RK611/RK06

SUBSYSTEM VERIFICTION 2

MD-11-DZR6N-B

EP-DZR6N-B-DL-A

FICHE 1 OF 2

NOV 1976

digital

MADE IN USA

RK611/RK06

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MD-11-DZR6N-B

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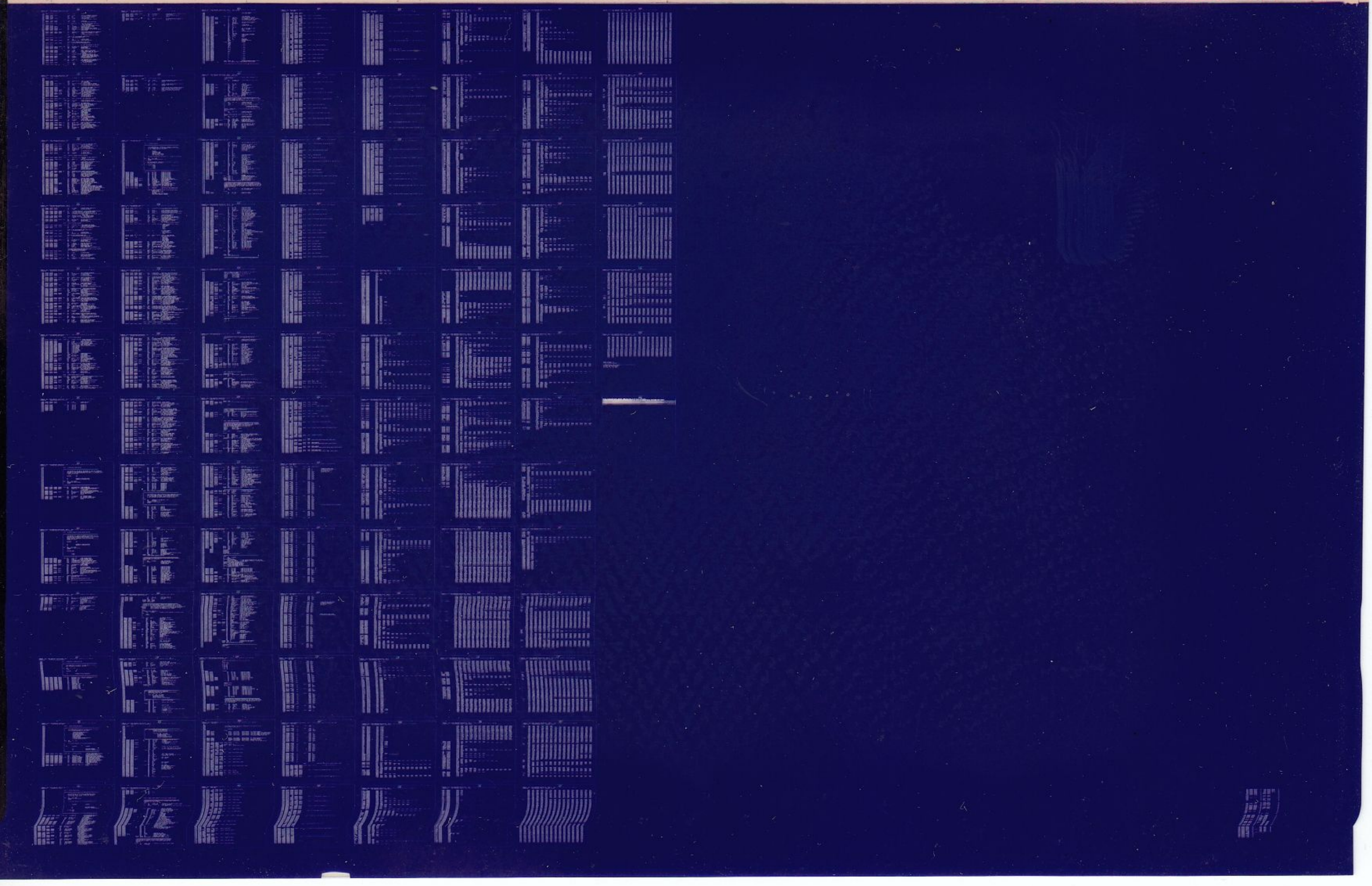

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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZR6N-B-D

PRODUCT NAME: RK611/RK06 SUBSYSTEM VERIFICATION:PART 2

DATE: AUGUST 1976

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: DAVE HOFFMAN

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1.0 ABSTRACT

THIS PROGRAM PERFORMS PART 2 OF THE RK611/RK06 SUBSYSTEM VERIFICATION TESTS, WHICH PROVIDE A FUNCTIONAL SHAKEDOWN OF THE ENTIRE SUBSYSTEM, INCLUDING THE UNIBUS INTERFACE AND ACCESS TO MAIN MEMORY. THE TESTING IN PART 2 EMPLOYS WORST-CASE SITUATIONS INVOLVING HEAD OFFSETTING, MEMORY ADDRESSING AND DATA TRANSFER, UNIBUS CYCLE CONTENTION, AND MULTIPLE DRIVE OPERATIONS. ADDITIONALLY, AN RK06 HEAD ALIGNMENT AID IS PROVIDED TO FACILITATE ON-LINE ALIGNMENT OF DRIVE HEADS.

WITHIN THE VARIOUS SUBSYSTEM TESTS, EMPHASIS IS GIVEN TO USEFUL SCOPE LOOPS AND OPERATOR SPECIFICATION OF TEST PARAMETER VALUES. AT THE BEGINNNG OF TESTING, THE FOLLOWING OPTIONS MAY BE SPECIFIED BY THE USER:

- RK611 REGISTER ADDRESS
- RK06 VECTOR ADDRESS
- RK06 PRIORITY LEVEL
- DRIVE (S) TO BE TESTED
- TEST (S) TO BE RUN
- NUMBER OF TEST ITERATIONS
- INITIAL DISK ADDRESS ON TRANSFERS
- DATA PATTERNS USED
- STALL TIME BETWEEN OPERATIONS

IN ADDITION, STANDARD SWITCH REGISTER OPTIONS ARE PROVIDED, FOR A VARIETY OF PROGRAM LOOPING, RUNNING, AND REPORTING MODES.

ERRORS WILL BE REPORTED AS THEY OCCUR. THE REPORT WILL INCLUDE A TEST NUMBER AND DESCRIPTION, CURRENT AND PREVIOUS OPERATIONS, GOOD AND BAD TEST DATA, AND APPLICABLE DEVICE REGISTER CONTENTS.

2.0 HARDWARE REQUIREMENTS

2.1 REQUIREMENTS FOR SUBSYSTEM TESTS

THE FOLLOWING HARDWARE IS REQUIRED TO RUN PART 2 OF THE SUBSYSTEM VERIFICATION TESTS:

- PDP-11/04,(05,10 MFG. ONLY),20,34,35,40,45,50,70 OR PDQ
- 16 K MEMORY
- CONSOLE TELETYPE
- RK06 UNIBUS CONTROLLER (RK611)
- 1 TO 8 RK06 DRIVES
- 1 TO 8 RK06 DISK CARTRIDGES (FORMATTED IN 20 OR 22 SECTOR FORMAT)

2.2 REQUIREMENTS FOR HEAD ALIGNMENT AID

```
202
203                         ADDITIONAL HARDWARE IS REQUIRED BY THE RK06 HEAD ALIGNMENT AID:
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RK06 FIELD TEST BOX (OR ALIGNMENT SECTION THEREOF)
RK06 ALIGNMENT CARTRIDGE
RK06 HEAD ALIGNMENT TOOL

3.0 PRELIMINARY PROGRAM REQUIREMENTS

BEFORE RUNNING THE SUBSYSTEM VERIFICATION PROGRAM, THE RK611 CONTROLLER DIAGNOSTIC (MAINDEC-11-DZR6A THRU DZR6F AND DZR6K) AND RK06 DRIVE DIAGNOSTIC (MAINDEC-11-DZR6H THRU DZR6J) SHOULD FIRST BE RUN, TO RESOLVE BASIC, SOLID HARDWARE FAULTS.

4.0 GENERAL PROGRAM CONSIDERATIONS

4.1 SYSMAC

THIS PROGRAM USES PORTIONS OF THE SYSMAC DIAGNOSTIC SYSTEM MACRO PACKAGE.

4.2 XXDP

THIS PROGRAM MAY BE LOADED UNDER XXDP. SUBSYSTEM TESTS 1-6 MAY BE RUN IN CHAIN OR DUMP MODE, BUT THE ALIGNMENT AID MAY ONLY BE RUN IN DUMP MODE.

4.2.1 CHAIN MODE

THIS PROGRAM IS DESIGNED TO BE RUN IN THE DEFAULT MODE WHEN CHAINED UNDER XXDP. THUS, INPUT DIALOGUE IS BYPASSED, AND RK06 UNIBUS ADDRESS AND INTERRUPT VECTOR ARE DEFAULTED TO STANDARD VALUES. ALL DRIVES PRESENT AND READY WILL BE TESTED WITH THE EXCEPTION OF DRIVE 0, IF THE RK06 CONTAINS THE XXDP MEDIUM.

4.2.2 DUMP MODE

THE PROGRAM CAN BE RUN IN DUMP MODE, WITH OR WITHOUT DEFAULT PARAMETERS. DRIVE 0 MAY BE TESTED, BUT IF IT CONTAINS THE XXDP MEDIUM, THE OPERATOR MUST REPLACE THE XXDP PACK WITH A FORMATTED SCRATCH PACK PRIOR TO TESTING (OR AN ALIGNMENT CARTRIDGE IF ALIGNMENT IS TO BE DONE ON DRIVE 0). A MESSAGE WILL INFORM THE OPERATOR WHEN THIS IS NECESSARY.

4.3 ACT/APT

THE PROGRAM IS COMPATIBLE WITH ACT/APT CONVENTIONS. SUBSYSTEM TESTS 1-6 MAY BE RUN IN AUTOMATIC OR DUMP MODE, AND THE HEAD ALIGNMENT AID MAY ONLY BE RUN IN DUMP MODE.

4.3.1 AUTOMATIC MODE

THE PROGRAM PROVIDES FOR AUTOMATIC APT/ACT OPERATION. IN THIS MODE, PARAMETERS REVERT TO DEFAULT VALUES, AND ALL DRIVES WHICH ARE PRESENT AND READY ARE TESTED.

4.3.2 DUMP MODE

IN DUMP MODE, PARAMETERS MAY BE INPUT, OR DEFAULTED, AND SUBSYSTEM TESTS 1-6 OR HEAD ALIGNMENT AID MAY BE RUN.

4.3.3 APT ETABLE DEFINITIONS

THE FOLLOWING DEFINITIONS ARE VALID FOR SPECIFYING APT ENVIRONMENTAL TABLE (ETABLE) ENTRIES, VIA THE APT UTILITY PROGRAM "APPLU" :

1. SOFTWARE ENVIRONMENT
   =1 IF APT SCRIPT MODE
   =0 IF STANDALONE MODE

2. ENVIRONMENT MODE BYTE
   BIT 7 = 1 ETABLE DOES SIZING
         = 0 PROGRAM DOES SIZING
   BIT 6 = 1 SPOOL MESSAGES TO APT IF SCRIPT MODE
         = 0 DON'T SPOOL TO APT
   BIT 5 = 1 SUPPRESS CONSOLE OUTPUT
         = 0 ALLOW CONSOLE OUTPUT
   BITS 4-0   NOT USED

3. SWITCH 1 (SOFTWARE SWITCH REGISTER)
IF ENVIRONMENT MODE BIT 7 (SIZING BIT) IS SET TO 1, THE SOFTWARE SWITCH REGISTER WILL BE USED, INSTEAD OF THE HARDWARE CONSOLE SWITCH REGISTER. REGARDLESS OF WHICH ONE IS USED, ALL BITS DEFINED IN SECTION 6.2 (SWITCH REGISTER OPTIONS) MAY USED WHEN RUNNING IN STANDALONE MODE.
IN APT SCRIPT MODE, HOWEVER, BIT 14 (LOOP ON TEST) MUST ALWAYS BE SET TO 0.

4. SWITCH 2 (USER SWITCH REGISTER)
   NOT USED

```
                                5. MEMORY TYPES 1-4 AND MAX MEMORY ADDRESSES
                                        NOT USED
```

6. INTERRUPT VECTOR 1
USED WHEN ENVIRONMENT MODE BIT 7 = 1. DEFAULT = 210

7. BUS PRIORITY 1
USED WHEN ENVIRONMENT MODE BIT 7 = 1. DEFAULT = 5

8. INTERRUPT VECTOR 2
NOT USED

9. BUS PRIORITY 2
NOT USED

10. BASE ADDRESS
USED WHEN ENVIRONMENT MODE BIT 7 = 1. DEFAULT = 177440

11. DEVICE MAP
USED WHEN ENVIRONMENT MODE BIT 7 = 1. EACH BIT SET TO 1 IN BITS 0-7 WILL SELECT THE CORRESPONDING DRIVE TO BE TESTED.
BITS 8-15 ARE NOT USED.

4.4 DUAL-ACCESS

THIS PROGRAM DOES NOT UTILIZE DUAL-ACCESS. FOR THE PURPOSES OF ALL TESTS (1-6), AND THE HEAD ALIGNMENT AID (SECTION 11), THE OPERATOR MUST GUARANTEE THAT THERE IS NO INTERFERENCE FROM THE UNUSED PORT. IF FAILURES ARE ENCOUNTERED IN TESTS 1-6 DUE TO INTERFERENCE FROM THE OTHER PORT, THE OPERATOR IS ADVISED TO SWITCH THAT PORT OFF-LINE AND RE-RUN THE TESTS.

4.5 MEMORY MANAGEMENT

THIS PROGRAM SUPPORTS MEMORY MANAGEMENT OPTIONS KT11C,D AND PDP11/70, FOR THE PURPOSES OF TESTS 2-4 ONLY. IN THESE TESTS (SEE SECTION 9.7) DIRECT ACCESS TO ALL OF PHYSICAL MEMORY ABOVE THE PROGRAM IS EXERCISED. FOR THE DURATION OF THESE 3 TESTS, MEMORY MANAGEMENT IS ENABLED. IN ALL OTHER TESTS, AND DURING THE USE OF THE HEAD ALIGNMENT AID, MEMORY MANAGEMENT IS DISABLED.

4.6 MEMORY PARITY CHECK

IF THE MEMORY PARITY CHECK OPTION IS AVAILABLE ON THE SYSTEM, ALL TESTING IS DONE WITH PARITY CHECK ENABLED. PARITY ERRORS ARE REPORTED, AND TESTING IS ABORTED, UNLESS THE BYTE LABELED MEMABT WAS PREVIOUSLY LOADED WITH A NON-ZERO VALUE.

373 4.7 BAD SECTORS

ACCORDING TO A CONTROL SWITCH OPTION (SEE SECTION 8.2.4.2) THE BAD SECTOR FILE ON EACH DRIVE TO BE TESTED IS TYPED AT THE CONSOLE PRIOR TO TESTING. ALL DATA ERRORS OCCURRING IN THE PROGRAM ARE MASKED OUT IF THEY OCCUR ON SECTORS DESIGNATED AS BAD, (BY EITHER FACTORY OR SOFTWARE).

4.8 EXECUTION TIME

EXECUTION TIME IS DEPENDENT UPON PARAMETERS INPUT BY THE OPERATOR (SUCH AS STALL TIME OR ITERATION COUNT), AND TO A GREAT DEGREE, UPON THE AMOUNT OF MEMORY. HOWEVER, THE "AVERAGE TIME" REQUIRED TO RUN A QUICK VERIFICATION (FIRST PASS) IS 2 MINUTES (FOR A 64K SYSTEM). A SUBSEQUENT PASS WITH PARAMETERS DEFAULTED REQUIRES 3 MINUTES PER DRIVE (ON A 64-K SYSTEM).

5.0 PROGRAM LOADING

THE PROGRAM CAN BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER OR FROM ANY MEDIA SUPPORTED BY XXDP.

6.0 STARTING PROCEDURE

6.1 STARTING ADDRESSES

200 NORMAL STARTING ADDRESS OF TESTS 1-6 (PARAMETERS DEFAULTED)
204 SELECT OPERATING PARAMETERS,RK06 UNIBUS ADDR. AND INTERRUPT VECTOR FOR TESTS 1-6
224 HEAD ALIGNMENT AID START ADDRESS

NOTE

FOR HEAD ALIGNMENT AID OPERATING INFORMATION PLEASE SKIP TO SECTION 11. THE SECTIONS WHICH IMMEDIATELY FOLLOW APPLY ONLY TO THE SUBSYSTEM TESTS (1-6).

6.2 SWITCH REGISTER OPTIONS USED

THIS PROGRAM IS DESIGNED TO ALLOW THE USE OF THE HARDWARE SWITCH REGISTER IF PRESENT, OR THE SYSMAC-SUPPORTED SOFTWARE SWITCH REGISTER (IF HARDWARE SWR IS NOT PRESENT OR IS SET TO ALL ONES). IN EITHER CASE, THE FOLLOWING OPTIONS ARE IMPLEMENTED WHEN THE APPROPRIATE BITS

430 ARE SET TO 1:

BIT	OPTION
15	HALT ON ERROR
14	LOOP ON TEST
13	INHIBIT ERROR REPORTS
12	REPORT DESCRIPTION ONLY, ON ERRORS
11	INHIBIT ITERATIONS
10	BELL ON ERROR
09	LOOP ON ERROR
08	APPLY RANDOM STALL BETWEEN OPERATIONS
06	REPORT ONE ERROR PER TRANSFER IN TESTS 2-4
01	INHIBIT WRITES IN TEST 1
00	REPORT ALL SOFTWARE COMPARE ERRORS IN TESTS 2-4.

NOTE

FOR ADDITIONAL PROGRAM CONTROL OPTIONS, SEE DESCRIPTION OF CONTROL SWITCH WORD (CS), SECTION 8.2.4.2 .

7.0 OPERATOR ACTION

1. LOAD PROGRAM INTO MEMORY (SEE SECTION 5.0)
2. LOAD A FORMATTED PACK ON EACH DRIVE TO BE TESTED.
3. BRING DRIVE (S) TO ONLINE STATE, WRITE ENABLED, AND LOCKED ON PORT.
4. LOAD THE DESIRED STARTING ADDRESS (SEE SECTION 6.1)
5. SET SWITCHES IF DESIRED (SEE SECTION 6.2)
6. PRESS START OR GIVE APPROPRIATE MONITOR START COMMAND.

8.0 PROGRAM ACTION

8.1 DESCRIPTION OF OPERATING PARAMETERS

AFTER THE PROGRAM IS STARTED, IT TYPES ITS IDENTIFICATION AS FOLLOWS: "DZR6N-B- RK11/RK06 SUBSYSTEM VERIFICATION:PART 2", FOLLOWED BY: "LAST PHYS MEM ADRS=XXXXXXXX". THEN, EITHER THE TESTS BEGIN EXECUTION WITH DEFAULT PARAMETERS, OR AN OPERATOR INTERACTIVE MODE IS ENTERED (SEE STARTING ADDRESSES, SECTION 6.1). IN THIS MODE OPERATING PARAMETERS MAY BE LISTED OR ALTERED BY VARIOUS MEANS. ALL PARAMETERS ARE TREATED AS OCTAL NUMBERS, AND THE PARAMETER LIST IS SHARED AMONG THE TESTS.

THE FOLLOWING IS THE LIST OF OPERATING PARAMETERS, (WHICH APPLY TO THE CURRENT SELECTION OF DRIVES AND TESTS). AFTER EACH, IS INDICATED THE

```
                        VALID RANGE OF VALUES FOR THAT PARAMETER (IN OCTAL), AND  ITS  DEFAULT
                        VALUE.  ALL PARAMETERS ARE ENTERED AS OCTAL NUMBERS, AND THE PARAMETER
```

MNEMONICS SHOWN ARE THOSE USED BY THE PROGRAM.

FC	FIRST CYLINDER ADDRESS IN TESTS WHICH ARE DONE OVER A RANGE OF CYLINDERS, FC=0-631, DEFAULT=0
LC	LAST CYLINDER ADDRESS IN TESTS WHICH ARE DONE OVER A RANGE OF CYLINDERS, LC=0-632, DEFAULT=632
FT	FIRST TRACK ADDRESS IN TESTS WHICH ARE DONE OVER A RANGE OF TRACKS, FT=0-2, DEFAULT=0
LT	LAST TRACK ADDRESS IN TESTS WHICH ARE DONE OVER A RANGE OF TRACKS, LT=0-2, DEFAULT=2
S0	FIRST SECTOR ADDRESS IN TESTS WHICH ARE DONE OVER A RANGE OF SECTORS USED ON ANY DRIVE WHICH HAS A 20-SECTOR FORMAT CARTRIDGE. S0=0-23, DEFAULT=0.
S1	LAST SECTOR ADDRESS IN TESTS WHICH ARE DONE OVER A RANGE OF SECTORS USED ON ANY DRIVE WHICH HAS A 20-SECTOR FORMAT CARTRIDGE. S1=0-23, DEFAULT=23.
S2	FIRST SECTOR ADDRESS IN TESTS WHICH ARE DONE OVER A RANGE OF SECTORS, USED ON ANY DRIVE WHICH HAS A 22-SECTOR FORMATTED CARTRIDGE, S2=0-25, DEFAULT=0.
S3	LAST SECTOR ADDRESS IN TESTS WHICH ARE DONE OVER A RANGE OF SECTORS, USED ON ANY DRIVE WHICH HAS A 22-SECTOR FORMATTED CARTRIDGE. S3=0-25, DEFAULT = 25.
PT	DATA PATTERN SELECT WORD (SEE SECTION 8.2.4.1 FOR DETAILS) PT=0-177777, DEFAULT=0
CS	CONTROL SWITCH WORD (SEE SECTION 8.2~~4.2~~ FOR DETAILS) CS=0-000062, DEFAULT=0
ST	NUMBER OF UNIT STALL TIMES WITH WHICH TO STALL (DELAY) BETWEEN RK06 COMMANDS

8.2 SELECTION OF OPERATING PARAMETERS (ADDRESS 204 START)

8.2.1 DRIVE SELECTION

AFTER AN ADDRESS 204 START, THE PROGRAM INDICATES INPUT MODE BY TYPING "PARAMETER INPUT MODE". THEN, THE RK611 REGISTER ADDRESS, RK06 VECTOR ADDRESS AND RK06 PRIORITY ARE OPENED FOR POSSIBLE MODIFICATION AS FOLLOWS:

```
RK06 BUS ADR = 177440   NEW=(TYPE NEW VALUE HERE)
```

```
545                                     RK06 VEC ADR =    210   NEW=(TYPE NEW VALUE HERE)
546                                     RK06 PRIORITY=      5   NEW=(TYPE NEW VALUE HERE)
```

NEXT THE PROGRAM TYPES THE NUMBER(S) OF THE CURRENT DRIVES UNDER TEST, FOLLOWED BY A (*) ON THE NEXT LINE TO REQUEST NEW DRIVE NUMBERS. FOR EXAMPLE:

```
PARAMETER INPUT MODE

DRIVE(S)=0,1,2,4,7
* (INPUT, IF ANY, GOES HERE)
```

THE OPERATOR TYPES THE NEW NUMBERS (SEPARATED BY COMMAS) PLUS <CR> OR SIMPLY <CR> TO LEAVE THEM UNCHANGED. IF HE ENTERS DRIVE NUMBERS, THESE DRIVES ARE THEN CHECKED FOR VALID STATUS BY THE PROGRAM, AND ALL THOSE TYPED WHICH ARE ACCEPTABLE WILL NOW BE LISTED AS BEFORE. THE OPERATOR MAY MANUALLY RECONFIGURE THE DRIVES AND TYPE IN NEW DRIVE NUMBERS, AND THESE WILL BE CHECKED AND TYPED, UNTIL THE OPERATOR FINALLY TYPES JUST <CR>.

ON INITIAL ENTRY FROM ADDRESS 204, THE DRIVES WHICH ARE LISTED ARE ALL THOSE ON THE SUBSYSTEM WHICH ARE ON-LINE, READY, WRITE-ENABLED, AND LOADED WITH A CARTRIDGE OTHER THAN AN ALIGNMENT PACK. (THIS IS THE DEFAULT DRIVE SELECTION FOR ADDRESS 200 START). ON ALL OTHER ENTRIES TO THE DRIVE SELECTION ROUTINE (VIA <↑C> AS DESCRIBED IN SECTIONS 8.2.2.5 AND 8.2.3.6) THE PROGRAM FIRST TYPES :

```
TO TEST ALL DRIVES TYPE "A" <CR>, ELSE <CR>
* (CHARACTER GOES HERE)
```

NEXT, THE DRIVES ARE LISTED AS SHOWN ABOVE. IF (A) IS TYPED, ALL AVAILABLE DRIVES WILL BE LISTED, AND IF NOT, THE PREVIOUS SELECTION OF DRIVES WILL BE LISTED.

8.2.2 TEST SELECTION

WHEN THE OPERATOR FINALLY TYPES JUST <CR> IN RESPONSE TO THE DRIVE REQUEST, THE PROGRAM ENTERS THE TEST INPUT ROUTINE. THE FOLLOWING INSTRUCTIVE LINES ARE TYPED :

```
L = LIST TESTS
C = CHANGE TESTS
I = INPUT PARAMETERS AND RUN TESTS
```

THEN, THE FOLLOWING REQUEST IS MADE :

```
ENTER L,C, OR I
* (CHARACTER GOES HERE)
```

THE OPERATOR TYPES THE DESIRED CHARACTER PLUS <CR>.

8.2.2.1 LIST TESTS, (L)

```
603
604                                IF (L) IS TYPED, THE PROGRAM TYPES THE CURRENT DESIRED TEST  LIST,  AS
```

FOLLOWS :

```
TEST     ITERATIONS
  1             0
  2        177777
  3           400
  4            25
  ETC.
```

THE ITERATION NUMBER IS THE NUMBER OF TIMES THE TEST WILL BE RUN ON THIS PASS, AND IT MUST BE BETWEEN 0 AND 177777. IF IT IS ZERO, THAT TEST WILL NOT BE RUN. ON THE FIRST TIME THROUGH, ALL TESTS ARE LISTED WITH DEFAULT ITERATIONS (YET TO BE DETERMINED).

WHEN THE LIST IS COMPLETED, THE PROGRAM RETURNS TO TYPE : "ENTER L,C, OR I" AGAIN.

8.2.2.2 CHANGE TESTS, (C)

IF (C) IS TYPED, THE PROGRAM THEN ASKS: "TO DEFAULT TESTS TYPE D<CR>, ELSE <CR>". IF JUST <CR> IS TYPED, THE PROGRAM SEQUENTIALLY OPENS EACH TEST FOR POSSIBLE ALTERATION OF THE ITERATION NUMBER. EACH TEST IS OPENED AND A NEW LINE IS TYPED, GIVING THE TEST NO. AND ITER. NO. IN OCTAL, FOLLOWED BY (*) ON THE SAME LINE. FOR EXAMPLE :

```
TEST     ITERATIONS
  0           0 * (INPUT, IF ANY, GOES HERE)
```

THE OPERATOR THEN TYPES THE NEW VALUE PLUS <CR>, OR JUST <CR> TO LEAVE IT UNCHANGED. IF THE OPERATOR TYPES A NUMBER FOLLOWED BY <!> (EXCLAMATION POINT), THE NUMBER JUST ENTERED WILL BE LOADED INTO THE ITERATION TABLE FOR ALL REMAINING TESTS. AFTER ALL TESTS HAVE BEEN OPENED, THE PROGRAM RETURNS TO TYPE : "ENTER L,C, OR I" AGAIN.

8.2.2.3 INPUT PARAMETERS AND RUN TESTS, (I)

IF (I) IS TYPED, THE PROGRAM ENTERS THE PARAMETER LIST ALTERATION ROUTINE, DESCRIBED IN SECTION 8.2.3, IN WHICH OPERATING PARAMETERS MAY BE INPUT, AND TESTING BEGUN.

8.2.2.4 CONTROL Z (↑Z) FUNCTION

IF THE OPERATOR WISHES TO EXIT AT ANY TIME FROM L OR C MODE, AND RETURN TO SELECT A NEW MODE (L,C, OR I), CONTROL Z (↑Z) MAY BE TYPED.

661 S.2.2.5 CONTROL C (^C) FUNCTION

IF THE OPERATOR WISHES TO TERMINATE L,C, OR I MODE, AND RETURN TO REQUEST NEW DRIVES AND TESTS, CONTROL C (↑C) MAY BE TYPED.

8.2.3 PARAMETER LIST ALTERATION

THE PROGRAM NEXT TYPES THE FOLLOWING INSTRUCTIVE LINES:

```
T = TYPE LIST
O = OPEN LIST
S = SET INDIVIDUAL PARAM.
R = RUN TESTS
ENTER T,O,S, OR R
* (CHARACTER GOES HERE)
```

THE OPERATOR TYPES THE DESIRED CHARACTER PLUS <CR>.

8.2.3.1 TYPE LIST, (T)

IF (T) IS TYPED, THE PROGRAM TYPES THE CURRENT PARAMETER LIST, AS FOLLOWS:

```
FC = XXXXXX
LC = XXXXXX
ETC.
```

WHEN THE LIST IS COMPLETED, THE PROGRAM RETURNS TO TYPE "ENTER T,O,S, OR R" AGAIN.

8.2.3.2 OPEN LIST, (O)

IF (O) IS TYPED THE PROGRAM THEN ASKS: "TO DEFAULT ALL PARAMETERS TYPE D<CR>, ELSE <CR>". IF JUST <CR> IS TYPED, THE PROGRAM SEQUENTIALLY OPENS EACH OPERATING PARAMETER IN THE LIST FOR ALTERATION (IN THE ORDER SHOWN IN SECTION 8.1). EACH PARAMETER IS OPENED AND A NEW LINE IS TYPED, GIVING THE PARAMETER AND ITS CURRENT VALUE (IN OCTAL), FOLLOWED BY (*) ON THE SAME LINE. FOR EXAMPLE:

```
IC=3 * (INPUT, IF ANY, GOES HERE)
```

THE OPERATOR THEN TYPES THE NEW VALUE PLUS A <CR> OR JUST <CR> TO LEAVE THAT PARAMETER UNCHANGED. AFTER ALL PARAMETERS HAVE BEEN OPENED FOR ALTERATION, THE PROGRAM RETURNS TO TYPE "ENTER T,O,S, OR R" AGAIN.

8.2.3.3 SET INDIVIDUAL PARAMETER, (S)

```
                        IF (S) IS TYPED, THE PROGRAM TYPES THE PROMPTER (>) ON THE NEXT  LINE,
                        AND  WAITS  FOR  THE  OPERATOR  TO  SET  THE  VALUE  OF ANY INDIVIDUAL
```

PARAMETER:

ENTER T,O,S, OR R
*S
> (ENTER PARAMETER AND VALUE HERE)

THE OPERATOR TYPES THE PARAMETER AND ITS NEW VALUE FOLLOWED BY <CR>, AND THE PROGRAM GIVES THE PROMPTER (>) AGAIN AS IN THE FOLLOWING EXAMPLE:

```
> FC = 600
> FS = 12
> IT = 1
> ETC.
```

TO TERMINATE INDIVIDUAL SETTING MODE, THE OPERATOR TYPES CONTROL Z (↑Z), AND THE PROGRAM RETURNS TO TYPE "ENTER T,O, S, OR R" AGAIN.

8.2.3.4 RUN TESTS, (R)

IF THE OPERATOR TYPES (R), EXECUTION OF TESTS BEGINS, USING ALL THE CURRENT PARAMETERS.

8.2.3.5 CONTROL Z (↑Z) FUNCTION

IF THE OPERATOR WISHES TO EXIT AT ANY TIME FROM T, O, S, OR R MODE (RUNNING TESTS), AND RETURN TO SELECT A NEW MODE (T,O,S, OR R), CONTROL Z (↑Z) MAY BE TYPED.

8.2.3.6 CONTROL C (↑C) FUNCTION

IF THE OPERATOR WISHES TO TERMINATE T, O, OR S MODE, OR STOP TEST EXECUTION (R MODE), CONTROL C (↑C) MAY BE TYPED, AND THE PROGRAM WILL RETURN TO REQUEST NEW DRIVE SELECTION (SEE SECTION 8.2.1). (ON AN ADDRESS 200 DEFAULT RUN, TYPING CONTROL C CAUSES THE PROGRAM TO HALT AFTER COMPLETING ANY DATA TRANSFER).

8.2.4 SPECIAL PARAMETER SPECIFICATIONS

8.2.4.1 PT-DATA PATTERN SELECT WORD

THE OPERATOR SPECIFIES A WORD OF SIXTEEN BITS (6 OCT. DIGITS), TO SELECT UP TO ALL SIXTEEN OF THE PATTERNS, LISTED IN SECTION 9.5.1.

