RL11,RLV11 BD SEC FIL TL
CZRLMBO

AH-F134B-MC
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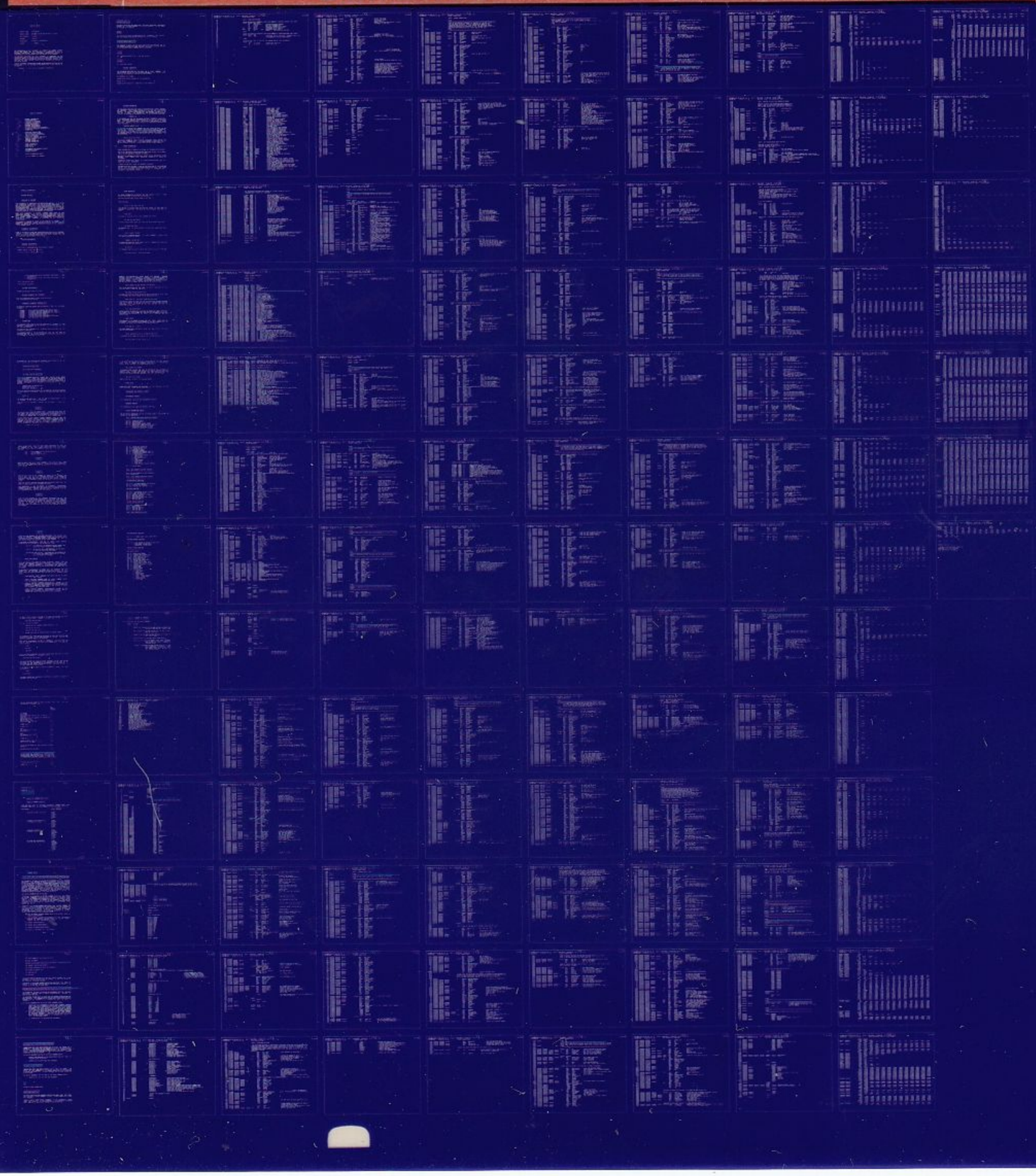

IDENTIFICATION

PRODUCT CODE: AC-F135B-MC

PRODUCT NAME: CZRLMB0 RL01/02 BAD SECTOR FILE TOOL

DATE CREATED: 5-JAN-79

REVISED: 7-DEC-79

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: C. CAMPBELL

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1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

1.1.1 STRUCTURE OF PROGRAM

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

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

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

1.1.2 DIAGNOSTIC INFORMATION

THERE IS NO SPECIFIC RUN TIME ASSOCIATED WITH THIS UTILITY PROGRAM. HOWEVER, TO WRITE THE WORST CASE DATA PATTERN ON THE DISK AND THEN VERIFY THE DATA BY READING SHOULD TAKE LESS THAN 1 MINUTE FOR AN RL01 AND LESS THAN 2 MINUTES FOR AN RL02.

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'

* KW11-L OR KW11-P CLOCK

* LINE PRINTER (OPTIONAL)

1.2.2 SOFTWARE REQUIREMENTS

CZRLMB0 RL01/02 BAD SECTOR FILE TOOL

1.3 RELATED DOCUMENTS AND STANDARDS

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

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

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

CVRLAB0	RLV11 RL01/02 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)
CZRLJB0	RL01/02 DRIVE TEST (PART 2)
CZRLKB0	RL11/RLV11 RL01/02 PERFORMANCE EXERCISER
CZRLNA0	RL01/02 DRIVE TEST (PART 3)

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.

THIS UTILITY WILL CONFORM TO ALL INTERFACE SPECIFICATIONS FOR THE DIAGNOSTIC SUPERVISOR.

THE INTERNAL FORMAT OF THE BAD SECTOR FILE WILL BE THE SAME AS DESCRIBED BY THE DEC STD-144 DOCUMENT FOR REPORTING AND UPDATING THE INFORMATION CONTAINED IN THAT FILE.

NO SUPPORT WILL BE GIVEN FOR THE RL8A/RL01 DISK CONTROLLER ON ANY PDP-8 SYSTEM...THIS IS A PDP-11 UTILITY ONLY!

2.0 OPERATING INSTRUCTIONS

2.1 HOW TO RUN THIS DIAGNOSTIC

2.1.1 THE FIVE STEPS OF EXECUTION

THIS UTILITY 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 UTILITY PROGRAM IS STARTED, THE FOLLOWING 5 STEPS WILL OCCUR:

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

THE UTILITY WILL ISSUE THE PROMPT "DR>". FROM THIS POINT UNTIL THE TIME WHEN YOU RESTART XXDP+, YOU WILL BE TALKING TO THE UTILITY, 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). 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: ONLY THE FIRST THREE CHARACTERS OF THIS OR ANY COMMAND AT THE "DR>" LEVEL NEED TO BE TYPED. THE "FLAGS" SWITCH MAY SPECIFY ANY OF A NUMBER OF FLAGS, BUT THE MAIN USEFUL ONES ARE:

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

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

WHEN YOU HAVE TYPED IN A "START" COMMAND, THE UTILITY WILL COME BACK WITH THE QUESTION "# UNITS?" TO WHICH YOU SHOULD RESPOND BY TYPING IN THE NUMBER OF DEVICES YOU WISH TO TEST (THE UTILITY USES ONLY 1 DRIVE).

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

WHEN YOU HAVE TYPED IN THE NUMBER OF UNITS TO BE TESTED, THE UTILITY 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 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, AND THE ANSWERS WILL BE PUT INTO THE SOFTWARE P-TABLE IN THE PROGRAM.

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

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

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 UTILITY WILL RETURN TO COMMAND MODE.

LOE SET: THE UTILITY 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 CZRLMB                               O
DRS LOADED                              D
DIAG. RUN-TIME SERVICES REV. D APR-79   D
CZRLM-B-0                               D
CZRLM IS A UTILITY PROGRAM FOR FORMATTING D
BAD SECTOR FILES
UNIT IS RL01, RL02                      D
DR>STA/PASS:1/FLAGS:HOE                 D,O

CHANGE HW (L) ? Y                       D,O

# UNITS (D) ? 2                         D,O

UNIT 0                                  D
BUS ADDRESS (O) 174400 ?                D,O
DRIVE (O) 0 ?                           D,O

UNIT 1                                  D
BUS ADDRESS (O) 174400?                 D,O
DRIVE (O) 0 ? 1                         D,O

CHANGE SW (L) ? Y                       D,O

SAWTOOTH WRITE CYCLE ? (L) Y ?          D,O
WRITE CYCLES PER TRACK ? (D) 2 ?        D,O


CZRLM 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
^C
```

```
DR>RESTART/PASS:1                          D.0

CHANGE SW (L) ? N                          D.0
-------------------
-------------------
-------------------
-------------------
```

2.2 DETAILS OF COMMANDS AND SYNTAX

2.2.1 TABLE OF COMMAND VALIDITY

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

	HOW ENTERED	LEGAL COMMANDS
1.	OPERATOR ENTERED 'RUN DIAG'	START PRINT DISPLAY FLAGS ZFLAGS EXIT
2.	DIAGNOSTIC HAS FINISHED ALL ITS REQUESTED PASSES	START RESTART PRINT DISPLAY FLAGS ZFLAGS EXIT
3.	OPERATOR INTERRUPTED THE DIAGNOSTIC WITH CTRL/C	START RESTART CONTINUE PRINT DISPLAY FLAGS ZFLAGS EXIT
4.	AN ERROR WAS ENCOUNTERED WITH THE HOE FLAG SET SET	START RESTART CONTINUE PROCEED PRINT DISPLAY FLAGS ZFLAGS EXIT

2.2.2 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.

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

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

THE SWITCH ARGUMENTS ARE AS IN THE START COMMAND EXCEPT:

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

2. UNSPECIFIED FLAG SETTINGS ARE UNCHANGED

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

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

2.3 HARDWARE PARAMETERS

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

BUS ADDRESS (O) 174400?

ANSWER WITH THE BUS ADDRESS OF THE CONTROLLER.

DRIVE (O) 0?

ANSWER WITH THE DRIVE(S) CONNECTED TO THE CONTROLLER

2.4 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.

''SAWTOOTH WRITE CYCLE? (L) Y ?''

IF ''Y'' THEN THE WRITE PACK COMMAND (#5) WILL CAUSE THE PACK TO BE WRITTEN IN A FORWARD AND REVERSE DIRECTION UTILIZING A 'SAWTOOTH' SEEK PATTERN. THIS WILL ATTEMPT TO DETECT POSITIONER PROBLEMS. IF 'N'' FOR NO, THEN THE PACK WILL BE WRITTEN FORWARD AND REVERSE USING AN INCREMENTAL SEEK - THIS IS THE FASTEST BUT NOT NECESSARLY THE MOST DIFFICULT.

''WRITE CYCLES PER TRACK? (D) 2 ?''

THE DEFAULT NUMBER OF TIMES TO WRITE A SELECTED TRACK DURING THE WRITE PACK COMMAND (#5). IF A HIGHER NUMBER IS SELECTED, THEN IT MAY BE POSSIBLE TO DETECT A TRACK DRIFTING POSITIONER PROBLEM.

3.0 ERROR INFORMATION

ERROR INFORMATION IS COMPLETE IN GIVING ALL INFORMATION NECESSARY.

THE 'RLCS' AND DRIVE STATUS REGISTER ARE GIVEN AS WELL AS CYLINDER, TRACK, SECTOR AND DRIVE INVOLVED IN ERROR.

ANY DETECTED HARDWARE FAILURES WILL RESULT IN AN APPROPIATE ERROR MESSAGE (THE PROPER DISK SUBSYSTEM DIAGNOSTIC(S) SHOULD BE PERFORMED).

UNEXPECTED ''TRAPS'' WILL RESULT IN A PROPER ERROR MESSAGE AND WILL CAUSE THE UTILITY TO RESTART.

A POWER FAILURE WILL CAUSE THE PROGRAM TO RESTART.

SOFTWARE DETECTED FAILURES - SUCH AS THE DETECTION OF A MISSING BAD SECTOR FILE OR A PARTIALLY DESTROYED BAD SECTOR FILE - WILL CAUSE THE UTILITY TO RESTART AFTER THE FAILURE IS DIAGNOSED AND A DIAGNOSTIC ERROR MESSAGE PRINTED.

3.1 ERROR REPORTING

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

REGISTER DESCRIPTIONS CAN BE FOUND IN SECTION 5.0.

ERROR MESSAGES:

'DRIVE IS NOT READY FOR USE''

THIS MESSAGE IS PRINTED WHEN THE SELECTED DRIVE IS NOT ABLE TO PERFORM A GIVEN TASK. THE DRIVE WILL BE ELIMINATED FROM THE TEST TABLE.

''SEEK ERR''

AN ERROR IS DETECTED AFTER A SEEK COMMAND WAS ISSUED.

'DR ERR WILL NOT RESET''

ISSUING A DRIVE RESET WOULD NOT CLEAR THE DRIVE ERROR CONDITION.

'DR WOULD NOT LOAD''

ON PROGRAM START, THE SELECTED DRIVE DID NOT HAVE 'HEADS OVER PACK' BIT SET.

'PACK IS WRITE LOCKED''

THIS IS JUST A WARNING MESSAGE. IF A WRITE COMMAND IS ISSUED, THEN THIS WOULD INDICATE AN ERROR.

'TIMEOUT - DR NOT RDY''

THE DRIVE WAS EXPECTED TO BE 'READY' AFTER A COMMAND WAS ISSUED AND IT NEVER FINISHED THE FUNCTION.

'NO DRIVES''

THE PROGRAM TRYED TO SELECT A DRIVE FOR USE BUT FAILED TO FIND ONE.

'UPDATING DENIED - INVALID PASSWORD''

NORMALLY, THIS PROGRAM WILL NEVER PRINT THIS MESSAGE! PROGRAM PASSWORD CHECKING IS NORMALLY INHIBITED. A USER MAY INVOKE THE PASSWORD CHECK IF THE WORD 'PASWD'' AT ADDRESS 2274 IS CHANGED TO A NON-ZERO NUMBER...THIS 'NUMBER' THEN BECOMES THE PROGRAM PASSWORD AND MUST BE USED TO ENABLE ANY WRITING ON THE SELECTED PACK.

''CAN'T UPDATE THE BAD SECTOR FILE ON PACK''

THIS IS AN INDICATION THAT THE PACK IS WRITE PROTECTED OR THE FUNCTION 'WRITE' CANNOT BE COMPLETED.

'BAD READ OF BAD SECTOR FILE)''

AN ERROR WAS DETECTED WHILE TRYING TO READ 10 SECTORS OF DATA FROM THE 'FACTORY' OR 'FIELD' AREAS IN THE BAD SECTOR FILE.

'MORE THAN 25. BAD SPOTS FOUND ON THIS PACK''

THIS MESSAGE WARNS THE USER THAT THE SELECTED PACK ALREADY HAS MORE THAN 25. ENTRYS IN THE BAD SECTOR FILE. THE PACK SPECIFICATION ALLOWS ONLY 16. BAD SPOTS ON THE PACK BEFORE THE PACK IS CLASSIFIED AS 'BAD'.

''SOFT ERR ENCOUNTERED''

DURING A WRITE OR READ DATA FUNCTION, AN ERROR HAS BEEN DETECTED. THE ERROR WILL ALSO REPORT THE STARTING SECTOR NUMBER OF THE DATA TRANSFER AND THE CONTENTS OF THE DRIVE 'RLCS' REGISTER AND THE DRIVE STATUS.

'HARD ERROR''

THIS MESSAGE IS TO INFORM THE USER THAT THE 'SOFT' COULD NOT BE RECOVERED. THE STARTING SECTOR NUMBER OF THE DATA TRANSFER WILL BE RECORDED FOR LATER USE IN UPDATING THE BAD SECTOR FILE.

'RL01 MAX CYL = 255.''

THE USER CANNOT ADD TO OR DELETE FROM THE BAD SECTOR FILE ANY INVALID DISK ADDRESS.

'ENTRY ALREADY EXISTS IN THE BAD SECTOR FILE''

A REDUNDANT ENTRY CANNOT BE ENTERED INTO THE BAD SECTOR FILE.

'NO SUCH ENTRY IN THE 'FIELD' FILE''

IF AN ENTRY DOES NOT EXIST IN THE 'FIELD' AREA OF THE BAD SECTOR FILE, THEN IT CANNOT BE REMOVED FROM THE FILE. THIS PROTECTS ENTRYS IN THE 'FACTORY' FILE FROM BEING DELETED.

'NO FACTORY FILE FOUND''

THE PROGRAM TRIED TO READ THE FIRST 10 SECTORS OF THE LAST TRACK TO IDENTIFY THE 'FACTORY' BAD SECTOR FILE...AND FAILED TO MAKE THAT IDENTIFICATION. EITHER THE 'FACTORY' FILE WAS DESTROYED OR THE DATA ON THIS TRACK DOES NOT CONFORM TO THE 'DEC STD-144' SPEC.

'NO FIELD FILE FOUND''

SAME AS FOR THE 'FACTORY' FILE MESSAGE ABOVE.

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 EXISTENT 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=UPPER, 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 UTILITY - SUMMARY OF COMMANDS

THIS UTILITY HAS THE FOLLOWING COMMANDS:

INPUT	ACTION
1	REPORT THE CONTENTS OF THE BAD SECTOR FILE BOTH THE 'FACTORY' AREA AND THE 'FIELD' AREA
2	ADD A SECTOR TO THE BAD SECTOR FILE IN THE 'FIELD' AREA OF THAT FILE
3	REMOVE A SECTOR FROM THE BAD SECTOR FILE - (ONLY IN THE 'FIELD' AREA)
4	READ THE PACK TO FIND BAD SPOTS (READ ONLY)
5	WRITE THE PACK WITH THE WORST CASE DATA PATTERN. THEN ISSUE THE 'VERIFY' COMMAND TO FIND BAD SPOTS.
6	ATTEMPT TO GENERATE THE BAD SECTOR FILE IF IT HAS BEEN DESTROYED ACCIDENTLY. ONLY THE 'DUMMY' ENTRY WILL BE MADE FOR THE 'FACTORY' AREA!

23	BIT AND OFFSET DEFINITIONS
90	MACRO DEFINITIONS
116	GLOBAL DATA AND CONSTANTS
219	GLOBAL MESSAGES
325	ERROR MESSAGES
408	STATISTIC CODE
416	LOAD PROTECTION TABLE
426	INITIALIZATION CODE
568	AUTO DROP SECTION
654	CLOCK INTERRUPT SERVICE ROUTINES
715	GLOBAL SUBROUTINES
841	PROGRAM MAIN LOOP
888	COMMAND QUERY LOOP
934	GLOBAL SUBROUTINES
1880	ROUTINE TO LOAD FUNCTION
1902	INTERRUPT SERVICE ROUTINE
1908	BAD SECTOR FILE ROUTINE
2135	ROUTINE TO WAIT FOR CONTROLLER READY
2157	GET STATUS/DRIVE RESET ROUTINE
2178	ROUTINE TO WRITE PACKS INITIALLY
2409	HEADS HOME ROUTINE
2445	SEEK ROUTINE
2497	ROUTINE TO CHECK FOR BAD SECTOR

0010


```
                                                .TITLE  CZRLMB0 RL01/02 BD SEC FIL TL
                                                .ENABLE AMA
                                                .ENABLE ABS
002000                                          .=2000
                                                .MCALL  SVC

002000                                          SVC
000000                                          SVCINS=0
000000                                          SVCTAG=0

002000                                                  POINTER BGNRPT,BGNSW,BGNSFT,BGNAU,BGNDU

002000                                          BGNMOD  MDHEDR
002000                                                  HEADER  CZRLM,B,0,0,1
(4) 002000  103                                         .ASCII /C/
(4) 002001  132                                         .ASCII /Z/
(4) 002002  122                                         .ASCII /R/
(4) 002003  114                                         .ASCII /L/
(4) 002004  115                                         .ASCII /M/
(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  000000                                      .WORD   0
(4) 002016  035534                                      .WORD   L$HARD
(4) 002020  035602                                      .WORD   L$SOFT
(4) 002022  010122                                      .WORD   L$HW
(4) 002024  010130                                      .WORD   L$SW
(4) 002026  035704                                      .WORD   L$LAST
(4) 002030  000000                                      .WORD   0
(4) 002032  000000                                      .WORD   0
(4) 002034  000001                                      .WORD   1
(4) 002036  000000                                      .WORD   0
(4) 002040  010136                                      .WORD   L$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  002216                                      .WORD   L$DVTYP
(4) 002062  010140                                      .WORD   L$RPT
(4) 002064  000000                                      .WORD   0
(4) 002066  000000                                      .WORD   0
(4) 002070  011726                                      .WORD   L$AU
(4) 002072  011730                                      .WORD   L$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  010150                                      .WORD   L$INIT
```

```
(4)  002106  011644                          .WORD   L$CLEAN
(4)  002110  011224                          .WORD   L$AUTO
(4)  002112  010142                          .WORD   L$PROT
(4)  002114  000000                          .WORD   0
(4)  002116  000000                          .WORD   0
(4)  002120  000000                          .WORD   0
 16  002122                                  ENDMOD
 17
 18
 19  002122                          DESCRIPT <CZRLM IS A UTILITY PROGRAM FOR FORMATTING BAD SECTOR FILES>
(3)  002122  055103  046122  020115          .ASCIZ  /CZRLM IS A UTILITY PROGRAM FOR FORMATTING BAD SECTOR FILES/
(3)  002130  051511  040440  052440
(3)  002136  044524  044514  054524
(3)  002144  050040  047522  051107
(3)  002152  046501  04304C  051117
(3)  002160  043040  051117  040515
(3)  002166  052124  047111  020107
(3)  002174  040502  020104  042523
(3)  002202  052103  051117  043040
(3)  002210  046111  051505     000
(2)          002216                          .EVEN
 20
 21  002216                                  DEVTYP  <RL01,RL02>
(3)  002216  046122  030460  051054          .ASCIZ  /RL01,RL02/
(3)  002224  030114  000062
(2)                                          .EVEN
 22
 23                                          .SBTTL  BIT AND OFFSET DEFINITIONS
 24
 25                                          ;DEFINITIONS
 26
 27  002230                                  BGNMOD  GLBEQAT
 28
 29  002230                                  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
 30
 31  000000  CS=0                    ;CONTROL AND STATUS OFFSET
 32  000002  BA=2                    ;BUS ADDRESS OFFSET
 33  000004  DA=4                    ;DISK ADDRESS OFFSET
 34  000006  MP=6                    ;MULTI PURPOSE OFFSET
 35
 36           ;CSR REGISTER
 37
 38  000001  SKDON=BIT0
 39  000001  DRDY=BIT0          ;DRIVE READY
```

```
                        INTEN=BIT6              ;INTERRUPT ENABLE
                        ERR=BIT15               ;COMPOSITE ERROR
                        DERR=BIT14              ;DRIVE ERROR
                        NXM=BIT13               ;NON-EXISTENT MEMORY ERROR
                        DLT=BIT12               ;DATA LATE
                        DCRC=BIT11              ;DATA CRC ERROR
                        HCRC=BIT11              ;HEADER CRC ERROR
                        HNF=BIT12               ;HEADER NOT FOUND ERROR
                        OPI=BIT10               ;OPERATION INCOMPLETE ERROR
                        CRDY=BIT7               ;CONTROLLER READY
                        BA17=BIT5               ;EXTENDED BUS ADDRESS BIT 17
                        BA16=BIT4               ;EXTENDED BUS ADDRESS BIT 16

                        ;GET STATUS BITS

                        WDE=BIT15               ;WRITE DATA ERROR
                        HCE=BIT14               ;HEAD CURRENT ERROR
                        WL=BIT13                ;WRITE LOCK
                        SKTO=BIT12              ;SEEK TIMEOUT ERROR
                        SPE=BIT11               ;SPINDLE TIMEOUT/UNDER/OVER SPEED
                        WGE=BIT10               ;WRITE GATE ERROR
                        VC=BIT9                 ;VOLUME CHECK
                        DSE=BIT8                ;DRIVE SELECT ERROR
                        COP=BIT5                ;TOP COVER OPEN
                        HOP=BIT4                ;HEADS OVER PACK
                        BRHM=BIT3               ;BRUSHES HOME

                        ;COMMANDS

                        WRCHK=BIT1              ;WRITE CHECK FUNCTION CODE
                        GSTAT=BIT2              ;GET DRIVE STATUS FUNCTION CODE
                        SEEK=BIT1!BIT2          ;SEEK FUNCTION CODE
                        RDHDR=BIT3              ;READ HEADER FUNCTION CODE
                        WRITE=BIT3!BIT1         ;WRITE FUNCTION CODE
                        READ=BIT3!BIT2          ;READ FUNCTION CODE
                        DRST=BIT3!BIT1!BIT0     ;DRIVE RESET COMMAND CODE FOR DRIVE COMMAD WORD
                        GSBIT=BIT1!BIT0         ;GET STATUS COMMAND CODE FOR DRIVE COMMAND WORD
                        MK=BIT0                 ;MARKER BIT FOR DRIVE COMMAND WORD(SEEK,GET STATUS)
                        SIGN=BIT2               ;DIRECTION FOR SEEK(0=AWAY FROM SPINDLE)
                        SKHS=BIT4               ;HEAD SELECT FOR SEEK
                        HEAD=BIT6               ;HEAD SELECT FOR READ,WRITE,GET STATUS

                        ;OFFSET FOR HARDWARE P-TABLE
                        CSR=0
                        DRBT=2

002230                  ENDMOD
```

```
                        .SBTTL  MACRO DEFINITIONS

                        ;DELAY EXECUTION OF PROGRAM A SPECIFIED NUMBER OF 100-MILLISECOND TIME COUNTS
                        .MACRO  WAITMS  ARG,?WAIT
                                MOV     #ARG,DLYCNT     ;INITIALIZE DELAY COUNTER
                                ASL     DLYCNT          ;MULTIPLY ARGUMENT BY 2
                                ASL     DLYCNT          ;MULTIPLY ARGUMENT BY 2 AGAIN
                        WAIT:   DELAY   #250.           ;IMPLEMENT 25-MS TIME DELAY
                                DEC     DLYCNT          ;DECREMENT DELAY COUNT
                                BNE     WAIT            ;BRANCH IF TIME DELAY NOT EXPIRED
                        .ENDM

                        ;DELAY EXECUTION OF PROGRAM A SPECIFIED NUMBER OF 100-MICROSECOND TIME COUNTS
                        .MACRO  WAITUS  ARG
                                DELAY   #ARG            ;IMPLEMENT 100-US TIME DELAY, ARGUMENT SPECIFIES
                                                        ;/THE NUMBER OF 100-US TIME COUNTS
                        .ENDM

                        ;ACTIVATE THE CLOCK TO INITIATE THE GENERATION OF CLOCK INTERRUPTS
                        .MACRO  CLKON
                                JSR     PC,CLKINI       ;INITIALIZE THE CLOCK
                                JSR     PC,CLKST        ;START THE CLOCK

                        .ENDM
```

```
                        .SBTTL  GLOBAL DATA AND CONSTANTS

002230                  BGNMOD  GLBDAT
002230  000000  ERRCNT: .WORD   0               ;ERROR COUNT - HARD
002232  000000  SFTCNT: .WORD   0               ;ERROR COUNT - SOFT
002234  000000  SKECNT: .WORD   0               ;SEEK ERROR COUNT
002236  000000  DERCNT: .WORD   0               ;DRIVE ERROR COUNT
002240  000000  WRTCNT: .WORD   0               ;WRITE PASS COUNT PER TRACK
002242  000000  RETRY:  .WORD   0               ;PRESENT RETRY NUMBER
002244  000000  BDA:    .WORD   0               ;  ''     DISK ADDRESS CONTENTS
002246  000000  BMP:    .WORD   0               ;PRESENT MULTIPURPOSE CONTENTS
002250  000000  DCS:    .WORD   0               ;CSR ADDRESS
002252  000000  E.DCS:  .WORD   0               ;CONTENTS OF RLCS AT ERROR
002254  000000  E.STAT: .WORD   0               ;STATUS AT FAILURE TIME
002256  000000  BBA:    .WORD   0               ;PRESENT BUS ADDRESS CONTENTS
002260  000000  FUNC:   .WORD   0               ;LAST FUNCTION LOADED
002262  000000  BCSADR: .WORD   0               ;CSR IMAGE OF LAST COMMAND
002264  000000  LSTHDR: .WORD   0               ;LAST POSITION ON DISK
002266  000000  PRFLGS: .WORD   0               ;INTERNAL FLAGS
002270  000000  LSTDA:  .WORD   0               ;DISK ADDRESS AT SOFT ERROR
002272  000000  DIFWD:  .WORD   0               ;LAST DIFFERENCE WORD OF SEEK
002274  000000  SERNM1: .WORD   0               ;SERIAL NUMBER OF CARTRIDGE
002276  000000  SERNM2: .WORD   0               ;SERIAL NUMBER OF CARTRIDGE
002300  000000  NEWFAC: .WORD   0               ;FLAG TO BUILD A DUMMY FACTORY FILE
002302  000000  DRSEL:  .WORD   0               ;DRIVE SELECT BITS(8,9)
002304  000000  BSECPT: .WORD   0               ;POINTER TO BAD SECTOR FILE DATA STORAGE
002306  000000  RSEEK:  .WORD   0               ;SEEK IN PROCESS OF RECOVERY
002310  000000  SOFTCS: .WORD   0               ;CSR OF SOFT ERROR
002312  000000  FWDFLG: .WORD   0               ;SAWTOOTH WRITE CONTROL FLAG
002314  000000  CVFLG:  .WORD   0               ;'CALL' FLAG FOR VERIFY ROUTINE
002316  000000  TDR:    .WORD   0               ;TYPE OF DRIVE... RL01=1 RL02=2
002320  000000  WRIPG:  .WORD   0               ;WRITE IN PROGRESS FLAG
002322  000000  PRPOS:  .WORD   0               ;PRESENT POSITION ON DISK
002324  000000  NEWPOS: .WORD   0               ;NEW DESIRED CYLINDER ADDRESS
002326  000000  RECNT:  .WORD   0               ;READ ERROR COUNT
002330  000000  NXTUNI: .WORD   0               ;POINTER OF UNIT SELECT SLOT IN 'SELTBL'
002332  000000  SYSMSK: .WORD   0               ;MASK FOR 0-7 DRIVES
002334  100177  CYLMSK: .WORD   100177          ;MASK FOR CYLINDER ONLY (RL01)
002336  100077  SECMSK: .WORD   100077          ;MASK OUT SECTOR BITS (RL01)
002340  000177  CMSK:   .WORD   000177          ;CYL MASK FOR RL02
002342  000077  SMSK:   .WORD   000077          ;SECT MASK FOR RL02
002344  000000  PASWD:  .WORD   000000          ;PASSWORD (IF=0 THEN NO CHECKING)
002346  000000  WRINIT: .WORD   0               ;WRITE INIT FLAG
002350  000160  BVEC:   .WORD   160             ;VECTOR ''   ''
002352  000240  BPRIOR: .WORD   240             ;PRIORITY 5
002354  000000  CLKFRQ: .WORD   0               ;CLOCK FREQUENCY FLAG, 1=60HZ, 2=50HZ
002356  000000  CLKTYP: .WORD   0               ;CLOCK TYPE FLAG, 1=P-CLOCK, 2=L-CLOCK
002360  000000  CLKADR: .WORD   0               ;POINTER TO ADDRESS OF SUPERVISOR CLOCK TABLE
002362  000000  DLYCNT: .WORD   0               ;DELAY COUNTER FOR WAITMS TIMING MACRO
002364  000000  CLKSON: .WORD   0               ;''CLOCK ON'' INDICATOR
002366  000000  CLKCNT: .WORD   0               ;CLOCK COUNTER TO STORE CLOCK TICK COUNT
002370  000000  CLKBFR: .WORD   0               ;CLOCK BUFFER TO STORE CLOCK TICK COUNT
002372  000000  SYSCLK: .WORD   0               ;FLAG INDICATING PRESENCE OF A SYSTEM CLOCK
002374  000000  LOGUNIT: .WORD  0               ;LOGICAL UNIT UNDER TEST
002376  000000  CLKFLD: .WORD   0               ;CLOCK FIELD TO CHECK IF LSI-11 CLOCK
                                                ;/IS ''TICKING''
```

```
                        ;THE FOLLOWING LOCATIONS ARE CLEARED AS A GROUP (DOWN TO 'STFLG')
                        ;THEREFORE DON'T INSERT ANY CONSTANTS
002400  000000  LSTDR1: .WORD   0          ;BUFFER POINTER OF DRIVE
002402  000000  BCSR:   .WORD   0          ;CSR FROM P-TABLE
002404  000000  BDRSEL: .WORD   0          ;DRIVE UNIT NUMBER FROM P-TABLE
002406  000000  HDRFND: .WORD   0          ;FLAG TO INDICATE HDR IN BAD LIST
002410  000000  CHKSEC: .WORD   0          ;SECTOR OF ERROR - USED BY BAD SECTOR LOCATION
002412  000000  DECNT:  .WORD   0          ;DATA ERROR COUNT
002414  000000  TEMP0:  .WORD   0          ;TEMP LOCATION
002416  000000  TEMP1:  .WORD   0          ;TEMP LOCATION
002420  000000  TEMP2:  .WORD   0          ;TEMP LOCATION
002422  000000  TEMP3:  .WORD   0          ;TEMP LOCATION
002424  000000  TICK:   .WORD   0          ;STORAGE FOR TICK COUNT
002426  000000  SECOND: .WORD   0          ;SECONDS OF SYSTEM CLOCK
002430  000000  MINUTE: .WORD   0          ;MINUTES OF SYSTEM CLODK
002432  000000  HOUR:   .WORD   0          ;HOURS OF SYSTEM CLOCK
002434  000000  E.CS:   .WORD   0          ;IMAGES OF REGISTERS
002436  000000  E.BA:   .WORD   0          ;ON INTERRUPT
002440  000000  E.DA:   .WORD   0          ;
002442  000000  E.MP:   .WORD   0          ;
002444  000000  E.MP1:  .WORD   0          ;
002446  000000  E.MP2:  .WORD   0          ;
002450  000000  BUF1:   .WORD   0          ;BUFFER FOR  FIRST CONTROLLER
002452  000000  MAXWC:  .WORD   0          ;MAX WORD COUNT DETERMINED BY CORE
002454  000000  UUT:    .WORD   0          ;NUMBER OF UNITS ON SYSTEM
002456  000000  SN1:    .WORD   0          ;TYPED SERIAL # - LOW
002460  000000  SN2:    .WORD   0          ;  ''     ''      HIGH
002462  000000  WRTLOK: .WORD   0          ;WRITE LOCK FLAG
002464  000000  ACCESS: .WORD   0          ;ACCESS PRIV FOR UPDATING
002466  000000  PWRFLG: .WORD   0          ;POWER FAIL INDICATOR
002470  000000  TRPFLG: .WORD   0          ;TRAP OCCURRENCE FLAG
002472  000000  CNTFLG: .WORD   0          ;CONTINUE FLAG
002474  000000  STFLG:  .WORD   0          ;START FLAG
002476  000000  BSFFLG: .WORD   0          ;BAD SECTOR FILE FLAG (FACTORY BSF=0, FIELD BSF=1)
002500  000000  CPYCNT: .WORD   0          ;COUNTER FOR DUPLICATING COPIES OF THE 'FIELD'
                                           ;/BAD SECTOR FILE ON THE PACK
002502  000000  ERSTER: .WORD   0          ;ADDRESS OF ERROR FOUND IN MAIN PROGRAM
                        ;
                        ;END OF MASS CLEAR
                        ;
002504  000004  ERRVEC: .WORD   4          ;ERROR VECTOR

002506          ENDMOD
```

```
                        .SBTTL  GLOBAL MESSAGES

002506                  BGNMOD  GLBTXT

                        ;GLOBAL TEXT


002506 046122 051503 020072 MRLCS:   .ASCIZ  'RLCS: '
002515    050 046122 051503 CRLCS:   .ASCIZ  '(RLCS): '
002526 040520 045503 051440 CART:    .ASCIZ  /PACK SERIAL NO.: /
002550 054503 044514 042116 CMSG:    .ASCIZ  /CYLINDER: /
002563    040 042510 042101 HMSG:    .ASCIZ  / HEAD: /
002573    052 025052 025052 STARMSG: .ASCIZ /*********************************************************************/
002675    055 026440 026440 HYPHEN:  .ASCIZ  /- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -/
002777    047 044506 046105 TFMSG:   .ASCIZ  /'FIELD' ENTRIES = /
003022 043047 041501 047524 TMMSG:   .ASCIZ  /'FACTORY' ENTRIES = /
003047    047 047523 052106 TSOFT:   .ASCIZ  /'SOFT' ERRORS FOUND = /
003076 044047 051101 023504 THARD:   .ASCIZ  /'HARD' ERRORS FOUND = /
003125    123 043117 020124 MSREC:   .ASCIZ  /SOFT ERROR RECOVERED.../
003155    102 044525 042114 MBLD:    .ASCIZ  /BUILD A DUMMY BAD SECTOR FILE/
003213    102 044525 042114 BUILD:   .ASCIZ  /BUILD A BAD SECTOR FILE/
003243    040 042523 052103 SMSG:    .ASCIZ  / SECTOR: /
003255    101 020124 047105 BSEND:   .ASCIZ  /AT END OF FILE /
003275    123 042505 020113 MSKER:   .ASCIZ  /SEEK ERROR/
003310 047523 052106 042440 MSFER:   .ASCIZ  /SOFT ERROR ENCOUNTERED/
003337    104 044522 042526 MDERS:   .ASCIZ  /DRIVE ERROR WILL NOT RESET/
003372 051104 053111 020105 MRDER:   .ASCIZ  /DRIVE ERROR RECOVERED/
003420 040510 042122 042440 MHDER:   .ASCIZ  /HARD ERROR/
003433    104 044522 042526 NOLOAD:  .ASCIZ  /DRIVE WOULD NOT LOAD/
003460 040520 045503 044440 WRTLCK:  .ASCIZ  /PACK IS WRITE LOCKED/
003505    120 041501 020113 NEWLD:   .ASCIZ  /PACK WAS JUST LOADED/
003532 047516 043040 041501 HWSEC:   .ASCIZ  /NO FACTORY FILE ENTRIES/
003562 047516 043040 041501 NHWSEC:  .ASCIZ  /NO FACTORY FILE FOUND/
003610 047516 043040 042511 SWSEC:   .ASCIZ  /NO FIELD FILE ENTRIES/
003636 047516 043040 042511 NSWSEC:  .ASCIZ  /NO FIELD FILE FOUND/
003662 047516 051440 041525 NOFLDE:  .ASCIZ  /NO SUCH ENTRY IN 'FIELD' FILE/
003720 047503 050115 042514 MDONE:   .ASCIZ  /COMPLETED.../
003735    120 047522 051107 PRGER:   .ASCIZ  /PROGRAM 'BUG' - DRIVE NOT READY/
003775    124 046511 047505 NOCRDY:  .ASCIZ  /TIMEOUT - NO 'CRDY'/
004021    116 020117 051104 NODRIV:  .ASCIZ  /NO DRIVES/
004033    040 051104 053111 DRNM:    .ASCIZ  / DRIVE: /
004044 047105 042524 020122 PASWORD: .ASCIZ /ENTER PASSWORD TO ENABLE BAD SECTOR FILE UPDATES/
004125    125 042120 052101 DENIED:  .ASCIZ  /UPDATING DENIED - INVALID PASSWORD!/
004171    105 052116 054522 EXISTS:  .ASCIZ  /ENTRY ALREADY EXISTS IN BAD SECTOR FILE/
004241    122 040505 044504 VERIFY:  .ASCIZ  /READING PACK/
004256 051127 052111 020105 MWRITE:  .ASCIZ  /WRITE PACK WITH WORST CASE DATA PATTERN/
004326 020061 020040 042522 CMD1:    .ASCIZ  /1   REPORT CONTENTS OF THE BAD SECTOR FILE/
004401    062 020040 040440 CMD2:    .ASCIZ  /2   ADD A SECTOR TO THE 'FIELD' BAD SECTOR FILE/
004461    063 020040 042040 CMD3:    .ASCIZ  /3   DELETE A SECTOR FROM THE 'FIELD' BAD SECTOR FILE/
004546 020064 020040 042526 CMD4:    .ASCIZ  /4   VERIFY PACK - READ ONLY/
004602 020065 020040 051127 CMD5:    .ASCIZ  /5   WRITE PACK WITH WORST CASE DATA PATTERN AND VERIFY/
004671    066 020040 046440 CMD6:    .ASCIZ  /6   MAKE A BAD SECTOR FILE/
004724 020067 020040 051120 CMD7:    .ASCIZ  /7   PRINT HELP MESSAGE/
004753    105 052116 051105 CMDDO:   .ASCIZ  /ENTER COMMAND (1 - 7) - /
005004 047503 052116 047105 BSRM:    .ASCIZ  /CONTENTS OF THE 'FACTORY' BAD SECTOR FILE:/
```

```
 278  005057     103  047117  042524  BSRF:    .ASCIZ  /CONTENTS OF THE 'FIELD' BAD SECTOR FILE:/
 279  005130  040502  020104  042522  BADBSF:  .ASCIZ  /BAD READ OF BAD SECTOR FILE/
 280  005164  042101  020104  054503  ABSMSG:  .ASCIZ  /ADD CYLINDER, SECTOR, & HEAD TO 'FIELD' BAD SECTOR FILE/
 281  005254                          DELCYL:
 282  005254  054503  044514  042116  ABSCYL:  .ASCIZ  /CYLINDER (0 TO 511.) - /
 283  005304                          DELSEC:
 284  005304  042523  052103  051117  ABSSEC:  .ASCIZ  /SECTOR (0 TO 39.) - /
 285  005331                          DELHD:
 286  005331     110  040505  020104  ABSHD:   .ASCIZ  /HEAD (0 OR 1) - /
 287  005352  047516  041440  051101  ABSSER:  .ASCIZ  /NO CARTRIDGE SERIAL NO. - ADD ONE?/
 288  005415     111  050116  052125  ABSSNL:  .ASCIZ  /INPUT THE LOW 5 OCTAL DIGITS OF SERIAL NO. /
 289  005471     111  050116  052125  ABSSNH:  .ASCIZ  /INPUT THE HIGH 5 OCTAL DIGITS OF SERIAL NO. /
 290  005546  051127  052111  020105  DOWRT:   .ASCIZ  /WRITE THE UPDATED BAD SECTOR FILE/
 291  005610  040503  047116  052117  BADWRT:  .ASCIZ  /CANNOT UPDATE BAD SECTOR FILE ON PACK/
 292  005656  042504  042514  042524  DELMSG:  .ASCIZ  /DELETE A 'FIELD' BAD SECTOR FILE ENTRY/
 293  005725     116  020117  052523  NOENTRY: .ASCIZ  /NO SUCH ENTRY TO DELETE!/
 294  005756  046122  030460  046440  RL1CLM:  .ASCIZ  /RL01 MAX CYLINDER = 255./
 295  006007     111  020123  044124  VALSN:   .ASCIZ  /IS THIS SERIAL NO. VALID/
 296  006040  047515  042522  052040  TBLFUL:  .ASCIZ  /MORE THAN 25. BAD SPOTS FOUND ON THIS PACK!/
 297  006114  047503  052116  047111  TILLEND: .ASCIZ  /CONTINUE TO END OF FILE/
 298  006144  051127  052111  020105  MSTWRT:  .ASCIZ  /WRITE ON ALL SELECTED PACKS/
 299  006200  042516  020127  047105  NEWENT:  .ASCIZ  /NEW ENTRY.../
 300  006215     130  042506  020122  ERRAT:   .ASCIZ  /XFER ERROR AT PACK ADDRESS /
 301  006251     122  030114  026461  OVRMAX:  .ASCIZ  /RL01-RL02 CARTRIDGE SPEC ALLOWS MAX OF 16. BAD SECTORS/
 302  006340  047506  047125  000104  OK:      .ASCIZ  /FOUND/
 303  006346  041101  053117  020105  INBSF:   .ASCIZ  /ABOVE SECTOR IS IN BAD SECTOR FILE/
 304  006411     103  042510  045503  CKFACT:  .ASCIZ  /CHECKING FOR 'FACTORY' FILE.../
 305  006450  044103  041505  044513  CKFLD:   .ASCIZ  /CHECKING FOR 'FIELD' FILE.../
 306  006505     104  044522  042526  NOTRDY:  .ASCIZ  /DRIVE DROPPED - DID NOT RESPOND WITH 'READY'/
 307  006562  051104  053111  020105  MDRTYP:  .ASCIZ  /DRIVE TYPE = RL0/
 308  006603     055  051440  053501  SAWFWD:  .ASCIZ  /- SAWTOOTH FROM CYLINDER 0/
 309  006636  020055  040523  052127  SAWREV:  .ASCIZ  /- SAWTOOTH FROM LAST CYLINDER/
 310  006674  051127  052111  047111  WRPKF:   .ASCIZ  /WRITING PACK FORWARD /
 311  006722  051127  052111  047111  WRPKR:   .ASCIZ  /WRITING PACK REVERSE /
 312  006750  051525  020105  044124  THISDRV: .ASCIZ  /USE THIS SELECTED UNIT/
 313  006777     123  051531  042524  NOCLK:   .ASCIZ  /SYSTEM CLOCK IS NOT AVAILABLE/
 314  007035     122  047125  052040  NOTIM:   .ASCIZ  /RUN TIMES CANNOT BE REPORTED/
 315  007072  051104  053111  020105  NOCTLR:  .ASCIZ  /DRIVE DROPPED - NO CONTROLLER/
 316
 317                                   .NLIST  CND,MD,ME
 318                                   .LIST   BEX
 319                                   .EVEN
 320
 321  007130                                   ENDMOD
 322
```

