    MOV     T.DA,-(SP)
  (9)  025712  013746  003060                    MOV     T.CS,-(SP)
  (8)  025716  012746  006275                    MOV     #LAB2,-(SP)
  (7)  025722  012746  011110                    MOV     #FMT7,-(SP)
  (6)  025726  012746  000010                    MOV     #10,-(SP)
  (3)  025732  010600                            MOV     SP,R0
  (4)  025734  104414                            TRAP    C$PNTB
  (4)  025736  062706  000022                    ADD     #22,SP
2646   025742  000207                            RTS     PC
2647
2648                                    ;        CLEAR PARAMETER BLOCK FOR REPORTING
2649   025744  010546                  CLRPARM:          MOV     R5,-(SP)        ;STORE R5
2650   025746  012701  003076                    MOV     #RESPARM,R1     ;GET ADDRESS OF BLOCK
2651   025752  012705  000005                    MOV     #5,R5           ;SET COUNT
2652   025756  005021                  2$:       CLR     (R1)+           ;CLEAR WORD
2653   025760  005305                            DEC     R5              ;DEC COUNT
2654   025762  001375                            BNE     2$              ;LOOP UNTIL 0
2655   025764  012701  003076                    MOV     #RESPARM,R1     ;RESET POINTER
2656   025770  012605                            MOV     (SP)+,R5        ;RESTORE R5
```

```
 2657  025772  000207                          RTS     PC
 2658
 2659  025774                          ENDMOD
```

```
 2661
 2662                                   .TITLE  CZRLJB0 RL01/02 DRIVE TEST 2
 2663
 2664                                   .SBTTL  *TEST 1          **OUTER GUARD BAND DETECTION
 2665
 2666  025774                           BGNMOD  HRDWTST
 2667  025774                           BGNTST                   ;TEST 1
  (3)  025774                                                                          T1::
 2668
 2669  025774  012737  006507  003026          MOV     #P2T03E,ERHEAD  ;SET ERROR HEADER
 2670  026002  004737  016214                  JSR     PC,TSTINT       ;INITIALIZE TEST
 2671  026006  004737  016232                  JSR     PC,GSTATR       ;CLEAR DRIVE
 2672  026012  026214                          T1965$
 2673  026014  004737  020552                  JSR     PC,CHOSHD       ;GO CHOSE HEAD
 2674  026020  005005          T197$:          CLR     R5              ;CLEAR FOR POSITION TO 0
 2675  026022  004737  017732                  JSR     PC,POSHDS       ;POSITION HEADS
 2676  026026  026214                          T1965$
 2677  026030                           BGNSUB
  (3)  026030                                                                          T1.1:
  (3)  026030  104402                          TRAP    C$BSUB
 2678  026032  012737  177777  003116          MOV     #-1,NEWCYL      ;SET FOR GUARD BAND SEEK
 2679  026040  004737  017160                  JSR     PC,XSEEK        ;DO SEEK
 2680  026044  026170                          60$
 2681  026046  012701  000002                  MOV     #2,R1           ;INITIALIZE WAIT COUNT
 2682  026052  032762  000001  000000  8$:     BIT     #DRDYMSK,RLCS(R2) ;TEST IF DRIVE READY
 2683  026060  001414                          BEQ     9$              ;NO-SKIP
 2684  026062  004737  016262                  JSR     PC,GSTAT        ;GET DRIVE STATUS
 2685  026066  026170                          60$
 2686  026070  012703  007760                  MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
 2687  026074  012704  010634                  MOV     #C10MS,R4       ;SET CONDITION MESSAGE PTR
 2688  026100                                  ERRHRD  301,,ERR4       ;REPORT READY ERROR
  (4)  026100  104456                          TRAP    C$ERHRD
  (5)  026102  000455                          .WORD   301
  (5)  026104  000000                          .WORD   0
  (5)  026106  012106                          .WORD   ERR4
 2689  026110  000427                          BR      60$             ;EXIT TEST
 2690  026112  005301          9$:             DEC     R1              ;DEC WAIT COUNT
 2691  026114  001406                          BEQ     12$             ;SKIP IF 0
 2692  026116                                  WAITUS  #10.            ;WAIT 1MS
 2693  026130  000750                          BR      8$              ;LOOP
 2694  026132  012701  000226          12$:    MOV     #150.,R1        ;SET WAIT COUNT FOR 15 MS
 2695  026136  004737  022054                  JSR     PC,RDYWAIT      ;WAIT FOR READY & REPORT IF NOT READY
 2696  026142  026170                          60$
 2697
 2698  026144  004737  022340                  JSR     PC,GETPOS       ;GET POSITION
 2699  026150  026170                          60$
 2700  026152  005737  003120                  TST     CURCYL          ;CHECK IF HEADS STILL AT 0
 2701  026156  001404                          BEQ     15$             ;YES-SKIP
 2702  026160                                  ERRHRD  302,,ERR8       ;ELSE REPORT CYLINDER ERROR
  (4)  026160  104456                          TRAP    C$ERHRD
  (5)  026162  000456                          .WORD   302
  (5)  026164  000000                          .WORD   0
  (5)  026166  013160                          .WORD   ERR8
 2703  026170                           15$:
 2704  026170  012737  000002  003032  60$:     MOV     #2,ERRSWI       ;INIT ERROR SWITCH
 2705  026176                           ENDSUB
```

```
  (3)  026176                          L10024:
  (3)  026176  104403                          TRAP    C$ESUB
2706   026200                                  ESCAPE  TST             ;EXIT TEST IF ERROR
  (3)  026200  104410                          TRAP    C$ESCAPE
  (3)  026202  000012                          .WORD   L10023-.
2707   026204  004737  020576                  JSR     PC,SWAPHD       ;GO SWAP TO HEAD 1 OR END TEST
2708   026210  026214                          17$                     ;ABORT RETURN
2709   026212  000702                          BR      T197$           ;REDO TEST
2710   026214                          17$:
2711   026214                          T1965$:
2712
2713   026214                          ENDTST
  (3)  026214                          L10023:
  (3)  026214  104401                          TRAP    C$ETST
2714
```

```
 2716
 2717                                        .SBTTL  *TEST 2          **INCREMENTAL FORWARD SEEK HEAD 0
 2718  026216                                BGNTST                   ;TEST 2
  (3)  026216                                                                                    T2::
 2719  026216  012737  006525  003026               MOV     #P2T04E,ERHEAD  ;SET ERROR HEADER
 2720  026224  004737  016214                      JSR     PC,TSTINT       ;INITIALIZE TEST
 2721  026230  004737  016232                      JSR     PC,GSTATR       ;CLEAR DRIVE
 2722  026234  026424                              T2065$
 2723  026236  004737  020552                      JSR     PC,CHOSHD       ;GO CHOSE HEAD
 2724  026242  005737  003126                      TST     DESHD           ;TEST IF THIS IS HEAD 0
 2725  026246  001402                              BEQ     2$              ;YES - SKIP
 2726  026250                                      EXIT    TST             ;ELSE EXIT TEST
  (3)  026250  104432                              TRAP    C$EXIT
  (3)  026252  000152                              .WORD   L10025-.
 2727  026254  013705  013560               2$:    MOV     LOLIMW,R5       ;CLEAR TO POSITION HEADS TO LOLIMIT
 2728  026260  004737  017732                      JSR     PC,POSHDS       ;POSITION HEADS
 2729  026264  026424                              T2065$
 2730  026266                                BGNSUB
  (3)  026266                                                                                    T2.1:
  (3)  026266  104402                              TRAP    C$BSUB
 2731  026270  004737  022340               T206$: JSR     PC,GETPOS       ;GET POSITION
 2732  026274  026414                              60$
 2733  026276                                      INLOOP                  ;CHECK IF IN ERROR LOOP
  (3)  026276  104420                              TRAP    C$INLP
 2734  026300                                      BNCOMPLETE      5$      ;NO - SKIP
  (2)  026300  103007                              BCC     5$
 2735  026302  023737  003120  003116               CMP     CURCYL,NEWCYL   ;CHECK IF POSITIONED AT DESIRED LOC
 2736  026310  001003                              BNE     5$              ;NO - SKIP
 2737  026312  004737  020636                      JSR     PC,ONSWAP       ;ELSE SWAP NEW AND OLD CYLINDERS
 2738  026316  000405                              BR      7$              ;SKIP
 2739  026320  013737  003120  003116  5$:    MOV     CURCYL,NEWCYL   ;PLACE CURRENT INTO NEW
 2740  026326  005237  003116                      INC     NEWCYL          ;BUMP FOR ONE CYLINDER SEEK
 2741  026332                                7$:
 2742  026332  004737  017160                      JSR     PC,XSEEK        ;DO SEEK
 2743  026336  026414                              60$
 2744  026340  012701  000226                      MOV     #150.,R1        ;SET WAIT TIME 15 MS
 2745  026344  004737  022054                      JSR     PC,RDYWAIT      ;WAIT FOR READY
 2746  026350  026414                              60$
 2747
 2748  026352  004737  022466                      JSR     PC,VERPOS       ;GO VERIFY POSITON
 2749  026356  026414                              60$
 2750
 2751  026360  032737  000002  013556               BIT     #ALLSEC,MISWIW  ;TEST IF CHECK ALL SECTORS
 2752  026366  001406                              BEQ     11$             ;NO-SKIP
 2753  026370  004737  022610                      JSR     PC,RDALHD       ;GO READ ALL HEADERS
 2754  026374  026414                              60$
 2755  026376  004737  021460                      JSR     PC,VERHDR       ;GO VERIFY HEADER
 2756  026402  026414                              60$
 2757  026404                                11$:
 2758  026404  023737  013562  003116               CMP     HILIMW,NEWCYL   ;CHECK IF HILIMIT REACHED
 2759  026412  103726                              BLO     T206$           ;NO-LOOP
 2760  026414  012737  000002  003032  60$:    MOV     #2,ERRSWI       ;INIT ERROR SWITCH
 2761  026422                                ENDSUB
  (3)  026422                                L10026:
  (3)  026422  104403                              TRAP    C$ESUB
 2762  026424                                T2065$:
```

```
 2763  026424                          ENDTST
  (3)  026424                          L10025:
  (3)  026424  104401                          TRAP    C$ETST
```

```
                                        .SBTTL  *TEST 3          **INCREMENTAL REVERSE SEEK HEAD 0
2766  026426                            BGNTST                   ;TEST 3
 (3)  026426                                                                                T3::
2767  026426  012737  006545  003026            MOV     #P<TOSE,ERHEAD  ;SET ERROR HEADER
2768  026434  004737  016214                    JSR     PC,TSTINT       ;INITIALIZE TEST
2769  026440  004737  016232                    JSR     PC,GSTATR       ;CLEAR DRIVE
2770  026444  026634                            T2165$
2771  026446  004737  020552                    JSR     PC,CHOSHD       ;GO CHOSE HEAD
2772  026452  005737  003126                    TST     DESHD           ;TEST IF HEAD 0 SELECTED
2773  026456  001402                            BEQ     2$              ;YES - SKIP
2774  026460                                    EXIT    TST             ;ELSE EXIT TEST
 (3)  026460  104432                            TRAP    C$EXIT
 (3)  026462  000152                            .WORD   L10027-.
2775  026464  013705  013562            2$:     MOV     HILIMW,R5       ;SET TO POSITION HDS TO HILIMIT
2776  026470  004737  017732                    JSR     PC,POSHDS       ;POSITION HEADS
2777  026474  026634                            T2165$
2778  026476                            BGNSUB
 (3)  026476                                                                                T3.1:
 (3)  026476  104402                            TRAP    C$BSUB
2779  026500  004737  022340            T216$:  JSR     PC,GETPOS       ;GET POSITION
2780  026504  026624                            60$
2781  026506                                    INLOOP                  ;CHECK IF IN ERROR LOOP
 (3)  026506  104420                            TRAP    C$INLP
2782  026510                                    BNCOMPLETE      5$      ;NO - SKIP
 (3)  026510  103007                            BCC     5$
2783  026512  023737  003120  003116            CMP     CURCYL,NEWCYL   ;CHECK IF POSITIONED AT DES LOC
2784  026520  001003                            BNE     5$              ;NO - SKIP
2785  026522  004737  020636                    JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW CYLINDERS
2786  026526  000405                            BR      7$              ;SKIP
2787  026530  013737  003120  003116  5$:     MOV     CURCYL,NEWCYL   ;PUT CURRENT INTO NEW
2788  026536  005337  003116                    DEC     NEWCYL          ;DEC FOR ONE CYLINDER REVERSE SEEK
2789  026542  004737  017160            7$:     JSR     PC,XSEEK        ;SEEK TO IT
2790  026546  026624                            60$
2791  026550  012701  000226                    MOV     #150.,R1        ;SET WAIT FOR 15 MS
2792  026554  004737  022054                    JSR     PC,RDYWAIT      ;WAIT FOR READY
2793  026560  026624                            60$
2794
2795  026562  004737  022466                    JSR     PC,VERPOS       ;VERIFY POSITION
2796  026566  026624                            60$
2797
2798  026570  032737  000002  003020            BIT     #ALLSEC,OPFLAG  ;TEST IF USE ALL SECTORS
2799  026576  001406                            BEQ     11$             ;NO-SKIP
2800  026600  004737  022610                    JSR     PC,RDALHD       ;ELSE READ ALL THE HDRS
2801  026604  026624                            60$
2802  026606  004737  021460                    JSR     PC,VERHDR       ;VERIFY THE HEADERS
2803  026612  026624                            60$
2804  026614                            11$:
2805  026614  023737  013560  003116            CMP     LOLIMW,NEWCYL   ;CHECK IF REACHED LOLIMIT
2806  026622  103726                            BLO     T216$           ;NO - LOOP
2807  026624  012737  000002  003032  60$:     MOV     #2,ERRSWI       ;INIT ERROR SWITCH
2808  026632                            ENDSUB
 (3)  026632                            L10030:
 (3)  026632  104403                            TRAP    C$ESUB
2809  026634                            T2165$:
2810  026634                            ENDTST
 (3)  026634                            L10027:
```