```
                        THE NO.  OF ANY BIT SET IN PT CORRESPONDS TO THE  NO.   OF  A  PATTERN
                        CHOSEN.  IF THE HIGH BIT OF PT (BIT 15) IS SET, THE USER WILL BE ASKED
```

TO TYPE UP TO SIXTEEN DATA WORDS WHICH WILL BE LOADED INTO THE BUFFER FOR PATTERN 15. THE PROGRAM TYPES:

"SELECT USER DEFINED PATTERN 15"

NEXT, EACH OF UP TO 16 WORDS ARE REQUESTED BY THE PROGRAM IN THE SAME MANNER IN WHICH THE OPERATING PARAMETERS ARE OPENED FOR ALTERATION (SEE SECT. 8.2.3.2):

WORD 0 = (OLD VALUE) * (NEW VALUE GOES HERE)
WORD 1 = (OLD VALUE) * (NEW VALUE GOES HERE)
ETC.

FOR EACH WORD, THE USER TYPES THE NEW VALUE PLUS <CR>, OR JUST <CR>, (TO LEAVE IT UNCHANGED). TO INPUT LESS THAN 16 WORDS FOR PATTERN 15, THE OPERATOR MAY TYPE (!) (EXCLAMATION POINT) AND THE PROGRAM WILL FILL UP THE REST OF THE PATTERN 15 BUFFER WITH THE LAST WORD SPECIFIED. NEXT, THE PROGRAM WILL CONTINUE, IN THE PROPER PARAMETER INPUT MODE (O OR S).

8.2.4.2 CS- CONTROL SWITCH WORD

IN ADDITION TO THE OPTIONS PROVIDED BY THE SWITCH REGISTER (HARDWARE OR SOFTWARE), A CONTROL SWITCH WORD (CS) MAY BE SPECIFIED AMONG THE OPERATING PARAMETERS TO PROVIDE THE FOLLOWING OPTIONS:

BIT	OPTION
05	DROP DRIVE IF 20 (DEC) ERRORS EXCEEDED
04	TYPE BAD SECTOR FILES (BSF'S) ON FIRST PASS)
01	INHIBIT OFFSET REPORTS IN TEST 1

NOTE

OTHER BITS UNUSED

8.3 DATA PATTERNS

THIS SECTION DESCRIBES THE DATA PATTERNS AVAILABLE FOR USE IN THE TESTS. EACH DATA PATTERN IS COMPRISED OF 16 WORDS. PATTERNS ARE REPEATED AS NECESSARY TO OBTAIN THE DESIRED WORD COUNT ON THE WRITE DATA COMMANDS. THE MAXIMUM ALLOWABLE WORD COUNT IS DETERMINED BY THE AMOUNT OF AVAILABLE BUFFER SPACE AT THE END OF THE PROGRAM, AND COULD BE AS LARGE AS 65,536 (DEC) WORDS. DATA SPIRALING AND TRACK SWITCHING

```
834                             IS THUS POSSIBLE DURING THE DATA TESTS.
```

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THE FOLLOWING IS THE LIST OF 16 SELECTABLE DATA PATTERNS (IN OCTAL),
WITH NOTABLE FEATURES DESCRIBED:

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0 HIGH-LOW FREQUENCY MIX	1 HIGH FREQUENCY PHASE MIX	2 LOW FREQUENCY PHASE MIX	3 MAXIMUM PRECOMPENSATION PHASE MIX
177777	000000	052525	133333
177777	000000	052525	066666
177777	000000	052525	155555
052525	177777	125252	155555
052525	177777	125252	133333
052525	177777	125252	066666
177777	000000	052525	066666
177777	000000	052525	155555
052525	177777	125252	155555
052525	177777	125252	133333
177777	000000	052525	133333
052525	177777	125252	133333
177252	000000	052525	133333
177252	177777	125252	133333
172765	000000	052525	133333
172765	177777	125252	133333

4 ROTATING BOUNDARY PULSE PRECOMPENSATION	5 ROTATING CELL PULSE PRECOMPENSATION	6 ALL ZEROS	7 ALL ONES
121105	026455	000000	177777
150442	113226	000000	177777
064221	045513	000000	177777
132110	122645	000000	177777
055044	151322	000000	177777
026422	064551	000000	177777
013211	132264	000000	177777
105504	055132	000000	177777
042642	026455	000000	177777
021321	113226	000000	177777
110550	045513	000000	177777
044264	122645	000000	177777
022132	151322	000000	177777
011055	064551	000000	177777
104426	132264	000000	177777
042213	055132	000000	177777

8 SHIFTED 1 IN FIELD OF 0'S	9 SHIFTED 0 IN FIELD OF 1'S	10 ALTERNATING 0-1	11 ALTERNATING 1-0
000001	177776	052525	125252
000002	177775	052525	125252
000004	177773	052525	125252
000010	177767	052525	125252
000020	177757	052525	125252
000040	177737	052525	125252
000100	177677	052525	125252
000200	177577	052525	125252
000400	177377	052525	125252
001000	176777	052525	125252
002000	175777	052525	125252
004000	173777	052525	125252
010000	167777	052525	125252
020000	157777	052525	125252
040000	137777	052525	125252
100000	077777	052525	125252

12 SHIFTING 0'S AND 1'S	13 COMPOSITE ROTATING	14 PSEUDO- RANDOM	15 USER- DEFINED
000001	072307		
000003	135143		
000007	156461		
000017	167230		
000037	073514		
000077	035646		
000177	016723		
000377	107351		
000777	143564		
001777	061672		
003777	030735		
007777	114356		
017777	046167		
037777	123073		
077777	151453		
177777	164616		

9.0 DESCRIPTION OF TESTS

9.1 TEST 1 - OFFSET-TO-FAILURE MEASUREMENT

IN THIS TEST A REPEATED PATTERN 072307(OCT) IS WRITTEN INTO ALL WORDS OF SECTORS FS AND LS ON TRACKS 0-2 OF CYLINDERS FC AND LC. THE SAME SECTORS ON ADJACENT CYLINDERS ARE THEN WRITTEN WITH 167230(OCT) (TO ESTABLISH A KNOWN PATTERN), BUT THEY ARE NOT TESTED. THEN, EACH DESIRED SECTOR IS WRITE CHECKED WITH INCREASING POSITIVE OFFSETS, UNTIL EITHER A "DATA TYPE" ERROR OCCURS, OR THE FULL RANGE OF POSITIVE OFFSETS HAVE BEEN APPLIED. THEN, THE SAME SECTOR IS WRITE CHECKED WITH INCREASING NEGATIVE HEAD OFFSETS, UNTIL FAILURE OR MAXIMUM NEGATIVE OFFSET IS APPLIED. THIS IS DONE FOR ALL THE SECTORS ORIGINALLY WRITTEN, IN THE FOLLOWING ORDER: SECTORS FS AND LS ON CYLINDERS FC AND LC FOR TRACK 0, THEN FOR TRACK 1, AND FINALLY FOR TRACK 2. THE OFFSET-TO-FAILURE RESULTS ARE REPORTED IN ORDER OF INCREASING TRACKS, AS FOLLOWS:

OFFSET-TO-FAILURE MEASUREMENTS:

TRACK	CYLN	SECT	-OFST (UIN)	-OFST (UIN)
X	XXX	XX	XXXX	XXXX
X	XXX	XX	XXXX	XXXX
X	XXX	XX	XXXX	XXXX
X	XXX	XX	XXXX	XXXX

ETC.

NOTE

IN AN ADRS 200 DEFAULT RUN, FS DEFAULTS TO 0, AND LS DEFAULTS TO 12(OCT), FOR THIS TEST.

9.2 NPR / MAIN MEMORY TESTS

THIS GROUP OF TESTS EXERCISES ALL MEMORY ABOVE THE PROGRAM, VIA READ/WRITE NPR TRANSFERS WITH THE RK06. THE TESTS ARE DESIGNED TO DIAGNOSE MEMORY TRANSFER FAILURES DURING HEAVY NPR ACTIVITY, IN SYSTEMS PROVIDED WITH MEMORY MANAGEMENT (KT 11 C, D OR PDP 11/70), ALTHOUGH MEMORY MANAGEMENT IS NOT REQUIRED.

NOTE

THERE IS NO PROGRAM RELOCATION (EXCEPT FOR THE XXDP LOADER, IF PRESENT).

```
                                        HENCE, MEMORY IN WHICH THE PROGRAM
                                        RESIDES IS NOT TESTED.  ALSO, THE UNIBUS
```

I/O ADDRESSES ARE NOT TESTED.

THERE ARE 3 MEMORY TESTS PROVIDED. TESTS 2 AND 3 ARE TESTS OF MEMORY ADDRESSING CAPABILITY DURING DISK NPR'S, AND TEST 4 IS AN NPR/MEMORY DATA PATTERN TEST. DURING TESTING, MEMORY MANAGEMENT WILL BE ENABLED IF INSTALLED, AND ALL OPERATIONS WILL BE PERFORMED IN KERNAL MODE, WITH ADDRESS RELOCATION BEING DONE THROUGH MANIPULATION OF KERNAL I PAGE ADDRESS REGISTERS.

9.2.1 TEST 2 - NPR/MEMORY WORD ADDRESSING TEST

STARTING AT THE FIRST ADDRESS OF THE NEXT 1 K MEMORY BLOCK BEYOND THE END OF THE READ/WRITE DATA BUFFER (RWBUF), WRITE UNIQUE NUMBERS (STARTING WITH 1) INTO EACH OF UP TO 64K WORDS (DEPENDING ON THE AMOUNT OF PHYSICAL MEMORY). THESE NUMBERS REFLECT UNIQUE ADDRESSES WITHIN THE 64K BLOCK. NEXT WRITE THE 64K WORDS (MAX) ONTO DISK AT FC, FS, FT (SCALED, IF NECESSARY, TO AVOID PACK OVERFLOW). THEN ZERO THE ENTIRE 64K BLOCK IN MEMORY, AND READ THE DATA BACK FROM THE DISK, AT THE SAME PHYSICAL ADDRESSES. COMPARE THE DATA READ TO THE DATA WRITTEN. TYPE THE FAILING VIRTUAL (IF MEM. MANAGEMENT) AND PHYSICAL ADDRESSES, AS WELL AS THE GOOD AND BAD DATA, FOR UP TO THE FIRST 10 (DECIMAL) FAILING LOCATIONS.

IF MEMORY MANAGEMENT IS PROVIDED AND THERE IS ADDITONAL MEMORY TO TEST, REPEAT THE ABOVE ADDRESSING TEST FOR EACH OF THE REMAINING 64K PHYSICAL MEMORY BLOCKS.

9.2.2 TEST 3 - NPR/MEMORY BLOCK ADDRESSING TEST

IN THIS TEST, MEMORY BLOCK ADDRESSING CAPABILITY DURING RK06 NPR'S IS TESTED.

THE TEST BEGINS BY WRITING A SINGLE NUMBER INTO ALL LOCATIONS OF EACH MEMORY BLOCK OF UP TO 64K WORDS. THIS NUMBER UNIQUELY DEFINES EACH BLOCK. THEN WRITE EACH BLOCK ONTO DISK AT ADDRESS FC, FS, FT (SCALED, IF NECESSARY TO AVOID PACK OVERFLOW OR DESTRUCTION OF THE BAD SECTOR FILE). ZERO THE BLOCK IN MEMORY, AND THEN READ THE DATA BACK INTO THE PROPER PHYSICAL ADDRESSES, DO THIS FOR ALL 64K BLOCKS, AND THEN COMPARE THE CONTENTS OF ALL THE MEMORY TO EXPECTED VALUES. TYPE FAILURES AS DESCRIBED ABOVE FOR THE FIRST 10(DEC) FAILING LOCATIONS IN EACH 64K MEMORY BLOCK.

9.2.3 TEST 4 - NPR/MEMORY DATA PATTERN TEST

IN THIS TEST, ALL PHYSICAL MEMORY LOCATIONS ABOVE THE PROGRAM (NOT INCLUDING UPPER UNIBUS DEVICE ADDRESSES) ARE EXERCISED WITH UP TO 15

```
1050                    DATA PATTERNS, AS CHOSEN FROM  THE  FIRST  14  PATTERNS  DESCRIBED  IN
1051                    SECTION  8.3,  PLUS  PATTERN  15  (USER  DEFINED  PATTERN).   THE DATA
```

PATTERNS DESIRED FOR THIS TEST ARE CHOSEN SEPARATELY, HOWEVER, AND THEY DEFAULT TO PATTERNS 8, 9, 10, AND 11.

MEMORY IS TESTED IN BLOCKS OF 64K, STARTING AT THE FIRST ADDRESS OF THE NEXT 1K MEMORY BLOCK BEYOND THE PROGRAM. EACH BLOCK OF UP TO 64K IS LOADED WITH DATA, WRITTEN ONTO DISK AT FC, FS, FT, LOADED WITH ZEROS, AND READ BACK AND COMPARED. THIS IS DONE FOR EACH OF THE DATA PATTERNS CHOSEN, INCLUDING AN OPTIONAL PATTERN CHOSEN BY THE USER.

9.3 TEST 5 - UNIBUS CONTENTION TEST

THE PURPOSE OF THIS TEST IS TO EXERCISE THE NPR CONTROL LOGIC WITHIN THE CONTROLLER IN SUCH A MANNER THAT A CONTENTION FOR MEMORY CYCLES ARISES BETWEEN THE PROCESSOR AND THE RK06.

FIRST, A WRITE DATA IS BEGUN ON CYLINDER FC, (SCALED TO AVOID PACK OVERFLOW) AT SECTOR 0, WITH THE BUS ADDRESS INCREMENT INHIBIT BIT SET IN THE CONTROLLER. USING A WORD COUNT OF 12000(OCT) OR 13000(OCT) (DEPENDING ON THE FORMAT), THE ENTIRE TRACK IS WRITTEN WITH THE FIRST WORD OF USER DEFINED PATTERN 15 (IF SELECTED) OR THE FIRST WORD OF PATTERN 13 (BY DEFAULT). THEN, AN INSTRUCTION LOOP IS ENTERED IN WHICH A NON-EXISTENT UNIBUS DEVICE ADDRESS IS REFERENCED ONCE PER PASS. THIS WILL RESULT IN A PROCESSOR SIEZURE OF THE UNIBUS, FOR 5-20 MICRO-SEC (DEPENDING ON THE PROCESSOR), FOLLOWED BY A NON-EXISTENT MEMORY PROCESSOR TRAP, ONCE PER PASS. THUS, FOR EACH PASS THROUGH THE INSTRUCTION LOOP, THE CONTROLLER IS FORCED TO LOSE FROM ONE TO FOUR NPR BUS CYCLES. THE EXECUTION TIME OF THE LOOP DETERMINES THE REPITITION RATE OF THE NON-EXISTENT MEMORY REFERENCES, AND THIS IS CHOSEN TO ALLOW ENOUGH NPR'S SO THAT THERE SHOULD BE NO DATA LATE ERRORS IN A FAULT-FREE CONTROLLER. THE DATA IS THEN WRITE CHECKED FOR VERIFICATION, AND THE ABOVE TEST IS REPEATED USING A READ DATA COMMAND. NO ERRORS ARE EXPECTED.

THE ABOVE OPERATIONS ARE REPEATED 15 MORE TIMES, USING THE NEXT WORD OF THE PROPER PATTERN (13 OR 15) EACH TIME, TO WRITE AND READ THE ENTIRE TRACK.

9.4 TEST 6 - MULTI-DRIVE INTERFERENCE TEST

THIS TEST PERFORMS MULTI-DRIVE POSITIONING OPERATIONS, WHILE A LARGE DATA TRANSFER IS IN PROGRESS ON THE DRIVE UNDER TEST, FOR THE PURPOSE OF DETECTING PROBLEMS OF CONCURRENT DRIVE OPERATION. THE TEST IS RUN ONLY IF THERE IS MORE THAN ONE DRIVE ON THE SUBSYSTEM.

THE TEST PROCEEDS AS FOLLOWS: IT IS FIRST DETERMINED WHICH DRIVE(S) (BESIDE THE ONE UNDER TEST) EXIST AND ARE OPERATIONAL. THESE DRIVES ARE THEN CLEARED AND A SEEK TO CYL 0 IS DONE ON EACH. NEXT, A SEEK IS DONE TO CYLINDER FC (SCALED, IF NECESSARY) ON THE DRIVE UNDER TEST. A SEEK IS NOW BEGUN ON EACH OF THE OTHER DRIVES , EACH TO A DIFFERENT

```
1108                    PSEUDO-RANDOM  CYLINDER  ADDRESS.   THIS  SHOULD  REQUIRE  FROM  10-67
1109                    MILLI-SEC TO COMPLETE.  AS SOON AS THESE SEEKS ARE BEGUN, A WRITE DATA
```

IS BEGUN ON THE DRIVE UNDER TEST, AT THE CURRENT CYLINDER (FC), SECTOR 0, TRACK 0, WITH THE BUS ADDRESS INCREMENT INHIBIT BIT SET IN THE CONTROLLER, AND WITH A WORD COUNT OF 15,616 (DEC) WORDS IF 20 SECTOR FORMAT, OR 17,152 (DEC) WORDS IF 22 SECTOR FORMAT. THIS WORD COUNT AMOUNTS TO A FULL CYLINDER + 1 SECTOR OF DATA. THIS TRANSFER REQUIRES FROM 101-126 MILLI-SEC TO COMPLETE, AND IN THAT TIME, ALL THE OTHER DRIVES SHOULD HAVE COMPLETED POSITIONING. NEXT, A WRITE CHECK IS DONE TO VERIFY THE DATA WRITTEN ON THE DRIVE UNDER TEST, AND A CHECK IS MADE TO INSURE THAT ALL OTHER DRIVES WHICH PERFORMED SEEKS WERE ABLE TO COMPLETE THEM SUCCESSFULLY, BY CHECKING ATTENTION BITS AND COMPARING DRIVE CYLINDER ADDRESSES TO EXPECTED VALUES.

10.0 ERROR REPORTING

10.1 COMMON ERRORS

THE FOLLOWING IS A LIST OF COMMON ERROR MESSAGES WHICH ACCOMPANY ERROR TYPEOUTS FROM THE SUBSYSTEM VERIFICATION PROGRAM. THE ERRORS ARE SELF-EXPLANATORY.

1. UNIBUS PARITY ERROR
2. NON-EXISTANT MEMORY ERROR
3. NON-EXISTANT DRIVE ERROR
4. UNIT FIELD ERROR
5. SUBSYSTEM TIMEOUT
6. SERCON PARITY ERROR
7. DRIVE DETECTED PARITY ERROR
8. AC LOW
9. SPEED LOSS
10. ILLEGAL FUNCTION ERROR
11. PROGRAMMING ERROR
12. NON-EXECUTABLE FUNCTION ERROR
13. DRIVE TYPE ERROR
14. FORMAT ERROR
15. WRITE LOCK ERROR
16. DRIVE UNSAFE ERROR
17. SEEK INCOMPLETE ERROR
18. CYLINDER OVERFLOW ERROR
19. ILLEGAL CYLINDER ADDRESS ERROR
20. DRIVE OFF TRACK
21. DRIVE TIMING ERROR
22. DATA LATE ERROR
23. CONTROLLER TIMEOUT ERROR
24. OPERATION INCOMPLETE ERROR
25. HEADER VRC ERROR
26. DATA CHECK ERROR
27. WRITE CHECK ERROR
28. DATA MISCOMPARE
29. NO DRIVE RESPONSE - UFE AND NXD

```
1166                                    30.  DRIVE ERROR WILL NOT CLEAR
1167                                    31.  DRIVE STATUS CHANGE WILL NOT CLEAR
```

32. ATTENTION BUT NO STATUS CHANGE OR FAULT
33. ATTENTION BUT DRIVE NOT AVAILABLE
34. ERROR WHILE GATHERING DRIVE STATUS
35. MULTIPLE DRIVE SELECT
36. HEADER COMPARE ERROR
37. ERROR IN RECALIBRATE FOR RECOVERY
38. CLEAR CONTROLLER DID NOT CLEAR ERROR
39. NO ATTENTION IN ATTENTION SUMMARY REGISTER
40. UNSOLICITED ATTENTION
41. UNEXPECTED DATA TYPE ERROR
42. ATTENTION DID NOT RESET WITH CLEAR
43. SUBSYSTEM CLEAR DID NOT CLEAR DRIVE ATTENTION
44. DATA LATE WHEN UNLOADING HEADER
45. CONTROLLER ERROR WHEN DRIVER SERVICING
46. RETRY UNSUCCESSFUL
47. BAD SECTOR ERROR ON SECTOR NOT LISTED BAD

10.2 ERROR HANDLING

ERRORS REPORTED BY THE PROGRAM CONSIST OF COMMON FAILURES RESULTING FROM ATTEMPTED SUBSYSTEM FUNCTIONS, AS WELL AS CERTAIN ERRORS UNIQUE TO PARTICULAR TESTS. EACH ERROR PRINTOUT CONSISTS OF AN ERROR DESCRIPTION AND TEST NUMBER, POSSIBLY FOLLOWED BY HEADER LINES, COLUMN HEADINGS, AND COLUMNS OF REGISTER CONTENTS IN OCTAL. AS MUCH MEANINGFUL REGISTER DATA AS POSSIBLE (FOR EXAMPLE, RK611 REGISTERS) ARE REPORTED IN A GIVEN ERROR. IN THE CASE OF A DATA MISCOMPARE, FOR INSTANCE, THE NUMBER GOOD DATA WORD, BAD DATA WORD, PHYSICAL MEMORY ADDRESS, VIRTUAL ADDRESS, AND MEMORY MANAGEMENT REGISTER CONTENTS (IF PRESENT) ARE REPORTED. OTHER ERROR REPORTS MAY CONSIST OF A SINGLE DESCRIPTIVE LINE.

10.3 ERROR PRINTOUT EXAMPLES

EXAMPLE 1:

```
     **  WRITE CHECK ERROR
         TEST 2

     PREVIOUS COMMAND:
     DRIVE   CMND    CYLNDR  TRACK   SECTOR  WD CNT
     000000  000121  000016  000001  000000  175000
       HI BA   LO BA
       000000  061566

     CURRENT COMMAND:
     ERR PC  DRIVE   CMND    CYLNDR  TRACK   SECTOR  WD CNT
     041154  000000  000131  000016  000001  000006  175000
       HI BA   LO BA
       000000  061566
```

```
1224                                    PACK ADDRESS OF ERROR(S):
1225                                    CYLNDR   TRACK    SECTOR
```

```
                    000016  000001  000006


               EXAMPLE 2:

                    **  DATA MISCOMPARE
                        TEST 2

                    PREVIOUS COMMAND:
                    DRIVE   CMND    CYLNDR  TRACK   SECTOR  WD CNT
                    000000  000131  000016  000001  000000  175000
                      HI BA   LO BA
                      000000  074000

                    CURRENT COMMAND:
                    ERR PC  DRIVE   CMND    CYLNDR  TRACK   SECTOR  WD CNT
                    033156  000000  000121  000016  000001  000000  175000
                      HI BA   LO BA
                      000000  074000

                    PACK ADDRESS OF ERROR(S):
                    CYLNDR  TRACK   SECTOR
                    000016  000001  000000

                    WD #    GOOD    BAD     HI PHY  LO PHY  VRT AD  KIPAR6

                    000400  000401  125252  000000  075000  155000  000600
                    000401  000402  125252  000000  075002  155002  000600
                    000402  000403  125252  000000  075004  155004  000600
                    000403  000404  125252  000000  075006  155006  000600
                    000404  000405  125252  000000  075010  155010  000600
                    000405  000406  125252  000000  075012  155012  000600
                    000406  000407  125252  000000  075014  155014  000600
                    000407  000410  125252  000000  075016  155016  000600
                    000410  000411  125252  000000  075020  155020  000600
                    000411  000412  125252  000000  075022  155022  000600


               11.0  RK06 HEAD ALIGNMENT AID

               THIS PROGRAM IS PROVIDED AS A SOFTWARE AID TO HEAD  ALIGNMENT  OF  THE
               RK06 DRIVE, TO BE USED IN CONJUNCTION WITH THE RK06 FIELD TEST BOX, OR
               OTHER SUITABLE INDICATOR OF HEAD ALIGNMENT.  THE PROGRAM  OPERATES  IN
               TWO  MODES.  THE FIRST IS MANUAL SELECT MODE, WHICH SELECTS A SPECIFIC
               DRIVE AND HEAD TO BE ALIGNED BY TTY INPUT AT THE CONSOLE.  THE  SECOND
               MODE IS AUTO-SELECT MODE, WHICH ALLOWS REMOTE DRIVE AND HEAD SELECTION
               THROUGH OPERATION OF DRIVE DUAL-PORT SELECT SWITCHES.  IN EITHER  MODE
               THE  OPERATOR  HAS THE OPTION TO EITHER PERFORM HEAD ALIGNMENT, VERIFY
               ALIGNMENT, OR REQUEST UP TO FIVE MINUTES OF RANDOM SEEK  EXERCISES  TO
               BE PERFORMED ON THE SPECIFIED DRIVE (S).
```

1282
1283

11.1 HARDWARE REQUIREMENTS

TO PERFORM HEAD ALIGNMENT, THE ALIGNMENT INDICATING DEVICE MUST BE CONNECTED TO THE DRIVE VIA THE ALIGNMENT CABLE WHICH ATTACHES TO THE RK06 READ/WRITE MODULE. THE ALIGNMENT INFORMATION FROM THE DRIVE MUST BE DISPLAYED ON A METER OR OTHER INDICATOR. EACH DRIVE TO BE ALIGNED MUST BE LOADED WITH AN RK06 ALIGNMENT CARTRIDGE, AND MUST BE WRITE-PROTECTED. UP TO EIGHT DRIVES PER CONTROLLER MAY BE ALIGNED, AND EACH DRIVE MAY BE OPERATED IN SINGLE-PORT MODE ONLY. FOR THE PURPOSE OF THE HEAD ALIGNMENT AND ALL SWITCH REGISTER BITS (HARDWARE OR SOFTWARE) ARE IGNORED.

11.2 OPERATIONAL MODES

THE PROGRAM COMMUNICATES WITH THE OPERATOR DOING THE ALIGNMENT THROUGH CONSOLE DIALOGUE. WHEN THE PROGRAM IS STARTED AT ADDRESS 224(OCTAL), IT TYPES IDENTIFICATION:

" *** RK06 HEAD ALIGNMENT AID ***
TYPE H(CR) FOR INFORMATION- OTHERWISE, TYPE (CR) "

NEXT, THE PROGRAM REQUESTS THE DESIRED MODE OF OPERATION:

" MANUAL OR AUTO MODE (M OR A) ? "

THE OPERATOR MAKES THE SELECTION, AND ENTERS ONE OF THE FOLLOWING MODES.

11.2.1 MANUAL SELECT MODE

IN THIS MODE, THE DRIVE(S) TO BE ALIGNED AND THE HEAD(S) TO BE SELECTED ARE SPECIFIED BY TTY INPUT. THIS MODE IS USEFUL FOR SYSTEMS WITH FEW DRIVES, WHICH ARE IN CLOSE PROXIMITY TO THE CONSOLE, AS IN TYPICAL FIELD INSTALLATIONS.

THE PROGRAM FIRST ECHOS THE MODE:

"* MANUAL SELECT MODE * "
AND TYPES "ENTER DRIVE NO. (0-7):".

THE OPERATOR TYPES THE DRIVE NUMBER, THE PROGRAM TYPES THE DRIVE SERIAL NUMBER, AND THEN ASKS "ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?". THE OPERATOR RESPONDS, AND THE PROGRAM ENTERS THE APPROPRIATE SUB-MODE.

11.2.1.1 MANUAL SELECT ALIGNMENT

ALIGNMENT IN MANUAL MODE PROCEEDS AS FOLLOWS. THE PROGRAM TYPES:

```
1340                                    "* MANUAL SELECT ALIGNMENT *," FOLLOWED BY
1341                                    " ENTER HEAD NO.  (0-2):"
```

THE OPERATOR TYPES THE DESIRED HEAD NUMBER, AND THE PROGRAM UNLOADS THE HEADS ON THE DRIVE, IN ANTICIPATION OF OPERATOR MOUNTING OF THE HEAD ALIGNMENT TOOL. THE PROGRAM TYPES "TYPE<R> WHEN READY:". AFTER THE TOOL HAS BEEN MOUNTED THE OPERATOR TYPES <R>, AND THE PROGRAM LOADS HEADS AND RESPONDS WITH:

"HEADS POSITIONED AT CYLINDER 365(OCT)"
AND "HEAD X SELECTED"

THE POSITIONING TO CYLINDER 365 IS DONE IN SINGLE INCREMENT SEEKS, TO AVOID EXCESSIVE MOMENTUM ON THE POSITIONER, WHILE THE ALIGNMENT TOOL IS INSTALLED. THE OPERATOR MAY NOW PROCEED TO ALIGN THIS HEAD, AND THE PROGRAM LOOPS BACK TO ASK FOR ANOTHER HEAD NUMBER ON THIS DRIVE. IF THE OPERATOR TYPES CONTROL Z (↑Z) THE PROGRAM WILL LOOP BACK TO ASK FOR "ALIGN OR EXERCISE ?" (STILL IN THE SAME MODE). IF CONTROL C (↑C) IS TYPED, THE PROGRAM LOOPS FURTHER BACK TO ASK FOR A NEW DRIVE NUMBER (STILL IN THE SAME MODE). IF CONTROL R (↑R) IS TYPED, THE PROGRAM EXITS FROM THE CURRENT MODE, AND DOES A COMPLETE RESTART.

11.2.1.2 MANUAL SELECT VERIFY

VERIFY MODE IDENTIFIES ITSELF AS FOLLOWS :

"* MANUAL SELECT VERIFY *" , FOLLOWED BY
"ENTER HEAD NO. (0-2) :"

THE VERIFY MODE IS IDENTICAL TO THE ALIGNMENT MODE, EXCEPT THAT UNLOADING AND LOADING OF HEADS IS NOT DONE BETWEEN HEAD SELECTIONS. THEREFORE, IN THIS MODE, THE OPERATOR MAY SELECT HEADS FOR QUICK ALIGNMENT VERIFICATION (USING THE ALIGNMENT METER), WITHOUT THE DELAYS OF UNLOADING AND LOADING HEADS. IN THIS MODE, THE OPERATOR WILL NOT BE ASKED TO "TYPE <R> WHEN READY".

11.2.1.3 MANUAL SELECT EXERCISE

WHEN THE EXERCISE SUB-MODE OF MANUAL SELECT MODE IS ENTERED, THE PROGRAM UNLOADS HEADS ON THE SELECTED DRIVE, AND TYPES "TYPE <R> WHEN READY". THE OPERATOR MUST THEN REMOVE THE ALIGNMENT TOOL PRIOR TO THE RANDOM SEEKS WHICH FOLLOW, AND ALLOW EXERCISES TO PROCEED BY TYPING <R>. THE PROGRAM THEN LOADS HEADS, AND RESPONDS WITH:

"* SEEK EXERCISES IN PROGRESS ON DRIVE X *".

AT THIS POINT, 7500 RANDOM SEEKS ARE BEGUN ON THE DRIVE, WHICH LASTS FOR ABOUT FIVE MINUTES. UPON COMPLETION OF THESE EXERCISES, THE PROGRAM RETURNS TO ASK FOR "ALIGN OR EXERCISE ?" (STILL IN MANUAL MODE) ON THIS DRIVE. WHILE IN EXERCISE SUB-MODE, THE CHARACTERS (↑Z), (↑C), AND (↑R) PERFORM THE SAME FUNCTIONS AS DESCRIBED IN SECTION 11.2.1.1.

11.2.2 AUTO SELECT MODE

IN THIS MODE, ALL SELECTION OF DRIVES AND HEADS FOR ALIGNMENT IS DONE BY SEQUENTIAL OPERATION OF DRIVE PORT SELECT SWITCHES. THIS ALLOWS COMMUNICATION WITH THE PROGRAM TO BE REMOTE FROM THE CONSOLE. THUS AUTO SELECT MODE IS WELL SUITED TO THE MANUFACTURING TEST ENVIRONMENT, OR TO A FIELD INSTALLATION, WHICH HAS A NUMBER OF REMOTE DRIVES. THE PROGRAM FIRST ECHOS THE MODE:

" * AUTO SELECT MODE * ", AND ASKS
"ALIGN OR EXERCISE (A OR E) ?".

THE OPERATOR RESPONDS, AND THE PROGRAM ENTERS THE APPROPRIATE SUB-MODE.

11.2.2.1 AUTO SELECT ALIGNMENT

ALIGNMENT IN AUTO SELECT MODE PROCEEDS AS FOLLOWS. THE PROGRAM TYPES:

" * AUTO SELECT ALIGNMENT * ".

THE PROGRAM CONSTANTLY SCANS ALL DRIVES 0-7 TO DETERMINE THE EXISTENCE OF EACH. WHENEVER A DRIVE IS DESELECTED BY THE OPERATION OF ITS PORT SELECT SWITCH, THE PROGRAM RECEIVES A NON-EXISTENT DRIVE INDICATION WHEN IT SELECTS THAT DRIVE. THEN, WHEN THE PROGRAM DETERMINES THAT A DRIVE WHICH WAS PREVIOUSLY OFF-LINE (DESELECTED) HAS JUST BECOME ON-LINE (SELECTED), IT PREPARES FOR ALIGNMENT ON THAT DRIVE. IN SUMMARY, THE OPERATOR SELECTS A DRIVE FOR ALIGNMENT BY DEPRESSING AND THEN RELEASING THE PORT SELECT SWITCH (FOR THE PORT IN USE) ON THAT DRIVE.

THE PROGRAM RECOGNIZES THE DRIVE SELECTED, AND CHECKS IT TO BE SURE THAT IT IS WRITE-LOCKED. THE PROGRAM THEN TYPES:

"DRIVE X SELECTED"

AND THEN IT UNLOADS THE HEADS ON THAT DRIVE, SO THAT THE OPERATOR CAN MOUNT THE HEAD ALIGNMENT TOOL. WHEN IT IS MOUNTED THE OPERATOR MUST DEPRESS AND RELEASE THE PORT SWITCH AGAIN, AND THE PROGRAM LOADS HEADS, SEEKS IN SINGLE INCREMENTS OUT TO THE ALIGNMENT CYLINDER (365 OCT.), AND TYPES:

"HEADS POSITIONED AT CYLINDER 365(OCT.)
 HEAD 0 SELECTED".

AFTER THE OPERATOR ALIGNS HEAD 0, HE MAY PROCEED TO HEAD 1, BY DEPRESSING AND RELEASING THE PORT SELECT SWITCH. WHEN HE DOES, THE HEADS WILL BE UNLOADED AGAIN, AND THE OPERATOR MAY MOVE THE ALIGNMENT TOOL TO HEAD 1, AND UPON DEPRESSING AND RELEASING THE PORT SWITCH AGAIN, THE HEADS WILL BE LOADED, THE PROGRAM WILL SEEK TO CYLINDER 365(OCT), AND TYPE:

```
1454
1455                                    "HEADS POSITIONED AT CYLINDER 365(OCT)
```

HEAD 1 SELECTED".

THIS PROCESS MAY BE CONTINUED WITH HEADS BEING SELECTED IN THE ORDER 0, 1, 2, 0, 1, 2, 0, ETC. UNTIL THE OPERATOR HAS COMPLETED THE ALIGNMENT.

WHEN THE OPERATOR COMPLETES ALIGNMENT ON THIS DRIVE, HE SHOULD REMOVE THE ALIGNMENT TOOL, AND SWITCH THE DRIVE ON-LINE. IF HE THEN WISHES TO SELECT ANOTHER DRIVE, HE MUST SWITCH THE DESIRED DRIVE OFF-LINE AND THEN ON-LINE AGAIN TO INITIATE SELECTION. WHEN ALL DESIRED DRIVES HAVE BEEN ALIGNED THE OPERATOR TYPES ↑Z OR ↑R, AS DESCRIBED IN SECTION 11.2.1.1. BEFORE LEAVING ALIGNMENT MODE AND PROCEEDING TO DO SEEK EXERCISES, THE OPERATOR MUST BE SURE TO REMOVE THE ALIGNMENT TOOL(S) FROM ALL DRIVE(S).

NOTE

THE ↑C FUNCTION DOES NOT APPLY IN AUTO MODE.

11.2.2.2 AUTO SELECT VERIFY

VERIFY MODE IDENTIFIES ITSELF AS FOLLOWS :

"* AUTO SELECT VERIFY *"

THE AUTO SELECT VERIFY MODE IS IDENTICAL TO THE AUTO ALIGNMENT MODE, EXCEPT THAT UNLOADING AND LOADING OF HEADS IS NOT DONE BETWEEN HEAD SELECTIONS. THEREFORE, IN THIS MODE, THE OPERATOR MAY SELECT HEADS FOR QUICK ALIGNMENT VERIFICATION (USING THE ALIGNMENT METER), WITHOUT THE DELAY OF UNLOADING AND LOADING HEADS.

11.2.2.3 AUTO SELECT EXERCISE

IN AUTO SELECT EXERCISE SUB MODE, RANDOM SEEK EXERCISES ARE PERFORMED UPON ALL DRIVES WHICH ARE ON-LINE. DRIVES ARE EXERCISED SEQUENTIALLY, STARTING WITH DRIVE 0. THE OPERATOR SPECIFIES EITHER LONG EXERCISES (7500 SEEKS- 5 MINUTES) OR SHORT EXERCISES (1500 SEEKS- 1 MINUTE) TO BE PERFORMED UPON EACH DRIVE.

AUTO SELECT EXERCISE MODE IDENTIFIES ITSELF AS FOLLOWS:

" * AUTO SELECT EXERCISES * "
FOLLOWED BY"SHORT OR LONG (S OR L) ?".

THE OPERATOR TYPES HIS RESPONSE , AND THE SELECTED SEEK EXERCISES ARE

```
1512                    PERFORMED  ON  EACH  DRIVE.  UPON  COMPLETION OF THESE EXERCISES, THE
1513                    PROGRAM RETURNS TO ASK FOR "ALIGN OR EXERCISE?" (STILL IN AUTO  MODE).
```

WHILE IN EXERCISE SUB-MODE THE CHARACTERS ↑Z AND ↑R PERFORM THE SAME FUNCTIONS AS DESCRIBED IN SECTION 11.2.1.1.

NOTE

BEFORE REQUESTING AUTO-EXERCISE MODE, THE OPERATOR MUST REMOVE THE ALIGNMENT TOOL (WHILE STILL IN AUTO-ALIGNMENT MODE) WHILE THE HEADS ARE UNLOADED.

11.3 ALIGNMENT AID ERROR MESSAGES

1. "DRIVE X NOT READY! PLEASE START IF DESIRED, THEN PRESS 'CONT' ON CPU WHEN READY." - THIS INDICATES THAT A DRIVE SELECTED FOR ALIGNMENT WAS FOUND NOT READY.

2. "DRIVE X NOT WRITE-LOCKED! PLEASE SET WRITE LOCK SWITCH. PRESS 'CONT' ON CPU WHEN READY". - THIS INDICATES THAT A DRIVE SELECTED FOR ALIGNMENT WAS FOUND NOT TO BE WRITE-PROTECTED.

3. "PLEASE LOAD ALIGNMENT CARTRIDGE ON DRIVE X! PRESS 'CONT' ON CPU WHEN READY." - THIS INDICATES THAT A DRIVE SELECTED FOR ALIGNMENT WAS NOT LOADED WITH AN ALIGNMENT CARTRIDGE.

4. "MULTIPLE DRIVES AUTO-SELECTED! PRESS 'CONT' TO RESTART." - THIS INDICATES THAT IN AUTO ALIGNMENT MODE MORE THAN ONE OF THE DRIVES WERE SELECTED FOR ALIGNMENT SIMULTANEOUSELY.

5. "CANNOT READ BAD SECTOR FILE ON DRIVE X! PRESS 'CONT' ON CPU TO RESTART". - THIS INDICATES THAT A READ ERROR WAS ENCOUNTERED WHILE THE PROGRAM WAS ATTEMPTING TO IDENTIFY THE CARTRIDGE ON DRIVE X AS AN ALIGNMENT CARTRIDGE.

6. "? X" - THIS IS TYPED BY THE PROGRAM IN RESPONSE TO THE INPUT OF AN INVALID PARAMETER, SHOWN HERE AS X. THE OPERATOR SHOULD NOW ENTER THE PROPER VALUE.

APPENDIX A

SAMPLE ADDRESS 200 DEFAULT RUN

THE FOLLOWING PRINTOUT WAS THE RESULT OF RUNNING SUBSYSTEM VERIFICATION, PART 2, ON A SINGLE DRIVE (DRIVE 0), FOR THE FIRST PASS OF THE PROGRAM (QUICK-VERIFY PASS). IN THIS MODE, ALL MESSAGES APPEARING HERE WERE OUTPUTS--NO OPERATOR INPUTS ARE PROVIDED ON AN ADDRESS 200 RUN.