```
                                        .SBTTL  ERROR MESSAGES
                                        BGNMOD  GLBERR
                                        BGNMSG  ERR1
                                                MOV     R1,-(SP)        ;SAVE R1
                                        ;ROUTINE TO REPORT THE POSITION OF CYLINDER, SECTOR & HEAD
                                                JSR     R5,PTIME        ;PRINT RUN TIME
                                                MOV     CHKSEC,BSFSEC   ;GET THE SECTOR IN ERROR
                                                BIC     #177700,BSFSEC  ;CLEAR THE JUNK BITS
                                                CLR     BSFHD           ;CLEAR THE HEAD #
                                                BIT     #100,CHKSEC     ;HEAD 1??
                                                BEQ     1$              ;NO
                                                INC     BSFHD           ;YES - SET IT TO 1
                                        1$:     MOV     CHKSEC,BSFCYL   ;GET ADDR AGAIN FOR THE CYLINDER
                                                BIC     #177,BSFCYL     ;CLEAR THE HEAD & SECTOR #
                                                SWAB    BSFCYL
                                                CLC                     ;CLEAR THE 'C' BIT
                                                ROL     BSFCYL          ;POSITION
                                                BCC     2$              ;BR IF DON'T NEED OTHER BIT
                                                INC     BSFCYL          ;ADD IN THE LOW ORDER BIT
                                        2$:     PRINTB  #FMT16,#ERRAT,#CMSG,BSFCYL,#SMSG,BSFSEC,#HMSG,BSFHD
(14) 007226  013746  015336                     MOV     BSFHD,-(SP)
(13) 007232  012746  002563                     MOV     #HMSG,-(SP)
(12) 007236  013746  015334                     MOV     BSFSEC,-(SP)
(11) 007242  012746  003243                     MOV     #SMSG,-(SP)
(10) 007246  013746  015332                     MOV     BSFCYL,-(SP)
(9)  007252  012746  002550                     MOV     #CMSG,-(SP)
(8)  007256  012746  006215                     MOV     #ERRAT,-(SP)
(7)  007262  012746  007503                     MOV     #FMT16,-(SP)
(6)  007266  012746  000010                     MOV     #10,-(SP)
(3)  007272  010600                             MOV     SP,R0
(4)  007274  104414                             TRAP    C$PNTB
(4)  007276  062706  000022                     ADD     #22,SP
348  007302  004537  025422                     JSR     R5,GETDST       ;GET THE DRIVE STATUS
349  007306  010137  002254                     MOV     R1,E.STAT
350  007312                                     PRINTB  #FMT17A,#CRLCS,E.DCS,E.STAT,E.DA
(11) 007312  013746  002440                     MOV     E.DA,-(SP)
(10) 007316  013746  002254                     MOV     E.STAT,-(SP)
(9)  007322  013746  002252                     MOV     E.DCS,-(SP)
(8)  007326  012746  002515                     MOV     #CRLCS,-(SP)
(7)  007332  012746  007554                     MOV     #FMT17A,-(SP)
(6)  007336  012746  000005                     MOV     #5,-(SP)
(3)  007342  010600                             MOV     SP,R0
(4)  007344  104414                             TRAP    C$PNTB
(4)  007346  062706  000014                     ADD     #14,SP
351  007352                                     PRINTB  #MCRLF
(7)  007352  012746  010041                     MOV     #MCRLF,-(SP)
(6)  007356  012746  000001                     MOV     #1,-(SP)
(3)  007362  010600                             MOV     SP,R0
(4)  007364  104414                             TRAP    C$PNTB
(4)  007366  062706  000004                     ADD     #4,SP
352  007372  012601                             MOV     (SP)+,R1        ;RESET R1
353  007374                                     ENDMSG
```

```
   (3)  007374                                  L10000:
   (3)  007374  104423                                  TRAP    C$MSG
   354
   355  007376                                  BGNMSG  ERR2
   356  007376  010146                                  MOV     R1,-(SP)        ;SAVE R1
   357  007400  004537  025422                          JSR     R5,GETDST       ;GET THE DRIVE STATUS
   358  007404  010137  002254                          MOV     R1,E.STAT       ;SAVE STATUS FOR PRINTING
   359  007410                                          PRINTB  #FMT17A,#CRLCS,E.DCS,E.STAT,E.DA
  (11)  007410  013746  002440                          MOV     E.DA,-(SP)
  (10)  007414  013746  002254                          MOV     E.STAT,-(SP)
   (9)  007420  013746  002252                          MOV     E.DCS,-(SP)
   (8)  007424  012746  002515                          MOV     #CRLCS,-(SP)
   (7)  007430  012746  007554                          MOV     #FMT17A,-(SP)
   (6)  007434  012746  000005                          MOV     #5,-(SP)
   (3)  007440  010600                                  MOV     SP,R0
   (4)  007442  104414                                  TRAP    C$PNTB
   (4)  007444  062706  000014                          ADD     #14,SP
   360  007450                                          PRINTB  #MCRLF
   (7)  007450  012746  010041                          MOV     #MCRLF,-(SP)
   (6)  007454  012746  000001                          MOV     #1,-(SP)
   (3)  007460  010600                                  MOV     SP,R0
   (4)  007462  104414                                  TRAP    C$PNTB
   (4)  007464  062706  000004                          ADD     #4,SP
   361  007470  012601                                  MOV     (SP)+,R1        ;RESET R1
   362  007472                                          ENDMSG
   (3)  007472                                  L10001:
   (3)  007472  104423                                  TRAP    C$MSG
   366  007474  047045  052045  047045          FMT15:  .ASCIZ  /%N%T%N/
   367  007503     045  022516  022524          FMT16:  .ASCIZ  /%N%T%T%Z3%A.%T%Z2%A.%T%D1%N/
   368  007537     045  022516  022524          FMT17:  .ASCIZ  /%N%T%06%T%01/
   369  007554  052045  047445  022466          FMT17A: .ASCIZ  /%T%06%A  STATUS WAS: %06%A  (DA): %06%N/
   370  007624  047045  052045     000          FMT18:  .ASCIZ  /%N%T/
   371  007631     045  022516  022516          FMT19:  .ASCIZ  /%N%N%T/
   372  007640  047045  040445  040502          FMT20:  .ASCIZ  /%N%ABAD SECTOR FILE HAS %Z3%A. ENTRIES/
   373  007707     045  022516  022524          FMTSN:  .ASCIZ  /%N%T%05%05%N/
   374  007724  047045  052045  055045          FMTTB:  .ASCIZ  /%N%T%Z3%A./
   375  007737     045  022516  031132          FMTCSH: .ASCIZ  /%N%Z2%A.  %T%Z3%A.%T%Z2%A.%T%D1/
   376  007777     045  022516  022516          FMTMS:  .ASCIZ  /%N%N%ACOMMANDS AVAILABLE ARE:%N%T/
   377  010041     045  000116                  MCRLF:  .ASCIZ  /%N/
   378  010044  052045     000                  MSG:    .ASCIZ  /%T/
   379  010047     045  022516  052101          TIME:   .ASCIZ  /%N%ATIME: %Z2%A:%Z2%A:%Z2%A  /
   380  010105     045  022516  022524          FDTYP:  .ASCIZ  /%N%T%01%N/
   381
   385
   386          010120                          .EVEN
   387  010120                                          ENDMOD
   388
   389  010120                                  BGNMOD  HPTCODE
   390  010120                                  BGNHW
   (3)  010120  000002                                  .WORD   L10002-L$HW/2
   391  010122  174400                                  .WORD   174400          ;CSR BASE ADDRESS DEFAULT
   392  010124  000000                                  .WORD   0               ;DRIVE UNIT NUMBER DEFAULT
   393  010126                                  ENDHW
   (3)  010126                                  L10002:
   394  010126                                          ENDMOD
   395  010126                                  BGNMOD  SPTCODE
```

```
      010126                    BGNSW
(3)   010126  000002                    .WORD   L10003-L$SW/2
      010130  000001            WRTSAW: .WORD   1                       ;DEFAULT TO SAWTOOTH WRITE CYCLE
      010132  000002            WRTLIM: .WORD   2                       ;DEFAULT TO 2 WRITE PASSES PER TRACK
      010134                    ENDSW
(3)   010134                    L10003:
      010134                            ENDMOD

      010134                    BGNMOD  DSPCODE

      010134                    DISPATCH        1
(4)   010134  000001                    .WORD   1
(6)   010136  012716                    .WORD   T1

      010140                            ENDMOD

                                .SBTTL  STATISTIC CODE

      010140                    BGNMOD  RPTCODE
      010140                    BGNRPT
      010140                    ENDRPT
(3)   010140                    L10004:
(3)   010140  104425                    TRAP    C$RPT
      010142                            ENDMOD


                                .SBTTL  LOAD PROTECTION TABLE

      010142                    BGNPROT
      010142  000000            .WORD    0                              ;P-TABLE OFFSET OF CSR
      010144  177777            .WORD   -1                              ;NOT A MASS-BUS DRIVE
      010146  000010            .WORD   10                              ;P-TABLE OFFSET OF DRIVE
      010150                    ENDPROT
```

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                                .SBTTL  INITIALIZATION CODE

                        BGNMOD  INITCODE                        ;START OF INITIALIZE CODE

                                BGNINIT

                                SETPRI  #340                    ;PRIORITY TO 7 TO INHIBIT INTERRUPTS
(3)  010150  012700  000340             MOV     #340,R0
(3)  010154  104441                     TRAP    C$SPRI

                                BRESET                          ;FOR LSI-11 CPU'S
(3)  010156  104433                     TRAP    C$RESET
     010160  005037  002474             CLR     STFLG
     010164  005037  002472             CLR     CNTFLG         ;CLEAR CONT
     010170  005037  002466             CLR     PWRFLG         ;CLEAR THE POWER FAIL FLAG
                        ;CHECK FOR PRESENCE OF A SYSTEM CLOCK
     010174                             CLOCK   P,CLKADR        ;P-CLOCK?
(3)  010174  012700  000120             MOV     #'P,R0
(3)  010200  104462                     TRAP    C$CLCK
(3)  010202  010037  002360             MOV     R0,CLKADR
     010206                             BNCOMPLETE      LCLKCH  ;BRANCH IF NO P-CLOCK
(2)  010206  103006                     BCC     LCLKCH
     010210  012737  000001  002356     MOV     #1,CLKTYP       ;IDENTIFY P-CLOCK TYPE
     010216  005237  002372             INC     SYSCLK          ;INDICATE PRESENCE OF A SYSTEM CLOCK
     010222  000522                     BR      PWRCH           ;BRANCH TO CHECK POWER
     010224                     LCLKCH: CLOCK   L,CLKADR        ;L-CLOCK?
(3)  010224  012700  000114             MOV     #'L,R0
(3)  010230  104462                     TRAP    C$CLCK
(3)  010232  010037  002360             MOV     R0,CLKADR
     010236                             BCOMPLETE       1$      ;BRANCH IF L-CLOCK
(2)  010236  103401                     BCS     1$
     010240  000467                     BR      NILCLK          ;ELSE, INDICATE CLOCK IS NOT PRESENT
     010242                     1$:     READBUS                 ;CHECK TYPE OF BUS
(3)  010242  104407                     TRAP    C$RDBU
     010244                             BNCOMPLETE      2$      ;BRANCH IF NOT Q-BUS
(2)  010244  103057                     BCC     2$
     010246  005037  002376             CLR     CLKFLD          ;CLEAR CLOCK FIELD FOR STORING 'TICKS'
     010252                             SETVEC  #100,#CLKTIK,#340 ;SET UP L-CLOCK INTERRUPT VECTOR TO CHECK
(7)  010252  012746  000340             MOV     #340,-(SP)
(6)  010256  012746  012124             MOV     #CLKTIK,-(SP)
(5)  010262  012746  000100             MOV     #100,-(SP)
(4)  010266  012746  000003             MOV     #3,-(SP)
(3)  010272  104437                     TRAP    C$SVEC
(2)  010274  062706  000010             ADD     #10,SP
                                                                ;/IF CLOCK IS 'TICKING'
     010300                             SETPRI  #240            ;SET PRIORITY TO 5 TO ALLOW CLOCK INTERRUPTS
(3)  010300  012700  000240             MOV     #240,R0
(3)  010304  104441                     TRAP    C$SPRI
     010306                             WAITMS  #5              ;PAUSE TO ALLOW CLOCK INTERRUPTS
(3)  010324  012727  000372             MOV     ##250.,(PC)+
(3)  010330  000000                     .WORD   0
(3)  010332  013727  002116             MOV     L$DLY,(PC)+
(3)  010336  000000                     .WORD   0
(3)  010340  005367  177772             DEC     -6(PC)
(3)  010344  001375                     BNE     .-4
(3)  010346  005367  177756             DEC     -22(PC)
```

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(3)  010352  001367                          BNE     .-20
454  010362                                  SETPRI  #340                    ;RESTORE PRIORITY TO 7 TO INHIBIT INTERRUPTS
(3)  010362  012700  000340                  MOV     #340,R0
(3)  010366  104441                          TRAP    C$SPRI
455  010370                                  CLRVEC  #100                    ;CLEAR L-CLOCK INTERRUPT VECTOR
(3)  010370  012700  000100                  MOV     #100,R0
(3)  010374  104436                          TRAP    C$CVEC
456  010376  005737  002376                  TST     CLKFLD                  ;L-CLOCK ''TICKS''?
457  010402  001406                          BEQ     NILCLK                  ;BRANCH IF NO ''TICKS:
458  010404  012737  000002  002356  2$:     MOV     #2,CLKTYP               ;IDENTIFY L-CLOCK TYPE
459  010412  005237  002372                  INC     SYSCLK                  ;INDICATE PRESENCE OF A SYSTEM CLOCK
460  010416  000424                          BR      PWRCH                   ;BRANCH TO CHECK POWER
461  010420                          NILCLK: PRINTF  #FMT15,#NOCLK           ;REPORT ''SYSTEM CLOCK IS NOT AVAILABLE''
(8)  010420  012746  006777                  MOV     #NOCLK,-(SP)
(7)  010424  012746  007474                  MOV     #FMT15,-(SP)
(6)  010430  012746  000002                  MOV     #2,-(SP)
(3)  010434  010600                          MOV     SP,R0
(4)  010436  104417                          TRAP    C$PNTF
(4)  010440  062706  000006                  ADD     #6,SP
462  010444                                  PRINTF  #FMT15,#NOTIM           ;PRINT 'RUN TIMES CANNOT BE REPORTED''
(8)  010444  012746  007035                  MOV     #NOTIM,-(SP)
(7)  010450  012746  007474                  MOV     #FMT15,-(SP)
(6)  010454  012746  000002                  MOV     #2,-(SP)
(3)  010460  010600                          MOV     SP,R0
(4)  010462  104417                          TRAP    C$PNTF
(4)  010464  062706  000006                  ADD     #6,SP
463                                     ;POWER FAIL SEQUENCE
464  010470                             PWRCH: READEF  #EF.PWR
(3)  010470  012700  000034                  MOV     #EF.PWR,R0
(3)  010474  104447                          TRAP    C$REFG
465  010476                                  BNCOMPLETE      3$
(2)  010476  103106                          BCC     3$
466  010500  005237  002466                  INC     PWRFLG                  ;INDICATE POWER FAIL
467  010504  013702  002454                  MOV     UUT,R2                  ;GET NUMBER OF UNITS SELECTED
468  010510  005302                          DEC     R2
469  010512  006302                          ASL     R2
470  010514  006302                          ASL     R2
471  010516  062702  011162                  ADD     #SELTBL,R2              ;POINT TO THE CORRECT SLOT
472  010522  012237  002250          11$:    MOV     (R2)+,DCS               ;GET THE DCS ADDRESS
473  010526  011237  002302                  MOV     (R2),DRSEL              ;AND GET THE DRIVE BITS
474  010532  052737  000200  002302          BIS     #200,DRSEL              ;ADD IN THE CRDY BIT
475  010540  013777  002302  171502          MOV     DRSEL,@DCS              ;SELECT THE DRIVE
476  010546  012701  000170                  MOV     #120.,R1                ;INITIALIZE WAIT COUNT
477  010552  032777  000001  171470  12$:    BIT     #1,@DCS                 ;DRIVE READY UP?
478  010560  001040                          BNE     14$                     ;YES - RESET DRIVE & HEADS HOME
479
480  010562                                  WAITMS  #10.                    ;WAIT A WHILE
(3)  010600  012727  000372                  MOV     ##250.,(PC)+
(3)  010604  000000                          .WORD   0
(3)  010606  013727  002116                  MOV     L$DLY,(PC)+
(3)  010612  000000                          .WORD   0
(3)  010614  005367  177772                  DEC     -6(PC)
(3)  010620  001375                          BNE     .-4
(3)  010622  005367  177756                  DEC     -22(PC)
(3)  010626  001367                          BNE     .-20
481  010636  005301                          DEC     R1                      ;UPDATE THE TIMER
```

```
                                        BNE     12$                     ;IF MORE TIME, THEN TRY AGAIN

                                ;DRIVE NOT READY IN TIME - KILL THE ENTRY
                                        TST     -(R2)                   ;CORRECT THE POINTER
                                        CLR     (R2)+                   ;KILL THE ENTRY WORD FOR DCS

                                13$:    SUB     #4,R2                   ;POINT TO THE NEXT ENTRY IN LIST
                                        CMP     #SELTBL,R2              ;DONE?
                                        BLE     11$                     ;NO - DO THIS UNIT ALSO
                                        BR      15$                     ;YES - PROCEED

                                14$:    JSR     R5,ISDRST               ;RESET THE DRIVE SELECTED
                                        JSR     R5,HDHOME               ;AND BRING THE HEADS HOME

                                15$:    TST     SYSCLK                  ;CLOCK TICK?
                                        BEQ     4$                      ;BR IF NO
                                        CLKON                           ;YES - SET FOR 1 SEC INTERVALS
                                4$:     JMP     POWER

                                ;''CONTINUE'' COMMAND SEQUENCE
                                3$:     READEF  #EF.CONTINUE            ;CONTINUE FROM CONSOLE?
(3)  010714  012700  000036             MOV     #EF.CONTINUE,R0
(3)  010720  104447                     TRAP    C$REFG
                                        BNCOMPLETE      1$              ;NO, CONTINUE W/ INIT CODE
(2)  010722  103004                     BCC     1$

                                        INC     CNTFLG                  ;YES SET CONT FLAG, GO TO END OF INIT
                                        JMP     END

                                1$:     JSR     R5,CLEAR                ;CLEAR ALL DRIVE STORAGE BUFFERS

                                2$:     MOV     #LSTDR1,R0              ;CLEAR FLAGS
                                CLRDAT: CLR     (R0)+                   ;
                                        CMP     R0,#STFLG+2             ;MASS CLEAR OF GLOBAL DATA AREA
                                        BNE     CLRDAT                  ;DO TILL TABLE IS ZEROED

                                        MOV     #SELTBL,R0
                                CLRSTB: MOV     #-1,(R0)+               ;INIT THE SELECT TABLE
                                        CMP     R0,#STBLE               ;END OF THE TABLE?
                                        BNE     CLRSTB                  ;NO CLEAR THE NEXT

                                        MOV     L$UNIT,R3               ;GET NUMBER OF UNITS
                                        MOV     R3,UUT                  ;SAVE L$UNIT
                                        MOV     #SELTBL,R4              ;INIT SELECT TABLE POINTER
                                        CLR     R1                      ;INIT P-TABLE
                                1$:     GPHARD  R1,R0                   ;GET A P-TABLE
                                        MOV     R1,R0
                                        TRAP    C$GPHRD
                                        BNCOMPLETE      2$
                                        BCC     2$
                                ;MOVE P-TABLE CONTENTS TO LOCAL STORAGE
                                        MOV     (R0)+,(R4)+             ;GET CSR INTO SELECT TABLE STORAGE
                                        MOV     (R0),(R4)+              ;GET DRIVE INTO TABLE
                                2$:     INC     R1                      ;POINT TO NEXT
                                        DEC     R3                      ;DOWN COUNT
                                        BNE     1$                      ;DO WHILE
```

```
                                        END:
011030  013704  002454                        MOV     UUT,R4
011034  006304                                ASL     R4
011036  006304                                ASL     R4
011040  062704  011162                        ADD     #SELTBL,R4              ;POINT TO THE SELECT TABLE
011044  012704  177777                        MOV     #-1,R4                  ;FORCE A TERMINATE IN THE TABLE
                                        ;''START'' COMMAND SEQUENCE
011050                                  L10006: READEF  #EF.START               ;START COMMAND
(3) 011050  012700  000040                      MOV     #EF.START,R0
(3) 011054  104447                              TRAP    C$REFG
011056                                          BNCOMPLETE      RESTART         ;NO, CHK RESTART
(2) 011056  103002                              BCC     RESTART
011060  005237  002474                          INC     STFLG                   ;SET START INDICATOR

011064                                  RESTART:
011064                                          SETVEC  BVEC,#INTR1,BPRIOR      ;SET CONTROLLER VECTOR
(7) 011064  013746  002352                      MOV     BPRIOR,-(SP)
(6) 011070  012746  023646                      MOV     #INTR1,-(SP)
(5) 011074  013746  002350                      MOV     BVEC,-(SP)
(4) 011100  012746  000003                      MOV     #3,-(SP)
(3) 011104  104437                              TRAP    C$SVEC
(2) 011106  062706  000010                      ADD     #10,SP

011112  012737  030530  002450  FINDBF: MOV     #BSFILE,BUF1                    ;ALL XFERS TO BSFILE STORAGE
011120  012737  002400  002452          MOV     #1280.,MAXWC                    ;MAX XFER SIZE = 1/4 TRACK
011126  012737  002450  002256          MOV     #BUF1,BBA                       ;POINT TO THE DATA STORAGE AREA
011134  012737  027416  002304          MOV     #BSEC0,BSECPT                   ;POINT TO THE BAD SECTOR FILE DATA
011142  005737  002472                  TST     CNTFLG                          ;HERE FROM 'CON' CMD?
011146  001004                          BNE     POWER                           ;BR IF TRUE

011150                                  CLKON                                   ;ACTIVATE SYSTEM CLOCK TO INITIATE GENERATION
                                                                                ;/OF TIMING INTERVALS

011160                          POWER:
011160                                  ENDINIT
(3) 011160                      L10006:
(3) 011160  104411                      TRAP    C$INIT

011162  000020                  SELTBL: .BLKW   16.
011222  177777                  STBLE:  .WORD   -1

011224                          ENDMOD
```

```
                                        .SBTTL  AUTO DROP SECTION

                                        ;THE AUTO DROP SECTION IS CONDITIONALLY EXECUTED AFTER THE INITIALIZATION CODE
                                        ;WHEN THE OPERATOR ''ADR'' FLAG IS SET. EACH DRIVE IS CHECKED TO DETERMINE IF IT
                                        ;RESPONDS WITH 'READY'' AND IS DROPPED FROM THE TEST CYCLE IF IT DOES NOT. THE
                                        ;HARDWARE TESTS ARE PERFORMED IMMEDIATELY AFTER THE READY STATUS OF ALL DRIVES
                                        ;HAVE BEEN CHECKED.
011224                                  BGNAUTO
011224  010146                                  MOV     R1,-(SP)                ;SAVE CONTENTS OF REGISTERS
011226  010246                                  MOV     R2,-(SP)
011230  010346                                  MOV     R3,-(SP)
011232  013703  002012                          MOV     L$UNIT,R3               ;INITIALIZE NUMBER OF UNITS
011236  012702  011162                          MOV     #SELTBL,R2              ;INITIALIZE START OF SELECT TABLE
011242  005037  002374                          CLR     LOGUNIT                 ;CLEAR LOGICAL UNIT NUMBER
011246  005037  002470                  1$:     CLR     TRPFLG                  ;CLEAR TRAP FLAG
011252                                          SETVEC  ERRVEC,#TRPHAN,#340     ;SET UP TIME-OUT VECTOR TO DETECT
(7)  011252  012746  000340                     MOV     #340,-(SP)
(6)  011256  012746  012474                     MOV     #TRPHAN,-(SP)
(5)  011262  013746  002504                     MOV     ERRVEC,-(SP)
(4)  011266  012746  000003                     MOV     #3,-(SP)
(3)  011272  104437                             TRAP    C$SVEC
(2)  011274  062706  000010                     ADD     #10,SP
                                                                                ;/NON-EXISTENT CONTROLLER
011300  011237  002250                          MOV     @R2,DCS                 ;GET CONTROL STATUS REGISTER ADDRESS
011304  016237  000002  002302                  MOV     2(R2),DRSEL             ;GET DRIVE SELECT BITS
011312  005777  170732                          TST     @DCS                    ;ACCESS CONTROLLER
011316  005737  002470                          TST     TRPFLG                  ;DID TRAP OCCUR?
011322  001441                                  BEQ     2$                      ;BRANCH TO CHECK DRIVE IF TRAP DID NOT
                                                                                ;/OCCUR
011324                                          PRINTF  #FMT17,#MRLCS,DCS,#DRNM,<B,DRSEL+1>     ;GIVE CONTROL STATUS AND
(11) 011324  005046                             CLR     -(SP)
(11) 011326  153716  002303                     BISB    DRSEL+1,(SP)
(10) 011332  012746  004033                     MOV     #DRNM,-(SP)
(9)  011336  013746  002250                     MOV     DCS,-(SP)
(8)  011342  012746  002506                     MOV     #MRLCS,-(SP)
(7)  011346  012746  007537                     MOV     #FMT17,-(SP)
(6)  011352  012746  000005                     MOV     #5,-(SP)
(3)  011356  010600                             MOV     SP,R0
(4)  011360  104417                             TRAP    C$PNTF
(4)  011362  062706  000014                     ADD     #14,SP
                                                                                ;/DRIVE INFORMATION
011366                                          PRINTF  #FMT15,#NOCTLR          ;MSG. 'DROPPING DRIVE - NO CONTROLLER''
(8)  011366  012746  007072                     MOV     #NOCTLR,-(SP)
(7)  011372  012746  007474                     MOV     #FMT15,-(SP)
(6)  011376  012746  000002                     MOV     #2,-(SP)
(3)  011402  010600                             MOV     SP,R0
(4)  011404  104417                             TRAP    C$PNTF
(4)  011406  062706  000006                     ADD     #6,SP
011412                                          DODU    LOGUNIT                 ;DO DROP UNIT ON DRIVE FROM TEST CYCLE
(3)  011412  013700  002374                     MOV     LOGUNIT,R0
(3)  011416  104451                             TRAP    C$DODU
011420  005022                                  CLR     (R2)+                   ;CLEAR CONTROL STATUS REGISTER ADDRESS
                                                                                ;/ENTRY IN SELECT TABLE
011422  005022                                  CLR     (R2)+                   ;CLEAR DRIVE SELECT ENTRY IN SELECT TABLE
011424  000474                                  BR      5$                      ;BRANCH TO ACCESS NEXT DRIVE
011426  052737  000200  002302  2$:     BIS     #200,DRSEL                      ;ADD IN THE CRDY BIT
```

```
600  011434  013777  002302  170606          MOV     DRSEL,@DCS              ;SELECT THE DRIVE
601  011442  012701  000074                  MOV     #60.,R1                 ;INITIALIZE TIMER
602  011446  032777  000001  170574  3$:     BIT     #1,@DCS                 ;DRIVE READY?
603  011454  001057                          BNE     4$                      ;BRANCH TO ACCESS NEXT DRIVE IF READY
604  011456                                  WAITUS  #10.                    ;IMPLEMENT A TIME DELAY
(3)  011456  012727  000012                  MOV     ###10.,(PC)+
(3)  011462  000000                          .WORD   0
(3)  011464  013727  002116                  MOV     L$DLY,(PC)+
(3)  011470  000000                          .WORD   0
(3)  011472  005367  177772                  DEC     -6(PC)
(3)  011476  001375                          BNE     .-4
(3)  011500  005367  177756                  DEC     -22(PC)
(3)  011504  001367                          BNE     .-20
605  011506  005301                          DEC     R1                      ;DECREMENT THE TIMER
606  011510  001356                          BNE     3$                      ;BRANCH IF TIME NOT ELAPSED
607  011512                                  PRINTF  #FMT17,#MRLCS,DCS,#DRNM,<B,DRSEL+1>     ;GIVE CONTROL STATUS AND
(11) 011512  005046                          CLR     -(SP)
(11) 011514  153716  002303                  BISB    DRSEL+1,(SP)
(10) 011520  012746  004033                  MOV     #DRNM,-(SP)
(9)  011524  013746  002250                  MOV     DCS,-(SP)
(8)  011530  012746  002506                  MOV     #MRLCS,-(SP)
(7)  011534  012746  007537                  MOV     #FMT17,-(SP)
(6)  011540  012746  000005                  MOV     #5,-(SP)
(3)  011544  010600                          MOV     SP,R0
(4)  011546  104417                          TRAP    C$PNTF
(4)  011550  062706  000014                  ADD     #14,SP
608                                                                     ;/DRIVE INFORMATION
609  011554                                  PRINTF  #FMT15,#NOTRDY          ;MSG. 'DRIVE DROPPED - DID NOT RESPOND
(8)  011554  012746  006505                  MOV     #NOTRDY,-(SP)
(7)  011560  012746  007474                  MOV     #FMT15,-(SP)
(6)  011564  012746  000002                  MOV     #2,-(SP)
(3)  011570  010600                          MOV     SP,R0
(4)  011572  104417                          TRAP    C$PNTF
(4)  011574  062706  000006                  ADD     #6,SP
610                                                                     ;/WITH 'READY'''
611  011600                                  DODU    LOGUNIT                 ;DO DROP UNIT ON DRIVE FROM TEST CYCLE
(3)  011600  013700  002374                  MOV     LOGUNIT,R0
(3)  011604  104451                          TRAP    C$DODU
612  011606  005022                          CLR     (R2)+                   ;CLEAR CONTROL STATUS REGISTER ADDRESS
613                                                                     ;/ENTRY IN SELECT TABLE
614  011610  005022                          CLR     (R2)+                   ;CLEAR DRIVE SELECT ENTRY IN SELECT TABLE
615  011612  000401                          BR      5$                      ;BRANCH TO ACCESS NEXT DRIVE
616  011614  022222          4$:     CMP     (R2)+,(R2)+             ;ACCESS NEXT DRIVE IN SELECT TABLE
617  011616  005237  002374      5$:     INC     LOGUNIT                 ;INCREMENT LOGICAL UNIT NUMBER
618  011622  005303                          DEC     R3                      ;DECREMENT DRIVE COUNT
619  011624  001210                          BNE     1$                      ;BRANCH TO GET NEXT DRIVE IF MORE
620  011626                                  CLRVEC  ERRVEC                  ;RELEASE THE ERROR VECTOR
(3)  011626  013700  002504                  MOV     ERRVEC,R0
(3)  011632  104436                          TRAP    C$CVEC
621  011634  012603                          MOV     (SP)+,R3                ;RESTORE CONTENTS OF REGISTERS
622  011636  012602                          MOV     (SP)+,R2
623  011640  012601                          MOV     (SP)+,R1
624  011642                      ENDAUTO
(3)  011642                      L10007:
(3)  011642  104461                          TRAP    C$AUTO
625
```

```
  627  011644                          BGNMOD  CLNCODE
  628  011644                                  BGNCLN
  629
  630  011644                                  SETVEC  ERRVEC,#TRPHAN,#340
(7)    011644  012746  000340                  MOV     #340,-(SP)
(6)    011650  012746  012474                  MOV     #TRPHAN,-(SP)
(5)    011654  013746  002504                  MOV     ERRVEC,-(SP)
(4)    011660  012746  000003                  MOV     #3,-(SP)
(3)    011664  104437                          TRAP    C$SVEC
(2)    011666  062706  000010                  ADD     #10,SP
  631  011672                                  SETPRI  #PRI00                  ;PRIORITY TO ZERO
(3)    011672  012700  000000                  MOV     #PRI00,R0
(3)    011676  104441                          TRAP    C$SPRI
  632  011700                                  CLRVEC  BVEC                    ;RELEASE VECTOR OF FIRST CONTROLLER
(3)    011700  013700  002350                  MOV     BVEC,R0
(3)    011704  104436                          TRAP    C$CVEC
  633
  634  011706                          3$:     CLRVEC  ERRVEC
(3)    011706  013700  002504                  MOV     ERRVEC,R0
(3)    011712  104436                          TRAP    C$CVEC
  635  011714  005737  002372                  TST     SYSCLK
  636  011720  001400                          BEQ     4$
  637  011722                          4$:     BRESET                          ;TAKE CARE OF LSI-11
(3)    011722  104433                          TRAP    C$RESET
  638  011724                                  ENDCLN
(3)    011724                          L10010:
(3)    011724  104412                          TRAP    C$CLEAN
  639
  640  011726                                  ENDMOD
  641
  642  011726                          BGNMOD  ADDCODE
  643  011726                                  BGNAU
  644  011726                                  ENDAU
(3)    011726                          L10011:
(3)    011726  104452                          TRAP    C$AU
  645  011730                                  ENDMOD
  646
  647  011730                          BGNMOD  DROPCODE
  648  011730                                  BGNDU
  649  011730                                  ENDDU
(3)    011730                          L10012:
(3)    011730  104453                          TRAP    C$DU
  650  011732                                  ENDMOD
  651
  652
```

```
                                .SBTTL  CLOCK INTERRUPT SERVICE ROUTINES

011732                          STARS
(2)                             ;;**********************************************************************
                                ;UPDATES  TIME EVERY 1/60 SECOND (60 HZ) OR EVERY 1/50 SECOND
                                ;(50 HZ)
011732                          STARS
(2)                             ;;**********************************************************************

011732                          BGNSRV  UPDATE
011732  010446                          MOV     R4,-(SP)        ;SAVE R4
                                ;CLEAR CLOCK INTERRUPT ENABLE TO INHIBIT CLOCK INTERRUPTS DURING UPDATING
                                ;OF TIME FIELDS
011734  022737  000001  002356          CMP     #1,CLKTYP       ;P-CLOCK?
011742  001004                          BNE     1$              ;BRANCH IF NOT P-CLOCK
011744  042737  000100  172540          BIC     #100,@#172540   ;DISABLE P-CLOCK INTERRUPT FACILITY
011752  000403                          BR      2$
011754  042737  000100  177546  1$:     BIC     #100,@#177546   ;DISABLE L-CLOCK INTERRUPT FACILITY
                                ;UPDATE TIME FIELDS
011762  012704  002424          2$:     MOV     #TICK,R4        ;INITIALIZE TICK ADDRESS
011766  005214                          INC     (R4)            ;INCREMENT TICK TIME FIELD
011770  023727  002354  000002          CMP     CLKFRQ,#2       ;50 HZ CLOCK?
011776  001005                          BNE     3$              ;NO - BRANCH FOR SERVICING 60 HZ CLOCK
012000  021427  000062                  CMP     (R4),#50.       ;((R4))=50?
012004  001024                          BNE     EXIT            ;IF NOT,UPDATING IS COMPLETE
012006  005014                          CLR     (R4)            ;ELSE,((R4))=0 (RESET COUNT)
012010  000404                          BR      4$              ;BRANCH TO UPDATE ''SECOND'' TIME FIELD
012012  021427  000074          3$:     CMP     (R4),#60.       ;((R4))=60?
012016  001017                          BNE     EXIT            ;IF NOT,UPDATING IS COMPLETE
012020  005014                          CLR     (R4)            ;ELSE,((R4))=0 (RESET COUNT)
012022  005724                  4$:     TST     (R4)+           ;(R4)=(R4)+2 (GO TO NEXT TIME FIELD)
012024  005214                          INC     (R4)            ;INCREMENT ''SECOND'' TIME FIELD
012026  021427  000074                  CMP     (R4),#60.       ;((R4))=60?
012032  001011                          BNE     EXIT            ;IF NOT,UPDATING IS COMPLETE
012034  005014                          CLR     (R4)            ;ELSE,((R4))=0 (RESET COUNT)
012036  005724                          TST     (R4)+           ;ACCESS ''MINUTE'' TIME FIELD
012040  005214                          INC     (R4)            ;INCREMENT ''MINUTE'' TIME FIELD
012042  021427  000074                  CMP     (R4),#60.       ;((R4))=60?
012046  001003                          BNE     EXIT            ;IF NOT,UPDATING IS COMPLETE
012050  005014                          CLR     (R4)            ;ELSE,((R4))=0 (RESET COUNT)
012052  005724                          TST     (R4)+           ;ACCESS ''HOUR'' TIME FIELD
012054  005214                          INC     (R4)            ;INCREMENT ''HOUR'' TIME FIELD
012056  005337  002370          EXIT:   DEC     CLKBFR          ;COUNT CLOCK TICKS
012062  003003                          BGT     5$              ;TIME NOT EXPIRED
012064  013737  002366  002370          MOV     CLKCNT,CLKBFR   ;RE-INITIALIZE TIME INCREMENT
                                ;RE-ENABLE CLOCK INTERRUPT FACILITY
012072  022737  000001  002356  5$:     CMP     #1,CLKTYP       ;P-CLOCK?
012100  001004                          BNE     6$              ;BRANCH IF NOT P-CLOCK
012102  052737  000100  172540          BIS     #100,@#172540   ;SET P-CLOCK INTERRUPT ENABLE BIT
012110  000403                          BR      7$              ;EXIT
012112  052737  000100  177546  6$:     BIS     #100,@#177546   ;SET L-CLOCK INTERRUPT ENABLE BIT
012120  012604          7$:     MOV     (SP)+,R4        ;RESTORE R4
012122                          ENDSRV
012122                          L10013:
012122  000002                          RTI
                                
```

```
706
707  012124                          BGNSRV  CLKTIK
708
709  012124  005237  002376                  INC     CLKFLD          ;INCREMENT CLOCK FIELD TO INDICATE
710                                                                    ;/THAT CLOCK IS 'TICKING'
711
712  012130                          ENDSRV
(3)  012130                          L10014:
(2)  012130  000002                         RTI
713
```

```
                        .SBTTL  GLOBAL SUBROUTINES

012132                  BGNMOD  GLBSUB

012132                  STARS
(2)                     ;;*****************************************************************
                        ;SET UP CLOCK INTERRUPT VECTOR, CLOCK COUNT, AND IDENTIFY THE
                        ;CLOCK FREQUENCY
012132                  STARS
(2)                     ;;*****************************************************************

012132  010346          CLKINI: MOV     R3,-(SP)        ;SAVE R3
012134  022737  000001  002356          CMP     #1,CLKTYP       ;P-CLOCK?
012142  001014                        BNE     LCLK            ;BRANCH IF NOT P-CLOCK
012144                          SETVEC  #104,#UPDATE,#340       ;SET P-CLOCK INTERRUPT VECTOR
(7)     012144  012746  000340          MOV     #340,-(SP)
(6)     012150  012746  011732          MOV     #UPDATE,-(SP)
(5)     012154  012746  000104          MOV     #104,-(SP)
(4)     012160  012746  000003          MOV     #3,-(SP)
(3)     012164  104437                  TRAP    C$SVEC
(2)     012166  062706  000010          ADD     #10,SP
012172  000417                        BR      FRQCHK          ;BRANCH FOR SYSTEM FREQUENCY CHECK
012174  022737  000002  002356  LCLK:   CMP     #2,CLKTYP       ;L-CLOCK?
012202  001036                        BNE     ENDINI          ;BRANCH IF NO CLOCK
012204                          SETVEC  #100,#UPDATE,#340       ;SET L-CLOCK INTERRUPT VECTOR
(7)     012204  012746  000340          MOV     #340,-(SP)
(6)     012210  012746  011732          MOV     #UPDATE,-(SP)
(5)     012214  012746  000100          MOV     #100,-(SP)
(4)     012220  012746  000003          MOV     #3,-(SP)
(3)     012224  104437                  TRAP    C$SVEC
(2)     012226  062706  000010          ADD     #10,SP
012232  013703  002360          FRQCHK: MOV     CLKADR,R3       ;GET BASE ADDRESS OF THE SUPERVISOR CLOCK TABLE
012236  022763  000074  000006          CMP     #60.,6(R3)      ;60 HZ?
012244  001007                        BNE     FRQ50           ;BRANCH FOR 50 HZ
012246  012737  000074  002366          MOV     #60.,CLKCNT     ;INITIALIZE CLOCK COUNT FOR 60 TICKS PER SECOND
012254  012737  000001  002354          MOV     #1,CLKFRQ       ;IDENTIFY CLOCK FREQUENCY IS 60 HZ
012262  000406                        BR      ENDINI          ;RETURN
012264  012737  000062  002366  FRQ50:  MOV     #50.,CLKCNT     ;INITIALIZE CLOCK COUNT FOR 50 TICKS PER SECOND
012272  012737  000002  002354          MOV     #2,CLKFRQ       ;IDENTIFY CLOCK FREQUENCY IS 50 HZ
012300  012603          ENDINI: MOV     (SP)+,R3        ;RESTORE R3