```
   (3)  026634  104401                    TRAP    C$ETST
```

```
                                        .SBTTL  *TEST 4          **INCREMENTAL FORWARD SEEK HEAD 1
2813  026636                            BGNTST                   ;TEST 4
 (3)  026636                                                                                T4::
2814  026636  012737  006565  003026            MOV     #P2T06E,ERHEAD  ;SET ERROR HEADER
2815  026644  004737  016214                    JSR     PC,TSTINT       ;INITIALIZE TEST
2816  026650  004737  016232                    JSR     PC,GSTATR       ;CLEAR DRIVE
2817  026654  027060                            T2265$
2818  026656  005037  003126                    CLR     DESHD           ;SET HEAD TO 0
2819  026662  013705  013560                    MOV     LOLIMW,R5       ;CLEAR FOR POSITION HDS TO LOLIMIT
2820  026666  004737  017732                    JSR     PC,POSHDS       ;POSITION HDS
2821  026672  027060                            T2265$
2822  026674  012737  000001  003126            MOV     #1,DESHD        ;SET TO HEAD 1
2823  026702  032737  010000  013556            BIT     #HEADLM,MISWIW  ;TEST IF HEAD SPECIFIED
2824  026710  001405                            BEQ     2$              ;NO - SKIP
2825  026712  005737  013564                    TST     HEADW           ;TEST IF IT IS HEAD 0
2826  026716  001002                            BNE     2$              ;NO - SKIP
2827  026720                                    EXIT    TST             ;ELSE EXIT TEST
 (3)  026720  104432                            TRAP    C$EXIT
 (3)  026722  000136                            .WORD   L10031-.
2828  026724                            2$:
2829  026724                            BGNSUB
 (3)  026724                                                                                T4.1:
 (3)  026724  104402                            TRAP    C$BSUB
2830  026726  004737  022340            T227$:  JSR     PC,GETPOS       ;GET CURRENT POSITION
2831  026732                                    INLOOP                  ;CHECK IF IN ERROR LOOP
 (3)  026732  104420                            TRAP    C$INLP
2832  026734                                    BNCOMPLETE 5$           ;NO - SKIP
 (2)  026734  103007                            BCC     5$
2833  026736  023737  003120  003116            CMP     CURCYL,NEWCYL   ;CHECK IF AT DESIRED LOCATION
2834  026744  001003                            BNE     5$              ;NO - SKIP
2835  026746  004737  020636                    JSR     PC,ONSWAP       ;SWAP OLD AND NEW CYLINDER
2836  026752  000405                            BR      7$              ;SKIP
2837  026754  013737  003120  003116  5$:       MOV     CURCYL,NEWCYL   ;MOVE CURRENT INTO NEW
2838  026762  005237  003116                    INC     NEWCYL          ;BUMP NEWCYL FOR ONE CYL FWRD SEEK
2839  026766                            7$:
2840  026766  004737  017160                    JSR     PC,XSEEK        ;DO SEEK
2841  026772  027050                            60$
2842  026774  012701  000226                    MOV     #150.,R1        ;SET WAIT COUNT 15 MS
2843  027000  004737  022054                    JSR     PC,RDYWAIT      ;WAIT FOR READY
2844  027004  027050                            60$
2845  027006  004737  022466                    JSR     PC,VERPOS       ;VERIFY POSITION IS CORRECT
2846  027012  027050                            60$
2847
2848  027014  032737  000002  013556            BIT     #ALLSEC,MISWIW  ;CHECK IF USE ALL SECTORS
2849  027022  001406                            BEQ     9$              ;NO-SKIP
2850  027024  004737  022610                    JSR     PC,RDALHD       ;ELSE READ ALL HEADERS
2851  027030  027050                            60$
2852  027032  004737  021460                    JSR     PC,VERHDR       ;VERIFY HEADERS
2853  027036  027050                            60$
2854  027040                            9$:
2855  027040  023737  013562  003116            CMP     LOLIMW,NEWCYL   ;CHECK IF DONE
2856  027046  101327                            BHI     T227$           ;NO - LOOP
2857  027050  012737  000002  003032  60$:      MOV     #2,ERRSWI       ;INIT ERROR SWITCH
2858  027056                            ENDSUB
 (3)  027056                            L10032:
 (3)  027056  104403                            TRAP    C$ESUB
```

```
 2859  027060                          T2265$:
 2860  027060                          ENDTST
  (3)  027060                          L10031:
  (3)  027060  104401                          TRAP    C$ETST
 2861
```

```
2863
2864                                    .SBTTL  *TEST 5         **INNER GUARD BAND DETECTION
2865
2866  027062                            BGNTST                  ;TEST 5
 (3)  027062                                                                        T5::
2867
2868  027062  012737  006605  003020            MOV     #P2T07E.ERHEAD  ;SET ERROR HEADER
2869  027070  004737  016214                    JSR     PC,TSTINT       ;INITIALIZE TEST
2870  027074  004737  016232                    JSR     PC,GSTATR       ;CLEAR DRIVE
2871  027100  027266                            T2365$
2872  027102  004737  020552                    JSR     PC,CHOSHD       ;GO CHOSE HEAD
2873  027106  013705  002316            T233$:  MOV     HLMTW,R5        ;SET FOR POSITION TO 255.
2874  027112  004737  017732                    JSR     PC,POSHDS       ;POSITION HEADS
2875  027116  027266                            T2365$
2876  027120                            BGNSUB
 (3)  027120                                                                        T5.1:
 (3)  027120  104402                            TRAP    C$BSUB
2877  027122  013737  002324  003116            MOV     GBND,NEWCYL     ;SET FOR INNER GUARD BAND SEEK
2878  027130  004737  017160                    JSR     PC,XSEEK        ;DO IT
2879  027134  027242                            60$
2880  027136  012701  000001                    MOV     #1.,R1          ;INITIALIZE WAIT COUNT
2881  027142  032762  000001  000000    7$:     BIT     #DRDYMSK,RLCS(R2) ;CHECK IF READY
2882  027150  001414                            BEQ     9$              ;NO-SKIP
2883  027152  004737  016262                    JSR     PC,GSTAT        ;GET DRIVE STATUS
2884  027156  027242                            60$
2885  027160  012703  007760                    MOV     #MDRDY,R3       ;SET NAME MESSAGE PTR
2886  027164  012704  010634                    MOV     #C10MS,R4       ;SET CONDITION MESSAGE PTR
2887  027170                                    ERRHRD  701.,ERR4       ;REPORT READY ERROR
 (5)  027170  104456                            TRAP    C$ERHRD
 (5)  027172  001275                            .WORD   701
 (5)  027174  000000                            .WORD   0
 (5)  027176  012106                            .WORD   ERR4
2888  027200  000420                            BR      60$             ;EXIT TEST
2889  027202  005301                    9$:     DEC     R1              ;DEC WAIT COUNT
2890  027204  001406                            BEQ     11$             ;SKIP IF 0
2891  027206                                    WAITUS  #10.            ;WAIT 1MS
2892  027220  000750                            BR      7$              ;LOOP
2893  027222  012701  000226            11$:    MOV     #150.,R1        ;SET WAIT COUNT 15 MS
2894  027226  004737  022054                    JSR     PC,RDYWAIT      ;GO WAIT FOR READY
2895  027232  027242                            60$
2896
2897  027234  004737  022466                    JSR     PC,VERPOS       ;GO VERIFY POSITION IS 255
2898  027240  027242                            60$
2899  027242  012737  000002  003032    60$:    MOV     #2,ERRSW1       ;INIT ERROR SWITCH
2900  027250                            ENDSUB
 (3)  027250                            L10034:
 (3)  027250  104403                            TRAP    C$ESUB
2901  027252                                    ESCAPE  TST             ;EXIT TEST IF ERROR
 (3)  027252  104410                            TRAP    C$ESCAPE
 (3)  027254  000012                            .WORD   L10033-.
2902  027256  004737  020576                    JSR     PC,SWAPHD       ;GO SWAP TO HEAD 1 OR END TEST
2903  027262  027266                            15$                     ;ABORT RETURN
2904  027264  000710                            BR      T233$           ;REPEAT THE TESTS
2905  027266                            15$:
2906  027266                            T2365$:
2907
```

```
 2908  027266                          ENDTST
  (3)  027266                          L10033:
  (3)  027266  104401                          TRAP    $ETST
 2909
```

```
2911
2912                                        .SBTTL  *TEST 6         **INCREMENTAL REVERSE SEEK HEAD 1
2913  027270                                BGNTST                  ;TEST 6
 (3)  027270                                                                                    T6::
2914  027270  012737  006623  003026                MOV     #P2T08E,ERHEAD  ;SET ERROR HEADER
2915  027276  004737  016214                        JSR     PC,TSTINT       ;INITIALIZE TEST
2916  027302  004737  016232                        JSR     PC,GSTATR       ;GET STATUS & CLEAR
2917  027306  027514                               T2465$
2918  027310  005037  003126                        CLR     DESHD           ;SET TO HEAD 0
2919  027314  013705  013562                        MOV     HILIMW,R5       ;SET TO POSITION HDS AT HILIMIT
2920  027320  004737  017732                        JSR     PC,POSHDS       ;POSITION HDS
2921  027324  027514                               T2465$
2922  027326  012737  000001  003126                MOV     #1,DESHD        ;SET TO SELECT HD 1
2923  027334  032737  010000  013556                BIT     #HEADLM,MISWIW  ;TEST IF HEAD SPECIFIED
2924  027342  001405                                BEQ     2$              ;NO - SKIP
2925  027344  005737  013564                        TST     HEADW           ;TEST IF HEAD SPECIFIED IS 0
2926  027350  001002                                BNE     2$              ;NO - SKIP
2927  027352                                        EXIT    TST             ;ESLE EXIT TEST
 (3)  027352  104432                                TRAP    C$EXIT
 (3)  027354  000140                                .WORD   L10035-.
2928  027356                                2$:
2929  027356                                BGNSUB
 (3)  027356                                                                                    T6.1:
 (3)  027356  104402                                TRAP    C$BSUB
2930  027360  004737  022340                T247$:  JSR     PC,GETPOS       ;GET CURRENT POSITION
2931  027364  027504                               60$
2932  027366                                        INLOOP                  ;CHECK IF IN ERROR LOOP
 (3)  027366  104420                                TRAP    C$INLP
2933  027370                                        BNCOMPLETE      5$      ;NO - SKIP
 (2)  027370  103007                                BCC     5$
2934  027372  023737  003120  003116                CMP     CURCYL,NEWCYL   ;CHECK IF POSITIONED AT DESIRED LOC
2935  027400  001003                                BNE     5$              ;NO - SKIP
2936  027402  004737  020636                        JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW CYLINDER
2937  027406  000405                                BR      7$              ;SKIP
2938  027410  013737  003120  003116  5$:           MOV     CURCYL,NEWCYL   ;MOV CUR TO NEW
2939  027416  005337  003116                        DEC     NEWCYL          ;DEC NEWCYL FOR 1 CYL REV SEEK
2940  027422  004737  017160          7$:           JSR     PC,XSEEK        ;DO SEEK
2941  027426  027504                               60$
2942  027430  012701  000226                        MOV     #150.,R1                ;SET WAIT FOR 15 MS
2943  027434  004737  022054                        JSR     PC,RDYWAIT      ;WAIT FOR READY
2944  027440  027504                               60$
2945  027442  004737  022466                        JSR     PC,VERPOS       ;VERIFY POSITION
2946  027446  027504                               60$
2947  027450  032737  000002  013556                BIT     #ALLSEC,MISWIW  ;TEST IF ALL SECTORS
2948  027456  001406                                BEQ     9$              ;NO-EXIT
2949  027460  004737  022610                        JSR     PC,RDALHD       ;READ ALL HEADERS
2950  027464  027504                               60$
2951  027466  004737  021460                        JSR     PC,VERHDR       ;VERIFY HEADER
2952  027472  027504                               60$
2953  027474                                9$:
2954  027474  023737  013560  003116                CMP     LOLIMW,NEWCYL   ;CHECK IF AT LOLIMIT
2955  027502  103726                                BLO     T247$           ;NO - LOOP
2956  027504  012737  000002  003032  60$:           MOV     #2,ERRSW1       ;INIT ERROR SWITCH
2957  027512                                ENDSUB
 (3)  027512                                L10036:
 (3)  027512  104403                                TRAP    C$ESUB
```

```
 2958  027514                          T2465$:
 2959  027514                          ENDTST
  (3)  027514                          L10035:
  (3)  027514  104401                          TRAP    C$ETST
```

```
                                        .SBTTL  *TEST 7          **SEEK TESTS
027516                                  BGNTST                   ;TEST 7
(3) 027516                                                                          T7::
027516 012737 006643 003026                     MOV     #P2T09E,ERHEAD  ;SET ERROR HEADER
027524 004737 016214                            JSR     PC,TSTINT       ;INITIALIZE TEST
027530 004737 016232                            JSR     PC,GSTATR       ;CLEAR DRIVE
027534 030024                                   T2565$
027536 004737 020552                            JSR     PC,CHOSHD       ;GO CHOSE HEAD
027542 013705 013560                            MOV     LOLIMW,R5       ;SET TO POSTION HEADS TO LOLIMIT
027546 004737 017732                            JSR     PC,POSHDS       ;POSITION HDS TO LOWLIMIT
027552 030024                                   T2565$
027554 004737 022340                    T256$:  JSR     PC,GETPOS       ;GET CURRENT POSITION
027560 030024                                   T2565$
027562 013737 003120 003116                     MOV     CURCYL,NEWCYL   ;PUT CURRENT INTO NEW
027570 012704 002444                            MOV     #T25TBL,R4      ;SET POINTER TO TABLE OF SEEK DIFF FOR RL01
027574 022737 000001 002312     T258$:  CMP     #1,T.DRIVE      ;CHECK TYPE OF DRIVE
027602 001402                                   BEQ     T2588$          ;BRANCH IF RL01
027604 012704 002472                            MOV     #T25TB2,R4      ;POINT TO THE RL02 TABLE OF CYLINDERS

027610 012405                   T2588$: MOV     (R4)+,R5        ;PUT FIRST IN R5
027612 013701 013562                            MOV     HILIMW,R1       ;GET HILIMIT
027616 163701 013560                            SUB     LOLIMW,R1       ;SUBTRACT LOLIMIT
027622 021401                                   CMP     (R4),R1         ;CHECK IF NEW DIFFERENCE IS IN BOUNDS
027624 101073                                   BHI     T2517$$         ;NO - SKIP TEST
027626 060537 003116            T257$:  ADD     R5,NEWCYL       ;ADD TO PRESENT POSITION
027632 023737 003116 013560                     CMP     NEWCYL,LOLIMW   ;CHECK IF AT OR PAST LOLIMIT
027640 002004                                   BGE     9$              ;NO - SKIP
027642 013737 013560 003116                     MOV     LOLIMW,NEWCYL   ;ELSE SET TO LOLIMIT
027650 000407                                   BR      11$
027652 023737 003116 013562     9$:     CMP     NEWCYL,HILIMW   ;CHECK IF AT HILIMIT OR GREATER
027660 003403                                   BLE     11$             ;NO - SKIP
027662 013737 013562 003116                     MOV     HILIMW,NEWCYL   ;ELSE SET FOR HILIMIT
027670                                  11$:
027670                                  BGNSUB
(3) 027670                                                                          T7.1:
(3) 027670 104402                               TRAP    C$BSUB
027672                                          INLOOP                  ;CHECK IF IN ERROR LOOP
(3) 027672 104420                               TRAP    C$INLP
027674                                          BNCOMPLETE      13$     ;NO - SKIP
(2) 027674 103011                               BCC     13$
027676 004737 022340                            JSR     PC,GETPOS       ;GET CURRENT POSITION
027702 027746                                   60$
027704 023737 003120 003116                     CMP     CURCYL,NEWCYL   ;CHECK IF HEADS AT DESIRED POSITION
027712 001002                                   BNE     13$             ;NO - SKIP
027714 004737 020636                            JSR     PC,ONSWAP       ;ELSE SWAP CURRENT AND NEW CYLINDERS
027720 004737 017160            13$:    JSR     PC,XSEEK        ;DO SEEK
027724 027746                                   60$
027726 012701 005670                            MOV     #3000.,R1       ;SET WAIT COUNT
027732 004737 022054                            JSR     PC,RDYWAIT      ;WAIT FOR READY
027736 027746                                   60$
027740 004737 022466                            JSR     PC,VERPOS       ;VERIFY POSITION
027744 027746                                   60$
027746 012737 000002 003032     60$:    MOV     #2,ERRSWI       ;INITIALIZE ERROR SWITCH
027754                                  ENDSUB
(3) 027754                              L10040:
(3) 027754 104403                               TRAP    C$ESUB
```