```
DZR6N-B - RK611/RK06 SUBSYSTEM VERIFICATION :  PART 2

LAST PHYS MEM ADR = 377776

DRIVE 1 NON-EXISTENT
DRIVE 2 NON-EXISTENT
DRIVE 3 NON-EXISTENT
DRIVE 4 NON-EXISTENT
DRIVE 5 NON-EXISTENT
DRIVE 6 NON-EXISTENT
DRIVE 7 NON-EXISTENT

DRIVE(S) = 0

TESTING DRIVE 0
DRIVE SER. NO.  8
CART. SER. NO.  334

OFFSET-TO-FAILURE MEASUREMENTS:

TRACK  CYLN  SECT  +OFST (UIN)  -OFST (UIN)
  0     0     0    NONE         NONE
  0     0    12    NONE         1175
  0   631     0    NONE         NONE
  0   631    12    NONE         NONE
  1     0     0    1050         NONE
  1     0    12    NONE         1200
  1   631     0    NONE         NONE
  1   631    12    NONE         NONE
  2     0     0    NONE         NONE
  2     0    12    NONE         NONE
  2   631     0    NONE         NONE
  2   631    12    NONE         NONE

END PASS #   1
```

APPENDIX B

SAMPLE ADDRESS 204 RUN

THE FOLLOWING PRINTOUT WAS THE RESULT OF RUNNING SUBSYSTEM VERIFICATION, PART 2, ON A SINGLE DRIVE (DRIVE 0), WITH PARTICULAR TESTS SELECTED TO BE RUN FOR SPECIFIED NUMBERS OF TIMES, WITH SPECIFIED PARAMETERS, AND A SPECIFIED NO. OF PROGRAM PASSES. SPECIFICALLY, IT WAS DESIRED THAT TEST 1 BE RUN ONCE, TEST 4 ONCE, AND TEST 6 ONCE. THESE TESTS WERE SPECIFIED TO RUN FOR 1 PROGRAM PASS, USING PARAMETERS SPECIFIED BY THE OPERATOR. IN THIS CASE, SECTOR ADDRESS LIMITS (S2 AND S3) AND DATA PATTERN (PT) WERE SPECIFIED AS NON-DEFAULT VALUES.

```
DZR6N-B - RK611/RK06 SUBSYSTEM VERIFICATION:PART 2


LAST PHYS MEM ADR=377776


PARAMETER INPUT MODE

RK06 BUS ADR  = 177440  NEW =
RK06 VEC ADR  =    210  NEW =
RK06 PRIORITY =      5  NEW =


DRIVE(S) = 0
*

L = LIST TESTS
C = CHANGE TESTS
I = INPUT PARAMETERS AND RUN TESTS

ENTER L,C, OR I
* C
TO DEFAULT TESTS TYPE D <CR>, ELSE <CR>
*

TEST    ITERATIONS
  1        2 * 1
  2        2 * 0
  3        2 * 0
  4        2 * 0\0\1
```

```
1679                                    5       2 * 0
1680                                    6     100 * 1
```

```
1681
1682
1683
1684                    ENTER L,C, OR I
1685                    * L
1686
1687                    TEST    ITERATIONS
1688                      1         1
1689                      2         0
1690                      3         0
1691                      4         1
1692                      5         0
1693                      6         1
1694
1695                    ENTER L,C, OR I
1696                    * I
1697
1698                    T = TYPE PARAMETER LIST
1699                    O = OPEN PARAMETER LIST
1700                    S = SET INDIVIDUAL PARAM
1701                    R = RUN TESTS
1702
1703                    ENTER T,O,S, OR R
1704                    * T
1705                    FC=0
1706                    LC=632
1707                    FT=0
1708                    LT=2
1709                    SO=0
1710                    S1=23
1711                    S2=0
1712                    S3=25
1713                    PT=0
1714                    CS=0
1715                    ST=0
1716
1717                    ENTER T,O,S, OR R
1718                    * S
1719                    > S2=4
1720                    > SV=20
1721                    SV=20?
1722                    > S3=20
1723                    > PT=100000
1724                    TO MODIFY PATTERN 15, TYPE M <CR>, ELSE <CR>
1725                    * M
1726
1727                    MODIFY USER-DEFINED PATTERN 15:
1728                    WORD 00 = 072307 * 123456!
1729                    > ↑Z
1730
1731                    ENTER T,O,S, OR R
1732                    * T
1733                    FC=0
1734                    LC=632
1735                    FT=0
1736                    LT=2
```

```
1737                                    SO=0
1738                                    S1=23
```

```
                        S2=4
                        S3=20
                        PT=100000
                        CS=0
                        ST=0

                        USER-DEFINED PATTERN 15:
                        WORD 00 = 123456
                        WORD 01 = 123456
                        WORD 02 = 123456
                        WORD 03 = 123456
                        WORD 04 = 123456
                        WORD 05 = 123456
                        WORD 06 = 123456
                        WORD 07 = 123456
                        WORD 10 = 123456
                        WORD 11 = 123456
                        WORD 12 = 123456
                        WORD 13 = 123456
                        WORD 14↑Z
                         = 123456

                        ENTER T,O,S, OR R
                        * R

                        ENTER NO. OF PASSES (1-77777) :
                        * 1

                        TESTING DRIVE 0
                        DRIVE SER. NO.  8
                        CART. SER. NO.  334


                        OFFSET-TO-FAILURE MEASUREMENTS:
                        TRACK  CYLN  SECT   +OFST   -OFST
                                            (UIN)   (UIN)
                          0     0     4    NONE    NONE
                          0     0    20    NONE    NONE
                          0   631     4    NONE    NONE
                          0   631    20    NONE    NONE
                          1     0     4    NONE    NONE
                          1     0    20    NONE    NONE
                          1   631     4    NONE    NONE
                          1   631    20    NONE    NONE
                          2     0     4    NONE    NONE
                          2     0    20    NONE    NONE
                          2   631     4    NONE    NONE
                          2   631    20    NONE    NONE

                        END PASS #     1
                        TO TEST ALL DRIVES TYPE "A" <CR>, ELSE <CR>
                        *
```

APPENDIX C

SAMPLE MANUAL MODE HEAD ALIGNMENT AID RUN

THE FOLLOWING PRINTOUT WAS THE RESULT OF RUNNING THE HEAD ALIGNMENT AID, PROVIDED IN SUBSYSTEM VERIFICATION PART 2 (ADDRESS 224 START). MANUAL MODE WAS REQUESTED, AND THE OPERATOR SELECTED DRIVE 0 FOR ALIGNMENT. IN THIS CASE, THE OPERATOR SELECTED HEADS 1,0, AND 2, IN THAT ORDER, AND THEN REQUESTED RANDOM SEEK EXERCISES TO BE RUN ON THE DRIVE (AFTER REMOVAL OF THE HEAD ALIGNMENT TOOL). THE EXERCISES WOULD HAVE NORMALLY RUN FOR 5 MINUTES BUT THEY WERE PREMATURELY TERMINATED BY THE OPERATOR, BY TYPING (↑Z), IN THIS PARTICULAR RUN. FINALLY, VERIFY MODE WAS REQUESTED, AND HEAD 2 WAS SELECTED BY THE OPERATOR.

```
DZR6N-B - RK611/RK06 SUBSYSTEM VERIFICATION : PART 2

*** RK06 HEAD ALIGNMENT AID ***
FOR HELP TYPE H, ELSE <CR>

MANUAL OR AUTO MODE (M OR A)?
M


* MANUAL SELECT MODE *

ENTER DRIVE NO. (0-7):
0
DRIVE SER. NO.  8

ALIGN, VERIFY, OR EXERCISE (A, V, OR E)?
A


* MANUAL SELECT ALIGNMENT *

ENTER HEAD NO. (0-2):
1
TYPE <R> WHEN READY:
R
HEADS POSITIONED AT CYLINDER 365 (OCT)
HEAD 1 SELECTED

ENTER HEAD NO. (0-2):
```

```
1850                                    0
1851                                    TYPE <R> WHEN READY:
```

```
1852
1853
1854
1855                                    R
1856                                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1857                                    HEAD 0 SELECTED
1858
1859                                    ENTER HEAD NO. (0-2):
1860                                    2
1861                                    TYPE <R> WHEN READY:
1862                                    R
1863                                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1864                                    HEAD 2 SELECTED
1865
1866                                    ENTER HEAD NO. (0-2):
1867                                    ↑Z
1868
1869                                    ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
1870                                    E
1871                                    TYPE <R> WHEN READY:
1872                                    R
1873
1874
1875                                    *RANDOM SEEK EXERCISES IN PROGRESS ON DRIVE 0 *
1876                                    ↑Z
1877
1878                                    ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
1879                                    V
1880
1881
1882                                    * MANUAL SELECT VERIFY *
1883
1884                                    ENTER HEAD NO. (0-2) :
1885                                    2
1886                                    HEADS POSITIONED AT CYLINDER 365 (OCT)
1887                                    HEAD 2 SELECTED
1888
1889                                    ENTER HEAD NO. (0-2) :
1890                                    ↑Z
1891
1892                                    ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
```

APPENDIX D

SAMPLE AUTO MODE HEAD ALIGNMENT AID RUN

THE FOLLOWING PRINTOUT WAS THE RESULT OF RUNNING THE HEAD ALIGNMENT AID, PROVIDED IN SUBSYSTEM VERIFICATION PART 2 (ADDRESS 224 START). AUTO MODE WAS REQUESTED, AND THE OPERATOR SELECTED DRIVE 0 FOR ALIGNMENT. IN THIS CASE, HEADS 0,1,2, AND 0 (AGAIN) WERE SELECTED FOR ALIGNMENT (IN AUTO MODE, THE HEADS ARE ALWAYS SELECTED IN THE ORDER 0,1,2,0,1,2, ETC.). BETWEEN HEAD SELECTIONS, THE HEADS WERE UNLOADED TO ALLOW REMOVAL OR INSTALLATION OF THE HEAD ALIGNMENT TOOL. NOTE THAT ALL DRIVE AND HEAD SELECTION (IN AUTO MODE) IS DONE BY THE OPERATOR, AT THE DRIVES, BY OPERATION OF PORT SELECT SWITCHES. AFTER ALIGNING HEADS, THE OPERATOR REQUESTED RANDOM SEEK EXCERCISES TO BE RUN (ON ALL DRIVES, IN THIS CASE DRIVE 0). SHORT EXERCISES WERE REQUESTED, WHICH RUN FOR 1 MINUTE PER DRIVE. FINALLY, AUTO SELECT VERIFY WAS REQUESTED, AND HEADS 0,1, AND 2 WERE SELECTED SEQUENTIALLY.

```
DZR6N-B - RK611/RK06 SUBSYSTEM VERIFICATION : PART 2


*** RK06 HEAD ALIGNMENT AID ***
FOR HELP TYPE H, ELSE <CR>

MANUAL OR AUTO MODE (M OR A)?
A


* AUTO SELECT MODE *

ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
A


* AUTO SELECT ALIGNMENT *

DRIVE 0 SELECTED

HEADS POSITIONED AT CYLINDER 365 (OCT)
HEAD 0 SELECTED
HEADS POSITIONED AT CYLINDER 365 (OCT)
HEAD 1 SELECTED
HEADS POSITIONED AT CYLINDER 365 (OCT)
HEAD 2 SELECTED
```

```
 1949                            HEADS POSITIONED AT CYLINDER 365 (OCT)
 1950                            HEAD 0 SELECTED
```

```
                                ↑Z

                                * AUTO SELECT MODE *

                                ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
                                E

                                * AUTO SELECT EXERCISES *

                                SHORT OR LONG (S OR L) ?
                                S
                                EXERCISING DRIVE 0

                                * AUTO SELECT MODE *

                                ALIGN, VERIFY, OR EXERCISE (A, V, OR E)?
                                V

                                * AUTO SELECT VERIFY *

                                DRIVE 0 SELECTED

                                HEADS POSITIONED AT CYLINDER 365 (OCT)
                                HEAD 0 SELECTED
                                HEADS POSITIONED AT CYLINDER 365 (OCT)
                                HEAD 1 SELECTED
                                HEADS POSITIONED AT CYLINDER 365 (OCT)
                                HEAD 2 SELECTED
                                ↑Z

                                ALIGN, VERIFY, OR EXERCISE (A, V, OR E) ?
                                   J
000001                          PART=1
                                ;*** IF "PART" IS DEFINED = 0, PART 1 WILL BE ASSEMBLED. ***
                                ;*** IF "PART" IS DEFINED NOT = 0, PART 2 WILL BE ASSEMBLED. ***


                                        .NLIST  MC,MD,CND
                                        .LIST   ME
                                        .ENABL  ABS,AMA
                                        .MCALL  .HEADER,.SWRHI,.SWRLO,.EQUAT,.SETUP,.$CATCH,SWRSU
                                        .MCALL  .$CMTAG,.$TYPE,.$TYPOCT,.$POWER,.$TRAP,.$DB2O,.$DB2D
                                        .MCALL  .$READ,.$TYPDEC,.$RAND,.$SIZE,.$ERROR,.$SAVE
                                        .MCALL  .$RAND,.$SUPRS,.$EOP,.$SCOPE,.KT11
                                        .MCALL  .$ACT11,.$APTHDR,.$APTYPE
167000                          $SWR=   167000
                                ;;*****************************************************************
                                .SBTTL  STARTING ADDRESSES
                                ;*
```

```
                        ;*      200     DEFAULT PARAMETERS FOR TESTS 1-6
                        ;*      204     SELECT PARAMETERS FOR TESTS 1-6
                        ;*      224     HEAD ALIGNMENT AID
                        ;;*****************************************************************

000001                  $TN=1
                        .TITLE  DZR6N-B - RK611/RK06 SUBSYSTEM VERIFICATION : PART 2
                        ;*COPYRIGHT (C) 1976
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*PROGRAM BY DAVE HOFFMAN
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-CO),MAR 21, 1976.
                        ;*
                        .SBTTL  OPERATIONAL SWITCH SETTINGS
                        ;*
                        ;*      SWITCH              USE
                        ;*      ------          --------------------
                        ;*        15            HALT ON ERROR
                        ;*        14            LOOP ON TEST
                        ;*        13            INHIBIT ERROR TYPEOUTS
                        ;*        12            REPORT DESCRIPTION ONLY, ON ERRORS
                        ;*        11            INHIBIT ITERATIONS
                        ;*        10            BELL ON ERROR
                        ;*         9            LOOP ON ERROR
                        ;*         8            APPLY RANDOM STALL BETWEEN OPERATIONS
                        ;*         6            REPORT 1 ERROR PER TRANSFER IN TESTS 2-4
                        ;*         1            INHIBIT WRITES IN TEST 1
                        ;*         0            REPORT ALL SOFTWARE COMPARE ERRORS IN TESTS 2-4
                        .SBTTL  CONTROL SWITCH SETTINGS (PARAMETER CS)
                        ;*
                        ;*      SWITCH              USE
                        ;*      ------          --------------------
                        ;*        05            DROP DRIVE IF 20(DEC) ERRORS EXCEEDED
                        ;*        04            TYPE BAD SECTOR FILES (BSF'S) ON FIRST PASS
                        ;*        01            INHIBIT OFFSET REPORTS IN TEST 1

                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                  STACK=  1100
                        .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                        .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

                        ;*MISCELLANEOUS DEFINITIONS
000011                  HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                  LF=     12              ;;CODE FOR LINE FEED
000015                  CR=     15              ;;CODE FOR CARRIAGE RETURN
000200                  CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776                  PS=     177776          ;;PROCESSOR STATUS WORD
                        .EQUIV  PS,PSW
177774                  STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                  PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                  DSWR=   177570          ;;HARDWARE SWITCH REGISTER
```

```
                        
                        DDISP=  177570          ;;HARDWARE DISPLAY REGISTER
                        
                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0=     %0              ;;GENERAL REGISTER
000001                  R1=     %1              ;;GENERAL REGISTER
000002                  R2=     %2              ;;GENERAL REGISTER
000003                  R3=     %3              ;;GENERAL REGISTER
000004                  R4=     %4              ;;GENERAL REGISTER
000005                  R5=     %5              ;;GENERAL REGISTER
000006                  R6=     %6              ;;GENERAL REGISTER
000007                  R7=     %7              ;;GENERAL REGISTER
                        .EQUIV  R6,SP           ;;STACK POINTER
                        .EQUIV  R7,PC           ;;PROGRAM COUNTER
                        
                        ;*PRIORITY LEVEL DEFINITIONS
000000                  PR0=    0               ;;PRIORITY LEVEL 0
000040                  PR1=    40              ;;PRIORITY LEVEL 1
000100                  PR2=    100             ;;PRIORITY LEVEL 2
000140                  PR3=    140             ;;PRIORITY LEVEL 3
000200                  PR4=    200             ;;PRIORITY LEVEL 4
000240                  PR5=    240             ;;PRIORITY LEVEL 5
000300                  PR6=    300             ;;PRIORITY LEVEL 6
000340                  PR7=    340             ;;PRIORITY LEVEL 7
                        
                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
000002                  SW01=   2
000001                  SW00=   1
                        .EQUIV  SW09,SW9
                        .EQUIV  SW08,SW8
                        .EQUIV  SW07,SW7
                        .EQUIV  SW06,SW6
                        .EQUIV  SW05,SW5
                        .EQUIV  SW04,SW4
                        .EQUIV  SW03,SW3
                        .EQUIV  SW02,SW2
                        .EQUIV  SW01,SW1
                        .EQUIV  SW00,SW0
                        
                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15=  100000
040000                  BIT14=  40000
020000                  BIT13=  20000
```

```
                        BIT12=  10000
                        BIT11=  4000
                        BIT10=  2000
                        BIT09=  1000
                        BIT08=  400
                        BIT07=  200
                        BIT06=  100
                        BIT05=  40
                        BIT04=  20
                        BIT03=  10
                        BIT02=  4
                        BIT01=  2
                        BIT00=  1
                        .EQUIV  BIT09,BIT9
                        .EQUIV  BIT08,BIT8
                        .EQUIV  BIT07,BIT7
                        .EQUIV  BIT06,BIT6
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0

                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014                  TBITVEC=14              ;;"T" BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                  TRAPVEC=34              ;;"TRAP" TRAP
000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
                        .SBTTL  MEMORY MANAGEMENT DEFINITIONS

                        ;*KT11 VECTOR ADDRESS

000250                  MMVEC=  250

                        ;*KT11 STATUS REGISTER ADDRESSES

177572                  SR0=    177572
177574                  SR1=    177574
177576                  SR2=    177576
172516                  SR3=    172516

                        ;*KERNEL "I" PAGE DESCRIPTOR REGISTERS

172300                  KIPDR0= 172300
172302                  KIPDR1= 172302
172304                  KIPDR2= 172304
172306                  KIPDR3= 172306
```

```
                                ;*KIPDR4= 172310
                                ;*KIPDR5= 172312
                                ;*KIPDR6= 172314
                                ;*KIPDR7= 172316
                                ;
                                ;*KERNEL "I" PAGE ADDRESS REGISTERS
                                ;
                                ;*KIPAR0= 172340
                                ;*KIPAR1= 172342
                                ;*KIPAR2= 172344
                                ;*KIPAR3= 172346
                                ;*KIPAR4= 172350
                                ;*KIPAR5= 172352
                                ;*KIPAR6= 172354
                                ;*KIPAR7= 172356
                                ;
                                ;*MAPLO0=170200
                                ;*MAPHO0=170202
                                ;*MEMCSR=172100                  ;MEMORY CSR REG START ADRS
                                ;*LOERAD=177740                  ;11/70 MEM LO ERROR ADRS REG
                                ;*HIERAD=177742                  ;11/70 MEM HI ERROR ADRS REG
                                ;*MEMSYS=177744                  ;11/70 MEM SYSTEM REG
                                .SBTTL  TRAP CATCHER
                                ;
                                        .=0
                                ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                                        .=174
000174  000000                  DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000                  SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                .SBTTL  STARTING ADDRESS(ES)
000200  000137  013450                  JMP     @#DFSTRT        ;;JUMP TO STARTING ADDRESS OF PROGRAM
        000204
000204  000137  013504                  JMP     @#PSTART
        000224
000224  000137  023602                  JMP     @#ASTART
000230  000700                  ..LOW:  .WORD   700
000232  001100                  ..HIGH: .WORD   1100
                                .SBTTL  ACT11 HOOKS
                                ;
                                ;;*****************************************************************
                                ;HOOKS REQUIRED BY ACT11
                                        $SVPC=.                 ;SAVE PC
                                        .=46
                                        $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                                        .=52
                                        .WORD   140000          ;;2)SET LOC.52 TO 140000
                                        .=$SVPC                 ;; RESTORE PC
                                        .=1000
                                .SBTTL  APT PARAMETER BLOCK
                                ;
                                ;;*****************************************************************
                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                ;;*****************************************************************
                                        .$X=.   ;;SAVE CURRENT LOCATION
```

```
                                                .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
                                                200     ;;FOR APT START UP
                                                .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
                                                $APTHDR ;;POINT TO APT HEADER BLOCK
                                                .=.$X   ;;RESET LOCATION COUNTER
                                        ;;**************************************************************
                                        ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                                        ;INTERFACE SPEC.

001000                                  $APTHD:
001000  000000                          $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
001002  001320                          $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
001004  001130                          $TSTM:  .WORD   1130    ;;RUN TIM OF LONGEST TEST
001006  003410                          $PASTM: .WORD   3410    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
001010  003410                          $UNITM: .WORD   3410    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
001012  000030                                  .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
        120210                          AVECT1=120210                  ;RKVEC=210, RKPRI=5
        177440                          ABASE=177440                   ;RKBAS ADRS
        000377                          ADEVM=000377                   ;SET DEVICES 0-7 IN MAP
```

```
                                .SBTTL  COMMON TAGS

                                ;;*****************************************************************
                                ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                ;*USED IN THE PROGRAM.

                        001100          .=1100
001100                  $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                  .WORD   0
001102  000             $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103  000             $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001106  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114  000             $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115  001             $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                  .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                  .WORD   0
001134  000             $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135  000             $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000                  .WORD   0
001140  177570          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
                        $TKS:   177560                  ;;TTY KBD STATUS
                        $TKB:   177562                  ;;TTY KBD BUFFER
                        $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
                        $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154  000             $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155  002             $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156  012             $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001157  000             $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001160  000000          $REGAD: .WORD   0               ;;CONTAINS THE ADDRESS FROM
                                                        ;;WHICH  ($REG0) WAS OBTAINED
001162  000000          $REG0:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001164  000000          $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001166  000000          $REG2:  .WORD   0               ;;CONTAINS (($REGAD)+4)
001170  000000          $REG3:  .WORD   0               ;;CONTAINS (($REGAD)+6)
001172  000000          $REG4:  .WORD   0               ;;CONTAINS (($REGAD)+10)
001174  000000          $REG5:  .WORD   0               ;;CONTAINS (($REGAD)+12)
001176  000000          $REG6:  .WORD   0               ;;CONTAINS (($REGAD)+14)
001200  000000          $REG7:  .WORD   0               ;;CONTAINS (($REGAD)+16)
001202  000000          $REG10: .WORD   0               ;;CONTAINS (($REGAD)+20)
001204  000000          $REG11: .WORD   0               ;;CONTAINS (($REGAD)+22)
001206  000000          $REG12: .WORD   0               ;;CONTAINS (($REGAD)+24)
001210  000000          $REG13: .WORD   0               ;;CONTAINS (($REGAD)+26)
001212  000000          $REG14: .WORD   0               ;;CONTAINS (($REGAD)+30)
001214  000000          $REG15: .WORD   0               ;;CONTAINS (($REGAD)+32)
001216  000000          $REG16: .WORD   0               ;;CONTAINS (($REGAD)+34)
001220  000000          $REG17: .WORD   0               ;;CONTAINS (($REGAD)+36)
001222  000000          $REG20: .WORD   0               ;;CONTAINS (($REGAD)+40)
```

```
2306  001224  000000                  $REG21: .WORD   0               ;;CONTAINS (($REGAD)+42)
2307  001226  000000                  $REG22: .WORD   0               ;;CONTAINS (($REGAD)+44)
2308  001230  000000                  $REG23: .WORD   0               ;;CONTAINS (($REGAD)+46)
2309  001232  000000                  $REG24: .WORD   0               ;;CONTAINS (($REGAD)+50)
2310  001234  000000                  $REG25: .WORD   0               ;;CONTAINS (($REGAD)+52)
2311  001236  000000                  $REG26: .WORD   0               ;;CONTAINS (($REGAD)+54)
2312  001240  000000                  $REG27: .WORD   0               ;;CONTAINS (($REGAD)+56)
2313  001242  000000                  $REG30: .WORD   0               ;;CONTAINS (($REGAD)+60)
2314  001244  000000                  $REG31: .WORD   0               ;;CONTAINS (($REGAD)+62)
2315  001246  000000                  $REG32: .WORD   0               ;;CONTAINS (($REGAD)+64)
2316  001250  000000                  $REG33: .WORD   0               ;;CONTAINS (($REGAD)+66)
2317  001252  000000                  $REG34: .WORD   0               ;;CONTAINS (($REGAD)+70)
2318  001254  000000                  $REG35: .WORD   0               ;;CONTAINS (($REGAD)+72)
2319  001256  000000                  $REG36: .WORD   0               ;;CONTAINS (($REGAD)+74)
2320  001260  000000                  $REG37: .WORD   0               ;;CONTAINS (($REGAD)+76)
2321  001262  000000                  $TMP0:  .WORD   0               ;;USER DEFINED
2322  001264  000000                  $TMP1:  .WORD   0               ;;USER DEFINED
2323  001266  000000                  $TMP2:  .WORD   0               ;;USER DEFINED
2324  001270  000000                  $TMP3:  .WORD   0               ;;USER DEFINED
2325  001272  000000                  $TMP4:  .WORD   0               ;;USER DEFINED
2326  001274  000000                  $TMP5:  .WORD   0               ;;USER DEFINED
2327  001276  000000                  $TMP6:  .WORD   0               ;;USER DEFINED
2328  001300  000000                  $TMP7:  .WORD   0               ;;USER DEFINED
2329  001302  000000                  $TMP10: .WORD   0               ;;USER DEFINED
2330  001304  000000                  $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
2331  001306  000000                  $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
2332  001310  177607  000377          $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
2333  001314    077                   $QUES:  .ASCII  /?/             ;;QUESTION MARK
2334  001315    015                   $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
2335  001316  000012                  $LF:    .ASCIZ  <12>            ;;LINE FEED
2336                                  ;;*****************************************************************
2337                                  .SBTTL  APT MAILBOX-ETABLE
2338
2339                                  ;;*****************************************************************
2340                                  .EVEN
2341  001320                          $MAIL:                          ;;APT MAILBOX
2342  001320  000000                  $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
2343  001322  000000                  $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
2344  001324  000000                  $TESTN: .WORD   ATESTN          ;;TEST NUMBER
2345  001326  000000                  $PASS:  .WORD   APASS           ;;PASS COUNT
2346  001330  000000                  $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
2347  001332  000000                  $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
2348  001334  000000                  $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
2349  001336  000000                  $MSGLG: .WORD   AMSGLG          ;;MESSAGE LENGTH
2350  001340                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
2351  001340     000                  $ENV:   .BYTE   AENV            ;;ENVIRONMENT BYTE
2352  001341     000                  $ENVM:  .BYTE   AENVM           ;;ENVIRONMENT MODE BITS
2353  001342  000000                  $SWREG: .WORD   ASWREG          ;;APT SWITCH REGISTER
2354  001344  000000                  $USWR:  .WORD   AUSWR           ;;USER SWITCHES
2355  001346  000000                  $CPUOP: .WORD   ACPUOP          ;;CPU TYPE,OPTIONS
2356                                  ;*                              BITS 15-11=CPU TYPE
2357                                  ;*                                   11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
2358                                  ;*                                   11/70=06,PDQ=07,Q=10
2359                                  ;*                              BIT 10=REAL TIME CLOCK
2360                                  ;*                              BIT  9=FLOATING POINT PROCESSOR
2361                                  ;*                              BIT  8=MEMORY MANAGEMENT
```

```
2362  001350  000                $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
2363  001351  000                $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
2364                             ;*                      MEM.TYPE BYTE   --  (HIGH BYTE)
2365                             ;*                              900 NSEC CORE=001
2366                             ;*                              300 NSEC BIPOLAR=002
2367                             ;*                              500 NSEC MOS=003
2368  001352  000000             $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
2369                             ;*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
2370  001354  000                $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
2371  001355  000                $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
2372  001356  000000             $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
2373  001360  000                $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
2374  001361  000                $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
2375  001362  000000             $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
2376  001364  000                $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
2377  001365  000                $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
2378  001366  000000             $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
2379  001370  120210             $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
2380  001372  000000             $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
2381  001374  177440             $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
2382  001376  000377             $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
2383  001400                     $ETEND:
2384                             .MEXIT
```

```
                                .SBTTL  ERROR POINTER TABLE

                                ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
                                ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                                ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
                                ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

                                ;*      EM              ;;POINTS TO THE ERROR MESSAGE
                                ;*      DH              ;;POINTS TO THE DATA HEADER
                                ;*      DT              ;;POINTS TO THE DATA
                                ;*      DF              ;;POINTS TO THE DATA FORMAT

001400                          $ERRTB:

                                        ;ERROR 1                ;UNIBUS PARITY ERROR
001400  056645                          EM1
001402  061740                          DH100
001404  063524                          DT100
001406  063640                          DF01

                                        ;ERROR 2                ;NON-EXISTANT MEMORY
001410  056671                          EM2
001412  061740                          DH100
001414  063524                          DT100
001416  063640                          DF01