012302  000207                        RTS     PC              ;RETURN
```

```
012304                              STARS
                                    ;;*******************************************************************
                                    ;START CLOCK OPERATION
012304                              STARS
                                    ;;*******************************************************************

012304  022737  000002  002356      CLKST:  CMP     #2,CLKTYP           ;L-CLOCK?
012312  001006                              BNE     1$                  ;BRANCH FOR P-CLOCK
012314  012737  000100  177546              MOV     #100,@#177546       ;SET INTERRUPT ENABLE BIT TO 1
012322  005237  002364                      INC     CLKSON              ;INDICATE CLOCK IS 'ON'
012326  000414                              BR      2$                  ;BRANCH TO SET UP TIME INCREMENTS
012330  022737  000001  002356      1$:     CMP     #1,CLKTYP           ;P-CLOCK?
012336  001013                              BNE     3$                  ;BRANCH IF NO CLOCK
012340  012737  000001  172542              MOV     #1,@#172542         ;SET UP P-CLOCK FOR 1 INTERRUPT PER TICK
012346  012737  000115  172540              MOV     #115,@#172540       ;SET INTERRUPT ENABLE,REPEAT INTERRUPT MODE,
                                                                        ;/LINE FREQUENCY RATE,START CLOCK
012354  005237  002364                      INC     CLKSON              ;INDICATE CLOCK IS 'ON'
012360  013737  002366  002370      2$:     MOV     CLKCNT,CLKBFR       ;SET UP TIME INCREMENTS
012366  000207                      3$:     RTS     PC                  ;RETURN

012370                              STARS
                                    ;;*******************************************************************
                                    ;FIRST & SELDRV -- DRIVE SELECT ROUTINE
012370                              STARS
                                    ;;*******************************************************************

012370  012704  011162              FIRST:  MOV     #SELTBL,R4                  ;POINT TO THE SELECT TABLE
012374  010437  002330                      MOV     R4,NXTUNI

012400  013704  002330              SELDRV: MOV     NXTUNI,R4                   ;SETUP THE POINTER
012404  005714                      10$:    TST     (R4)                        ;CHECK FOR A VALID ENTRY
012406  100402                              BMI     1$                          ;OK TO GO ON
012410  022424                              CMP     (R4)+,(R4)+                 ;POINT TO THE NEXT ENTRY SLOT
012412  000774                              BR      10$                         ;AND TRY AGAIN

012414  012437  002250              1$:     MOV     (R4)+,DCS                   ;GET THE CSR ADDR FROM TABLE
012420  022737  177777  002250              CMP     #-1,DCS                     ;END OF THE TABLE?
012426  001001                              BNE     2$                          ;NO - CONTINUE
012430  000416                              BR      4$                          ;EXIT +1

012432  012437  002302              2$:     MOV     (R4)+,DRSEL                 ;GET THE DRIVE SELECT BITS
012436  004537  025422                      JSR     R5,GETDST                   ;GET THE DRIVE STATUS
012442  012737  000001  002316              MOV     #1,TDR                      ;DEFAULT TO RL01 TYPE
012450  032701  000200                      BIT     #BIT7,R1                    ;IS IT AN RL02?
012454  001403                              BEQ     3$                          ;NO
012456  012737  000002  002316              MOV     #2,TDR                      ;YES - SET FOR AN RL02

012464  022525                      3$:     CMP     (R5)+,(R5)+                 ;RETURN +2 - NORMAL EXIT
012466  010437  002330              4$:     MOV     R4,NXTUNI                   ;SAVE THE 'NEXT' SLOT POINTER
012472  000205                              RTS     R5                          ;EXIT

012474  005237  002470              TRPHAN: INC     TRPFLG
012500  000002                              RTI
```

```
 799  012502                                 STARS
 (2)                                         ;;*************************************************************
 800                                         ;PTIME -- ROUTINE TO PRINT THE SYSTEM RUNTIME IF A CLOCK IS PRESENT
 801  012502                                 STARS
 (2)                                         ;;*************************************************************
 802
 803  012502  005737  002372                 PTIME:  TST     SYSCLK          ;CLOCK PRESENT?
 804  012506  001416                                 BEQ     1$              ;NO
 805  012510                                         PRINTB  #TIME,HOUR,MINUTE,SECOND
(10)  012510  013746  002426                         MOV     SECOND,-(SP)
 (9)  012514  013746  002430                         MOV     MINUTE,-(SP)
 (8)  012520  013746  002432                         MOV     HOUR,-(SP)
 (7)  012524  012746  010047                         MOV     #TIME,-(SP)
 (6)  012530  012746  000004                         MOV     #4,-(SP)
 (3)  012534  010600                                 MOV     SP,R0
 (4)  012536  104414                                 TRAP    C$PNTB
 (4)  012540  062706  000012                         ADD     #12,SP
 806  012544  000205                         1$:     RTS     R5              ;EXIT
 807  012546                                 STARS
 (2)                                         ;;*************************************************************
 808                                         ;DRVID -- ROUTINE TO PRINT THE SELECTED UNIT IDENTIFICATION
 809  012546                                 STARS
 (2)                                         ;;*************************************************************
 810
 811  012546                                 DRVID:  PRINTF  #FMT17,#MRLCS,DCS,#DRNM,<B,DRSEL+1>
(11)  012546  005046                                 CLR     -(SP)
(11)  012550  153716  002303                         BISB    DRSEL+1,(SP)
(10)  012554  012746  004033                         MOV     #DRNM,-(SP)
 (9)  012560  013746  002250                         MOV     DCS,-(SP)
 (8)  012564  012746  002506                         MOV     #MRLCS,-(SP)
 (7)  012570  012746  007537                         MOV     #FMT17,-(SP)
 (6)  012574  012746  000005                         MOV     #5,-(SP)
 (3)  012600  010600                                 MOV     SP,R0
 (4)  012602  104417                                 TRAP    C$PNTF
 (4)  012604  062706  000014                         ADD     #14,SP
 812  012610                                         PRINTF  #FDTYP,#MDRTYP,TDR
 (9)  012610  013746  002316                         MOV     TDR,-(SP)
 (8)  012614  012746  006562                         MOV     #MDRTYP,-(SP)
 (7)  012620  012746  010105                         MOV     #FDTYP,-(SP)
 (6)  012624  012746  000003                         MOV     #3,-(SP)
 (3)  012630  010600                                 MOV     SP,R0
 (4)  012632  104417                                 TRAP    C$PNTF
 (4)  012634  062706  000010                         ADD     #10,SP
 813  012640  000205                                 RTS     R5
 814
 815  012642                                 STARS
 (2)                                         ;;*************************************************************
 816                                         ;DRNRDY -- ROUTINE TO PRINT THE DRIVE SELECTED ISN'T READY
 817  012642                                 STARS
 (2)                                         ;;*************************************************************
 818
 819  012642  004537  012546                 DRNRDY: JSR     R5,DRVID
 820  012646                                         PRINTF  #M[illegible],#N[illegible]RDY
 (8)  012646  012746  006505                         MOV     #NOTRDY,-(SP)
 (7)  012652  012746  010044                         MOV     #[illegible],-(SP)
 (6)  012656  012746  000002                         MOV     #2,-(SP)
```

```
(3)  012662  010600                    MOV     SP,R0
(4)  012664  104417                    TRAP    C$PNTF
(4)  012666  062706  000006            ADD     #6,SP
821  012672  004537  012700            JSR     R5,DRDRV                ;DROP THE DRIVE SELECTED
822  012676  000205                    RTS     R5
823
824  012700                          STARS
(2)                                  ;;*****************************************************************-********
825                                  ;DRDRV -- ROUTINE TO KILL A UNIT ENTRY INTO THE SELTBL AREA IF THE
826                                  ;       PGM DETERMINES A UNIT IS NOT ABLE TO BE USED
827  012700                          STARS
(2)                                  ;;*****************************************************************************
828
829  012700  013704  002330         DRDRV:  MOV     NXTUNI,R4               ;POINT TO THE 'NEXT' UNIT SLOT
830  012704  162704  000004                 SUB     #4,R4                   ;POINT TO THE CURRENT UNIT
831  012710  005024                         CLR     (R4)+                   ;KILL THE ENTRY
832  012712  005024                         CLR     (R4)+                   ;KILL DRSEL ENTRY
833  012714  000205                         RTS     R5                      ;EXIT
834
835
836  012716                          ENDMOD
837
838
839
```

```
                                        .SBTTL  PROGRAM MAIN LOOP

                                        BGNTST
                                        STARS
                                        ;;*****************************************************************************
                                        ;THIS IS WHERE CONTROL IS PASSED AFTER THE INITIAL QUESTIONS HAVE
                                        ;BEEN ANSWERED FOR THE P-TABLE STORAGE.
                                        STARS
                                        ;;*****************************************************************************

012716                                  MTEST:
012716  004537  012370                          JSR     R5,FIRST                ;SELECT THE 1ST DRIVE
012722  000137  013216                          JMP     WHATCMD                 ;NO - UNITS
012726  000404                                  BR      2$
012730  004537  012400                  1$:     JSR     R5,SELDRV               ;SELECT ANOTHER UNIT
012734  000137  013216                          JMP     WHATCMD                 ;NO MORE TO SELECT
012740  012777  000200  167302          2$:     MOV     #200,@DCS               ;CHECK IF DRIVE THERE
012746  053777  002302  167274                  BIS     DRSEL,@DCS
012754  012700  000000                          MOV     #0.,R0                  ;STALL
012760  005300                          13$:    DEC     R0
012762  001376                                  BNE     13$
012764  004537  025422                          JSR     R5,GETDST               ;GET THE CURRENT DRIVE STATUS
012770  010137  002414                          MOV     R1,TEMP0                ;SAVE THE STATUS
012774                                          PRINTF  #MCRLF
(7)  012774  012746  010041                     MOV     #MCRLF,-(SP)
(6)  013000  012746  000001                     MOV     #1,-(SP)
(3)  013004  010600                             MOV     SP,R0
(4)  013006  104417                             TRAP    C$PNTF
(4)  013010  062706  000004                     ADD     #4,SP
013014  004537  012546                          JSR     R5,DRVID                ;TELL OPR THE UNIT SELECTED

013020  032737  000020  002414  130$:   BIT     #HOP,TEMP0              ;ARE THE HEADS LOADED?
013026  001015                                  BNE     131$                    ;BR IF OK
013030                                          PRINTF  #FMT18,#NOLOAD          ;NO
(8)  013030  012746  003433                     MOV     #NOLOAD,-(SP)
(7)  013034  012746  007624                     MOV     #FMT18,-(SP)
(6)  013040  012746  000002                     MOV     #2,-(SP)
(3)  013044  010600                             MOV     SP,R0
(4)  013046  104417                             TRAP    C$PNTF
(4)  013050  062706  000006                     ADD     #6,SP
013054  004537  012700                          JSR     R5,DRDRV                ;DROP THIS DRIVE
013060  000452                                  BR      15$
013062  032737  020000  002414  131$:   BIT     #WL,TEMP0               ;IS THE PACK WRITE LOCKED?
013070  001414                                  BEQ     132$                    ;BR IF NOT WRT LOCKED
013072                                          PRINTF  #FMT18,#WRTLCK          ;TELL OPR
(8)  013072  012746  003460                     MOV     #WRTLCK,-(SP)
(7)  013076  012746  007624                     MOV     #FMT18,-(SP)
(6)  013102  012746  000002                     MOV     #2,-(SP)
(3)  013106  010600                             MOV     SP,R0
(4)  013110  104417                             TRAP    C$PNTF
(4)  013112  062706  000006                     ADD     #6,SP
013116  005237  002462                          INC     WRTLOK                  ;SET THE WRITE LOCK FLAG
013122  032737  001000  002414  132$:   BIT     #VC,TEMP0               ;PACK JUST LOADED?
013130  001412                                  BEQ     133$                    ;JUMP IF NOT
013132                                          PRINTF  #FMT18,#NEWLD           ;TELL OPR
(8)  013132  012746  003505                     MOV     #NEWLD,-(SP)
```

```
(7)  013136  012746  007624                MOV     #FMT18,-(SP)
(6)  013142  012746  000002                MOV     #2,-(SP)
(3)  013146  010600                        MOV     SP,R0
(4)  013150  104417                        TRAP    C$PNTF
(4)  013152  062706  000006                ADD     #6,SP
877  013156  004537  025436        133$:   JSR     R5,ISDRST               ;RESET THE DRIVE
878  013162  004537  025422                JSR     R5,GETDST               ;GET THE DRIVE STATUS AGAIN
879  013166  032777  100000  167054        BIT     #ERR,@DCS               ;COMPOSITE ERROR STILL SET?
880  013174  001404                        BEQ     15$                     ;NOPE - SKIP OVER
881  013176                                ERRDF   170.,MDERS
(4)  013176  104455                        TRAP    C$ERDF
(5)  013200  000252                        .WORD   170
(5)  013202  003337                        .WORD   MDERS
(5)  013204  000000                        .WORD   0
882
883  013206                        15$:    SETPRI  #0                      ;PRIORITY TO ZERO
(3)  013206  012700  000000                MOV     #0,R0
(3)  013212  104441                        TRAP    C$SPRI
884  013214  000645                        BR      1$                      ;SELECT THE NEXT UNIT
885
886
```

```
                                        .SBTTL  COMMAND QUERY LOOP

                                        STARS
                                        ;;*****************************************************************
                                        ;HERE IS THE 'CMD>' QUERY LOOP FOR COMMANDS TO PERFORM
                                        STARS
                                        ;;*****************************************************************

013216  005737  002474          WHATCMD: WHATCMD: TST    STFLG    ;JUST STARTING?
013222  001551                           BEQ     NXTCMD           ;NO - BYPASS THE STARTING BLURB
013224  005737  002344                   TST     PASWD            ;DO THE PASSWORD STUFF?
013230  001440                           BEQ     HLPMSG           ;NO - PRINT THE HELP MESSAGE
013232                                   PRINTF  #MCRLF
(7) 013232  012746  010041               MOV     #MCRLF,-(SP)
(6) 013236  012746  000001               MOV     #1,-(SP)
(3) 013242  010600                       MOV     SP,R0
(4) 013244  104417                       TRAP    C$PNTF
(4) 013246  062706  000004               ADD     #4,SP
013252                                   GMANID  PASWORD,TEMP0,0,177777,1,177777,NO ;GET THE PASSWORD
(3) 013252  104443                       TRAP    C$GMAN
(3) 013254  000406                       BR      10000$
(4) 013256  002414                       .WORD   TEMP0
(5) 013260  000022                       .WORD   T$CODE
(5) 013262  004044                       .WORD   PASWORD
(5) 013264  177777                       .WORD   177777
(5) 013266  000001                       .WORD   T$LOLIM
(5) 013270  177777                       .WORD   T$HILIM
013272                           10000$:
013272  023737  002344  002414           CMP     PASWD,TEMP0      ;CORRECT PASSWORD?
013300  001414                           BEQ     HLPMSG           ;YES
013302  005237  002464                   INC     ACCESS           ;SET THE DENIED FLAG
013306                                   PRINTF  #FMT18,#DENIED   ;& TELL OPR
(8) 013306  012746  004125               MOV     #DENIED,-(SP)
(7) 013312  012746  007624               MOV     #FMT18,-(SP)
(6) 013316  012746  000002               MOV     #2,-(SP)
(3) 013322  010600                       MOV     SP,R0
(4) 013324  104417                       TRAP    C$PNTF
(4) 013326  062706  000006               ADD     #6,SP

013332                           HLPMSG: PRINTF  #FMTMS,#CMD1     ;PRINT THE HELP MESSAGE
(8) 013332  012746  004326               MOV     #CMD1,-(SP)
(7) 013336  012746  007777               MOV     #FMTMS,-(SP)
(6) 013342  012746  000002               MOV     #2,-(SP)
(3) 013346  010600                       MOV     SP,R0
(4) 013350  104417                       TRAP    C$PNTF
(4) 013352  062706  000006               ADD     #6,SP
013356                                   PRINTF  #FMT18,#CMD2
(8) 013356  012746  004401               MOV     #CMD2,-(SP)
(7) 013362  012746  007624               MOV     #FMT18,-(SP)
(6) 013366  012746  000002               MOV     #2,-(SP)
(3) 013372  010600                       MOV     SP,R0
(4) 013374  104417                       TRAP    C$PNTF
(4) 013376  062706  000006               ADD     #6,SP
013402                                   PRINTF  #FMT18,#CMD3
(8) 013402  012746  004461               MOV     #CMD3,-(SP)
(7) 013406  012746  007624               MOV     #FMT18,-(SP)
```

```
(6)  013412  012746  000002          MOV     #2,-(SP)
(3)  013416  010600                  MOV     SP,R0
(4)  013420  104417                  TRAP    C$PNTF
(4)  013422  062706  000006          ADD     #6,SP
908  013426                          PRINTF  #FMT18,#CMD4
(8)  013426  012746  004546          MOV     #CMD4,-(SP)
(7)  013432  012746  007624          MOV     #FMT18,-(SP)
(6)  013436  012746  000002          MOV     #2,-(SP)
(3)  013442  010600                  MOV     SP,R0
(4)  013444  104417                  TRAP    C$PNTF
(4)  013446  062706  000006          ADD     #6,SP
909  013452                          PRINTF  #FMT18,#CMD5
(8)  013452  012746  004602          MOV     #CMD5,-(SP)
(7)  013456  012746  007624          MOV     #FMT18,-(SP)
(6)  013462  012746  000002          MOV     #2,-(SP)
(3)  013466  010600                  MOV     SP,R0
(4)  013470  104417                  TRAP    C$PNTF
(4)  013472  062706  000006          ADD     #6,SP
910  013476                          PRINTF  #FMT18,#CMD6
(8)  013476  012746  004671          MOV     #CMD6,-(SP)
(7)  013502  012746  007624          MOV     #FMT18,-(SP)
(6)  013506  012746  000002          MOV     #2,-(SP)
(3)  013512  010600                  MOV     SP,R0
(4)  013514  104417                  TRAP    C$PNTF
(4)  013516  062706  000006          ADD     #6,SP
911  013522                          PRINTF  #FMT18,#CMD7
(8)  013522  012746  004724          MOV     #CMD7,-(SP)
(7)  013526  012746  007624          MOV     #FMT18,-(SP)
(6)  013532  012746  000002          MOV     #2,-(SP)
(3)  013536  010600                  MOV     SP,R0
(4)  013540  104417                  TRAP    C$PNTF
(4)  013542  062706  000006          ADD     #6,SP
912
913  013546  005037  015330  NXTCMD: CLR     FACNUM          ;CLEAR ENTRY COUNTER
914  013552  005037  015326          CLR     FLDNUM
915  013556                          PRINTF  #MCRLF
(7)  013556  012746  010041          MOV     #MCRLF,-(SP)
(6)  013562  012746  000001          MOV     #1,-(SP)
(3)  013566  010600                  MOV     SP,R0
(4)  013570  104417                  TRAP    C$PNTF
(4)  013572  062706  000004          ADD     #4,SP
916  013576                          GMANID  CMDDO,INPUT,D,7,1,7,NO  ;PROMPT 'ENTER COMMAND (1-7) -''
(3)  013576  104443                  TRAP    C$GMAN
(3)  013600  000406                  BR      10001$
(4)  013602  013650                  .WORD   INPUT
(5)  013604  000042                  .WORD   T$CODE
(5)  013606  004753                  .WORD   CMDDO
(5)  013610  000007                  .WORD   7
(5)  013612  000001                  .WORD   T$LOLIM
(5)  013614  000007                  .WORD   T$HILIM
(3)  013616          10001$:
917
918  013616  013700  013650          MOV     INPUT,R0        ;GET THE CMD REQUEST TYPED
919  013622  006300                  ASL     R0              ;SHIFT FOR PROPER INDEX INTO LIST
920  013624  000170  013630          JMP     @LIST(R0)       ;DO THE FUNCTION REQUESTED
921
```

```
 922  013630  000000                LIST:   .WORD   0               ;NOTHING FOR FUNCTION '0'
 923  013632  013652                        BSRPT                   ; 1 REPORT CONTENTS OF BAD SECTOR FILES
 924  013634  015754                        BSADD                   ; 2 ADD AN ENTRY INTO 'FIELD' FILE
 925  013636  017352                        BSDEL                   ; 3 DELETE AN ENTRY FROM 'FIELD' FILE
 926  013640  020644                        BSVERIFY                ; 4 VERIFY PACK - READ ONLY
 927  013642  020172                        BSWRITE                 ; 5 WRITE THE PACK
 928  013644  023030                        BSMAKE                  ; 6 MAKE A BAD SECTOR FILE
 929  013646  013332                        HLPMSG                  ; 7 PRINT THE COMMANDS AVAILABLE
 930
 931  013650  000000                INPUT:  .WORD   0               ;STORAGE FOR TYPED COMMAND
 932
```

```
                        .SBTTL  GLOBAL SUBROUTINES

013652                  STARS
(2)                     ;;*****************************************************************
                        ;THIS IS THE ROUTINE TO REPORT THE CONTENTS OF THE BAD SECTOR FILE
                        ;FOR THE DRIVE SELECTED. 'BSFILE' CONTAINS AN IMAGE OF THE
                        ;CARTRIDGE BAD SECTOR FILE. FIRST REPORT THE CARTRIDGE SERIAL
                        ;NUMBER FOLLOWED BY THE CONTENTS OF THE 'FACTORY' BAD SECTOR FILE
                        ;AND THEN THE CONTENTS OF THE 'FIELD' BAD SECTOR FILE.
013652                  STARS
(2)                     ;;*****************************************************************

013652  004537  012370  BSRPT:  JSR     R5,FIRST        ;SELECT A DRIVE
013656  000137  013546          JMP     NXTCMD          ;NONE AVAIL!
013662  000404                  BR      BSRPTL
013664  004537  012400  BSRPTS: JSR     R5,SELDRV       ;SELECT THE NEXT UNIT
013670  000137  013546          JMP     NXTCMD          ;ALL DONE
013674  004537  025246  BSRPTL: JSR     R5,LOADED       ;SEE IF DRIVE READY FOR OPR
013700  005737  002414          TST     TEMP0           ;READY?
013704  001404                  BEQ     1$              ;YES
013706  004537  012642          JSR     R5,DRNRDY
013712  000137  013664          JMP     BSRPTS          ;SELECT THE NEXT UNIT

013716                  1$:     PRINTF  #FMT19,#STARMSG
(8)     013716  012746  002573          MOV     #STARMSG,-(SP)
(7)     013722  012746  007631          MOV     #FMT19,-(SP)
(6)     013726  012746  000002          MOV     #2,-(SP)
(3)     013732  010600                  MOV     SP,R0
(4)     013734  104417                  TRAP    C$PNTF
(4)     013736  062706  000006          ADD     #6,SP
013742  004537  023656          JSR     R5,RDBDSC       ;READ THE BAD SECTOR FILE
013746                          PRINTF  #MCRLF
(7)     013746  012746  010041          MOV     #MCRLF,-(SP)
(6)     013752  012746  000001          MOV     #1,-(SP)
(3)     013756  010600                  MOV     SP,R0
(4)     013760  104417                  TRAP    C$PNTF
(4)     013762  062706  000004          ADD     #4,SP
013766  004537  012546          JSR     R5,DRVID
013772                          PRINTF  #MCRLF
(7)     013772  012746  010041          MOV     #MCRLF,-(SP)
(6)     013776  012746  000001          MOV     #1,-(SP)
(3)     014002  010600                  MOV     SP,R0
(4)     014004  104417                  TRAP    C$PNTF
(4)     014006  062706  000004          ADD     #4,SP
014012  005037  015350          CLR     PSNFG           ;CLEAR THE PRINT FLAG FOR SER # MSG


                        ;HERE TO REPORT CONTENTS OF THE 'FACTORY' FILE
014016  004537  025032  BSRFAC: JSR     R5,RDFACT               ;READ THE FACTORY FILE FROM BD SEC FILE
014022                          PRINTF  #FMT18,#BSRM
(8)     014022  012746  005004          MOV     #BSRM,-(SP)
(7)     014026  012746  007624          MOV     #FMT18,-(SP)
(6)     014032  012746  000002          MOV     #2,-(SP)
(3)     014036  010600                  MOV     SP,R0
(4)     014040  104417                  TRAP    C$PNTF
(4)     014042  062706  000006          ADD     #6,SP
014046  005037  015330          CLR     FACNUM                  ;INIT THE FACTORY ENTRY COUNTER
```

```
966  014052  012737  000020  015340          MOV     #16.,SECMAX             ;LAST SECTOR PAIR IN FACTORY FILE
967  014060  005037  015342                  CLR     SECNUM                  ;POINT TO THE 1ST PAIR OF SECTORS
968  014064  005002                          CLR     R2                      ;CLEAR THE INDEX INTO THE BSFILE STORAGE
969  014066  004537  015622                  JSR     R5,BSFOK                ;FIND A SECTOR TO USE IN FACTORY AREA
970  014072  005737  015346                  TST     BSFOKF                  ;SEE IF ERROR DETECTED
971  014076  001437                          BEQ     10$                     ;JUMP IF OK
972  014100                                  PRINTF  #FMT18,#NHWSEC
(8)  014100  012746  003562                  MOV     #NHWSEC,-(SP)
(7)  014104  012746  007624                  MOV     #FMT18,-(SP)
(6)  014110  012746  000002                  MOV     #2,-(SP)
(3)  014114  010600                          MOV     SP,R0
(4)  014116  104417                          TRAP    C$PNTF
(4)  014120  062706  000006                  ADD     #6,SP
973  014124  004537  022570                  JSR     R5,NEWBSF               ;BUILD A NEW FILE
974  014130  005737  002414                  TST     TEMP0                   ;DID I?
975  014134  001405                          BEQ     1$                      ;NO
976  014136  013737  002414  002300          MOV     TEMP0,NEWFAC            ;SET THE FLAG
977  014144  004537  016770                  JSR     R5,WRTBSF               ;WRITE UPDATED 'FIELD' BAD SECTOR FILE
978                                                                          ;/ON THE PACK IF REQUESTED
979  014150                          1$:     PRINTF  #FMT18,#HYPHEN
(8)  014150  012746  002675                  MOV     #HYPHEN,-(SP)
(7)  014154  012746  007624                  MOV     #FMT18,-(SP)
(6)  014160  012746  000002                  MOV     #2,-(SP)
(3)  014164  010600                          MOV     SP,R0
(4)  014166  104417                          TRAP    C$PNTF
(4)  014170  062706  000006                  ADD     #6,SP
980  014174  000544                          BR      BSRFLD                  ;DO THE FIELD REPORT
981
982                                     ;START PROCESSING THE ENTRIES
983  014176                             10$:
984  014176                                  PRINTF  #FMTSN,#CART,SERNM2,SERNM1
(10) 014176  013746  002274                  MOV     SERNM1,-(SP)
(9)  014202  013746  002276                  MOV     SERNM2,-(SP)
(8)  014206  012746  002526                  MOV     #CART,-(SP)
(7)  014212  012746  007707                  MOV     #FMTSN,-(SP)
(6)  014216  012746  000004                  MOV     #4,-(SP)
(3)  014222  010600                          MOV     SP,R0
(4)  014224  104417                          TRAP    C$PNTF
(4)  014226  062706  000012                  ADD     #12,SP
985  014232  005237  015350                  INC     PSNFG                   ;SET THE FLAG
986  014236  005037  002416                  CLR     TEMP1
987  014242  016203  030530          11$:    MOV     BSFILE(R2),R3           ;GET THE CYLINDER # FROM ENTRY
988  014246  005703                          TST     R3                      ;SEE IF ITS OK TO USE
989  014250  100002                          BPL     2$                      ;OK
990  014252  000137  015352                  JMP     NOFACT                  ;WHOOPS...ERROR
991  014256  005237  015330          2$:     INC     FACNUM                  ;COUNT THIS ENTRY
992  014262  022737  000176  015330          CMP     #126.,FACNUM            ;END OF FILE LIMIT?
993  014270  001506                          BEQ     BSRFLD                  ;YUP
994  014272  022737  000062  015330          CMP     #50.,FACNUM             ;TIME TO QUIT PRINTING?
995  014300  001040                          BNE     21$                     ;NO
996  014302  005737  002416                  TST     TEMP1                   ;PRINTED ERROR MESSAGE YET?
997  014306  001035                          BNE     21$                     ;YUP
998  014310                                  PRINTF  #FMT19,#OVRMAX          ;TELL OPR OVER LIMIT
(8)  014310  012746  006251                  MOV     #OVRMAX,-(SP)
(7)  014314  012746  007631                  MOV     #FMT19,-(SP)
(6)  014320  012746  000002                  MOV     #2,-(SP)
```

```
  (3)  014324  010600                        MOV     SP,R0
  (4)  014326  104417                        TRAP    C$PNTF
  (4)  014330  062706  000006                ADD     #6,SP
  999  014334                                PRINTF  #MCRLF
  (7)  014334  012746  010041                MOV     #MCRLF,-(SP)
  (6)  014340  012746  000001                MOV     #1,-(SP)
  (3)  014344  010600                        MOV     SP,R0
  (4)  014346  104417                        TRAP    C$PNTF
  (4)  014350  062706  000004                ADD     #4,SP
 1000  014354                                GMANIL  TILLEND,TEMP0,177777,NO
  (3)  014354  104443                        TRAP    C$GMAN
  (3)  014356  000404                        BR      10002$
  (4)  014360  002414                        .WORD   TEMP0
  (5)  014362  000120                        .WORD   T$CODE
  (5)  014364  006114                        .WORD   TILLEND
  (5)  014366  177777                        .WORD   177777
  (3)  014370                           10002$:
 1001  014370  005737  002414                TST     TEMP0                   ;NO?
 1002  014374  001444                        BEQ     BSRFLD                  ;QUIT PRINTING ENTRIES
 1003  014376  005237  002416                INC     TEMP1                   ;SET THE PRINT ERROR FLAG
 1004  014402  010337  015332          21$:  MOV     R3,BSFCYL               ;SAVE THE CYLINDER NUMBER
 1005  014406  005722                        TST     (R2)+                   ;POINT TO HEAD & SECTOR ENTRY
 1006  014410  016203  030530                MOV     BSFILE(R2),R3           ;GET IT
 1007  014414  110337  015334                MOVB    R3,BSFSEC               ;SAVE THE SECTOR NUMBER
 1008  014420  000303                        SWAB    R3                      ;PUT THE HEAD # IN LOW BYTE
 1009  014422  110337  015336                MOVB    R3,BSFHD                ;SAVE THE HEAD NUMBER
 1010  014426  005722                        TST     (R2)+                   ;POINT TO THE NEXT ENTRY
 1011  014430                                PRINTF  #FMTCSH,FACNUM,#CMSG,BSFCYL,#SMSG,BSFSEC,#HMSG,BSFHD
 (14)  014430  013746  015336                MOV     BSFHD,-(SP)
 (13)  014434  012746  002563                MOV     #HMSG,-(SP)
 (12)  014440  013746  015334                MOV     BSFSEC,-(SP)
 (11)  014444  012746  003243                MOV     #SMSG,-(SP)
 (10)  014450  013746  015332                MOV     BSFCYL,-(SP)
  (9)  014454  012746  002550                MOV     #CMSG,-(SP)
  (8)  014460  013746  015330                MOV     FACNUM,-(SP)
  (7)  014464  012746  007737                MOV     #FMTCSH,-(SP)
  (6)  014470  012746  000010                MOV     #10,-(SP)
  (3)  014474  010600                        MOV     SP,R0
  (4)  014476  104417                        TRAP    C$PNTF
  (4)  014500  062706  000022                ADD     #22,SP
 1012  014504  000656                        BR      11$                     ;PROCESS THE NEXT ENTRY
 1013
 1014                                 ;HERE TO REPORT THE CONTENTS OF THE 'FIELD' FILE
 1015  014506  004537  025076          BSRFLD: JSR     R5,RDFIELD              ;GET THE FIELD BD SEC FILE
 1016  014512  005002                        CLR     R2                      ;POINT TO THE 1ST SECTOR OF THE 'FIELD' FILE
 1017  014514  012737  000020  015340        MOV     #16.,SECMAX             ;SET THE LAST USABLE SECTOR NUMBER
 1018  014522  005037  015342                CLR     SECNUM                  ;POINT TO THE 1ST SECTOR IN FIELD FILE
 1019  014526  005037  015326                CLR     FLDNUM                  ;CLEAR THE FIELD ENTRY COUNTER
 1020  014532  005037  015350                CLR     PSNFG                   ;CLEAR THE PRINT FLAG FOR SERIAL #
 1021  014536                                PRINTF  #FMT18,#BSRF
  (8)  014536  012746  005057                MOV     #BSRF,-(SP)
  (7)  014542  012746  007624                MOV     #FMT18,-(SP)
  (6)  014546  012746  000002                MOV     #2,-(SP)
  (3)  014552  010600                        MOV     SP,R0
  (4)  014554  104417                        TRAP    C$PNTF
  (4)  014556  062706  000006                ADD     #6,SP
```

```
1022  014562  004537  015622                JSR     R5,BSFOK                ;FIND A SECTOR TO USE IN THE FIELD AREA
1023  014566  005737  015346                TST     BSFOKF                  ;ANY ERROR DETECTED?
1024  014572  001434                        BEQ     10$                     ;JUMP IF OK
1025  014574                                PRINTF  #FMT18,#NSWSEC
 (8)  014574  012746  003636                MOV     #NSWSEC,-(SP)
 (7)  014600  012746  007624                MOV     #FMT18,-(SP)
 (6)  014604  012746  000002                MOV     #2,-(SP)
 (3)  014610  010600                        MOV     SP,R0
 (4)  014612  104417                        TRAP    C$PNTF
 (4)  014614  062706  000006                ADD     #6,SP
1026  014620  004537  022570                JSR     R5,NEWBSF               ;BUILD A NEW FILE
1027  014624  005737  002414                TST     TEMP0                   ;DID I?
1028  014630  001402                        BEQ     1$                      ;NO
1029  014632  004537  016770                JSR     R5,WRTBSF               ;WRITE UPDATED 'FIELD' BAD SECTOR FILE
1030                                                                          ;/ON THE PACK IF REQUESTED
1031  014636                          1$:   PRINTF  #FMT18,#HYPHEN
 (8)  014636  012746  002675                MOV     #HYPHEN,-(SP)
 (7)  014642  012746  007624                MOV     #FMT18,-(SP)
 (6)  014646  012746  000002                MOV     #2,-(SP)
 (3)  014652  010600                        MOV     SP,R0
 (4)  014654  104417                        TRAP    C$PNTF
 (4)  014656  062706  000006                ADD     #6,SP
1032  014662  000544                        BR      BSRTOT                  ;PRINT THE TOTALS FOUND
1033
1034                                    ;HERE TO PROCESS ENTRIES FROM THE FIELD FILE
1035  014664                            10$:
1036  014664                                PRINTF  #FMTSN,#CART,SERNM2,SERNM1
(10)  014664  013746  002274                MOV     SERNM1,-(SP)
 (9)  014670  013746  002276                MOV     SERNM2,-(SP)
 (8)  014674  012746  002526                MOV     #CART,-(SP)
 (7)  014700  012746  007707                MOV     #FMTSN,-(SP)
 (6)  014704  012746  000004                MOV     #4,-(SP)
 (3)  014710  010600                        MOV     SP,R0
 (4)  014712  104417                        TRAP    C$PNTF
 (4)  014714  062706  000012                ADD     #12,SP
1037  014720  005237  015350                INC     PSNFG                   ;SET THE PRINT FLAG
1038  014724  005037  002416                CLR     TEMP1
1039  014730  016203  030530          11$:  MOV     BSFILE(R2),R3           ;GET THE CYLINDER # FROM ENTRY
1040  014734  005703                        TST     R3                      ;SEE IF ITS OK TO USE
1041  014736  100002                        BPL     2$                      ;OK
1042  014740  000137  015440                JMP     NOFIELD                 ;ERROR!
1043  014744  005237  015326          2$:   INC     FLDNUM                  ;COUNT THIS ENTRY
1044  014750  022737  000176  015326        CMP     #126.,FLDNUM            ;END OF FIELD ENTRY LIMIT?
1045  014756  001506                        BEQ     BSRTOT                  ;YES
1046  014760  022737  000062  015326        CMP     #50.,FLDNUM             ;TIME TO QUIT PRINTING?
1047  014766  001040                        BNE     21$                     ;NO
1048  014770  005737  002416                TST     TEMP1                   ;PRINT THE ERROR MESSAGE?
1049  014774  001035                        BNE     21$                     ;NO
1050  014776                                PRINTF  #FMT19,#OVRMAX          ;YES - TELL OPR
 (8)  014776  012746  006251                MOV     #OVRMAX,-(SP)
 (7)  015002  012746  007631                MOV     #FMT19,-(SP)
 (6)  015006  012746  000002                MOV     #2,-(SP)
 (3)  015012  010600                        MOV     SP,R0
 (4)  015014  104417                        TRAP    C$PNTF
 (4)  015016  062706  000006                ADD     #6,SP
1051  015022                                PRINTF  #MCRLF
```

```
  (7)  015022  012746  010041          MOV     #MCRLF,-(SP)
  (6)  015026  012746  000001          MOV     #1,-(SP)
  (3)  015032  010600                  MOV     SP,R0
  (4)  015034  104417                  TRAP    C$PNTF
  (4)  015036  062706  000004          ADD     #4,SP
1052   015042                         GMANIL  TILLEND,TEMP0,177777,NO
  (3)  015042  104443                  TRAP    C$GMAN
  (3)  015044  000404                  BR      10003$
  (4)  015046  002414                  .WORD   TEMP0
  (5)  015050  000120                  .WORD   T$CODE
  (5)  015052  006114                  .WORD   TILLEND
  (5)  015054  177777                  .WORD   177777
  (3)  015056                  10003$:
1053   015056  005737  002414          TST     TEMP0                   ;QUIT?
1054   015062  001444                  BEQ     BSRTOT                  ;YUP
1055   015064  005237  002416          INC     TEMP1                   ;SET THE PRINT FLAG
1056   015070  010337  015332  21$:    MOV     R3,BSFCYL               ;SAVE THE CYLINDER NUMBER
1057   015074  005722                  TST     (R2)+                   ;POINT TO HEAD & SECTOR ENTRY
1058   015076  016203  030530          MOV     BSFILE(R2),R3           ;GET IT
1059   015102  110337  015334          MOVB    R3,BSFSEC               ;SAVE THE SECTOR NUMBER
1060   015106  000303                  SWAB    R3                      ;PUT THE HEAD # IN LOW BYTE
1061   015110  110337  015336          MOVB    R3,BSFHD                ;SAVE THE HEAD NUMBER
1062   015114  005722                  TST     (R2)+                   ;POINT TO THE NEXT ENTRY
1063   015116                         PRINTF  #FMTCSH,FLDNUM,#CMSG,BSFCYL,#SMSG,BSFSEC,#HMSG,BSFHD
 (14)  015116  013746  015336          MOV     BSFHD,-(SP)
 (13)  015122  012746  002563          MOV     #HMSG,-(SP)
 (12)  015126  013746  015334          MOV     BSFSEC,-(SP)
 (11)  015132  012746  003243          MOV     #SMSG,-(SP)
 (10)  015136  013746  015332          MOV     BSFCYL,-(SP)
  (9)  015142  012746  002550          MOV     #CMSG,-(SP)
  (8)  015146  013746  015326          MOV     FLDNUM,-(SP)
  (7)  015152  012746  007737          MOV     #FMTCSH,-(SP)
  (6)  015156  012746  000010          MOV     #10,-(SP)
  (3)  015162  010600                  MOV     SP,R0
  (4)  015164  104417                  TRAP    C$PNTF
  (4)  015166  062706  000022          ADD     #22,SP
1064   015172  000656                  BR      11$                     ;PROCESS THE NEXT ENTRY
1065
1066                           ;PRINT THE TOTALS FROM EACH SECTION
1067
1068   015174                 BSRTOT: PRINTF  #FMTTB,#TMMSG,FACNUM
  (9)  015174  013746  015330          MOV     FACNUM,-(SP)
  (8)  015200  012746  003022          MOV     #TMMSG,-(SP)
  (7)  015204  012746  007724          MOV     #FMTTB,-(SP)
  (6)  015210  012746  000003          MOV     #3,-(SP)
  (3)  015214  010600                  MOV     SP,R0
  (4)  015216  104417                  TRAP    C$PNTF
  (4)  015220  062706  000010          ADD     #10,SP
1069   015224                         PRINTF  #FMTTB,#TFMSG,FLDNUM
  (9)  015224  013746  015326          MOV     FLDNUM,-(SP)
  (8)  015230  012746  002777          MOV     #TFMSG,-(SP)
  (7)  015234  012746  007724          MOV     #FMTTB,-(SP)
  (6)  015240  012746  000003          MOV     #3,-(SP)
  (3)  015244  010600                  MOV     SP,R0
  (4)  015246  104417                  TRAP    C$PNTF
  (4)  015250  062706  000010          ADD     #10,SP
```

```
 1070  015254                                  PRINTF  #FMT18,#STARMSG
  (8)  015254  012746  002573                  MOV     #STARMSG,-(SP)
  (7)  015260  012746  007624                  MOV     #FMT18,-(SP)
  (6)  015264  012746  000002                  MOV     #2,-(SP)
  (3)  015270  010600                          MOV     SP,R0
  (4)  015272  104417                          TRAP    C$PNTF
  (4)  015274  062706  000006                  ADD     #6,SP
 1071  015300                                  PRINTF  #MCRLF
  (7)  015300  012746  010041                  MOV     #MCRLF,-(SP)
  (6)  015304  012746  000001                  MOV     #1,-(SP)
  (3)  015310  010600                          MOV     SP,R0
  (4)  015312  104417                          TRAP    C$PNTF
  (4)  015314  062706  000004                  ADD     #4,SP
 1072  015320  000137  013664                  JMP     BSRPTS                  ;SELECT NEXT UNIT
 1073
 1074                                  ;HERE IS THE STORAGE FOR THIS ROUTINE
 1075
 1076  015324  000000                  NOSNUM: .WORD   0       ;HAVE SERIAL # FLAG
 1077  015326  000000                  FLDNUM: .WORD   0       ;NUMBER OF CURRENT FIELD ENTRY
 1078  015330  000000                  FACNUM: .WORD   0       ;NUMBER OF THE CURRENT FACTORY ENTRY
 1079  015332  000000                  BSFCYL: .WORD   0       ;CURRENT CYLINDER FROM ENTRY IN PROCESS
 1080  015334  000000                  BSFSEC: .WORD   0       ;CURRENT SECTOR FROM ENTRY
 1081  015336  000000                  BSFHD:  .WORD   0       ;CURRENT SURFACE (HEAD) FROM ENTRY IN PROCESS
 1082  015340  000000                  SECMAX: .WORD   0       ;LAST USABLE SECTOR NUMBER IN SELECTED SECTION
 1083  015342  000000                  SECNUM: .WORD   0       ;CURRENT SECTOR BEING USED TO EXTRACT ENTRYS
 1084  015344  000000                  SECOLD: .WORD   0       ;START ADDR OF THE 'FOUND' SECTOR IN BAD SEC FILE
 1085  015346  000000                  BSFOKF: .WORD   0       ;ERROR DETECT FLAG
 1086  015350  000000                  PSNFG:  .WORD   0       ;PRINT FLAG FOR SERIAL #
 1087
 1088                                  ;HERE IF AT THE END OF THE FACTORY FILE
 1089
 1090  015352  005737  015330          NOFACT: TST     FACNUM          ;WAS ANY ENTRY DETECTED?
 1091  015356  001014                          BNE     1$              ;YES
 1092  015360  005037  015330                  CLR     FACNUM          ;CLEAR THE ENTRY COUNTER FOR FACTORY SECTORS
 1093  015364                                  PRINTF  #FMT18,#HWSEC
  (8)  015364  012746  003532                  MOV     #HWSEC,-(SP)
  (7)  015370  012746  007624                  MOV     #FMT18,-(SP)
  (6)  015374  012746  000002                  MOV     #2,-(SP)
  (3)  015400  010600                          MOV     SP,R0
  (4)  015402  104417                          TRAP    C$PNTF
  (4)  015404  062706  000006                  ADD     #6,SP
 1094  015410                          1$:     PRINTF  #FMT18,#HYPHEN
  (8)  015410  012746  002675                  MOV     #HYPHEN,-(SP)
  (7)  015414  012746  007624                  MOV     #FMT18,-(SP)
  (6)  015420  012746  000002                  MOV     #2,-(SP)
  (3)  015424  010600                          MOV     SP,R0
  (4)  015426  104417                          TRAP    C$PNTF
  (4)  015430  062706  000006                  ADD     #6,SP
 1095  015434  000137  014506                  JMP     BSRFLD          ;DO THE FIELD SECTION
 1096
 1097                                  ;HERE IF AT THE END OF THE FIELD FILE
 1098
 1099  015440  005737  015326          NOFIELD: TST    FLDNUM          ;ANY FIELD ENTRYS?
 1100  015444  001014                          BNE     1$              ;YES
 1101  015446  005037  015326                  CLR     FLDNUM          ;NO - CLEAR THE ENTRY COUNTER
 1102  015452                                  PRINTF  #FMT18,#SWSEC
```