```
 3010  027756                                    ESCAPE  TST             ;EXIT TEST IF ERROR
  (3)  027756  104410                            TRAP    C$ESCAPE
  (3)  027760  000044                            .WORD   L10037-.
 3011  027762  023737  013562  003116            CMP     HILIMW,NEWCYL   ;CHECK IF SEEK WAS TO HILIMIT
 3012  027770  001002                            BNE     15$             ;NO - SKIP
 3013  027772  005405                            NEG     R5              ;ELSE SET R5 TO REPEAT DIFF IN REVERSE
 3014  027774  000714                            BR      T257$
 3015  027776  023737  013560  003116  15$:     CMP     LOLIMW,NEWCYL   ;TEST IF LAST SEEK WAS TO LOLIMIT
 3016  030004  001310                            BNE     T257$           ;NO - GO DO SEEK TEST
 3017  030006  021437  002316                    CMP     (R4),HLMTW      ;CHECK IF ALL TABLE DIFF USED
 3018  030012  001?76                            BNE     T2588$          ;NO - SKIP
 3019  030014  004737  020576          T2517$:   JSR     PC,SWAPHD       ;GO SWAP TO HEAD 1 OR END TEST
 3020  030020  030024                            T2565$                  ;ABORT RETURN
 3021  030022  000654                            BR      T256$           ;REPEAT TEST HEAD 1
 3022  030024                          T2565$:
 3023  030024                          ENDTST
  (3)  030024                          L10037:
  (3)  030024  104401                            TRAP    C$ETST
```

```
                                        .SBTTL  *TEST 8          **FORWARD OSCILLATING SEEK
3025
3026  030026                            BGNTST          ;TEST 8
 (3)  030026                                                                        T8::
3027  030026  012737  006646  003026            MOV     #P2T10E,ERHEAD  ;SET ERROR HEADER
3028  030034  004737  016214                    JSR     PC,TSTINT       ;INITIALIZE TEST
3029  030040  004737  016232                    JSR     PC,GSTATR       ;CLEAR DRIVE
3030  030044  030322                            T2665$
3031  030046  004737  020552                    JSR     PC,CHOSHD       ;GO CHOSE HEAD
3032  030052  012705  000001            T266$:  MOV     #1,R5           ;LOAD R5 FOR FIRST SEEK
3033  030056  032737  020000  013556            BIT     #HICYL,MISWIW   ;TEST IF HI CYLINDER SPECED
3034  030064  001402                            BEQ     2$              ;NO - SKIP
3035  030066  013705  013562                    MOV     HILIMW,R5       ;ELSE SET UPPER LIMIT
3036  030072  005037  003116            2$:     CLR     NEWCYL          ;SET TO SEEK TO CYL 0
3037  030076  032737  040000  013556            BIT     #LOCYL,MISWIW   ;CHECK IF LO CYL SPEC'D
3038  030104  001403                            BEQ     5$              ;NO - SKIP
3039  030106  013737  013560  003116            MOV     LOLIMW,NEWCYL   ;ELSE SET LOWER LIMIT
3040  030114  004737  017160            5$:     JSR     PC,XSEEK        ;DO SEEK
3041  030120  030322                            T2665$
3042  030122  012701  005670                    MOV     #3000.,R1       ;SET WAIT COUNT FOR 120 MS
3043  030126  004737  022054                    JSR     PC,RDYWAIT      ;WAIT FOR READY
3044  030132  030322                            T2665$
3045  030134  004737  022340            T267$:  JSR     PC,GETPOS       ;GET HEAD POSITION
3046  030140  030322                            T2665$
3047  030142  010537  003116                    MOV     R5,NEWCYL       ;LOAD NEW CYLINDER INTO NEWCYL
3048  030146                            BGNSUB                                      T8.1:
 (3)  030146
 (3)  030146  104402                            TRAP    C$BSUB
3049  030150                                    INLOOP                  ;CHECK IF IN ERROR LOOP
 (3)  030150  104420                            TRAP    C$INLP
3050  030152                                    BNCOMPLETE      18$     ;NO - SKIP
 (2)  030152  103011                            BCC     18$
3051  030154  004737  022340                    JSR     PC,GETPOS       ;GET POSITION
3052  030160  030256                            60$
3053  030162  023737  003120  003116            CMP     CURCYL,NEWCYL   ;CHECK IF HEADS AT DESIRED LOC
3054  030170  001002                            BNE     18$             ;NO - SKIP
3055  030172  004737  020636                    JSR     PC,ONSWAP               ;SWAP OLD AND NEW
3056  030176  004737  017160            18$:    JSR     PC,XSEEK        ;DO SEEK
3057  030202  030256                            60$
3058  030204  012701  005670                    MOV     #3000.,R1       ;SET WAIT COUNT 120 MS
3059  030210  004737  022054                    JSR     PC,RDYWAIT      ;WAIT FOR READY
3060  030214  030256                            60$
3061  030216  004737  022466                    JSR     PC,VERPOS       ;VERIFY HEAD POSITION
3062  030222  030256                            60$
3063  030224  005737  003124                    TST     DESSGN          ;TEST IF JUST SEEK REV
3064  030230  001412                            BEQ     60$             ;YES - SKIP
3065  030232  005037  003116                    CLR     NEWCYL          ;ELSE SET TO SEEK TO 0
3066  030236  032737  040000  013556            BIT     #LOCYL,MISWIW   ;CHECK IF LO LIMIT SPEC'D
3067  030244  001754                            BEQ     18$             ;NO - SKIP
3068  030246  013737  013560  003116            MOV     LOLIMW,NEWCYL   ;ELSE SET LOW LIMIT FOR SEEK
3069  030254  000750                            BR      18$
3070  030256  012737  000002  003032    60$:    MOV     #2,ERRSWI       ;INIT ERROR SWITCH
3071  030264                            ENDSUB
 (3)  030264                            L10042:
 (3)  030264  104403                            TRAP    C$ESUB
3072  030266                                    ESCAPE  TST             ;EXIT TEST IF ERROR
 (3)  030266  104410                            TRAP    C$ESCAPE
```

```
  (3)  030270  000032                          .WORD   L10041-.
3073   030272  032737  020000  013556          BIT     #HICYL,MISWIW   ;TEST IF UPPER LIMIT SPEC'D
3074   030300  001004                          BNE     20$             ;YES - SKIP
3075   030302  005205                          INC     R5              ;BUMP R5
3076   030304  020537  002324                  CMP     R5,GBND ;ALL CYLINDERS DONE
3077   030310  001311                          BNE     T267$           ;NO - GO DO NEXT CYLINDER
3078   030312  004737  020576          20$:    JSR     PC,SWAPHD       ;GO SWAP TO HEAD 1 OR END TEST
3079   030316  030322                          T2665$                  ;ABORT RETURN
3080   030320  000654                          BR      T266$           ;GO DO TESTS
3081   030322                          T2665$:
3082   030322                          ENDTST
  (3)  030322                          L10041:
  (3)  030322  104401                          TRAP    C$ETST
```

```
 3084                                   .SBTTL  *TEST 9          **REVERSE OSCILLATING SEEK
 3085  030324                           BGNTST                   ;TEST 9
  (3)  030324                                                                        T9::
 3086  030324  012737  006661  003026           MOV     #P2T11E,ERHEAD  ;SET ERROR HEADER
 3087  030332  004737  016214                   JSR     PC,TSTINT       ;INITIALIZE TEST
 3088  030336  004737  016232                   JSR     PC,GSTATR       ;CLEAR DRIVE
 3089  030342  030620                           T2765$
 3090  030344  004737  020552                   JSR     PC,CHOSHD       ;GO CHOSE HEAD
 3091  030350  013737  002316  003116  T275$:   MOV     HLMTW,NEWCYL    ;SEEK OUT TO 255.
 3092  030356  032737  020000  013556           BIT     #HICYL,MISWIW   ;TEST IF UPPER LIMIT SPEC'D
 3093  030364  001403                           BEQ     2$              ;NO - SKIP
 3094  030366  013737  013562  003116           MOV     HILIMW,NEWCYL   ;ELSE SET UPPER LIMIT
 3095  030374  013705  002322           2$:     MOV     NXTHL,R5        ;SET R5 FOR FIRST SEEKS
 3096  030400  032737  040000  013556           BIT     #LOCYL,MISWIW   ;CHECK IF LO LIMIT SPEC'D
 3097  030406  001402                           BEQ     5$              ;NO - SKIP
 3098  030410  013705  013560                   MOV     LOLIMW,R5       ;SET LOWER LIMIT
 3099  030414  004737  017160           5$:     JSR     PC,XSEEK        ;DO SEEK
 3100  030420  030620                           T2765$
 3101  030422  012701  005670                   MOV     #3000.,R1       ;SET WAIT TO 120 MS
 3102  030426  004737  022054                   JSR     PC,RDYWAIT      ;WAIT FOR DRIVE READY
 3103  030432  030620                           T2765$
 3104  030434  004737  022340           T276$:  JSR     PC,GETPOS       ;GET POSITION
 3105  030440  030620                           T2765$
 3106  030442  010537  003116                   MOV     R5,NEWCYL       ;SET FOR NEXT SEEK
 3107  030446                           BGNSUB
  (3)  030446                                                                        T9.1:
  (3)  030446  104402                           TRAP    C$BSUB
 3108  030450                                   INLOOP                  ;CHECK IF IN ERROR LOOP
  (3)  030450  104420                           TRAP    C$INLP
 3109  030452                                   BNCOMPLETE      18$     ;NO - SKIP
  (2)  030452  103011                           BCC     18$
 3110  030454  004737  022340                   JSR     PC,GETPOS       ;ELSE GET POSITION
 3111  030460  030560                           60$
 3112  030462  023737  003120  003116           CMP     CURCYL,NEWCYL   ;CHECK IF AT DESIRED CYL
 3113  030470  001002                           BNE     18$             ;NO - SKIP
 3114  030472  004737  020636                   JSR     PC,ONSWAP       ;ELSE SWAP OLD AND NEW CYL
 3115  030476  004737  017160           18$:    JSR     PC,XSEEK        ;DO SEEK
 3116  030502  030560                           60$
 3117  030504  012701  005670                   MOV     #3000.,R1       ;SET WAIT FOR 120 MS
 3118  030510  004737  022054                   JSR     PC,RDYWAIT      ;WAIT FOR READY
 3119  030514  030560                           60$
 3120  030516  004737  022466                   JSR     PC,VERPOS       ;VERIFY POSITION
 3121  030522  030560                           60$
 3122  030524  005737  003124                   TST     DESSGN          ;CHECK IF JUST SEEK FWD
 3123  030530  001013                           BNE     60$             ;YES - SKIP
 3124  030532  013737  002316  003116           MOV     HLMTW,NEWCYL    ;ELSE SEEK TO TO 255
 3125  030540  032737  020000  013556           BIT     #HICYL,MISWIW   ;TEST IF HILIMIT SPEC'D
 3126  030546  001753                           BEQ     18$             ;NO - SKIP
 3127  030550  013737  013562  003116           MOV     HILIMW,NEWCYL   ;SET TO UPPER LIMIT
 3128  030556  000747                           BR      18$
 3129  030560  012737  000002  003032  60$:     MOV     #2,ERRSWI       ;INIT ERROR SWITCH
 3130  030566                           ENDSUB
  (3)  030566                           L10044:
  (3)  030566  104403                           TRAP    C$ESUB
 3131  030570                                   ESCAPE  TST             ;EXIT TEST IF ERROR
  (3)  030570  104410                           TRAP    C$ESCAPE
```

```
  (3)  030572  000026                          .WORD   L10043-.
3132   030574  032737  040000  013556          BIT     #LOCYL,MISWIW   ;TEST IF LOLIMIT SPEC'D
3133   030602  001002                          BNE     20$             ;YES - SKIP
3134   030604  005305                          DEC     R5              ;DEC CYLINDER COUNT
3135   030606  100312                          BPL     T276$           ;IF STILL POSITIVE, DO SEEKS AGAIN
3136   030610  004737  020576          20$:    JSR     PC,SWAPHD       ;GO SWAP TO HEAD 1 OR END TEST
3137   030614  030620                          T2765$                  ;ABORT RETURN
3138   030616  000654                          BR      T275$           ;LOOP AGAIN
3139   030620                          T2765$:
3140   030620                          ENDTST
  (3)  030620                          L10043:
  (3)  030620  104401                          TRAP    C$ETST
3141
3142   030622                          ENDMOD
3143
3144
3145
```

```
                                                .SBTTL  PARAMETER CODING
                                                BGNMOD  HRDPRM
                                                BGNHRD
  (3)  030622  000030                                   .WORD L10045-L$HARD/2
                                                GPRML   CNTYPE,CNT,1,YES
  (4)  030624  005130                                   .WORD   T$CODE
  (4)  030626  030770                                   .WORD   CNTYPE
  (4)  030630  000001                                   .WORD   1
                                                GPRMA   CSRMSG,CSR,0,160000,177776,YES
  (4)  030632  000031                                   .WORD   T$CODE
  (4)  030634  030704                                   .WORD   CSRMSG
  (4)  030636  160000                                   .WORD   T$LOLIM
  (4)  030640  177776                                   .WORD   T$HILIM
                                                GPRMA   VECMSG,VECT,0,0,776,YES
  (4)  030642  001031                                   .WORD   T$CODE
  (4)  030644  030720                                   .WORD   VECMSG
  (4)  030646  000000                                   .WORD   T$LOLIM
  (4)  030650  000776                                   .WORD   T$HILIM
                                                GPRMD   DRMSG,DRSB,0,3400,0,7,YES
  (4)  030652  004032                                   .WORD   T$CODE
  (4)  030654  030762                                   .WORD   DRMSG
  (4)  030656  003400                                   .WORD   3400
  (4)  030660  000000                                   .WORD   T$LOLIM
  (4)  030662  000007                                   .WORD   T$HILIM
                                                GPRML   DRTYPE,TYPDR,1,YES
  (4)  030664  003130                                   .WORD   T$CODE
  (4)  030666  030740                                   .WORD   DRTYPE
  (4)  030670  000001                                   .WORD   1
                                                GPRMD   BRMSG,PRIOR,0,340,0,7,YES
  (4)  030672  002032                                   .WORD   T$CODE
  (4)  030674  030727                                   .WORD   BRMSG
  (4)  030676  000340                                   .WORD   340
  (4)  030700  000000                                   .WORD   T$LOLIM
  (4)  030702  000007                                   .WORD   T$HILIM

                                                ENDHRD
  (2)                                                   .EVEN
  (3)  030704                                   L10045:

030704  052502  020123  042101  CSRMSG: .ASCIZ  /BUS ADDRESS/
030712  051104  051505  000123
030720  042526  052103  051117  VECMSG: .ASCIZ  /VECTOR/
030726     000
030727     102  020122  042514  BRMSG:  .ASCIZ  /BR LEVEL/
030734  042526  000114
030740  051104  053111  020105  DRTYPE: .ASCIZ  /DRIVE TYPE = RL01/
030746  054524  042520  036440
030754  051040  030114  000061
030762  051104  053111  000105  DRMSG:  .ASCIZ  /DRIVE/
030770  046122  030461     000  CNTYPE: .ASCIZ  /RL11/
030775                          ENDMOD
        030776                            .EVEN

030776                          BGNMOD  SFTPRM
030776                          BGNSFT
  (3)  030776  000053                   .WORD L10046-L$SOFT/2
```