                                        ;ERROR 3                ;NON-EXISTANT DRIVE
001420  056715                          EM3
001422  061740                          DH100
001424  063524                          DT100
001426  063640                          DF01

                                        ;ERROR 4                ;UNIT FIELD ERROR
001430  056740                          EM4
001432  061740                          DH100
001434  063524                          DT100
001436  063640                          DF01

                                        ;ERROR 5                ;SUBSYSTEM TIMEOUT
001440  056761                          EM5
001442  061740                          DH100
001444  063524                          DT100
001446  063670                          DF02

                                        ;ERROR 6
001450  057000                          EM6                     ;SERCON PARITY ERROR
001452  061740                          DH100
001454  063524                          DT100
001456  063724                          DF03

                                        ;ERROR 7
001460  057024                          EM7                     ;DRIVE DETECTED PARITY ERROR
001462  061740                          DH100
001464  063524                          DT100
```

```
2441  001466  063724                    DF03
2442
2443                                    ;ERROR 10
2444  001470  057060                    EM10                ;AC LOW
2445  001472  061740                    DH100
2446  001474  063524                    DT100
2447  001476  063670                    DF02
2448
2449                                    ;ERROR 11
2450  001500  057067                    EM11                ;SPEED LOSS
2451  001502  061740                    DH100
2452  001504  063524                    DT100
2453  001506  063670                    DF02
2454
2455                                    ;ERROR 12
2456  001510  057102                    EM12                ;ILLEGAL FUNCTION
2457  001512  061740                    DH100
2458  001514  063524                    DT100
2459  001516  063670                    DF02
2460
2461                                    ;ERROR 13
2462  001520  057123                    EM13                ;PROGRAMMING ERROR
2463  001522  061740                    DH100
2464  001524  063524                    DT100
2465  001526  063640                    DF01
2466
2467                                    ;ERROR 14           ;NON-EXISTANT FUNCTION
2468  001530  057145                    EM14
2469  001532  061740                    DH100
2470  001534  063524                    DT100
2471  001536  063670                    DF02
2472
2473                                    ;ERROR 15
2474  001540  057173                    EM15                ;DRIVE TYPE ERROR
2475  001542  061740                    DH100
2476  001544  063524                    DT100
2477  001546  063670                    DF02
2478
2479                                    ;ERROR 16
2480  001550  057214                    EM16                ;FORMAT ERROR
2481  001552  061740                    DH100
2482  001554  063524                    DT100
2483  001556  063670                    DF02
2484
2485                                    ;ERROR 17
2486  001560  057231                    EM17                ;WRITE LOCK ERROR
2487  001562  061740                    DH100
2488  001564  063524                    DT100
2489  001566  063670                    DF02
2490
2491                                    ;ERROR 20
2492  001570  057252                    EM20                ;DRIVE UNSAFE
2493  001572  061740                    DH100
2494  001574  063524                    DT100
2495  001576  063670                    DF02
2496
```

```
2497                                        ;ERROR 21
2498  001600  057267                        EM21            ;SEEK INCOMPLETE
2499  001602  061740                        DH100
2500  001604  063524                        DT100
2501  001606  063670                        DF02
2502
2503                                        ;ERROR 22
2504  001610  057307                        EM22            ;CYLINDER OVERFLOW
2505  001612  061740                        DH100
2506  001614  063524                        DT100
2507  001616  063670                        DF02
2508
2509                                        ;ERROR 23
2510  001620  057331                        EM23            ;ILLEGAL CYLINDER
2511  001622  061740                        DH100
2512  001624  063524                        DT100
2513  001626  063670                        DF02
2514
2515                                        ;ERROR 24
2516  001630  057362                        EM24            ;DRIVE OFF TRACK
2517  001632  061740                        DH100
2518  001634  063524                        DT100
2519  001636  063670                        DF02
2520
2521                                        ;ERROR 25
2522  001640  057402                        EM25            ;DRIVE TIMING ERROR
2523  001642  061740                        DH100
2524  001644  063524                        DT100
2525  001646  063670                        DF02
2526
2527                                        ;ERROR 26
2528  001650  057425                        EM26            ;DATA LATE
2529  001652  061740                        DH100
2530  001654  063524                        DT100
2531  001656  063670                        DF02
2532
2533                                        ;ERROR 27
2534  001660  057437                        EM27            ;CONTROLLER TIMEOUT
2535  001662  061740                        DH100
2536  001664  063524                        DT100
2537  001666  063670                        DF02
2538
2539                                        ;ERROR 30       ;OPERATION INCOMPLETE
2540  001670  057462                        EM30
2541  001672  061740                        DH100
2542  001674  063524                        DT100
2543  001676  064000                        DF05
2544
2545                                        ;ERROR 31
2546  001700  057507                        EM31            ;HEADER VRC ERROR
2547  001702  061740                        DH100
2548  001704  063524                        DT100
2549  001706  064000                        DF05
2550
2551                                        ;ERROR 32
2552  001710  057530                        EM32            ;DATA CHECK ERROR
```

```
2553  001712  061740                  DH100
2554  001714  063524                  DT100
2555  001716  064034                  DF07
2556
2557                                  ;ERROR 33
2558  001720  057551                  EM33          ;WRITE CHECK ERROR
2559  001722  061740                  DH100
2560  001724  063524                  DT100
2561  001726  064070                  DF10
2562
2563                                  ;ERROR 34
2564  001730  057573                  EM34          ;DATA MISCOMPARE(S)
2565  001732  061740                  DH100
2566  001734  063524                  DT100
2567  001736  063764                  DF04
2568
2569                                  ;ERROR 35
2570  001740  057613                  EM35          ;NO DRIVE RESPONSE-UFE & NXD
2571  001742  061740                  DH100
2572  001744  063524                  DT100
2573  001746  063640                  DF01
2574
2575                                  ;ERROR 36
2576  001750  057647                  EM36          ;DRIVE ERROR WILL NOT CLEAR
2577  001752  000000                  0
2578  001754  000000                  0
2579  001756  000000                  0
2580
2581                                  ;ERROR 37     ;DRIVE STATUS CHANGE WILL NOT CLEAR
2582  001760  057702                  EM37
2583  001762  000000                  0
2584  001764  000000                  0
2585  001766  000000                  0
2586
2587                                  ;ERROR 40
2588  001770  057745                  EM40          ;ATTENTION BUT NO STATUS CHANGE OR FAULT
2589  001772  061740                  DH100
2590  001774  063524                  DT100
2591  001776  063670                  DF02
2592
2593                                  ;ERROR 41
2594  002000  060011                  EM41          ;ATTENTION BUT DRIVE NOT AVAILABLE
2595  002002  061740                  DH100
2596  002004  063524                  DT100
2597  002006  063670                  DF02
2598
2599                                  ;ERROR 42
2600  002010  060047                  EM42          ;ATTENTION WHEN NOT EXPECTED
2601  002012  061740                  DH100
2602  002014  063524                  DT100
2603  002016  063670                  DF02
2604
2605                                  ;ERROR 43     ;ERROR WHILE GATHERING DRIVE STATUS
2606  002020  060077                  EM43
2607  002022  061740                  DH100
2608  002024  063524                  DT100
```

```
2609  002026  064134                        DF12
2610
2611                                        ;ERROR 44
2612  002030  060354                        EM63          ;CLEAR CONTROLLER DID NOT CLEAR ERROR
2613  002032  061740                        DH100
2614  002034  063524                        DT100
2615  002036  064134                        DF12
2616
2617                                        ;ERROR 45
2618  002040  060421                        EM64          ;NO ATTENTION IN ATTENTION SUMMARY REG
2619  002042  061740                        DH100
2620  002044  063524                        DT100
2621  002046  064134                        DF12
2622
2623                                        ;ERROR 46
2624  002050  060464                        EM65          ;UNSOLICITED ATTENTION
2625  002052  061740                        DH100
2626  002054  063524                        DT100
2627  002056  064134                        DF12
2628
2629                                        ;ERROR 47
2630  002060  060512                        EM66          ;UNEXPECTED DATA TYPE ERROR
2631  002062  061740                        DH100
2632  002064  063524                        DT100
2633  002066  064134                        DF12
2634
2635                                        ;ERROR 50
2636  002070  060545                        EM67          ;ATTENTION DID NOT RESET WITH CLEAR
2637  002072  061740                        DH100
2638  002074  063524                        DT100
2639  002076  064134                        DF12
2640
2641                                        ;ERROR 51
2642  002100  060604                        EM70          ;SUBSYSTEM CLEAR DID NOT CLEAR DRIVE ATTENTION
2643  002102  061740                        DH100
2644  002104  063524                        DT100
2645  002106  064134                        DF12
2646
2647                                        ;ERROR 52
2648  002110  060134                        EM52          ;MULTIPLE DRIVE SELECT
2649  002112  061740                        DH100
2650  002114  063524                        DT100
2651  002116  064134                        DF12
2652
2653                                        ;ERROR 53
2654  002120  060162                        EM53          ;ABREVIATED HCE ERROR
2655  002122  061740                        DH100
2656  002124  063524                        DT100
2657  002126  064164                        DF13
2658
2659                                        ;ERROR 54
2660  002130  057462                        EM30          ;OPERATION INCOMPLETE ERROR
2661  002132  061740                        DH100
2662  002134  063524                        DT100
2663  002136  064214                        DF14
2664
```

```
                                        ;ERROR 55
002140  057507                          EM31            ;ABREVIATED HVRC ERROR
002142  061740                          DH100
002144  063524                          DT100
002146  064164                          DF13

                                        ;ERROR 56
002150  060207                          EM56            ;2 TIMEOUT ERROR
002152  061740                          DH100
002154  063524                          DT100
002156  064244                          DF15

                                        ;ERROR 57       ;2ND LEVEL IN SUBSYSTEM TIMEOUT
002160  060207                          EM56
002162  061740                          DH100
002164  063524                          DT100
002166  064310                          DF16

                                        ;ERROR 60
002170  060226                          EM60            ;ERROR IN RECAL FOR RECOVERY
002172  000000                          0
002174  000000                          0
002176  000000                          0

                                        ;ERROR 61
002200  060262                          EM61            ;ABORT MESSAGE
002202  000000                          0
002204  000000                          0
002206  000000                          0

                                        ;ERROR 62
002210  060330                          EM62            ;CYLINDER MISCOMPARE
002212  061740                          DH100
002214  063524                          DT100
002216  064354                          DF17

                                        ;ERROR 63       ;DATA ERROR WORDS
002220  000000                          0
002222  000000                          0
002224  063616                          DT602
002226  064464                          DF25

                                        ;ERROR 64
002230  060354                          EM63            ;CLEAR CONTROLLER DID NOT CLEAR ERROR
002232  061740                          DH100
002234  063524                          DT100
002236  063670                          DF02

                                        ;ERROR 65
002240  060421                          EM64            ;NO ATTENTION IN ATTENTION SUMMARY REG
002242  061740                          DH100
002244  063524                          DT100
002246  063670                          DF02

                                        ;ERROR 66
002250  060464                          EM65            ;UNSOLICITED ATTENTION
```

```
2721  002252  061740                  DH100
2722  002254  063524                  DT100
2723  002256  063670                  DF02
2724
2725                                  ;ERROR 67
2726  002260  060512                  EM66          ;UNEXPECTED DATA TYPE ERROR
2727  002262  061740                  DH100
2728  002264  063524                  DT100
2729  002266  063670                  DF02
2730
2731                                  ;ERROR 70
2732  002270  060545                  EM67          ;ATTENTION DID NOT RESET WITH CLEAR
2733  002272  061740                  DH100
2734  002274  063524                  DT100
2735  002276  063670                  DF02
2736
2737                                  ;ERROR 71
2738  002300  060604                  EM70          ;SUBSYSTEM CLEAR DID NOT CLEAR ATT
2739  002302  061740                  DH100
2740  002304  063524                  DT100
2741  002306  063670                  DF02
2742
2743                                  ;ERROR 72
2744  002310  060653                  EM71          ;DATA LATE WHEN UNLOADING HEADER
2745  002312  061740                  DH100
2746  002314  063524                  DT100
2747  002316  063670                  DF02
2748
2749                                  ;ERROR 73
2750  002320  060713                  EM72          ;CONTROLLER ERROR DURING DRIVER SERVICE
2751  002322  061740                  DH100
2752  002324  063524                  DT100
2753  002326  063670                  DF02
2754
2755                                  ;ERROR 74
2756  002330  060762                  EM73          ;DRIVE DETECTED PARITY ERROR
2757  002332  061740                  DH100
2758  002334  063524                  DT100
2759  002336  063670                  DF02
2760
2761                                  ;ERROR 75
2762  002340  061016                  EM74          ;UNDEFINED ERROR
2763  002342  061740                  DH100
2764  002344  063524                  DT100
2765  002346  063670                  DF02
2766
2767                                  ;ERROR 76
2768  002350  061036                  EM75          ;MARKING SECTOR BAD MESSAGE
2769  002352  000000                  0
2770  002354  000000                  0
2771  002356  000000                  0
2772
2773                                  ;ERROR 77
2774  002360  061066                  EM76          ;BAD DATA VERIFICATION WITH READ
2775  002362  062725                  DH605
2776  002364  063610                  DT601
```

```
2777  002366  064410                    DF21
2778
2779                                    ;ERROR 100
2780  002370  061150                    EM77                ;RETRY SUCCESFUL MESSAGE
2781  002372  000000                    0
2782  002374  063610                    DT601
2783  002376  064450                    DF23
2784
2785                                    ;ERROR 101
2786  002400  061150                    EM77                ;ANOTHER RETRY SUCCESSFUL MESSAGE
2787  002402  000000                    0
2788  002404  063610                    DT601
2789  002406  064450                    DF23
2790
2791                                    ;ERROR 102
2792  002410  061171                    EM100               ;RETRY UNSUCCESSFUL MESSAGE
2793  002412  000000                    0
2794  002414  063610                    DT601
2795  002416  064450                    DF23
2796
2797                                    ;ERROR 103
2798  002420  061214                    EM101               ;NO VALID HEADERS IN TRACK JUST READ
2799  002422  062707                    DH6042
2800  002424  063610                    DT601
2801  002426  064460                    DF24
2802
2803                                    ;ERROR 104
2804  002430  061272                    EM102               ;BSE ERROR ON SECTOR NOT LISTED AS BAD
2805  002432  061740                    DH100
2806  002434  063524                    DT100
2807  002436  063670                    DF02
2808
2809                                    ;ERROR  105
2810  002440  061344                    EM103               ;TIMED-OUT ON READ HEADER
2811  002442  061740                    DH100
2812  002444  063524                    DT100
2813  002446  063724                    DF03
2814
2815                                    ;ERROR  106
2816  002450  061372                    EM104               ;TIMED-OUT ON SEEK
2817  002452  061740                    DH100
2818  002454  063524                    DT100
2819  002456  063724                    DF03
2820
2821                                    ;ERROR  107
2822  002460  061414                    EM105               ;DRIVE SIEZED BY OTHER PORT,
2823  002462  061740                    DH100
2824  002464  063524                    DT100
2825  002466  063670                    DF02
2826
2827                                    ;ERROR  110
2828  002470  061447                    EM106               ;"DATA MISCMPR WHILE BAI SET"
2829  002472  061740                    DH100
2830  002474  063524                    DT100
2831  002476  064500                    DF27
2832
```

```
2833                                            ;ERROR  111
2834  002500  061502                           EM107                   ;"NO MEM WHEN EXPECTED"
2835  002502  000000                           0
2836  002504  000000                           0
2837  002506  000000                           0
2838
2839                                            ;ERROR  112
2840  002510  061547                           EM110                   ;"INTRPT WHEN CNTRLR NOT READY"
2841  002512  061740                           DH100
2842  002514  063524                           DT100
2843  002516  063640                           DF01
2844
2845                                            ;ERROR  113
2846  002520  061602                           EM111                   ;"NO ATT'N ON SEEK"
2847  002522  061740                           DH100
2848  002524  063524                           DT100
2849  002526  063670                           DF02
2850
2851                                            ;ERROR  114
2852  002530  061623                           EM112                   ;DRIVE'S CYLINDER INCORRECT
2853  002532  063134                           DH702
2854  002534  063564                           DT202
2855  002536  064470                           DF26
2856
2857                                            ;ERROR  115
2858  002540  000000                           0                       ;TYPE ADRS OF DATA MISCOMPARE(S)
2859  002542  000000                           0
2860  002544  063610                           DT601
2861  002546  064114                           DF11
2862
2863                                            ;ERROR  116
2864  002550  057573                           EM34                    ;DATA MISCOMPARE (11/70)
2865  002552  062251                           DH103
2866  002554  063634                           DT103
2867  002556  064400                           DF20
2868
2869                                            ;ERROR  117
2870  002560  000000                           0                       ;PART OF DATA MISCOMPARE
2871  002562  000000                           0
2872  002564  063524                           DT100
2873  002566  064420                           DF22
2874
2875                                            ;ERROR  120
2876  002570  061656                           EM113                   ;ABORT- CAN'T READ BSF
2877  002572  061740                           DH100
2878  002574  063524                           DT100
2879  002576  063640                           DF01
2880
2881                                            ;ERROR  121
2882  002600  061704                           EM114                   ;KT11 FAILURE
2883  002602  061740                           DH100
2884  002604  063524                           DT100
2885  002606  064524                           DF30
2886
2887                                            ;ERROR  122
2888  002610  061721                           EM115                   ;MEM PARITY ERROR
```

```
2889  002612  061740                          DH100
2890  002614  063524                          DT100
2891  002616  064550                          DF31
2892
2893
2894
2895
2896
2897
```

```
                        .SBTTL  BIT ASSIGNMENTS IN THE RK611 REGISTERS

                        ;RKCS1
                        ; 15      14      13      12      11      10      9       8
                        ;-----------------------------------------------------------------
                        ;CERR !  DI   ! SPAR ! CFMT ! CTO  ! CDT  ! BA17 ! BA16 !
                        ;CCLR !       !      !      !      !      !      !      !
                        ; R/W !  RO   !  RO  !  R/W !  RO  !  R/W !  R/W !  R/W !
                        ;-----------------------------------------------------------------

                        ;  7      6       5       4       3       2       1       0
                        ;-----------------------------------------------------------------
                        ; RDY !  IE   ! SPARE!  F4   !  F3  !  F2  !  F1  !  GO  !
                        ; R/W !  R/W  !  R/W !  R/W  !  R/W !  R/W !  R/W !  R/W !
                        ;-----------------------------------------------------------------

                        ;RKCS2
                        ; 15     14      13      12      11      10      9       8
                        ;-----------------------------------------------------------------
                        ; DLT !  WCE  !  UPE !  NED  !  NEM  !  PGE  !  MDS  !  UFE  !
                        ; RO  !  RO   !  RO  !  RO   !  RO   !  RO   !  RO   !  RO   !
                        ;-----------------------------------------------------------------

                        ;  7      6       5       4       3       2       1       0
                        ;-----------------------------------------------------------------
                        ;  OR  !  IR   !  CLR !  BAI  !  DESL !  DS2  !  DS1  !  DS0  !
                        ;  RO  !  RO   !  WO  !  R/W  !  R/W  !  R/W  !  R/W  !  R/W  !
                        ;-----------------------------------------------------------------

                        ;RKDC (DESIRED CYLINDER)
                        ; 15      14      13      12      11      10      9       8
                        ;-----------------------------------------------------------------
                        ; NU  !  NU   !  NU  !  NU   !  NU   !  NU   !  DC9  !  DC8  !
                        ;                       READ ONLY                               !
                        ;-----------------------------------------------------------------

                        ;  7      6       5       4       3       2       1       0
                        ;-----------------------------------------------------------------
                        ; DC7 !  DC6  !  DC5 !  DC4  !  DC3  !  DC2  !  DC1  !  DC0  !
                        ;                       READ ONLY                               !
                        ;-----------------------------------------------------------------

                        ;RKDA (DESIRED TRACK AND SECTOR)
                        ; 15      14      13      12      11      10      9       8
                        ;-----------------------------------------------------------------
                        ; NU  !  UN   !  UN  !  UN   !  UN   !  TA2  !  TA1  !  TA0  !
                        ;                       READ ONLY                               !
                        ;-----------------------------------------------------------------

                        ;  7      6       5       4       3       2       1       0
                        ;-----------------------------------------------------------------
                        ; UN  !  UN   !  UN  !  SA4  !  SA3  !  SA2  !  SA1  !  SA0  !
                        ;                       READ ONLY                               !
                        ;-----------------------------------------------------------------
```

```
                        ;RKDB (DATA BUFFER)
                        ; 15     14     13     12     11     10     9      8
                        ;-------------------------------------------------------
                        ;DB15 ! DB14 ! DB13 ! DB12 ! DB11 ! DB10 ! DB9  ! DB8  !
                        ;                    READ/WRITE                         !
                        ;-------------------------------------------------------

                        ;  7      6      5      4      3      2      1      0
                        ;-------------------------------------------------------
                        ; DB7 ! DB6  ! DB5  ! DB4  ! DB3  ! DB2  ! DB1  ! DB0  !
                        ;                    READ/WRITE                         !
                        ;-------------------------------------------------------

                        ;RKASOF (ATTENTION SUMMARY AND OFFSET)
                        ; 15     14     13     12     11     10     9      8
                        ;-------------------------------------------------------
                        ;ATN7 ! ATN6 ! ATN5 ! ATN4 ! ATN3 ! ATN2 ! ATN1 ! ATN0 !
                        ;                    READ ONLY                          !
                        ;-------------------------------------------------------

                        ;  7      6      5      4      3      2      1      0
                        ;-------------------------------------------------------
                        ; UN  ! OF6  ! OF5  ! OF4  ! OF3  ! OF2  ! OF1  ! OF0  !
                        ;  ?  !             READ/WRITE                         !
                        ;-------------------------------------------------------

                        ;RKWC (WORD COUNT)
                        ; 15     14     13     12     11     10     9      8
                        ;-------------------------------------------------------
                        ;WC15 ! WC14 ! WC13 ! WC12 ! WC11 ! WC10 ! WC9  ! WC8  !
                        ;                    READ/WRITE                         !
                        ;-------------------------------------------------------

                        ;  7      6      5      4      3      2      1      0
                        ;-------------------------------------------------------
                        ; WC7 ! WC6  ! WC5  ! WC4  ! WC3  ! WC2  ! WC1  ! WC0  !
                        ;                    READ/WRITE                         !
                        ;-------------------------------------------------------

                        ;RKBA (BUS ADDRESS)
                        ; 15     14     13     12     11     10     9      8
                        ;-------------------------------------------------------
                        ;BA15 ! BA14 ! BA13 ! BA12 ! BA11 ! BA10 ! BA9  ! BA8  !
                        ;                    READ/WRITE                         !
                        ;-------------------------------------------------------

                        ;  7      6      5      4      3      2      1      0
                        ;-------------------------------------------------------
                        ; BA7 ! BA6  ! BA5  ! BA4  ! BA3  ! BA2  ! BA1  ! BA0  !
                        ;                    READ/WRITE                 !ALWYS0!
                        ;-------------------------------------------------------
```

```
3003                    ;RKER (ERROR REGISTER)
3004                    ; 15     14     13     12     11     10     9      8
3005                    ;-----------------------------------------------------
3006                    ; DCK ! UNS  ! OPI  ! DTE  ! WLE  ! IDAE ! COE  ! HVRC !
3007                    ;                    READ ONLY                        !
3008                    ;-----------------------------------------------------
3009
3010                    ;  7      6      5      4      3      2      1      0
3011                    ;-----------------------------------------------------
3012                    ; BSE ! ECH  ! DTYPE! FMTE ! DRPAR! ILF  ! SKI  ! ILC  !
3013                    ;                    READ ONLY                        !
3014                    ;-----------------------------------------------------
3015
3016                    ;RKDS (DRIVE STATUS)
3017                    ; 15     14     13     12     11     10     9      8
3018                    ;-----------------------------------------------------
3019                    ;SVAL ! DSC  ! PIP  ! SPON ! WRL  !  UN  !  UN  ! DTP  !
3020                    ;                    READ ONLY                        !
3021                    ;-----------------------------------------------------
3022
3023                    ;  7      6      5      4      3      2      1      0
3024                    ;-----------------------------------------------------
3025                    ;DRDY !  VV  ! DROT ! SPLS ! ACLO ! OFSET!  UN  ! DRA  !
3026                    ;                    READ ONLY                        !
3027                    ;-----------------------------------------------------
3028
3029                    ;RKMR1 (MAINTENANCE REG 1)
3030                    ; 15     14     13     12     11     10     9      8
3031                    ;-----------------------------------------------------
3032                    ;RD    ! WRT  ! ECCW ! PCD  ! PCA  ! MEWD ! MERD ! MCLK !
3033                    ;GATE ! GATE !      !      !      !      !      !      !
3034                    ;                  READ ONLY                 ! READ/WRITE !
3035                    ;-----------------------------------------------------
3036
3037                    ;  7      6      5      4      3      2      1      0
3038                    ;-----------------------------------------------------
3039                    ;MIND ! MSP  ! DMD  ! PAT  ! MS3  ! MS2  ! MS1  ! MS0  !
3040                    ;                    READ/WRITE                       !
3041                    ;-----------------------------------------------------
```

```
3042                    ;RKECC/PAT
3043                    ; 15    14    13    12    11    10    9     8
3044                    ;-----------------------------------------------
3045                    ; UN  !  UN  !  UN  !  UN  !  UN  ! EPA10! EPA9 ! EPA8 !
3046                    ;                READ ONLY                      !
3047                    ;-----------------------------------------------
3048
3049                    ;  7     6     5     4     3     2     1     0
3050                    ;-----------------------------------------------
3051                    ;EPA7 ! EPA6 ! EPA5 ! EPA4 ! EPA3 ! EPA2 ! EPA1 ! EPA0 !
3052                    ;                READ ONLY                      !
3053                    ;-----------------------------------------------
3054
3055                    ;RKECC/POS
3056                    ; 15    14    13    12    11    10    9     8
3057                    ;-----------------------------------------------
3058                    ; UN  !  UN  !  UN  ! EP012! EP011! EP010! EP09 ! EP08 !
3059                    ;                READ ONLY                      !
3060                    ;-----------------------------------------------
3061
3062                    ;  7     6     5     4     3     2     1     0
3063                    ;-----------------------------------------------
3064                    ;EP07 ! EP06 ! EP05 ! EP04 ! EP03 ! EP02 ! EP01 ! EP00 !
3065                    ;                READ ONLY                      !
3066                    ;-----------------------------------------------
3067
3068                    ;DRIVE STATUS INFORMATION
3069
3070                    ;LINE A MESSAGE 00
3071                    ; 15    14    13    12    11    10    9     8
3072                    ;-----------------------------------------------
3073                    ; PAR ! DSC  ! PIP  ! SPON ! WRLK ! OFFON! FMT  ! DRTP !
3074                    ;-----------------------------------------------
3075
3076                    ;  7     6     5     4     3     2     1     0
3077                    ;-----------------------------------------------
3078                    ;DRDY !  VV  ! DRA  !  NU  !  NU  ! DRIVE SELECT CODE  !
3079                    ;-----------------------------------------------
```

```
;LINE B MESSAGE 00
; 15     14     13     12     11     10     9      8
;-----------------------------------------------------
; PAR ! UNS  ! DROT ! DCLO ! WLE  ! SKI  ! PERR ! ILF  !
;-----------------------------------------------------

;  7     6      5      4      3      2      1      0
;-----------------------------------------------------
; FLT ! ACLO ! IVDA !  UN  !  UN  !  UN  !  0   !  0   !
;-----------------------------------------------------

;LINE A MESSAGE 01
; 15     14     13     12     11     10     9      8
;-----------------------------------------------------
; PAR ! UNLDG! RTZ  ! LDG  ! REV  ! FWD  ! SPEED! CART !
;     ! HDS  !      ! HDS  !      !      !  OK  ! PRES !
;-----------------------------------------------------

;  7     6      5      4      3      2      1      0
;-----------------------------------------------------
;DOOR ! BRUSH! HEADS! TRK  !  UN  !  DRIVE SELECT CODE !
;LTCH ! HOME ! HOME ! FOLOW!      !                     !
;     !      !      !  OK  !      !                     !
;-----------------------------------------------------

;LINE B MESSAGE 01
; 15     14     13     12     11     10     9      8
;-----------------------------------------------------
; PAR ! SERVO! LIMIT! SEEK ! PLO  ! DIBIT! INDEX! MULTI!
;     ! BRAKE! ON SK!NO MO ! ERR  !  ERR !  ERR !HD SEL!
;-----------------------------------------------------

;  7     6      5      4      3      2      1      0
;-----------------------------------------------------
;HEAD !WR GTE!WR CUR! SEC  !  NU  !  NU  !  0   !  1   !
;FAULT!AND NO!AND NO! ERR  !      !      !      !      !
;     !XISTON!WR GTE!      !      !      !      !      !
;-----------------------------------------------------
```

```
                        ;LINE A MESSAGE 10
                        ; 15    14    13    12    11    10    9     8
                        ;-----------------------------------------------
                        ; PAR !  NU  !  NU  ! CYLINDER DIFF/OFFSET VALUE     !
                        ;-----------------------------------------------

                        ;  7     6     5     4     3     2     1     0
                        ;-----------------------------------------------
                        ;CYLINDER DIFF/OFFSET VALUE!  NU  !  DRIVE SELECT CODE !
                        ;-----------------------------------------------

                        ;LINE B MESSAGE 10
                        ; 15    14    13    12    11    10    9     8
                        ;-----------------------------------------------
                        ; PAR ! ALIGN!  NU  !    CYLINDER ADDRESS            !
                        ;     ! SIGN !                                      !
                        ;-----------------------------------------------

                        ;  7     6     5     4     3     2     1     0
                        ;-----------------------------------------------
                        ;    CYLINDER ADDRESS     ! UN  ! UN  !  1  !  0  !
                        ;-----------------------------------------------

                        ;LINE A MESSAGE 11
                        ; 15    14    13    12    11    10    9     8
                        ;-----------------------------------------------
                        ; PAR !     DRIVE SERIAL NUMBER                     !
                        ;-----------------------------------------------

                        ;  7     6     5     4     3     2     1     0
                        ;-----------------------------------------------
                        ; DRIVE SERIAL NUMBER           !  DRIVE SELECT CODE !
                        ;-----------------------------------------------

                        ;LINE B MESSAGE 11
                        ; 15    14    13    12    11    10    9     8
                        ;-----------------------------------------------
                        ; PAR !  NU  !    NU     !   DECODED HEAD     ! SECTOR!
                        ;     !     !           !    ADDRESS          ! COUNT !
                        ;-----------------------------------------------

                        ;  7     6     5     4     3     2     1     0
                        ;-----------------------------------------------
                        ;   SECTOR COUNT          ! UN  ! UN  !  1  !  1  !
                        ;-----------------------------------------------

                        .SBTTL  RK06 CONTROLLER REGISTER DEFINITION

000000                  RKCS1=  0               ;CONTROL AND STATUS REGISTER 1
000002                  RKWC=   2               ;WORD COUNT REGISTER
000004                  RKBA=   4               ;BUS ADDRESS REGISTER
000006                  RKDA=   6               ;DESIRED TRACK SECTOR REGISTER
000010                  RKCS2=  10              ;CONTROL AND STATUS REGISTER 2
```

```
                                RKDS=   12              ;DRIVE STATUS REGISTER
                                RKER=   14              ;ERROR REGISTER
                                RKASOF= 16              ;ATTENTION SUMMARY AND OFFSET REGISTER
                                RKDC=   20              ;DESIRED CYLINDER REGISTER
                                RKDCYL= 20              ;DESIRED CYLINDER REGISTER
                                RKDB=   24              ;DATA BUFFER
                                RKMR1=  26              ;MAINTENANCE REGISTER 1
                                RKMR2=  34              ;MAINTENANCE REGISTER 2
                                RKMR3=  36              ;MAINTENANCE REGISTER 3
                                RKPOS=  30              ;ECC POSITION INFORMATION
                                RKECPS= 30              ;ECC POSITION INFORMATION
                                RKPAT=  32              ;ECC PATTERN INFORMATION
                                RKECPT= 32              ;ECC PATTERN INFORMATION

                                .SBTTL  DRIVE COMMANDS

                                SELDRV= 101             ;SELECT DRIVE
                                PACK=   103             ;PACK ACKNOWLEDGE
                                CLEAR=  105             ;DRIVE CLEAR
                                UNLOAD= 107             ;UNLOAD
                                SRTSPL= 111             ;START SPINDLE
                                RECAL=  113             ;RECALIBRATE
                                OFFSET= 115             ;OFFSET
                                SEEK=   117             ;SEEK
                                RDDATA= 121             ;READ DATA
                                WRDATA= 123             ;WRITE DATA
                                RDHEAD= 125             ;READ HEADER
                                WRHEAD= 127             ;WRITE HEADER AND DATA
                                WRTCHK= 131             ;WRITE CHECK

                                ;       THE FOLLOWING ARE NOT DRIVE COMMANDS BUT ARE USED BY THE DRIVER
                                ;       TO SIMULATE A SPECIFIC DESIRED OPERATION

                                RELEAS= 140             ;RELEASE DRIVE
                                RDSTAT= 141             ;GET ALL STATUS FROM DRIVE
                                RDALHD= 164             ;READ ALL HEADERS
                                CONCLR= 176             ;CONTROLLER CLEAR (BIT 15 OF CS1)
                                SUBCLR= 177             ;SUBSYSTEM CLEAR (BIT 5 OF CS2)
                                INTR=   300             ;GENERATE INTERRUPT TO CPU

                                ;       DRIVER ISSUED SERVICE COMMANDS

                                DR.SEL= 001             ;DRIVE SELECT
                                DR.CLR= 005             ;DRIVE CLEAR

                                .SBTTL  CONTROL AND STATUS REGISTER 1 BITS

                                GO=     BIT0            ;GO BIT
                                IE=     BIT6            ;INTERRUPT ENABLE
                                RDY=    BIT7            ;CONTROLLER READY
                                BA16=   BIT8            ;BUS ADDRESS BIT 16
                                BA17=   BIT9            ;BUS ADDRESS BIT 17
                                CDT=    BIT10           ;CONTROLLER DRIVE TYPE (0=RK06)
                                CTO=    BIT11           ;CONTROLLER TIMED OUT WAITING FOR
                                                        ;  DRIVE RESPONSE
                                CFMT=   BIT12           ;CONTROLLER DRIVE FORMAT (0=22 SECTOR, 1=20 SECTOR)
```