```
   (8)  015452  012746  003610                    MOV     #SWSEC,-(SP)
   (7)  015456  012746  007624                    MOV     #FMT18,-(SP)
   (6)  015462  012746  000002                    MOV     #2,-(SP)
   (3)  015466  010600                            MOV     SP,R0
   (4)  015470  104417                            TRAP    C$PNTF
   (4)  015472  062706  000006                    ADD     #6,SP
  1103  015476                          1$:       PRINTF  #FMT18,#HYPHEN
   (8)  015476  012746  002675                    MOV     #HYPHEN,-(SP)
   (7)  015502  012746  007624                    MOV     #FMT18,-(SP)
   (6)  015506  012746  000002                    MOV     #2,-(SP)
   (3)  015512  010600                            MOV     SP,R0
   (4)  015514  104417                            TRAP    C$PNTF
   (4)  015516  062706  000006                    ADD     #6,SP
  1104  015522  000137  015174                    JMP     BSRTOT          ;DO THE TOTALS
  1105
  1106                          ;HERE IF NO SERIAL NUMBER OR 2 0'S NOT DETECTED IN 1ST 4 WORDS OF SECTOR
  1107
  1108  015526  062737  000004  015342  NOMSEC: ADD     #4,SECNUM       ;UPDATE THE SECTOR NUMBER TO ACCESS NEXT BSF COPY
  1109  015534  023737  015342  015340          CMP     SECNUM,SECMAX   ;AT THE END OF SECTION?
  1110  015542  101416                          BLOS    1$              ;BRANCH IF OK
  1111  015544                                  PRINTF  #FMT18,#BSEND
   (8)  015544  012746  003255                    MOV     #BSEND,-(SP)
   (7)  015550  012746  007624                    MOV     #FMT18,-(SP)
   (6)  015554  012746  000002                    MOV     #2,-(SP)
   (3)  015560  010600                            MOV     SP,R0
   (4)  015562  104417                            TRAP    C$PNTF
   (4)  015564  062706  000006                    ADD     #6,SP
  1112  015570  052737  177777  015346          BIS     #177777,BSFOKF  ;SET THE ERROR FLAG
  1113  015576  000465                          BR      BSFOKX          ;EXIT THE SECTOR FIND ROUTINE WITH ERROR SET
  1114  015600  005737  002476          1$:     TST     BSFFLG          ;IS BAD SECTOR FILE WRITTEN BY FIELD?
  1115  015604  001003                          BNE     2$              ;YES - BRANCH IF FIELD BAD SECTOR FILE
  1116  015606  004537  025032                  JSR     R5,RDFACT       ;ELSE, READ FACTORY BAD SECTOR FILE
  1117  015612  000403                          BR      BSFOK           ;CHECK IF THIS SECTOR IS O.K.
  1118  015614  004537  025076          2$:     JSR     R5,RDFIELD      ;READ FIELD BAD SECTOR FILE
  1119  015620  000400                          BR      BSFOK           ;CHECK IF THIS SECTOR IS O.K.
```

```
1121                                    ;HERE IS THE SECTOR FIND ROUTINE FOR THE BAD SECTOR FILE
1122
1123  015622  005037  015346    BSFOK:  CLR     BSFOKF              ;CLEAR THE ERROR FLAG
1124  015626  012737  030530  015344      MOV     #BSFILE,SECOLD      ;GET BASIC ADDRESS
1125  015634  060237  015344            ADD     R2,SECOLD           ;ADD IN THE OFFSET
1126  015640  005762  030530            TST     BSFILE(R2)          ;SEE IF ANY SERIAL NUMBER
1127  015644  100730                    BMI     NOMSEC              ;IF -1 JUMP TO ERROR SERVICE
1128  015646  001006                    BNE     1$                  ;IF >0 THEN HAVE A NUMBER
1129  015650  005762  030532            TST     BSFILE+2(R2)        ;ANY SER. NUM IN WORD 2?
1130  015654  001003                    BNE     1$                  ;BR IF OK
1131  015656  052737  177777  015324    BIS     #177777,NOSNUM      ;SET THE NO SERIAL NUMBER FLAG
1132  015664  022762  177777  031126  1$:     CMP     #-1,BSFILE+254.(R2) ;END OF SECTOR OK ALSO?
1133  015672  001315                    BNE     NOMSEC              ;NO - NO MATCH HERE!
1134  015674  022762  177777  031130        CMP     #-1,BSFILE+256.(R2) ;END OK HERE TOO?
1135  015702  001311                    BNE     NOMSEC              ;NO - DON'T HAVE A BAD SECT FILE YET!
1136  015704  016237  030530  002274        MOV     BSFILE(R2),SERNM1 ;SAVE LOW ORDER OF SERIAL #
1137  015712  005722                    TST     (R2)+               ;POINT TO HIGH ORDER OF SERIAL #
1138  015714  005762  030530            TST     BSFILE(R2)          ;SEE IF LEGAL
1139  015720  100702                    BMI     NOMSEC              ;NO - ERROR
1140  015722  016237  030530  002276        MOV     BSFILE(R2),SERNM2 ;SAVE HIGH ORDER OF SERIAL #
1141  015730  005722                    TST     (R2)+               ;POINT TO A BLANK ENTRY
1142  015732  005762  030530            TST     BSFILE(R2)          ;SEE IF LEGAL (=0)
1143  015736  001273                    BNE     NOMSEC              ;NO - ERROR
1144  015740  005722                    TST     (R2)+               ;POINT TO LAST CHECK ENTRY SPOT
1145  015742  005762  030530            TST     BSFILE(R2)          ;SEE IF LEGAL (=0)
1146  015746  001267                    BNE     NOMSEC              ;NO - ERROR
1147  015750  005722                    TST     (R2)+               ;POINT TO 1ST VALID ENTRY IN SECTOR
1148  015752  000205            BSFOKX: RTS     R5                  ;EXIT - R2 POINTS TO THE OFFSET VALUE
1149                                                                ;AND SECNUM = CURRENT SECTOR IN FILE
```

```
1151  015754                          STARS
 (2)                                  ;;*******************************************************************
1152                                  ;HERE IS THE ROUTINE TO ADD AN ENTRY INTO THE 'FIELD' BAD SECTOR FILE
1153  015754                          STARS
 (2)                                  ;;*******************************************************************
1154
1155  015754                          BSADD:  PRINTF  #FMT19,#ABSMSG
 (8)  015754  012746  005164                  MOV     #ABSMSG,-(SP)
 (7)  015760  012746  007631                  MOV     #FMT19,-(SP)
 (6)  015764  012746  000002                  MOV     #2,-(SP)
 (3)  015770  010600                          MOV     SP,R0
 (4)  015772  104417                          TRAP    C$PNTF
 (4)  015774  062706  000006                  ADD     #6,SP
1156  016000  004537  012370                  JSR     R5,FIRST        ;SELECT 1ST UNIT
1157  016004  000137  013546                  JMP     NXTCMD          ;NONE AVAIL.!
1158  016010  000404                          BR      BSADDL
1159  016012  004537  012400          BSADDS: JSR     R5,SELDRV       ;SELECT THE NEXT UNIT
1160  016016  000137  013546                  JMP     NXTCMD          ;ALL DONE
1161  016022  004537  025246          BSADDL: JSR     R5,LOADED       ;DRV READY?
1162  016026  005737  002414                  TST     TEMP0           ;WELL?
1163  016032  001403                          BEQ     1$              ;YES
1164  016034  004537  012642                  JSR     R5,DRNRDY
1165  016040  000764                          BR      BSADDS          ;SELECT THE NEXT UNIT
1166
1167  016042  004537  012546          1$:     JSR     R5,DRVID        ;TELL OPR WHAT DRIVE
1168  016046  004537  023656                  JSR     R5,RDBDSC       ;GET A FRESH COPY OF THE BAD SECTOR FILE
1169  016052  005737  002464                  TST     ACCESS          ;ALLOWED TO DO IT?
1170  016056  001414                          BEQ     BSATD           ;YES
1171  016060                                  PRINTF  #FMT18,#DENIED
 (8)  016060  012746  004125                  MOV     #DENIED,-(SP)
 (7)  016064  012746  007624                  MOV     #FMT18,-(SP)
 (6)  016070  012746  000002                  MOV     #2,-(SP)
 (3)  016074  010600                          MOV     SP,R0
 (4)  016076  104417                          TRAP    C$PNTF
 (4)  016100  062706  000006                  ADD     #6,SP
1172  016104  000137  013546                  JMP     NXTCMD          ;TELL OPR NOT ALLOWED & EXIT
1173
1174  016110                          BSATD:  GMANIL  THISDRV,TEMP0,1,NO
 (3)  016110  104443                          TRAP    C$GMAN
 (3)  016112  000404                          BR      10004$
 (4)  016114  002414                          .WORD   TEMP0
 (5)  016116  000120                          .WORD   T$CODE
 (5)  016120  006750                          .WORD   THISDRV
 (5)  016122  000001                          .WORD   1
 (3)  016124                          10004$:
1175  016124  005737  002414                  TST     TEMP0
1176  016130  001730                          BEQ     BSADDS          ;BRANCH IF NOT TO USE THIS DRIVE
1177
1178  016132  005737  015324          BSASN:  TST     NOSNUM          ;SEE IF NEED A SERIAL NUMBER
1179  016136  001470                          BEQ     GETCYL          ;JUMP IF HAVE A NUMBER
1180  016140                                  PRINTF  #MCRLF
 (7)  016140  012746  010041                  MOV     #MCRLF,-(SP)
 (6)  016144  012746  000001                  MOV     #1,-(SP)
 (3)  016150  010600                          MOV     SP,R0
 (4)  016152  104417                          TRAP    C$PNTF
 (4)  016154  062706  000004                  ADD     #4,SP
```

```
1181  016160
 (3)  016160  104443
 (3)  016162  000404
 (4)  016164  002414
 (5)  016166  000120
 (5)  016170  005352
 (5)  016172  000001
 (3)  016174
1182  016174  005737  002414
1183  016200  001447
1184  016202
 (3)  016202  104443
 (3)  016204  000406
 (4)  016206  002456
 (5)  016210  000022
 (5)  016212  005415
 (5)  016214  077777
 (5)  016216  000001
 (5)  016220  077777
 (3)  016222
1185  016222
 (3)  016222  104443
 (3)  016224  000406
 (4)  016226  002460
 (5)  016230  000022
 (5)  016232  005471
 (5)  016234  077777
 (5)  016236  000000
 (5)  016240  077777
 (3)  016242
1186  016242
 (10) 016242  013746  002456
 (9)  016246  013746  002460
 (8)  016252  012746  002526
 (7)  016256  012746  007707
 (6)  016262  012746  000004
 (3)  016266  010600
 (4)  016270  104417
 (4)  016272  062706  000012
1187  016276
 (3)  016276  104443
 (3)  016300  000404
 (4)  016302  002414
 (5)  016304  000120
 (5)  016306  006007
 (5)  016310  177777
 (3)  016312
1188  016312  005737  002414
1189  016316  001720
1190
1191
```

```
GETSN:  GMANIL  ABSSER,TEMP0,1,NO
        TRAP    C$GMAN
        BR      10005$
        .WORD   TEMP0
        .WORD   T$CODE
        .WORD   ABSSER
        .WORD   1
10005$:
        TST     TEMP0               ;SEE IF YES (=1)
        BEQ     GETCYL              ;BRANCH IF NO
        GMANID  ABSSNL,SN1,0,77777,1,77777,NO
        TRAP    C$GMAN
        BR      10006$
        .WORD   SN1
        .WORD   T$CODE
        .WORD   ABSSNL
        .WORD   77777
        .WORD   T$LOLIM
        .WORD   T$HILIM
10006$:
        GMANID  ABSSNH,SN2,0,77777,0,77777,NO
        TRAP    C$GMAN
        BR      10007$
        .WORD   SN2
        .WORD   T$CODE
        .WORD   ABSSNH
        .WORD   77777
        .WORD   T$LOLIM
        .WORD   T$HILIM
10007$:
        PRINTF  #FMTSN,#CART,SN2,SN1
        MOV     SN1,-(SP)
        MOV     SN2,-(SP)
        MOV     #CART,-(SP)
        MOV     #FMTSN,-(SP)
        MOV     #4,-(SP)
        MOV     SP,R0
        TRAP    C$PNTF
        ADD     #12,SP
        GMANIL  VALSN,TEMP0,177777,NO
        TRAP    C$GMAN
        BR      10010$
        .WORD   TEMP0
        .WORD   T$CODE
        .WORD   VALSN
        .WORD   177777
10010$:
        TST     TEMP0               ;JMP IF NO
        BEQ     GETSN               ;NO VALID SERIAL NUMBER - ASK AGAIN
```

```
1193
1194  016320                                GETCYL: GMANID  ABSCYL,BSFCYL,D,777,0,511.,NO
 (3)  016320  104443                               TRAP    C$GMAN
 (3)  016322  000406                               BR      10011$
 (4)  016324  015332                               .WORD   BSFCYL
 (5)  016326  000042                               .WORD   T$CODE
 (5)  016330  005254                               .WORD   ABSCYL
 (5)  016332  000777                               .WORD   777
 (5)  016334  000000                               .WORD   T$LOLIM
 (5)  016336  000777                               .WORD   T$HILIM
 (3)  016340                                10011$:
1195                                        ;CHECK FOR A VALID RL01 CYL IF DRIVE=RL01
1196
1197  016340  022737  000001  002316                CMP     #1,TDR          ;RL01=1
1198  016346  001017                              BNE     GETSEC          ;SKIP CHECK IF RL02
1199  016350  022737  000377  015332              CMP     #255.,BSFCYL    ;VALID RL01 CYLINDER?
1200  016356  103013                              BHIS    GETSEC          ;YES
1201  016360                                      PRINTF  #FMT19,#RL1CLM  ;NO - TELL OPR
 (8)  016360  012746  005756                      MOV     #RL1CLM,-(SP)
 (7)  016364  012746  007631                      MOV     #FMT19,-(SP)
 (6)  016370  012746  000002                      MOV     #2,-(SP)
 (3)  016374  010600                              MOV     SP,R0
 (4)  016376  104417                              TRAP    C$PNTF
 (4)  016400  062706  000006                      ADD     #6,SP
1202  016404  000745                              BR      GETCYL          ;GET CYL AGAIN
1203  016406                                GETSEC: GMANID  ABSSEC,BSFSEC,D,77,0,39.,NO
 (3)  016406  104443                               TRAP    C$GMAN
 (3)  016410  000406                               BR      10012$
 (4)  016412  015334                               .WORD   BSFSEC
 (5)  016414  000042                               .WORD   T$CODE
 (5)  016416  005304                               .WORD   ABSSEC
 (5)  016420  000077                               .WORD   77
 (5)  016422  000000                               .WORD   T$LOLIM
 (5)  016424  000047                               .WORD   T$HILIM
 (3)  016426                                10012$:
1204  016426                                      GMANID  ABSHD,BSFHD,D,3,0,1,NO
 (3)  016426  104443                               TRAP    C$GMAN
 (3)  016430  000406                               BR      10013$
 (4)  016432  015336                               .WORD   BSFHD
 (5)  016434  000042                               .WORD   T$CODE
 (5)  016436  005331                               .WORD   ABSHD
 (5)  016440  000003                               .WORD   3
 (5)  016442  000000                               .WORD   T$LOLIM
 (5)  016444  000001                               .WORD   T$HILIM
 (3)  016446                                10013$:
1205
1206                                        ;CHECK TO SEE IF THE NEW ENTRY ALREADY EXISTS IN THE FILE
1207
1208  016446  013700  015332                      MOV     BSFCYL,R0       ;GET THE CYL TYPED
1209  016452  000300                              SWAB    R0
1210  016454  000241                              CLC                     ;CLEAR THE 'C' BIT
1211  016456  006000                              ROR     R0
1212  016460  103002                              BCC     1$              ;BR IF DON'T NEED THE EXTRA BIT
1213  016462  052700  100000                      BIS     #BIT15,R0       ;ADD HIGH ORDER BIT IN CYL #
1214  016466  053700  015334              1$:     BIS     BSFSEC,R0       ;ADD IN THE SECTOR NUMBER
1215  016472  005737  015336                      TST     BSFHD           ;ON HEAD 0??
```

```
1216  016476  001402                          BEQ     ACKENT          ;BR IF HEAD 0
1217  016500  052700  000100                  BIS     #100,R0         ;MAKE IT HEAD #1
1218  016504  010037  002410          ACKENT: MOV     R0,CHKSEC       ;SAVE FOR THE CHECK
1219  016510  004537  027340                  JSR     R5,CKBDSC       ;CHECK TO SEE IF ALREADY IN BAD SECT FILE
1220  016514  005737  002406                  TST     HDRFND          ;HEADER IN FILE?
1221  016520  001414                          BEQ     1$              ;BR IF NOT IN FILE
1222  016522                                  PRINTF  #FMT18,#EXISTS  ;TELL OPR ENTRY IN FILE NOW
 (8)  016522  012746  004171                  MOV     #EXISTS,-(SP)
 (7)  016526  012746  007624                  MOV     #FMT18,-(SP)
 (6)  016532  012746  000002                  MOV     #2,-(SP)
 (3)  016536  010600                          MOV     SP,R0
 (4)  016540  104417                          TRAP    C$PNTF
 (4)  016542  062706  000006                  ADD     #6,SP
1223  016546  000137  016012                  JMP     BSADDS          ;SELECT THE NEXT UNIT
1224
1225                                  ;WE NOW HAVE THE NEW ENTRY DATA NEEDED TO GENERATE A BAD SECTOR FILE
1226                                  ;ENTRY...FIND A FREE SPOT IN THE BAD SECTOR FILE 'FIELD' AREA FOR THE
1227                                  ;ADDITION AND THEN UPDATE THE BAD SECTOR FILE ITSELF (MEDIA).
1228
1229  016552                          1$:     PRINTF  #FMT18,#NEWENT          ;TELL OPR IT IS A NEW ENTRY
 (8)  016552  012746  006200                  MOV     #NEWENT,-(SP)
 (7)  016556  012746  007624                  MOV     #FMT18,-(SP)
 (6)  016562  012746  000002                  MOV     #2,-(SP)
 (3)  016566  010600                          MOV     SP,R0
 (4)  016570  104417                          TRAP    C$PNTF
 (4)  016572  062706  000006                  ADD     #6,SP
1230  016576  005037  015342                  CLR     SECNUM                  ;START THE SEARCH AT SECTOR 20.
1231  016602  005002                          CLR     R2                      ;POINT TO THE STARTING AREA IN BSFILE
1232  016604  012737  000020  015340          MOV     #16.,SECMAX             ;THIS IS THE LAST AVAIL. SECTOR PAIR
1233  016612  005037  015326                  CLR     FLDNUM                  ;START AT ENTRY #1
1234  016616  004537  015622                  JSR     R5,BSFOK                ;FIND A 'FIELD' SECTOR AREA
1235  016622  005737  015346                  TST     BSFOKF                  ;ON A SECTOR?
1236  016626  001421                          BEQ     2$                      ;YES
1237  016630                                  PRINTF  #FMT18,#NSWSEC          ;NO - TELL OPR
 (8)  016630  012746  003636                  MOV     #NSWSEC,-(SP)
 (7)  016634  012746  007624                  MOV     #FMT18,-(SP)
 (6)  016640  012746  000002                  MOV     #2,-(SP)
 (3)  016644  010600                          MOV     SP,R0
 (4)  016646  104417                          TRAP    C$PNTF
 (4)  016650  062706  000006                  ADD     #6,SP
1238  016654  004537  022570                  JSR     R5,NEWBSF               ;ASK OPR IF TIME TO MAKE A 'FIELD' BSF
1239  016660  005737  002414                  TST     TEMP0                   ;WAS A FILE BUILT?
1240  016664  001002                          BNE     2$                      ;YES - CONTINUE
1241  016666  000137  016012                  JMP     BSADDS                  ;SELECT THE NEXT UNIT
1242
1243  016672  005737  015324          2$:     TST     NOSNUM                  ;PACK HAVE A SERIAL # ??
1244  016676  001406                          BEQ     21$                     ;YUP
1245  016700  013777  002456  176436          MOV     SN1,@SECOLD             ;NO - SAVE LOW 5 #
1246  016706  013777  002460  176432          MOV     SN2,@SECOLD+2           ;SAVE HIGH 5 #
1247  016714  005237  015326          21$:    INC     FLDNUM                  ;COUNT THIS ENTRY TO BE TESTED
1248  016720  005762  030530                  TST     BSFILE(R2)              ;SEE IF A FREE SLOT
1249  016724  100403                          BMI     3$                      ;I FOUND IT...
1250  016726  062702  000004                  ADD     #4,R2                   ;POINT TO THE NEXT ENTRY
1251  016732  000757                          BR      2$                      ;AND TRY THE NEXT SLOT
1252
1253  016734  013762  015332  030530  3$:     MOV     BSFCYL,BSFILE(R2)       ;INSERT THE CYLINDER NUMBER
```

```
1254  016742  013703  015336          MOV     BSFHD,R3                ;GET THE SELECTED HEAD
1255  016746  000303                  SWAB    R3                      ;SWAP BYTES TO POSITION THE HD BIT
1256  016750  063703  015334          ADD     BSFSEC,R3               ;R3 NOW HAS COMPLETE HD & SEC ENTRY
1257  016754  010362  030532          MOV     R3,BSFILE+2(R2)         ;INSERT 2ND HALF OF ENTRY
1258
1259                                ;INSERT THE ENTRY INTO REST OF THE 'FIELD' FILE
1260
1261  016760  004537  016770    4$:   JSR     R5,WRTBSF               ;WRITE UPDATED 'FIELD' BAD SECTOR FILE
1262                                                                    ;/ON THE PACK IF REQUESTED
1263
1264  016764  000137  016012          JMP     BSADDS                  ;SELECT THE NEXT UNIT
```

```
 1266  016770                          STARS
  (2)                                ;;**********************************************************************
 1267                                ;HERE IS WHERE THE 'FIELD' FILE IS WRITTEN ON THE PACK.
 1268                                ;THE OPERATOR IS ASKED IF IT IS TIME TO UPDATE THE PACK...IF NOT, THEN
 1269                                ;THIS CODE IS ABORTED.
 1270  016770                          STARS
  (2)                                ;;**********************************************************************
 1271
 1272  016770  010146                 WRTBSF: MOV     R1,-(SP)        ;SAVE R1
 1273  016772                                  PRINTF  #MCRLF
  (7)  016772  012746  010041                    MOV     #MCRLF,-(SP)
  (6)  016776  012746  000001                    MOV     #1,-(SP)
  (3)  017002  010600                            MOV     SP,R0
  (4)  017004  104417                            TRAP    C$PNTF
  (4)  017006  062706  000004                    ADD     #4,SP
 1274  017012                                  GMANIL  DOWRT,TEMP0,177777,NO
  (3)  017012  104443                            TRAP    C$GMAN
  (3)  017014  000404                            BR      10014$
  (4)  017016  002414                            .WORD   TEMP0
  (5)  017020  000120                            .WORD   T$CODE
  (5)  017022  005546                            .WORD   DOWRT
  (5)  017024  177777                            .WORD   177777
  (3)  017026                           10014$:
 1275  017026  005737  002414                    TST     TEMP0                   ;YES? (=1)
 1276  017032  001545                            BEQ     3$                      ;EXIT IF 'NO'
 1277  017034  004537  025246                    JSR     R5,LOADED               ;READY?
 1278  017040  005737  002414                    TST     TEMP0                   ;WELL?
 1279  017044  001413                            BEQ     11$                     ;YES
 1280  017046                                    PRINTF  #FMT18,#NOTRDY          ;NO
  (8)  017046  012746  006505                    MOV     #NOTRDY,-(SP)
  (7)  017052  012746  007624                    MOV     #FMT18,-(SP)
  (6)  017056  012746  000002                    MOV     #2,-(SP)
  (3)  017062  010600                            MOV     SP,R0
  (4)  017064  104417                            TRAP    C$PNTF
  (4)  017066  062706  000006                    ADD     #6,SP
 1281  017072  000525                            BR      3$
 1282  017074  004537  025422          11$:      JSR     R5,GETDST
 1283  017100  032701  020000                    BIT     #WL,R1                  ;DRIVE WRITE LOCKED?
 1284  017104  001413                            BEQ     5$                      ;NO
 1285  017106                                    PRINTF  #FMT18,#WRTLCK          ;YES
  (8)  017106  012746  003460                    MOV     #WRTLCK,-(SP)
  (7)  017112  012746  007624                    MOV     #FMT18,-(SP)
  (6)  017116  012746  000002                    MOV     #2,-(SP)
  (3)  017122  010600                            MOV     SP,R0
  (4)  017124  104417                            TRAP    C$PNTF
  (4)  017126  062706  000006                    ADD     #6,SP
 1286  017132  000505                            BR      3$
 1287  017134  012737  000005  002500  5$:       MOV     #5,CPYCNT               ;INITIALIZE COPY COUNT FOR DUPLICATION OF
 1288                                                                           ;/THE 'FIELD' BAD SECTOR FILE ON THE PACK
 1289  017142  012737  177000  002246  12$:      MOV     #-512.,BMP              ;SET UP THE WORD COUNT
 1290  017150  012737  077724  002244           MOV     #77724,BDA              ;START THE WRITE AT SECTOR 20. (RL01)
 1291  017156  022737  000001  002316           CMP     #1,TDR                  ;RL02?
 1292  017164  001403                            BEQ     1$                      ;JUMP IF RL01
 1293  017166  012737  177724  002244           MOV     #177724,BDA             ;START AT SECTOR 20. FOR RL02
 1294  017174  012737  000012  002260  1$:       MOV     #WRITE,FUNC             ;LOAD THE FUNCTION
 1295  017202  005737  002300                    TST     NEWFAC                  ;MAKING A DUMMY 'FACTORY' FILE?
```

```
 1296  017206  001405                    BEQ     13$                     ;NO
 1297  017210  042737  000077  002244    BIC     #77,BDA                 ;YES - START AT SECTOR 00
 1298  017216  005037  002300            CLR     NEWFAC                  ;CLEAR THE FLAG ALSO
 1299  017222  005237  002320    13$:    INC     WRIPG                   ;SET THE WRITE IN PROGRESS FLAG
 1300  017226  004537  023534            JSR     R5,LDFUNC               ;DO THE WRITE OF THE UPDATED 'FIELD'
 1301                                                                    ;/BAD SECTOR FILE
 1302  017232  004537  025310            JSR     R5,WTRDY                ;WAIT FOR READY
 1303  017236  005337  002500            DEC     CPYCNT                  ;DECREMENT COPY COUNT
 1304  017242  005777  163002            TST     @DCS                    ;WAS THE TRANSFER GOOD?
 1305  017246  100407                    BMI     4$                      ;BRANCH TO REPORT ''CANNOT UPDATE BAD SECTOR
 1306                                                                    ;/FILE ON PACK''
 1307  017250  005737  002500            TST     CPYCNT                  ;IS ENTIRE 'FIELD' BAD SECTOR FILE
 1308                                                                    ;/WRITTEN ON THE PACK?
 1309  017254  001420                    BEQ     2$                      ;BRANCH TO PRINT TIME AND REPORT
 1310                                                                    ;/OPERATION IS COMPLETED
 1311  017256  062737  000004  002244    ADD     #4,BDA                  ;ELSE, ADD OFFSET TO DISK ADDRESS REGISTER TO
 1312                                                                    ;/ACCESS THE NEXT SECTOR GROUP IN WHICH TO
 1313                                                                    ;/DUPLICATE THE BAD SECTOR FILE
 1314  017264  000726                    BR      12$                     ;BRANCH TO REPEAT WRITE OPERATION
 1315
 1316                            ;HERE IF AN ERROR DETECTED WHILE UPDATING THE MEDIA
 1317
 1318  017266                    4$:     PRINTF  #FMT18,#BADWRT          ;REPORT ''CANNOT UPDATE BAD SECTOR FILE ON PACK''
  (8)  017266  012746  005610            MOV     #BADWRT,-(SP)
  (7)  017272  012746  007624            MOV     #FMT18,-(SP)
  (6)  017276  012746  000002            MOV     #2,-(SP)
  (3)  017302  010600                    MOV     SP,R0
  (4)  017304  104417                    TRAP    C$PNTF
  (4)  017306  062706  000006            ADD     #6,SP
 1319  017312  000137  013546            JMP     NXTCMD                  ;BACK TO THE QUERY LOOP
 1320  017316  004537  012502    2$:     JSR     R5,PTIME                ;PRINT THE SYS RUN TIME
 1321  017322                            PRINTF  #FMT18,#MDONE           ;TELL OPR - DONE
  (8)  017322  012746  003720            MOV     #MDONE,-(SP)
  (7)  017326  012746  007624            MOV     #FMT18,-(SP)
  (6)  017332  012746  000002            MOV     #2,-(SP)
  (3)  017336  010600                    MOV     SP,R0
  (4)  017340  104417                    TRAP    C$PNTF
  (4)  017342  062706  000006            ADD     #6,SP
 1322  017346  012601            3$:     MOV     (SP)+,R1                ;RESET R1
 1323  017350  000205                    RTS     R5                      ;EXIT ROUTINE
```