```
3170
3172  031000                        GPRML   CYLQ,MISWI,1,YES
 (4)  031000  000130                .WORD   T$CODE
 (4)  031002  031126                .WORD   CYLQ
 (4)  031004  000001                .WORD   1
3173  031006                        GPRML   SECQ,MISWI,2,YES
 (4)  031006  000130                .WORD   T$CODE
 (4)  031010  031142                .WORD   SECQ
 (4)  031012  000002                .WORD   2
3179
3181  031014                        GPRML   LOLIMQ,MISWI,40000,YES
 (4)  031014  000130                .WORD   T$CODE
 (4)  031016  031157                .WORD   LOLIMQ
 (4)  031020  040000                .WORD   40000
3182  031022                        XFERF   1$
 (5)  031022  006044                .WORD   T$CODE
3183  031024                        GPRMD   LIMVAL,LOLIM,D,255.,0,253.,YES
 (4)  031024  001052                .WORD   T$CODE
 (4)  031026  031176                .WORD   LIMVAL
 (4)  031030  000377                .WORD   255.
 (4)  031032  000000                .WORD   T$LOLIM
 (4)  031034  000375                .WORD   T$HILIM
3184  031036                1$:     GPRML   HILIMQ,MISWI,20000,YES
 (4)  031036  000130                .WORD   T$CODE
 (4)  031040  031204                .WORD   HILIMQ
 (4)  031042  020000                .WORD   20000
3185  031044                        XFERF   2$
 (5)  031044  006044                .WORD   T$CODE
3186  031046                        GPRMD   LIMVAL,HILIM,D,255.,0,255.,YES
 (4)  031046  002052                .WORD   T$CODE
 (4)  031050  031176                .WORD   LIMVAL
 (4)  031052  000377                .WORD   255.
 (4)  031054  000000                .WORD   T$LOLIM
 (4)  031056  000377                .WORD   T$HILIM
3187  031060                2$:     GPRML   HEADQ,MISWI,10000,YES
 (4)  031060  000130                .WORD   T$CODE
 (4)  031062  031225                .WORD   HEADQ
 (4)  031064  010000                .WORD   10000
3188  031066                        XFERF   3$
 (5)  031066  006044                .WORD   T$CODE
3189  031070                        GPRMD   HEADV,HEAD,D,17,0,1,YES
 (4)  031070  003052                .WORD   T$CODE
 (4)  031072  031247                .WORD   HEADV
 (4)  031074  000017                .WORD   17
 (4)  031076  000000                .WORD   T$LOLIM
 (4)  031100  000001                .WORD   T$HILIM
3191  031102                3$:     GPRMD   ERLIMQ,ERLIM,D,377,0,377,YES
 (4)  031102  004052                .WORD   T$CODE
 (4)  031104  031272                .WORD   ERLIMQ
 (4)  031106  000377                .WORD   377
 (4)  031110  000000                .WORD   T$LOLIM
 (4)  031112  000377                .WORD   T$HILIM
3193  031114                        GPRMD   DCLIMQ,DCLIM,D,377,1,377,YES
 (4)  031114  005052                .WORD   T$CODE
 (4)  031116  031314                .WORD   DCLIMQ
 (4)  031120  000377                .WORD   377
```

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  (4)  031122  000001                          .WORD   T$LOLIM
  (4)  031124  000377                          .WORD   T$HILIM
3195   031126                          ENDSFT
  (2)                                          .EVEN
  (3)  031126                          L10046:
3196
3198   031126  051525  020105  046101  CYLQ:   .ASCIZ  /USE ALL CYL/
       031134  020114  054503  000114
3199   031142  051525  020105  046101  SECQ:   .ASCIZ  /USE ALL SECT/
       031150  020114  042523  052103
       031156     000
3206   031157     114  053517  051440  LOLIMQ: .ASCIZ  /LOW SEEK LIMIT/
       031164  042505  020113  044514
       031172  044515  000124
3207   031176  040526  052514  000105  LIMVAL: .ASCIZ  /VALUE/
3208   031204  050125  042520  020122  HILIMQ: .ASCIZ  /UPPER SEEK LIMIT/
       031212  042523  045505  046040
       031220  046511  052111     000
3209   031225     125  042523  047440  HEADQ:  .ASCIZ  /USE ONLY ONE SURF/
       031232  046116  020131  047117
       031240  020105  052523  043122
       031246     000
3210   031247     127  040510  020124  HEADV:  .ASCIZ  /WHAT SURF (0 OR 1)/
       031254  052523  043122  024040
       031262  020060  051117  030440
       031270  000051
3212   031272  047111  052520  020124  ERLIMQ: .ASCIZ  /INPUT ERROR LIMIT/
       031300  051105  047522  020122
       031306  044514  044515  000124
3214   031314  040504  040524  041440  DCLIMQ: .ASCIZ  /DATA CMP ERR LMT/
       031322  050115  042440  051122
       031330  046040  052115     000
3216           031336                           .EVEN
3217   031336                          ENDMOD
3218
3219   031336                          LASTAD
  (2)                                          .EVEN
  (4)  031336  000000                          .WORD   0
  (4)  031340  000000                          .WORD   0
  (3)  031342                          L$LAST::
3220
3221           000001                          .END
```

```
ADR    = 000020 G          92#
AFMID    003224           495#
AFMIDU   003226           496#
ALLCYL= 000001             110#
ALLSEC= 000002             111#  2751  2798  2848  2947
AMYERR= 100000             163#  1620  1921  2185
ARMID    003230           497#
AHMIDL   003232           498#
ASSEMB= 000010               8
BADADD= 004000             142#  2428  2464  2466
BAMSK  = 000060            174#
BANAM    006243           677#  2643
BASADD   006141           672#  1152  1332  1361  1374  1492  1973  2641
BELL     010555           813#
BHSTAT= 000010             200#
BIT0   = 000001 G          92#
BIT00  = 000001 G          92#   110   132   151  2592
BIT01  = 000002 G          92#   111   131   152
BIT02  = 000004 G          92#   112   133   153
BIT03  = 000010 G          92#   113   134   154
BIT04  = 000020 G          92#   135
BIT05  = 000040 G          92#   136
BIT06  = 000100 G          92#   137
BIT07  = 000200 G          92#   138
BIT08  = 000400 G          92#   139
BIT09  = 001000 G          92#   140
BIT1   = 000002 G          92#
BIT10  = 002000 G          92#   141  1593  1712  2006  2280  2445
BIT11  = 004000 G          92#   142
BIT12  = 010000 G          92#   114   143
BIT13  = 020000 G          92#   115   144
BIT14  = 040000 G          92#   116   145
BIT15  = 100000 G          92#   117   146  1051
BIT2   = 000004 G          92#  2446
BIT3   = 000010 G          92#
BIT4   = 000020 G          92#
BIT5   = 000040 G          92#
BIT6   = 000100 G          92#  2535
BIT7   = 000200 G          92#
BIT8   = 000400 G          92#
BIT9   = 001000 G          92#  1015
BOE    = 000400 G          92#
BRMSG    030727           3155  3161#
BSCHK    024344           2518#
BSFLAG   003034            427#  2521*  2541*  2548
BSFVAL   003510            530#  1970
BSNSTR   007550            772#  1972
BYPSNM   007501            769#
CAFDT    010662            831#  2019  2488
CAMSK    002326            255#  1286*  1294*
CCYLUP   010653            830#
CHOSHD   020552           1940#  2673  2723  2771  2872  2967  3031  3090
CKBSVD   020662           1970#
CKDATA= 000102             120#
CKFRLM   015664            931   945   959   974   989  1094  1108  1130  1144  1158  1487#
CLKADR   003506            526#  1217*
```

```
CLKCSB= 172542          215#
CLKCSR= 172540          214#
CLKCTR= 172544          216#
CLKFLG  003504          525#    1216*   1219*
CLNCOD  015124 G       1385#
CLRBYT  002320          252#    1289*   1298*
CLRPAR  025744         2609     2649#
CNT   - 000012           99#    3150
CNTYPE  030770         315C     3164#
COMPOP= 007777          130#    2588
CONHNG= 000004          153#
CONTIN  014016         1252#
COSTAT= 000040          202#
COUNT   003250          509#
CRDYMS= 000200          172#    1013    1322    1368    1391    1508    1519    2288    2294
CSNAM   006236          676#    2643
CSR   = 000000           94#    3151
CSRMSG  030704         3151     3159#
CURCYL  003120          459#    1674    1691    1835    1839    1840    1858    1864    1872    2221*   2246    2424    2451
                       2608     2645    2700    2735    2739    2783    2787    2833    2837    2934    2938    2973    2998
                       3053     3112
CYLQ    031126         3172     3198#
CYLTBL  002620          334#
CYLUP = 000004          133#
CYLWD   007466          767#    2608    2643
C$AU  = 000052            8#
C$AUTO= 000061            8#    1379
C$BRK = 000022            8#
C$BSEG= 000004            8#    1830
C$BSUB= 000002            8#    2677    2730    2778    2829    2876    2929    2993    3048    3107
C$CEFG= 000045            8#
C$CLCK= 000062            8#    1217
C$CLEA= 000012            8#    1404
C$CLOS= 000035            8#
C$CLP1= 000006            8#
C$CVEC= 000036            8#    1378    1397    1401
C$DCLN= 000044            8#    1335    1495
C$DODU= 000051            8#    1334    1365    1377    1494
C$DRPT= 000024            8#
C$DU  = 000053            8#    1408
C$EDIT= 000005            8#      63
C$ERDF- 000055            8#
C$ERHR= 000056            8#    1578    1615    1628    1634    1739    1744    1853    1869    1912    1923    2020    2031
                       2035     2043    2092    2104    2111    2173    2183    2187    2248    2301    2306    2410    2468
                       2483     2489    2498    2502    2688    2702    2887
C$ERRO= 000060            8#
C$ERSF- 000054            8#
C$ERSO= 000057            8#
C$ESCA= 000010            8#    2706    2901    3010    3072    3131
C$ESEG- 000005            8#    1877
C$ESUB= 000003            8#    2705    2761    2808    2858    2900    2957    3009    3071    3130
C$ETST= 000001            8#    2713    2763    2810    2860    2908    2959    3023    3082    3140
C$EXIT= 000032            8#    2726    2774    2827    2927
C$GETB- 000026            8#
C$GETW= 000027            8#
C$GMAN  000043            8#
```

```
C$GPHR= 000042          8#  1270
C$GPLO= 000030          8#
C$GPRI= 000040          8#
C$INIT= 000011          8#  1338
C$INLP= 000020          8#  1489  1831  2733  2781  2831  2932  2994  3049  3108
C$MANI= 000050          8#
C$MEM = 000031          8#
C$MSG = 000023          8#   932   946   960   975   990  1095  1109  1131  1145  1159
C$OPEN= 000034          8#
C$PNTB= 000014          8#  1033  1066  1080  1089  1152  1153  1155  2395  2563  2564  2568  2581
                     2597   2601  2605  2608  2620  2629  2630  2633  2641  2643  2644  2645
C$PNTF- 000017          8#  1331   332  1333  1360  1361  1363  1372  1374  1376  1491  1492  1493
                     1972   1973  1974
C$PNTS- 000016          8#
C$PNTX- 000015          8#
C$QIO - 000377          8#
C$RDBU= 000007          8#  1422  1442
C$REFG= 000047          8#  1225  1229  1250  1253  1256
C$RESE= 000033          8#  1221  1402
C$REVI= 000003          8#    63
C $RFLA- 000021         8#
C$RPT = 000025          8#
C$SEFG= 000046          R#
C$SPRI= 000041          8#  1220  1304  1390
C$SVEC= 000037          8#  1303  1354  1388
C$TPRI= 000013          8#
C1OMS   010634        828#  2687  2886
C5SEC   010673        832#  2030  2182  2497
C5OUMS  010645        829#  1911
DANAM   006250        678#  2643
DATACM= 000001        132#  2380  2391
DATCOM  023316       2371#
DATGEN  023156       2331#
DCKERR= 004000        168#  1043  1067
DCLIM = 000012        107#  3193
DCLIMQ  031314       3193   3214#
DCLIMW  013570       1195#  2407
DESDIF  003122        460#  1684* 1698* 1707* 1714  2605
DESHD   003126        462#  1722  1940* 1943* 1950  1952* 2097  2283  2426  2456  2533  2605  2608
                     2645   2724  2772  2818* 2822* 2918* 2922*
DESSEC  003130        463#  2459  2536  2608
DESSGN  003124        461#  1683* 1694* 1697* 1703* 1719  1862  2605  3063  3122
DIAGMC= 000000           8
DIFAUG  003112        456#  1670* 1678* 1689* 1699  1707
DIFWD   007442        763#  2605
DIRBIT= 000004        183#  1721
DIRMSK  002330        256#  1287* 1295*
DLTERR= 010000        166#  1047
DONE    003022        422#  1475* 1511  1524  1591* 1598  1728* 1735  2003* 2014  2471* 2479
DRDYMS= 000001        175#  1325  1370  1394  1562  1607  1905  1916  2016  2024  2166  2177  2485
                     2493   2682  2881
DRMSG   030762       3153   3163#
DRSB  = 000010         98#  3153
DRSELT= 000004        112#  1222
DRSET = 000010        188#  1538  1554  1602  2584
DRTYPE  030740       3154   3162#
```

```
DRVCNT  003110            455# 1235* 1259  1263* 1266*
DRVERR= 040000            164# 1556  1572  1626
DRVNAM  006152            673# 1152  1332  1361  1374  1492  1973  2641
DRVNAV  006157            674#
DSESTA= 000400            204#
DSMSK = 001400            171#
DSPCOD  013572 G         1199#
EF.CON= 000036 G           92# 1253
EF.NEW= 000035 G           92# 1256
EF.PWR= 000034 G           92# 1225
EF.RES= 000037 G           92# 1250
EF.STA= 000040 G           92# 1229
ERHEAD  003026            424# 2568  2669* 2719* 2767* 2814* 2868* 2914* 2963* 3027* 3086*
ERLIM = 000010            106# 3191
ERLIMQ  031272           3191  3212#
ERLIMW  013566           1194# 1487  1491
ERRCNT  003254            511# 1237  1242  1262  1924* 2188*
ERRPOI  003252            510#  923*  935*  949*  963*  978*  995* 1098* 1112* 1134* 1150* 1242* 1262*
                         1267* 1487
ERRSWI  003032            426# 1553* 1635* 1648  1650  1669* 1740* 1745* 1751  1753  1826* 1854* 1870*
                         1882  1884  1901* 1925* 1931  1933  1993* 2026* 2044* 2057  2059  2077* 2093*
                         2105* 2112* 2131  2133  2163* 2189* 2195  2197  2226  2228  2243* 2249* 2253
                         2255  2272* 2302* 2307* 2319  2321  2392  2401  2403  2411* 2499* 2503* 2509
                         2511  2704* 2760* 2807* 2857* 2899* 2956* 3008* 3070* 3129*
ERRVEC  003244            505# 1354  1378  1388  1401
ERR1    011724 G          920# 1578  1615  1634  1739  1869  2043  2301  2468  2483
ERR10   013320 G         1146# 2092  2104  2111  2410
ERR2    011772 G          934#
ERR3    012040 G          948# 2173
ERR4    012106 G          962# 2688  2887
ERR5    012156 G          977# 1912  2020  2031  2183  2489  2498
ERR6    012226 G          992# 1628  1744  1853  1923  2035  2187  2306  2502
ERR7    013110 G         1097#
ERR8    013160 G         1111# 2248  2702
ERR9    013254 G         1133#
EVL   = 000004 G           92#
EXACYL  003240            502#
EXHCYL  003236            501#
EXOCYL  003234            500#
EXROT   003242            503#
E$END = 002100              8#
E$LOAD= 000035              8#  63
FBSFIL  003706            533# 1976* 2522  2543
FMTOP1  010701            834#
FMTOP2  010730            835#
FMTOP3  010752            836#
FMT1    010773            837# 2581  2633
FMT1.1  011000            838# 2620
FMT11   011217            847# 2623
FMT12   011225            848# 2626
FMT13   011233            849# 2605
FMT14   011277            850# 1153
FMT15   011331            851# 1080  1155
FMT16   011365            852# 2564
FMT17   011376            853# 1066
FMT18   011420            854#
```