```
3230  020000  SPAR=   BIT13          ;DRIVE BUS PARITY ERROR DETECTED BY CONTROLLER
3231  040000  DI=     BIT14          ;DRIVE INTERRUPT
3232  100000  CERR=   BIT15          ;CONTROLLER ERROR
3233  100000  CCLR=   BIT15          ;CONTROLLER CLEAR
3234
3235          ;       THESE BIT DEFINITIONS ARE USED FOR ADDRESS
3236          ;       THE HIGH BYTE OF RKCS1
3237
3238  000001  B.BA16= BIT0           ;BUS ADDRESS BIT 16
3239  000002  B.BA17= BIT1           ;BUS ADDRESS BIT 17
3240  000004  B.CDT=  BIT2           ;CONTROLLER DRIVE TYPE (0=RK06)
3241  000020  B.CFMT= BIT4           ;CONTROLLER DRIVE FORMAT (0=22 SECTOR, 1=20 SECTOR)
3242
3243          .SBTTL  CONTROL AND STATUS REGISTER 2 BITS
3244
3245  000007  DRVMSK= 7              ;MASK FOR DRIVE SELECTION CODE
3246  000010  DESL=   BIT3           ;DESELECT OR RELEASE DRIVE IN BITS 0-2
3247  000010  RLS=    BIT3           ;DESELECT OR RELEASE DRIVE IN BITS 0-2
3248  000020  BAI=    BIT4           ;BUS ADDRESS INCREMENT INHIBIT
3249  000040  CLR=    BIT5           ;CLEAR CONTROLLER AND ALL DRIVES
3250  000040  SCLR=   BIT5           ;CLEAR CONTROLLER AND ALL DRIVES
3251  000100  IR=     BIT6           ;INPUT READY
3252  000200  OR=     BIT7           ;OUTPUT READY
3253  000400  UFE=    BIT8           ;UNIT FIELD ERROR
3254  001000  MDS=    BIT9           ;MULTIPLE DRIVE SELECT
3255  002000  PGE=    BIT10          ;PROGRAMMING ERROR
3256  004000  NEM=    BIT11          ;NON-EXISTENT MEMORY
3257  010000  NED=    BIT12          ;NON-EXISTENT DRIVE
3258  020000  UPE=    BIT13          ;UNIBUS PARITY ERROR
3259  040000  WCE=    BIT14          ;WRITE CHECK ERROR
3260  100000  DLT=    BIT15          ;DATA LATE ERROR
3261
3262          .SBTTL  ERROR REGISTER BIT DEFINITION
3263
3264  000001  ILC=    BIT0           ;ILLEGAL FUNCTION CODE
3265          ;*ILF=   BIT0           ;ILLEGAL FUNCTION CODE
3266  000002  SKI=    BIT1           ;SEEK INCOMPLETE
3267  000004  ILF=    BIT2           ;ILLEGAL DRIVE FUNCTION
3268  000004  NXF=    BIT2           ;ILLEGAL DRIVE FUNCTION
3269  000010  DRPAR=  BIT3           ;DRIVE DETECTED DRIVE BUS PARITY ERROR
3270  000020  FMTE=   BIT4           ;FORMAT ERROR
3271  000040  DTYE=   BIT5           ;DRIVE TYPE ERROR
3272  000100  ECH=    BIT6           ;ECC HARD
3273  000200  BSE=    BIT7           ;BAD SECTOR ERROR
3274  000400  HCRC=   BIT8           ;HEADER CRC ERRROR
3275  000400  HVRC=   BIT8           ;HEADER VRC ERRROR
3276  001000  COE=    BIT9           ;CYLINDER ADDRESS OVERFLOW ERROR
3277  002000  IDAE=   BIT10          ;INVALID DISK ADDRESS ERROR
3278  004000  WLE=    BIT11          ;WRITE LOCK ERROR
3279  010000  DTE=    BIT12          ;DRIVE TIMING ERROR
3280  020000  OPI=    BIT13          ;OPERATION (SEARCH) INCOMPLETE
3281  040000  UNS=    BIT14          ;DRIVE UNSAFE
3282  100000  DCK=    BIT15          ;DATA CHECK
3283
3284          .SBTTL  STATUS REGISTER BIT DEFINITION
3285
```

```
                        DRA=    BIT0                    ;DRIVE AVAILABLE (CONTROLLER IS SET IF
                                                        ;  THIS BIT IS RESET)
                        OFST=   BIT2                    ;DRIVE OFFSET
                        ACLO=   BIT3                    ;AC LOW
                        SPDLSS= BIT4                    ;SPEED LOSS
                        DCLO=   BIT4                    ;DC LOW
                        DROT=   BIT5                    ;DRIVE OFF TRACK
                        VV=     BIT6                    ;VOLUME VALID
                        DRY=    BIT7                    ;DRIVE READY
                        DRDY=   BIT7                    ;DRIVE READY
                        DDT=    BIT8                    ;DRIVE TYPE (0=RK06)
                        WRL=    BIT11                   ;WRITE LOCK
                        PIP=    BIT13                   ;POSITIONING IN PROGRESS
                        DSC=    BIT14                   ;DRIVE STATUS CHANGE
                        SVAL=   BIT15                   ;STATUS VALID

                        .SBTTL  MAINTENANCE REGISTER 1 BIT DEFINITION

                        MESMSK= 17                      ;MESSAGE MASK

                        PAT=    BIT4                    ;FORCE EVEN PARITY ON DRIVE BUS MESSAGE LINES
                        DMD=    BIT5                    ;DIAGNOSTIC MODE
                        MSP=    BIT6                    ;MAINTENANCE SECTOR PULSE
                        MIND=   BIT7                    ;MAINTENANCE INDEX
                        MCLK=   BIT8                    ;MAINTENANCE CLOCK
                        MERD=   BIT9                    ;MAINTENANCE ENCODED READ DATA
                        MEWD=   BIT10                   ;MAINTENACNE ENCODED WRITE DATA
                        PCA=    BIT11                   ;PRECOMPENSATION ADVANCE
                        PCD=    BIT12                   ;PRECOMPENSATION DELAY
                        ECCW=   BIT13                   ;ECC WORD IS BEING READ OR WRITTEN
                        WRTGAT= BIT14                   ;WRITE GATE
                        RDGATE= BIT15                   ;READ GATE

                        .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE A

                        S.DRA=  BIT5                    ;DRIVE AVAILIABLE
                        S.VV=   BIT6                    ;VOLUME VALID
                        S.DRY=  BIT7                    ;DRIVE READY
                        S.TYPE= BIT8                    ;DRIVE TYPE
                        S.FORM= BIT9                    ;DRIVE FORMAT
                        S.OFF=  BIT10                   ;OFFSET
                        S.WRL=  BIT11                   ;WRITE LOCK
                        S.SPIN= BIT12                   ;SPINDLE ON
                        S.PIP=  BIT13                   ;POSITIONING IN PROGRESS
                        S.DSC=  BIT14                   ;DRIVE STATUS CHANGE

                        .SBTTL  DEFINITION OF DRIVE STATUS BYTE 00 MESSAGE B

                        S.ICYL= BIT5                    ;ILLEGAL CYLINDER ADDRESS
                        S.ACLO= BIT6                    ;AC LOW
                        S.FLT=  BIT7                    ;DRIVE FAULT
                        S.ILF=  BIT8                    ;ILLEGAL FUNCTION
                        S.PAR=  BIT9                    ;DRIVE DETECTED DRIVE BUS PARITY ERROR
                        S.SKI=  BIT10                   ;SEEK INCOMPLETE
                        S.WLE=  BIT11                   ;WRITE LOCK ERROR
                        S.SPLS= BIT12                   ;SPEED LOSS
```

```
3342            010000                  S.DCLO= BIT12                   ;DC LOW
3343            020000                  S.DROT= BIT13                   ;DRIVE OFF TRACK
3344            040000                  S.UNS=  BIT14                   ;DRIVE UNSAFE
3345
3346                                    .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE A
3347
3348            000020                  S.XDOK= BIT4                    ;TRANSDUCER OK
3349            000040                  S.HDHM= BIT5                    ;HEADS HOME
3350            000100                  S.BRHM= BIT6                    ;BRUSHES HOME
3351            000200                  S.DOOR= BIT7                    ;DOOR INTERLOCKED
3352            000400                  S.CART= BIT8                    ;CARTRAGE INTERLOCK
3353            001000                  S.SPOK= BIT9                    ;SPEED OK
3354            002000                  S.FWD=  BIT10                   ;FORWARD
3355            004000                  S.REV=  BIT11                   ;REVERSE
3356            010000                  S.LOAD= BIT12                   ;HEADS LOADING
3357            020000                  S.RTZ=  BIT13                   ;RETURN TO ZERO
3358            040000                  S.UNLD= BIT14                   ;HEADS UNLOADING
3359
3360                                    .SBTTL  DEFINITION OF DRIVE STATUS BYTE 01 MESSAGE B
3361
3362            000020                  S.SECT= BIT4                    ;SECTOR ERROR
3363            000040                  S.WCLK= BIT5                    ;WRITE CLOCK AND NO WRITE GATE
3364            000100                  S.WGAT= BIT6                    ;WRITE GATE AND NO TRANSISTIONS
3365            000200                  S.HDFL= BIT7                    ;HEAD FAULT
3366            000400                  S.MHD=  BIT8                    ;MULTIPLE HEAD SELECT
3367            001000                  S.XERR= BIT9                    ;INDEX ERROR
3368            002000                  S.DIB=  BIT10                   ;DIBIT ERROR
3369            004000                  S.PLO=  BIT11                   ;PLO ERROR
3370            010000                  S.NMOV= BIT12                   ;SEEK AND NO MOTION
3371            020000                  S.LIMD= BIT13                   ;LIMIT DETECT ON SEEK
3372            040000                  S.BRKE= BIT14                   ;SERVO-BRAKE
3373
3374                                    .SBTTL  COMMON MASKS
3375
3376            000007                  M.DRV=  7                       ;DRIVE CODE
3377            100000                  M.PAR=  BIT15                   ;PARITY
3378            000003                  M.ID=   3                       ;BYTE ID
3379            017760                  M.CDIF= 17760                   ;CYLINDER DIFFERENCE/OFFSET
3380            017760                  M.CADD= 17760                   ;CYLINDER ADDRESS
3381            077770                  M.SER=  77770                   ;DRIVE SERIAL NUMBER
3382            000760                  M.SECT= 760                     ;SECTOR COUNT
3383            007000                  M.HEAD= 7000                    ;HEAD DECODE
```

```
                        .SBTTL  PARAMETER BLOCK ALLOCATION

                        ;*      ************************************************
                        ;*  1   ! COMMAND                ! DRIVE NO.          !  0
                        ;*  3   ! CYLINDER ADDRESS                            !  2
                        ;*  5   ! TRACK                  ! SECTOR             !  4
                        ;*  7   !BA16-17,FORMAT,DRV TYPE! OFFSET              !  6
                        ;* 11   ! BUS ADDRESS (LOW 16 BITS)                   ! 10
                        ;* 13   ! WORD COUNT (2'S COMPLEMENT)                 ! 12
                        ;* 15   ! PROGRAM DRIVE STATUS INFORMATION            ! 14
                        ;* 17   ! COMMAND AND STATUS REGISTER 1               ! 16
                        ;* 21   ! COMMAND AND STATUS REGISTER 2               ! 20
                        ;* 23   ! WORD COUNT REGISTER                         ! 22
                        ;* 25   ! BUS ADDRESS REGISTER                        ! 24
                        ;* 27   ! DESIRED TRACK AND SECTOR                    ! 26
                        ;* 31   ! DESIRED CYLINDER                            ! 30
                        ;* 33   ! ATTENTION SUMMARY AND DRIVE OFFSET          ! 32
                        ;* 35   ! ERROR REGISTER                              ! 34
                        ;* 37   ! STATUS REGISTER                             ! 36
                        ;* 41   ! MESSAGE LINE A STATUS BYTE 00               ! 40
                        ;* 43   ! MESSAGE LINE B STATUS BYTE 00               ! 42
                        ;* 45   ! MESSAGE LINE A STATUS BYTE 01               ! 44
                        ;* 47   ! MESSAGE LINE B STATUS BYTE 01               ! 46
                        ;* 51   ! MESSAGE LINE A STATUS BYTE 10               ! 50
                        ;* 53   ! MESSAGE LINE B STATUS BYTE 10               ! 52
                        ;* 55   ! MESSAGE LINE A STATUS BYTE 11               ! 54
                        ;* 57   ! MESSAGE LINE B STATUS BYTE 11               ! 56
                        ;* 61   ! ECC POSITION INFORMATION                    ! 60
                        ;* 63   ! ECC PATTERN INFORMATION                     ! 62
                        ;*      ************************************************

                        .SBTTL  PARAMETERS PASSED TO THE DRIVER

                        ;       THE FOLLOWING DEFINITIONS ARE USED TO PASS PARAMETERS
                        ;         TO THE RK06 DRIVER

000000                  P.DRVN= 0                       ;DRIVE NUMBER
000001                  P.CMND= 1                       ;COMMAND
000002                  P.CYLN= 2                       ;CYLINDER ADDRESS
000004                  P.SECT= 4                       ;SECTOR
000005                  P.TRCK= 5                       ;TRACK
000006                  P.OFST= 6                       ;OFFSET
000007                  P.CS1H= 7                       ;RKCS1 BITS 8-15
000007                  P.BAHI= 7                       ;BUS ADDRESS (BITS 16 AND 17)
000010                  P.BALO= 10                      ;BUS ADDRESS (BITS 0-15)
000012                  P.WC=   12                      ;WORD COUNT (2'S COMPLEMENT)
000014                  P.PRST= 14                      ;PROGRAM DRIVE STATUS INFORMATION

                        .SBTTL  PROGRAM DEVICE STATUS REGISTER DEFINITION

000001                  DRVUSE= BIT0                    ;DRIVE IN USE
000002                  DRVPOS= BIT1                    ;DRIVE POSITIONING
000004                  DRVPDT= BIT2                    ;DRIVE POSITIONED FOR DATA TRANSFER
000010                  UEXATT= BIT3                    ;UNEXPECTED ATTENTION
000020                  DRVHRD= BIT4                    ;DRIVE HAS HARD ERROR
000040                  DRVDSC= BIT5                    ;DRIVE STATUS CHANGE DID NOT CLEAR
```

```
3440            000100                  CMDTO=  BIT6                    ;NO TERMINATION TO COMMAND FOR AT
3441                                                                    ;  LEAST 1 SECOND
3442            000200                  W.WCK=  BIT7                    ;WRITE FOR WRITE WRITE CHECK
3443            000400                  NOCHK=  BIT8                    ;NO CHECK, DO NOT SET INTERRUPT ENABLE
3444            001000                  PBSVAL= BIT9                    ;PARAMETER STATUS WORDS VALID
3445                                                                    ;  (SET WHEN ERROR TERMINATION OR
3446                                                                    ;  READ STATUS COMMAND)
3447            002000                  DRPDRV= BIT10                   ;DROP DRIVE FROM TEST SEQUENCE
3448            004000                  NODSC=  BIT11                   ;ATTENTION SET BUT DCS AND FAULT RESET
3449            010000                  DRVSZD= BIT12                   ;DRIVE SEIZED BY OTHER PORT
3450            020000                  E.UNLD= BIT13                   ;DRIVE UNLOADED DUE TO ERROR
3451            040000                  Q.INIT= BIT14                   ;PARAMETER BLOCK ENQUEUED IN INITIATION QUEUE
3452            100000                  DTBAII= BIT15                   ;INHIBIT BUS ADDRESS INCREMENT
3453
3454                                    .SBTTL  PARAMETERS PASSED FROM DRIVER TO PROGRAM
3455
3456                                    ;       THE FOLLOWING DEFINITIONS ARE USED FOR REGISTER RETURNS
3457                                    ;         FROM THE DRIVER TO THE CALLING PROGRAM
3458
3459            000016                  P.CS1=  16                      ;COMMAND AND STATUS REGISTER 1
3460            000020                  P.CS2=  20                      ;COMMAND AND STATUS REGISTER 2
3461            000022                  P.WCR=  22                      ;WORD COUNT REGISTER
3462            000024                  P.BAR=  24                      ;BUS ADDRESS REGISTER
3463            000026                  P.DTS=  26                      ;DESIRED TRACK SECTOR REGISTER
3464            000030                  P.DCYL= 30                      ;DESIRED CYLINDER REGISTER
3465            000032                  P.ASOF= 32                      ;ATTENTION SUMMARY/OFFSET REGISTER
3466            000034                  P.ER=   34                      ;ERROR REGISTER
3467            000036                  P.DS=   36                      ;STATUS REGISTER
3468            000040                  P.A00=  40                      ;MESSAGE A STATUS BYTE 00
3469            000042                  P.B00=  42                      ;MESSAGE B STATUS BYTE 00
3470            000044                  P.A01=  44                      ;MESSAGE A STATUS BYTE 01
3471            000046                  P.B01=  46                      ;MESSAGE B STATUS BYTE 01
3472            000050                  P.A10=  50                      ;MESSGGE A STATUS BYTE 10
3473            000052                  P.B10=  52                      ;MESSAGE B STATUS BYTE 10
3474            000054                  P.A11=  54                      ;MESSAGE A STATUS BYTE 11
3475            000056                  P.B11=  56                      ;MESSAGE B STATUS BYTE 11
3476            000060                  P.EPOS= 60                      ;ECC POSITION INFORMATION
3477            000062                  P.EPAT= 62                      ;ECC PATTERN INFORMATION
3478
3479                                    .SBTTL  PARAMETER BLOCK 0 FOR DRIVE
3480
3481   002620       000                 PARM0:  .BYTE   0               ;DRIVE NUMBER
3482   002621       000                         .BYTE   0               ;COMMAND
3483   002622    000000                         .WORD   0               ;CYLINDER ADDRESS
3484   002624       000                         .BYTE   0               ;SECTOR ADDRESS
3485   002625       000                         .BYTE   0               ;TRACK ADDRESS
3486   002626       000                         .BYTE   0               ;OFFSET VALUE
3487   002627       000                         .BYTE   0               ;BUS ADDRESS (BITS 16 AND 17)
3488   002630    000000                         .WORD   0               ;BUS ADDRESS (BITS 0 - 15)
3489   002632    000000                         .WORD   0               ;WORD COUNT (2'S COMPLEMENT)
3490   002634    000000                         .WORD   0               ;PROGRAM DRIVE STATUS INFORMATION
3491   002636    000000                         .WORD   0               ;COMMAND AND STATUS REGISTER 1
3492   002640    000000                         .WORD   0               ;COMMAND AND STATUS REGISTER 2
3493   002642    000000                         .WORD   0               ;WORD COUNT REGISTER
3494   002644    000000                         .WORD   0               ;BUS ADDRESS REGISTER
3495   002646    000000                         .WORD   0               ;DESIRED TRACK AND SECTOR REGISTER
```

```
3496  002650  000000                    .WORD   0       ;DESIRED CYLINDER REGISTER
3497  002652  000000                    .WORD   0       ;ATTENTION SUMMARY/OFFSET REGISTER
3498  002654  000000                    .WORD   0       ;ERROR REGISTER
3499  002656  000000                    .WORD   0       ;STATUS REGISTER
3500  002660  000000                    .WORD   0       ;MESSAGE LINE A STATUS BYTE 00
3501  002662  000000                    .WORD   0       ;MESSAGE LINE B STATUS BYTE 00
3502  002664  000000                    .WORD   0       ;MESSAGE LINE A STATUS BYTE 01
3503  002666  000000                    .WORD   0       ;MESSAGE LINE B STATUS BYTE 01
3504  002670  000000                    .WORD   0       ;MESSAGE LINE A STATUS BYTE 10
3505  002672  000000                    .WORD   0       ;MESSAGE LINE B STATUS BYTE 10
3506  002674  000000                    .WORD   0       ;MESSAGE LINE A STATUS BYTE 11
3507  002676  000000                    .WORD   0       ;MESSAGE LINE B STATUS BYTE 11
3508  002700  000000                    .WORD   0       ;ECC POSITION INFORMATION
3509  002702  000000                    .WORD   0       ;ECC PATTERN INFORMATION
3510
3511                          .SBTTL  PARAMETER BLOCK 1 FOR DRIVE
3512
3513  002704     000          PARM1:  .BYTE   0       ;DRIVE NUMBER
3514  002705     000                  .BYTE   0       ;COMMAND
3515  002706  000000                  .WORD   0       ;CYLINDER ADDRESS
3516  002710     000                  .BYTE   0       ;SECTOR ADDRESS
3517  002711     000                  .BYTE   0       ;TRACK ADDRESS
3518  002712     000                  .BYTE   0       ;OFFSET VALUE
3519  002713     000                  .BYTE   0       ;BUS ADDRESS (BITS 16 AND 17)
3520  002714  000000                  .WORD   0       ;BUS ADDRESS (BITS 0 - 15)
3521  002716  000000                  .WORD   0       ;WORD COUNT (2'S COMPLEMENT)
3522  002720  000000                  .WORD   0       ;PROGRAM DRIVE STATUS INFORMATION
3523  002722  000000                  .WORD   0       ;COMMAND AND STATUS REGISTER 1
3524  002724  000000                  .WORD   0       ;COMMAND AND STATUS REGISTER 2
3525  002726  000000                  .WORD   0       ;WORD COUNT REGISTER
3526  002730  000000                  .WORD   0       ;BUS ADDRESS REGISTER
3527  002732  000000                  .WORD   0       ;DESIRED TRACK AND SECTOR REGISTER
3528  002734  000000                  .WORD   0       ;DESIRED CYLINDER REGISTER
3529  002736  000000                  .WORD   0       ;ATTENTION SUMMARY/OFFSET REGISTER
3530  002740  000000                  .WORD   0       ;ERROR REGISTER
3531  002742  000000                  .WORD   0       ;STATUS REGISTER
3532  002744  000000                  .WORD   0       ;MESSAGE LINE A STATUS BYTE 00
3533  002746  000000                  .WORD   0       ;MESSAGE LINE B STATUS BYTE 00
3534  002750  000000                  .WORD   0       ;MESSAGE LINE A STATUS BYTE 01
3535  002752  000000                  .WORD   0       ;MESSAGE LINE B STATUS BYTE 01
3536  002754  000000                  .WORD   0       ;MESSAGE LINE A STATUS BYTE 10
3537  002756  000000                  .WORD   0       ;MESSAGE LINE B STATUS BYTE 10
3538  002760  000000                  .WORD   0       ;MESSAGE LINE A STATUS BYTE 11
3539  002762  000000                  .WORD   0       ;MESSAGE LINE B STATUS BYTE 11
3540  002764  000000                  .WORD   0       ;ECC POSITION INFORMATION
3541  002766  000000                  .WORD   0       ;ECC PATTERN INFORMATION
3542
3543                          .SBTTL  TEMPORARY CONTROLLER REGISTER STORAGE
3544
3545  002770  000000          T.CS1:  .WORD   0       ;TEMPORARY STORAGE FOR COMMAND AND STATUS
3546                                                  ;  REGISTER 1
3547  002772  000000          T.CS2:  .WORD   0       ;TEMPORARY STORAGE FOR COMMAND AND STATUS
3548                                                  ;  REGISTER 2
3549  002774  000000          T.WCR:  .WORD   0       ;TEMPORARY STORAGE FOR WORD COUNT REGISTER
3550  002776  000000          T.BA:   .WORD   0       ;TEMPORARY STORAGE FOR BUS ADDRESS REGISTER
3551  003000  000000          T.DA:   .WORD   0       ;TEMPORARY STORAGE FOR DISK TRACK AND SECTOR
```

```
003002  000000          T.DC:   .WORD   0       ;TEMPORARY STORAGE FOR DRIVE CYLINDER
003004  000000          T.ASOF: .WORD   0       ;TEMPORARY STORAGE FOR ATTENTION SUMMARY
                                                ;  AND OFFSET
003006  000000          T.ER:   .WORD   0       ;TEMPORARY STORAGE FOR ERROR REGISTER
003010  000000          T.DS:   .WORD   0       ;TEMPORARY STORAGE FOR DRIVE STATUS REGISTER
003012  000000          T.MR1:  .WORD   0       ;TEMPORARY STORAGE FOR MAINTENANCE REGISTER 1
003014  000000          T.MR2:  .WORD   0       ;TEMPORARY STORAGE FOR MAINTENANCE REGISTER 2
003016  000000          T.MR3:  .WORD   0       ;TEMPORARY STORAGE FOR MAINTENANCE REGISTER 3
003020  000000          T.POS:  .WORD   0       ;TEMPORARY STORAGE FOR ECC POSITION
003022  000000          T.PAT:  .WORD   0       ;TEMPORARY STORAGE FOR ECC PATTERN
003024  000000          T.DB:   .WORD   0       ;TEMPORARY STORAGE FOR DATA BUFFER REGISTER

                        .SBTTL  DRIVER PARAMERTERS

003026  177440          RKBAS:  .WORD   177440  ;ADDRESS OF RK611 UNIBUS ADDRESS BLOCK
003030  000210          RKVEC:  .WORD   210     ;ADDRESS OF R611 VECTOR
003032  000240          RKPRI:  .WORD   PR5     ;RK611 INTERRUPT PRIORITY
003034  041142          A.NORM: ERRFRE          ;ADDRESS OF NORMAL RETURN FROM DRIVER
003036  042410          A.ABNL: ERRHDL          ;ADDRESS OF ABNORMAL RETURN FROM DRIVER
003040  041704          A.CONT: CONERR          ;ADDRESS OF CONTROLLER ERROR RETURN
003042  000000          E.CONT: .WORD   0       ;CONTROLLER ERROR STATUS
                                                ;  THIS LOCATION IS CLEARED WHEN EVERY COMMAND
                                                ;  IS INITIATED.  IF A CONTROLLER ERROR
                                                ;  OCCURS THE FOLLOWING BIT ASSIGNMENT IS
                                                ;  USED:
                                                ;
000001          E.CCLR= BIT0                    ;CLEAR CONTROLLER DID NOT CLEAR ERROR
000002          E.NOAT= BIT1                    ;NO ATTENTION IN ATTENTION SUMMARY REG
000004          E.UATT= BIT2                    ;UNSOLICATED ATTENTION (SEQUENTIAL ONLY)
000010          E.UDAT= BIT3                    ;UNEXPECTED DATA TYPE ERROR
000020          E.CLAT= BIT4                    ;ATTENTION DID NOT RESET WITH CLEAR
000040          E.SCLR= BIT5                    ;SUBSYSTEM CLEAR DID NOT CLEAR DRIVE
                                                ;  ATTENTION
000100          E.ILLD= BIT6                    ;ILLEGAL DRIVER COMMAND
000400          E.DLT=  BIT8                    ;DATA LATE WHEN UNLOADING HEADER
001000          E.CERR= BIT9                    ;CONTROLLER ERROR DURING DRIVER SERVICING
002000          E.DPAR= BIT10                   ;DRIVE DETECTED PARITY ERROR
040000          E.CMTO= BIT14                   ;CONTROLLER COMMAND TIME OUT (QUEUED ONLY)
100000          E.MDS=  BIT15                   ;MULTIPLE DRIVE SELECT

003044  000000          0.WAIT: .WORD   0       ;PARAMETER BLOCK OF THE DRIVE
                                                ;WAITING FOR COMMAND COMPLETION
003046  000400          W.MTIM: .WORD   400     ;LOOP COUNTER FOR MILISECOND SCAN OF DRIVE
003050  000400          W.MILI: .WORD   400     ;16 MILISECOND TIME FOR PROGRAM
                                                ;
                                                ;       CPU     VALUE
                                                ;       ---     -----
                                                ;
                                                ;       11/05   100
                                                ;       11/10
                                                ;       11/20
                                                ;       11/34
                                                ;       11/40
                                                ;       11/45   400
                                                ;       11/50
                                                ;       11/70
```