```
1325  017352                            STARS
 (2)                                    ;;*******************************************************************
1326                                    ;HERE IS THE CODE TO SERVICE REMOVING AN ENTRY FROM THE 'FIELD' BAD
1327                                    ;SECTOR FILE
1328  017352                            STARS
 (2)                                    ;;*******************************************************************
1329
1330  017352                            BSDEL:  PRINTF  #FMT19,#DELMSG          ;TELL OPR ABOUT TO DELETE...
 (8)  017352  012746  005656                    MOV     #DELMSG,-(SP)
 (7)  017356  012746  007631                    MOV     #FMT19,-(SP)
 (6)  017362  012746  000002                    MOV     #2,-(SP)
 (3)  017366  010600                            MOV     SP,R0
 (4)  017370  104417                            TRAP    C$PNTF
 (4)  017372  062706  000006                    ADD     #6,SP
1331  017376  004537  012370                    JSR     R5,FIRST                ;SELECT THE 1ST UNIT
1332  017402  000137  013546                    JMP     NXTCMD                  ;NONE AVAIL.!
1333  017406  000404                            BR      BSDELL
1334  017410  004537  012400            BSDELS: JSR     R5,SELDRV               ;SELECT NEXT UNIT
1335  017414  000137  013546                    JMP     NXTCMD                  ;ALL DONE
1336  017420  004537  025246            BSDELL: JSR     R5,LOADED               ;READY?
1337  017424  005737  002414                    TST     TEMPO
1338  017430  001403                            BEQ     1$                      ;YES
1339  017432  004537  012642                    JSR     R5,DRNRDY
1340  017436  000764                            BR      BSDELS                  ;SELECT THE NEXT UNIT
1341
1342  017440  004537  012546            1$:     JSR     R5,DRVID                ;TELL OPR WHAT DRIVE SELECTED
1343  017444  004537  023656                    JSR     R5,RDBDSC               ;GET A FRESH COPY OF THE BAD SEC FILE
1344  017450  005737  002464                    TST     ACCESS                  ;ALLOWED TO PROCEED?
1345  017454  001414                            BEQ     BSDELTD                 ;YES
1346  017456                                    PRINTF  #FMT18,#DENIED          ;NO - TELL OPR
 (8)  017456  012746  004125                    MOV     #DENIED,-(SP)
 (7)  017462  012746  007624                    MOV     #FMT18,-(SP)
 (6)  017466  012746  000002                    MOV     #2,-(SP)
 (3)  017472  010600                            MOV     SP,R0
 (4)  017474  104417                            TRAP    C$PNTF
 (4)  017476  062706  000006                    ADD     #6,SP
1347  017502  000137  013546                    JMP     NXTCMD                  ;BACK TO THE QUERY LOOP
1348
1349  017506                            BSDELTD: GMANIL THISDRV,TEMPO,1,NO
 (3)  017506  104443                            TRAP    C$GMAN
 (3)  017510  000404                            BR      10015$
 (4)  017512  002414                            .WORD   TEMPO
 (5)  017514  000120                            .WORD   T$CODE
 (5)  017516  006750                            .WORD   THISDRV
 (5)  017520  000001                            .WORD   1
 (3)  017522                            10015$:
1350  017522  005737  002414                    TST     TEMPO
1351  017526  001730                            BEQ     BSDELS                  ;RE-SELECT IF NOT THIS DRIVE
1352
1353  017530                            BSDEL1: PRINTF  #MCRLF
 (7)  017530  012746  010041                    MOV     #MCRLF,-(SP)
 (6)  017534  012746  000001                    MOV     #1,-(SP)
 (3)  017540  010600                            MOV     SP,R0
 (4)  017542  104417                            TRAP    C$PNTF
 (4)  017544  062706  000004                    ADD     #4,SP
1354  017550                                    GMANID  DELCYL,BSFCYL,D,777,0,511.,NO
```

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  (3)  017550  104443                    TRAP    C$GMAN
  (3)  017552  000406                    BR      10016$
  (4)  017554  015332                    .WORD   BSFCYL
  (5)  017556  000042                    .WORD   T$CODE
  (5)  017560  005254                    .WORD   DELCYL
  (5)  017562  000777                    .WORD   777
  (5)  017564  000000                    .WORD   T$LOLIM
  (5)  017566  000777                    .WORD   T$HILIM
  (3)  017570                    10016$:
 1355  017570                            GMANID  DELSEC,BSFSEC,D,77,0,39.,NO
  (3)  017570  104443                    TRAP    C$GMAN
  (3)  017572  000406                    BR      10017$
  (4)  017574  015334                    .WORD   BSFSEC
  (5)  017576  000042                    .WORD   T$CODE
  (5)  017600  005304                    .WORD   DELSEC
  (5)  017602  000077                    .WORD   77
  (5)  017604  000000                    .WORD   T$LOLIM
  (5)  017606  000047                    .WORD   T$HILIM
  (3)  017610                    10017$:
 1356  017610                            GMANID  DELHD,BSFHD,D,3,0,1,NO
  (3)  017610  104443                    TRAP    C$GMAN
  (3)  017612  000406                    BR      10020$
  (4)  017614  015336                    .WORD   BSFHD
  (5)  017616  000042                    .WORD   T$CODE
  (5)  017620  005331                    .WORD   DELHD
  (5)  017622  000003                    .WORD   3
  (5)  017624  000000                    .WORD   T$LOLIM
  (5)  017626  000001                    .WORD   T$HILIM
  (3)  017630                    10020$:
 1357  017630  013700  015332            MOV     BSFCYL,R0               ;COPY THE CYL TO REMOVE
 1358  017634  000300                    SWAB    R0                      ;PUT IT IN HIGH BYTE
 1359  017636  000241                    CLC
 1360  017640  006000                    ROR     R0
 1361  017642  103002                    BCC     1$                      ;BR IF DON'T WANT ANOTHER BIT
 1362  017644  052700  100000            BIS     #BIT15,R0               ;ADD IN HIGH ORDER CYL BIT
 1363  017650  053700  015334    1$:     BIS     BSFSEC,R0               ;ADD IN THE SECTOR NUMBER
 1364  017654  005737  015336            TST     BSFHD                   ;ON HEAD 0??
 1365  017660  001402                    BEQ     2$                      ;YES
 1366  017662  052700  000100            BIS     #100,R0                 ;NO - POINT TO HEAD 1
 1367  017666  010037  002410    2$:     MOV     R0,CHKSEC               ;SAVE THE COMPACTED DISK ADDRESS
 1368  017672  004537  027340            JSR     R5,CKBDSC               ;CHECK TO SEE IF ENTRY EXISTS
 1369  017676  005737  002406            TST     HDRFND                  ;FOUND?
 1370  017702  001014                    BNE     10$                     ;YES
 1371  017704                            PRINTF  #FMT18,#NOENTRY         ;NO
  (8)  017704  012746  005725            MOV     #NOENTRY,-(SP)
  (7)  017710  012746  007624            MOV     #FMT18,-(SP)
  (6)  017714  012746  000002            MOV     #2,-(SP)
  (3)  017720  010600                    MOV     SP,R0
  (4)  017722  104417                    TRAP    C$PNTF
  (4)  017724  062706  000006            ADD     #6,SP
 1372  017730  000137  017410            JMP     BSDELS                  ;SELECT THE NEXT UNIT
 1373
 1374  017734  004537  025076    10$:    JSR     R5,RDFIELD              ;GET THE FIELD BAD SEC FILE
 1375  017740  005002                    CLR     R2
 1376  017742  005037  015342            CLR     SECNUM
 1377  017746  005037  015326            CLR     FLDNUM
```

```
1378  017752  012737  000020  015340          MOV     #16.,SECMAX
1379  017760  004537  015622                  JSR     R5,BSFOK                ;POINT TO A WORK AREA
1380  017764  005737  015346                  TST     BSFOKF                  ;POINTING TO A VALID AREA?
1381  017770  001421                          BEQ     11$                     ;YES - PROCEED
1382  017772                                  PRINTF  #FMT18,#NSWSEC          ;TELL OPR THAT ERROR EXISTS
  (8) 017772  012746  003636                  MOV     #NSWSEC,-(SP)
  (7) 017776  012746  007624                  MOV     #FMT18,-(SP)
  (6) 020002  012746  000002                  MOV     #2,-(SP)
  (3) 020006  010600                          MOV     SP,R0
  (4) 020010  104417                          TRAP    C$PNTF
  (4) 020012  062706  000006                  ADD     #6,SP
1383  020016  004537  022570                  JSR     R5,NEWBSF               ;SEE IF OPR WANTS TO MAKE A FILE
1384  020022  005737  002414                  TST     TEMP0                   ;PROCEED IF A 'FIELD' FILE BUILT
1385  020026  001002                          BNE     11$                     ;BR - FILE WAS BUILT
1386  020030  000137  017410                  JMP     BSDELS                  ;SELECT THE NEXT UNIT
1387
1388  020034  023762  015332  030530  11$:    CMP     BSFCYL,BSFILE(R2)       ;AT CORRECT ENTRY?
1389  020042  001027                          BNE     20$                     ;NOPE! UPDATE POINTER
1390  020044  013737  015336  002416          MOV     BSFHD,TEMP1             ;GET THE HEAD SELECTED
1391  020052  000337  002416                  SWAB    TEMP1                   ;PUT IT IN HIGH BYTE
1392  020056  053737  015334  002416          BIS     BSFSEC,TEMP1            ;ADD IN THE SECTOR BITS
1393  020064  023762  002416  030532          CMP     TEMP1,BSFILE+2(R2)      ;CORRECT SECTOR TOO?
1394  020072  001013                          BNE     20$                     ;NO - UPDATE POINTER
1395
1396                                  ;HAVE THE ENTRY SLOT NOW ... KILL THE ENTRY & MOVE ALL OTHERS UP 1
1397
1398  020074  016262  030534  030530  12$:    MOV     BSFILE+4(R2),BSFILE(R2) ;MOVE NEXT CYL ENTRY UP
1399  020102  016262  030536  030532          MOV     BSFILE+6(R2),BSFILE+2(R2) ;MOVE NEXT SECT ENTRY UP
1400  020110  005762  030534                  TST     BSFILE+4(R2)            ;END OF ENTRYS YET?
1401  020114  100422                          BMI     3$                      ;YUP - EXIT
1402  020116  022222                          CMP     (R2)+,(R2)+             ;POINT TO THE NEXT SLOT OF ENTRYS
1403  020120  000765                          BR      12$                     ;AND DO AGAIN
1404
1405                                  ;UPDATE THE ENTRY SLOT POINTER
1406
1407  020122  022222                  20$:    CMP     (R2)+,(R2)+             ;UPDATE POINTER BY 2 LOCATIONS
1408  020124  005762  030530                  TST     BSFILE(R2)              ;END OF ENTRYS?
1409  020130  100341                          BPL     11$                     ;NO - LOOK AT THIS SLOT
1410
1411                                  ;HERE IF NO 'FIELD' ENTRY DETECTED ON THE PACK
1412
1413  020132                                  PRINTF  #FMT18,#NOFLDE          ;TELL OPR NO 'FIELD' ENTRY HERE
  (8) 020132  012746  003662                  MOV     #NOFLDE,-(SP)
  (7) 020136  012746  007624                  MOV     #FMT18,-(SP)
  (6) 020142  012746  000002                  MOV     #2,-(SP)
  (3) 020146  010600                          MOV     SP,R0
  (4) 020150  104417                          TRAP    C$PNTF
  (4) 020152  062706  000006                  ADD     #6,SP
1414  020156  000137  017410                  JMP     BSDELS                  ;SELECT THE NEXT UNIT
1415
1416                                  ;HERE TO CLEAR THIS ENTRY FROM REST OF FIELD BAD SECTOR FILE
1417                                  ;WILL COPY THIS MODIFIED SECTOR PAIR INTO THE ENTIRE 'FIELD' BAD SEC FILE
1418
1419  020162  004537  016770  3$:     JSR     R5,WRTBSF               ;WRITE UPDATED 'FIELD' BAD SECTOR FILE
1420                                                                  ;/ON THE PACK IF REQUESTED
1421  020166  000137  017410          JMP     BSDELS                  ;SELECT THE NEXT UNIT
```

```
020172                          STARS
                                ;;*******************************************************************
                                ;BSWRITE -- ROUTINE TO WRITE THE WHOLE PACK WITH THE WORST CASE DATA PATTERN
                                ;        FOR THE RL01/2 THEN ISSUE THE 'VERIFY' (READ PACK) COMMAND. THIS
                                ;        WILL CHECK THE PACK FOR BAD SPOTS AND COMPARE THE FOUND ENTRYS
                                ;        WITH THE EXISTING BAD SECTOR FILE.
020172                          STARS
                                ;;*******************************************************************

020172                          BSWRITE: PRINTF #FMT19,#MWRITE  ;TELL OPR WHAT IS HAPPENING
020172  012746  004256                   MOV     #MWRITE,-(SP)
020176  012746  007631                   MOV     #FMT19,-(SP)
020202  012746  000002                   MOV     #2,-(SP)
020206  010600                           MOV     SP,R0
020210  104417                           TRAP    C$PNTF
020212  062706  000006                   ADD     #6,SP
020216                                   GMANIL  MSTWRT,TEMPO,177777,NO
020216  104443                           TRAP    C$GMAN
020220  000404                           BR      10021$
020222  002414                           .WORD   TEMPO
020224  000120                           .WORD   T$CODE
020226  006144                           .WORD   MSTWRT
020230  177777                           .WORD   177777
020232                          10021$:
020232  005737  002414                   TST     TEMPO
020236  001402                           BEQ     1$              ;QUIT IF CAN'T WRITE ON ALL PACKS
020240  004537  012370                   JSR     R5,FIRST        ;SELECT THE 1ST UNIT
020244  000137  013546          1$:      JMP     NXTCMD          ;NONE AVAIL.!
020250  000404                           BR      BSWRTL
020252  004537  012400          BSWRTS:  JSR     R5,SELDRV       ;SELECT THE NEXT UNIT
020256  000137  013546                   JMP     NXTCMD          ;ALL DONE

020262  004537  012546          BSWRTL:  JSR     R5,DRVID        ;TELL OPR WHAT DRIVE SELECTED
020266  004537  025246                   JSR     R5,LOADED
020272  005737  002414                   TST     TEMPO
020276  001403                           BEQ     1$              ;DRV READY
020300  004537  012642                   JSR     R5,DRNRDY       ;TELL OPR NOT READY
020304  000762                           BR      BSWRTS          ;SELECT THE NEXT UNIT

020306  004537  012502          1$:      JSR     R5,PTIME        ;PRINT THE RUN TIME
020312  004537  025422                   JSR     R5,GETDST       ;GET STATUS OF DRV
020316  032701  020000                   BIT     #WL,R1          ;WRITE LOCKED?
020322  001416                           BEQ     2$              ;NO
020324  004537  012546                   JSR     R5,DRVID        ;TELL THE DRIVE ID
020330                                   PRINTF  #MSG,#WRTLCK    ;YES
020330  012746  003460                   MOV     #WRTLCK,-(SP)
020334  012746  010044                   MOV     #MSG,-(SP)
020340  012746  000002                   MOV     #2,-(SP)
020344  010600                           MOV     SP,R0
020346  104417                           TRAP    C$PNTF
020350  062706  000006                   ADD     #6,SP
020354  000137  020252          11$:     JMP     BSWRTS          ;SELECT THE NEXT UNIT

020360                          2$:      PRINTF  #MCRLF
020360  012746  010041                   MOV     #MCRLF,-(SP)
020364  012746  000001                   MOV     #1,-(SP)
```

```
  (3)  020370  010600                    MOV     SP,R0
  (4)  020372  104417                    TRAP    C$PNTF
  (4)  020374  062706  000004            ADD     #4,SP
1456   020400  004537  020612            JSR     R5,CLRBSN       ;CLEAR THE TEMP STORAGE FOR HARD ERRORS
1457   020404  005037  002232            CLR     SFTCNT          ;CLEAR THE SOFT ERROR COUNTER
1458   020410  005037  002230            CLR     ERRCNT          ;CLEAR THE HARD ERROR COUNTER
1459
1460   020414                            PRINTF  #FMT18,#WRPKF   ;PRINT WRITE PACK FWD
  (8)  020414  012746  006674            MOV     #WRPKF,-(SP)
  (7)  020420  012746  007624            MOV     #FMT18,-(SP)
  (6)  020424  012746  000002            MOV     #2,-(SP)
  (3)  020430  010600                    MOV     SP,R0
  (4)  020432  104417                    TRAP    C$PNTF
  (4)  020434  062706  000006            ADD     #6,SP
1461   020440  005737  010130            TST     WRTSAW          ;SAWTOOTH WRT?
1462   020444  001412                    BEQ     3$              ;NO
1463   020446                            PRINTF  #MSG,#SAWFWD    ;YES - TELL OPR
  (8)  020446  012746  006603            MOV     #SAWFWD,-(SP)
  (7)  020452  012746  010044            MOV     #MSG,-(SP)
  (6)  020456  012746  000002            MOV     #2,-(SP)
  (3)  020462  010600                    MOV     SP,R0
  (4)  020464  104417                    TRAP    C$PNTF
  (4)  020466  062706  000006            ADD     #6,SP
1464   020472  005037  002312    3$:     CLR     FWDFLG          ;SET CONTROL FOR FWD SAWTOOTH WRITE
1465   020476  004537  025514            JSR     R5,WRPACK       ;WRITE THE PACK
1466   020502  004537  020636            JSR     R5,CVERIFY      ;CALL THE VERIFY ROUTINE
1467
1468   020506  004537  012502            JSR     R5,PTIME        ;TELL THE HALF TIME
1469   020512                            PRINTF  #FMT18,#WRPKR   ;TELL OPR WRT PACK REVERSE
  (8)  020512  012746  006722            MOV     #WRPKR,-(SP)
  (7)  020516  012746  007624            MOV     #FMT18,-(SP)
  (6)  020522  012746  000002            MOV     #2,-(SP)
  (3)  020526  010600                    MOV     SP,R0
  (4)  020530  104417                    TRAP    C$PNTF
  (4)  020532  062706  000006            ADD     #6,SP
1470   020536  005737  010130            TST     WRTSAW          ;SAWTOOTH WRT?
1471   020542  001412                    BEQ     4$              ;NO
1472   020544                            PRINTF  #MSG,#SAWREV    ;YES
  (8)  020544  012746  006636            MOV     #SAWREV,-(SP)
  (7)  020550  012746  010044            MOV     #MSG,-(SP)
  (6)  020554  012746  000002            MOV     #2,-(SP)
  (3)  020560  010600                    MOV     SP,R0
  (4)  020562  104417                    TRAP    C$PNTF
  (4)  020564  062706  000006            ADD     #6,SP
1473   020570  005237  002312    4$:     INC     FWDFLG          ;SET CONTROL FOR REVERSE SAWTOOTH WRT
1474   020574  004537  025514            JSR     R5,WRPACK       ;WRITE THE PACK
1475   020600  004537  020636            JSR     R5,CVERIFY      ;CALL THE VERIFY ROUTINE
1476   020604  004537  021110            JSR     R5,ENDRD1       ;PRINT THE TOTALS OF ERRORS DETECTED
1477   020610  000620                    BR      BSWRTS          ;SELECT THE NEXT DRIVE
```

```
1479                                    ;HERE TO CLEAR THE TEMP BAD SECTOR FILE STORAGE OF 'HARD' ERROR SPOTS
1480                                    ;ON THE PACK
1481
1482  020612  010146                    CLRBSN: MOV     R1,-(SP)        ;SAVE R1
1483  020614  012701  030014                    MOV     #BSECN,R1       ;POINT TO THE 1ST LOCATION IN THE TABLE
1484  020620  012721  177777            1$:     MOV     #-1,(R1)+       ;INIT THIS ADDR OF TABLE
1485  020624  022701  030410                    CMP     #BSECNE,R1      ;DONE?
1486  020630  001373                            BNE     1$              ;NO - DO THIS ADDR ALSO
1487  020632  012601                            MOV     (SP)+,R1        ;RESET R1
1488  020634  000205                            RTS     R5
```

```
020636                            STARS
                                  ;;*******************************************************************
                                  ;BSVERIFY -- ROUTINE TO READ THE PACK TO FIND BAD SPOTS. SPOTS THAT
                                  ;          ARE 'BAD' AFTER 16 RETRYS TO RECOVER THE DATA WILL BE ENTERED
                                  ;          INTO A TEMPORARY AREA FOR LATER INSERTION INTO THE REAL BAD
                                  ;          SECTOR FILE (UNDER THE OPERATOR'S CONTROL).
020636                            STARS
                                  ;;*******************************************************************

020636  005237  002314            CVERIFY: INC    CVFLG           ;SET THE 'CALLED' FLAG
020642  000402                             BR     COMVER          ;GO TO THE COMMON VERIFY CODE

020644  005037  002314            BSVERIFY: CLR   CVFLG           ;CLEAR THE 'CALLED' FLAG

020650                            COMVER: PRINTF  #FMT19,#VERIFY  ;MSG. 'READING PACK''
020650  012746  004241                    MOV     #VERIFY,-(SP)
020654  012746  007631                    MOV     #FMT19,-(SP)
020660  012746  000002                    MOV     #2,-(SP)
020664  010600                            MOV     SP,R0
020666  104417                            TRAP    C$PNTF
020670  062706  000006                    ADD     #6,SP
020674  005737  002314                    TST     CVFLG           ;'CALLED'?
020700  001011                            BNE     BSVERL          ;YES - SKIP SELECT CODE
020702  004537  012370                    JSR     R5,FIRST        ;NO - SELECT THE 1ST UNIT
020706  000137  013546                    JMP     NXTCMD          ;NONE AVAIL.!
020712  000404                            BR      BSVERL
020714  004537  012400            BSVERS: JSR     R5,SELDRV       ;SELECT THE NEXT UNIT
020720  000137  013546                    JMP     NXTCMD          ;ALL DONE
020724  004537  025246            BSVERL: JSR     R5,LOADED       ;DRV RDY?
020730  005737  002414                    TST     TEMP0
020734  001410                            BEQ     1$              ;YES
020736  004537  012642                    JSR     R5,DRNRDY
020742  005737  002314                    TST     CVFLG           ;'CALLED'?
020746  001002                            BNE     10$             ;YES
020750  000137  020714                    JMP     BSVERS          ;SELECT THE NEXT UNIT
020754  000205                    10$:    RTS     R5              ;NO - EXIT NOW

020756                            1$:     PRINTF  #MCRLF
020756  012746  010041                    MOV     #MCRLF,-(SP)
020762  012746  000001                    MOV     #1,-(SP)
020766  010600                            MOV     SP,R0
020770  104417                            TRAP    C$PNTF
020772  062706  000004                    ADD     #4,SP
020776  022737  000005  013650            CMP     #5,INPUT        ;HERE FROM 'WRITE' COMMAND?
021004  001406                            BEQ     11$             ;YES
021006  004537  020612                    JSR     R5,CLRBSN       ;NO - INIT HARD ERROR STORAGE AREA
021012  005037  002232                    CLR     SFTCNT          ;CLEAR THE SOFT ERROR COUNTER
021016  005037  002230                    CLR     ERRCNT          ;CLEAR THE HARD ERROR COUNT
021022  004537  023656            11$:    JSR     R5,RDBDSC       ;GET A FRESH COPY OF THE BAD SECTOR FILE
021026  004537  026754                    JSR     R5,HDHOME       ;PUT THE HEADS OVER CYLINDER 0
021032  012737  002450  002256            MOV     #BUF1,BBA       ;POINT TO THE BUFFER FOR READ/WRITE
021040  012737  175400  002246            MOV     #-1280.,BMP     ;SAVE THE WC FOR 10 SECTORS
021046  005037  002416                    CLR     TEMP1           ;START AT HEAD 0
021052  005001                            CLR     R1              ;START AT CYLINDER 0

021054  022737  000001  002316    CONREAD: CMP    #1,TDR          ;DRIVE = RL01?
```

```
1533  021062  001101                        BNE     CRD2            ;NO - MUST BE AN RL02
1534  021064  022701  077600                CMP     #077600,R1      ;AT RL01 LAST CYL?
1535  021070  001101                        BNE     STREAD          ;NO - READ THIS TRACK
1536
1537  021072  005737  002416        CRD1:   TST     TEMP1           ;ON LAST CYL ... IS IT LAST TRACK?
1538  021076  001476                        BEQ     STREAD          ;NO - DO THE READ
1539
1540  021100  005737  002314        ENDRD:  TST     CVFLG           ;'CALLED'?
1541  021104  001401                        BEQ     ENDRD1          ;NO - PROCEED WITH THE TOTALS PRINTOUT
1542  021106  000205                        RTS     R5              ;YES - EXIT NOW
1543  021110  004537  012502        ENDRD1: JSR     R5,PTIME        ;PRINT THE DONE READING TIME
1544  021114                                PRINTF  #MSG,#MDONE     ;TELL OPR ALL DONE
 (8)  021114  012746  003720                MOV     #MDONE,-(SP)
 (7)  021120  012746  010044                MOV     #MSG,-(SP)
 (6)  021124  012746  000002                MOV     #2,-(SP)
 (3)  021130  010600                        MOV     SP,R0
 (4)  021132  104417                        TRAP    C$PNTF
 (4)  021134  062706  000006                ADD     #6,SP
1545  021140  004537  012546                JSR     R5,DRVID        ;TELL OPR WHICH DRIVE
1546  021144                                PRINTF  #FMTTB,#TSOFT,SFTCNT ;PRINT TOTAL 'SOFT' ERRORS
 (9)  021144  013746  002232                MOV     SFTCNT,-(SP)
 (8)  021150  012746  003047                MOV     #TSOFT,-(SP)
 (7)  021154  012746  007724                MOV     #FMTTB,-(SP)
 (6)  021160  012746  000003                MOV     #3,-(SP)
 (3)  021164  010600                        MOV     SP,R0
 (4)  021166  104417                        TRAP    C$PNTF
 (4)  021170  062706  000010                ADD     #10,SP
1547  021174                                PRINTF  #FMTTB,#THARD,ERRCNT ;PRINT TOTAL 'HARD' ERRORS
 (9)  021174  013746  002230                MOV     ERRCNT,-(SP)
 (8)  021200  012746  003076                MOV     #THARD,-(SP)
 (7)  021204  012746  007724                MOV     #FMTTB,-(SP)
 (6)  021210  012746  000003                MOV     #3,-(SP)
 (3)  021214  010600                        MOV     SP,R0
 (4)  021216  104417                        TRAP    C$PNTF
 (4)  021220  062706  000010                ADD     #10,SP
1548  021224                                PRINTF  #FMT18,#HYPHEN
 (8)  021224  012746  002675                MOV     #HYPHEN,-(SP)
 (7)  021230  012746  007624                MOV     #FMT18,-(SP)
 (6)  021234  012746  000002                MOV     #2,-(SP)
 (3)  021240  010600                        MOV     SP,R0
 (4)  021242  104417                        TRAP    C$PNTF
 (4)  021244  062706  000006                ADD     #6,SP
1549  021250  004537  022162                JSR     R5,ADDFND       ;SEE IF OPR WANTS TO UPDATE BAD SEC FILE
1550  021254  005737  002314                TST     CVFLG           ;'CALLED'?
1551  021260  001001                        BNE     1$              ;YES
1552  021262  000614                        BR      BSVERS          ;SELECT THE NEXT UNIT
1553  021264  000205                1$:     RTS     R5              ;NO - EXIT NOW
1554
1555                                ;HERE TO CHECK THE END OF AN RL02
1556  021266  022701  177600        CRD2:   CMP     #177600,R1      ;RL02 LAST CYL?
1557  021272  001677                        BEQ     CRD1            ;YES - CHECK TO SEE IF LAST TRACK TOO
```

```
1559                                    ;HERE TO READ THE TRACK SELECTED...WILL TRY 10 SECTORS AT A TIME
1560                                    ;IF AN ERROR IS DETECTED, WILL THEN TRY TO RECOVER BY READING ONE
1561                                    ;SECTOR AT A TIME. A SECTOR IS DEEMED 'HARD ERROR' AFTER 16 RETRYS.
1562                                    ;ALL BAD SPOTS WILL ENTER A TEMP BAD SEC FILE STORAGE AREA...TO BE ADDED
1563                                    ;TO THE REAL BAD SECTOR FILE AFTER WHOLE PACK HAS BEEN READ.
1564
1565  021274  005002                    STREAD: CLR     R2              ;START AT SECTOR 0 ON THIS TRACK
1566  021276  005037  002412                    CLR     DECNT           ;INITIALIZE ERROR RECOVERY COUNTER
1567  021302  010137  002244            SRD1:   MOV     R1,BDA          ;INSERT THE CYL # INTO DISK ADDR
1568  021306  053737  002416  002244            BIS     TEMP1,BDA       ;ADD THE HEAD NUMBER (0 OR 1)
1569  021314  050237  002244                    BIS     R2,BDA          ;ADD THE SECTOR NUMBER
1570  021320  012737  000014  002260            MOV     #READ,FUNC      ;GET A READ FUNCTION
1571  021326  004537  023534                    JSR     R5,LDFUNC       ;ISSUE THE READ CMD
1572  021332  004537  025310                    JSR     R5,WTRDY        ;WAIT FOR READ TO FINISH
1573
1574  021336  005777  160706                    TST     @DCS            ;ANY ERROR ON THE READ?
1575  021342  100041                            BPL     NXTSEC          ;BR IF OK
1576
1577                                    ;HERE IF AN ERROR DETECTED ON THE READ ... READ ONE SECTOR AT A TIME
1578                                    ;TILL WHOLE TRACK HAS BEEN READ
1579
1580  021344                                    PRINTF  #MCRLF
 (7)  021344  012746  010041                    MOV     #MCRLF,-(SP)
 (6)  021350  012746  000001                    MOV     #1,-(SP)
 (3)  021354  010600                            MOV     SP,R0
 (4)  021356  104417                            TRAP    C$PNTF
 (4)  021360  062706  000004                    ADD     #4,SP
1581  021364  017737  160660  002252            MOV     @DCS,E.DCS      ;GET THE ERROR DETECTED
1582  021372  013703  002250                    MOV     DCS,R3          ;GET THE BASE ADDRESS FOR RLCS
1583  021376  016337  000004  002440            MOV     DA(R3),E.DA     ;SAVE THE DISK ADDRESS AT ERROR
1584  021404  005337  002440                    DEC     E.DA            ;SECTOR IS PREVIOUS FROM INDICATED
1585  021410  013737  002440  002410            MOV     E.DA,CHKSEC
1586  021416  013737  002410  002502            MOV     CHKSEC,FRSTER   ;STORE ERROR ADDRESS FOR RECOVERY LOOP
1587  021424                                    ERRSOFT 400.,MSFER,ERR1 ;TELL OPR ABOUT THE ERROR DETECTED
 (4)  021424  104457                            TRAP    C$ERSOFT
 (5)  021426  000620                            .WORD   400
 (5)  021430  003310                            .WORD   MSFER
 (5)  021432  007130                            .WORD   ERR1
1588  021434  004537  025436                    JSR     R5,ISDRST       ;ISSUE A DRIVE RESET TO CLEAR THE ERROR
1589  021440  005237  002232                    INC     SFTCNT          ;ADD TO SOFT ERROR TALLY
1590  021444  000446                            BR      ONESEC          ;RECOVER THE TRACK DATA...SLOWLY!
```

```
                                        ;HERE TO SELECT THE NEXT SECTOR ADDR TO READ FROM ON THIS TRACK
                                        ;HERE IF NO ERROR DETECTED ON PREV. READ CMD

021446  062702  000012          NXTSEC: ADD     #10.,R2         ;POINT TO THE NEXT SPOT ON THE TRACK
021452  022702  000050                  CMP     #40.,R2         ;END OF THE TRACK?
021456  001311                          BNE     SRD1            ;NO - DO THE READ

                                        ;HERE TO SELECT THE NEXT TRACK TO READ ... WILL DO A SEEK TO NEXT HEAD
                                        ;OR TO THE NEXT CYLINDER.

021460  005737  002416          NXTTRK: TST     TEMP1           ;ON HEAD #1 NOW?
021464  001427                          BEQ     5$              ;NO - SEEK TO NEXT TRACK SAME CYL
021466  005037  002416                  CLR     TEMP1           ;SET FOR NEXT CYL HEAD 0
021472  062701  000200                  ADD     #200,R1         ;POINT TO THE NEXT CYLINDER
021476  042701  000177                  BIC     #177,R1         ;CLEAR UNEXPECTED JUNK BITS
021502  012737  000200  002244          MOV     #200,BDA

021510  052737  000005  002244  4$:     BIS     #SIGN!MK,BDA    ;SET FOR A SEEK CMD
021516  012737  000006  002260          MOV     #SEEK,FUNC      ;GET THE SEEK CMD
021524  004537  023534                  JSR     R5,LDFUNC       ;ISSUE THE SEEK
021530  004537  025310                  JSR     R5,WTRDY        ;WAIT TILL READY
021534  010137  002322                  MOV     R1,PRPOS        ;SAVE THE PRESENT POSITION ON DISK
021540  000137  021054                  JMP     CONREAD         ;CONTINUE READING THE PACK

021544  012737  000100  002416  5$:     MOV     #HEAD,TEMP1     ;SAVE HEAD SELECT STATUS
021552  012737  000020  002244          MOV     #SKHS,BDA       ;SET FOR SEEK TO NEXT TRACK SAME CYL
021560  000753                          BR      4$              ;ISSUE THE SEEK
```

```
021562                                  STARS
                                        ;;*****************************************************************
                                        ;HERE TO TRY AND RECOVER THE DATA ON SELECTED TRACK BY READING 1 SECTOR
                                        ;AT A TIME. SECTOR WILL BE MARKED 'BAD' AFTER 16 RETRYS AND NO RECOVERY.
021562                                  STARS
                                        ;;*****************************************************************

021562  005002                          ONESEC: CLR     R2              ;START AT SECTOR 0 ON THIS TRACK
021564  012737  177600  002246                  MOV     #-128.,BMP      ;SET THE WC AT 1 SECTOR'S WORTH
021572  013737  002322  002244          1$:     MOV     PRPOS,BDA       ;GET THE CYL # TO START AT
021600  050237  002244                          BIS     R2,BDA          ;ADD IN THE SECTOR NUMBER
021604  053737  002416  002244                  BIS     TEMP1,BDA       ;AND THE TRACK (HEAD 0 OR 1)

                                        ;READ A SECTOR
021612  012737  000014  002260          2$:     MOV     #READ,FUNC      ;GET A READ FUNCTION
021620  004537  023534                          JSR     R5,LDFUNC       ;ISSUE THE READ
021624  004537  025310                          JSR     R5,WTRDY        ;WAIT FOR READY

021630  005777  160414                          TST     @DCS            ;THIS SECTOR READ OK?
021634  100106                                  BPL     3$              ;BE IF OK - SELECT NEXT SECTOR

                                        ;ERROR IN THIS SECTOR - TRY A MAX OF 16 TIMES TO RECOVER

021636  017737  160406  002252                  MOV     @DCS,E.DCS      ;SAVE THE DETECTED ERROR
021644  023737  002244  002502                  CMP     BDA,FRSTER      ;DID WE REPORT THIS IN MAIN PROGRAM?
021652  001425                                  BEQ     10$             ;YES - SKIP
021654  005737  002412                          TST     DECNT           ;DID WE REPORT IT YET IN RECOVERY LOOP?
021660  001022                                  BNE     10$             ;YES - SKIP
021662                                          PRINTF  #MCRLF          ;ELSE REPORT SOFT ERROR NOW
021662  012746  010041                          MOV     #MCRLF,-(SP)
021666  012746  000001                          MOV     #1,-(SP)
021672  010600                                  MOV     SP,R0
021674  104417                                  TRAP    C$PNTF
021676  062706  000004                          ADD     #4,SP
021702  013737  002244  002410                  MOV     BDA,CHKSEC      ;GET ERROR ADDRESS FOR PRINOUT
021710  013737  002244  002440                  MOV     BDA,E.DA
021716                                          ERRSOFT 420.,MSFER,ERR1
021716  104457                                  TRAP    C$ERSOFT
021720  000644                                  .WORD   420
021722  003310                                  .WORD   MSFER
021724  007130                                  .WORD   ERR1
021726  005237  002412                  10$:    INC     DECNT           ;COUNT THIS RETRY
021732  013737  002244  002410                  MOV     BDA,CHKSEC      ;SEE IF THIS SECTOR IS ALREADY IN
021740  004537  027340                          JSR     R5,CKBDSC       ;THE BAD SECTOR FILE
021744  005737  002406                          TST     HDRFND          ;IN THE FILE NOW?
021750  001423                                  BEQ     21$             ;BR IF ERROR
021752                                          PRINTF  #FMT18,#INBSF   ;TELL OPR SECT IS IN BSF ALREADY
021752  012746  006346                          MOV     #INBSF,-(SP)
021756  012746  007624                          MOV     #FMT18,-(SP)
021762  012746  000002                          MOV     #2,-(SP)
021766  010600                                  MOV     SP,R0
021770  104417                                  TRAP    C$PNTF
021772  062706  000006                          ADD     #6,SP
021776                                          PRINTF  #MCRLF
021776  012746  010041                          MOV     #MCRLF,-(SP)
022002  012746  000001                          MOV     #1,-(SP)
```

```
  (3)  022006  010600                        MOV     SP,R0
  (4)  022010  104417                        TRAP    C$PNTF
  (4)  022012  062706  000004                ADD     #4,SP
1657   022016  000445                        BR      30$             ;DO THE NEXT SECTOR ON THIS TRACK
1658
1659   022020  022737  000020  002412  21$:  CMP     #16.,DECNT      ;TIME TO MARK IT AS A BAD SPOT?
1660   022026  001403                        BEQ     22$             ;YES
1661   022030  004537  025436                JSR     R5,ISDRST       ;NO - ISSUE A DRIVE RESET
1662   022034  000666                        BR      2$              ;AND CONTINUE
1663   022036  005337  002232          22$:  DEC     SFTCNT          ;DELETE THIS HARD ERROR FROM SOFT ERROR TALLY
1664   022042  004537  026604                JSR     R5,INBAD        ;YES - MAKE A TEMP BAD SPOT ENTRY
1665   022046  004537  025436          23$:  JSR     R5,ISDRST       ;RESET THE DRIVE FOR THE NEXT FUNCTION
1666
1667                                  ;HERE TO SELECT THE NEXT SECTOR TO RECOVER IN THIS TRACK
1668
1669   022052  005737  002412          3$:   TST     DECNT           ;ANY DETECTED?
1670   022056  001433                        BEQ     31$             ;BR IF NONE THIS SECTOR
1671   022060  005037  002412                CLR     DECNT           ;CLEAR LOOP COUNTER FOR NEXT SECTOR
1672   022064                                PRINTF  #FMT18,#MSREC   ;TELL OPR 'RECOVERED'
  (8)  022064  012746  003125                MOV     #MSREC,-(SP)
  (7)  022070  012746  007624                MOV     #FMT18,-(SP)
  (6)  022074  012746  000002                MOV     #2,-(SP)
  (3)  022100  010600                        MOV     SP,R0
  (4)  022102  104417                        TRAP    C$PNTF
  (4)  022104  062706  000006                ADD     #6,SP
1673   022110                                PRINTF  #MCRLF
  (7)  022110  012746  010041                MOV     #MCRLF,-(SP)
  (6)  022114  012746  000001                MOV     #1,-(SP)
  (3)  022120  010600                        MOV     SP,R0
  (4)  022122  104417                        TRAP    C$PNTF
  (4)  022124  062706  000004                ADD     #4,SP
1674   022130  000406                        BR      31$
1675   022132  005337  002232          30$:  DEC     SFTCNT          ;ADJUST COUNTERS BECAUSE SECTOR-
1676   022136  005037  002412                CLR     DECNT           ;IN-ERROR ALREADY IN BSF
1677   022142  004537  025436                JSR     R5,ISDRST       ;RESET THE DRIVE
1678
1679   022146  005202                  31$:  INC     R2              ;POINT TO THE NEXT SECTOR
1680   022150  022702  00005C                CMP     #40.,R2         ;END OF THIS TRACK?
1681   022154  001206                        BNE     1$              ;NO - READ THIS SECTOR
1682   022156  000137  021460                JMP     NXTTRK          ;ELSE BACK TO NORMAL 10 SECTOR READS
1683
1684   022162                          STARS
  (2)                                   ;;*************************************************************************
1685                                    ;ADDFND -- ROUTINE TO ASK OPR IF THE NEW BAD SPOTS FOUND BY THE
1686                                    ;       'WRITE' COMMAND OR THE 'VERIFY' COMMAND IS TO BE ADDED TO THE
1687                                    ;       BAD SECTOR FILE ON THE PACK.
1688   022162                          STARS
  (2)                                   ;;*************************************************************************
1689
1690   022162  005737  002464  ADDFND: TST     ACCESS          ;ALLOWED TO UPDATE THE PACK?
1691   022166  001177                        BNE     ADDFEX          ;NO - EXIT NOW
1692   022170  004537  023656                JSR     R5,RDBDSC       ;GET A FRESH COPY OF THE BAD SECTOR FILE
1693   022174  004537  025076                JSR     R5,RDFIELD      ;GET A CORE COPY OF THE 'FIELD' FILE
1694   022200  012701  030014                MOV     #BSECN,R1       ;POINT TO THE NEW ENTRY TABLE
1695   022204  005737  002230                TST     ERRCNT          ;SEE IF ANY NEW BAD SPOTS
1696   022210  001566                        BEQ     ADDFEX          ;EXIT IF NONE DETECTED
```

```
1697  022212  005002                          CLR     R2              ;CLEAR AN INDEX INTO BAD SECTOR FILE
1698  022214  005037  015342                  CLR     SECNUM          ;START AT THE 1ST SECTOR IN 'FIELD'
1699  022220  012737  000020  015340          MOV     #16.,SECMAX     ;SETUP THE LIMIT
1700  022226  004537  015622                  JSR     R5,BSFOK        ;SET R2 TO POINT INTO THE FILE
1701  022232  005737  015346                  TST     BSFOKF          ;SEE IF FIELD FILE EXISTS
1702  022236  001420                          BEQ     1$              ;BR IF OK
1703  022240                                  PRINTF  #FMT18,#NSWSEC  ;TELL OPR THAT NO 'FIELD' FILE EXISTS
 (8)  022240  012746  003636                  MOV     #NSWSEC,-(SP)
 (7)  022244  012746  007624                  MOV     #FMT18,-(SP)
 (6)  022250  012746  000002                  MOV     #2,-(SP)
 (3)  022254  010600                          MOV     SP,R0
 (4)  022256  104417                          TRAP    C$PNTF
 (4)  022260  062706  000006                  ADD     #6,SP
1704  022264  004537  022570                  JSR     R5,NEWBSF       ;ASK IF TIME TO MAKE A 'FIELD' FILE
1705  022270  005737  002414                  TST     TEMP0           ;WAS A 'FIELD' FILE BUILT?
1706  022274  001001                          BNE     1$              ;BR IF YES
1707  022276  000533                          BR      ADDFEX          ;NO - EXIT
1708  022300  011137  002410          1$:     MOV     (R1),CHKSEC     ;GET AN ENTRY
1709  022304  023727  002410  177777          CMP     CHKSEC,#-1      ;DONE?
1710  022312  001523                          BEQ     4$              ;YES - UPDATE REST OF 'FIELD' FILE
1711
1712                                  ;HERE TO SEE IF ENTRY ALREADY EXISTS...SHOULDN'T
1713
1714  022314  004537  027340                  JSR     R5,CKBDSC       ;WELL...
1715  022320  005737  002406                  TST     HDRFND          ;FIND IN LIST ALREADY?
1716  022324  001114                          BNE     3$              ;YES - LOOK AT THE NEXT ENTRY
1717
1718                                  ;HERE TO ASK OPR IF THIS ENTRY TO BE ADDED TO BAD SEC FILE
1719
1720  022326  011137  015332                  MOV     (R1),BSFCYL     ;GET DA FOR CYL #
1721  022332  042737  000177  015332          BIC     #177,BSFCYL     ;CLEAR HEAD & SECTOR #
1722  022340  000337  015332                  SWAB    BSFCYL
1723  022344  000241                          CLC
1724  022346  006137  015332                  ROL     BSFCYL
1725  022352  103002                          BCC     11$
1726  022354  005237  015332                  INC     BSFCYL          ;ADD IN LOW ORDER CYL #
1727  022360  011137  015334          11$:    MOV     (R1),BSFSEC     ;GET DA FOR SEC VALUE
1728  022364  042737  177700  015334          BIC     #177700,BSFSEC  ;CLEAR CYLINDER # & HEAD
1729  022372  005037  015336                  CLR     BSFHD           ;START AT HEAD 0
1730  022376  032711  000100                  BIT     #100,(R1)       ;HEAD 1?
1731  022402  001402                          BEQ     2$              ;NO - ITS HEAD 0
1732  022404  005237  015336                  INC     BSFHD           ;POINT TO HEAD 1
1733  022410                          2$:     PRINTF  #FMT16,#NEWENT,#CMSG,BSFCYL,#SMSG,BSFSEC,#HMSG,BSFHD
 (14)  022410  013746  015336                 MOV     BSFHD,-(SP)
 (13)  022414  012746  002563                 MOV     #HMSG,-(SP)
 (12)  022420  013746  015334                 MOV     BSFSEC,-(SP)
 (11)  022424  012746  003243                 MOV     #SMSG,-(SP)
 (10)  022430  013746  015332                 MOV     BSFCYL,-(SP)
  (9)  022434  012746  002550                 MOV     #CMSG,-(SP)
  (8)  022440  012746  006200                 MOV     #NEWENT,-(SP)
  (7)  022444  012746  007503                 MOV     #FMT16,-(SP)
  (6)  022450  012746  000010                 MOV     #10,-(SP)
  (3)  022454  010600                         MOV     SP,R0
  (4)  022456  104417                         TRAP    C$PNTF
  (4)  022460  062706  000022                 ADD     #22,SP
1734  022464                                  GMANIL  ABSMSG,TEMP0,177777,NO  ;ASK OPR IF OK TO ENTER
```

```
(3)  022464  104443                    TRAP    C$GMAN
(3)  022466  000404                    BR      10022$
(4)  022470  002414                    .WORD   TEMP0
(5)  022472  000120                    .WORD   T$CODE
(5)  022474  005164                    .WORD   ABSMSG
(5)  022476  177777                    .WORD   177777
(3)  022500                    10022$:
1735 022500  005737  002414            TST     TEMP0           ;BR IF NO
1736 022504  001424                    BEQ     3$              ;NO - GET THE NEXT ENTRY
1737
1738
1739                           ;HERE TO INSERT THIS SPOT IN THE BAD SECTOR FILE
1740
1741 022506  005762  030530    21$:    TST     BSFILE(R2)      ;SEE IF A FREE SPOT
1742 022512  100403                    BMI     22$             ;BR IF FOUND A FREE ENTRY
1743 022514  062702  000004            ADD     #4,R2           ;POINT TO THE NEXT ENTRY SLOT
1744 022520  000772                    BR      21$             ;AND TRY AGAIN
1745
1746 022522  013762  015332  030530  22$:    MOV     BSFCYL,BSFILE(R2) ;INSERT THE CYL # INTO FILE
1747 022530  011162  030532            MOV     (R1),BSFILE+2(R2) ;ADD THE SECTOR NUM & HEAD
1748 022534  042762  177700  030532    BIC     #177700,BSFILE+2(R2) ;CLEAR CYL # AND HEAD
1749 022542  005737  015336            TST     BSFHD           ;IS IT HEAD ONE?
1750 022546  001403                    BEQ     3$              ;NO - SKIP
1751 022550  052762  000400  030532    BIS     #400,BSFILE+2(R2)  ;YES - SET BIT 8 FOR HEAD ONE
1752
1753                           ;HERE TO UPDATE THE POINTER INTO THE TEMP BAD SEC TABLE
1754 022556  005721            3$:     TST     (R1)+           ;UPDATE THE POINTER
1755 022560  000647                    BR      1$              ;PROCESS THIS ENTRY
1756
1757 022562  004537  016770    4$:     JSR     R5,WRTBSF       ;WRITE UPDATED 'FIELD' BAD SECTOR FILE
1758                                                           ;/ON THE PACK IF REQUESTED
1759
1760                           ;HERE TO EXIT THIS PHASE
1761 022566  000205            ADDFEX: RTS     R5              ;EXIT
1762
1763
```

```
      022570                              STARS
 (2)                                      ;;*******************************************************************
                                          ;NEWBSF -- ROUTINE TO ASK OPR IF TIME TO CREATE A BAD SECTOR
                                          ;          FILE IF THE AREA CAN'T BE RECOGNIZED AS A BAD SECTOR FILE.
      022570                              STARS
 (2)                                      ;;*******************************************************************

      022570  010146                      NEWBSF: MOV     R1,-(SP)          ;SAVE R1
      022572                                      GMANIL  MBLD,TEMPO,177777,NO
 (3)  022572  104443                              TRAP    C$GMAN
 (3)  022574  000404                              BR      10023$
 (4)  022576  002414                              .WORD   TEMPO
 (5)  022600  000120                              .WORD   T$CODE
 (5)  022602  003155                              .WORD   MBLD
 (5)  022604  177777                              .WORD   177777
 (3)  022606                              10023$:
      022606  005737  002414                      TST     TEMPO             ;BR IF NO
      022612  001502                              BEQ     2$                ;EXIT

                                          ;HERE TO INIT THE BSFILE STORAGE FOR BUILDING A FILE
      022614  012701  030530              1$:     MOV     #BSFILE,R1        ;SETUP A POINTER
      022620  010137  015344                      MOV     R1,SECOLD         ;POINT TO THE START OF THE 'UPDATE' AREA
      022624  012721  177777              11$:    MOV     #-1,(R1)+         ;INIT A LOCATION
      022630  022701  033130                      CMP     #BSFILE+1280.,R1 ;DONE??
      022634  001373                              BNE     11$               ;NO - PROCEED TO INIT
      022636  012701  030530                      MOV     #BSFILE,R1        ;GET START AGAIN
      022642  005021                              CLR     (R1)+             ;CLEAR
      022644  005021                              CLR     (R1)+
      022646  005021                              CLR     (R1)+
      022650  005011                              CLR     (R1)
      022652  005737  002456                      TST     SN1               ;ALREADY HAVE A SERIAL NUMBER?
      022656  001020                              BNE     13$               ;YES - TELL OPR WHAT IT IS

      022660                              12$:    GMANID  ABSSNL,SN1,0,77777,1,77777,NO ;GET SERIAL # LOW 5
 (3)  022660  104443                              TRAP    C$GMAN
 (3)  022662  000406                              BR      10024$
 (4)  022664  002456                              .WORD   SN1
 (5)  022666  000022                              .WORD   T$CODE
 (5)  022670  005415                              .WORD   ABSSNL
 (5)  022672  077777                              .WORD   77777
 (5)  022674  000001                              .WORD   T$LOLIM
 (5)  022676  077777                              .WORD   T$HILIM
 (3)  022700                              10024$:
      022700                                      GMANID  ABSSNH,SN2,0,77777,0,77777,NO ;GET SERIAL # HIGH 5
 (3)  022700  104443                              TRAP    C$GMAN
 (3)  022702  000406                              BR      10025$
 (4)  022704  002460                              .WORD   SN2
 (5)  022706  000022                              .WORD   T$CODE
 (5)  022710  005471                              .WORD   ABSSNH
 (5)  022712  077777                              .WORD   77777
 (5)  022714  000000                              .WORD   T$LOLIM
 (5)  022716  077777                              .WORD   T$HILIM
 (3)  022720                              10025$:

      022720                              13$:    PRINTF  #FMTSN,#CART,SN2,SN1
(10)  022720  013746  002456                      MOV     SN1,-(SP)
```

```
   (9)  022724  013746  002460                    MOV     SN2,-(SP)
   (8)  022730  012746  002526                    MOV     #CART,-(SP)
   (7)  022734  012746  007707                    MOV     #FMTSN,-(SP)
   (6)  022740  012746  000004                    MOV     #4,-(SP)
   (3)  022744  010600                            MOV     SP,R0
   (4)  022746  104417                            TRAP    C$PNTF
   (4)  022750  062706  000012                    ADD     #12,SP
  1793  022754                                    GMANIL  VALSN,TEMP0,177777,NO
   (3)  022754  104443                            TRAP    C$GMAN
   (3)  022756  000404                            BR      10026$
   (4)  022760  002414                            .WORD   TEMP0
   (5)  022762  000120                            .WORD   T$CODE
   (5)  022764  006007                            .WORD   VALSN
   (5)  022766  177777                            .WORD   177777
   (3)  022770                          10026$:
  1794  022770  005737  002414                    TST     TEMP0           ;SEE IF TYPED IN SERIAL NUMBER IS OK
  1795  022774  001731                            BEQ     12$             ;NO - GET A NEW SERIAL NUMBER
  1796  022776  013737  002456  030530            MOV     SN1,BSFILE      ;SAVE THE SERIAL NUMBER LOW 5
  1797  023004  013737  002460  030532            MOV     SN2,BSFILE+2    ;AND SERIAL NUMBER HIGH 5
  1798  023012  005237  002414                    INC     TEMP0           ;INDICATE FILE BUILT - 1 SECTOR
  1799  023016  000205                            RTS     R5
  1800
  1801  023020  005037  002414            2$:     CLR     TEMP0           ;INDICATE NO FILE BUILT
  1802  023024  012601                            MOV     (SP)+,R1
  1803  023026  000205                            RTS     R5
```

```
1805  023030                          STARS
 (2)                                  ;;*******************************************************************
1806                                  ;BSMAKE -- ROUTINE TO CREATE A 'FACTORY' OR 'FIELD' BAD SECTOR FILE.
1807                                  ;         THIS ROUTINE ABORTS IF 'UPDATE' ACCESS TO THE PACK IS DENIED.
1808                                  ;         THE 'FACTORY' FILE WILL CONTAIN ONLY THE DUMMY HEADERS...NO
1809                                  ;         ENTRYS CAN BE PUT IN THIS AREA!
1810  023030                          STARS
 (2)                                  ;;*******************************************************************
1811
1812  023030                          BSMAKE: PRINTF  #FMT19,#BUILD     ;TELL OPR WHAT IS HAPPENING
 (8)  023030  012746  003213                  MOV     #BUILD,-(SP)
 (7)  023034  012746  007631                  MOV     #FMT19,-(SP)
 (6)  023040  012746  000002                  MOV     #2,-(SP)
 (3)  023044  010600                          MOV     SP,R0
 (4)  023046  104417                          TRAP    C$PNTF
 (4)  023050  062706  000006                  ADD     #6,SP
1813  023054  004537  012370                  JSR     R5,FIRST          ;SELECT THE 1ST UNIT
1814  023060  000137  013546                  JMP     NXTCMD            ;NONE   AVAIL.!
1815  023064  000404                          BR      BSMKL
1816  023066  004537  012400          BSMKS:  JSR     R5,SELDRV         ;SELECT THE NEXT UNIT
1817  023072  000137  013546                  JMP     NXTCMD            ;ALL DONE
1818  023076  004537  025246          BSMKL:  JSR     R5,LOADED         ;DRV RDY?
1819  023102  005737  002414                  TST     TEMPO
1820  023106  001403                          BEQ     1$                ;YES
1821  023110  004537  012642                  JSR     R5,DRNRDY
1822  023114  000764                          BR      BSMKS             ;SELECT THE NEXT UNIT
1823
1824  023116  004537  012546          1$:     JSR     R5,DRVID          ;TELL OPR WHAT DRIVE SELECTED
1825  023122  005737  002464                  TST     ACCESS            ;ALLOWED TO UPDATE PACK?
1826  023126  001414                          BEQ     10$               ;YES - PROCEED
1827  023130                                  PRINTF  #FMT18,#DENIED    ;NO - TELL OPR
 (8)  023130  012746  004125                  MOV     #DENIED,-(SP)
 (7)  023134  012746  007624                  MOV     #FMT18,-(SP)
 (6)  023140  012746  000002                  MOV     #2,-(SP)
 (3)  023144  010600                          MOV     SP,R0
 (4)  023146  104417                          TRAP    C$PNTF
 (4)  023150  062706  000006                  ADD     #6,SP
1828  023154  000137  013546                  JMP     NXTCMD            ;QUIT NOW
1829
1830  023160                          10$:    GMANIL  THISDRV,TEMPO,1,NO
 (3)  023160  104443                          TRAP    C$GMAN
 (3)  023162  000404                          BR      10027$
 (4)  023164  002414                          .WORD   TEMPO
 (5)  023166  000120                          .WORD   T$CODE
 (5)  023170  006750                          .WORD   THISDRV
 (5)  023172  000001                          .WORD   1
 (3)  023174                          10027$:
1831  023174  005737  002414                  TST     TEMPO
1832  023200  001732                          BEQ     BSMKS             ;RE-SELECT IF NOT THIS DRIVE
1833
1834  023202  004537  023656          11$:    JSR     R5,RDBDSC         ;GET A FRESH COPY OF THE 'BAD SEC FILE'
1835  023206  004537  025032                  JSR     R5,RDFACT         ;THEN A CORE IMAGE OF THE FACTORY FILE
1836  023212                                  PRINTF  #FMT19,#CKFACT    ;TELL OPR CHECKING FACT FILE
 (8)  023212  012746  006411                  MOV     #CKFACT,-(SP)
 (7)  023216  012746  007631                  MOV     #FMT19,-(SP)
 (6)  023222  012746  000002                  MOV     #2,-(SP)
```

```
  (3)  023226  010600                        MOV     SP,R0
  (4)  023230  104417                        TRAP    C$PNTF
  (4)  023232  062706  000006                ADD     #6,SP
1837   023236  005002                        CLR     R2              ;POINT TO 1ST WORD IN CORE IMAGE
1838   023240  005037  015342                CLR     SECNUM          ;START AT 1ST SECTOR PAIR IN FILE
1839   023244  012737  000020  015340        MOV     #16.,SECMAX     ;STOP AT THIS SECT PAIR
1840   023252  004537  015622                JSR     R5,BSFOK        ;SEE IF ANY RECOGNIZED 'FACTORY' FILE
1841   023256  005737  015346                TST     BSFOKF          ;WELL???
1842   023262  001013                        BNE     12$             ;NO - ASK IF TIME TO MAKE ONE
1843   023264                                PRINTF  #MSG,#OK        ;MSG TO OPR 'FOUND'
  (8)  023264  012746  006340                MOV     #OK,-(SP)
  (7)  023270  012746  010044                MOV     #MSG,-(SP)
  (6)  023274  012746  000002                MOV     #2,-(SP)
  (3)  023300  010600                        MOV     SP,R0
  (4)  023302  104417                        TRAP    C$PNTF
  (4)  023304  062706  000006                ADD     #6,SP
1844   023310  000424                        BR      2$              ;JUMP OVER BUILD CODE
1845
1846                                  ;HERE TO BUILD A DUMMY 'FACTORY' FILE SO AT LEAST ONE EXISTS...WILL NOT
1847                                  ;CONTAIN ANY ENTRYS!
1848
1849   023312                         12$:    PRINTF  #MSG,#NHWSEC    ;TELL OPR THAT NO 'FACTORY' EXISTS
  (8)  023312  012746  003562                MOV     #NHWSEC,-(SP)
  (7)  023316  012746  010044                MOV     #MSG,-(SP)
  (6)  023322  012746  000002                MOV     #2,-(SP)
  (3)  023326  010600                        MOV     SP,R0
  (4)  023330  104417                        TRAP    C$PNTF
  (4)  023332  062706  000006                ADD     #6,SP
1850   023336  004537  022570                JSR     R5,NEWBSF       ;ASK IF TIME TO BUILD ONE
1851   023342  005737  002414                TST     TEMP0           ;DID I MAKE A DUMMY FILE?
1852   023346  001405                        BEQ     2$              ;NO - CHECK ON THE 'FIELD' FILE
1853   023350  013737  002414  002300        MOV     TEMP0,NEWFAC    ;SET FACTORY FLAG
1854   023356  004537  016770                JSR     R5,WRTBSF       ;WRITE UPDATED 'FIELD' BAD SECTOR FILE
1855                                                                  ;/ON THE PACK IF REQUESTED
1856
```

```
1858                                    ;HERE TO SEE IF A 'FIELD' FILE HAS TO BE BUILT
1859
1860  023362  004537  025076      2$:   JSR     R5,RDFIELD      ;GET A CORE IMAGE OF THE 'FIELD' FILE
1861  023366                            PRINTF  #FMT19,#CKFLD   ;TELL OPR CHECKING FOR FIELD FILE
 (8)  023366  012746  006450            MOV     #CKFLD,-(SP)
 (7)  023372  012746  007631            MOV     #FMT19,-(SP)
 (6)  023376  012746  000002            MOV     #2,-(SP)
 (3)  023402  010600                    MOV     SP,R0
 (4)  023404  104417                    TRAP    C$PNTF
 (4)  023406  062706  000006            ADD     #6,SP
1862  023412  005002                    CLR     R2              ;START AT 1ST WORD IN BUFFER
1863  023414  005037  015342            CLR     SECNUM          ;AND 1ST SECTOR PAIR OF FILE
1864  023420  012737  000020  015340    MOV     #16.,SECMAX     ;SETUP THE LIMIT FOR SEARCH
1865  023426  004537  015622            JSR     R5,BSFOK        ;POINT TO A VALID AREA
1866  023432  005737  015346            TST     BSFOKF          ;FIND THE 'FIELD' AREA?
1867  023436  001013                    BNE     21$             ;NO - ASK IF TIME TO MAKE ONE
1868  023440                            PRINTF  #MSG,#OK        ;TELL OPR 'FOUND' FILE
 (8)  023440  012746  006340            MOV     #OK,-(SP)
 (7)  023444  012746  010044            MOV     #MSG,-(SP)
 (6)  023450  012746  000002            MOV     #2,-(SP)
 (3)  023454  010600                    MOV     SP,R0
 (4)  023456  104417                    TRAP    C$PNTF
 (4)  023460  062706  000006            ADD     #6,SP
1869  023464  000421                    BR      4$              ;PROCEED
1870
1871  023466                    21$:    PRINTF  #MSG,#NSWSEC    ;TELL OPR NO 'FIELD' FILE
 (8)  023466  012746  003636            MOV     #NSWSEC,-(SP)
 (7)  023472  012746  010044            MOV     #MSG,-(SP)
 (6)  023476  012746  000002            MOV     #2,-(SP)
 (3)  023502  010600                    MOV     SP,R0
 (4)  023504  104417                    TRAP    C$PNTF
 (4)  023506  062706  000006            ADD     #6,SP
1872  023512  004537  022570            JSR     R5,NEWBSF       ;ASK OPR IF TIME TO BUILD A FILE
1873  023516  005737  002414            TST     TEMP0           ;BUILT A FILE?
1874  023522  001402                    BEQ     4$              ;BR IF NO
1875  023524  004537  016770    3$:     JSR     R5,WRTBSF       ;WRITE UPDATED 'FIELD' BAD SECTOR FILE
1876                                    ;/ON THE PACK IF REQUESTED
1877
1878  023530  000137  023066    4$:     JMP     BSMKS           ;SELECT THE NEXT UNIT
```

```
1880                                    .SBTTL  ROUTINE TO LOAD FUNCTION
1881                                    ;CALL   JSR     R5,LDFUNC
1882                                    ;ALL INFORMATION MUST BE SET UP IN DRIVE BUFFER
1883                                    ;R4 HAS POINTER TO BUFFER
1884
1885  023534  013703  002250           LDFUNC: MOV     DCS,R3          ;GET CSR FOR DRIVE
1886  023540  032713  000200                   BIT     #BIT7,(R3)      ;CAN WE ISSUE COMMAND?
1887  023544  001004                           BNE     1$              ;YES, GO ISSUE COMMAND
1888
1889  023546                                   ERRSF   200.,PRGER      ;THIS ERROR SHOULD NEVER PRINT
 (4)  023546  104454                           TRAP    C$ERSF
 (5)  023550  000310                           .WORD   200
 (5)  023552  003735                           .WORD   PRGER
 (5)  023554  000000                           .WORD   0
1890
1891  023556  017763  156474  000002   1$:     MOV     @BBA,BA(R3)     ;LOAD BUS ADDRESS REGISTER
1892  023564  013763  002244  000004           MOV     BDA,DA(R3)      ;LOAD DISK ADDRESS REGISTER
1893  023572  013763  002246  000006           MOV     BMP,MP(R3)      ;LOAD MULTI-PURPOSE REGISTER
1894  023600  013737  002260  002262           MOV     FUNC,BCSADR     ;GET FUNCTION
1895  023606  053737  002302  002262           BIS     DRSEL,BCSADR    ;SET DRIVE SELECT BITS
1896  023614  052737  000201  002262           BIS     #CRDY!DRDY,BCSADR       ;SET CRDY & DRDY IN IMAGE
1897  023622  042737  002000  002262           BIC     #OPI,BCSADR             ;WE'RE CLEAR BIT 10 FOR DRIVE 7-4 (OKAY?)
1898  023630  013763  002262  000000           MOV     BCSADR,CS(R3)   ;LOAD CSR
1899  023636  042763  000200  000000           BIC     #CRDY,CS(R3)    ;ISSUE FUNCTION
1900  023644  000205                           RTS     R5              ;EXIT
1901
1902                                    .SBTTL  INTERRUPT SERVICE ROUTINE
1903  023646                            BGNSRV  INTR1
1904
1905  023646  042777  000100  156374   INTR1:  BIC     #INTEN,@DCS
1906  023654                                    ENDSRV
 (3)  023654                            L10016:
 (2)  023654  000002                           RTI
```

```
                                        .SBTTL  BAD SECTOR FILE ROUTINE

                        023656          STARS
                         (2)            ;;*****************************************************************
                                        ;ROUTINE TO RECOVER BAD SECTOR FILE AND SAVE IT FOR
                                        ;COMPARISON UPON ERROR ON READS/WRITES.  WE WILL ONLY
                                        ;RESERVE SPACE FOR 16 BAD SECTORS PER DRIVE.
                                        ;WE WILL ISSUE A DRIVE RESET FIRST, READ HEADER, POSITION
                                        ;TO LAST TRACK (CYLINDER 255, SURFACE 1) AND READ IN
                                        ;THE FIRST SECTOR FOR FACTORY BAD, AND THE 20TH FOR
                                        ;FIELD BAD SECTORS.  R4 WILL CONTAIN THE BUFFER POINTER
                                        ;TO THE DRIVE WE WANT TO READ
                                        ;
                                        ;CALL   JSR     R5,RDBDSC
                        023656          STARS
                         (2)            ;;*****************************************************************

023656  010046                  RDBDSC: MOV     R0,-(SP)        ;SAVE REGISTERS
023660  010146                          MOV     R1,-(SP)        ;
023662  010246                          MOV     R2,-(SP)
023664  010346                          MOV     R3,-(SP)
023666  004537  025436          21$:    JSR     R5,ISDRST       ;RESET THE DRIVE - GET STATUS AND CLEAR ERROR REG.
023672  012737  000010  002260          MOV     #RDHDR,FUNC     ;READ HEADER TO FIND POSITION
023700  004537  023534                  JSR     R5,LDFUNC       ;ON  DISK
023704  004537  025310                  JSR     R5,WTRDY
023710  005777  156334                  TST     @DCS            ;ERROR DETECTED?
023714  100016                          BPL     22$             ;NO
023716  017737  156326  002252          MOV     @DCS,E.DCS      ;YES - SAVE THE RLCS STATUS
023724  013703  002250                  MOV     DCS,R3          ;GET THE BASE ADDRESS FOR RLCS
023730  016337  000004  002440          MOV     DA(R3),E.DA     ;SAVE THE DISK ADDRESS AT ERROR
023736                                  ERRHRD  500.,MHDER,ERR2
 (4)    023736  104456                  TRAP    C$ERHRD
 (5)    023740  000764                  .WORD   500
 (5)    023742  003420                  .WORD   MHDER
 (5)    023744  007376                  .WORD   ERR2
023746  000137  025020                  JMP     9$              ;FORCED EXIT

023752  016300  000006          22$:    MOV     MP(R3),R0       ;GET HEADER AND CALCULATE
023756  022737  000001  002316          CMP     #1,TDR          ;RL02 TYPE DRIVE?
023764  001005                          BNE     23$             ;JUMP IF RL02
023766  043700  002334                  BIC     CYLMSK,R0       ;HERE FOR RL01 - GET CYL ADDRESS (BITS 7-14)
023772  012701  077600                  MOV     #77600,R1       ;INITIALIZE FOR CYL 255
023776  000404                          BR      25$
024000  043700  002340          23$:    BIC     CMSK,R0         ;HERE FOR RL02
024004  012701  177600                  MOV     #177600,R1      ;INITIALIZE FOR CYL 510
024010  160001                  25$:    SUB     R0,R1           ;GET DIFFERENCE FROM PRESENT CYL ADDRESS TO CYL 255
024012  010137  002244                  MOV     R1,BDA          ;INITIALIZE DAR WITH DISK ADDRESS DIFFERENCE
024016  052737  000025  002244          BIS     #SKHS!SIGN!MK,BDA
024024  012737  000006  002260          MOV     #SEEK,FUNC
024032  004537  023534                  JSR     R5,LDFUNC       ;SEEK TO THE BAD SEC FILE CYLINDER
024036  004537  025310                  JSR     R5,WTRDY        ;WAIT FOR DONE
024042  005777  156202                  TST     @DCS            ;ERROR DETECTED?
024046  100016                          BPL     26$             ;NO
024050  017737  156174  002252          MOV     @DCS,E.DCS      ;YES - SAVE THE RLCS STATUS
024056  013703  002250                  MOV     DCS,R3          ;GET THE BASE ADDRESS FOR RLCS
024062  016337  000004  002440          MOV     DA(R3),E.DA     ;SAVE THE DISK ADDRESS AT ERROR
```

```
1958  024070                                    ERRHRD  510.,MHDER,ERR2
 (4)  024070  104456                            TRAP    C$ERHRD
 (5)  024072  000776                            .WORD   510
 (5)  024074  003420                            .WORD   MHDER
 (5)  024076  007376                            .WORD   ERR2
1959  024100  000137  025020                    JMP     9$                ;FORCED EXIT
1960
1961  024104  012737  000010  002260  26$:      MOV     #RDHDR,FUNC
1962  024112  004537  023534                    JSR     R5,LDFUNC         ;READ THE HEADER ON THIS CYLINDER
1963  024116  004537  025310                    JSR     R5,WTRDY
1964  024122  005777  156122                    TST     @DCS              ;ERROR DETECTED?
1965  024126  100016                            BPL     27$               ;NO
1966  024130  017737  156114  002252            MOV     @DCS,E.DCS        ;YES - SAVE THE ERROR STATUS IN RLCS
1967  024136  013703  002250                    MOV     DCS,R3            ;GET THE BASE ADDRESS FOR RLCS
1968  024142  016337  000004  002440            MOV     DA(R3),E.DA       ;SAVE THE DISK ADDRESS AT ERROR
1969  024150                                    ERRHRD  520.,MHDER,ERR2
 (4)  024150  104456                            TRAP    C$ERHRD
 (5)  024152  001010                            .WORD   520
 (5)  024154  003420                            .WORD   MHDER
 (5)  024156  007376                            .WORD   ERR2
1970  024160  000137  025020                    JMP     9$                ;FORCED EXIT
1971
1972  024164  016300  000006          27$:      MOV     MP(R3),R0         ;NO ERROR - GET THE HEADER WORD
1973  024170  042700  000077                    BIC     #77,R0            ;CLEAR THE SECTOR BITS FROM HEADER WORD
1974  024174  022737  000001  002316            CMP     #1,TDR            ;RL01?
1975  024202  001007                            BNE     300$              ;NO - JMP FOR RL02
1976  024204  022700  077700                    CMP     #77700,R0         ;HERE FOR RL01 - LAST TRACK?
1977  024210  001226                            BNE     21$               ;NO - TRY AGAIN
1978  024212  012737  077700  002244            MOV     #77700,BDA        ;YES - SET FOR A READ CMD
1979  024220  000406                            BR      555$
1980  024222  022700  177700          300$:     CMP     #177700,R0        ;HERE FOR RL02 - LAST TRACK (511.)?
1981  024226  001217                            BNE     21$               ;NO - TRY AGAIN
1982  024230  012737  177700  002244            MOV     #177700,BDA
1983  024236  012737  177400  002246  555$:     MOV     #-256.,BMP        ;DO A 1 SECTOR PAIR READ
1984  024244  012737  000014  002260            MOV     #READ,FUNC        ;READ DATA FUNCTION
1985
1986  024252  005037  002422                    CLR     TEMP3             ;MANUFACTURING/FIELD FILE SWITCH
1987  024256  005037  002414                    CLR     TEMP0
1988  024262  005037  002412                    CLR     DECNT             ;CLEAR THE COUNT OF ENTRYS DETECTED
1989  024266  013702  002304                    MOV     BSECPT,R2         ;INITIALIZE LIST TO ALL 1'S
1990  024272  012700  000176                    MOV     #126.,R0          ;126 ENTRIES
1991  024276  012722  177777          11$:      MOV     #-1,(R2)+         ;INIT ENTRY TO -1
1992  024302  005300                            DEC     R0
1993  024304  001374                            BNE     11$               ;EXIT IF STORAGE INITED
1994
1995  024306  013702  002304                    MOV     BSECPT,R2         ;GET LIST TO STORE
1996  024312  012700  000031                    MOV     #25.,R0           ;25 ENTRIES
1997  024316  004537  023534          4$:       JSR     R5,LDFUNC         ;ISSUE THE READ CMD
1998  024322  004537  025310                    JSR     R5,WTRDY          ;WAIT TILL SECTOR READ
1999
2000  024326  005777  155716                    TST     @DCS              ;WAS THE READ GOOD?
2001  024332  100065                            BPL     3$                ;YES
2002
2003  024334  004537  025436                    JSR     R5,ISDRST         ;NO - RESET THE DRIVE
2004  024340  062737  000004  002244            ADD     #4,BDA            ;NEXT SECTOR
2005  024346  005737  002422                    TST     TEMP3             ;MANUFACTURING OR FIELD BAD
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2006  024352  001424                          BEQ     5$              ;MANUFACTURING
2007  024354  022737  000001  002316          CMP     #1,TDR          ;RL01=1
2008  024362  001024                          BNE     400$            ;MUST BE AN RL02
2009  024364  022737  077750  002244          CMP     #77750,BDA      ;END OF FACTORY FILE?
2010  024372  001351                          BNE     4$              ;NO - READ NEXT SECTOR
2011  024374                          41$:    PRINTF  #FMT18,#SWSEC   ;TELL OPR NO 'FIELD' FILE ON PACK
 (8)  024374  012746  003610                  MOV     #SWSEC,-(SP)
 (7)  024400  012746  007624                  MOV     #FMT18,-(SP)
 (6)  024404  012746  000002                  MOV     #2,-(SP)
 (3)  024410  010600                          MOV     SP,R0
 (4)  024412  104417                          TRAP    C$PNTF
 (4)  024414  062706  000006                  ADD     #6,SP
2012  024420  000137  024766                  JMP     7$              ;EXIT
2013
2014  024424  023727  002244  077724  5$:     CMP     BDA,#77724      ;AT END OF MANUFACTURING BAD
2015  024432  000410                          BR      55$
2016  024434  022737  177750  002244  400$:   CMP     #177750,BDA     ;AT END OF FIELD BAD FOR RL02
2017  024442  001325                          BNE     4$              ;NO GO BACK FOR NEXT
2018  024444  000753                          BR      41$             ;PRINT 'FIELD' ERROR
2019  024446  023727  002244  177724          CMP     BDA,#177724     ;AT END OF MANUFACTURING BAD
2020  024454  001320                  55$:    BNE     4$              ;NO, GET THE NEXT SECTOR PAIR
2021  024456                          56$:    PRINTF  #FMT18,#HWSEC   ;TELL OPR NO 'FACTORY' FILE ON PACK
 (8)  024456  012746  003532                  MOV     #HWSEC,-(SP)
 (7)  024462  012746  007624                  MOV     #FMT18,-(SP)
 (6)  024466  012746  000002                  MOV     #2,-(SP)
 (3)  024472  010600                          MOV     SP,R0
 (4)  024474  104417                          TRAP    C$PNTF
 (4)  024476  062706  000006                  ADD     #6,SP
2022  024502  000137  024766                  JMP     7$              ;EXIT & HEADS HOME
2023
2024  024506  017701  155544          3$:     MOV     @BBA,R1         ;START OF LIST
2025  024512  005037  015324                  CLR     NOSNUM          ;CLEAR THE FOUND SERIAL NUMBER FLAG
2026  024516  005721                          TST     (R1)+           ;SEE IF A SERIAL NUMBER PRESENT
2027  024520  001005                          BNE     31$             ;YUP - SN WORD 0 >0
2028  024522  005721                          TST     (R1)+           ;NO ... SEE IF SN WORD 1 =0
2029  024524  001004                          BNE     32$             ;OK - SOME SERIAL NUM PRESENT
2030  024526  005237  015324                  INC     NOSNUM          ;NO - SET THE 'NO SERIAL NUMBER'' FLAG
2031  024532  000401                          BR      32$
2032  024534  005721                  31$:    TST     (R1)+           ;SKIP OVER THE 2ND SERIAL NUM WORD
2033  024536  022121                  32$:    CMP     (R1)+,(R1)+     ;SKIP PAST THE 'BLANK' WORDS
2034  024540  012137  002416          1$:     MOV     (R1)+,TEMP1     ;GET CYLINDER ENTRY WORD
2035  024544  100446                          BMI     2$              ;IF MINUS - END OF BAD SECTORS
2036  024546  005237  002412                  INC     DECNT           ;COUNT THIS ENTRY IN THE FILE
2037  024552  012137  002420                  MOV     (R1)+,TEMP2     ;GET HEAD AND SECTOR
2038  024556  000337  002416                  SWAB    TEMP1           ;PUT CYLINDER IN HIGH BYTE
2039  024562  000241                          CLC
2040  024564  006037  002416                  ROR     TEMP1           ;ALIGN THE BITS
2041  024570  103003                          BCC     111$            ;NEED ANOTHER BIT?
2042  024572  052737  100000  002416          BIS     #BIT15,TEMP1    ;YES
2043  024600  013712  002416          111$:   MOV     TEMP1,(R2)      ;STORE OFF CYLINDER PART
2044  024604  013737  002420  002416          MOV     TEMP2,TEMP1     ;GET SECTOR
2045  024612  042737  177700  002416          BIC     #177700,TEMP1   ;LEAVE ONLY SECTOR
2046  024620  053712  002416                  BIS     TEMP1,(R2)      ;SET IN SECTOR BITS
2047  024624  042737  177377  002420          BIC     #177377,TEMP2   ;CLEAR ALL EXCEPT HEAD BIT
2048  024632  006237  002420                  ASR     TEMP2
2049  024636  006237  002420                  ASR     TEMP2
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2050  024642  053722  002420          BIS     TEMP2,(R2)+     ;SET IN HEAD
2051  024646  005300                  DEC     R0
2052  024650  001333                  BNE     1$
2053  024652  005737  002414          TST     TEMP0           ;PRINT A MESSAGE?
2054  024656  001330                  BNE     1$              ;NO
2055  024660  000423                  BR      6$
2056
2057  024662  005737  002422  2$:     TST     TEMP3           ;SWITCH TO FIELD BAD OR QUIT
2058  024666  001037                  BNE     7$              ;QUIT, 7$
2059  024670  022737  000001  002316  CMP     #1,TDR          ;RL01=1
2060  024676  001004                  BNE     350$            ;MUST BE RL02
2061  024700  012737  077724  002244  MOV     #77724,BDA      ;START AT FIELD SECTOR
2062  024706  000403                  BR      36$
2063  024710  012737  177724  002244  350$:   MOV     #177724,BDA     ;START OF FIELD AREA FOR RL02
2064  024716  012737  000001  002422  36$:    MOV     #1,TEMP3
2065  024724  000137  024316          JMP     4$
2066  024730                  6$:     PRINTF  #FMT18,#TBLFUL
  (8) 024730  012746  006040          MOV     #TBLFUL,-(SP)
  (7) 024734  012746  007624          MOV     #FMT18,-(SP)
  (6) 024740  012746  000002          MOV     #2,-(SP)
  (3) 024744  010600                  MOV     SP,R0
  (4) 024746  104417                  TRAP    C$PNTF
  (4) 024750  062706  000006          ADD     #6,SP
2067  024754  005237  002414          INC     TEMP0           ;SET THE PRINT FLAG
2068  024760  012700  000170          MOV     #120.,R0        ;RESET THE COUNTER
2069  024764  000665                  BR      1$              ;AND CONTINUE
2070
2071  024766  005737  002414  7$:     TST     TEMP0           ;OVER 25. ENTRIES?
2072  024772  001412                  BEQ     9$              ;NO
2073  024774                          PRINTF  #FMT20,DECNT    ;PRINT # ENTRIES IN FILE
  (8) 024774  013746  002412          MOV     DECNT,-(SP)
  (7) 025000  012746  007640          MOV     #FMT20,-(SP)
  (6) 025004  012746  000002          MOV     #2,-(SP)
  (3) 025010  010600                  MOV     SP,R0
  (4) 025012  104417                  TRAP    C$PNTF
  (4) 025014  062706  000006          ADD     #6,SP
2074  025020  012603          9$:     MOV     (SP)+,R3
2075  025022  012602                  MOV     (SP)+,R2
2076  025024  012601                  MOV     (SP)+,R1
2077  025026  012600                  MOV     (SP)+,R0
2078  025030  000205                  RTS     R5
2079
2080                          ;ROUTINE TO READ THE 'FACTORY' FILE FROM THE BAD SECTOR FILE
2081
2082  025032  005037  002476  RDFACT: CLR     BSFFLG          ;CLEAR BSF FLAG TO DENOTE 'FACTORY' ENTRIES
2083  025036  004537  025222          JSR     R5,CLRBSF       ;CLEAR THE BSFILE STORAGE AREA
2084  025042  012737  177000  002246  MOV     #-512.,BMP      ;SAVE THE WORD COUNT
2085  025050  012737  077700  002244  MOV     #77700,BDA      ;AND THE DISK ADDR FOR FACTORY FILE
2086  025056  022737  000001  002316  CMP     #1,TDR          ;IS IT AN RL02?
2087  025064  001426                  BEQ     RDBSFILE        ;NO - READ THE FILE
2088  025066  012737  177700  002244  MOV     #177700,BDA     ;HERE FOR RL02
2089  025074  000422                  BR      RDBSFILE        ;THEN READ THEE FILE
2090
2091                          ;ROUTINE TO READ THE 'FIELD' FILE FROM THE BAD SECTOR FILE
2092  025076  012737  000001  002476  RDFIELD: MOV    #1,BSFFLG       ;MAKE BSF FLAG EQUAL TO 1 TO DENOTE 'FIELD' ENTRIES
2093  025104  004537  025222          JSR     R5,CLRBSF       ;CLEAR THE BSFILE STORAGE AREA
```