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FMT19   011452          855#
FMT2    011007          839#  2597    2601
FMT20   011507          856#
FMT21   011537          857#
FMT22   011562          858#  2608
FMT23   011616          859#
FMT24   011632          860#  1331    1360    1372
FMT25   011637          861#  1491
FMT26   011647          862#
FMT27   011673          863#  1089    2395
FMT28   011712          864#  1033
FMT3    011012          840#  1333    1363    1376    1493    1974
FMT4    011015          841#  2568
FMT5    011026          842#  1152    1332    1361    1374    1492    1973    2641
FMT6    011046          843#  2643
FMT7    011110          844#  2645
FMT8    011160          845#  2644
FMT9    011212          846#  1972    2563
FOLWRT= 000100          137#   147
FRMWD   007473          768#  2605
FWDSKO= 002000          141#   147
FWDSKS= 000400          139#   147
F$AU  = 000015            8#
F$AUTO= 000020            8#  1352    1379
F$BGN = 000040            8#    58      65      90     218     224     634     645     866     875     920     934     948
                        962     977     992    1097    1111    1133    1146    1160    1163    1171    1180    1182    1197
                       1199    1206    1212    1213    1339    1352    1385    1386    1406    1410    1415    1457    1465
                       1830    2659    2666    2667    2677    2705    2706    2713    2718    2726    2730    2761    2763
                       2766    2774    2778    2808    2810    2813    2827    2829    2858    2860    2866    2876    2900
                       2901    2908    2913    2927    2929    2957    2959    2962    2993    3009    3010    3023    3026
                       3048    3071    3072    3082    3085    3107    3130    3131    3140    3142    3148    3149    3165
                       3168    3169    3217
F$CLEA- 000007            8#  1386    1404
F$DU  = 000016            8#  1406    1408
F$END = 000041            8#    58      65      90     218     224     634     645     866     875     932     946     960
                        975     990    1095    1109    1131    1145    1159    1160    1171    1180    1182    1197    1199
                       1206    1212    1338    1339    1379    1385    1404    1408    1410    1415    1463    1479    1877
                       2659    2666    2667    2677    2705    2706    2713    2718    2726    2730    2761    2763    2766
                       2774    2778    2808    2810    2813    2827    2829    2858    2860    2866    2876    2900    2901
                       2908    2913    2927    2929    2957    2959    2962    2993    3009    3010    3023    3026    3048
                       3071    3072    3082    3085    3107    3130    3131    3140    3142    3148    3157    3165    3168
                       3195    3217
F$HARD= 000004            8#  3149    3157    3182    3185    3188
F$HW  = 000013            8#  1172    1179
F$INIT= 000006            8#  1213    1338
F$JMP = 000050            8#  2726    2774    2827    2927
F$MOD = 000000            8#    58      65      90     218     224     634     645     866     875    1160    1171    1180
                       1182    1197    1199    1206    1212    1339    1385    1410    1415    2659    2666    3142    3148
                       3165    3168    3217
F$MSG - 000011            8#   920     932     934     946     948     960     962     975     977     990     992    1095
                       1097    1109    1111    1131    1133    1145    1146    1159
F$PROT= 000021            8#  1163    1167
F$PWR = 000017            8#
F$RPT = 000012            8#
F$SEG = 000003            8#  1830    1877
F$SOFT= 000005            8#  3169    3182    3185    3188    3195
```

```
F$SRV  = 000010          8#  1457  1463  1465  1479
F$SUB  = 000002          8#  2677  2705  2730  2761  2778  2808  2829  2858  2876  2900  2929  2957
                       2993  3009  3048  3071  3107  3130
F$SW   = 000014          8#  1183  1196
F$TEST= 000001           8#  2667  2713  2718  2763  2766  2810  2813  2860  2866  2908  2913  2959
                       2962  3023  3026  3082  3085  3140
GBND     002324        254#  1285*  1293*  2877  3076
GETPOS   022340       1672  1827  1833  1856  2205#  2244  2698  2731  2779  2830  2930  2971  2996
                      3045  3051  3104  3110
GETSTA= 000003         187#  1008  1538  1541  1587
GLBDAT   002240 G      224#
GLBEQA   002240 G       90#
GLBERR   011724 G      875#
GLBSUB   015256 G     1415#
GLBTXT   005360 G      645#
GSTAT    016262       1543#  1560  1612  1618  1903  1914  2022  2164  2175  2491  2684  2883
GSTATC   016246       1540#
GSTATG   016272       1539  1542  1545#
GSTATR   016232       1537#  2671  2721  2769  2816  2870  2916  2965  3029  3088
GTSTAT= 000104         121#  1594
G$CNTO= 000200           8#
G$DELM= 000372           8#  1424  1429  1445  1449
G$DISP= 000003           8#
G$EXCP= 000400           8#
G$HILI= 000002           8#
G$LOLI= 000001           8#
G$NO   = 000000          8#
G$OFFS= 000400           8#  3150  3151  3152  3153  3154  3155  3172  3173  3181  3183  3184  3186
                       3187  3189  3191  3193
G$OFSI= 000376           8#  3150  3151  3152  3153  3154  3155  3172  3173  3181  3183  3184  3186
                       3187  3189  3191  3193
G$PRMA= 000001           8#  3151  3152
G$PRMD= 000002           8#  3153  3155  3183  3186  3189  3191  3193
G$PRML= 000000           8#  3150  3154  3172  3173  3181  3184  3187
G$RADA= 000140           8#
G$RADB= 000000           8#
G$RADD= 000040           8#  3183  3186  3189  3191  3193
G$RADL= 000120           8#  3150  3154  3172  3173  3181  3184  3187
G$RADO= 000020           8#  3151  3152  3153  3155
G$XFER= 000004           8#  3182  3185  3188
G$YES  = 000010          8#  3150  3151  3152  3153  3154  3155  3172  3173  3181  3183  3184  3186
                       3187  3189  3191  3193
HADONE   003024       423#  1244*
HCESTA= 040000        210#  1566
HCRCER= 004000        169#  1030  1037
HDALTG= 000010        113#  1222
HDCYL    002332       257#  1288*  1296*
HDHSEL= 000100        196#  2096  2099
HDMOVF   007323       740#  1868
HDRCMP= 000002        131#  2078
HDR40  = 100000       146#  2274  2598
HDSEC  = 000077       195#  2118  2121
HDSEL  = 000020       184#  1724  2285
HDWD     007455       765#  2605  2608  2643
HDWRD1   003066       443#  1118  2140  2215
HDWRD2   003070       444#  2037
```

```
HDWRD3  003072            445#
HEAD  = 000006            105#  3189
HEADLM= 010000            114#  1941  1948  2823  2923
HEADQ   031225           3187   3209#
HEADV   031247           3189   3210#
HEADW   013564           1193#  1943  2825  2925
HFIN    003204            487#
HFINU   003206            488#
HFOUT   003210            489#
HFOUTU  003212            490#
HICYL = 020000            115#  1300  3033  3073  3092  3125
HILIM = 000004            104#  3186
HILIMQ  031204           3184   3208#
HILIMW  013562           1192#  1302*  2758  2775  2855  2919  2980  2989  2991  3011  3035  3094  3127
HLMTW   002316            251#  1284*  1292*  1302  1675  1677  1679  1701  2424  2873  3017  3091  3124
HNFERR= 010000            167#  1028
HOE   = 100000 G           92#
HOSTAT- 000020            201#  1564
HPTCOD  013536 G          1171#
HRDPRM  030622 G          3148#
HRDWTS  025774 G          2666#
HRIN    003214            491#
HRINU   003216            492#
HROUT   003220            493#
HROUTU  003222            494#
HSMSK = 000100            179#  2458
HSSTAT= 000100            203#  2144
IBE   = 010000 G           92#
IBUFF   004102            535#  1075  2080  2275  2383  2448
IDU   = 000040 G           92#
IER   = 020000 G           92#
INITCO  013616 G          1212#
INOUTS= 000020             135#   147
INTEBL= 000100             173#
INTHLR  015604            1303   1469#
ISR   = 000100 G           92#
IXE   = 004000 G           92#
I$AU  = 000041              8#
I$AUTO= 000041              8#  1352#  1379#
I$CLN = 000041              8#  1386#  1404#
I$DU  = 000041              8#  1406#  1408#
I$HRD = 000041           3149#  3157#
I$INIT= 000041              8#  1213#  1338#
I$MOD = 000041              8#    58#    65#    90#   218#   224#   634#   645#   866#   875#  1160#  1171#  1180#
                         1182#  1197#  1199#  1206#  1212#  1339#  1385#  1410#  1415#  2659#  2666#  3142#  3148#
                         3165#  3168#  3217#
I$MSG = 000041              8#   920#   932#   934#   946#   948#   960#   962#   975#   977#   990#   992#  1095#
                         1097#  1109#  1111#  1131#  1133#  1145#  1146#  1159#
I$PROT= 000040              8#  1163#
I$PTAB= 000041              8#
I$PWR = 000041              8#
I$RPT = 000041              8#
I$SEG = 000041              8#  1830#  1877#  2667  2677  2718  2730  2766  2778  2813  2829  2866  2876
                         2913   2929   2962   2993  3026  3048  3085  3107
I$SETU= 000041              8#
I$SFT = 000041           3169#  3195#
```

```
I$SRV = 000041                8#  1457#  1463#  1465#  1479#
I$SUB = 000041                8#  2667   2677#  2705#  2718   2730#  2761#  2766   2778#  2808#  2813   2829#  2858#
                           2866   2876#  2900#  2913   2929#  2957#  2962   2993#  3009#  3026   3048#  3071#  3085
                           3107#  3130#
I$TST = 000041                8#  2667#  2677   2706   2713#  2718#  2726   2730   2763#  2766#  2774   2778   2810#
                           2813#  2827   2829   2860#  2866#  2876   2901   2908#  2913#  2927   2929   2959#  2962#
                           2993   3010   3023#  3026#  3048   3072   3082#  3085#  3107   3131   3140#
JJJ       002314            250#
J$JMP = 000167                8#
LAB       013770           1245#
LABACF    007273            737#
LABACR    007307            738#
LABEXP    007206            732#
LABHCF    007243            735#
LABHCR    007257            736#
LABIN     007163            729#
LABMID    007171            730#
LABOCF    007217            733#
LABOCR    007231            734#
LABOUT    007200            731#
LAB1      006262            680#  2644
LAB2      006275            681#  2645
LIMVAL    031176           3183   3186   3207#
LOCERR    003460            514#
LOCYL = 040000                116#  1245   3037   3066   3096   3132
LOE   = 040000 G               92#
LOLIM = 000002                103#  3183
LOLIMQ    031157           3181   3206#
LOLIMW    013560           1191#  1247*  2727   2805   2819   2954   2968   2981   2985   2987   3015   3039   3068
                           3098
LOT   = 000010 G               92#
L$ACP     002110 G             63#
L$APT     002036 G             63#
L$AJT     002070 G             63#
L$AUTO    014566 G             63   1352#
L$CCP     002106 G             63#
L$CLEA    015124 G             63   1386#
L$CO      002032 G             63#
L$DEPO    002011 G             63#
L$DESC    002122 G             63     66#
L$DESP    002076 G             63#
L$DEVP    002060 G             63#
L$DISP    013574 G             63   1204#
L$DLY     002116 G             63#  1418*  1424   1428*  1429   1436*  1444*  1445   1449
L$DTP     002040 G             63#
L$DTYP    002034 G             63#
L$DU      015252 G             63   1406#
L$DUT     002072 G             63#
L$DVTY    002226 G             63     67#
L$EF      002052 G             63#
L$ENVI    002044 G             63#
L$ETP     002102 G             63#
L$EXP1    002046 G             63#
L$EXP4    002064 G             63#
L$EXP5    002066 G             63#
L$HARD    030624 G             63   3149#
```

```
L$HIME  002120 G          63#
L$HPCP  002016 G          63#
L$HPTP  002022 G          63#
L$HW    013540 G          63    1172#
L$ICP   002104 G          63#
L$INIT  013616 G          63    1213#
L$LADP  002026 G          63#
L$LAST  031342 G          63    3219#
L$LOAD  002100 G          63#
L$LUN   002074 G          63#
L$MREV  002050 G          63#
L$NAME  002000 G          63#
L$PRIO  002042 G          63#
L$PROT  013530 G          63    1163#
L$PRT   002112 G          63#
L$REPP  002062 G          63#
L$REV   002010 G          63#
L$SOFT  031000 G          63    3169#
L$SPC   002056 G          63#
L$SPCP  002020 G          63#
L$SPTP  002024 G          63#
L$STA   002030 G          63#
L$SW    013556 G          63    1183#
L$TEST  002114 G          63#
L$TIML  002014 G          63#
L$UNIT  002012 G          63#   1227    1235    1263
L.BA    003052           436#   2281*   2287    2644
L.CS    003050           435#   1592*   1593*   1594*   1596    1638    1709    2004    2047    2278*   2279*   2280*   2292
                        2442    2570    2644
L.DA    003054           437#   1587*   1589*   1595    1602    2282*   2285*   2286    2584    2644
L.MP    003056           438#   1583    1996    2644
L10000  011770           932#
L10001  012036           946#
L10002  012104           960#
L10003  012154           975#
L10004  012224           990#
L10005  013106          1095#
L10006  013156          1109#
L10007  013252          1131#
L10010  013316          1145#
L10011  013526          1159#
L10013  013554          1172    1179#
L10014  013572          1183    1196#
L10015  014564          1338#
L10016  015122          1379#
L10017  015250          1404#
L10020  015254          1408#
L10021  015602          1463#
L10022  015662          1479#
L10023  026214          2706    2713#
L10024  026176          2705#
L10025  026424          2726    2763#
L10026  026422          2761#
L10027  026634          2774    2810#
L10030  026632          2808#
L10031  027060          2827    2860#
```

```
L10032  027056            2858#
L10033  027266            2901    2908#
L10034  027250            2900#
L10035  027514            2927    2959#
L10036  027512            2957#
L10037  030024            3010    3023#
L10040  027754            3009#
L10041  030322            3072    3082#
L10042  030264            3071#
L10043  030620            3131    3140#
L10044  030566            3130#
L10045  030704            3149    3157#
L10046  031126            3169    3195#
MAJINC  003502             524#   1438*   1452
MAPROX  007153             728#
MBADAD  006022             247     668#
MBADSF  006043             669#
MBSETO= 000001             182#   1725
MCERR   007771             260     780#
MCONHN  006407             686#   1522
MCYLOC  010345             806#   1117    2624
MCYLUP  005560             238     660#
MDATCP  005442             236     653#
MDCRC   010013             782#   1045
MDHEDR  002000 G            58#
MDLT    010040             784#   1049
MDRDY   007760             779#   1910    2018    2172    2487    2686    2885
MDRERR  010102             261     786#
MDRRES  006336             684#   1516
MDRVST  010130             796#   1102
MDSERR  010113             275     795#
MERRS   010550             812#   1033
MEXERS  010513             811#   1491
MFLERR  010272             263     804#
MFMTER  006073             670#
MFOLWR  005630             242     663#
MFWDSK  005701             244     665#
MFWSKO  005732             246     666#
MGTSTA  005430             230     652#
MHCERR  010212             269     800#
MHCRC   010003             781#   1035
MHDERR  010255             264     803#
MHDRCP  005461             237     654#
MHFCRC  010052             785#   1041
MHNF    010024             783#   1039
MININC  003472             520#   1420*   1432
MINOUT  005607             240     662#
MISWI = 000000             102#   3172    3173    3181    3184    3187
MISWIW  013556            1184#   1222*   1245    1300    1941    1948    2751    2823    2848    2923    2947    3033    3037
                          3066    3073    3092    3096    3125    3132
MITEST= 100000             117#   1222
MNDRST  010352             266     807#   2621
MNEERR  010320             262     805#
MNOCLR  006423             687#
MNOINT  006354             685#   1527
MOPER   005527             657#   2581
```