```
3608  003052  000100                  W.SEC:  .WORD   100             ;SECOND COUNT COUNT FOR ALL COMMANDS
3609                                                                  ;   EXCEPT START SPINDLE
3610  003054  001000                  W.8SEC: .WORD   1000            ;8 SECOND FOR DRIVE CYCLE DOWN
3611  003056  010000                  W.MIN:  .WORD   10000           ;MINUTE TIME FOR START SPINDLE
3612  003060  000000                  HDR.AD: .WORD   0               ;ADDRESS USED FOR READ ALL HEADERS
3613  003062  000000                  HDR.CT: .WORD   0               ;NUMBER OF HEADERS LEFT TO READ FOR READ
3614                                                                  ;   ALL HEADERS
3615  003064      000                 I.ISRL: .BYTE   0               ;INTERRUPT OR RELEASED COMMAND ISSUED
3616  003065      002     004   010   H.HEAD: .BYTE   2,4,10           ;HEAD DECODES
3617  003070      000                 W.TIME: .BYTE   0               ;DRIVES BEING WATCH-DOG TIMED
3618
3619                                  .SBTTL  INTERRUPT MASKS
3620
3621  003071      000                 INTMSK: .BYTE   0               ;INTERRUPT MASKS FOR DRIVE IN PARAMETER BLOCK
3622
3623                                  ;       INTERRUPT MASK TABLE
3624
3625  003072      001                 I.DRV:  .BYTE   1               ;INTERRUPT MASK FOR DRIVE 0
3626  003073      002                         .BYTE   2               ;INTERRUPT MASK FOR DRIVE 1
3627  003074      004                         .BYTE   4               ;INTERRUPT MASK FOR DRIVE 2
3628  003075      010                         .BYTE   10              ;INTERRUPT MASK FOR DRIVE 3
3629  003076      020                         .BYTE   20              ;INTERRUPT MASK FOR DRIVE 4
3630  003077      040                         .BYTE   40              ;INTERRUPT MASK FOR DRIVE 5
3631  003100      100                         .BYTE   100             ;INTERRUPT MASK FOR DRIVE 6
3632  003101      200                         .BYTE   200             ;INTERRUPT MASK FOR DRIVE 7
3633
3634                                  .SBTTL  PARAMETER BLOCK TABLE
3635
3636  003102  002620                  PBLKT:  PARM0                   ;ADDRESS OF PARAMETER BLOCK GIVEN WITH
3637                                                                  ;DRIVE CALL.  MUST BE LOADED INTO PBLKT
3638
3639
3640                                  .SBTTL  TIME FOR WATCH-DOG TIMER
3641
3642  003104  000000                  W.DRV:  .WORD   0               ;TIME FOR INSTRUCTION IN PARAMETER BLOCK
3643                                  .SBTTL  PROGRAM SPECIFIC RESERVED LOCATIONS
3644  003106      000                 MDFLAG: .BYTE   0               ;FLAG TO INDIC. DEFLT OR PARAM MODE
3645  003107      000                 XXDPCH: .BYTE   0               ;XXDP CHAIN MODE FLAG
3646  003110      000                 TSTING: .BYTE   0               ;CURRENTLY RUNNING TESTS IF = 1
3647  003111      000                 DERCNT: .BYTE   0               ;DATA ERROR COUNT
3648  003112      000                 OPCOMP: .BYTE   0               ;OPERATION COMPLETE FLAG
3649  003113      000                 DONE:   .BYTE   0               ;DONE SWITCH
3650  003114      000                 TYPFMT: .BYTE   0               ;DRIVE TYPE & FORMAT CONTROL
3651  003115      000                 FORMAT: .BYTE   0               ;DRIVE FORMAT IN BIT 4 OF BYTE
3652  003116      000                 ERRCNT: .BYTE   0               ;ERROR COUNT
3653  003117      004                 ERRLMT: .BYTE   4               ;ERROR LIMIT
3654  003120      000                 DRVERS: .BYTE   0               ;ERROR COUNT FOR CURRENT DRIVE
3655  003121      000                 OPCONT: .BYTE   0               ;OPERATION CONTROL SWITCHES
3656  003122      000                 PCLKF:  .BYTE   0               ;IF BYTE=1, KW11-P CLOCK IS PRESENT
3657  003123      000                 DOTIM:  .BYTE   0               ;IF BYTE=1, DO TIMING TESTS
3658  003124      000                 XOVLAD: .BYTE   0               ;FLAG = 1 IF XXDP IS POSSIBLY OVERLAID
3659  003125      000                 XDPSVD: .BYTE   0               ;FLAG = 1 IF XXDP IS SAVED
3660  003126      000                 DULACS: .BYTE   0               ;FLAG=1 IF DUAL ACCESS TEST
3661  003127      000                 DRNAFG: .BYTE   0               ;=1 INDICATES DRIVE SIEZED BY OTHER PORT
3662  003130      000                 REISSU: .BYTE   0               ;DUAL-ACC FLAG TO RE-ISSUE COMMAND
3663  003131      000                 WCEFLG: .BYTE   0               ;WRITE CHECK ERROR FLAG
```

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3664  003132  000          DLTFLG: .BYTE   0          ;DATA LATE ERROR FLAG
3665  003133  000          NORTRY: .BYTE   0          ;"NO-RETRY" FLAG
3666  003134  000          UBMPRS: .BYTE   0          ;UNIBUS MAP PRESENT IF = 1
3667  003135  000          MEMABT: .BYTE   0          ;SET BYTE = 1 FOR NO ABORT
3668                                                  ;    ON MEMORY PARITY ERRORS
3669  003136  000          HLPOVL: .BYTE   0          ;HELP FILE OVERLAID INDICATOR
3670  003137  000          NOTYPE: .BYTE   0          ;INDICATES PROGRAM JUST LOADED IF 0
3671          000001       WHDSW=BIT0                 ;WRITE HEADER & DATA SWITCH
3672          000002       VFHDSW=BIT1                ;VERIFY HEADERS SWITCH
3673          000004       WCDASW=BIT2                ;WRITE CHECK DATA SWITCH
3674          000010       RCDASW=BIT3                ;READ CHECK DATA SWITCH
3675          000020       OREQSW=BIT4                ;OFFSET REQUIRED SWITCH
3676                               .EVEN
3677
3678  003140  177546       LKS:    .WORD   177546     ;KW11-L CLOCK STATUS REGISTER
3679  003142  172540       PKS:    .WORD   172540     ;KW11-P CONTROL AND STATUS REGISTER
3680  003144  172542       PKSB:   .WORD   172542     ;KW11-P COUNT SET BUFFER REGISTER
3681  003146  172544       PKRB:   .WORD   172544     ;KW11-P COUNTER REGISTER
3682  003150  000100       LCVEC:  .WORD   100        ;KW11-L VECTOR STORAGE
3683  003152  000104       PCVEC:  .WORD   104        ;KW11-P VECTOR STORAGE
3684  003154  000000       HZ:     .WORD   0          ;LINE FREQ. FLAG -  0 = 60 HZ.
3685          000114       MEMVEC=114                 ;MEMORY PARITY TRAP VECTOR
3686  003156  000000       TCONLO: .WORD   0          ;LO BITS OF CALIBRATION TIME CONSTANT
3687  003160  000000       TCONHI: .WORD   0          ;HI BITS OF CALIB TIME CONST
3688  003162  000000       BLWMIN: .WORD   0          ;COUNT OF TIMES BELOW MIN
3689  003164  000000       ABVMX1: .WORD   0          ;COUNT OF FORWARD TIMES ABOVE MAX
3690  003166  000000       ABVMX2: .WORD   0          ;COUNT OF REVERSE TIMES ABOVE MAX
3691  003170  000000       SUMLO1: .WORD   0          ;LO BITS OF FORWARD TIME SUM
3692  003172  000000       SUMHI1: .WORD   0          ;HI BITS OF FORWARD TIME SUM
3693  003174  000000       SUMLO2: .WORD   0          ;LO BITS OF REVERSE TIME SUM
3694  003176  000000       SUMHI2: .WORD   0          ;HI BITS OF REVERSE TIME SUM
3695  003200  000000       SAVPAR: .WORD   0          ;SAVE WORD FOR PAR CONSTANT
3696  003202  000000       SAVWRD: .WORD   0          ;SCRATCH WORD
3697  003204  000010       CYLLST: .BLKW   ^D8        ;LIST OF PSEUDO-RAND CYL ADDRESSES
3698  003224  000400       BSSOFT: .BLKW   ^D256      ;RECORD OF BAD SECTORS FROM SOFTWARE
3699  004224  000400       BSFACT: .BLKW   ^D256      ;RECORD OF BAD SECTORS FROM FACTORY
3700  005224  000006       PRVCMD: .BLKW   6          ;PREVIOUS COMMAND STORAGE
3701  005240  000006       COMSTR: .BLKW   6          ;CURRENT COMMAND STORAGE
3702  005254  000000       PRMPLO: .WORD   0          ;PREV. U.B. MAP REG 0
3703  005256  000000       PRMPHO: .WORD   0
3704  005260  000000       CRMPLO: .WORD   0          ;CURRENT U.B. MAP REG 0
3705  005262  000000       CRMPHO: .WORD   0
3706  005264  000102       BUFFO:  .BLKW   ^D66       ;OUTPUT BUFFER 1
3707  005470  000000       LOWOCT: .WORD   0          ;LOW 16 BITS OF CONVERTED BINARY NUMBER
3708  005472  000000       HIGOCT: .WORD   0          ;HIGH BITS OF CONVERTED BINARY NO.
3709  005474  000000       BUFPRT: .WORD   0          ;BUFFER POINTER
3710  005476  000000       RECODE: .WORD   0          ;RECOVERY CODE WORD
3711  005500  000000       ERRCOM: .WORD   0          ;ERROR COMMAND
3712  005502  000000       DRIVE:  .WORD   0          ;NO.  OF  DRIVE IN USE
3713  005504  000000       STALLS: .WORD   0          ;CURRENT NO. OF UNIT STALLS TO APPLY
3714  005506  000000       CYLNDR: .WORD   0          ;CURRENT CYLINDER NUMBER
3715  005510  000000       FS:     .WORD   0          ;FIRST SECTOR LIMIT
3716  005512  000000       LS:     .WORD   0          ;LAST SECTOR LIMIT
3717  005514  000000       NCYL1:  .WORD   0          ;NEXT CYL SCRATCH WORD
3718  005516  000000       NCYL2:  .WORD   0          ;NEXT CYL SCRATCH WORD
3719  005520  000000       OFINUS: .WORD   0          ;OFFSET IN USE
```

```
3720  005522  000000          TRACK:  .WORD   0               ;TRACK IN USE
3721  005524  000000          INTCHR: .WORD   0               ;TTY INTERRUPT INPUT WORD
3722  005526  000000          SELECT: .WORD   0               ;ANY BIT SET IN LOW BYTE GIVES AUTO-SELECTED DRIVE NO.
3723  005530  000000          ONLINE: .WORD   0               ;ANY BIT SET IN LOW BYTE INDICATES A DRIVE WAS ON-LINE
3724  005532  000000          NEWON:  .WORD   0               ;NEW LOOK AT ONLINE DRIVES
3725  005534  000000          SCRACH: .WORD   0               ;ALL-PURPOSE SCRATCH WORD
3726  005536  000000          PATRN:  .WORD   0               ;DATA PATTERN LIST WORD
3727  005540  000000          XXDPAD: .WORD   0               ;STARTING ADDRESS OF XXDP LOADER
3728  005542  000002          XDPSAV: .BLKW   2               ;XXDP PHYSICAL SAVE ADDRESS
3729  005546  000000          PLOFST: .WORD   0               ;(+) OFFSET VALUE
3730  005550  000000          NGOFST: .WORD   0               ;(-) OFFSET VALUE
3731  005552  000005          SAVPRS: .BLKW   5               ;SAVE INITIAL PARAMS FOR XFER
3732  005564  000000          WDSXFR: .WORD   0               ;NO. OF WORDS ACTUALLY XFERRED
3733  005566  000000          FINCYL: .WORD   0               ;FINAL CYLINDER ADRS
3734  005570      000         FINTRK: .BYTE   0               ;FINAL TRACK ADRS
3735  005571      000         FINSEC: .BYTE   0               ;FINAL SECTOR ADRS
3736  005572  000000          LASTWC: .WORD   0               ;ACTUAL FINAL WC
3737  005574  157776          MAHILM: .WORD   157776          ;MA UPPER LIMIT
3738  005576  000077                  .WORD   77
3739  005600  064574          MA:     .WORD   RWBUF           ;LO BITS OF PHYS MEM ADRS
3740  005602  000000                  .WORD   0               ;HI BITS OF PHYS MEM ADRS
3741  005604  000002          PMA:    .BLKW   2               ;PARTIAL TRANSFER MEMORY START ADRS
3742
3743
3744
3745                          ;LIST OF DESIRED DRIVES TO TEST (IF BYTE=0, DON'T TEST DRIVE)
3746  005610                  DRVLST:
3747  005610      001                 .BYTE   1               ;DRIVE 0
3748  005611      001                 .BYTE   1               ;DRIVE 1
3749  005612      001                 .BYTE   1               ;DRIVE 2
3750  005613      001                 .BYTE   1               ;DRIVE 3
3751  005614      001                 .BYTE   1               ;DRIVE 4
3752  005615      001                 .BYTE   1               ;DRIVE 5
3753  005616      001                 .BYTE   1               ;DRIVE 6
3754  005617      001                 .BYTE   1               ;DRIVE 7
3755
3756
3757
3758                          ;LIST OF ITERATION COUNTS FOR DESIRED TESTS (IF=0, TEST NOT RUN)
3759                          ;MAXIMUM ALLOWABLE NUMBER OF ITERATIONS = 77776 (OCT)
3760  005620                  TSTLST:
3761  005620  000002                  .WORD   2               ;TEST 1
3762  005622  000002                  .WORD   2               ;TEST 2
3763  005624  000002                  .WORD   2               ;TEST 3
3764  005626  000002                  .WORD   2               ;TEST 4
3765  005630  000002                  .WORD   2               ;TEST 5
3766  005632  000100                  .WORD   100             ;TEST 6
3767
3768
3769
3770                          ;LIST OF DEFAULT ITERATION COUNTS FOR ALL TESTS
3771  005634                  DFLTST:
3772  005634  000002                  .WORD   2               ;TEST 1
3773  005636  000002                  .WORD   2               ;TEST 2
3774  005640  000002                  .WORD   2               ;TEST 3
3775  005642  000002                  .WORD   2               ;TEST 4
```

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3776  005644  000002                  .WORD   2               ;TEST 5
3777  005646  000100                  .WORD   100             ;TEST 6
3778
3779
3780          000006          NMTSTS=<DFLTST-TSTLST>/2        ;TOTAL NO. OF AUTOMATIC TESTS
3781
3782
3783                          ;OPERATING PARAMETER LIST
3784  005650                  PRMLST:
3785  005650  000000          FC:     .WORD   0               ;FIRST CYLINDER
3786  005652  000632          LC:     .WORD   632             ;LAST CYLINDER
3787  005654  000000          FT:     .WORD   0               ;FIRST TRACK
3788  005656  000002          LT:     .WORD   2               ;LAST TRACK
3789  005660  000000          S0:     .WORD   0               ;FIRST SECTOR IF 20(DEC) SECTOR FMT
3790  005662  000023          S1:     .WORD   23              ;LAST SECTOR IF 20(DEC) SECTOR FMT
3791  005664  000000          S2:     .WORD   0               ;FIRST SECTOR IF 22(DEC) SECTOR FMT
3792  005666  000025          S3:     .WORD   25              ;LAST SECTOR IF 22(DEC) SECTOR FMT
3793  005670  000000          PT:     .WORD   0               ;DATA PATTERN SELECT WORD
3794  005672  000000          CS:     .WORD   0               ;CONTROL SWITCH WORD
3795  005674  000000          ST:     .WORD   0               ;NUMBER OF UNIT STALLS
3796
3797
3798                          ;DEFAULT OPERATING PARAMETER VALUES
3799  005676                  PRDFLT:
3800  005676  000000                  .WORD   0               ;FC DEFAULT
3801  005700  000632                  .WORD   632             ;LC DEFAULT
3802  005702  000000                  .WORD   0               ;FT DEFAULT
3803  005704  000002                  .WORD   2               ;LT DEFAULT
3804  005706  000000                  .WORD   0               ;S0 DEFAULT
3805  005710  000023                  .WORD   23              ;S1 DEFAULT
3806  005712  000000                  .WORD   0               ;S2 DEFAULT
3807  005714  000025                  .WORD   25              ;S3 DEFAULT
3808  005716  000000                  .WORD   0               ;PT DEFAULT
3809  005720  000000                  .WORD   0               ;CS DEFAULT
3810  005722  000000                  .WORD   0               ;ST DEFAULT
3811
3812
3813
3814                          ;OPERATING PARAMETER VALUE LOW AND HIGH LIMITS
3815  005724                  PRMLIM:
3816  005724  000000                  .WORD   0               ;FC LIMITS
3817  005726  000631                  .WORD   631
3818  005730  000000                  .WORD   0               ;LC LIMITS
3819  005732  000632                  .WORD   632
3820  005734  000000                  .WORD   0               ;FT LIMITS
3821  005736  000002                  .WORD   2
3822  005740  000000                  .WORD   0               ;LT LIMITS
3823  005742  000002                  .WORD   2
3824  005744  000000                  .WORD   0               ;S0 LIMITS
3825  005746  000023                  .WORD   23
3826  005750  000000                  .WORD   0               ;S1 LIMITS
3827  005752  000023                  .WORD   23
3828  005754  000000                  .WORD   0               ;S2 LIMITS
3829  005756  000025                  .WORD   25
3830  005760  000000                  .WORD   0               ;S3 LIMITS
3831  005762  000025                  .WORD   25
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3832  005764  000000                    .WORD   0               ;PT LIMITS
3833  005766  177777                    .WORD   177777
3834  005770  000000                    .WORD   0               ;CS LIMITS
3835  005772  000062                    .WORD   000062
3836  005774  000000                    .WORD   0               ;ST LIMITS
3837  005776  177777                    .WORD   177777
3838
3839
3840
3841                              ;ASCII PARAMETER MNEMONICS
3842  006000                      PRMNEM:
3843  006000  041506                     .ASCII  /FC/
3844  006002  041514                     .ASCII  /LC/
3845  006004  052106                     .ASCII  /FT/
3846  006006  052114                     .ASCII  /LT/
3847  006010  030123                     .ASCII  /S0/
3848  006012  030523                     .ASCII  /S1/
3849  006014  031123                     .ASCII  /S2/
3850  006016  031523                     .ASCII  /S3/
3851  006020  052120                     .ASCII  /PT/
3852  006022  051503                     .ASCII  /CS/
3853  006024  052123                     .ASCII  /ST/
3854
3855
3856
3857                              ;DATA PATTERN 00
3858                              ;       HI-LO FREQ. MIX
3859  006026                      PAT00:
3860  006026  177777                     177777
3861  006030  177777                     177777
3862  006032  177777                     177777
3863  006034  052525                     052525
3864  006036  052525                     052525
3865  006040  052525                     052525
3866  006042  177777                     177777
3867  006044  177777                     177777
3868  006046  052525                     052525
3869  006050  052525                     052525
3870  006052  177777                     177777
3871  006054  052525                     052525
3872  006056  177252                     177252
3873  006060  177252                     177252
3874  006062  172765                     172765
3875  006064  172765                     172765
3876
3877
3878
3879                              ;DATA PATTERN 01
3880                              ;       HI FREQ. PHASE MIX
3881  006066                      PAT01:
3882  006066  000000                     000000
3883  006070  000000                     000000
3884  006072  000000                     000000
3885  006074  177777                     177777
3886  006076  177777                     177777
3887  006100  177777                     177777
```

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3888  006102  000000                          000000
3889  006104  000000                          000000
3890  006106  177777                          177777
3891  006110  177777                          177777
3892  006112  000000                          000000
3893  006114  177777                          177777
3894  006116  000000                          000000
3895  006120  177777                          177777
3896  006122  000000                          000000
3897  006124  177777                          177777
3898
3899
3900
3901                                  ;DATA PATTERN 02
3902                                  ;       LO FREQ. PHASE MIX
3903  006126                          PAT02:
3904  006126  052525                          052525
3905  006130  052525                          052525
3906  006132  052525                          052525
3907  006134  125252                          125252
3908  006136  125252                          125252
3909  006140  125252                          125252
3910  006142  052525                          052525
3911  006144  052525                          052525
3912  006146  125252                          125252
3913  006150  125252                          125252
3914  006152  052525                          052525
3915  006154  125252                          125252
3916  006156  052525                          052525
3917  006160  125252                          125252
3918  006162  052525                          052525
3919  006164  125252                          125252
3920
3921
3922
3923                                  ;DATA PATTERN 03
3924                                  ;       MAX. PRECOMP. PHASE MIX
3925  006166                          PAT03:
3926  006166  133333                          133333
3927  006170  066666                          066666
3928  006172  155555                          155555
3929  006174  155555                          155555
3930  006176  133333                          133333
3931  006200  066666                          066666
3932  006202  066666                          066666
3933  006204  155555                          155555
3934  006206  155555                          155555
3935  006210  133333                          133333
3936  006212  133333                          133333
3937  006214  133333                          133333
3938  006216  133333                          133333
3939  006220  133333                          133333
3940  006222  133333                          133333
3941  006224  133333                          133333
3942
3943
```

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3944
3945                                    ;DATA PATTERN 04
3946                                    ;       ROTATING BOUNDARY PULSE PRECOMP.
3947   006226                           PAT04:
3948   006226   121105                          121105
3949   006230   150442                          150442
3950   006232   064221                          064221
3951   006234   132110                          132110
3952   006236   055044                          055044
3953   006240   026422                          026422
3954   006242   013211                          013211
3955   006244   105504                          105504
3956   006246   042642                          042642
3957   006250   021321                          021321
3958   006252   110550                          110550
3959   006254   044264                          044264
3960   006256   022132                          022132
3961   006260   011055                          011055
3962   006262   104426                          104426
3963   006264   042213                          042213
3964
3965
3966
3967                                    ;DATA PATTERN 05
3968                                    ;       ROTATING CELL PULSE PRECOMP.
3969   006266                           PAT05:
3970   006266   026455                          026455
3971   006270   113226                          113226
3972   006272   045513                          045513
3973   006274   122645                          122645
3974   006276   151322                          151322
3975   006300   064551                          064551
3976   006302   132264                          132264
3977   006304   055132                          055132
3978   006306   026455                          026455
3979   006310   113226                          113226
3980   006312   045513                          045513
3981   006314   122645                          122645
3982   006316   151322                          151322
3983   006320   064551                          064551
3984   006322   132264                          132264
3985   006324   055132                          055132
3986
3987
3988                                    ;DATA PATTERN 06
3989                                    ;       ALL ZEROS
3990   006326                           PAT06:
3991   006326   000000                          000000
3992   006330   000000                          000000
3993   006332   000000                          000000
3994   006334   000000                          000000
3995   006336   000000                          000000
3996   006340   000000                          000000
3997   006342   000000                          000000
3998   006344   000000                          000000
3999   006346   000000                          000000
```

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4000  006350  000000                          000000
4001  006352  000000                          000000
4002  006354  000000                          000000
4003  006356  000000                          000000
4004  006360  000000                          000000
4005  006362  000000                          000000
4006  006364  000000                          000000
4007
4008
4009
4010                                ;DATA PATTERN 07
4011                                ;       ALL ONES
4012  006366                        PAT07:
4013  006366  177777                          177777
4014  006370  177777                          177777
4015  006372  177777                          177777
4016  006374  177777                          177777
4017  006376  177777                          177777
4018  006400  177777                          177777
4019  006402  177777                          177777
4020  006404  177777                          177777
4021  006406  177777                          177777
4022  006410  177777                          177777
4023  006412  177777                          177777
4024  006414  177777                          177777
4025  006416  177777                          177777
4026  006420  177777                          177777
4027  006422  177777                          177777
4028  006424  177777                          177777
4029
4030
4031                                ;DATA PATTERN 08
4032                                ;       SHIFTED 1 IN FIELD OF ZEROS
4033  006426                        PAT08:
4034  006426  000001                          000001
4035  006430  000002                          000002
4036  006432  000004                          000004
4037  006434  000010                          000010
4038  006436  000020                          000020
4039  006440  000040                          000040
4040  006442  000100                          000100
4041  006444  000200                          000200
4042  006446  000400                          000400
4043  006450  001000                          001000
4044  006452  002000                          002000
4045  006454  004000                          004000
4046  006456  010000                          010000
4047  006460  020000                          020000
4048  006462  040000                          040000
4049  006464  100000                          100000
4050
4051
4052
4053                                ;DATA PATTERN 09
4054                                ;       SHIFTED 0 IN FIELD OF ONES
4055  006466                        PAT09:
```

```
4056  006466  177776                  177776
4057  006470  177775                  177775
4058  006472  177773                  177773
4059  006474  177767                  177767
4060  006476  177757                  177757
4061  006500  177737                  177737
4062  006502  177677                  177677
4063  006504  177577                  177577
4064  006506  177377                  177377
4065  006510  176777                  176777
4066  006512  175777                  175777
4067  006514  173777                  173777
4068  006516  167777                  167777
4069  006520  157777                  157777
4070  006522  137777                  137777
4071  006524  077777                  077777
4072
4073
4074
4075                          ;DATA PATTERN 10
4076                          ;       ALTERNATING 0-1
4077  006526                  PAT10:
4078  006526  052525                  052525
4079  006530  052525                  052525
4080  006532  052525                  052525
4081  006534  052525                  052525
4082  006536  052525                  052525
4083  006540  052525                  052525
4084  006542  052525                  052525
4085  006544  052525                  052525
4086  006546  052525                  052525
4087  006550  052525                  052525
4088  006552  052525                  052525
4089  006554  052525                  052525
4090  006556  052525                  052525
4091  006560  052525                  052525
4092  006562  052525                  052525
4093  006564  052525                  052525
4094
4095
4096
4097                          ;DATA PATTERN 11
4098                          ;       ALTERNATING 1-0
4099  006566                  PAT11:
4100  006566  125252                  125252
4101  006570  125252                  125252
4102  006572  125252                  125252
4103  006574  125252                  125252
4104  006576  125252                  125252
4105  006600  125252                  125252
4106  006602  125252                  125252
4107  006604  125252                  125252
4108  006606  125252                  125252
4109  006610  125252                  125252
4110  006612  125252                  125252
4111  006614  125252                  125252
```

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 4112  006616  125252                          125252
 4113  006620  125252                          125252
 4114  006622  125252                          125252
 4115  006624  125252                          125252
 4116
 4117
 4118
 4119                                  ;DATA PATTERN 12
 4120                                  ;       SHIFTING ZEROS AND ONES
 4121  006626                          PAT12:
 4122  006626  000001                          000001
 4123  006630  000003                          000003
 4124  006632  000007                          000007
 4125  006634  000017                          000017
 4126  006636  000037                          000037
 4127  006640  000077                          000077
 4128  006642  000177                          000177
 4129  006644  000377                          000377
 4130  006646  000777                          000777
 4131  006650  001777                          001777
 4132  006652  003777                          003777
 4133  006654  007777                          007777
 4134  006656  017777                          017777
 4135  006660  037777                          037777
 4136  006662  077777                          077777
 4137  006664  177777                          177777
 4138
 4139
 4140
 4141                                  ;DATA PATTERN 13
 4142                                  ;       COMPOSITE ROTATING
 4143  006666                          PAT13:
 4144  006666  072307                          072307
 4145  006670  135143                          135143
 4146  006672  156461                          156461
 4147  006674  167230                          167230
 4148  006676  073514                          073514
 4149  006700  035646                          035646
 4150  006702  016723                          016723
 4151  006704  107351                          107351
 4152  006706  143564                          143564
 4153  006710  061672                          061672
 4154  006712  030735                          030735
 4155  006714  114356                          114356
 4156  006716  046167                          046167
 4157  006720  123073                          123073
 4158  006722  151453                          151453
 4159  006724  164616                          164616
 4160
 4161
 4162
 4163                                  ;DATA PATTERN 14
 4164                                  ;       PSEUDO-RANDOM (COMPUTED BY PROGRAM)
 4165  006726                          PAT14:
 4166  006726  000000                          .WORD
 4167  006730  000000                          .WORD
```

```
 4168  006732  000000                          .WORD
 4169  006734  000000                          .WORD
 4170  006736  000000                          .WORD
 4171  006740  000000                          .WORD
 4172  006742  000000                          .WORD
 4173  006744  000000                          .WORD
 4174  006746  000000                          .WORD
 4175  006750  000000                          .WORD
 4176  006752  000000                          .WORD
 4177  006754  000000                          .WORD
 4178  006756  000000                          .WORD
 4179  006760  000000                          .WORD
 4180  006762  000000                          .WORD
 4181  006764  000000                          .WORD
 4182
 4183
 4184                                  ;USER-DEFINED DATA PATTERN 15
 4185  006766                          PAT15:
 4186  006766  072307                          072307          ;WORD 00
 4187  006770  135143                          135143          ;WORD 01
 4188  006772  156461                          156461          ;WORD 02
 4189  006774  167230                          167230          ;WORD 03
 4190  006776  073514                          073514          ;WORD 04
 4191  007000  035646                          035646          ;WORD 05
 4192  007002  016723                          016723          ;WORD 06
 4193  007004  107351                          107351          ;WORD 07
 4194  007006  143564                          143564          ;WORD 10
 4195  007010  061672                          061672          ;WORD 11
 4196  007012  030735                          030735          ;WORD 12
 4197  007014  114356                          114356          ;WORD 13
 4198  007016  046167                          046167          ;WORD 14
 4199  007020  123073                          123073          ;WORD 15
 4200  007022  151453                          151453          ;WORD 16
 4201  007024  164615                          164616          ;WORD 17
 4202
 4203
 4204
 4205          057467          MINLO1=↑D24375                  ;LO BITS OF SPEC'D MIN ROT. LATENCY
 4206          000000          MINHI1=0                        ;HI BITS OF SPEC'D MIN ROT. LATENCY
 4207          062031          MAXLO1=↑D25625                  ;LO BITS OF SPEC'D MAX ROT. LATENCY
 4208          000000          MAXHI1=0                        ;HI BITS OF SPEC'D MAX ROT. LATENCY
 4209          017500          MAXLO2=↑D8000                   ;LO BITS OF SPEC'D MAX 1 CYL SEEK TIME
 4210          000000          MAXHI2=0                        ;HI BITS OF SPEC'D MAX 1 CYL SEEK TIME
 4211          112160          MAXLO3=↑D38000                  ;LO BITS OF SPEC'D MAX AVG SEEK TIME
 4212          000000          MAXHI3=0                        ;HI BITS OF SPEC'D MAX AVG SEEK TIME
 4213          022370          MAXLO4=↑D9464                   ;LO BITS OF SPEC'D MAX 410 CYL SEEK TIME
 4214          000001          MAXHI4=1                        ;HI BITS OF SPEC'D MAX 410 CYL SEEK TIME
 4215          002734          RNDSHT=↑D1500                   ;SHORT RANDOM SEEKS = 1500(10)
 4216          016514          RNDLNG=↑D7500                   ;LONG RANDOM SEEKS = 7500(10)
 4217          000632          LSTCYL=632                      ;LAST CYL. = 410(10)
 4218          000002          LSTTRK=2                        ;LAST TRACK  = 2
 4219          000365          ALNCYL=365                      ;ALIGNMENT CYLINDER =245(10)
 4220          000002          BSERR=BIT1                      ;BSE ERROR
 4221          000004          HVRCER=BIT2                     ;HVRC ERROR
 4222          000010          OPIERR=BIT3                     ;OPI ERROR
 4223          000020          DCKERR=BIT4                     ;DATA CHECK ERROR
```

```
                                ECCNC=BIT5                      ;ECC NON-CORRECTABLE
                                WCERR=BIT6                      ;WRITE CHECK ERROR
                                ABORT=BIT7                      ;ABORT
                                LEV2ER=BIT8                     ;LEVEL TWO ERROR
                                BADSEC=BIT9                     ;BAD SECTOR FLAG
                                TWOTOS=BIT10                    ;TWO TIME OUTS
                                RCLREQ=BIT11                    ;RECALIBRATE REQUIRED
                                DRNAVL=BIT12                    ;DRIVE NOT RELSD BY OTHER PORT
                                ANYDER=BIT15                    ;ANY ERROR DETECTED FLAG

007026 005015 055104 033122  DZR6N:  .ASCIZ  <15><12>/DZR6N-B/
007034 026516 000102
007040 026440 051040 033113  SUBVER: .ASCIZ  $ - RK611/RK06 SUBSYSTEM VERIFICATION : PART $
007046 030461 051057 030113
007054 020066 052523 051502
007062 051531 042524 020115
007070 042526 044522 044506
007076 040503 044524 047117
007104 035040 050040 051101
007112 020124 000
007115 061 005015 000        PART1:  .ASCIZ  /1/<15><12>
007121 062 005015 000        PART2:  .ASCIZ  /2/<15><12>
007125 015 005012 040514     LSTMEM: .ASCIZ  <15><12><12>/LAST PHYS MEM ADR = /
007132 052123 050040 054510
007140 020123 042515 020115
007146 042101 020122 020075
007154 000
007155 117 042526 046122     OVLODR: .ASCIZ  /OVERLAY LOADER ? (Y OR N) * /
007162 054501 046040 040517
007170 042504 020122 020077
007176 054450 047440 020122
007204 024516 025040 000040
007212 005015 040520 040522  PRMINP: .ASCIZ  <15><12>/PARAMETER INPUT MODE/<15><12><12>
007220 042515 042524 020122
007226 047111 052520 020124
007234 047515 042504 005015
007242 000012
007244 045522 033060 041040  RKBADR: .ASCIZ  /RK06 BUS ADR = /
007252 051525 040440 051104
007260 036440 000040
007264 045522 033060 053040  RKVADR: .ASCIZ  /RK06 VEC ADR = /
007272 041505 040440 051104
007300 036440 000040
007304 045522 033060 050040  RKPRTY: .ASCIZ  /RK06 PRIORITY =/
007312 044522 051117 052111
007320 020131 000075
007324 053523 020122 020075  SWRMSG: .ASCIZ  /SWR = /
007332 000
007333 040 047040 053505     NEWMSG: .ASCIZ  /  NEW = /
007340 036440 000040
007344 005015 051104 053111  DRVSEQ: .ASCIZ  <15><12>/DRIVE(S) = /
007352 024105 024523 036440
007360 000040
007362 051104 053111 020105  BADDRV: .ASCIZ  /DRIVE   /
007370 020040 000
007373 116 047117 042455     NXDRIV: .ASCIZ  /NON-EXISTENT/<15><12>
```

```
 4280  007400  044530  052123  047105
 4281  007406  006524  000012
 4282  007412  047516  020124  042522  NTREDY: .ASCIZ  /NOT READY/<15><12>
 4283  007420  042101  006531  000012
 4284  007426  051127  052111  026505  WRTLOK: .ASCIZ  /WRITE-LOCKED/<15><12>
 4285  007434  047514  045503  042105
 4286  007442  005015     000
 4287  007445     114  040517  042504  ALNPAK: .ASCIZ  /LOADED WITH ALIGN PACK/<15><12>
 4288  007452  020104  044527  044124
 4289  007460  040440  044514  047107
 4290  007466  050040  041501  006513
 4291  007474  000012
 4292  007476  043111  054040  042130  REPLPK: .ASCIZ  /IF XXDP PACK ON DRV 0, TYPE "Y <CR>", &  REPLACE IT : /
 4293  007504  020120  040520  045503
 4294  007512  047440  020116  051104
 4295  007520  020126  026060  052040
 4296  007526  050131  020105  054442
 4297  007534  036040  051103  021076
 4298  007542  020054  020046  051040
 4299  007550  050105  040514  042503
 4300  007556  044440  020124  020072
 4301  007564     000
 4302  007565     015  005012  025052  NODRTS: .ASCII  <15><12><12>/** NO DRIVES TO TEST/<15><12>
 4303  007572  047040  020117  051104
 4304  007600  053111  051505  052040
 4305  007606  020117  042524  052123
 4306  007614  005015
 4307  007616  051120  051505  020123  CNTRDY: .ASCIZ  /PRESS "CONT" WHEN RDY/<15><12>
 4308  007624  041442  047117  021124
 4309  007632  053440  042510  020116
 4310  007640  042122  006531  000012
 4311  007646  040510  052114  051040  HLTRQD: .ASCIZ  /HALT REQUESTED/<15><12>
 4312  007654  050505  042525  052123
 4313  007662  042105  005015     000
 4314  007667     104  044522  042526  DROXDP: .ASCIZ  /DRIVE 0 IS LOAD MEDIUM/<15><12>
 4315  007674  030040  044440  020123
 4316  007702  047514  042101  046440
 4317  007710  042105  052511  006515
 4318  007716  000012
 4319  007720  005015  052012  020117  ALDRVS: .ASCIZ  <15><12><12>/TO TEST ALL DRIVES TYPE "A" <CR>, ELSE <CR>/<15><12>/* /
 4320  007726  042524  052123  040440
 4321  007734  046114  042040  044522
 4322  007742  042526  020123  054524
 4323  007750  042520  021040  021101
 4324  007756  036040  051103  026076
 4325  007764  042440  051514  020105
 4326  007772  041474  037122  005015
 4327  010000  020052     000
 4328  010003     015  046012  036440  TSTMDS: .ASCII  <15><12>/L = LIST TESTS/<15><12>
 4329  010010  046040  051511  020124
 4330  010016  042524  052123  006523
 4331  010024     012
 4332  010025     103  036440  041440          .ASCII  /C = CHANGE TESTS/<15><12>
 4333  010032  040510  043516  020105
 4334  010040  042524  052123  006523
 4335  010046     012
```

```
 4336  010047    111  036440  044440          .ASCIZ  /I = INPUT PARAMS, RUN TESTS/<15><12>
 4337  010054 050116  052125  050040
 4338  010062 051101  046501  026123
 4339  010070 051040  047125  052040
 4340  010076 051505  051524  005015
 4341  010104    000
 4342  010105    015  042412  052116  ENTLCI: .ASCIZ  <15><12>/ENTER L,C, OR I/<15><12>/* /
 4343  010112 051105  046040  041454
 4344  010120 020054  051117  044440
 4345  010126 005015  020052     000
 4346  010133    124  020117  042504  DFTEST: .ASCIZ  /TO DEFAULT TESTS TYPE D <CR>, ELSE <CR>/<15><12>/* /
 4347  010140 040506  046125  020124
 4348  010146 042524  052123  020123
 4349  010154 054524  042520  042040
 4350  010162 036040  051103  026076
 4351  010170 042440  051514  020105
 4352  010176 041474  037122  005015
 4353  010204 020052     000
 4354  010207    015  052012  051505  TLSTHD: .ASCIZ  <15><12>/TEST     ITERATIONS/<15><12>
 4355  010214 020124  020040  020040
 4356  010222 052111  051105  052101
 4357  010230 047511  051516  005015
 4358  010236    000
 4359  010237    015  052012  036440  EXPLAN: .ASCII  <15><12>/T = TYPE PARAM LIST/<15><12>
 4360  010244 052040  050131  020105
 4361  010252 040520  040522  020115
 4362  010260 044514  052123  005015
 4363  010266 020117  020075  050117          .ASCII  /O = OPEN PARAM LIST/<15><12>
 4364  010274 047105  050040  051101
 4365  010302 046501  046040  051511
 4366  010310 006524     012
 4367  010313    123  036440  051440          .ASCII  /S = SET INDIVIDUAL PARAM/<15><12>
 4368  010320 052105  044440  042116
 4369  010326 053111  042111  040525
 4370  010334 020114  040520  040522
 4371  010342 006515     012
 4372  010345    122  036440  051040          .ASCIZ  /R = RUN TESTS/<15><12>
 4373  010352 047125  052040  051505
 4374  010360 051524  005015     000
 4375  010365    015  042412  052116  PARMDE: .ASCIZ  <15><12>/ENTER T,O,S, OR R/<15><12>
 4376  010372 051105  052040  047454
 4377  010400 051454  020054  051117
 4378  010406 051040  005015     000
 4379  010413    015  025012  042040  DUACES: .ASCIZ  <15><12>/* DUAL-ACCESS DATA TEST */<15><12>
 4380  010420 040525  026514  041501
 4381  010426 042503  051523  042040
 4382  010434 052101  020101  042524
 4383  010442 052123  025040  005015
 4384  010450    000
 4385  010451    115  054101  053440  MAWRDC: .ASCIZ  /MAX WORD COUNT = /
 4386  010456 051117  020104  047503
 4387  010464 047125  020124  020075
 4388  010472    000
 4389  010473    052  020052  051440  SECNL1: .ASCII  /**  SO>S1/
 4390  010500 037060  030523
 4391  010504 047040  052117  040440  NOTALD: .ASCIZ  / NOT ALLOWED/<15><12>
```