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2094  025110  012737  177000  002246          MOV     #-512.,BMP      ;SAVE THE WORD COUNT
2095  025116  012737  077724  002244          MOV     #77724,BDA      ;AND THE DISK ADDR FOR 'FIELD' FILE
2096  025124  022737  000001  002316          CMP     #1,TDR          ;IS DRIVE A RL02?
2097  025132  001403                          BEQ     RDBSFILE        ;NO - READ THE FILE
2098  025134  012737  177724  002244          MOV     #177724,BDA     ;HERE FOR RL02
2099
2100  025142  063737  015342  002244  RDBSFILE: ADD   SECNUM,BDA      ;ADD OFFSET TO DAR TO ACCESS APPROPRIATE SECTORS
2101  025150  012737  000014  002260          MOV     #READ,FUNC      ;SAVE THE COMMAND
2102  025156  004537  023534                  JSR     R5,LDFUNC       ;AND ISSUE IT
2103  025162  004537  025310                  JSR     R5,WTRDY        ;THEN WAIT FOR READY
2104  025166  005777  155056                  TST     @DCS            ;WAS THERE ANY ERROR?
2105  025172  100012                          BPL     RDBSEX          ;NO - EXIT
2106
2107  025174                                  PRINTF  #FMT19,#BADBSF  ;TELL THE OPR AN ERROR OCCURRED
 (8)  025174  012746  005130                  MOV     #BADBSF,-(SP)
 (7)  025200  012746  007631                  MOV     #FMT19,-(SP)
 (6)  025204  012746  000002                  MOV     #2,-(SP)
 (3)  025210  010600                          MOV     SP,R0
 (4)  025212  104417                          TRAP    C$PNTF
 (4)  025214  062706  000006                  ADD     #6,SP
2108
2109  025220  000205          RDBSEX: RTS     R5              ;EXIT
2110
2111  025222  010146          CLRBSF: MOV     R1,-(SP)        ;SAVE R1
2112  025224  012701  030530                  MOV     #BSFILE,R1      ;SET UP A POINTER
2113  025230  012721  177777  1$:     MOV     #-1,(R1)+       ;SET BUFFER & POINT TO NEXT
2114  025234  022701  033130                  CMP     #BSFILE+1280.,R1 ;DONE?
2115  025240  001373                          BNE     1$              ;NO - INIT THE NEXT ADDR
2116  025242  012601                          MOV     (SP)+,R1        ;RESET R1
2117  025244  000205                          RTS     R5              ;EXIT
2118
2119  025246                          STARS
 (2)                              ;;**********************************************************************
2120                               ;LOADED -- CHECK FOR DRV READY
2121  025246                          STARS
 (2)                              ;;**********************************************************************
2122
2123  025246  010146          LOADED: MOV     R1,-(SP)        ;SAVE R1
2124  025250  004537  025422          JSR     R5,GETDST       ;GET DRV STATUS
2125  025254  005037  002414          CLR     TEMP0           ;CLEAR THE FLAG
2126  025260  032701  000020          BIT     #HOP,R1         ;HEADS OVER PACK?
2127  025264  001002                  BNE     1$              ;YES
2128  025266  005237  002414          INC     TEMP0           ;NO
2129  025272  032701  000010  1$:     BIT     #BRHM,R1        ;BRUSHES HOME?
2130  025276  001002                  BNE     2$              ;YES
2131  025300  005237  002414          INC     TEMP0
2132  025304  012601          2$:     MOV     (SP)+,R1
2133  025306  000205                  RTS     R5              ;EXIT
```

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                                        .SBTTL  ROUTINE TO WAIT FOR CONTROLLER READY

                                        ;ROUTINE TO WAIT FOR CONTROLLER READY UNDER FLAG
                                        ;MODE.  USED IN INITIALIZE PORTION OF PROGRAM,I.E.,
                                        ;GETTING BAD SECTOR FILE, WRITING PACK INITIALLY.

025310  010046                 WTRDY: MOV     R0,-(SP)         ;SAVE REGISTERS
025312  010146                        MOV     R1,-(SP)
025314  012701  001750                MOV     #1000.,R1        ;WAIT A WHILE
025320                         1$:    WAITUS  #2
(3) 025320  012727  000002             MOV     ###2.,(PC)+
(3) 025324  000000                     .WORD   0
(3) 025326  013727  002116             MOV     L$DLY,(PC)+
(3) 025332  000000                     .WORD   0
(3) 025334  005367  177772             DEC     -6(PC)
(3) 025340  001375                     BNE     .-4
(3) 025342  005367  177756             DEC     -22(PC)
(3) 025346  001367                     BNE     .-20
025350  032777  000200  154672         BIT     #CRDY,@DCS       ;READY SET?
025356  001016                         BNE     2$               ;YES, EXIT
025360  005301                         DEC     R1               ;TIMED OUT?
025362  001356                         BNE     1$               ;NO GO BACK
025364  017737  154660  002252         MOV     @DCS,E.DCS       ;SAVE THE STATUS FOR ERROR REPORT
025372  013703  002250                 MOV     DCS,R3           ;GET THE BASE ADDRESS FOR RLCS
025376  016337  000004  002440         MOV     DA(R3),E.DA      ;SAVE THE DISK ADDRESS AT ERROR
025404                                 ERRDF   110.,NOCRDY,ERR2
(4) 025404  104455                     TRAP    C$ERDF
(5) 025406  000156                     .WORD   110
(5) 025410  003775                     .WORD   NOCRDY
(5) 025412  007376                     .WORD   ERR2
025414  012601                 2$:    MOV     (SP)+,R1         ;RESTORE REGISTERS
025416  012600                        MOV     (SP)+,R0
025420  000205                         RTS     R5

                                        .SBTTL  GET STATUS/DRIVE RESET ROUTINE

                                        ;ROUTINE TO ISSUE DRIVE RESET
                                        ;ALSO GET STATUS. R1 HAS STATUS IF GS
                                        ;USES R3, DOES NOT SAVE !T

025422  013703  002250         GETDST: MOV     DCS,R3           ;GET CSR ADDRESS
025426  012763  000003  000004         MOV     #GSBIT,DA(R3)    ;INITIALIZE DAR FOR GET STATUS COMMAND
025434  000405                         BR      CSTUFF
025436  013703  002250         ISDRST: MOV     DCS,R3           ;GET CSR ADDRESS
025442  012763  000013  000004         MOV     #DRST,DA(R3)     ;INIT DAR FOR GET STATUS COMMAND AND CLEAR ERR REG
025450  012763  000204  000000 CSTUFF: MOV     #CRDY!GSTAT,CS(R3)       ;SET CONTROLLER READY AND GET STATUS FUNCTION
025456  053763  002302  000000         BIS     DRSEL,CS(R3)     ;SELECT THE DRIVE
025464  042763  000200  000000         BIC     #CRDY,CS(R3)     ;PERFORM THE GET STATUS COMMAND
025472  004537  025310                 JSR     R5,WTRDY         ;WAIT FOR CONTROLLER READY
025476  022763  000013  000004         CMP     #DRST,DA(R3)     ;RESET THE DRIVE?
025504  001402                         BEQ     1$               ;NO - EXIT
025506  016301  000006                 MOV     MP(R3),R1        ;ELSE, GET THE STATUS WORD
025512  000205                 1$:    RTS     R5
```

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                                        .SBTTL  ROUTINE TO WRITE PACKS INITIALLY

                                        ;ROUTINE TO WRITE PACK WITH PATTERN, ALL TRACKS WILL BE
                                        ;WRITTEN (EXCEPT BAD SECTOR TRACK)
                                        ;FORMAT IS # OF WORDS (WORD 1), PATTERN ADDRESS (WORD 2)
                                        ;PATTERN (WORDS 3 - 128)
                                        ;WE WILL ATTEMPT TO WRITE MULTIPLE SECTORS AT A TIME
                                        ;(10 SECTORS). IF AN ERROR OCCURS WE WILL THEN
                                        ;WRITE INDIVIDUAL SECTORS FOR THAT TRACK.  WE DO WRITES,
                                        ;READS AND INCORE COMPARISONS TO VERIFY.

                                        ;
                                        ;CALL JSR R5,WRPACK

025514  010046                  WRPACK: MOV     R0,-(SP)        ;SAVE REGISTERS
025516  010146                          MOV     R1,-(SP)
025520  010246                          MOV     R2,-(SP)
025522  010346                          MOV     R3,-(SP)
025524  010446                          MOV     R4,-(SP)
025526  013746  002256                  MOV     @BBA,-(SP)
025532  004537  026754          1$:     JSR     R5,HDHOME       ;HEADS HOME
025536  012737  002450  002256        MOV     #BUF1,BBA
025544  012737  175400  002246        MOV     #-1280.,BMP     ;INITIALIZE TO WRITE 10 SECTORS
025552  004537  030412                JSR     R5,WRBUF        ;GENERATE THE WC DATA PATTERN

                                        ;NOW ACTUALLY WRITE DATA OUT ON PACK, WILL NOT WRITE LAST
                                        ;TRACK

025556  005001                          CLR     R1              ;R1=CYL 000
025560  005004                          CLR     R4              ;START AT 1ST CYLINDER
025562  005737  002312                  TST     FWDFLG          ;FORWARD DIRECTION?
025566  001410                          BEQ     2$              ;YES
025570  012704  000776                  MOV     #510.,R4        ;SET FOR THE LAST CYL (RL02)
025574  022737  000001  002316          CMP     #1,TDR          ;DRIVE = RL01?
025602  001002                          BNE     2$              ;NO - DA IS OK
025604  042704  177400                  BIC     #177400,R4      ;YES - MAX CYL IS 255.
025610  000137  026152          2$:     JMP     SKWRT           ;SEEK TO THE START CYLINDER

025614  022737  000001  002316  CONWR:  CMP     #1,TDR          ;RL01=1
025622  001007                          BNE     13$             ;MUST BE AN RL02
025624  022701  077600                  CMP     #077600,R1      ;RL01 LAST CYLINDER?
025630  001020                          BNE     STWRT           ;NO - PROCEED TO WRITE TRACK
025632  005737  002416          12$:    TST     TEMP1           ;ON HEAD 1 LAST TRACK?
025636  001415                          BEQ     STWRT           ;NO - WRITE HEAD 0 LAST TRACK
025640  000404                          BR      ENDWR
025642  022701  177600          13$:    CMP     #177600,R1      ;LAST CYL FOR RL02?
025646  001011                          BNE     STWRT           ;NO - GO WRITE TRACK
025650  000770                          BR      12$             ;YES - TEST FOR LAST TRACK ON LAST CYL

                                        ;HERE WHEN ALL DONE WRITING THE PACK

025652  012637  002256          ENDWR:  MOV     (SP)+,BBA
025656  012604                          MOV     (SP)+,R4
025660  012603                          MOV     (SP)+,R3
025662  012602                          MOV     (SP)+,R2
025664  012601                          MOV     (SP)+,R1
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 2234  025666  012600                        MOV     (SP)+,R0
 2235  025670  000205                        RTS     R5              ;END EXIT
 2236
 2237                                ;THIS PORTION WILL WRITE THE PACK USING MULTIPLE SECTORS. IF AN
 2238                                ;ERROR OCCURS WE WILL GO TO 2$ AND INDIVIDUAL SECTORS.
 2239                                ;IF AFTER 3 RETRYS ON A SECTOR NO RECOVERY CAN BE MADE, THEN THE SECTOR WILL
 2240                                ;BE MARKED 'BAD' IN THE TEMP BAD SEC FILE STORAGE AREA.
 2241
 2242  025672  005002                STWRT:  CLR     R2              ;INITIAL SECTOR 0
 2243  025674  005037  002412                CLR     DECNT           ;INITIALIZE ERROR LOOP COUNTER
 2244  025700  010137  002244        SWRT1:  MOV     R1,BDA          ;SET UP CYLINDER
 2245  025704  053737  002416  002244        BIS     TEMP1,BDA       ;INSERT THE HEAD NUMBER (0 OR 1)
 2246  025712  050237  002244              BIS     R2,BDA          ;ADD IN THE SECTOR NUMBER
 2247  025716  012737  000012  002260        MOV     #WRITE,FUNC     ;WRITE CMD
 2248  025724  004537  023534              JSR     R5,LDFUNC       ;ISSUE THE WRITE
 2249  025730  004537  025310              JSR     R5,WTRDY        ;WAIT FOR READY
 2250
 2251  025734  005777  154310              TST     @DCS            ;ERROR DETECTED?
 2252  025740  100041                      BPL     WNXSEC          ;BR IF NO ERROR - GET NEXT SECTOR
 2253
 2254                                ;HERE IF AN ERROR WAS DETECTED - GOING TO WRITE THE TRACK ONE SECTOR
 2255                                ;AT A TIME ... >3 RETRYS = 'BAD' SECTOR
 2256
 2257  025742                              PRINTF  #MCRLF
  (7)  025742  012746  010041              MOV     #MCRLF,-(SP)
  (6)  025746  012746  000001              MOV     #1,-(SP)
  (3)  025752  010600                      MOV     SP,R0
  (4)  025754  104417                      TRAP    C$PNTF
  (4)  025756  062706  000004              ADD     #4,SP
 2258  025762  017737  154262  002252        MOV     @DCS,E.DCS      ;SAVE THE ERROR DETECTED
 2259  025770  013703  002250              MOV     DCS,R3          ;GET THE BASE ADDRESS FOR RLCS
 2260  025774  016337  000004  002440        MOV     DA(R3),E.DA     ;SAVE THE DISK ADDRESS AT ERROR
 2261  026002  005337  002440              DEC     E.DA            ;SECTOR IS PREVIOUS FROM INDICATED
 2262  026006  013737  002440  002410        MOV     E.DA,CHKSEC
 2263  026014  013737  002410  002502        MOV     CHKSEC,FRSTER   ;STORE ERROR ADDRESS FOR ERROR LOOP
 2264  026022                              ERRSOFT 410.,MSFER,ERR1
  (4)  026022  104457                      TRAP    C$ERSOFT
  (5)  026024  000632                      .WORD   410
  (5)  026026  003310                      .WORD   MSFER
  (5)  026030  007130                      .WORD   ERR1
 2265  026032  004537  025436              JSR     R5,ISDRST       ;RESET THE DRIVE
 2266  026036  005237  002232              INC     SFTCNT          ;ADD TO SOFT ERROR TALLY
 2267  026042  000471                      BR      W1SEC           ;WRITE 1 SECTOR AT A TIME
 2268
 2269                                ;HERE TO SELECT THE NEXT SECTOR GROUP ON THIS TRACK
 2270
 2271  026044  062702  000012        WNXSEC: ADD     #10.,R2         ;NEXT GROUP
 2272  026050  022702  000050              CMP     #40.,R2         ;DONE?
 2273  026054  001311                      BNE     SWRT1           ;NO, GO BACK
 2274  026056  005237  002240              INC     WRTCNT          ;COUNT THIS WRITE PASS ON SELECTED TRK
 2275  026062  023737  002240  010132        CMP     WRTCNT,WRTLIM   ;AT LIMIT FOR THIS TRACK?
 2276  026070  001300                      BNE     STWRT           ;NO - DO THIS TRACK AGAIN
 2277  026072  005037  002240              CLR     WRTCNT          ;YES - CLEAR THE PASS COUNTER
 2278
 2279                                ;HERE TO SELECT THE NEXT TRACK WITH A SEEK CMD
 2280
```