```
MOPERR  010245   265    802#   1032
MORECE  003030   425#   1071*  1078   1081*  1086   1089   1148   1156*  1533*  2079*  2381*  2395   2407
                2414*
MOUTIN  005570   241    661#
MPNAM   006255   679#   2643
MQUALS= 003760   147#
MREAD   005364   234    648#
MREADH  005375   232    649#
MRESKO  005766   245    667#
MREVSK  005650   243    664#
MRLFAL  010442   809#   1614
MRSLT   005536   658#   1033   1153   2620
MSEEK   005360   231    647#
MSPERR  010143   272    797#
MSTERR  010176   271    799#
MTMBS   006120   671#
MTOSLO  006316   683#   1513
MULOAD  005547   239    659#
MUNDEF  010375   808#   1577
MWDERR  010230   268    801#
MWGERR  010161   273    798#
MWORD   006310   682#   1080   1153   1155
MWRCHK  005405   229    650#
MWRITE  005416   233    651#
MWRSET  005513   235    656#
MWRTAB  010501   810#   2467
M40HDR  005477   248    655#
NEWCYL  003116   458#   1125   1675   1677*  1678   1679*  1682*  1686   1688*  1689   1690*  1692   1701
                1835   1843*  1845*  1858   1864   1872   1961   1962*  2090   2246   2528   2678*  2735
                2739*  2740*  2758   2783   2787*  2788*  2805   2833   2837*  2838*  2855   2877*  2934
                2938*  2939*  2954   2973*  2984*  2985   2987*  2989   2991*  2998   3011   3015   3036*
                3039*  3047*  3053   3065*  3068*  3091*  3094*  3106*  3112   3124*  3127*
NOCLR - 000010   154#
NOCTLR  007645   774#   1360
NOERCT  003461   515#   921    993    1532*
NOIRPT= 000002   152#
NOOP  = 000100   127#
NOPWR   006176   675#   1331
NOTRDY  007703   775#   1372
NXMERR= 020000   165#
NXTHL   002322   253#   1283*  1297*  3095
NXTPAS  014036  1258#   1273   1275
OBUFF   004502   536#   1074   2334   2350   2352   2359   2382   2450
OFIN    003154   475#
OFINU   003156   476#
OFMID   003160   477#
OFMIDU  003162   478#
OFOUT   003164   479#
OFOUTU  003166   480#
OLDCYL  003114   457#   1674*  1839*  1960   1961*  2605
ONSWAP  020636  1837    1959#  2737   2785   2835   2936   3000   3055   3114
OPFLAG  003020   421#   1531*  1570*  1604   2078*  2274*  2380*  2391*  2428*  2464   2466*  2469*  2569*
                2574*  2577*  2580*  2588   2590   2598   2603   2606   2798
OPIERR= 002000   170#   1026   1069   1514
OPMSGS  002240   228#   2581   2597   2601
OPR004  007425   762#
```

```
OPR1A   007375          759#
OPR1B   007402          760#
OPR12   007357          758#
ORIN    003170          481#
ORINU   003172          482#
ORMID   003174          483#
ORMIDU  003176          484#
OROUT   003200          485#
OROUTU  003202          486#
OUTINS= 000040          136#    147
O$APTS= 000000            8#     63
O$AU  = 000000            8#     63
O$BGNR= 000000            8#     63
O$BGNS= 000001            8#     56#     63
O$DU  = 000001            8#     56#     63
O$ERRT= 000000            8#     63
O$GNSW= 000001            8#     56#     63
O$POIN= 000001            8#     56#     63
O$SETU= 000000            8#     63     3219
PART1 = ****** U         59     691     741     787     825    1200    1306    1758    3175    3201
PART2 = 000001 G          2#     62     473     707    1203    1815    1966    2064    2233    2327    3171    3180    3192
                       3197   3205    3213
PASCNT  003246          508#
PASNEW  014044         1257   1261#
PASNUM  003454          512#   1236*   1261*
PATTBL  002374          278#   2337
PAT1    005102          278     538#
PAT10   005356          287     632#
PAT2    005104          279     539#
PAT3    005144          280     556#
PAT4    005204          281     573#
PAT5    005244          282     590#
PAT6    005252          283     594#
PAT7    005312          284     611#
PAT8    005314          285     613#
PAT9    005354          286     630#
PH65$   020240         1828   1878#
PNT   = 001000 G          92#
POSHDS  017732         1818#   2675    2728    2776    2820    2874    2920    2969
POSHDO  022030         2141    2143#
POSHSB  022024         2142#
POSHWI  022016         2140#
PRI   = 002000 G          92#
PRIOR = 000004            96#   3155
PRI00 = 000000 G          92#
PRI01 = 000040 G          92#
PRI02 = 000100 G          92#
PRI03 = 000140 G          92#
PRI04 = 000200 G          92#
PRI05 = 000240 G          92#
PRI06 = 000300 G          92#
PRI07 = 000340 G          92#
PSETNM  003456          513#   1243*   1264*   1265*   1268    1334    1365    1377    1494
PWRON   014314         1228    1254    1290    1300#
PWRFLG  003464          517#   1227*   1272    1274*   1318    1398    1400*
P2T03E  006507          708#   2669
```

```
P2T04E  006525            709#  2719
P2T05E  006545            710#  2767
P2T06E  006565            711#  2814
P2T07E  006605            712#  2868
P2T08E  006623            713#  2914
P2T09E  006643            714#  2963
P2T10E  006646            715#  3027
P2T11E  006661            716#  3086
P2T12E  006674            717#
P2T13E  006706            718#
P2T14E  006722            719#
P2T15E  006743            720#
P2T16E  006766            721#
P2T17E  007007            722#
P2T18E  007041            723#
P2T19E  007063            724#
RDALHD  022610           2263#  2753  2800  2850  2949
RDDATA= 000114            125#  2430
RDHEAD= 000110            123#  2007
RDNOHR= 000116            126#
RDYCHK  020276           1726   1892#  2001  2290  2440
RDYWAI  022054           1849   2154#  2695  2745  2792  2843  2894  2943  3004  3043  3059  3102  3118
READRL  016024           1499#  1510  1521  1526  2298
RELDWT= 040000            145#  1570  1604
RESE3   010561            816#  1080  1153  1155  2629
RESE4   010565            817#  1080  1153  1155  2630
RESE5   010572            820#  2633
RESE6   010577            821#  1089  2395
RESPAR  003076            449#  2618  2650  2655
RESTAR  014006           1230   1249#
RESTBL  002334            260#  1060
REVSKO= 001000            140#   147
REVSKS= 000200            138#   147
RLBA  = 000002            157#  1500  1732*  2011*  2287*  2476*
RLBAS   003042            431#  1152  1269  1305  1332  1356  1361  1374  1476  1492  1973  2276  2641
RLCS  = 000000            156#  1011*  1013  1323*  1325  1357  1369*  1370  1391  1393*  1394  1519  1556
                         1607   1733*  2288  2292*  2294  2477*  2682  2881
RLCSR = 000000            162#  1499  1508  1596*  2012*
RLDA  = 000004            158#  1008*  1501  1595*  1731*  2010*  2286*  2475*
RLDRV   003046            433#  1010  1152  1321  1332  1361  1367  1374  1393  1492  1592  1711  1973
                         2005   2279  2444  2641
RLMP  = 000006            159#  1017  1502  2038  2039  2277  2474*
RLVEC   003044            432#  1303  1397
RORWOP= 020000            144#  2569  2577  2580  2606
RPTOP   024514            925    937   951   965   980  1000  1100  1115  1136  1151  2559#
RPTREM  025510            929    943   957   972   987  1063  1106  1127  1142  2641#
RPTRES  025302            928    942   956   971   986  1061  1105  1126  1141  2615#
RSTRT   013724           1236#  1251
SAMSK = 000077            178#
SBSFIL  003512            532#  1975*  2525
SECQ    031142           3173   3199#
SECWD   007461            766#  2608
SFEK  = 000106            122#  1710
SEEKOP= 010000            143#  2569  2574  2603
SEQMES  007514            770#  2563
SETDON  014072           1248   1260  1265#
```

```
SETPRM  030776 G      3168#
SGNLD   007450         764#  2605
SKTMES  007073         725#
SPDSTA= 004000         207#  1566
SPTCOD  013554 G      1182#
SRTMES  007105         726#
SSINDX  003016         418#  1224*  1546  1550*  1643*  1661  1665*  1746*  1819  1823*  1878*  1893  1897*
                      1926*  1985  1989*  2052*  2068  2072*  2125*  2155  2159*  2190*  2206  2210*  2222*
                      2237   2241*  2251*  2264  2268*  2314*  2372  2376*  2396*  2432  2436*  2504*  2560
                      2506
STAMES  007537         771#  1066
STAMSK= 000007         199#  1601
STATE2  010604         822#
STATE3  010614         823#
STATE5  010624         824#
STOSTA= 010000         208#
SUBSTK  002420         291#  1548*  1549*  1663*  1664*  1821*  1822*  1895*  1896*  1987*  1988*  2070*  2071*
                      2157*  2158*  2208*  2209*  2239*  2240*  2266*  2267*  2374*  2375*  2434*  2435*  2564
SVCBGL- 000001          11#
SVCGBL  000000          8#    58    63    66    67    90   224   645   875   920   934   948   962
                       977   992  1097  1111  1133  1146  1163  1171  1172  1182  1183  1199  1204
                      1212  1213  1352  1385  1386  1406  1415  2666  3148  3149  3168  3169  3219#
SVCINS  000000          8#    12#   63    66    67   932   946   960   975   990  1033  1066  1080
                      1089  1095  1109  1131  1145  1152  1153  1155  1159  1172  1183  1204  1217
                      1218  1220  1221  1225  1226  1229  1230  1250  1251  1253  1254  1256  1257
                      1270  1271  1303  1304  1331  1332  1333  1334  1335  1338  1354  1360  1361
                      1363  1365  1372  1374  1376  1377  1378  1379  1388  1390  1397  1401  1402
                      1404  1408  1422  1423  1424  1429  1442  1443  1445  1449  1463  1479  1489
                      1490  1491  1492  1493  1494  1495  1578  1615  1628  1634  1739  1744  1830
                      1831  1832  1853  1869  1877  1912  1923  1972  1973  1974  2020  2031  2035
                      2043  2092  2104  2111  2173  2183  2187  2248  2301  2306  2395  2410  2468
                      2483  2489  2498  2502  2563  2564  2568  2581  2597  2601  2605  2608  2620
                      2629  2630  2633  2641  2643  2644  2645  2677  2688  2702  2705  2706  2713
                      2726  2730  2733  2734  2761  2763  2774  2778  2781  2782  2808  2810  2827
                      2829  2831  2832  2858  2860  2876  2887  2900  2901  2908  2927  2929  2932
                      2933  2957  2959  2993  2994  2995  3009  3010  3023  3048  3049  3050  3071
                      3072  3082  3107  3108  3109  3130  3131  3140  3149  3150  3151  3152  3153
                      3154  3155  3157  3169  3172  3173  3181  3182  3183  3184  3185  3186  3187
                      3188  3189  3191  3193  3195  3219
SVCSUB= 000001          8#    10#  2677  2730  2778  2829  2876  2929  2993  3048  3107
SVCTAG= 000000          8#    13#   932   946   960   975   990  1095  1109  1131  1145  1159  1179
                      1196  1338  1379  1404  1408  1463  1479  1877  2705  2713  2761  2763  2808
                      2810  2858  2860  2900  2908  2957  2959  3009  3023  3071  3082  3130  3140
                      3157  3195
SVCTST= 000001          8#    9#  2667  2718  2766  2813  2866  2913  2962  3026  3085
SWAPHD  020576         1948#  2707  2902  3019  3078  3136
SSLSYM= 010000          8#   932#  946#  960#  975#  990#  1095#  1109#  1131#  1145#  1159#  1179#  1196#
                      1338#  1379#  1404#  1408#  1463#  1479#  1830#  2705#  2713#  2761#  2763#  2808#  2810#
                      2858#  2860#  2900#  2908#  2957#  2959#  3009#  3023#  3071#  3082#  3130#  3140#  3157#
                      3195#
TAG     003500         523#
TBLSTR  003040         429#
TBT     002560         331#
TCERR   007624         773#  1089  2395
TEMP    003474         521#  1452*  1477*
TEMP0   003132         464#  1432*  1477*  2081
```

```
TEMP1   003134   465# 1657* 1659* 1729 2420* 2422* 2461 2472
TEMP2   003136   466#
TEMP3   003140   467# 1003* 1018* 1019 1064 1066
TEMP4   003142   468# 1537 1538* 1540 1541* 1543 1544* 1554 1580 1589 1636 1647* 1981*
                 1983* 1994 2045
TEMP5   003144   469#
TEMP6   003146   470#
TEMP7   003150   471# 2423* 2430* 2443
TEMP8   003152   472#
TIME    015256  1012 1418# 1597 1617 1734 1907 2013 2170 2478 2692 2891
TIM.US  003476   522# 1419* 1437*
TOSLOW= 000001   151#
TRPFLG  003462   516# 1353* 1358 1461*
TRPHAN  015576  1354 1388 1461#
TSTINT  016214  1531# 2670 2720 2768 2815 2869 2915 2964 3028 3087
TSTLAB  006501   690# 2568
TYPDR = 000006    97# 3154
T$ARGC= 000010    63# 1033# 1066# 1080# 1089# 1152# 1153# 1155# 1331# 1332# 1333# 1360# 1361#
                1363# 1372# 1374# 1376# 1491# 1492# 1493# 1972# 1973# 1974# 2395# 2563# 2564#
                2568# 2581# 2597# 2601# 2605# 2608# 2620# 2629# 2630# 2633# 2641# 2643# 2644#
                2645#
T$CODE= 005052  3150# 3151# 3152# 3153# 3154# 3155# 3172# 3173# 3181# 3182# 3183# 3184# 3185#
                3186# 3187# 3188# 3189# 3191# 3193#
T$ERRN= 001275     8# 1578# 1615# 1628# 1634# 1739# 1744# 1853# 1869# 1912# 1923# 2020# 2031#
                2035# 2043# 2092# 2104# 2111# 2173# 2183# 2187# 2248# 2301# 2306# 2410# 2468#
                2483# 2489# 2498# 2502# 2688# 2702# 2887#
T$EXCP= 000000  3151# 3152# 3153# 3155# 3183# 3186# 3189# 3191# 3193#
T$FLAG= 000040  2706# 2726# 2774# 2827# 2901# 2927# 3010# 3072# 3131#
T$GMAN= 000000     8#
T$HILI= 000377  3151# 3152# 3153# 3155# 3183# 3186# 3189# 3191# 3193#
T$LAST= 000001     8# 3219#
T$LOLI= 000001  3151# 3152# 3153# 3155# 3183# 3186# 3189# 3191# 3193#
T$LSYM= 010000     8#  932  946  960  975  990 1095 1109 1131 1145 1159 1179 1196
                1338 1379 1404 1408 1463 1479 2705 2713 2761 2763 2808 2810 2858
                2860 2900 2908 2957 2959 3009 3023 3071 3082 3130 3140 3157 3195
T$LTNO= 000011  3219#
T$NEST= 177777     8#   58#   65#   90#  218#  224#  634#  645#  866#  875#  920#  932#  934#
                 946#  948#  960#  962#  975#  977#  990#  992# 1095# 1097# 1109# 1111# 1131#
                1133# 1145# 1146# 1159# 1160# 1163# 1167# 1171# 1172# 1179# 1180# 1182# 1183#
                1196# 1197# 1199# 1206# 1212# 1213# 1338# 1339# 1352# 1379# 1385# 1386# 1404#
                1406# 1408# 1410# 1415# 1457# 1463# 1465# 1479# 1830# 1877# 2659# 2666# 2667#
                2677# 2705# 2713# 2718# 2730# 2761# 2763# 2766# 2778# 2808# 2810# 2813# 2829#
                2858# 2860# 2866# 2876# 2900# 2908# 2913# 2929# 2957# 2959# 2962# 2993# 3009#
                3023# 3026# 3048# 3071# 3082# 3085# 3107# 3130# 3140# 3142# 3148# 3149# 3157#
                3165# 3168# 3169# 3182  3185  3188  3195# 3217#
T$NS0 = 000000    58#   65    90#  218   224#  634   645#  866   875#  1160  1163# 1167  1171#
                1180  1182# 1197  1199# 1206  1212# 1339  1352# 1379  1385# 1410  1415# 2659
                2666# 3142  3148# 3165  3168# 3217
T$NS1 = 000005   920#  932   934#  946   948#  960   962#  975   977#  990   992# 1095  1097#
                1109  1111# 1131  1133# 1145  1146# 1159  1172# 1179  1183# 1196  1213# 1338
                1386# 1404  1406# 1408  1457# 1463  1465# 1479  1830# 1877  2667# 2713  2718#
                2763  2766# 2810  2813# 2860  2866# 2908  2913# 2959  2962# 3023  3026# 3082
                3085# 3140  3149# 3157  3169# 3182  3185  3188  3195
T$NS2 = 000002  2677# 2705  2730# 2761  2778# 2808  2829# 2858  2876# 2900  2929# 2957  2993#
                3009  3048# 3071  3107# 3130
T$PTNU= 000000     8#
```