```
 4392  010512  046114  053517  042105
 4393  010520  005015     000
 4394  010523     052  020052  051440  SECNL2: .ASCIZ  /**  S2>S3/
 4395  010530  037062  031523     000
 4396  010535     052  020052  043040  TRKNLW: .ASCIZ  /**  FT>LT/
 4397  010542  037124  052114     000
 4398  010547     052  020052  053440  WC2BIG: .ASCIZ  /**  WC OR MA TOO LARGE/<15><12>
 4399  010554  020103  051117  046440
 4400  010562  020101  047524  020117
 4401  010570  040514  043522  006505
 4402  010576  000012
 4403  010600  047524  042040  043105  DFQUES: .ASCIZ  /TO DEFAULT ALL PARAMS, TYPE D <CR>, ELSE <CR>/<15><12>/* /
 4404  010606  052501  052114  040440
 4405  010614  046114  050040  051101
 4406  010622  046501  026123  052040
 4407  010630  050131  020105  020104
 4408  010636  041474  037122  020054
 4409  010644  046105  042523  036040
 4410  010652  051103  006476  025012
 4411  010660  000040
 4412  010662  005015  051525  051105  PFIFTN: .ASCIZ  <15><12>/USER-DEFINED PATTERN 15 :/<15><12>
 4413  010670  042055  043105  047111
 4414  010676  042105  050040  052101
 4415  010704  042524  047122  030440
 4416  010712  020065  006472  000012
 4417  010720  005015  047515  044504  SELP15: .ASCIZ  <15><12>/MODIFY PATTERN 15 :/<15><12>
 4418  010726  054506  050040  052101
 4419  010734  042524  047122  030440
 4420  010742  020065  006472  000012
 4421  010750  047524  046440  042117  MDFY15: .ASCIZ  /TO MODIFY PATTERN 15, TYPE M <CR>, ELSE <CR>/<15><12>/* /
 4422  010756  043111  020131  040520
 4423  010764  052124  051105  020116
 4424  010772  032461  020054  054524
 4425  011000  042520  046440  036040
 4426  011006  051103  026076  042440
 4427  011014  051514  020105  041474
 4428  011022  037122  005015  020052
 4429  011030     000
 4430  011031     015  042412  052116  ENTPAS: .ASCIZ  <15><12>/ENTER NO. OF PASSES (1-77777) :/<15><12>/* /
 4431  011036  051105  047040  027117
 4432  011044  047440  020106  040520
 4433  011052  051523  051505  024040
 4434  011060  026461  033467  033467
 4435  011066  024467  035040  005015
 4436  011074  020052     000
 4437  011077     015  025012  020052  DROPDR: .ASCIZ  <15><12>/**  DROPPING DRIVE - 20 ERRORS/<15><12>
 4438  011104  042040  047522  050120
 4439  011112  047111  020107  051104
 4440  011120  053111  020105  020055
 4441  011126  030062  042440  051122
 4442  011134  051117  006523  000012
 4443  011142  005015  052012  051505  TSTDRN: .ASCII  <15><12><12>/TESTING DRIVE /
 4444  011150  044524  043516  042040
 4445  011156  044522  042526     040
 4446  011163     040  005015     000  DRVNO:  .ASCIZ  / /<15><12>
 4447  011167     104  044522  042526  DRIV:   .ASCIZ  /DRIVE /
```

```
 4448  011174  000040
 4449  011176  040503  052122  020056  CART:   .ASCIZ  /CART. /
 4450  011204     000
 4451  011205     123  051105  020056  SERNM:  .ASCIZ  /SER. NO.  /
 4452  011212  047516  020056  000040
 4453  011220  005015  040506  052103  FACTBS: .ASCIZ  <15><12>/FACTORY /
 4454  011226  051117  020131     000
 4455  011233     012  047523  052106  SOFTBS: .ASCII  <12>/SOFTWARE /
 4456  011240  040527  042522     040
 4457  011245     102  042101  051440  BDSECT: .ASCIZ  /BAD SECTORS :/<15><12>
 4458  011252  041505  047524  051522
 4459  011260  035040  005015     000
 4460  011265     040  047040  047117  NOFALS: .ASCIZ  /  NONE/
 4461  011272  000105
 4462
 4463
 4464                                   ;MESSAGES USED IN OFFSET-TO-FAILURE TEST
 4465  011274  005015  047412  043106  OFSHED: .ASCII  <15><12><12>/OFFSET-TO-FAILURE MEASUREMENTS :/<15><12><12>
 4466  011302  042523  026524  047524
 4467  011310  043055  044501  052514
 4468  011316  042522  046440  040505
 4469  011324  052523  042522  042515
 4470  011332  052116  020123  006472
 4471  011340  005012
 4472  011342  051124  041501  020113          .ASCII  /TRACK  CYLN  SECT  +OFST  -OFST/<15><12>
 4473  011350  041440  046131  020116
 4474  011356  051440  041505  020124
 4475  011364  025440  043117  052123
 4476  011372  020040  047455  051506
 4477  011400  006524     012
 4478  011403     011  020011  020040          .ASCIZ  <011><011>/   (UIN)  (UIN)/<15><12>
 4479  011410  052450  047111  020051
 4480  011416  024040  044525  024516
 4481  011424  005015     000
 4482
 4483
 4484  011427     000                         UNLOD:  .BYTE   0               ;DRIVE UNLOADED INDICATOR
 4485  011430     000                         VERIFY: .BYTE   0               ;VERIFY MODE FLAG
 4486  011431     015  005012  025052  IDENT:  .ASCIZ  <15><12><12>/*** RK06 HEAD ALIGNMENT AID ***/<15><12>
 4487  011436  020052  045522  033060
 4488  011444  044040  040505  020104
 4489  011452  046101  043511  046516
 4490  011460  047105  020124  044501
 4491  011466  020104  025052  006452
 4492  011474  000012
 4493  011476  047506  020122  042510  FORHLP: .ASCIZ  /FOR HELP TYPE H, ELSE <CR>/<15><12>
 4494  011504  050114  052040  050131
 4495  011512  020105  026110  042440
 4496  011520  051514  020105  041474
 4497  011526  037122  005015     000
 4498  011533     012  040515  052516  TYPMOD: .ASCIZ  <12>/MANUAL OR AUTO MODE (M OR A)?/<15><12>
 4499  011540  046101  047440  020122
 4500  011546  052501  047524  046440
 4501  011554  042117  020105  046450
 4502  011562  047440  020122  024501
 4503  011570  006477  000012
```

```
 4504  011574  005012  020052  040515  TYPMAN: .ASCIZ  <12><12>/* MANUAL SELECT MODE */<15><12>
 4505  011602  052516  046101  051440
 4506  011610  046105  041505  020124
 4507  011616  047515  042504  025040
 4508  011624  005015     000
 4509  011627     012  047105  042524  ENTDRV: .ASCIZ  <12>/ENTER DRIVE NO. (0-7):/<15><12>
 4510  011634  020122  051104  053111
 4511  011642  020105  047516  020056
 4512  011650  030050  033455  035051
 4513  011656  005015     000
 4514  011661     052  020052  042040  NOTRDY: .ASCII  /**  DRIVE /
 4515  011666  044522  042526     040
 4516  011673     040  047040  052117  DRNRDY: .ASCII  /  NOT READY !  START DRIVE IF NECESSARY./<15><12>
 4517  011700  051040  040505  054504
 4518  011706  020440  020040  052123
 4519  011714  051101  020124  051104
 4520  011722  053111  020105  043111
 4521  011730  047040  041505  051505
 4522  011736  040523  054522  006456
 4523  011744     012
 4524  011745     040  020040  053440          .ASCIZ  /    WHEN DRIVE IS READY, PRESS "CONT" ON CPU./<15><12>
 4525  011752  042510  020116  051104
 4526  011760  053111  020105  051511
 4527  011766  051040  040505  054504
 4528  011774  020054  051120  051505
 4529  012002  020123  041442  047117
 4530  012010  021124  047440  020116
 4531  012016  050103  027125  005015
 4532  012024     000
 4533  012025     052  020052  042040  NONEXD: .ASCII  /**  DRIVE /
 4534  012032  044522  042526     040
 4535  012037     040  047040  047117  DRVNED: .ASCIZ  /  NON-EXISTENT OR OFF-LINE ! PRESS "CONT" TO RESTART./<15><12>
 4536  012044  042455  044530  052123
 4537  012052  047105  020124  051117
 4538  012060  047440  043106  046055
 4539  012066  047111  020105  020041
 4540  012074  051120  051505  020123
 4541  012102  041442  047117  021124
 4542  012110  052040  020117  042522
 4543  012116  052123  051101  027124
 4544  012124  005015     000
 4545  012127     040  020040  041440  HALTER: .ASCIZ  /    CPU WILL HALT./<15><12>
 4546  012134  052520  053440  046111
 4547  012142  020114  040510  052114
 4548  012150  006456  000012
 4549  012154  025052  020040  051104  NOTLOK: .ASCII  /**  DRIVE /
 4550  012162  053111  020105
 4551  012166  020040  047516  020124  NODRLK: .ASCII  /  NOT WRITE-LOCKED ! PLEASE SET WRITE LOCK SWITCH ./<15><12>
 4552  012174  051127  052111  026505
 4553  012202  047514  045503  042105
 4554  012210  020440  050040  042514
 4555  012216  051501  020105  042523
 4556  012224  020124  051127  052111
 4557  012232  020105  047514  045503
 4558  012240  051440  044527  041524
 4559  012246  020110  006456     012
```

```
 4560  012253    040  020040  052040          .ASCIZ  /    THEN PRESS "CONT" ON CPU./<15><12>
 4561  012260 042510  020116  051120
 4562  012266 051505  020123  041442
 4563  012274 047117  021124  047440
 4564  012302 020116  050103  027125
 4565  012310 005015     000
 4566  012313    052  020052  046440  MULSEL: .ASCIZ  /**  MULTIPLE DRIVES AUTO-SELECTED ! PRESS 'CONT' TO RESTART./<15><12>
 4567  012320 046125  044524  046120
 4568  012326 020105  051104  053111
 4569  012334 051505  040440  052125
 4570  012342 026517  042523  042514
 4571  012350 052103  042105  020440
 4572  012356 050040  042522  051523
 4573  012364 023440  047503  052116
 4574  012372 020047  047524  051040
 4575  012400 051505  040524  052122
 4576  012406 006456  000012
 4577  012412 040412  044514  047107  ENTMOD: .ASCIZ  <12>/ALIGN,VERIFY, OR EXERCISE (A,V, OR E) ?/<15><12>
 4578  012420 053054  051105  043111
 4579  012426 026131  047440  020122
 4580  012434 054105  051105  044503
 4581  012442 042523  024040  026101
 4582  012450 026126  047440  020122
 4583  012456 024505  037440  005015
 4584  012464    000
 4585  012465    012  025012  051040  MANEXR: .ASCII  <12><12>/* RANDOM SEEK EXERCISES IN PROGRESS /
 4586  012472 047101  047504  020115
 4587  012500 042523  045505  042440
 4588  012506 042530  041522  051511
 4589  012514 051505  044440  020116
 4590  012522 051120  043517  042522
 4591  012530 051523     040
 4592  012533    117  020116  051104          .ASCII  /ON DRIVE /
 4593  012540 053111  020105
 4594  012544 020040  006452  000012  DRIEXR: .ASCIZ  /  */<15><12>
 4595  012552 005012  020052  040515  MANALN: .ASCIZ  <12><12>/* MANUAL SELECT ALIGNMENT */<15><12>
 4596  012560 052516  046101  051440
 4597  012566 046105  041505  020124
 4598  012574 046101  043511  046516
 4599  012602 047105  020124  006452
 4600  012610 000012
 4601  012612 005012  020052  040515  MANVRF: .ASCIZ  <12><12>/* MANUAL SELECT VERIFY */<15><12>
 4602  012620 052516  046101  051440
 4603  012626 046105  041505  020124
 4604  012634 042526  044522  054506
 4605  012642 025040  005015     000
 4606  012647    110  040505  051504  HEDPOS: .ASCIZ  /HEADS POSITIONED AT CYLINDER 365 (OCT)/<15><12>
 4607  012654 050040  051517  052111
 4608  012662 047511  042516  020104
 4609  012670 052101  041440  046131
 4610  012676 047111  042504  020122
 4611  012704 033063  020065  047450
 4612  012712 052103  006451  000012
 4613  012720 042412  052116  051105  ENTHED: .ASCIZ  <12>/ENTER HEAD NO. (0-2):/<15><12>
 4614  012726 044040  040505  020104
 4615  012734 047516  020056  030050
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 4616  012742  031055  035051  005015
 4617  012750     000
 4618  012751     124  050131  020105  RWNRDY: .ASCIZ  /TYPE <R> WHEN READY :/<15><12>
 4619  012756  051074  020076  044127
 4620  012764  047105  051040  040505
 4621  012772  054504  035040  005015
 4622  013000     000
 4623  013001     110  040505  020104  HEDSEL: .ASCII  /HEAD /
 4624  013006  020040  042523  042514  HEADNO: .ASCIZ  /  SELECTED/<15><12>
 4625  013014  052103  042105  005015
 4626  013022     000
 4627  013023     012  025012  040440  TYPAUT: .ASCIZ  <12><12>/* AUTO SELECT MODE */<15><12>
 4628  013030  052125  020117  042523
 4629  013036  042514  052103  046440
 4630  013044  042117  020105  006452
 4631  013052  000012
 4632  013054  005012  020052  052501  AUTALN: .ASCIZ  <12><12>/* AUTO SELECT ALIGNMENT */<15><12>
 4633  013062  047524  051440  046105
 4634  013070  041505  020124  046101
 4635  013076  043511  046516  047105
 4636  013104  020124  006452  000012
 4637  013112  005012  020052  052501  AUTVRF: .ASCIZ  <12><12>/* AUTO SELECT VERIFY */<15><12>
 4638  013120  047524  051440  046105
 4639  013126  041505  020124  042526
 4640  013134  044522  054506  025040
 4641  013142  005015     000
 4642  013145     012  051104  053111  DRISEL: .ASCII  <12>/DRIVE /
 4643  013152  020105
 4644  013154  020040  042523  042514  DRVSEL: .ASCIZ  /  SELECTED/<15><12><12>
 4645  013162  052103  042105  005015
 4646  013170  000012
 4647  013172  005012  020052  052501  AUTEXR: .ASCII  <12><12>/* AUTO SELECT EXERCISES */<15><12>
 4648  013200  047524  051440  046105
 4649  013206  041505  020124  054105
 4650  013214  051105  044503  042523
 4651  013222  020123  006452     012
 4652  013227     012  044123  051117          .ASCIZ  <12>/SHORT OR LONG (S OR L) ?/<15><12>
 4653  013234  020124  051117  046040
 4654  013242  047117  020107  051450
 4655  013250  047440  020122  024514
 4656  013256  037440  005015     000
 4657  013263     105  042530  041522  AUTOEX: .ASCII  /EXERCISING DRIVE /
 4658  013270  051511  047111  020107
 4659  013276  051104  053111  020105
 4660  013304  006440  000012          AUTODR: .ASCIZ  / /<15><12>
 4661
 4662  013310  025052  020040  040503  BAD632: .ASCIZ  /**  CANNOT READ BAD SECTOR TRACK!/<15><12>
 4663  013316  047116  052117  051040
 4664  013324  040505  020104  040502
 4665  013332  020104  042523  052103
 4666  013340  051117  052040  040522
 4667  013346  045503  006441  000012
 4668  013354  041536  005015     000  CNTRLC: .ASCIZ  /↑C/<15><12>
 4669  013361     136  006532  000012  CNTRLZ: .ASCIZ  /↑Z/<15><12>
 4670  013366  051136  005015     000  CNTRLR: .ASCIZ  /↑R/<15><12>
 4671  013373     136  006525  000012  CNTRLU: .ASCIZ  /↑U/<15><12>
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4672  013400  043536  005015  000  CNTRLG: .ASCIZ  /↑G/<15><12>
4673  013405  015     005012  000  CR2LF:  .ASCIZ  <15><12><12>
4674  013411  134     000          BKSLSH: .ASCIZ  /\/
4675  013413  054     000          COMMA:  .ASCIZ  /,/
4676  013415  040     040          SPACE6: .ASCII  /  /
4677  013417  040                  SPACE4: .ASCII  / /
4678  013420  040                  SPACE3: .ASCII  / /
4679  013421  040                  SPACE2: .ASCII  / /
4680  013422  000040               SPACE1: .ASCIZ  / /
4681                               .EVEN
4682  013424  020040  000075       PRMBUF: .ASCIZ  /  =/
4683  013430  047527  042122  000040 WORDSP: .ASCIZ  /WORD /
4684  013436  036440  000040       EQUALS: .ASCIZ  / = /
4685  013442  020052  000          PROMPT: .ASCIZ  /* /
4686  013445  076     000040       PRMPSP: .ASCIZ  /> /
4687
4688                               .EVEN
4689
4690
4691
4692
4693  013450  105037  003106       DFSTRT: CLRB    MDFLAG          ;SET FLAG FOR DEFAULT MODE
4694  013454  105037  003126               CLRB    DULACS          ;CLEAR DUAL-ACCESS FLAG
4695  013460  105037  003116               CLRB    ERRCNT          ;CLEAR ERROR COUNT FOR RESTARTS
4696  013464  022737  014520  000042       CMP     #DRVTST,@#42    ;SEE IF EOP RETURN ADRS = DRVTST
4697  013472  001003                       BNE     4$              ;BR IF NOT DRVTST
4698  013474  012737  017424  000042       MOV     #NEWPAS,@#42    ;SET RETURN ADRS = NEWPAS
4699  013502  000405               4$:     BR      CMSTRT          ;PROCEED
4700
4701
4702  013504  112737  000001  003106 PSTART: MOVB    #1,MDFLAG       ;SET FLAG FOR PARAMETER MODE
4703  013512  105037  003126               CLRB    DULACS          ;CLEAR DUAL-ACCESS TEST FLAG
4704
4705  013516  012737  000340  177776 CMSTRT: MOV     #PR7,@#PS       ;BLOCK ALL INTERRUPTS
4706                               .SBTTL  INITIALIZE THE COMMON TAGS
4707                               ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
4708  013524  012706  001100               MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
4709  013530  005026                       CLR     (R6)+           ;;CLEAR MEMORY LOCATION
4710  013532  022706  001140               CMP     #SWR,R6 ;;DONE?
4711  013536  001374                       BNE     .-6             ;;LOOP BACK IF NO
4712  013540  012706  001100               MOV     #STACK,SP       ;;SETUP THE STACK POINTER
4713                               ;;INITIALIZE A FEW VECTORS
4714  013544  012737  055426  000020       MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
4715  013552  012737  000340  000022       MOV     #340,@#IOTVEC+2 ;;LEVEL 7
4716  013560  012737  054722  000030       MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
4717  013566  012737  000340  000032       MOV     #340,@#EMTVEC+2 ;;LEVEL 7
4718  013574  012737  056562  000034       MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
4719  013602  012737  000340  000036       MOV     #340,@#TRAPVEC+2;LEVEL 7
4720  013610  012737  055272  000024       MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
4721  013616  012737  000340  000026       MOV     #340,@#PWRVEC+2 ;;LEVEL 7
4722  013624  013737  023514  023506       MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
4723  013632  005037  001304               CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
4724  013636  005037  001306               CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
4725  013642  112737  000001  001115       MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
4726  013650  012737  013650  001106       MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
4727  013656  012737  013656  001110       MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
```

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4728                                        ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
4729                                        ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
4730  013664  013746  000004                MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
4731  013670  012737  013724  000004        MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
4732  013676  012737  177570  001140        MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
4733  013704  012737  177570  001142        MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
4734  013712  022777  177777  165220        CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
4735  013720  001012                        BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
4736                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
4737  013722  000403                        BR      65$             ;;BRANCH IF NO TIMEOUT
4738  013724  012716  013732        64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
4739  013730  000002                        RTI
4740  013732  012737  000176  001140  65$:  MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
4741  013740  012737  000174  001142        MOV     #DISPREG,DISPLAY
4742  013746  012637  000004        66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
4743
4744  013752  005037  001326                CLR     $PASS           ;;CLEAR PASS COUNT
4745  013756  132737  000200  001341        BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
4746  013764  001403                        BEQ     67$             ;;YES,USE NON-APT SWITCH
4747  013766  012737  001342  001140        MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
4748  013774                        67$:
4749  013774  000005                        RESET                   ;CLEAR THE UNIBUS
4750  013776  012737  000006  000004        MOV     #6,@#ERRVEC     ;SET TIME-OUT VECTOR
4751  014004  005037  000006                CLR     @#ERRVEC+2
4752  014010  012737  030060  000114        MOV     #MPERHD,@#MEMVEC ;SET MEM PARITY TRAP VECTOR
4753  014016  012737  000340  000116        MOV     #PR7,@#MEMVEC+2 ;SET TRAP PRIORITY = 7
4754  014024  004737  027776                JSR     PC,ENBCSR       ;ENABLE MEMORY PARITY CHECK
4755  014030  105037  003120                CLRB    DRVERS          ;CLEAR ERROR COUNT FOR CURRENT DRIVE
4756  014034  112737  000001  003136        MOVB    #1,HLPOVL       ;SET HLP FILE OVLD INDICTR
4757  014042  104400  007026                TYPE    ,DZR6N          ;TYPE PROGRAM I.D. FOR PART 2
4758  014046  104400  007040                TYPE    ,SUBVER
4759  014052  104400  007121                TYPE    ,PART2
4760  014056  105737  003137                TSTB    NOTYPE          ;SEE IF OPERATOR NOTE SHOULD BE TYPED
4761  014062  001004                        BNE     39$             ;BR IF NOT
4762  014064  104400  064574                TYPE    ,NOTMSG         ;TYPE OPERATOR NOTE
4763  014070  105237  003137                INCB    NOTYPE          ;SET FLAG FOR NEXT TIME
4764  014074  105737  003126        39$:    TSTB    DULACS          ;SEE IF DUAL-ACCESS DATA TEST
4765  014100  001402                        BEQ     40$             ;BR IF NOT
4766  014102  104400  010413                TYPE    ,DUACES         ;TYPE "* DUAL-ACCESS DATA TEST *"
4767  014106  012737  027110  000060  40$:  MOV     #KBDHDL,@#TKVEC ;LOAD VECTOR FOR TTY KBD
4768  014114  012737  000200  000062        MOV     #PR4,@#TKVEC+2  ;SET KBD PRIORITY = 4
4769  014122  013701  003030                MOV     RKVEC,R1        ;ADDR. OF RK06 VECTOR STORAGE
4770  014126  012721  045542                MOV     #I.INTR,(R1)+   ;SET IT TO RK06 HANDLER
4771  014132  013711  003032                MOV     RKPRI,(R1)      ;SET RK06 PRIORITY
4772  014136  012737  027702  000250        MOV     #KTERHD,@#MMVEC ;VECT FOR KT11 FAILURE
4773  014144  012737  000340  000252        MOV     #PR7,@#MMVEC+2  ;SET PRIOR. = 7 FOR HNDLER
4774  014152  105037  003110                CLRB    TSTING          ;CLEAR "RUNNING TESTS" FLAG
4775  014156  012737  000000  177776        MOV     #PR0,@#PS       ;ALLOW ALL INTERRUPTS AGAIN
4776  014164  012701  005224                MOV     #PRVCMD,R1      ;ZERO OUT PREVIOUS COMMAND
4777  014170  012700  000006                MOV     #6,R0           ;SET COUNTER
4778  014174  005021                42$:    CLR     (R1)+           ;ZERO A WORD
4779  014176  005300                        DEC     R0
4780  014200  001375                        BNE     42$             ;BR IF NOT DONE YET
4781  014202  005037  005504                CLR     STALLS          ;DON'T ALLOW STALLS YET
4782  014206  004737  027562                JSR     PC,GTSWRG       ;OPEN SOFTWARE SWR FOR MODIFICATION
4783  014212  012737  176543  053170  44$:  MOV     #176543,$HINUM  ;INIT. PSEUDO-RANDOM NOS.
```