```
2281  026076  005737  010130          WNXTRK: TST     WRTSAW          ;DOING A SAWTOOTH WRITE CYCLE?
2282  026102  001410                          BEQ     3$              ;NO - DO INCREMENTAL
2283  026104  005737  002312                  TST     FWDFLG          ;SAWTOOTH FWD WRT?
2284  026110  001003                          BNE     2$              ;NO - DOING REVERSE WRT
2285
2286  026112  004537  026754          1$:     JSR     R5,HDHOME       ;YES - SET THE HEADS OVER CYL #000
2287  026116  000402                          BR      3$
2288
2289  026120  004537  027052          2$:     JSR     R5,HDLAST       ;SET THE HEADS OVER THE LAST CYL
2290
2291  026124  005737  002416          3$:     TST     TEMP1           ;DOING HEAD 0 ??
2292  026130  001432                          BEQ     5$              ;YES - SET FOR HEAD #1
2293  026132  005737  002312                  TST     FWDFLG          ;FWD WRITE?
2294  026136  001404                          BEQ     31$             ;YES - R4 IS AN UPCOUNTER
2295  026140  005304                          DEC     R4              ;NO - DOWNCOUNT R4 (CYL COUNTER)
2296  026142  002003                          BGE     32$             ;PROCEED IF STILL HAVE SOME TO DO
2297  026144  000137  025652                  JMP     ENDWR           ;JUST COMPLETED THE PACK
2298
2299  026150  005204          31$:    INC     R4              ;POINT TO THE NEXT CYLINDER (FWD DIRECTION)
2300
2301          026152          SKWRT=.
2302  026152  005037  002416          32$:    CLR     TEMP1           ;SET POINTER BACK TO HEAD #0
2303
2304  026156  010401          4$:     MOV     R4,R1           ;GET THE CYLINDER #
2305  026160  000301                  SWAB    R1              ;POSITION THE BITS FOR DIRECT LOADING
2306  026162  000241                  CLC                     ;INTO THE DA REGISTER
2307  026164  006001                  ROR     R1              ;FOR THE SEEK TO THE PROPER
2308  026166  103002                  BCC     41$             ;CYLINDER
2309  026170  052701  100000          BIS     #BIT15,R1
2310  026174  010137  002324          41$:    MOV     R1,NEWPOS       ;SET THE DESIRED DISK ADDRESS
2311  026200  053737  002416  002324          BIS     TEMP1,NEWPOS    ;ADD IN THE SELECTED HEAD BIT
2312  026206  004537  027136                  JSR     R5,SKFNC        ;ISSUE THE SEEK TO THE DESIRED CYLINDER/HEAD
2313  026212  000137  025614                  JMP     CONWR           ;AND CONTINUE WRITING THE PACK
2314
2315  026216  012737  000100  002416  5$:     MOV     #HEAD,TEMP1     ;POINT TO HEAD #1
2316  026224  000754                          BR      4$              ;AND SEEK THERE
2317
2318                                  ;IF AN ERROR OCCURS THEN WE COME HERE AND DO THE TRACK SECTOR
2319                                  ;BY SECTOR.
2320
2321  026226  005002          W1SEC:  CLR     R2              ;R2 = SECTOR
2322  026230  012737  177600  002246          MOV     #-128.,BMP      ;LOAD WORD COUNT
2323  026236  013737  002322  002244  1$:     MOV     PRPOS,BDA       ;SETUP DISK ADDRESS
2324  026244  053737  002416  002244          BIS     TEMP1,BDA       ;ADD IN THE HEAD NUMBER (0 OR 1)
2325  026252  050237  002244                  BIS     R2,BDA          ;ADD IN THE SECTOR NUMBER
2326
2327                                  ;HERE TO WRITE A SECTOR
2328
2329  026256  012737  000012  002260  2$:     MOV     #WRITE,FUNC     ;WRITE FUNCTION
2330  026264  004537  023534                  JSR     R5,LDFUNC       ;ISSUE THE WRITE
2331  026270  004537  025310                  JSR     R5,WTRDY        ;WAIT FOR WRITE TO FINISH
2332
2333  026274  005777  153750                  TST     @DCS            ;ERROR ON WRITE?
2334  026300  100114                          BPL     3$              ;NO - SETUP FOR NEXT SECTOR
2335
2336                                  ;HERE IF ERROR ON 1 SECTOR WRITE
```

```
2337
2338  026302  017737  153742  002252          MOV     @DCS,E.DCS      ;SAVE THE DETECTED ERROR
2339  026310  023737  002244  002502          CMP     BDA,FRSTER      ;DID WE REPORT ERROR IN MAIN PROGRAM?
2340  026316  001425                          BEQ     10$             ;YES - SKIP
2341  026320  005737  002412                  TST     DECNT           ;DID WE REPORT IT ONCE IN ERROR LOOP?
2342  026324  001022                          BNE     10$             ;YES - SKIP
2343  026326                                  PRINTF  #MCRLF          ;ELSE REPORT IT NOW
  (7) 026326  012746  010041                  MOV     #MCRLF,-(SP)
  (6) 026332  012746  000001                  MOV     #1,-(SP)
  (3) 026336  010600                          MOV     SP,R0
  (4) 026340  104417                          TRAP    C$PNTF
  (4) 026342  062706  000004                  ADD     #4,SP
2344  026346  013737  002244  002410          MOV     BDA,CHKSEC
2345  026354  013737  002244  002440          MOV     BDA,E.DA
2346  026362                                  ERRSOFT 430.,MSFER,ERR1
  (4) 026362  104457                          TRAP    C$ERSOFT
  (5) 026364  000656                          .WORD   430
  (5) 026366  003310                          .WORD   MSFER
  (5) 026370  007130                          .WORD   ERR1
2347  026372  005237  002412          10$:    INC     DECNT           ;NO, GIVE IT ONE MORE TRY
2348  026376  013737  002244  002410          MOV     BDA,CHKSEC      ;CHECK IF SECTOR IS IN
2349  026404  004537  027340                  JSR     R5,CKBDSC       ;BAD SECTOR FILE
2350  026410  005737  002406                  TST     HDRFND          ;IF SET, IT WAS
2351  026414  001431                          BEQ     21$             ;NO MATCH
2352  026416                                  PRINTF  #FMT18,#INBSF   ;TELL OPR SECT IN FILE ALREADY
  (8) 026416  012746  006346                  MOV     #INBSF,-(SP)
  (7) 026422  012746  007624                  MOV     #FMT18,-(SP)
  (6) 026426  012746  000002                  MOV     #2,-(SP)
  (3) 026432  010600                          MOV     SP,R0
  (4) 026434  104417                          TRAP    C$PNTF
  (4) 026436  062706  000006                  ADD     #6,SP
2353  026442                                  PRINTF  #MCRLF
  (7) 026442  012746  010041                  MOV     #MCRLF,-(SP)
  (6) 026446  012746  000001                  MOV     #1,-(SP)
  (3) 026452  010600                          MOV     SP,R0
  (4) 026454  104417                          TRAP    C$PNTF
  (4) 026456  062706  000004                  ADD     #4,SP
2354  026462  005337  002232                  DEC     SFTCNT          ;ADJUST COUNTERS BECAUSE SECTOR-
2355  026466  005037  002412                  CLR     DECNT           ;IN-ERROR ALREADY IN BSF
2356  026472  004537  025436                  JSR     R5,ISDRST       ;RESET THE DRIVE
2357  026476  000434                          BR      31$             ;WORK ON NEXT SECTOR
2358
2359  026500  022737  000004  002412  21$:    CMP     #4,DECNT        ;IT MAY HAVE BEEN NOISE.
2360  026506  001403                          BEQ     22$             ;HARD ERROR?
2361  026510  004537  025436                  JSR     R5,ISDRST       ;NO - ISSUE A DRIVE RESET
2362  026514  000660                          BR      2$              ;AND TRY AGAIN
2363
2364  026516  005337  002232          22$:    DEC     SFTCNT          ;DELETE THIS HARD ERROR FROM SOFT ERROR TALLY
2365  026522  004537  026604                  JSR     R5,INBAD        ;TELL OPR & PUT IT IN TEMP STORAGE
2366  026526  004537  025436                  JSR     R5,ISDRST       ;RESET THE DRIVE
2367  026532  005737  002412          3$:     TST     DECNT           ;ANY RECOVERY HERE?
2368  026536  001414                          BEQ     31$             ;NO
2369  026540                                  PRINTF  #FMT18,#MSREC   ;YES - TELL OPR 'RECOVERED'
  (8) 026540  012746  003125                  MOV     #MSREC,-(SP)
  (7) 026544  012746  007624                  MOV     #FMT18,-(SP)
  (6) 026550  012746  000002                  MOV     #2,-(SP)
```

```
  (3)  026554  010600                    MOV     SP,R0
  (4)  026556  104417                    TRAP    C$PNTF
  (4)  026560  062706  000006            ADD     #6,SP
2370   026564  005037  002412            CLR     DECNT           ;CLEAR LOOP COUNTER FOR NEXT SECTOR
2371
2372                                ;SELECT THE NEXT SECTOR
2373
2374   026570  005202                31$:    INC     R2              ;POINT TO THE NEXT SECTOR
2375   026572  020227  000050            CMP     R2,#40.         ;END OF THE TRACK?
2376   026576  002617                    BLT     1$              ;NO - DO THIS SECTOR
2377   026600  000137  026076            JMP     WNXTRK          ;YES - DO NEXT TRACK
```

```
026604                                  STARS
                                        ;;*******************************************************************
                                        ;INBAD -- ROUTINE TO INSERT THE BAD SECTOR FOUND INTO A TEMP
                                        ;       BAD SECTOR FILE AND TELL OPR THAT A BAD SECTOR (HARD ERR)
                                        ;       WAS DETECTED.
026604                                  STARS
                                        ;;*******************************************************************

026604  010146                          INBAD:  MOV     R1,-(SP)                ;SAVE R1
026606  016337  000000  002434                  MOV     CS(R3),E.CS
026614  016337  000002  002436                  MOV     BA(R3),E.BA
026622  016337  000004  002440                  MOV     DA(R3),E.DA
026630  016337  000006  002442                  MOV     MP(R3),E.MP
026636  016337  000006  002444                  MOV     MP(R3),E.MP1
026644  016337  000006  002446                  MOV     MP(R3),E.MP2
026652  005037  002412                          CLR     DECNT                   ;CLEAR CURRENT SOFT ERROR COUNT
026656  005337  002410                          DEC     CHKSEC                  ;SECTOR IS PREVIOUS FROM INDICATED
026662                                          ERRHRD  300.,MHDER,ERR1
026662  104456                                  TRAP    C$ERHRD
026664  000454                                  .WORD   300
026666  003420                                  .WORD   MHDER
026670  007130                                  .WORD   ERR1
026672  005237  002230                          INC     ERRCNT                  ;UPDATE THE HARD ERROR COUNT
026676  012701  030014                          MOV     #BSECN,R1               ;POINT TO THE BAD SECTOR TEMP STORAGE
026702  005711                          IBDN:   TST     (R1)                    ;LOOK FOR A SPOT TO INSERT ENTRY
026704  100417                                  BMI     IBDN1                   ;BR IF FOUND ONE
026706  005721                                  TST     (R1)+                   ;POINT TO NEXT ENTRY ADDR
026710  022701  030076                          CMP     #BSECN+50.,R1           ;END OF TABLE?
026714  001372                                  BNE     IBDN                    ;NO - TRY THIS ENTRY SLOT
026716                                          PRINTF  #FMT18,#TBLFUL          ;YES - TELL OPR END OF TABLE (25. ENTRYS FOUND)
026716  012746  006040                          MOV     #TBLFUL,-(SP)
026722  012746  007624                          MOV     #FMT18,-(SP)
026726  012746  000002                          MOV     #2,-(SP)
026732  010600                                  MOV     SP,R0
026734  104417                                  TRAP    C$PNTF
026736  062706  000006                          ADD     #6,SP
026742  000402                                  BR      IBDN2                   ;EXIT
026744  013711  002410                  IBDN1:  MOV     CHKSEC,(R1)             ;SAVE THE ENTRY IN TABLE
026750  012601                          IBDN2:  MOV     (SP)+,R1                ;RESET R1
026752  000205                                  RTS     R5
```

```
                                        .SBTTL  HEADS HOME ROUTINE
                                        ;ROUTINE TO BRING HEADS OVER TRACK 0
026754 010046                   HDHOME: MOV     R0,-(SP)        ;SAVE R0
026756 012737 000010 002260             MOV     #RDHDR,FUNC     ;READ HEADER
026764 004537 023534                    JSR     R5,LDFUNC       ;GO DO IT.
026770 004537 025310                    JSR     R5,WTRDY
026774 016300 000006                    MOV     MP(R3),R0       ;GET HEADER
027000 042700 000177                    BIC     #177,R0         ;ONLY CYLINDER
027004 010037 002244                    MOV     R0,BDA          ;MOVE IT TO BUFFERED DA
027010 052737 000001 002244             BIS     #MK,BDA         ;SET MARKER
027016 012737 000006 002260             MOV     #SEEK,FUNC      ;LOAD SEEK
027024 004537 023534                    JSR     R5,LDFUNC       ;SEEK!
027030 004537 025310                    JSR     R5,WTRDY        ;WAIT.
027034 013737 002322 002264             MOV     PRPOS,LSTHDR
027042 005037 002322                    CLR     PRPOS           ;SET BUFFER TO HOME
027046 012600                           MOV     (SP)+,R0
027050 000205                           RTS     R5
                                        ;ROUTINE TO SET THE HEADS OVER THE LAST CYLINDER
027052 012737 000010 002260     HDLAST: MOV     #RDHDR,FUNC     ;SET TO READ THE CURRENT POSITION
027060 004537 023534                    JSR     R5,LDFUNC       ;READ HEADERS
027064 004537 025310                    JSR     R5,WTRDY        ;WAIT TILL DONE
027070 016337 000006 002322             MOV     MP(R3),PRPOS    ;GET THE CURRENT POSITION
027076 042737 000177 002322             BIC     #177,PRPOS      ;SAVE ONLY THE CYL BITS
027104 012737 177600 002324             MOV     #177600,NEWPOS  ;SET LAST CYL FOR RL02
027112 022737 000001 002316             CMP     #1,TDR          ;DRIVE = RL01?
027120 001003                           BNE     1$              ;NO - MUST BE RL02
027122 012737 077600 002324             MOV     #77600,NEWPOS   ;YES - SET RL01 LAST TRACK ADDRESS
027130 004537 027136            1$:     JSR     R5,SKFNC        ;SEEK TO THE LAST TRACK
027134 000205                           RTS     R5
```

```
                                        .SBTTL  SEEK ROUTINE
                                        ;ROUTINE TO SEEK TO A CYLINDER POINTED TO BY 'NEWPOS' FROM A CYLINDER
                                        ;POINTED TO BY 'PRPOS'
                                        ;EXITS WITH PRPOS CONTAIN.ING THE NEW CYLINDER ADDRESS

027136  010146                  SKFNC:  MOV     R1,-(SP)        ;SAVE R1
027140  010246                          MOV     R2,-(SP)        ;SAVE R2
027142  013702  002324                  MOV     NEWPOS,R2       ;SET THE DESIRED CYL
027146  013701  002322                  MOV     PRPOS,R1        ;GET THE CURRENT POSITION
027152  042701  000177                  BIC     #177,R1         ;CLEAR THE HEAD/SECTOR BITS
027156  042702  000177                  BIC     #177,R2
027162  160102                          SUB     R1,R2           ;CALC THE DIFFERENCE
027164  103002                          BCC     1$
027166  005402                          NEG     R2              ;MAKE DIFFERENCE A POSITIVE NUMBER
027170  000402                          BR      2$
027172  052702  000004          1$:     BIS     #4,R2           ;SET THE DIRECTION BIT
027176  052702  000001          2$:     BIS     #MK,R2          ;SET THE SEEK MARKER BIT
027202  032737  000100  002324          BIT     #HEAD,NEWPOS    ;GO TO HEAD #1?
027210  001402                          BEQ     3$              ;NO
027212  052702  000020                  BIS     #SKHS,R2        ;YES - SELECT THE HEAD BIT
027216  010237  002244          3$:     MOV     R2,BDA          ;SAVE THE DA
027222  010237  002272                  MOV     R2,DIFWD        ;ALSO AS DIFFERENCE WORD
027226  012737  000006  002260          MOV     #SEEK,FUNC      ;SET TO DO A SEEK FUNCTION
027234  004537  023534                  JSR     R5,LDFUNC       ;ISSUE THE SEEK
027240  004537  025310                  JSR     R5,WTRDY        ;WAIT TILL READY SET
027244  005777  153000                  TST     @DCS            ;SEEK ERROR DETECTED?
027250  100014                          BPL     31$             ;NO
027252  017737  152772  002252          MOV     @DCS,E.DCS      ;YES - SAVE THE ERROR STATUS
027260  013703  002250                  MOV     DCS,R3          ;GET THE BASE ADDRESS FOR RLCS
027264  016337  000004  002440          MOV     DA(R3),E.DA     ;SAVE THE DISK ADDRESS AT ERROR
027272                                  ERRHRD  530.,MSKER,ERR2
(4)  027272  104456                     TRAP    C$ERHRD
(5)  027274  001022                     .WORD   530
(5)  027276  003275                     .WORD   MSKER
(5)  027300  007376                     .WORD   ERR2

027302  013737  002324  002322  31$:    MOV     NEWPOS,PRPOS    ;UPDATE THE CURRENT POSITION WORD
027310  012602                  4$:     MOV     (SP)+,R2        ;RESET R2
027312  012601                          MOV     (SP)+,R1        ;RESET R1
027314  000205                          RTS     R5              ;EXIT

                                        ;ROUTINE TO CLEAR ALL DRIVE INFORMATION USED ON START OR
                                        ;RESTART IF CALLED.  CAN BE USED TO CLEAR INDIVIDUAL DRIVE
                                        ;INFORMATION BY BITMAP FOLLOWING CALL.
                                        ;CALL    JSR     R5,CLEAR
                                        ;

027316  010446                  CLEAR:  MOV     R4,-(SP)                ;SAVE R4
027320  012704  002230                  MOV     #ERRCNT,R4              ;POINT TO THE 1ST TO CLEAR
027324  005024                  2$:     CLR     (R4)+                   ;CLEAR
027326  020427  002326                  CMP     R4,#RECNT               ;AT END OF BUFFER
027332  001374                          BNE     2$                      ;NO, GO TO 2$
027334  012604                  4$:     MOV     (SP)+,R4                ;RESTORE CURRENT BUFFER POINTER
027336  000205                          RTS     R5                      ;EXIT
```

```
                                        .SBTTL  ROUTINE TO CHECK FOR BAD SECTOR

                                        ;ROUTINE TO MATCH BAD SECTOR.....BDA IS SECTOR WE ARE LOOKING
                                        ;FOR IN LIST POINTED TO BY BSECPT......HDRFND IS SET IF WE FIND IT.
                                        ;

027340  005037  002406        CKBDSC: CLR     HDRFND          ;CLEAR FLAG
027344  010046                        MOV     R0,-(SP)        ;SAVE R0
027346  010146                        MOV     R1,-(SP)        ;SAVE R1
027350  012700  000177                MOV     #127.,R0        ;127 ENTRIES
027354  013701  002304        1$:     MOV     BSECPT,R1       ;GET WHERE WE'RE LOOKING
027360  022711  177777        2$:     CMP     #-1,(R1)        ;END OF ENTRYS?
027364  001411                        BEQ     4$              ;BRANCH IF AT END
027366  023711  002410                CMP     CHKSEC,(R1)     ;HAVE WE GOT A MATCH
027372  001404                        BEQ     3$              ;THEN GO SET INDICATOR, ELSE
027374  005721                        TST     (R1)+
027376  005300                        DEC     R0
027400  001367                        BNE     2$
027402  000402                        BR      4$

027404  005237  002406        3$:     INC     HDRFND          ;SET FLAG FOUND

027410  012601                4$:     MOV     (SP)+,R1
027412  012600                        MOV     (SP)+,R0
027414  000205                        RTS     R5

027416                              STARS
                                    ;;**************************************************************************
027416                              STARS
                                    ;;**************************************************************************
                                    ;BUFFER TO STORE BAD SECTOR LISTS

027416  000176              BSEC0:  .BLKW   126.    ;STORAGE FOR BAD SPOTS IN BAD SECTOR FILE
030012  177777                      .WORD   -1      ;FORCED TERMINATOR

030014  000176              BSECN:  .BLKW   126.    ;STORAGE FOR 'FOUND' BAD SPOTS
030410  177777              BSECNE: .WORD   -1      ;FORCED TERMINATOR
030412                              STARS
                                    ;;**************************************************************************
030412                              STARS
                                    ;;**************************************************************************

030412                              STARS
                                    ;;**************************************************************************
                                    ;SUBROUTINE TO LOAD A MEMORY BUFFER WITH THE WORST CASE DATA PATTERN
                                    ;TO WRITE ON THE PACK.
030412                              STARS
                                    ;;**************************************************************************

030412  010146                WRBUF:  MOV     R1,-(SP)        ;SAVE R1
030414  010246                        MOV     R2,-(SP)        ;SAVE R2
030416  010346                        MOV     R3,-(SP)        ;AND R3

030420  013701  002246                MOV     BMP,R1          ;GET THE WORD COUNT FOR THE WRITE CMD
030424  013702  002450                MOV     BUF1,R2         ;GET THE BUFFER ADDRESS
030430  012703  030462        1$:     MOV     #WCPAT,R3       ;GET THE STARTING ADDRESS OF THE DATA PATTERN
```

```
 2547  030434  012322                  2$:     MOV     (R3)+,(R2)+     ;PUT THE DATA IN MEMORY BUFFER
 2548  030436  005201                          INC     R1              ;DOWNCOUNT THE WC (MINUS WC TO START WITH)
 2549  030440  001404                          BEQ     3$              ;EXIT IF ALL DONE BUILDING THE BUFFER
 2550  030442  022703  030522                  CMP     #WCPAT+32.,R3   ;AT THE END OF THE DATA PATTERN TABLE?
 2551  030446  001372                          BNE     2$              ;NO - STORE THE NEXT FROM DATA TABLE
 2552  030450  000767                          BR      1$              ;YES - RESET THE DATA TABLE POINTER
 2553  030452  012603                  3$:     MOV     (SP)+,R3        ;RESET R3
 2554  030454  012602                          MOV     (SP)+,R2
 2555  030456  012601                          MOV     (SP)+,R1
 2556  030460  000205                          RTS     R5              ;EXIT
 2557
 2558
 2559                                  ;WORST CASE PATTERN USED IN WRITING
 2560
 2561  030462  155555                  WCPAT:  .WORD   155555
 2562  030464  066666                          .WORD   066666
 2563  030466  133333                          .WORD   133333
 2564  030470  155555                          .WORD   155555
 2565  030472  066666                          .WORD   066666
 2566  030474  133333                          .WORD   133333
 2567  030476  155555                          .WORD   155555
 2568  030500  066666                          .WORD   066666
 2569  030502  133333                          .WORD   133333
 2570  030504  155555                          .WORD   155555
 2571  030506  066666                          .WORD   066666
 2572  030510  133333                          .WORD   133333
 2573  030512  155555                          .WORD   155555
 2574  030514  066666                          .WORD   066666
 2575  030516  133333                          .WORD   133333
 2576  030520  155555                          .WORD   155555
 2577
 2578  030522  000240                  ENDOFPROGRAM:   NOP
 2579  030524                          ENDTST
  (3)  030524                          L10015:
  (3)  030524  104401                          TRAP    C$ETST
 2580  030526  000000                          HALT
 2581
 2582  030530                          STARS
  (2)                                 ;;*****************************************************************
 2583  030530                          STARS
  (2)                                 ;;*****************************************************************
 2584  030530  002400                  BSFILE: .BLKW   1280.           ;STORAGE FOR BAD SECTOR FILE DATA
 2585                                                                  ;/(1280. WORDS = 10 SECTORS = 1/4 TRACK)
 2586  035530  177777                          .WORD   -1              ;END OF STORAGE
 2587
 2588  035532                          STARS
  (2)                                 ;;*****************************************************************
 2589  035532                          STARS
  (2)                                 ;;*****************************************************************
 2590
 2591  035532                          BGNMOD  HRDPRM
 2592  035532                                  BGNHRD
  (3)  035532  000011                          .WORD L10017-L$HARD/2
 2593  035534                                  GPRMA   CSRMSG,CSR,0,160000,177776,YES
  (4)  035534  000031                          .WORD   T$CODE
  (4)  035536  035556                          .WORD   CSRMSG
```

```
  (4)  035540  160000                          .WORD   T$LOLIM
  (4)  035542  177776                          .WORD   T$HILIM
 2594  035544                                  GPRMD   DRMSG,DRBT,0,03400,0,7,YES
  (4)  035544  001032                          .WORD   T$CODE
  (4)  035546  035572                          .WORD   DRMSG
  (4)  035550  003400                          .WORD   03400
  (4)  035552  000000                          .WORD   T$LOLIM
  (4)  035554  000007                          .WORD   T$HILIM
 2595  035556                                  ENDHRD
  (2)                                         .EVEN
  (3)  035556                          L10017:
 2596
 2600
 2601  035556  052502  020123  042101  CSRMSG: .ASCIZ  /BUS ADDRESS/
 2602  035572  051104  053111  000105  DRMSG:  .ASCIZ  /DRIVE/
 2603
 2607
 2608                                  .EVEN
 2609
 2610  035600                                  ENDMOD
 2611
 2612  035600                          BGNMOD  SFTPRM
 2613  035600                                  BGNSFT
  (3)  035600  000010                          .WORD L10020-L$SOFT/2
 2614  035602                                  GPRML   DSWRT,0,1,YES
  (4)  035602  000130                          .WORD   T$CODE
  (4)  035604  035622                          .WORD   DSWRT
  (4)  035606  000001                          .WORD   1
 2615  035610                                  GPRMD   DWCNT,2,D,177777,1,177777,YES
  (4)  035610  001052                          .WORD   T$CODE
  (4)  035612  035650                          .WORD   DWCNT
  (4)  035614  177777                          .WORD   177777
  (4)  035616  000001                          .WORD   T$LOLIM
  (4)  035620  177777                          .WORD   T$HILIM
 2616  035622                                  ENDSFT
  (2)                                         .EVEN
  (3)  035622                          L10020:
 2620                                  .EVEN
 2621  035622  040523  052127  047517  DSWRT:  .ASCIZ  /SAWTOOTH WRITE CYCLE?/
 2622  035650  051127  052111  020105  DWCNT:  .ASCIZ  /WRITE CYCLES PER TRACK?/
 2623
 2627  035700                                  ENDMOD
 2628  035700                          LASTAD
  (2)                                         .EVEN
  (4)  035700  000000                          .WORD   0
  (4)  035702  000000                          .WORD   0
  (3)  035704                          L$LAST::
 2629
 2630         000001                  .END
```

```
ABSCYL  005254          282#  1194
ABSHD   005331          286#  1204
ABSMSG  005164          280#  1155  1734
ABSSEC  005304          284#  1203
ABSSER  005352          287#  1181
ABSSNH  005471          289#  1185  1790
ABSSNL  005415          288#  1184  1789
ACCESS  002464          202#   902* 1169  1344  1690  1825
ACKENT  016504         1216   1218#
ADDCOD  011726 G        642#
ADDFEX  022566         1691   1696  1707  1761#
ADDFND  022162         1549   1690#
ADR   = 000020 G         29#
ASSEMB= 000010            7
BA    = 000002           32#  1891* 2387
BADBSF  005130          279#  2107
BADWRT  005610          291#  1318
BA16  = 000020           51#
BA17  = 000040           50#
BBA     002256          130#   549* 1527* 1891  2024  2197  2199* 2229*
BCSADR  002262          132#  1894* 1895* 1896* 1897* 1898
BCSR    002402          177#
BDA     002244          125#  1290* 1293* 1297* 1311* 1567* 1568* 1569* 1607* 1609* 1617* 1627* 1628*
                       1629*  1642  1647  1648  1651  1892  1948* 1949* 1978* 1982* 2004* 2009  2014
                       2016   2019  2061* 2063* 2085* 2088* 2095* 2098* 2100* 2244* 2245* 2246* 2323*
                       2324*  2325* 2339  2344  2345  2348  2420* 2421* 2465*
BDRSEL  002404          178#
BIT0  = 000001 G         29#    38    39    75    76    77
BIT00 = 000001 G         29#
BIT01 = 000002 G         29#
BIT02 = 000004 G         29#
BIT03 = 000010 G         29#
BIT04 = 000020 G         29#
BIT05 = 000040 G         29#
BIT06 = 000100 G         29#
BIT07 = 000200 G         29#
BIT08 = 000400 G         29#
BIT09 = 001000 G         29#
BIT1  = 000002 G         29#    69    71    73    75    76
BIT10 = 002000 G         29#    48    60
BIT11 = 004000 G         29#    45    46    59
BIT12 = 010000 G         29#    44    47    58
BIT13 = 020000 G         29#    43    57
BIT14 = 040000 G         29#    42    56
BIT15 = 100000 G         29#    41    55  1213  1362  2042  2309
BIT2  = 000004 G         29#    70    71    74    78
BIT3  = 000010 G         29#    65    72    73    74    75
BIT4  = 000020 G         29#    51    64    79
BIT5  = 000040 G         29#    50    63
BIT6  = 000100 G         29#    40    80
BIT7  = 000200 G         29#    49   787  1886
BIT8  = 000400 G         29#    62
BIT9  = 001000 G         29#    61
BMP     002246          126#  1289* 1528* 1626* 1893  1983* 2084* 2094* 2200* 2322* 2544
BOE   = 000400 G         29#
BPRIOR  002352          160#   545
```

```
BRMM  = 000010          65#  2129
BSADD   015754         924  1155#
BSADDL  016022        1158  1161#
BSADDS  016012        1159#  1165  1176  1223  1241  1264
BSASN   016132        1178#
BSATD   016110        1170  1174#
BSDEL   017352         925  1330#
BSDELL  017420        1333  1336#
BSDELS  017410        1334#  1340  1351  1372  1386  1414  1421
BSDELT  017506        1345  1349#
BSDEL1  017530        1353#
BSECN   030014        1483  1694  2396  2400  2530#
BSECNE  030410        1485  2531#
BSECPT  002304         141#  550*  1989  1995  2507
BSECO   027416         550  2527#
BSEND   003255         245#  1111
BSFCYL  015332         340*  341*  342*  344*  346*  347  1004*  1011  1056*  1063  1079#  1194  1199
                      1208  1253  1354  1357  1388  1720*  1721*  1722*  1724*  1726*  1733  1746
BSFFLG  002476         207#  1114  2082*  2092*
BSFHD   015336         336*  339*  347  1009*  1011  1061*  1063  1081#  1204  1215  1254  1356  1364
                      1390  1729*  1732*  1733  1749
BSFILE  030530         547  987  1006  1039  1058  1124  1126  1129  1132  1134  1136  1138  1140
                      1142  1145  1248  1253*  1257*  1388  1393  1398*  1399*  1400  1408  1741  1746*
                      1747*  1748*  1751*  1776  1779  1781  1796*  1797*  2112  2114  2584#
BSFOK   015622         969  1022  1117  1119  1123#  1234  1379  1700  1840  1865
BSFOKF  015346         970  1023  1085#  1112*  1123*  1235  1380  1701  1841  1866
BSFOKX  015752        1113  1148#
BSFSEC  015334         334*  335*  347  1007*  1011  1059*  1063  1080#  1203  1214  1256  1355  1363
                      1392  1727*  1728*  1733
BSMAKE  023030         928  1812#
BSMKL   023076        1815  1818#
BSMKS   023066        1816#  1822  1832  1878
BSRF    005057         278#  1021
BSRFAC  014016         963#
BSRFLD  014506         980  993  1002  1015#  1095
BSRM    005004         277#  964
BSRPT   013652         923  944#
BSRPTL  013674         946  949#
BSRPTS  013664         947#  953  1072
BSRTOT  015174        1032  1045  1054  1068#  1104
BSVERI  020644         926  1500#
BSVERL  020724        1504  1507  1510#
BSVERS  020714        1508#  1516  1552
BSWRIT  020172         927  1430#
BSWRTL  020262        1436  1440#
BSWRTS  020252        1437#  1445  1453  1477
BUF1    002450         196#  547*  549  1527  2199  2545
BUILD   003213         243#  1812
BVEC    002350         159#  545  632
CART    002526         232#  984  1036  1186  1792
CHKSEC  002410         180#  334  337  340  1218*  1367*  1585*  1586  1647*  1651*  1708*  1709  2262*
                      2263  2344*  2348*  2393*  2404  2510
CKBDSC  027340        1219  1368  1652  1714  2349  2503#
CKFACT  006411         304#  1836
CKFLD   006450         305#  1861
CLEAR   027316         508  2489#
```

```
CLKADR  002360          163#    439*    444*    733
CLKBFR  002370          167#    694*    696*    763*
CLKCNT  002366          166#    696     736*    739*    763
CLKFLD  002376          170#    449*    456     709*
CLKFRQ  002354          161#    673     737*    740*
CLKINI  012132          498     554     725#
CLKSON  002364          165#    755*    762*
CLKST   012304          498     554     752#
CLKTIK  012124 G        450     707#
CLKTYP  002356          162#    441*    458*    665     698     726     730     752     757
CLNCOD  011644 G        627#
CLRBSF  025222         2083    2093    2111#
CLRBSN  020612         1456    1482#   1522
CLRDAT  010744          511#    513
CLRSTB  010760          516#    518
CMDDO   004753          276#    916
CMD1    004326          269#    905
CMD2    004401          270#    906
CMD3    004461          271#    907
CMD4    004546          272#    908
CMD5    004602          273#    909
CMD6    004671          274#    910
CMD7    004724          275#    911
CMSG    002550          233#    347     1011    1063    1733
CMSK    002340          155#   1945
CNTFLG  002472          205#    436*    505*    551
COMVER  020650         1498    1502#
CONREA  021054         1532#   1614
CONWR   025614         2216#   2313
COP   = 000040           63#
CPYCNT  002500          208#   1287*   1303*   1307
CRDY  = 000200           49#   1896    1899    2145    2168    2170
CRD1    021072         1537#   1557
CRD2    021266         1533    1556#
CRLCS   002515          231#    350     359
CS    = 000000           31#   1898*   1899*   2168*   2169*   2170*   2386
CSR   = 000000           83#   2593
CSRMSG  035556         2593    2601#
CSTUFF  025450         2165    2168#
CVERIF  020636         1466    1475    1497#
CVFLG   002314          145#   1497*   1500*   1503    1514    1540    1550
CYLMSK  002334          153#   1942
C$AU  = 000052            7#    644
C$AUTO= 000061            7#    624
C$BRK = 000022            7#
C$BSEG= 000004            7#
C$BSUB= 000002            7#
C$CEFG= 000045            7#
C$CLCK= 000062            7#    439     444
C$CLEA= 000012            7#    638
C$CLOS= 000035            7#
C$CLP1= 000006            7#
C$CVEC= 000036            7#    455     620     632     634
C$DCLN= 000044            7#
C$DODU= 000051            7#    594     611
C$DRPT= 000024            7#
```

```
C$DU  = 000053          7#   649
C$EDIT= 000003          7#    15
C$ERDF= 000055          7#   881  2152
C$ERHR= 000056          7#  1936  1958  1969  2394  2475
C$ERRO= 000060          7#
C$ERSF= 000054          7#  1889
C$ERSO= 000057          7#  1587  1649  2264  2346
C$ESCA= 000010          7#
C$ESEG= 000005          7#
C$ESUB= 000003          7#
C$ETST= 000001          7#  2579
C$EXIT= 000032          7#
C$GETB= 000026          7#
C$GETW= 000027          7#
C$GMAN= 000043          7#   899   916  1000  1052  1174  1181  1184  1185  1187  1194  1203  1204
                     1274   1349  1354  1355  1356  1431  1734  1771  1789  1790  1793  1830
C$GPHR= 000042          7#   524
C$GPLO= 000030          7#
C$GPRI= 000040          7#
C$INIT= 000011          7#   558
C$INLP= 000020          7#
C$MANI= 000050          7#
C$MEM = 000031          7#
C$MSG = 000023          7#   353   362
C$OPEN= 000034          7#
C$PNTB= 000014          7#   347   350   351   359   360   805
C$PNTF= 000017          7#   461   462   591   593   607   609   811   812   820   862   867   872
                      876    898   903   905   906   907   908   909   910   911   915   955   957
                      959    964   972   979   984   998   999  1011  1021  1025  1031  1036  1050
                     1051   1063  1068  1069  1070  1071  1093  1094  1102  1103  1111  1155  1171
                     1180   1186  1201  1222  1229  1237  1273  1280  1285  1318  1321  1330  1346
                     1353   1371  1382  1413  1430  1452  1455  1460  1463  1469  1472  1502  1519
                     1544   1546  1547  1548  1580  1646  1655  1656  1672  1673  1703  1733  1792
                     1812   1827  1836  1843  1849  1861  1868  1871  2011  2021  2066  2073  2107
                     2257   2343  2352  2353  2369  2402
C$PNTS= 000016          7#
C$PNTX= 000015          7#
C$QIO = 000377          7#
C$RDBU= 000007          7#   447
C$REFG= 000047          7#   464   502   540
C$RESE= 000033          7#   434   637
C$REVI= 000003          7#    15
C$RFLA= 000021          7#
C$RPT = 000025          7#   412
C$SEFG= 000046          7#
C$SPRI= 000041          7#   432   452   454   631   883
C$SVEC= 000037          7#   450   545   583   630   728   732
C$TPRI= 000013          7#
DA    = 000004         33#  1583  1892*  1935  1957  1968  2151  2164*  2167*  2172  2260  2388  2474
DCRC  = 004000         45#
DCS     002250        127#   472*  475*  477   585*  587   591   600*  602   607   779*  780   811
                      855*   856*  879  1304  1574  1581  1582  1636  1641  1885  1905*  1931  1933
                     1934   1953  1955  1956  1964  1966  1967  2000  2104  2145  2149  2150  2163
                     2166   2251  2258  2259  2333  2338  2470  2472  2473
DECNT   002412         181#  1566*  1644  1650*  1659  1669  1671*  1676*  1988*  2036*  2073  2243*  2341
                     2347*  2355*  2359  2367  2370*  2392*
```

```
DELCYL  005254          281# 1354
DELHD   005331          285# 1356
DELMSG  005656          292# 1330
DELSEC  005304          283# 1355
DENIED  004125          265#  903  1171  1346  1827
DERCNT  002236          122#
DERR  = 040000           42#
DIAGMC= 000000            7
DIFWD   002272          136# 2466*
DLT   = 010000           44#
DLYCNT  002362          164#  453*  480*
DOWRT   005546          290# 1274
DRBT  = 000002           84# 2594
DRDRV   012700          821   829#  868
DRDY  = 000001           39# 1896
DRMSG   035572         2594  2602#
DRNM    004033          263#  591   607   811
DRNRDY  012642          819#  952  1164  1339  1444  1513  1821
DROPCO  011730 G        647#
DRSEL   002302          140#  473*  474*  475   586*  591   599*  600   607   784*  811   856   1895
                       2169
DRST  = 000013           75# 2167  2172
DRVID   012546          811#  819   863   958  1167  1342  1440  1451  1545  1824
DSE   = 000400           62#
DSPCOD  010134 G        402#
DSWRT   035622         2614  2621#
DWCNT   035650         2615  2622#
EF.CON= 000036 G         29#  502
EF.NEW= 000035 G         29#
EF.PWR= 000034 G         29#  464
EF.RES= 000037 G         29#
EF.STA= 000040 G         29#  540
END     011030          506  533#
ENDINI  012300          731  738  741#
ENDOFP  030522         2578#
ENDRD   021100         1540#
ENDRD1  021110         1476  1541  1543#
ENDWR   025652         2222  2229#  2297
ERR   = 100000           41#  879
ERRAT   006215          300#  347
ERRCNT  002230          119# 1458* 1524* 1547  1695  2395*  2490
ERRVEC  002504          214#  583   620   630   634
ERR1    007130 G        329# 1587  1649  2264  2346  2394
ERR2    007376 G        355# 1936  1958  1969  2152  2475
EVL   = 000004 G         29#
EXISTS  004171          266# 1222
EXIT    012056          676   680   685   690   694#
E$END = 002100            7#
E$LOAD= 000035            7#   15
E.BA    002436          191# 2387*
E.CS    002434          190# 2386*
E.DA    002440          192#  350   359  1583* 1584*  1585  1648*  1935*  1957*  1968*  2151*  2260*  2261*
                       2262  2345* 2388* 2474*
E.DCS   002252          128#  350   359  1581* 1641*  1933*  1955*  1966*  2149*  2258*  2338*  2472*
E.MP    002442          193# 2389*
E.MP1   002444          194# 2390*
```

```
E.MP2   002446   195#  2391*
E.STAT  002254   129#   349*   350   358*   359
FACNUM  015330   913*   965*   991*   992    994   1011  1068  1078#  1090  1092*
FDTYP   010105   380#   812
FINDBF  011112   547#
FIRST   012370   770#   850    944   1156   1331  1434  1505  1813
FLDNUM  015326   914*  1019*  1043*  1044   1046  1063  1069  1077#  1099  1101*  1233*  1247*  1377*
FMTCSH  007737   375#  1011   1063
FMTMS   007777   376#   905
FMTSN   007707   373#   984   1036   1186   1792
FMTTB   007724   374#  1068   1069   1546   1547
FMT15   007474   366#   461    462    593    609
FMT16   007503   347    367#  1733
FMT17   007537   368#   591    607    811
FMT17A  007554   350    359    369#
FMT18   007624   370#   867    872    876    903   906   907   908   909   910   911   964   972
                 979   1021   1025   1031   1070  1093  1094  1102  1103  1111  1171  1222  1229
                1237   1280   1285   1318   1321  1346  1371  1382  1413  1460  1469  1548  1655
                1672   1703   1827   2011   2021  2066  2352  2369  2402
FMT19   007631   371#   955    998    1050   1155  1201  1330  1430  1502  1812  1836  1861  2107
FMT20   007640   372#  2073
FRQCHK  012232   729    733#
FRQ50   012264   735    739#
FRSTER  002502   210#  1586*  1642   2263*  2339
FUNC    002260   131#  1294*  1570*  1610*  1632*  1894  1928*  1950*  1961*  1984*  2101*  2247*  2329*
                2414*  2422*  2432*  2467*
FWDFLG  002312   144#  1464*  1473*  2208   2283  2293
F$AU  = 000015     7#   643    644
F$AUTO= 000020     7#   575    624
F$BGN = 000040     7#    14     16     27     86   118   216   221   321   327   329   355   387
                 389   394    395    400    402   406   410   411   413   418   428   430   564
                 575   627    628    640    642   643   645   647   648   650   661   707   717
                 836   843   1903   2579   2591  2592  2610  2612  2613  2627
F$CLEA= 000007     7#   628    638
F$DU  = 000016     7#   648    649
F$END = 000041     7#    14     16     27     86   118   216   221   321   327   353   362   387
                 389   394    395    400    402   406   410   412   413   428   558   564   624
                 627   638    640    642    644   645   647   649   650   704   712   717   836
                 843  1906   2579   2591   2595  2610  2612  2616  2627
F$HARD= 000004     7#  2592   2595
F$HW  = 000013     7#   390    393
F$INIT= 000006     7#   430    558
F$JMP = 000050     7#
F$MOD = 000000     7#    14     16     27     86   118   216   221   321   327   387   389   394
                 395   400    402    406    410   413   428   564   627   640   642   645   647
                 650   717    836   2591   2610  2612  2627
F$MSG = 000011     7#   329    353    355    362
F$PROT= 000021     7#   418    422
F$PWR = 000017     7#
F$RPT = 000012     7#   411    412
F$SEG = 000003     7#
F$SOFT= 000005     7#  2613   2616
F$SRV = 000010     7#   661    704    707    712   1903  1906
F$SUB = 000002     7#
F$SW  = 000014     7#   396    399
F$TEST= 000001     7#   843   2579
```