```
T$SAVL= 177777          8#
T$SEGL= 177777          8#  1830#  1877#
T$SEKO= 010000       1830#  1877
T$SUBN= 000001          8#  2667#  2677#  2718#  2730#  2766#  2778#  2813#  2829#  2866#  2876#  2913#  2929#
                     2962#  2993#  3026#  3048#  3085#  3107#
T$TAGL= 177777          8#
T$TAGN= 010047          8#   920#   934#   948#   962#   977#   992#  1097#  1111#  1133#  1146#  1163#  1172#
                     1183#  1213#  1352#  1386#  1406#  1457#  1465#  2067#  2677#  2718#  2730#  2766#  2778#
                     2813#  2829#  2866#  2876#  2913#  2929#  2962#  2993#  3026#  3048#  3085#  3107#  3149#
                     3169#
T$TEMP= 000000         65#   218#   634#   866#   932#   946#   960#   975#   990#  1095#  1109#  1131#  1145#
                     1159#  1160#  1167#  1179#  1180#  1196#  1197#  1204#  1206#  1338#  1339#  1379#  1404#
                     1408#  1410#  1463#  1479#  1877#  2659#  2705#  2706#  2713#  2726#  2761#  2763#  2774#
                     2808#  2810#  2827#  2858#  2860#  2900#  2901#  2908#  2927#  2957#  2959#  3009#  3010#
                     3023#  3071#  3072#  3082#  3130#  3131#  3140#  3142#  3150#  3151#  3152#  3153#  3154#
                     3155#  3157#  3165#  3172#  3173#  3181#  3183#  3184#  3186#  3187#  3189#  3191#  3193#
                     3195#  3217#
T$TEST= 000011          8#  2667#  2677   2718#  2730   2766#  2778   2813#  2829   2866#  2876   2913#  2929
                     2962#  2993   3026#  3048   3085#  3107   3219
T$TSTM= 177777          8#   932    946    960    975    990   1033   1066   1080   1089   1095   1109   1131
                     1145   1152   1153   1155   1159   1217   1220   1221   1225   1229   1250   1253   1256
                     1270   1303   1304   1331   1332   1333   1334   1335   1338   1354   1360   1361   1363
                     1365   1372   1374   1376   1377   1378   1379   1388   1390   1397   1401   1402   1404
                     1408   1422   1442   1489   1491   1492   1493   1494   1495   1578   1615   1628   1634
                     1739   1744   1830   1831   1853   1869   1877   1912   1923   1972   1973   1974   2020
                     2031   2035   2043   2092   2104   2111   2173   2183   2187   2248   2301   2306   2395
                     2410   2468   2483   2489   2498   2502   2563   2564   2568   2581   2597   2601   2605
                     2608   2620   2629   2630   2633   2641   2643   2644   2645   2677   2688   2702   2705
                     2706   2713   2726   2730   2733   2761   2763   2774   2778   2781   2808   2810   2827
                     2829   2831   2858   2860   2876   2887   2900   2901   2908   2927   2929   2932   2957
                     2959   2993   2994   3009   3010   3023   3048   3049   3071   3072   3082   3107   3108
                     3130   3131   3140
T$TSTS= 000001          8#  2667#  2718#  2766#  2813#  2866#  2913#  2962#  3026#  3085#
T$$AUT= 010016       1352#  1379
T$$CLE= 010017       1386#  1404
T$$DU = 010020       1406#  1408
T$$HAR= 010045       3149#  3157
T$$HW = 010013       1172#  1179
T$$INI= 010015       1213#  1338
T$$MSG= 010011        920#   932    934#   946    948#   960    962#   975    977#   990    992#  1095  1097#
                     1109   1111#  1131   1133#  1145   1146#  1159
T$$PRO= 010012       1163#
T$$SEG= 010000       1830#  1877#
T$$SOF= 010046       3169#  3195
T$$SRV= 010022       1457#  1463   1465#  1479
T$$SUB= 010044       2677#  2705   2730#  2761   2778#  2808   2829#  2858   2876#  2900   2929#  2957  2993#
                     3009   3048#  3071   3107#  3130
T$$SW = 010014       1183#  1196
T$$TES= 010043       2667#  2706   2713   2718#  2726   2763   2766#  2774   2810   2813#  2827   2860  2866#
                     2901   2908   2913#  2927   2959   2962#  3010   3023   3026#  3072   3082   3085#  3131
                     3140
T.BA    003062        440#  1472*  1500*  2645
T.CS    003060        439#  1004   1023   1067   1069   1471*  1499*  1514   1562   1572   1620   1626  1742
                     1851   1905   1916   1921   2016   2024   2033   2166   2177   2185   2304   2485  2493
                     2500   2645
T.DA    003064        441#  1473*  1501*  2645
```

```
T.DRIV  002312            249#  1279*  1281  1680  1705  2975
T.MP    003066            442#  1021   1474* 1502* 1564  1566  1600  1622  2142  2645
T.STAT  003074            447#  1103   1600* 1601*
T1      025774 G    1204  2067#
T1.1    026030      2677#
T1965$  026214      2672  2676   2711#
T197$   026020      2674#  2709
T2      026216 G    1204  2718#
T2.1    026266      2730#
T206$   026270      2731#  2759
T2065$  026424      2722  2729   2762#
T216$   026500      2779#  2806
T2165$  026634      2770  2777   2809#
T2265$  027060      2817  2821   2859#
T227$   026726      2830#  2856
T233$   027106      2873#  2904
T2365$  027266      2871  2875   2906#
T2465$  027514      2917  2921   2958#
T247$   027360      2930#  2955
T25TBL  002444       303#  2974
T25TB2  002472       316#  2977
T2517$  030014      2983  3019#
T256$   027554      2971#  3021
T2565$  030024      2966  2970   2972  3020  3022#
T257$   027626      2984#  3014   3016
T258$   027574      2975#
T2588$  027610      2976  2979#  3018
T266$   030052      3032#  3080
T2665$  030322      3030  3041   3044  3046  3079  3081#
T267$   030134      3045#  3077
T275$   030350      3091#  3138
T276$   030434      3104#  3135
T2765$  030620      3089  3100   3103  3105  3137  3139#
T3      026426 G    1204  2766#
T3.1    026476      2778#
T33TBL  002520       330#
T4      026636 G    1204  2813#
T4.1    026724      2829#
T5      027062 G    1204  2866#
T5.1    027120      2876#
T6      027270 G    1204  2913#
T6.1    027356      2929#
T7      027516 G    1204  2962#
T7.1    027670      2993#
T8      030026 G    1204  3026#
T8.1    030146      3048#
T9      030324 G    1204  3085#
T9.1    030446      3107#
UAM   = 000200 G     92#
ULOAD = 000010       134#
UNDTST  007412       761#
UNXERR  006464       689#  1630
VALDES  007127       727#
VCNRST  006443       688#  1624
VCSTAT= 001000       205#  1622
VECMSG  030720      3152  3160#
```

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VECT  = 000002            95#  3152
VERHDR  021460          2067#  2755  2802  2852  2951
VERPOS  022466          2236#  2748  2795  2845  2897  2945  3006  3061  3120
WAITIN  016056          1506#  1632  1737  2041  2299  2481
WCMSK = 017777           191#
WCRNG = 160000           192#
WDESTA= 100000           211#  1566
WGESTA= 002000           206#
WLSTAT= 020000           209#
WRTSWI  003036           428#
WTDATA= 000112           124#  2423
XDELAY  003466           518#  1012*  1420  1421*  1425*  1430*  1477*  1597*  1617*  1734*  1907*  2013*  2170*
                        2478*  2692*  2891*
XRDHD   021024          1983#  2213
XRDHDC  021014          1981#
XRDHDG  021030          1982   1984#
XREAD   023646          2430#
XREADG  023654          2429   2431#
XSEEK   017160          1659#  1846  2679  2742  2789  2840  2878  2940  3001  3040  3056  3099  3115
XSEEKT  017150          1657#
XSEEK1  017164          1658   1660#
XTIME   015422          1328   1396  1436#  1518  1558  1574  1609  1918  2179
XWRITE  023606          2422#
XWRITT  023576          2420#
XWRIT1  023612          2421   2423#
X$ALWA= 000000             8#
X$FALS= 000040             8#  3182  3185  3188
X$OFFS= 000400             8#  3182  3185  3188
X$TRUE= 000020             8#
YDELAY  003470           519#  1328*  1396*  1438  1439*  1440*  1441*  1446*  1450*  1477*  1518*  1558*  1574*
                        1609*  1918*  2179*
.     - 031342             5#    66#   330#   331#   511#   532#   533#   535#   536#   869#  1424  1429  1445
                        1449  2706  2726  2774  2827  2901  2927  3010  3072  3131  3166#  3182  3185
                        3188  3216#
```

```
ABORTW    30#  1477
BCOMPL   1251  1254  1257  1271  1423  1490
BGNAUT   1352
BGNCLN   1386
BGNDU    1406
BGNHRD   3149
BGNHW    1172
BGNINI   1213
BGNMOD     58    90   224   645   875  1171  1182  1199  1212  1385  1415  2666  3148  3168
BGNMSG    920   934   948   962   977   992  1097  1111  1133  1146
BGNPRO   1163
BGNSEG   1830
BGNSFT   3169
BGNSRV   1457  1465
BGNSUB   2677  2730  2778  2829  2876  2929  2993  3048  3107
BGNSW    1183
BGNTST   2667  2718  2766  2813  2866  2913  2962  3026  3085
BNCOMP   1218  1226  1230  1443  1832  2734  2782  2832  2933  2995  3050  3109
BRESET   1221  1402
CLOCK    1217
CLRVEC   1378  1397  1401
DELAY    1424  1429  1445  1449
DESCRI     66
DEVTYP     67
DISPAT   1204
DOCLN    1335  1495
DODU     1334  1365  1377  1494
ENDAUT   1379
ENDCLN   1404
ENDDU    1408
ENDHRD   3157
ENDHW    1179
ENDINI   1338
ENDMOD     65   218   634   866  1160  1180  1197  1206  1339  1410  2659  3142  3165  3217
ENDMSG    932   946   960   975   990  1095  1109  1131  1145  1159
ENDPRO   1167
ENDSEG   1877
ENDSFT   3195
ENDSRV   1463  1479
ENDSUB   2705  2761  2808  2858  2900  2957  3009  3071  3130
ENDSW    1196
ENDTST   2713  2763  2810  2860  2908  2959  3023  3082  3140
EQUALS     92
ERRHRD   1578  1615  1628  1634  1739  1744  1853  1869  1912  1923  2020  2031  2035  2043  2092
         2104  2111  2173  2183  2187  2248  2301  2306  2410  2468  2483  2489  2498  2502  2688
         2702  2887
ESCAPE   2706  2901  3010  3072  3131
EXIT     2726  2774  2827  2927
GETTIM    37#
GPHARD   1270
GPRMA    3151  3152
GPRMD    3153  3155  3183  3186  3189  3191  3193
GPRML    3150  3154  3172  3173  3181  3184  3187
HEADER     63
INLOOP   1489  1831  2733  2781  2831  2932  2994  3049  3108
LASTAD   3219
```

```
M$BYTE    63#
M$CHEC  2726#  2774#  2827#  2927#
M$CNTO  3150#  3151#  3152#  3153#  3154#  3155#  3172#  3173#  3181#  3183#  3184#  3186#  3187#  3189#  3191#
        3193#
M$COUN  1033#  1066#  1080#  1089#  1152#  1153#  1155#  1331#  1332#  1333#  1360#  1361#  1363#  1372#  1374#
        1376#  1491#  1492#  1493#  1972#  1973#  1974#  2395#  2563#  2564#  2568#  2581#  2597#  2601#  2605#
        2608#  2620#  2629#  2630#  2633#  2641#  2643#  2644#  2645#
M$DATA    63#    66#    67#
M$DECR    65#   218#   634#   866#   932#   946#   960#   975#   990#  1095#  1109#  1131#  1145#  1159#  1160#
        1167#  1179#  1180#  1196#  1197#  1206#  1338#  1339#  1379#  1404#  1408#  1410#  1463#  1479#  1877#
        2659#  2705#  2713#  2761#  2763#  2808#  2810#  2858#  2860#  2900#  2908#  2957#  2959#  3009#  3023#
        3071#  3082#  3130#  3140#  3142#  3157#  3165#  3195#  3217#
M$DEFA  3150#  3151#  3152#  3153#  3154#  3155#  3172#  3173#  3181#  3183#  3184#  3186#  3187#  3189#  3191#
        3193#
M$ENDE    65#   218#   634#   866#   932#   946#   960#   975#   990#  1095#  1109#  1131#  1145#  1159#  1160#
        1179#  1180#  1196#  1197#  1206#  1338#  1339#  1379#  1404#  1408#  1410#  1463#  1479#  1877#  2659#
        2705#  2713#  2761#  2763#  2808#  2810#  2858#  2860#  2900#  2908#  2957#  2959#  3009#  3023#  3071#
        3082#  3130#  3140#  3142#  3157#  3165#  3195#  3217#
M$ERRI  1578#  1615#  1628#  1634#  1739#  1744#  1853#  1869#  1912#  1923#  2020#  2031#  2035#  2043#  2092#
        2104#  2111#  2173#  2183#  2187#  2248#  2301#  2306#  2410#  2468#  2483#  2489#  2498#  2502#  2688#
        2702#  2887#
M$ESCA  2706#  2901#  3010#  3072#  3131#
M$ESCS  2706#  2901#  3010#  3072#  3131#
M$EXCP  3151#  3152#  3153#  3155#  3183#  3186#  3189#  3191#  3193#
M$EXIT  2726#  2774#  2827#  2927#
M$EXSE  2726#  2774#  2827#  2927#
M$EXTJ  2726#  2774#  2827#  2927#
M$GEN     58#    63#    66#    67#    90#   224#   645#   875#   920#   932#   934#   946#   948#   960#   962#
         975#   977#   990#   992#  1095#  1097#  1109#  1111#  1131#  1133#  1145#  1146#  1159#  1163#  1171#
        1172#  1179#  1182#  1183#  1196#  1199#  1204#  1212#  1213#  1338#  1352#  1379#  1385#  1386#  1404#
        1406#  1408#  1415#  1457#  1463#  1465#  1479#  1877#  2666#  2667#  2677#  2705#  2713#  2718#  2730#
        2761#  2763#  2766#  2778#  2808#  2810#  2813#  2829#  2858#  2860#  2866#  2876#  2900#  2908#  2913#
        2929#  2957#  2959#  2962#  2993#  3009#  3023#  3026#  3048#  3071#  3082#  3085#  3107#  3130#  3140#
        3148#  3149#  3157#  3168#  3169#  3195#  3219#
M$GETS    65#   218#   634#   866#   932#   946#   960#   975#   990#  1095#  1109#  1131#  1145#  1159#  1160#
        1167#  1179#  1180#  1196#  1197#  1206#  1338#  1339#  1379#  1404#  1408#  1410#  1463#  1479#  1877#
        2659#  2705#  2713#  2761#  2763#  2808#  2810#  2858#  2860#  2900#  2908#  2957#  2959#  3009#  3023#
        3071#  3082#  3130#  3140#  3142#  3157#  3165#  3182#  3185#  3188#  3195#  3217#
M$GETT  2706#  2726#  2774#  2827#  2901#  2927#  3010#  3072#  3131#  3182#  3185#  3188#
M$GNGB    58#    63#    66#    67#    90#   224#   645#   875#   920#   934#   948#   962#   977#   992#  1097#
        1111#  1133#  1146#  1163#  1171#  1172#  1182#  1183#  1199#  1204#  1212#  1213#  1352#  1385#  1386#
        1406#  1415#  1457#  1465#  2666#  3148#  3149#  3168#  3169#  3219#
M$GNIN    63#    66#    67#   932#   946#   960#   975#   990#  1033#  1066#  1080#  1089#  1095#  1109#  1131#
        1145#  1152#  1153#  1155#  1159#  1172#  1183#  1204#  1217#  1218#  1220#  1221#  1225#  1226#  1229#
        1230#  1250#  1251#  1253#  1254#  1256#  1257#  1270#  1271#  1303#  1304#  1331#  1332#  1333#  1334#
        1335#  1338#  1354#  1360#  1361#  1363#  1365#  1372#  1374#  1376#  1377#  1378#  1379#  1388#  1390#
        1397#  1401#  1402#  1404#  1408#  1422#  1423#  1424#  1429#  1442#  1443#  1445#  1449#  1463#  1479#
        1489#  1490#  1491#  1492#  1493#  1494#  1495#  1578#  1615#  1628#  1634#  1739#  1744#  1830#  1831#
        1832#  1853#  1869#  1877#  1912#  1923#  1972#  1973#  1974#  2020#  2031#  2035#  2043#  2092#  2104#
        2111#  2173#  2183#  2187#  2248#  2301#  2306#  2395#  2410#  2468#  2483#  2489#  2498#  2502#  2563#
        2564#  2568#  2581#  2597#  2601#  2605#  2608#  2620#  2629#  2630#  2633#  2641#  2643#  2644#  2645#
        2677#  2688#  2702#  2705#  2706#  2713#  2726#  2730#  2733#  2734#  2761#  2763#  2774#  2778#  2781#
        2782#  2808#  2810#  2827#  2829#  2831#  2832#  2858#  2860#  2876#  2887#  2900#  2901#  2908#  2927#
        2929#  2932#  2933#  2957#  2959#  2993#  2994#  2995#  3009#  3010#  3023#  3048#  3049#  3050#  3071#
        3072#  3082#  3107#  3108#  3109#  3130#  3131#  3140#  3149#  3150#  3151#  3152#  3153#  3154#  3155#
        3169#  3172#  3173#  3181#  3182#  3183#  3184#  3185#  3186#  3187#  3188#  3189#  3191#  3193#
```

```
        3195#  3219#
M$GNLS  1877#
M$GNSU  2677#  2730#  2778#  2829#  2876#  2929#  2993#  3048#  3107#
M$GNTA   932#   946#   960#   975#   990#  1095#  1109#  1131#  1145#  1159#  1179#  1196#  1338#  1379#  1404#
        1408#  1463#  1479#  2705#  2713#  2761#  2763#  2808#  2810#  2858#  2860#  2900#  2908#  2957#  2959#
        3009#  3023#  3071#  3082#  3130#  3140#  3157#  3195#
M$GNTE  2667#  2718#  2766#  2813#  2866#  2913#  2962#  3026#  3085#
M$HAPT    63#
M$HNAP    63#
M$INCR    58#    90#   224#   645#   875#   920#   932#   934#   946#   948#   960#   962#   975#   977#   990#
         992#  1033#  1066#  1080#  1089#  1095#  1097#  1109#  1111#  1131#  1133#  1145#  1146#  1152#  1153#
        1155#  1159#  1163#  1171#  1172#  1182#  1183#  1199#  1212#  1213#  1217#  1220#  1221#  1225#  1229#
        1250#  1253#  1256#  1270#  1303#  1304#  1331#  1332#  1333#  1334#  1335#  1338#  1352#  1354#  1360#
        1361#  1363#  1365#  1372#  1374#  1376#  1377#  1378#  1379#  1385#  1386#  1388#  1390#  1397#  1401#
        1402#  1404#  1406#  1408#  1415#  1422#  1442#  1457#  1465#  1489#  1491#  1492#  1493#  1494#  1495#
        1578#  1615#  1628#  1634#  1739#  1744#  1830#  1831#  1853#  1869#  1877#  1912#  1923#  1972#  1973#
        1974#  2020#  2031#  2035#  2043#  2092#  2104#  2111#  2173#  2183#  2187#  2248#  2301#  2306#  2395#
        2410#  2468#  2483#  2489#  2498#  2502#  2563#  2564#  2568#  2581#  2597#  2601#  2605#  2608#  2620#
        2529#  2630#  2633#  2641#  2643#  2644#  2645#  2666#  2667#  2677#  2688#  2702#  2705#  2706#  2713#
        2718#  2726#  2730#  2733#  2761#  2763#  2766#  2774#  2778#  2781#  2808#  2810#  2813#  2827#  2829#
        2831#  2858#  2860#  2866#  2876#  2887#  2900#  2901#  2908#  2913#  2927#  2929#  2932#  2957#  2959#
        2962#  2993#  2994#  3009#  3010#  3023#  3026#  3048#  3049#  3071#  3072#  3082#  3085#  3107#  3108#
        3130#  3131#  3140#  3148#  3149#  3168#  3169#
M$LDRO  1217#  1220#  1225#  1229#  1250#  1253#  1256#  1270#  1304#  1334#  1365#  1377#  1378#  1390#  1397#
        1401#  1494#
M$MCHI    8#
M$MCLO    8#
M$POP     65#   218#   634#   866#   932#   946#   960#   975#   990#  1095#  1109#  1131#  1145#  1159#  1160#
        1167#  1179#  1180#  1196#  1197#  1206#  1338#  1339#  1379#  1404#  1408#  1410#  1463#  1479#  1877#
        2659#  2705#  2713#  2761#  2763#  2808#  2810#  2858#  2860#  2900#  2908#  2957#  2959#  3009#  3023#
        3071#  3082#  3130#  3140#  3142#  3157#  3165#  3195#  3217#
M$PRIN  1033#  1066#  1080#  1089#  1152#  1153#  1155#  1331#  1332#  1333#  1360#  1361#  1363#  1372#  1374#
        1376#  1491#  1492#  1493#  1972#  1973#  1974#  2395#  2563#  2564#  2568#  2581#  2597#  2601#  2605#
        2608#  2620#  2629#  2630#  2633#  2641#  2643#  2644#  2645#
M$PUSH    58#    90#   224#   645#   875#   920#   934#   948#   962#   977#   992#  1097#  1111#  1133#  1146#
        1163#  1171#  1172#  1182#  1183#  1199#  1212#  1213#  1352#  1385#  1386#  1406#  1415#  1457#  1465#
        1830#  2666#  2667#  2677#  2718#  2730#  2766#  2778#  2813#  2829#  2866#  2876#  2913#  2929#  2962#
        2993#  3026#  3048#  3085#  3107#  3148#  3149#  3168#  3169#
M$PUT   1033#  1066#  1080#  1089#  1152#  1153#  1155#  1303#  1331#  1332#  1333#  1354#  1360#  1361#  1363#
        1372#  1374#  1376#  1388#  1491#  1492#  1493#  1972#  1973#  1974#  2395#  2563#  2564#  2568#  2581#
        2597#  2601#  2605#  2608#  2620#  2629#  2630#  2633#  2641#  2643#  2644#  2645#
M$PUT1  1033#  1066#  1080#  1089#  1152#  1153#  1155#  1303#  1331#  1332#  1333#  1354#  1360#  1361#  1363#
        1372#  1374#  1376#  1388#  1491#  1492#  1493#  1972#  1973#  1974#  2395#  2563#  2564#  2568#  2581#
        2597#  2601#  2605#  2608#  2620#  2629#  2630#  2633#  2641#  2643#  2644#  2645#
M$RADI  3150#  3151#  3152#  3153#  3154#  3155#  3172#  3173#  3181#  3183#  3184#  3186#  3187#  3189#  3191#
        3193#
M$RNRO  1217#  1270#
M$SETS    58#    90#   224#   645#   875#   920#   934#   948#   962#   977#   992#  1097#  1111#  1133#  1146#
        1163#  1171#  1172#  1182#  1183#  1199#  1212#  1213#  1352#  1385#  1386#  1406#  1415#  1457#  1465#
        1830#  2666#  2667#  2677#  2718#  2730#  2766#  2778#  2813#  2829#  2866#  2876#  2913#  2929#  2962#
        2993#  3026#  3048#  3085#  3107#  3148#  3149#  3168#  3169#
M$SVC    932#   946#   960#   975#   990#  1033#  1066#  1080#  1089#  1095#  1109#  1131#  1145#  1152#  1153#
        1155#  1159#  1217#  1220#  1221#  1225#  1229#  1250#  1253#  1256#  1270#  1303#  1304#  1331#  1332#
        1333#  1334#  1335#  1338#  1354#  1360#  1361#  1363#  1365#  1372#  1374#  1376#  1377#  1378#  1379#
        1388#  1390#  1397#  1401#  1402#  1404#  1408#  1422#  1442#  1489#  1491#  1492#  1493#  1494#  1495#
        1578   1615   1628   1634   1739   1744   1830#  1831#  1853   1869   1877#  1912   1923   1972#  1973#
```

```
                1974#  2020   2031   2035   2043   2092   2104   2111   2173   2183   2187   2248   2301   2306   2395#
                2410   2468   2483   2489   2498   2502   2563#  2564#  2568#  2581#  2597#  2601#  2605#  2608#  2620#
                2629#  2630#  2633#  2641#  2643#  2644#  2645#  2677#  2688   2702   2705#  2706#  2713#  2726#  2730#
                2733#  2761#  2763#  2774#  2778#  2781#  2808#  2810#  2827#  2829#  2831#  2858#  2860#  2876#  2887
                2900#  2901#  2908#  2927#  2929#  2932#  2957#  2959#  2993#  2994#  3009#  3010#  3023#  3048#  3049#
                3071#  3072#  3082#  3107#  3108#  3130#  3131#  3140#
M$TLAB           932#   946#   960#   975#   990#  1033#  1066#  1080#  1089#  1095#  1109#  1131#  1145#  1152#  1153#
                1155#  1159#  1217#  1220#  1221#  1225#  1229#  1250#  1253#  1256#  1270#  1303#  1304#  1331#  1332#
                1333#  1334#  1335#  1338#  1354#  1360#  1361#  1363#  1365#  1372#  1374#  1376#  1377#  1378#  1379#
                1388#  1390#  1397#  1401#  1402#  1404#  1408#  1422#  1442#  1489#  1491#  1492#  1493#  1494#  1495#
                1578#  1615#  1628#  1634#  1739#  1744#  1830#  1831#  1853#  1869#  1877#  1912#  1923#  1972#  1973#
                1974#  2020#  2031#  2035#  2043#  2092#  2104#  2111#  2173#  2183#  2187#  2248#  2301#  2306#  2395#
                2410#  2468#  2483#  2489#  2498#  2502#  2563#  2564#  2568#  2581#  2597#  2601#  2605#  2608#  2620#
                2629#  2630#  2633#  2641#  2643#  2644#  2645#  2677#  2688#  2702#  2705#  2706#  2713#  2726#  2730#
                2733#  2761#  2763#  2774#  2778#  2781#  2808#  2810#  2827#  2829#  2831#  2858#  2860#  2876#  2887#
                2900#  2901#  2908#  2927#  2929#  2932#  2957#  2959#  2993#  2994#  3009#  3010#  3023#  3048#  3049#
                3071#  3072#  3082#  3107#  3108#  3130#  3131#  3140#
M$TSTL           932#   946#   960#   975#   990#  1033#  1066#  1080#  1089#  1095#  1109#  1131#  1145#  1152#  1153#
                1155#  1159#  1217#  1220#  1221#  1225#  1229#  1250#  1253#  1256#  1270#  1303#  1304#  1331#  1332#
                1333#  1334#  1335#  1338#  1354#  1360#  1361#  1363#  1365#  1372#  1374#  1376#  1377#  1378#  1379#
                1388#  1390#  1397#  1401#  1402#  1404#  1408#  1422#  1442#  1489#  1491#  1492#  1493#  1494#  1495#
                1578#  1615#  1628#  1634#  1739#  1744#  1830#  1831#  1853#  1869#  1877#  1912#  1923#  1972#  1973#
                1974#  2020#  2031#  2035#  2043#  2092#  2104#  2111#  2173#  2183#  2187#  2248#  2301#  2306#  2395#
                2410#  2468#  2483#  2489#  2498#  2502#  2563#  2564#  2568#  2581#  2597#  2601#  2605#  2608#  2620#
                2629#  2630#  2633#  2641#  2643#  2644#  2645#  2677#  2688#  2702#  2705#  2706#  2713#  2726#  2730#
                2733#  2761#  2763#  2774#  2778#  2781#  2808#  2810#  2827#  2829#  2831#  2858#  2860#  2876#  2887#
                2900#  2901#  2908#  2927#  2929#  2932#  2957#  2959#  2993#  2994#  3009#  3010#  3023#  3048#  3049#
                3071#  3072#  3082#  3107#  3108#  3130#  3131#  3140#
M$WORD            63#  1204#  1578#  1615#  1628#  1634#  1739#  1744#  1853#  1869#  1912#  1923#  2020#  2031#  2035#
                2043#  2092#  2104#  2111#  2173#  2183#  2187#  2248#  2301#  2306#  2410#  2468#  2483#  2489#  2498#
                2502#  2688#  2702#  2726#  2774#  2827#  2887#  2927#  3150#  3151#  3152#  3153#  3154#  3155#  3172#
                3173#  3181#  3182#  3183#  3184#  3185#  3186#  3187#  3188#  3189#  3191#  3193#  3219
M$XFER          3182#  3185#  3188#
POINTE            56
PRINTB          1033   1066   1080   1089   1152   1153   1155   2395   2563   2564   2568   2581   2597   2601   2605
                2608   2620   2629   2630   2633   2641   2643   2644   2645
PRINTF          1331   1332   1333   1360   1361   1363   1372   1374   1376   1491   1492   1493   1972   1973   1974
READBU          1422   1442
READEF          1225   1229   1250   1253   1256
SETPRI          1220   1304   1390
SETVEC          1303   1354   1388
STCLK             42#
SVC                6#     8
WAITMS            25#  1328   1396   1518   1558   1574   1609   1918   2179
WAITUS            20#  1012   1597   1617   1734   1907   2013   2170   2478   2692   2891
XFER            2726#  2774#  2827#  2927#
XFERF           3182   3185   3188

. ABS.  031342     000

 ERRORS DETECTED:  0

 CZRLJB,CZRLJB/CRF=SVC33/ML,CZRLJB.MAC
 RUN-TIME: 84 89 10 SECONDS
```

RUN-TIME RATIO: 485/184=2.6
CORE USED: 16K (31 PAGES)