```
GETCYL  016320          1179    1183    1194#   1202
GETDST  025422           348     357     785     860     878    1282    1448    2124    2163#
GETSEC  016406          1198    1200    1203#
GETSN   016160          1181#   1189
GLBDAT  002230 G         118#
GLBEQA  002230 G          27#
GLBERR  007130 G         327#
GLBSUB  012132 G         717#
GLBTXT  002506 G         221#
GSBIT = 000003            76#   2164
GSTAT = 000004            70#   2168
G$CNTO= 000200             7#
G$DELM= 000372             7#    453     480     604    2144
G$DISP= 000003             7#
G$EXCP= 000400             7#
G$HILI= 000002             7#
G$LOLI= 000001             7#
G$NO  = 000000             7#    899     916    1000    1052    1174    1181    1184    1185    1187    1194    1203    1204
                        1274   1349    1354    1355    1356    1431    1734    1771    1789    1790    1793    1830
G$OFFS= 000400             7#    899     916    1000    1052    1174    1181    1184    1185    1187    1194    1203    1204
                        1274   1349    1354    1355    1356    1431    1734    1771    1789    1790    1793    1830    2593
                        2594   2614    2615
G$OFSI= 000376             7#    899     916    1000    1052    1174    1181    1184    1185    1187    1194    1203    1204
                        1274   1349    1354    1355    1356    1431    1734    1771    1789    1790    1793    1830    2593
                        2594   2614    2615
G$PRMA= 000001             7#   2593
G$PRMD= 000002             7#    899     916    1184    1185    1194    1203    1204    1354    1355    1356    1789    1790
                        2594   2615
G$PRML= 000000             7#   1000    1052    1174    1181    1187    1274    1349    1431    1734    1771    1793    1830
                        2614
G$RADA= 000140             7#
G$RADB= 000000             7#
G$RADD= 000040             7#    916    1194    1203    1204    1354    1355    1356    2615
G$RADL= 000120             7#   1000    1052    1174    1181    1187    1274    1349    1431    1734    1771    1793    1830
                        2614
G$RADO= 000020             7#    899    1184    1185    1789    1790    2593    2594
G$XFER= 000004             7#
G$YES = 000010             7#   2593    2594    2614    2615
HCE   = 040000            56#
HCRC  = 004000            46#
HDHOME  026754           494   1526    2198    2286   2413#
HDLAST  027052          2289   2432#
HDRFND  002406           179#  1220    1369    1653    1715    2350   2503*   2517*
HEAD  = 000100            80#  1616    2315    2462
HLPMSG  013332           897    901     905#    929
HMSG    002563           234#   347    1011    1063    1733
HNF   = 010000            47#
HOE   = 100000 G          29#
HOP   = 000020            64#   865    2126
HOUR    002432           189#   805
HPTCOD  010120 G          389#
HRDPRM  035532 G         2591#
HWSEC   003532           254#  1093    2021
HYPHEN  002675           236#   979    1031    1094    1103    1548
IBDN    026702          2397#  2401
IBDN1   026744          2398   2404#
```

```
IBDN2   026750            2403    2405#
IBE   = 010000 G            29#
IDU   = 000040 G            29#
IER   = 020000 G            29#
INBAD   026604            1664    2365    2385#
INBSF   006346             303#   1655    2352
INITCO  010150 G           428#
INPUT   013650             916     918     931#   1520
INTEN = 000100              40#    1905
INTR1   023646 G           545    1903#   1905#
ISDRST  025436             493     877    1588    1661    1665    1677    1927    2003    2166#   2265    2356    2361    2366
ISR   = 000100 G            29#
IXE   = 004000 G            29#
I$AU  = 000041               7#     643#    644#
I$AUTO= 000041               7#     575#    624#
I$CLN = 000041               7#     628#    638#
I$DU  = 000041               7#     648#    649#
I$HRD = 000041            2592#    2595#
I$INIT= 000041               7#     430#    558#
I$MOD = 000041               7#      14#     16#    27#    86#   118#   216#   221#   321#   327#   387#   389#   394#
                           395#     400#    402#   406#   410#   413#   428#   564#   627#   640#   642#   645#   647#
                           650#     717#    836#  2591#  2610#  2612#  2627#
I$MSG = 000041               7#     329#    353#   355#   362#
I$PROT= 000040               7#     418#
I$PTAB= 000041               7#
I$PWR = 000041               7#
I$RPT = 000041               7#     411#    412#
I$SEG = 000041               7#     843
I$SETU= 000041               7#
I$SFT = 000041            2613#    2616#
I$SRV = 000041               7#     661#    704#   707#   712#  1903#  1906#
I$SUB = 000041               7#     843
I$TST = 000041               7#     843#   2579#
J$JMP = 000167               7#
LCLK    012174             727     730#
LCLKCH  010224             440     444#
LDFUNC  023534            1300    1571    1611   1633   1885#  1929   1951   1962   1997   2102   2248   2330   2415
                          2423    2433    2468
LIST    013630             920     922#
LOADED  025246             949    1161    1277   1336   1441   1510   1818   2123#
LOE   = 040000 G            29#
LOGUNI  002374             169#    581*    594    611    617*
LOT   = 000010 G            29#
LSTDA   002270             135#
LSTDR1  002400             176#    510
LSTHDR  002264             133#   2425*
L$ACP   002110 G            15#
L$APT   002036 G            15#
L$AU    011726 G            15     643#
L$AUT   002070 G            15#
L$AUTO  011224 G            15     575#
L$CCP   002106 G            15#
L$CLEA  011644 G            15     628#
L$CO    002032 G            15#
L$DEPO  002011 G            15#
L$DESC  002122 G            15      19#
```

```
L$DESP  002076 G          15#
L$DEVP  002060 G          15#
L$DISP  010136 G          15     40'#
L$DLY   002116 G          15#    453     480     604     2144
L$DTP   002040 G          15#
L$DTYP  002034 G          15#
L$DU    011730 G          15     648#
L$DUT   002072 G          15#
L$DVTY  002216 G          15      21#
L$EF    002052 G          15#
L$ENVI  002044 G          15#
L$ETP   002102 G          15#
L$EXP1  002046 G          15#
L$EXP4  002064 G          15#
L$EXP5  002066 G          15#
L$HARD  035534 G          15    2592#
L$HIME  002120 G          15#
L$HPCP  002016 G          15#
L$HPTP  002022 G          15#
L$HW    010122 G          15     390#
L$ICP   002104 G          15#
L$INIT  010150 G          15     430#
L$LADP  002026 G          15#
L$LAST  035704 G          15    2628#
L$LOAD  002100 G          15#
L$LUN   002074 G          15#
L$MREV  002050 G          15#
L$NAME  002000 G          15#
L$PRIO  002042 G          15#
L$PROT  010142 G          15     418#
L$PRT   002112 G          15#
L$REPP  002062 G          15#
L$REV   002010 G          15#
L$RPT   010140 G          15     411#
L$SOFT  035602 G          15    2613#
L$SPC   002056 G          15#
L$SPCP  002020 G          15#
L$SPTP  002024 G          15#
L$STA   002030 G          15#
L$SW    010130 G          15     396#
L$TEST  002114 G          15#
L$TIML  002014 G          15#
L$UNIT  002012 G          15#    520     579
L10000  007374            353#
L10001  007472            362#
L10002  010126            390    393#
L10003  010134            396    399#
L10004  010140            412#
L10006  011160            558#
L10007  011642            624#
L10010  011724            638#
L10011  011726            644#
L10012  011730            649#
L10013  012122            704#
L10014  012130            712#
L10015  030524           2579#
```

```
L10016  023654            1906#
L10017  035556            2592    2595#
L10020  035622            2613    2616#
MAXWC   002452             197#    548*
MBLD    003155             242#   1771
MCRLF   010041             351     360    377#    862    898    915    957    959    999   1051   1071   1180   1273
                          1353    1455   1519   1580   1646   1656   1673   2257   2343   2353
MDERS   003337             248#    881
MDHEDR  002000 G            14#
MDONE   003720             259#   1321   1544
MDRTYP  006562             307#    812
MHDER   003420             250#   1936   1958   1969   2394
MINUTE  002430             188#    805
MK      = 000001            77#   1609   1949   2421   2461
MP      = 000006            34#   1893*  1939   1972   2174   2389   2390   2391   2418   2436
MRDER   003372             249#
MRLCS   002506             230#    591    607    811
MSFER   003310             247#   1587   1649   2264   2346
MSG     010044             378#    820   1452   1463   1472   1544   1843   1849   1868   1871
MSKER   003275             246#   2475
MSREC   003125             241#   1672   2369
MSTWRT  006144             298#   1431
MTEST   012716             849#
MWRITE  004256             268#   1430
NEWBSF  022570             973    1026   1238   1383   1704   1770#  1850   1872
NEWENT  006200             299#   1229   1733
NEWFAC  002300             139#    976*  1295   1298*  1853*
NEWLD   003505             253#    876
NEWPOS  002324             149#   2310*  2311*  2438*  2441*  2452   2462   2477
NHWSEC  003562             255#    972   1849
NILCLK  010420             446     457    461#
NOCLK   006777             313#    461
NOCRDY  003775             261#   2152
NOCTLR  007072             315#    593
NODRIV  004021             262#
NOENTR  005725             293#   1371
NOFACT  015352             990    1090#
NOFIEL  015440            1042    1099#
NOFLDE  003662             258#   1413
NOLOAD  003433             251#    867
NOMSEC  015526            1108#   1127   1133   1135   1139   1143   1146
NOSNUM  015324            1076#   1131*  1178   1243   2025*  2030*
NOTIM   007035             314#    462
NOTRDY  006505             306#    609    820   1280
NSWSEC  003636             257#   1025   1237   1382   1703   1871
NXM     = 020000            43#
NXTCMD  013546             895     913#   945    948   1157   1160   1172   1319   1332   1335   1347   1435   1438
                          1506    1509   1814   1817   1828
NXTSEC  021446            1575    1595#
NXTTRK  021460            1602#   1682
NXTUNI  002330             151#    771*   773    792*   829
OK      006340             302#   1843   1868
ONESEC  021562            1590    1625#
OPI     = 002000            48#   1897
OVRMAX  006251             301#    998   1050
O$APTS= 000000              7#     15
```

```
O$AU   = 000001            7#     11#     15
O$BGNR= 000001             7#     11#     15
O$BGNS= 000001             7#     11#     15
O$DU   = 000001            7#     11#     15
O$ERRT= 000000             7#     15
O$GNSW= 000001             7#     11#     15
O$POIN= 000001             7#     11#     15
O$SETU= 000000             7#     15     2628
PASWD   002344           157#    896     900
PASWOR  004044           264#    899
PNT    = 001000 G         29#
POWER   011160           499     552     557#
PRFLGS  002266           134#
PRGER   003735           260#   1889
PRI    = 002000 G         29#
PRI00  = 000000 G         29#    631
PRI01  = 000040 G         29#
PRI02  = 000100 G         29#
PRI03  = 000140 G         29#
PRI04  = 000200 G         29#
PRI05  = 000240 G         29#
PRI06  = 000300 G         29#
PRI07  = 000340 G         29#
PRPOS   002322           148#   1613*   1627    2323    2425    2426*   2436*   2437*   2453    2477*
PSNFG   015350           960*    985*   1020*   1037*   1086#
PTIME   012502           333     803#   1320    1447    1468    1543
PWRCH   010470           443     460     464#
PWRFLG  002466           203#    437*    466*
RDBDSC  023656           956    1168    1343    1525    1692    1834    1923#
RDBSEX  025220          2105    2109#
RDBSFI  025142          2087    2089    2097    2100#
RDFACT  025032           963    1116    1835    2082#
RDFIEL  025076          1015    1118    1374    1693    1860    2092#
RDHDR  = 000010            72#   1928    1961    2414    2432
READ   = 000014            74#   1570    1632    1984    2101
RECNT   002326           150#   2492
RESTAR  011064           541     544#
RETRY   002242           124#
RL1CLM  005756           294#   1201
RPTCOD  010140 G         410#
RSEEK   002306           142#
SAWFWD  006603           308#   1463
SAWREV  006636           309#   1472
SECMAX  015340           966*   1017*   1082#   1109    1232*   1378*   1699*   1839*   1864*
SECMSK  002336           154#
SECNUM  015342           967*   1018*   1083#   1108*   1109    1230*   1376*   1698*   1838*   1863*   2100
SECOLD  015344          1084#   1124*   1125*   1245*   1246*   1777*
SECOND  002426           187#    805
SEEK   = 000006            71#   1610    1950    2422    2467
SELDRV  012400           773#    853     947    1159    1334    1437    1508    1816
SELTBL  011162           471     489     515     522     537     561#    580     770
SERNM1  002274           137#    984    1036    1136*
SERNM2  002276           138#    984    1036    1140*
SFTCNT  002232           120#   1457*   1523*   1546    1589*   1663*   1675*   2266*   2354*   2364*
SFTPRM  035600 G        2612#
SIGN   = 000004            78#   1609    1949
```

```
SKDON = 000001   38#
SKECNT  002234   121#
SKFNC   027136   2312  2442  2450#
SKHS  = 000020   79#  1617  1949  2464
SKTO  = 010000   58#
SKWRT = 026152   2214  2301#
SMSG    003243   244#  347  1011  1063  1733
SMSK    002342   156#
SN1     002456   199#  1184  1186  1245  1786  1789  1792  1796
SN2     002460   200#  1185  1186  1246  1790  1792  1797
SOFTCS  002310   143#
SPE   = 004000   59#
SPTCOD  010126 G 395#
SRD1    021302   1567#  1597
STARMS  002573   235#  955  1070
STBLE   011222   517  562#
STFLG   002474   206#  435*  512  542*  894
STREAD  021274   1535  1538  1565#
STWRT   025672   2219  2221  2224  2242#  2276
SVCGBL= 000000   7#  14  15  19  21  27  118  221  327  329  355  389  390
                 395  396  402  404  410  411  418  428  430  575  627  628  642
                 643  647  648  661  707  717  1903  2591  2592  2612  2613  2628#
SVCINS= 000000   7#  8#  15  19  21  347  350  351  353  359  360  362  390
                 396  404  412  432  434  439  440  444  445  447  448  450  452
                 453  454  455  461  462  464  465  480  502  503  524  525  540
                 541  545  558  583  591  593  594  604  607  609  611  620  624
                 630  631  632  634  637  638  644  649  704  712  728  732  805
                 811  812  820  862  867  872  876  881  883  898  899  903  905
                 906  907  908  909  910  911  915  916  955  957  959  964  972
                 979  984  998  999  1000  1011  1021  1025  1031  1036  1050  1051  1052
                 1063  1068  1069  1070  1071  1093  1094  1102  1103  1111  1155  1171  1174
                 1180  1181  1184  1185  1186  1187  1194  1201  1203  1204  1222  1229  1237
                 1273  1274  1280  1285  1318  1321  1330  1346  1349  1353  1354  1355  1356
                 1371  1382  1413  1430  1431  1452  1455  1460  1463  1469  1472  1502  1519
                 1544  1546  1547  1548  1580  1587  1646  1649  1655  1656  1672  1673  1703
                 1733  1734  1771  1789  1790  1792  1793  1812  1827  1830  1836  1843  1849
                 1861  1868  1871  1889  1906  1936  1958  1969  2011  2021  2066  2073  2107
                 2144  2152  2257  2264  2343  2346  2352  2353  2369  2394  2402  2475  2579
                 2592  2593  2594  2595  2613  2614  2615  2616  2628
SVCSUB= 177777   7#
SVCTAG= 000000   7#  9#  353  362  393  399  412  558  624  638  644  649  656
                 659  704  712  720  723  748  750  766  768  799  801  807  809
                 815  817  824  827  844  847  890  892  899  916  936  942  1000
                 1052  1151  1153  1174  1181  1184  1185  1187  1194  1203  1204  1266  1270
                 1274  1325  1328  1349  1354  1355  1356  1423  1428  1431  1490  1495  1620
                 1623  1684  1688  1734  1765  1768  1771  1789  1790  1793  1805  1810  1830
                 1906  1910  1921  2119  2121  2379  2383  2523  2524  2532  2533  2535  2538
                 2579  2582  2583  2588  2589  2595  2616
SVCTST= 177777   7#  843
SWRT1   025700   2244#  2273
SWSEC   003610   256#  1102  2011
SYSCLK  002372   168#  442*  459*  496  635  803
SYSMSK  002332   152#
S$LSYM= 010000   7#  353#  362#  393#  399#  412#  558#  624#  638#  644#  649#  704#  712#
                 899#  916#  1000#  1052#  1174#  1181#  1184#  1185#  1187#  1194#  1203#  1204#  1274#
                 1349#  1354#  1355#  1356#  1431#  1734#  1771#  1789#  1790#  1793#  1830#  1906#  2579#
```

```
                        2595#  2616#
TBLFUL  006040           296#  2066   2402
TDR     002316           146#   786*   789*   812   1197   1291   1532   1940   1974   2007   2059   2086   2096
                        2211   2216   2439
TEMP0   002414           182#   861*   865    870    874    899    900    950    974    976   1000   1001   1027
                        1052   1053   1162   1174   1175   1181   1182   1187   1188   1239   1274   1275   1278
                        1337   1349   1350   1384   1431   1432   1442   1511   1705   1734   1735   1771   1772
                        1793   1794   1798*  1801*  1819   1830   1831   1851   1853   1873   1987*  2053   2067*
                        2071   2125*  2128*  2131*
TEMP1   002416           183#   986*   996   1003*  1038*  1048   1055*  1390*  1391*  1392*  1393   1529*  1537
                        1568   1602   1604*  1616*  1629   2034*  2038*  2040*  2042*  2043   2044*  2045*  2046
                        2220   2245   2291   2302*  2311   2315*  2324
TEMP2   002420           184#  2037*  2044   2047*  2048*  2049*  2050
TEMP3   002422           185#  1986*  2005   2057   2064*
TFMSG   002777           237#  1069
THARD   003076           240#  1547
THISDR  006750           312#  1174   1349   1830
TICK    002424           186#   671
TILLEN  006114           297#  1000   1052
TIME    010047           379#   805
TMMSG   003022           238#  1068
TRPFLG  002470           204#   582*   588    795*
TRPHAN  012474           583    630    795#
TSOFT   003047           239#  1546
T$ARGC= 000002            15#   347#   350#   351#   359#   360#   461#   462#   591#   593#   607#   609#   805#
                         811#   812#   820#   862#   867#   872#   876#   898#   903#   905#   906#   907#   908#
                         909#   910#   911#   915#   955#   957#   959#   964#   972#   979#   984#   998#   999#
                        1011#  1021#  1025#  1031#  1036#  1050#  1051#  1063#  1068#  1069#  1070#  1071#  1093#
                        1094#  1102#  1103#  1111#  1155#  1171#  1180#  1186#  1201#  1222#  1229#  1237#  1273#
                        1280#  1285#  1318#  1321#  1330#  1346#  1353#  1371#  1382#  1413#  1430#  1452#  1455#
                        1460#  1463#  1469#  1472#  1502#  1519#  1544#  1546#  1547#  1548#  1580#  1646#  1655#
                        1656#  1672#  1673#  1703#  1733#  1792#  1812#  1827#  1836#  1843#  1849#  1861#  1868#
                        1871#  2011#  2021#  2066#  2073#  2107#  2257#  2343#  2352#  2353#  2369#  2402#
T$CODE= 001052           899#   916#  1000#  1052#  1174#  1181#  1184#  1185#  1187#  1194#  1203#  1204#  1274#
                        1349#  1354#  1355#  1356#  1431#  1734#  1771#  1789#  1790#  1793#  1830#  2593#  2594#
                        2614#  2615#
T$ERRN= 001022            7#   881#  1587#  1649#  1889#  1936#  1958#  1969#  2152#  2264#  2346#  2394#  2475#
T$EXCP= 000000           899#   916#  1184#  1185#  1194#  1203#  1204#  1354#  1355#  1356#  1789#  1790#  2593#
                        2594#  2615#
T$GMAN= 000000            7#   899#   916#  1184#  1185#  1194#  1203#  1204#  1354#  1355#  1356#  1789#  1790#
T$HILI= 177777           899#   916#  1184#  1185#  1194#  1203#  1204#  1354#  1355#  1356#  1789#  1790#  2593#
                        2594#  2615#
T$LAST= 000001            7#  2628#
T$LOLI= 000001           899#   916#  1184#  1185#  1194#  1203#  1204#  1354#  1355#  1356#  1789#  1790#  2593#
                        2594#  2615#
T$LSYM= 010000            7#   353    362    393    399    412    558    624    638    644    649    704    712
                        1906   2579   2595   2616
T$LTNO= 000001
                        2628#
T$NEST= 177777            7#    14#    16#    27#    86#   118#   216#   221#   321#   327#   329#   353#   355#
                         362#   387#   389#   390#   393#   394#   395#   396#   399#   400#   402#   406#   410#
                         411#   412#   413#   418#   422#   428#   430#   558#   564#   575#   624#   627#   628#
                         638#   640#   642#   643#   644#   645#   647#   648#   649#   650#   661#   704#   707#
                         712#   717#   836#   843#  1903#  1906#  2579#  2591#  2592#  2595#  2610#  2612#  2613#
                        2616#  2627#
T$NSO = 000000            14#    16     27#    86    118#   216    221#   321    327#   387    389#   394    395#
                         400    402#   406    410#   413    418#   422    428#   564    575#   624    627#   640
```

```
                    642#  645   647#  650   661#  704   707#  712   717#  836   843#  2579  2591#
                   2610   2612# 2627
T$NS1 = 000005      329#  353   355#  362   390#  393   396#  399   411#  412   430#  558   628#
                    638   643#  644   648#  649   1903# 1906  2592# 2595  2613# 2616
T$PTNU= 000000        7#
T$SAVL= 177777        7#
T$SEGL= 177777        7#
T$SUBN= 000000        7#  843#
T$TAGL= 177777        7#
T$TAGN= 010021        7#  329#  355#  390#  396#  411#  418#  430#  575#  628#  643#  648#  661#
                    707#  843#  1903# 2592# 2613#
T$TEMP= 000000       16#   86#  216#  321#  353#  362#  387#  393#  394#  399#  400#  404#  406#
                    412#  413#  422#  558#  564#  624#  638#  640#  644#  645#  649#  650#  656#
                    659#  704#  712#  720#  723#  748#  750#  766#  768#  799#  801#  807#  809#
                    815#  817#  824#  827#  836#  844#  847#  890#  892#  899#  916#  936#  942#
                   1000#  1052# 1151# 1153# 1174# 1181# 1184# 1185# 1187# 1194# 1203# 1204# 1266#
                   1270#  1274# 1325# 1328# 1349# 1354# 1355# 1356# 1423# 1428# 1431# 1490# 1495#
                   1620#  1623# 1684# 1688# 1734# 1765# 1768# 1771# 1789# 1790# 1793# 1805# 1810#
                   1830#  1906# 1910# 1921# 2119# 2121# 2379# 2383# 2523# 2524# 2532# 2533# 2535#
                   2538#  2579# 2582# 2583# 2588# 2589# 2593# 2594# 2595# 2610# 2614# 2615# 2616#
                   2627#
T$TEST= 000001        7#  843#  2628
T$TSTM= 177777        7#  347   350   351   353   359   360   362   412   432   434   439   444
                    447   450   452   454   455   461   462   464   502   524   540   545   558
                    583   591   593   594   607   609   611   620   624   630   631   632   634
                    637   638   644   649   728   732   805   811   812   820   862   867   872
                    876   881   883   898   899   903   905   906   907   908   909   910   911
                    915   916   955   957   959   964   972   979   984   998   999   1000  1011
                   1021  1025  1031  1036  1050  1051  1052  1063  1068  1069  1070  1071  1093
                   1094  1102  1103  1111  1155  1171  1174  1180  1181  1184  1185  1186  1187
                   1194  1201  1203  1204  1222  1229  1237  1273  1274  1280  1285  1318  1321
                   1330  1346  1349  1353  1354  1355  1356  1371  1382  1413  1430  1431  1452
                   1455  1460  1463  1469  1472  1502  1519  1544  1546  1547  1548  1580  1587
                   1646  1649  1655  1656  1672  1673  1703  1733  1734  1771  1789  1790  1792
                   1793  1812  1827  1830  1836  1843  1849  1861  1868  1871  1889  1936  1958
                   1969  2011  2021  2066  2073  2107  2152  2257  2264  2343  2346  2352  2353
                   2369  2394  2402  2475  2579
T$TSTS= 000001        7#  843#
T$$AU = 010011      643#  644
T$$AUT= 010007      575#  624
T$$CLE= 010010      628#  638
T$$DU = 010012      648#  649
T$$HAR= 010017     2592#  2595
T$$HW = 010002      390#  393
T$$INI= 010006      430#  558
T$$MSG= 010001      329#  353   355#  362
T$$PRO= 010005      418#
T$$RPT= 010004      411#  412
T$$SOF= 010020     2613#  2616
T$$SRV= 010016      661#  704   707#  712   1903# 1906
T$$SW = 010003      396#  399
T$$TES= 010015      843#  2579
T1      012716 G    404   843#
UAM   = 000200 G     29#
UPDATE  011732 G    661#  728   732
UUT     002454      198#  467   521*  534
```

```
VALSN   006007          295#   1187   1793
VC    = 001000           61#    874
VERIFY  004241          267#   1502
WCPAT   030462         2546    2550   2561#
WDE   = 100000           55#
WGE   = 002000           60#
WHATCM  013216          851     854    894#
WL    = 020000           57#    870   1283   1449
WNXSEC  026044         2252    2271#
WNXTRK  026076         2281#   2377
WRBUF   030412         2201    2540#
WRCHK = 000002           69#
WRINIT  002346          158#
WRIPG   002320          147#   1299*
WRITE = 000012           73#   1294   2247   2329
WRPACK  025514         1465    1474   2192#
WRPKF   006674          310#   1460
WRPKR   006722          311#   1469
WRTBSF  016770          977    1029   1261   1272#  1419   1757   1854   1875
WRTCNT  002240          123#   2274*  2275   2277*
WRTLCK  003460          252#    872   1285   1452
WRTLIM  010132          398#   2275
WRTLOK  002462          201#    873*
WRTSAW  010130          397#   1461   1470   2281
WTRDY   025310         1302    1572   1612   1634   1930   1952   1963   1998   2103   2141#  2171   2249   2331
                       2416    2424   2434   2469
W1SEC   026226         2267    2321#
X$ALWA= 000000            7#
X$FALS= 000040            7#
X$OFFS= 000400            7#
X$TRUE= 000020            7#
.     = 035704            4#     19#   386#   453    480    561#   604    2144   2301   2527#  2530#  2584#
```

```
BCOMPL    445
BGNAU     643
BGNAUT    575
BGNCLN    628
BGNDU     648
BGNHRD   2592
BGNHW     390
BGNINI    430
BGNMOD     14    27   118   221   327   389   395   402   410   428   627   642   647   717  2591
          2612
BGNMSG    329   355
BGNPRO    418
BGNRPT    411
BGNSFT   2613
BGNSRV    661   707  1903
BGNSW     396
BGNTST    843
BNCOMP    440   448   465   503   525   541
BRESET    434   637
CLKON     109#  498   554
CLOCK     439   444
CLRVEC    455   620   632   634
DELAY     453   480   604  2144
DESCRI     19
DEVTYP     21
DISPAT    404
DODU      594   611
ENDAU     644
ENDAUT    624
ENDCLN    638
ENDDU     649
ENDHRD   2595
ENDHW     393
ENDINI    558
ENDMOD     16    86   216   321   387   394   400   406   413   564   640   645   650   836  2610
          2627
ENDMSG    353   362
ENDPRO    422
ENDRPT    412
ENDSFT   2616
ENDSRV    704   712  1906
ENDSW     399
ENDTST   2579
EQUALS     29
ERRDF     881  2152
ERRHRD   1936  1958  1969  2394  2475
ERRSF    1889
ERRSOF   1587  1649  2264  2346
GMANID    899   916  1184  1185  1194  1203  1204  1354  1355  1356  1789  1790
GMANIL   1000  1052  1174  1181  1187  1274  1349  1431  1734  1771  1793  1830
GPHARD    524
GPRMA    2593
GPRMD     899#  916#  1184#  1185#  1194#  1203#  1204#  1354#  1355#  1356#  1789#  1790#  2594  2615
GPRML    1000#  1052#  1174#  1181#  1187#  1274#  1349#  1431#  1734#  1771#  1793#  1830#  2614
HEADER     15
LASTAD   2628
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         1355#  1356#  1431#  1734#  1771#  1789#  1790#  1793#  1830#  2593#  2594#  2614#  2615#
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          862#   867#   872#   876#   898#   903#   905#   906#   907#   908#   909#   910#   911#   915#   955#
          957#   959#   964#   972#   979#   984#   998#   999#  1011#  1021#  1025#  1031#  1036#  1050#  1051#
         1063#  1068#  1069#  1070#  1071#  1093#  1094#  1102#  1103#  1111#  1155#  1171#  1180#  1186#  1201#
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         1452#  1455#  1460#  1463#  1469#  1472#  1502#  1519#  1544#  1546#  1547#  1548#  1580#  1646#  1655#
         1656#  1672#  1673#  1703#  1733#  1792#  1812#  1827#  1836#  1843#  1849#  1861#  1868#  1871#  2011#
         2021#  2066#  2073#  2107#  2257#  2343#  2352#  2353#  2369#  2402#
M$DATA    15#    19#    21#
M$DECR    16#    86#   216#   321#   353#   362#   387#   393#   394#   399#   400#   406#   412#   413#   422#
          558#   564#   624#   638#   640#   644#   645#   649#   650#   704#   712#   836#  1906#  2579#  2595#
         2610#  2616#  2627#
M$DEFA    899#   916#  1000#  1052#  1174#  1181#  1184#  1185#  1187#  1194#  1203#  1204#  1274#  1349#  1354#
         1355#  1356#  1431#  1734#  1771#  1789#  1790#  1793#  1830#  2593#  2594#  2614#  2615#
M$ENDE    16#    86#   216#   321#   353#   362#   387#   393#   394#   399#   400#   406#   412#   413#   558#
          564#   624#   638#   640#   644#   645#   649#   650#   704#   712#   836#  1906#  2579#  2595#  2610#
         2616#  2627#
M$ERRI    881#  1587#  1649#  1889#  1936#  1958#  1969#  2152#  2264#  2346#  2394#  2475#
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M$GEN     14#    15#    19#    21#    27#   118#   221#   327#   329#   353#   355#   362#   389#   390#   393#
          395#   396#   399#   402#   404#   410#   411#   412#   418#   428#   430#   558#   575#   624#   627#
          628#   638#   642#   643#   644#   647#   648#   649#   661#   704#   707#   712#   717#   843#   899#
          916#  1000#  1052#  1174#  1181#  1184#  1185#  1187#  1194#  1203#  1204#  1274#  1349#  1354#  1355#
         1356#  1431#  1734#  1771#  1789#  1790#  1793#  1830#  1903#  1906#  2579#  2591#  2592#  2595#  2612#
         2613#  2616#  2628#
M$GENB    899#   916#  1000#  1052#  1174#  1181#  1184#  1185#  1187#  1194#  1203#  1204#  1274#  1349#  1354#
         1355#  1356#  1431#  1734#  1771#  1789#  1790#  1793#  1830#
M$GETS    16#    86#   216#   321#   353#   362#   387#   393#   394#   399#   400#   406#   412#   413#   422#
          558#   564#   624#   638#   640#   644#   645#   649#   650#   704#   712#   836#  1906#  2579#  2595#
         2610#  2616#  2627#
M$GNGB    14#    15#    19#    21#    27#   118#   221#   327#   329#   355#   389#   390#   395#   396#   402#
          404#   410#   411#   418#   428#   430#   575#   627#   628#   642#   643#   647#   648#   661#   707#
          717#  1903#  2591#  2592#  2612#  2613#  2628#
M$GNIN    15#    19#    21#   347#   350#   351#   353#   359#   360#   362#   390#   396#   404#   412#   432#
          434#   439#   440#   444#   445#   447#   448#   450#   452#   453#   454#   455#   461#   462#   464#
          465#   480#   502#   503#   524#   525#   540#   541#   545#   558#   583#   591#   593#   594#   604#
          607#   609#   611#   620#   624#   630#   631#   632#   634#   637#   638#   644#   649#   704#   712#
          728#   732#   805#   811#   812#   820#   862#   867#   872#   876#   881#   883#   898#   899#   903#
          905#   906#   907#   908#   909#   910#   911#   915#   916#   955#   957#   959#   964#   972#   979#
          984#   998#   999#  1000#  1011#  1021#  1025#  1031#  1036#  1050#  1051#  1052#  1063#  1068#  1069#
         1070#  1071#  1093#  1094#  1102#  1103#  1111#  1155#  1171#  1174#  1180#  1181#  1184#  1185#  1186#
         1187#  1194#  1201#  1203#  1204#  1222#  1229#  1237#  1273#  1274#  1280#  1285#  1318#  1321#  1330#
         1346#  1349#  1353#  1354#  1355#  1356#  1371#  1382#  1413#  1430#  1431#  1452#  1455#  1460#  1463#
         1469#  1472#  1502#  1519#  1544#  1546#  1547#  1548#  1580#  1587#  1646#  1649#  1655#  1656#  1672#
         1673#  1703#  1733#  1734#  1771#  1789#  1790#  1792#  1793#  1812#  1827#  1830#  1836#  1843#  1849#
         1861#  1868#  1871#  1889#  1906#  1936#  1958#  1969#  2011#  2021#  2066#  2073#  2107#  2144#  2152#
         2257#  2264#  2343#  2346#  2352#  2353#  2369#  2394#  2402#  2475#  2579#  2592#  2593#  2594#  2595#
         2613#  2614#  2615#  2616#  2628#
M$GNLS    899#   916#  1000#  1052#  1174#  1181#  1184#  1185#  1187#  1194#  1203#  1204#  1274#  1349#  1354#
         1355#  1356#  1431#  1734#  1771#  1789#  1790#  1793#  1830#
M$GNTA    353#   362#   393#   399#   412#   558#   624#   638#   644#   649#   704#   712#  1906#  2579#  2595#
         2616#
M$GNTE    843#
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M$HAPT 15#

M$HNAP 15#

M$INCR 14# 27# 118# 221# 327# 329# 347# 350# 351# 353# 355# 359# 360# 362# 389#
390# 395# 396# 402# 410# 411# 412# 418# 428# 430# 432# 434# 439# 444# 447#
450# 452# 454# 455# 461# 462# 464# 502# 524# 540# 545# 558# 575# 583# 591#
593# 594# 607# 609# 611# 620# 624# 627# 628# 630# 631# 632# 634# 637# 638#
642# 643# 644# 647# 648# 649# 661# 707# 717# 728# 732# 805# 811# 812# 820#
84[illegible]# 862# 867# 872# 876# 881# 883# 898# 899# 903# 905# 906# 907# 908# 909#
910# 911# 915# 916# 955# 957# 959# 964# 972# 979# 984# 998# 999# 1000# 1011#
1021# 1025# 1031# 1036# 1050# 1051# 1052# 1063# 1068# 1069# 1070# 1071# 1093# 1094# 1102#
1103# 1111# 1155# 1171# 1174# 1180# 1181# 1184# 1185# 1186# 1187# 1194# 1201# 1203# 1204#
1222# 1229# 1237# 1273# 1274# 1280# 1285# 1318# 1321# 1330# 1346# 1349# 1353# 1354# 1355#
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1936# 1958# 1969# 2011# 2021# 2066# 2073# 2107# 2152# 2257# 2264# 2343# 2346# 2352# 2353#
2369# 2394# 2402# 2475# 2579# 2591# 2592# 2612# 2613#

M$LDRO 432# 439# 444# 452# 454# 455# 464# 502# 524# 540# 594# 611# 620# 631# 632#
634# 883#

M$MCHI 7#

M$MCLO 7#

M$POP 16# 86# 216# 321# 353# 362# 387# 393# 394# 399# 400# 406# 412# 413# 422#
558# 564# 624# 638# 640# 644# 645# 649# 650# 704# 712# 836# 1906# 2579# 2595#
2610# 2616# 2627#

M$PRIN 347# 350# 351# 359# 360# 461# 462# 591# 593# 607# 609# 805# 811# 812# 820#
862# 867# 872# 876# 898# 903# 905# 906# 907# 908# 909# 910# 911# 915# 955#
957# 959# 964# 972# 979# 984# 998# 999# 1011# 1021# 1025# 1031# 1036# 1050# 1051#
1063# 1068# 1069# 1070# 1071# 1093# 1094# 1102# 1103# 1111# 1155# 1171# 1180# [illegible]186# 1201#
1222# 1229# 1237# 1273# 1280# 1285# 1318# 1321# 1330# 1346# 1353# 1371# 1382# 1413# 1430#
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2021# 2066# 2073# 2107# 2257# 2343# 2352# 2353# 2369# 2402#

M$PUSH 14# 27# 118# 221# 327# 329# 355# 389# 390# 395# 396# 402# 410# 411# 418#
428# 430# 575# 627# 628# 642# 643# 647# 648# 661# 707# 717# 843# 1903# 2591#
2592# 2612# 2613#

M$PUT 347# 350# 351# 359# 360# 450# 461# 462# 545# 583# 591# 593# 607# 609# 630#
728# 732# 805# 811# 812# 820# 862# 867# 872# 876# 898# 903# 905# 906# 907#
908# 909# 910# 911# 915# 955# 957# 959# 964# 972# 979# 984# 998# 999# 1011#
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1111# 1155# 1171# 1180# 1186# 1201# 1222# 1229# 1237# 1273# 1280# 1285# 1318# 1321# 1330#
1346# 1353# 1371# 1382# 1413# 1430# 1452# 1455# 1460# 1463# 1469# 1472# 1502# 1519# 1544#
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2402#

M$PUT1 347# 350# 351# 359# 360# 450# 461# 462# 545# 583# 591# 593# 607# 609# 630#
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908# 909# 910# 911# 915# 955# 957# 959# 964# 972# 979# 984# 998# 999# 1011#
1021# 1025# 1031# 1036# 1050# 1051# 1063# 1068# 1069# 1070# 1071# 1093# 1094# 1102# 1103#
1111# 1155# 1171# 1180# 1186# 1201# 1222# 1229# 1237# 1273# 1280# 1285# 1318# 1321# 1330#
1346# 1353# 1371# 1382# 1413# 1430# 1452# 1455# 1460# 1463# 1469# 1472# 1502# 1519# 1544#
1546# 1547# 1548# 1580# 1646# 1655# 1656# 1672# 1673# 1703# 1733# 1792# 1812# 1827# 1836#
1843# 1849# 1861# 1868# 1871# 2011# 2021# 2066# 2073# 2107# 2257# 2343# 2352# 2353# 2369#
2402#

M$RADI 899# 916# 1000# 1052# 1174# 1181# 1184# 1185# 1187# 1194# 1203# 1204# 1274# 1349# 1354#
1355# 1356# 1431# 1734# 1771# 1789# 1790# 1793# 1830# 2593# 2594# 2614# 2615#

M$RNRO 439# 444# 524#

M$SETS 14# 27# 118# 221# 327# 329# 355# 389# 390# 395# 396# 402# 410# 411# 418#
428# 430# 575# 627# 628# 642# 643# 647# 648# 661# 707# 717# 843# 1903# 2591#
2592# 2612# 2613#

M$SVC 347# 350# 351# 353# 359# 360# 362# 412# 432# 434# 439# 444# 447# 450# 452#
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609# 611# 620# 624# 630# 631# 632# 634# 637# 638# 644# 649# 728# 732# 805#
811# 812# 820# 862# 867# 872# 876# 881 883# 898# 899# 903# 905# 906# 907#
908# 909# 910# 911# 915# 916# 955# 957# 959# 964# 972# 979# 984# 998# 999#
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1519# 1544# 1546# 1547# 1548# 1580# 1587 1646# 1649 1655# 1656# 1672# 1673# 1703# 1733#
1734# 1771# 1789# 1790# 1792# 1793# 1812# 1827# 1830# 1836# 1843# 1849# 1861# 1868# 1871#
1889 1936 1958 1969 2011# 2021# 2066# 2073# 2107# 2152 2257# 2264 2343# 2346 2352#
2353# 2369# 2394 2402# 2475 2579#

M$TLAB 347# 350# 351# 353# 359# 360# 362# 412# 432# 434# 439# 444# 447# 450# 452#
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1094# 1102# 1103# 1111# 1155# 1171# 1174# 1180# 1181# 1184# 1185# 1186# 1187# 1194# 1201#
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1734# 1771# 1789# 1790# 1792# 1793# 1812# 1827# 1830# 1836# 1843# 1849# 1861# 1868# 1871#
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M$TSTL 347# 350# 351# 353# 359# 360# 362# 412# 432# 434# 439# 444# 447# 450# 452#
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1889# 1936# 1958# 1969# 2011# 2021# 2066# 2073# 2107# 2152# 2257# 2264# 2343# 2346# 2352#
2353# 2369# 2394# 2402# 2475# 2579#

M$WORD 15# 404# 881# 899# 916# 1000# 1052# 1174# 1181# 1184# 1185# 1187# 1194# 1203# 1204#
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1936# 1958# 1969# 2152# 2264# 2346# 2394# 2475# 2593# 2594# 2614# 2615# 2628

POINTE 11

PRINTB 347 350 351 359 360 805

PRINTF 461 462 591 593 607 609 811 812 820 862 867 872 876 898 903
905 906 907 908 909 910 911 915 955 957 959 964 972 979 984
998 999 1011 1021 1025 1031 1036 1050 1051 1063 1068 1069 1070 1071 1093
1094 1102 1103 1111 1155 1171 1180 1186 1201 1222 1229 1237 1273 1280 1285
1318 1321 1330 1346 1353 1371 1382 1413 1430 1452 1455 1460 1463 1469 1472
1502 1519 1544 1546 1547 1548 1580 1646 1655 1656 1672 1673 1703 1733 1792
1812 1827 1836 1843 1849 1861 1868 1871 2011 2021 2066 2073 2107 2257 2343
2352 2353 2369 2402

READBU 447

```
READEF    464     502     540
SETPRI    432     452     454     631     883
SETVEC    450     545     583     630     728     732
STARS     656     659     720     723     748     750     766     768     799     801     807     809     815     817     824
          827     844     847     890     892     936     942    1151    1153    1266    1270    1325    1328    1423    1428
         1490    1495    1620    1623    1684    1688    1765    1768    1805    1810    1910    1921    2119    2121    2379
         2383    2523    2524    2532    2533    2535    2538    2582    2583    2588    2589
SVC        5#       7
WAITMS    93#     453     480
WAITUS   103#     604    2144


. ABS.  035704     000


 ERRORS DETECTED:  0

 ,CZRLMB.LST/CRF=SVC33/ML,CZRLMB.MAC
 RUN-TIME: 121 116 10 SECONDS
 RUN-TIME RATIO: 502/248=2.0
 CORE USED:  16K  (31 PAGES)
```