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4784  014220  012737  123456  053172          MOV     #123456,$LONUM
4785  014226  004737  027302                  JSR     PC,SIZMEM       ;SIZE MEMORY, FIX MA LIMIT IN PRMLIM
4786  014232  105737  003125                  TSTB    XDPSVD          ;SEE IF XXDP PREVIOUSLY SAVED
4787  014236  001404                          BEQ     9$              ;BR IF NOT
4788  014240  004737  030502                  JSR     PC,GETXDP       ;RESTORE SAVED XXDP
4789  014244  105037  003125                  CLRB    XDPSVD          ;CLEAR THE FLA
4790  014250  105737  003106          9$:     TSTB    MDFLAG          ;SEE IF DEFAULT MODE
4791  014254  001031                          BNE     10$             ;BR IF NOT DEFAULT MODE
4792  014256  013700  001370                  MOV     $VECT1,R0       ;GET APT RK06 VECTOR AND PRTY
4793  014262  013737  001374  003026          MOV     $BASE,RKBAS     ;GET APT RK06 BASE ADDRESS
4794  014270  132737  000200  001341          BITB    #BIT7,$ENVM     ;SEE IF NO SIZING
4795  014276  001005                          BNE     18$             ;BR IF NO SIZING
4796  014300  012700  120210                  MOV     #AVECT1,R0      ;GET DEFAULT VECTOR AND PRIORITY
4797  014304  012737  177440  003026          MOV     #ABASE,RKBAS    ;GET DEFAULT BASE ADDRESS
4798  014312  110037  003030          18$:    MOVB    R0,RKVEC        ;STORE VECTOR
4799  014316  105037  003031                  CLRB    RKVEC+1         ;CLEAR HI BYTE
4800  014322  000300                          SWAB    R0              ;GET PRTY INTO BITS 5-7
4801  014324  042700  177437                  BIC     #177437,R0      ;CLEAR OTHER BITS
4802  014330  010037  003032                  MOV     R0,RKPRI        ;STORE RK06 PRIORITY
4803  014334  000137  015216                  JMP     ALLDRV          ;GO CHECK ALL DRIVES
4804
4805
4806
4807                                  ;BEGIN PARAMETER INPUT MODE
4808  014340  104400  007212          10$:    TYPE    ,PRMINP         ;TYPE "PARAMETER INPUT MODE"
4809
4810                                  ;OPEN RK06 UNIBUS ADDRESS FOR MODIFICATION
4811  014344  013746  003026                  MOV     RKBAS,-(SP)     ;PUT OLD VALUE ON STACK
4812  014350  104400  007244                  TYPE    ,RKBADR         ;TYPE "RK06 BUS ADR = "
4813  014354  004737  027452                  JSR     PC,GETPRM       ;TYPE OLD, GET NEW RKBAS VALUE
4814  014360  012637  003026                  MOV     (SP)+,RKBAS     ;STORE NEW VALUE
4815                                  ;OPEN RK06 VECTOR ADDRESS FOR MODIFICATION
4816  014364  013746  003030                  MOV     RKVEC,-(SP)     ;PUT OLD VALUE ON STACK
4817  014370  104400  007264                  TYPE    ,RKVADR         ;TYPE "RK06 VEC ADR = "
4818  014374  004737  027452                  JSR     PC,GETPRM       ;TYPE OLD, GET NEW RKVEC VALUE
4819  014400  012637  003030                  MOV     (SP)+,RKVEC     ;STORE NEW VALUE
4820                                  ;OPEN RK06 INTERRUPT HANDLER PRIORITY LEVEL FOR MODIFICATION
4821  014404  013746  003032          11$:    MOV     RKPRI,-(SP)     ;GET OLD VALUE OF PRIORITY
4822  014410  006316                          ASL     (SP)            ;GET IT INTO BITS 0-2
4823  014412  006316                          ASL     (SP)
4824  014414  006316                          ASL     (SP)
4825  014416  000316                          SWAB    (SP)
4826  014420  104400  007304                  TYPE    ,RKPRTY         ;TYPE   "RK06 PRIORITY = "
4827  014424  004737  027452                  JSR     PC,GETPRM       ;TYPE OLD, GET NEW RKPRI VALUE
4828  014430  012600                          MOV     (SP)+,R0
4829  014432  020027  000004                  CMP     R0,#4           ;SEE IF AT LEAST LEVEL 4
4830  014436  002414                          BLT     12$             ;BR IF NEW VALUE TOO SMALL
4831  014440  020027  000007                  CMP     R0,#7           ;SEE IF LEVEL 7 OR LESS
4832  014444  003011                          BGT     12$             ;BR IF NEW VALUE TOO LARGE
4833  014446  000300                          SWAB    R0              ;GET PRIORITY INTO BITS 5-7
4834  014450  006200                          ASR     R0
4835  014452  006200                          ASR     R0
4836  014454  006200                          ASR     R0
4837  014456  010037  003032                  MOV     R0,RKPRI        ;STORE NEW VALUE
4838  014462  104400  001315                  TYPE    ,$CRLF
4839  014466  000405                          BR      16$
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 4840  014470  104400  005264          12$:    TYPE    ,BUFFO          ;ECHO BAD INPUT
 4841  014474  104400  001314                  TYPE    ,$QUES
 4842  014500  000741                          BR      11$             ;GO ASK AGAIN
 4843
 4844  014502  105037  003116          16$:    CLRB    ERRCNT          ;CLEAR ERROR CNT FOR RESTARTS
 4845  014506  012737  014520  000042          MOV     #DRVTST,@#42    ;SET UP DUMP MODE RETURN FROM $EOP
 4846                                                                  ;    UPON COMPLETION OF REQUESTED PASSES
 4847  014514  000137  015310                  JMP     CHKLST          ;GO CHECK STATUS OF MARKED DRIVES
 4848
 4849
 4850
 4851                                  ;;*****************************************************************
 4852                                  .SBTTL  DESIRED DRIVE INPUT ROUTINE
 4853                                  ;*THIS ROUTINE TYPES THE CURRENT LIST OF DRIVES TO TEST,
 4854                                  ;*WITH DRIVE NUMBERS SEPARATED BY COMMAS. THEN, A NEW
 4855                                  ;*CHOICE OF DRIVES IS REQUESTED BY TTY INPUT, AND THESE
 4856                                  ;*DRIVES ARE CHECKED FOR VALIDITY AND PROPER STATUS,
 4857                                  ;*AND IF THEY ARE VALID, THEY ARE LOADED INTO THE DRIVE
 4858                                  ;*LIST (DRVLST).
 4859                                  ;;*****************************************************************
 4860
 4861  014520                          DRVTST:
 4862  014520  012706  001100                  MOV     #STACK,SP       ;RESET THE STACK
 4863  014524  005037  005504                  CLR     STALLS          ;INHIBIT STALL BETWEEN OPERATIONS
 4864  014530  004737  027776                  JSR     PC,ENBCSR       ;ENABLE MEMORY PARITY CHECK
 4865  014534  104400  007720                  TYPE    ,ALDRVS         ;ASK IF ALL DRIVES DESIRED
 4866  014540  004737  032214                  JSR     PC,RDCHRS       ;READ RESPONSE
 4867  014544  014520                          DRVTST                  ;(↑C) RETURN ADDRESS
 4868  014546  014520                          DRVTST                  ;(↑Z) RETURN ADDRESS
 4869  014550  014520                          DRVTST                  ;(↑U) OR ERROR RETURN ADDRESS
 4870  014552  005700                          TST     R0              ;SEE IF NULL INPUT
 4871  014554  001413                          BEQ     TELDRV          ;BR IF NULL INPUT
 4872  014556  022737  000101  005264          CMP     #'A,BUFFO       ;SEE IF ALL DRIVES REQUESTED
 4873  014564  001002                          BNE     4$              ;BR IF NOT ALL DRIVES
 4874  014566  000137  015216                  JMP     ALLDRV          ;CHECK ALL DRIVES
 4875  014572  104400  005264          4$:     TYPE    ,BUFFO          ;ECHO BAD INPUT
 4876  014576  104400  001314                  TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
 4877  014602  000746                          BR      DRVTST          ;GO ASK AGAIN
 4878                                  ;TYPE CURRENT DRIVE LIST
 4879  014604  104400  007344          TELDRV: TYPE    ,DRVSEQ         ;TYPE "DRIVE(S) = "
 4880  014610  005001                          CLR     R1              ;INITIALIZE DRIVE NUMBER
 4881  014612  005000                          CLR     R0              ;INIT. COUNT OF LISTED DRIVES
 4882  014614  012703  000001                  MOV     #BIT0,R3        ;INIT BIT POINTER
 4883  014620  105761  005610          4$:     TSTB    DRVLST(R1)      ;SEE IF THIS DRIVE IS LISTED
 4884  014624  001414                          BEQ     8$              ;BR IF DRIVE NOT LISTED
 4885  014626  005700                          TST     R0              ;SEE IF FIRST TIME HERE
 4886  014630  001402                          BEQ     6$              ;BR IF FIRST TIME HERE
 4887  014632  104400  013413                  TYPE    ,COMMA          ;TYPE A COMMA
 4888  014636  010137  005534          6$:     MOV     R1,SCRACH       ;USE SCRACH FOR BUFFER
 4889  014642  052737  000060  005534          BIS     #'0,SCRACH      ;CONVERT DRIVE NO. TO ASCII
 4890  014650  104400  005534                  TYPE    ,SCRACH         ;TYPE DRIVE NO.
 4891  014654  005200                          INC     R0              ;INCREMENT NO. OF LISTED DRIVES
 4892  014656  005201                  8$:     INC     R1              ;INCREMENT DRIVE NO.
 4893  014660  006303                          ASL     R3              ;SHIFT BIT POINTER
 4894  014662  022701  000010                  CMP     #10,R1          ;SEE IF DONE YET
 4895  014666  001354                          BNE     4$              ;BR IF NOT DONE
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 4896  014670  005700                          TST     R0              ;SEE IF ANY DRIVES WERE LISTED
 4897  014672  001006                          BNE     26$             ;BR IF YES
 4898  014674  104400  011265                  TYPE    ,NOFALS         ;TYPE "  NONE"
 4899  014700  104400  007565                  TYPE    ,NODRTS         ;TYPE "** NO DRIVES TO TEST"
 4900                                                                  ;     "PRESS 'CONT' WHEN RDY"
 4901  014704  000137  044420                  JMP     HLTPRG          ;HALT PROGRAM
 4902  014710  104400  001315          26$:    TYPE    ,$CRLF          ;TYPE <CR>,<LF>
 4903  014714  105737  003106                  TSTB    MDFLAG          ;SEE IF DEFAULT MODE
 4904  014720  001002                          BNE     20$             ;BR IF NOT DEFAULT MODE
 4905  014722  000137  015642                  JMP     LODFLS          ;GO LOAD DEFLT ITER. COUNTS
 4906  014726  122737  000013  000041  20$:    CMPB    #13,@#41        ;SEE IF RK06 IS XXDP MEDIUM
 4907  014734  001032                          BNE     19$             ;BR IF NOT
 4908  014736  105737  005610                  TSTB    DRVLST          ;SEE IF DRIVE 0 LISTED TO TEST
 4909  014742  001427                          BEQ     19$             ;BR IF NOT
 4910  014744  104400  007476          24$:    TYPE    ,REPLPK         ;TYPE "IF XXDP PACK ON DRV 0, TYPE Y <CR>
 4911                                                                  ;     AND REPLACE IT"
 4912  014750  004737  032214                  JSR     PC,RDCHRS       ;READ RESPONSE
 4913  014754  014744                          24$                     ;(↑C) RETURN
 4914  014756  014744                          24$                     ;(↑Z) RETURN
 4915  014760  014744                          24$                     ;(↑U) RETURN
 4916  014762  005700                          TST     R0              ;SEE IF NULL INPUT
 4917  014764  001416                          BEQ     19$             ;BR IF JUST <CR> TYPED
 4918  014766  022737  000131  005264          CMP     #'Y,BUFFO       ;SEE IF "Y <CR>" TYPED
 4919  014774  001363                          BNE     24$             ;BR IF NOT, TO ASK AGAIN
 4920  014776  104400  007616                  TYPE    ,CNTRDY         ;TYPE "PRESS CONT WHEN DRV RDY"
 4921  015002  042762  000100  000000          BIC     #IE,RKCS1(R2)   ;DISABLE RK06 INTERRUPT
 4922  015010  000000                          HALT                    ;HALT FOR PACK CHANGE
 4923  015012  004737  030726                  JSR     PC,INITSS       ;INIT THE SUB-SYS
 4924  015016  000137  015310                  JMP     CHKLST          ;GO CHECK STATUS OF LISTED DRIVES
 4925  015022  104400  013442          19$:    TYPE    ,PROMPT         ;TYPE ASTERISK AND SPACE
 4926                                  ;READ AND CHECK NEW DRIVE NUMBERS
 4927  015026  004737  032214                  JSR     PC,RDCHRS       ;READ IN INPUT STRING
 4928  015032  014520                          DRVTST                  ;(↑C) RETURN ADDRESS
 4929  015034  014520                          DRVTST                  ;(↑Z) RETURN ADDRESS
 4930  015036  014604                          TELDRV                  ;(↑U) OR ERROR RETURN ADDRESS
 4931  015040  005700                          TST     R0              ;SEE IF NULL INPUT
 4932  015042  001007                          BNE     9$              ;BR IF NEW DRIVES WILL BE SELECTED
 4933  015044  105737  003126                  TSTB    DULACS          ;SEE IF DUAL-ACCESS FLAG SET
 4934  015050  001002                          BNE     22$             ;BR IF YES
 4935  015052  000137  015354                  JMP     ASKTST          ;JUMP TO THE TEST INPUT ROUTINE
 4936  015056  000137  016120          22$:    JMP     INPUTP          ;GO ASK FOR INPUT PARAMETERS
 4937  015062  022700  000017          9$:     CMP     #15.,R0         ;SEE IF TOO MANY CHARACTERS TYPED
 4938  015066  002005                          BGE     12$             ;BR IF NOT TOO MANY
 4939  015070  104400  005264          10$:    TYPE    ,BUFFO          ;ECHO BAD INPUT
 4940  015074  104400  001314                  TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
 4941  015100  000641                          BR      TELDRV          ;GO TYPE DRIVES AND ASK AGAIN
 4942  015102  005001                  12$:    CLR     R1              ;CLEAR CHAR. POINTER
 4943  015104  126127  005264  000060  14$:    CMPB    BUFFO(R1),#'0   ;SEE IF DRIVE NO. < 0
 4944  015112  002766                          BLT     10$             ;BR TO ECHO BAD INPUT
 4945  015114  126127  005264  000067          CMPB    BUFFO(R1),#'7   ;SEE IF > 7
 4946  015122  003362                          BGT     10$             ;BR TO ECHO BAD INPUT
 4947  015124  005201                          INC     R1              ;INCREMENT CHAR POINTER
 4948  015126  020100                          CMP     R1,R0           ;SEE IF MORE CHARS TO CHECK
 4949  015130  001406                          BEQ     16$             ;BR IF ALL CHARS CHECKED
 4950  015132  126127  005264  000054          CMPB    BUFFO(R1),#',   ;SEE IF THIS IS COMMA
 4951  015140  001353                          BNE     10$             ;BR IF NOT COMMA
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 4952  015142  005201                          INC     R1              ;INCREMENT CHAR POINTER
 4953  015144  000757                          BR      14$             ;BR TO CONTINUE CHECKING CHARS
 4954                                  ;GET NEW DRIVE NUMBERS INTO LIST
 4955  015146  012701  005610          16$:    MOV     #DRVLST,R1      ;GET DRIVE LIST ADDRESS
 4956  015152  005021                          CLR     (R1)+           ;CLEAR OUT THE DRIVE LIST
 4957  015154  005021                          CLR     (R1)+
 4958  015156  005021                          CLR     (R1)+
 4959  015160  005011                          CLR     (R1)
 4960  015162  005000                          CLR     R0              ;CLEAR BUFFER POINTER
 4961  015164  116001  005264          18$:    MOVB    BUFFO(R0),R1    ;GET A DRIVE NUMBER
 4962  015170  042701  000060                  BIC     #'0,R1          ;STRIP ASCII BITS
 4963  015174  112761  000001  005610          MOVB    #1,DRVLST(R1)   ;MARK THIS DRIVE IN DRIVE LIST
 4964  015202  062700  000002                  ADD     #2,R0           ;POINT TO NEXT DRIVE NUMBER
 4965  015206  105760  005263                  TSTB    BUFFO-1(R0)     ;SEE IF NULL CHAR YET
 4966  015212  001364                          BNE     18$             ;BR IF NOT DONE YET
 4967  015214  000435                          BR      CHKLST          ;GO CHECK NEW DRIVES FOR VALID STATUS
 4968                                  ;COME HERE IF ALL DRIVES REQUESTED
 4969  015216  005000                  ALLDRV: CLR     R0              ;CLEAR DRIVE NUMBER
 4970  015220  013703  001376                  MOV     $DEVM,R3        ;GET APT DEVICE MAP
 4971  015224  132737  000200  001341          BITB    #BIT7,$ENVM     ;SEE IF NO SIZING
 4972  015232  001002                          BNE     1$              ;BR IF NO SIZING
 4973  015234  012703  000377                  MOV     #377,R3         ;SET UP FOR SIZING
 4974  015240  012701  000001          1$:     MOV     #BIT0,R1        ;SET BIT POINTER
 4975  015244  105060  005610          2$:     CLRB    DRVLST(R0)      ;INITIALIZE DRIVE ENTRY
 4976  015250  030103                          BIT     R1,R3           ;SEE IF THIS DRIVE IS REQUESTED
 4977  015252  001403                          BEQ     4$              ;BR IF NOT
 4978  015254  112760  000001  005610          MOVB    #1,DRVLST(R0)   ;MARK THIS DRIVE IN DRIVE LIST
 4979  015262  006301                  4$:     ASL     R1              ;SHIFT BIT POINTER
 4980  015264  005200                          INC     R0              ;INCREMENT DRIVE NUMBER
 4981  015266  022700  000010                  CMP     #10,R0          ;SEE IF DONE MARKING ALL DRIVES
 4982  015272  001364                          BNE     2$              ;BR IF NOT DONE YET
 4983  015274  132737  000200  001341          BITB    #BIT7,$ENVM     ;SEE IF PROGRAM SHOULD SIZE
 4984  015302  001402                          BEQ     CHKLST          ;BR IF YES
 4985  015304  000137  014604                  JMP     TELDRV          ;GO LIST APT-SELECTED DRIVES
 4986                                  ;CHECK ALL DRIVES MARKED IN DRIVE LIST FOR PROPER STATUS
 4987  015310  005000                  CHKLST: CLR     R0              ;CLEAR DRIVE NUMBER
 4988  015312  105760  005610          2$:     TSTB    DRVLST(R0)      ;SEE IF THIS DRIVE IS MARKED IN LIST
 4989  015316  001405                          BEQ     4$              ;BR IF NOT MARKED
 4990  015320  010037  005502                  MOV     R0,DRIVE        ;SET DRIVE NUMBER FOR SCNDRV
 4991  015324  004737  031046                  JSR     PC,SCNDRV       ;CHECK STATUS OF THIS DRIVE
 4992                                                                  ;IF NOT VALID, TYPE MESSAGE
 4993                                                                  ;   AND REMOVE IT FROM DRIVE LIST
 4994  015330  015346                          6$                      ;ERROR RETURN ADDRESS FOR SCNDRV
 4995  015332  005200                  4$:     INC     R0              ;RETURN HERE IF DRIVE IS USEABLE
 4996  015334  022700  000010                  CMP     #10,R0          ;SEE IF DONE CHECKING LIST
 4997  015340  001364                          BNE     2$              ;BR IF NOT DONE YET
 4998  015342  000137  014604                  JMP     TELDRV          ;GO BACK TO LIST SELECTED DRIVES
 4999  015346  105060  005610          6$:     CLRB    DRVLST(R0)      ;REMOVE INVALID DRIVE FROM LIST
 5000  015352  000767                          BR      4$              ;CONTINUE CHECKING THE LIST
 5001
 5002
 5003                                  ;;*****************************************************************
 5004                                  .SBTTL  DESIRED TEST INPUT ROUTINE
 5005                                  ;*THIS ROUTINE ALLOWS INPUT OF DESIRED TESTS AND ITERATION
 5006                                  ;*COUNT FOR EACH TEST. THE INPUT IS CHECKED FOR VALIDITY,
 5007                                  ;*AND IF VALID, THE ITERATION COUNTS ARE LOADED INTO THE
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                                        ;*TEST LIST (TSTLST). AN ITERATION VALUE OF 0 INDICATES
                                        ;*THAT THE TEST IS NOT TO BE RUN.
                                        ;*THIS ROUTINE REQUESTS "ENTER L,C, OR I". TYPING (L)
                                        ;*CAUSES THE CURRENT LIST OF TESTS AND ITERATIONS TO BE
                                        ;*TYPED, (C) ALLOWS TESTS AND ITERATIONS TO BE CHANGED,
                                        ;*AND (I) ALLOWS THE OPERATOR TO PROCEED WITH SELECTION
                                        ;*OF OPERATING PARAMETERS, AND RUN TESTS.
                                        ;*TYPING (↑C) CAUSES IMMEDIATE RETURN TO DRVTST. TYPING
                                        ;* (↑Z) CAUSES RETURN TO ASKTMD.
                                        ;;*****************************************************************

                                        ;DETERMINE L,C, OR I MODE
015354  104400  010003        ASKTST: TYPE    ,TSTMDS         ;ASK FOR TEST INPUT MODE
015360  104400  010105        ASKTMD: TYPE    ,ENTLCI         ;TYPE "ENTER L,C, OR I" :
015364  004737  032214                JSR     PC,RDCHRS       ;READ RESPONSE
015370  014520                        DRVTST                  ;(↑C) RETURN ADDRESS
015372  015360                        ASKTMD                  ;(↑Z) RETURN ADDRESS
015374  015360                        ASKTMD                  ;(↑U) OR ERROR RETURN ADDRESS
015376  005700                TST     R0                      ;SEE IF ANY INPUT
015400  001005                BNE     4$                      ;BR IF ANY INPUT
015402  104400  005264        2$:     TYPE    ,BUFFO          ;ECHO BAD INPUT
015406  104400  001314                TYPE    ,$QUES          ;TYPE (?) AND (CR),(LF)
015412  000762                BR      ASKTMD                  ;GO ASK AGAIN
015414  022737  000114  005264  4$:   CMP     #'L,BUFFO       ;SEE IF (L) TYPED
015422  001002                BNE     6$                      ;BR IF NOT (L)
015424  000137  015460                JMP     LSTTST          ;JUMP TO LIST TESTS
015430  022737  000103  005264  6$:   CMP     #'C,BUFFO       ;SEE IF (C) TYPED
015436  001002                BNE     8$                      ;BR IF NOT (C)
015440  000137  015576                JMP     CHGTST          ;JUMP TO CHANGE TESTS
015444  022737  000111  005264  8$:   CMP     #'I,BUFFO       ;SEE IF (I) TYPED
015452  001353                BNE     2$                      ;BR IF NOT (I), TO ECHO BAD INPUT
015454  000137  016120                JMP     INPUTP          ;GO INPUT PARAMS AND RUN TESTS

                                        ;LIST CURRENT TESTS AND ITERATION COUNTS
015460  104400  010207        LSTTST: TYPE    ,TLSTHD         ;TYPE HEADING "TEST     ITERATIONS"
015464  005001                CLR     R1                      ;INITIALIZE TEST INDEX
015466  004737  027250        2$:     JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
015472  004737  032526                JSR     PC,TYPTST       ;TYPE CURRENT TEST AND ITERATION NUMBER
015476  104400  001315                TYPE    ,$CRLF          ;TYPE (CR),(LF)
015502  005737  005524                TST     INTCHR          ;SEE IF ANY INPUT
015506  001416                BEQ     8$                      ;BR IF NO INPUT
015510  122737  000003  005524        CMPB    #003,INTCHR     ;SEE IF (↑C) TYPED
015516  001002                BNE     4$                      ;BR IF NOT (↑C)
015520  000137  014520                JMP     DRVTST          ;JUMP TO ASK FOR DRIVES AGAIN
015524  122737  000032  005524  4$:   CMPB    #032,INTCHR     ;SEE IF (↑Z) TYPED
015532  001002                BNE     6$                      ;BR IF NOT (↑Z)
015534  000137  015360                JMP     ASKTMD          ;JUMP TO ASK FOR NEW TEST INPUT MODE
015540  004737  027270        6$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
015544  062701  000002        8$:     ADD     #2,R1           ;INCREMENT TEST INDEX
015550  010102                MOV     R1,R2                   ;GET COPY OF INDEX
015552  062702  005620                ADD     #TSTLST,R2      ;GET POSITION IN LIST
015556  022702  005634                CMP     #DFLTST,R2      ;SEE IF DONE WITH LIST
015562  001341                BNE     2$                      ;BR IF NOT DONE YET
015564  042777  000100  163352        BIC     #BIT6,@$TKS     ;DISABLE KBD INTERRUPT
015572  000137  015360                JMP     ASKTMD          ;GO ASK FOR NEW TEST INPUT MODE
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5064
5065  015576  104400  010133          ;CHANGE CURRENT TESTS AND ITERATION COUNTS
5066  015602  004737  032214  CHGTST: TYPE   ,DFTEST          ;ASK IF TESTS SHOULD BE DEFAULTED
5067  015606  014520                  JSR    PC,RDCHRS        ;READ RESPONSE
5068  015610  015360                  DRVTST                  ;(↑C) RETURN ADDRESS
5069  015612  015576                  ASKTMD                  ;(↑Z) RETURN ADDRESS
5070  015614  005700                  CHGTST                  ;(↑U) OR ERROR RETURN ADDRESS
5071  015616  001426                  TST    R0               ;SEE IF NULL INPUT
5072  015620  022737  000104  005264  BEQ    NULINP           ;BR IF NULL INPUT
5073  015626  001405                  CMP    #'D,BUFFO        ;SEE IF (D) TYPED
5074  015630  104400  005264          BEQ    LODFLS           ;BR IF DEFAULTS REQUESTED
5075  015634  104400  001314          TYPE   ,BUFFO           ;ECHO BAD INPUT
5076  015640  000756                  TYPE   ,$QUES           ;TYPE <?> AND <CR>,<LF>
5077                                  BR     CHGTST           ;GO ASK AGAIN
5078  015642  012700  005634          ;LOAD DEFAULT ITERATION COUNTS INTO TEST LIST
5079  015646  012702  005620  LODFLS: MOV    #DFLTST,R0       ;LOAD DEFAULT LIST ADDRESS
5080  015652  012022                  MOV    #TSTLST,R2       ;LOAD TEST LIST ADDRESS
5081  015654  022702  005634  4$:     MOV    (R0)+,(R2)+      ;LOAD A DEFAULT VALUE
5082  015660  001374                  CMP    #DFLTST,R2       ;SEE IF DONE YET
5083  015662  105737  003106          BNE    4$               ;BR IF NOT DONE YET
5084  015666  001234                  TSTB   MDFLAG           ;SEE IF DEFAULT MODE
5085  015670  000137  016654          BNE    ASKTMD           ;BR IF NOT DEFAULT MODE
5086  015674  005001                  JMP    LODFPT           ;GO LOAD DEFAULT PARAMETERS
5087  015676  104400  010207  NULINP: CLR    R1               ;INITIALIZE TEST INDEX
5088                                  TYPE   ,TLSTHD          ;TYPE HEADING "TEST     ITERATIONS"
5089  015702  004737  032526          ;TYPE CURRENT TEST AND ITERATION NUMBER
5090  015706  104400  013422  8$:     JSR    PC,TYPTST        ;TYPE A TEST NO. AND ITERATION NO.
5091  015712  104400  013442          TYPE   ,SPACE1          ;TYPE A SPACE
5092                                  TYPE   ,PROMPT          ;TYPE ASTERISK AND SPACE
5093  015716  004737  032214          ;READ AND CHECK INPUT, IF ANY
5094  015722  014520                  JSR    PC,RDCHRS        ;READ OCTAL DIGITS TYPED
5095  015724  015360                  DRVTST                  ;(↑C) RETURN ADDRESS
5096  015726  015702                  ASKTMD                  ;(↑Z) RETURN ADDRESS
5097  015730  005700                  8$                      ;(↑U) OR ERROR RETURN ADDRESS
5098  015732  001012                  TST    R0               ;SEE IF ANY INPUT
5099  015734  062701  000002  10$:    BNE    12$              ;BR IF ANY INPUT
5100  015740  010102                  ADD    #2,R1            ;INCREMENT INDEX
5101  015742  062702  005620          MOV    R1,R2            ;COPY INDEX
5102  015746  022702  005634          ADD    #TSTLST,R2       ;GET POSITION IN LIST
5103  015752  001353                  CMP    #DFLTST,R2       ;SEE IF DONE WITH LIST
5104  015754  000137  015360          BNE    8$               ;BR IF NOT DONE YET
5105  015760  022737  000041  005264  12$:    JMP    ASKTMD           ;GO ASK FOR NEW TEST INPUT MODE
5106  015766  001431                  CMP    #'!,BUFFO        ;SEE IF (!) TYPED
5107  015770  005002                  BEQ    16$              ;BR TO PROPAGATE CURRENT ITER. NO.
5108  015772  122760  000041  005263  CLR    R2               ;INITIALIZE (!) INDICATOR
5109  016000  001004                  CMPB   #'!,BUFFO-1(R0)  ;SEE IF LAST CHAR IN BUF IS (!)
5110  016002  105060  005263          BNE    14$              ;BR IF NOT (!)
5111  016006  005300                  CLRB   BUFFO-1(R0)      ;INSERT TERMINATOR BYTE
5112  016010  005202                  DEC    R0               ;DECREMENT CHAR COUNT
5113  016012  022700  000005          INC    R2               ;SET (!) INDICATOR
5114  016016  002433                  CMP    #5,R0            ;SEE HOW MANY CHARS NOW
5115  016020  012746  005264  14$:    BLT    20$              ;BR IF TOO MANY (MAX ITER. NO. = 77776)
5116  016024  004737  052736          MOV    #BUFFO,-(SP)     ;GET BUF ADDR. ON STACK FOR OCTBIN
5117  016030  016106                  JSR    PC,OCTBIN        ;CHECK DIGITS AND CONVERT TO BINARY
5118  016032  012600                  20$                     ;ERROR RETURN ADDRESS FOR OCTBIN
5119  016034  020027  077776          MOV    (SP)+,R0         ;GET ITERATION NUMBER
                                      CMP    R0,#77776        ;SEE IF > 77776
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5120  016040  101022                          BHI     20$             ;BR IF TOO BIG
5121  016042  010061  005620                  MOV     R0,TSTLST(R1)   ;PUT ITERATION NUMBER INTO TEST LIST
5122  016046  005702                          TST     R2              ;SEE IF (!) WAS TYPED
5123  016050  001731                          BEQ     10$             ;BR IF NOT (!)
5124                                  ;PROPAGATE CURRENT ITERATION NO. TO THE END OF TSTLST
5125  016052  010102                  16$:    MOV     R1,R2           ;COPY INDEX
5126  016054  062702  005620                  ADD     #TSTLST,R2      ;GET POSITION IN LIST
5127  016060  022702  005632                  CMP     #DFLTST-2,R2    ;SEE IF AT END OF LIST
5128  016064  001002                          BNE     17$             ;BR IF NOT DONE
5129  016066  000137  015360                  JMP     ASKTMD          ;GO ASK FOR NEW TEST INPUT MODE
5130  016072  016161  005620  005622  17$:    MOV     TSTLST(R1),TSTLST+2(R1) ;PROPAGATE TO NEXT WORD
5131  016100  062701  000002                  ADD     #2,R1           ;INCREMENT INDEX
5132  016104  000762                          BR      16$             ;BR TO CONTINUE
5133  016106  104400  005264          20$:    TYPE    ,BUFFO          ;ECHO BAD INPUT
5134  016112  104400  001314                  TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
5135  016116  000671                          BR      8$              ;GO ASK AGAIN
5136
5137                                  ;ASK FOR DESIRED OPERATIONAL PARAMETER INPUT MODE
5138  016120  104400  010237          INPUTP: TYPE    ,EXPLAN         ;EXPLAIN INPUT MODES
5139  016124  005037  005504          ASKMDE: CLR     $TALLS          ;INHIBIT STALL BETWEEN OPERATIONS
5140  016130  004737  027776                  JSR     PC,ENBCSR       ;ENABLE MEMORY PARITY CHECK
5141  016134  104400  010365                  TYPE    ,PARMDE         ;ASK FOR DESIRED INPUT MODE
5142  016140  104400  013442                  TYPE    ,PROMPT         ;TYPE "* "
5143  016144  004737  032214                  JSR     PC,RDCHRS       ;READ RESPONSE TO MODE QUESTION
5144  016150  014520                          DRVTST                  ;(↑C) RETURN ADDRESS
5145  016152  016124                          ASKMDE                  ;(↑Z) RETURN ADDRESS
5146  016154  016124                          ASKMDE                  ;(↑U) OR ERROR RETURN ADDRESS
5147  016156  005700                          TST     R0              ;SEE IF NULL INPUT
5148  016160  001005                          BNE     4$              ;BR IF ANY INPUT
5149  016162  104400  005264          2$:     TYPE    ,BUFFO          ;ECHO BAD INPUT
5150  016166  104400  001314                  TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
5151  016172  000754                          BR      ASKMDE          ;GO ASK AGAIN
5152  016174  022737  000124  005264  4$:     CMP     #'T,BUFFO       ;SEE IF (T) TYPED
5153  016202  001002                          BNE     6$              ;BR IF NOT (T)
5154  016204  000137  016336                  JMP     TYPLST          ;JUMP TO THE TYPE LIST ROUTINE
5155  016210  022737  000117  005264  6$:     CMP     #'O,BUFFO       ;SEE IF (O) TYPED
5156  016216  001002                          BNE     8$              ;BR IF NOT (O)
5157  016220  000137  016610                  JMP     OPNLST          ;JUMP TO THE OPEN LIST ROUTINE
5158  016224  022737  000123  005264  8$:     CMP     #'S,BUFFO       ;SEE IF (S) TYPED
5159  016232  001002                          BNE     10$             ;BR IF NOT (S)
5160  016234  000137  017074                  JMP     SETPRM          ;JUMP TO THE SET INDIV. PARAM. ROUTINE
5161  016240  022737  000122  005264  10$:    CMP     #'R,BUFFO       ;SEE IF (R) TYPED
5162  016246  001345                          BNE     2$              ;BR IF NOT (R), TO ECHO BAD INPUT
5163  016250  023737  005660  005662          CMP     S0,S1           ;COMPARE 20(DEC) SECTOR LIMITS
5164  016256  003403                          BLE     12$             ;BR IF S0 NOT > S1
5165  016260  104400  010473                  TYPE    ,SECNL1         ;TYPE "S0>S1 NOT ALLOWED"
5166  016264  000717                          BR      ASKMDE          ;GO ASK AGAIN FOR PARAMETERS
5167  016266  023737  005664  005666  12$:    CMP     S2,S3           ;COMPARE 22(DEC) SECTOR LIMITS
5168  016274  003405                          BLE     14$             ;BR IF S2 NOT > S3
5169  016276  104400  010523                  TYPE    ,SECNL2         ;TYPE "S2>S3"
5170  016302  104400  010504                  TYPE    ,NOTALD         ;TYPE "NOT ALLOWED"
5171  016306  000706                          BR      ASKMDE          ;GO ASK AGAIN FOR PARAMETERS
5172  016310  023737  005654  005656  14$:    CMP     FT,LT           ;COMPARE CHOSEN TRACK LIMITS
5173  016316  003405                          BLE     20$             ;BR IF FT NOT > LT
5174  016320  104400  010535                  TYPE    ,TRKNLW         ;TYPE "FT>LT"
5175  016324  104400  010504                  TYPE    ,NOTALD         ;TYPE "NOT ALLOWED"
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5176  016330  000675                          BR      ASKMDE          ;GO ASK AGAIN FOR PARAMETERS
5177  016332  000137  017330          20$:    JMP     RUNTST          ;GO RUN THE TESTS
5178
5179
5180
5181                                  .SBTTL  TYPE (T) LIST ROUTINE
5182                                  ;*THIS ROUTINE TYPES THE ENTIRE PARAMETER LIST ON THE
5183                                  ;*CONSOLE, LINE BY LINE. EACH LINE HAS THE FOLLOWING
5184                                  ;*FORMAT:  XX=YYYYYY , WHERE XX IS A PARAMETER MNEMONIC
5185                                  ;*AND YYYYYY IS THE VALUE OF THE PARAMETER IN OCTAL.
5186                                  ;*TYPING (↑C) CAUSES IMMEDIATE RETURN TO DRVTST,
5187                                  ;*AND (↑Z) CAUSES RETURN TO ASKMDE.
5188
5189  016336                          TYPLST:
5190  016336  005001                          CLR     R1              ;INITIALIZE INDEX
5191  016340  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5192  016344  004737  032562          1$:     JSR     PC,TYPPRM       ;TYPE CURRENT PARAMETER AND VALUE
5193  016350  104400  001315                  TYPE    ,$CRLF          ;TYPE <CR>,<LF>
5194  016354  005737  005524                  TST     INTCHR          ;SEE IF ANY INPUT AT KBD
5195  016360  001420                          BEQ     8$              ;BR IF NO INPUT
5196  016362  122737  000003  005524          CMPB    #003,INTCHR     ;SEE IF (↑C) TYPED
5197  016370  001002                          BNE     4$              ;BR IF NOT (↑C)
5198  016372  000137  014520                  JMP     DRVTST          ;JUMP TO ASK FOR DRIVE(S) AGAIN
5199  016376  122737  000032  005524  4$:     CMPB    #032,INTCHR     ;SEE IF (↑Z) TYPED
5200  016404  001002                          BNE     6$              ;BR IF NOT (↑Z)
5201  016406  000137  016124                  JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5202  016412  004737  027270          6$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
5203  016416  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5204  016422  022761  040515  006000  8$:     CMP     #"MA,PRMNEM(R1) ;SEE IF PARAM. IS (MA)
5205  016430  001002                          BNE     10$             ;BR IF NOT (MA)
5206  016432  062701  000002                  ADD     #2,R1           ;INCREMENT PARAMETER INDEX
5207  016436  062701  000002          10$:    ADD     #2,R1           ;INCREMENT PARAMETER INDEX
5208  016442  010102                          MOV     R1,R2           ;GET COPY OF INDEX
5209  016444  062702  005650                  ADD     #PRMLST,R2      ;COMPUTE POSITION IN LIST
5210  016450  022702  005676                  CMP     #PRDFLT,R2      ;SEE IF DONE WITH LIST
5211  016454  001333                          BNE     1$              ;BR IF NOT DONE YET
5212  016456  032737  100000  005670          BIT     #BIT15,PT       ;SEE IF PATTERN 15 SPECIFIED
5213  016464  001005                          BNE     12$             ;BR IF PATTERN SPECIFIED
5214  016466  042777  000100  162450          BIC     #BIT6,@$TKS     ;DISABLE KBD INTERRUPT
5215  016474  000137  016124                  JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5216                                  ;TYPE OUT USER-DEFINED PATTERN 15
5217  016500  104400  010662          12$:    TYPE    ,PFIFTN         ;TYPE "USER-DEFINED PATTERN 15 :"
5218  016504  005001                          CLR     R1              ;INITIALIZE WORD INDEX
5219  016506  005737  005524          14$:    TST     INTCHR          ;SEE IF ANY INPUT
5220  016512  001420                          BEQ     20$             ;BR IF NO INPUT
5221  016514  122737  000003  005524          CMPB    #003,INTCHR     ;SEE IF (↑C) TYPED
5222  016522  001002                          BNE     16$             ;BR IF NOT (↑C)
5223  016524  000137  014520                  JMP     DRVTST          ;JUMP TO ASK FOR DRIVE(S) AGAIN
5224  016530  122737  000032  005524  16$:    CMPB    #032,INTCHR     ;SEE IF (↑Z) TYPED
5225  016536  001002                          BNE     18$             ;BR IF NOT (↑Z)
5226  016540  000137  016124                  JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5227  016544  004737  027270          18$:    JSR     PC,ECOBAD       ;ECHO BAD INPUT
5228  016550  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5229  016554  004737  032642          20$:    JSR     PC,TYPPAT       ;TYPE WORD XX = YYYYYY
5230  016560  104400  001315                  TYPE    ,$CRLF          ;TYPE <CR>,<LF>
5231  016564  062701  000002                  ADD     #2,R1           ;INCREMENT INDEX
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5232  016570  022701  000040          CMP     #32.,R1         ;SEE IF 16 WORDS TYPED
5233  016574  001344                  BNE     14$             ;BR IF NOT DONE YET
5234  016576  042777  000100  162340  BIC     #BIT6,@$TKS     ;DISABLE KBD INTERRUPT
5235  016604  000137  016124          JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5236
5237
5238
5239                                .SBTTL  OPEN (O) LIST ROUTINE
5240                                ;*THIS ROUTINE IS USED TO EITHER REQUEST LOADING OF ALL
5241                                ;*DEFAULT PARAMETERS INTO THE PARAMETER LIST, OR TO
5242                                ;*SEQUENTIALLY OPEN EACH PARAMETER FOR ALTERATION BY
5243                                ;*TTY INPUT. TYPING (↑C) CAUSES IMMEDIATE RETURN TO
5244                                ;*DRVTST, AND (↑Z) CAUSES RETURN TO ASKMDE.
5245
5246
5247  016610                        OPNLST:
5248  016610  104400  010600                TYPE    ,DFQUES         ;ASK IF ALL DEFAULT VALUES DESIRED
5249  016614  004737  032214                JSR     PC,RDCHRS       ;READ RESPONSE TO DEFAULT QUESTION
5250  016620  014520                        DRVTST                  ;(↑C) RETURN ADDRESS
5251  016622  016124                        ASKMDE                  ;(↑Z) RETURN ADDRESS
5252  016624  016610                        OPNLST                  ;(↑U) OR ERROR RETURN ADDRESS
5253  016626  005700                        TST     R0              ;SEE IF NULL INPUT
5254  016630  001433                        BEQ     NOTDFT          ;BR IF DEFAULTS NOT REQUESTED
5255  016632  022737  000104  005264        CMP     #'D,BUFF0       ;SEE IF (D) TYPED
5256  016640  001405                        BEQ     LODFPT          ;BR IF DEFAULTS DESIRED
5257  016642  104400  005264                TYPE    ,BUFF0          ;ECHO BAD INPUT
5258  016646  104400  001314                TYPE    ,$QUES
5259  016652  000756                        BR      OPNLST          ;GO ASK AGAIN
5260                                ;LOAD ALL DEFAULT VALUES INTO PARAMETER LIST
5261  016654  012700  005676        LODFPT: MOV     #PRDFLT,R0      ;LOAD DEFAULT LIST ADDRESS
5262  016660  012702  005650                MOV     #PRMLST,R2      ;LOAD PARAMETER LIST ADDRESS
5263  016664  012022                4$:     MOV     (R0)+,(R2)+     ;LOAD A DEFAULT VALUE
5264  016666  022702  005676                CMP     #PRDFLT,R2      ;SEE IF DONE YET
5265  016672  001374                        BNE     4$              ;BR IF MORE VALUES TO LOAD YET
5266  016674  105737  003106                TSTB    MDFLAG          ;SEE IF DEFAULT MODE
5267  016700  001005                        BNE     6$              ;BR IF NOT DEFAULT MODE
5268  016702  012737  000001  023506        MOV     #1,$EOPCT       ;SET PASS COUNT = 1
5269  016710  000137  017412                JMP     STPASS          ;GO RUN DFLT TESTS
5270  016714  000137  016124        6$:     JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5271  016720  005001                NOTDFT: CLR     R1              ;INITIALIZE INDEX
5272                                ;TYPE CURRENT PARAMETER AND VALUE
5273  016722  004737  032562        8$:     JSR     PC,TYPPRM       ;TYPE PARAMETER AND VALUE
5274  016726  104400  013422                TYPE    ,SPACE1         ;TYPE A SPACE
5275  016732  104400  013442                TYPE    ,PROMPT         ;TYPE ASTERISK AND SPACE
5276                                ;READ AND CHECK INPUT, IF ANY
5277  016736  004737  032214                JSR     PC,RDCHRS       ;READ OCTAL DIGITS TYPED
5278  016742  014520                        DRVTST                  ;(↑C) RETURN ADDRESS FOR RDCHRS
5279  016744  016124                        ASKMDE                  ;(↑Z) RETURN ADDRESS FOR RDCHRS
5280  016746  016722                        8$                      ;(↑U) OR ERROR RETURN ADDR. FOR RDCHRS
5281  016750  005700                        TST     R0              ;SEE IF ANY INPUT
5282  016752  001007                        BNE     10$             ;BR IF ANY INPUT
5283  016754  022761  040515  006000        CMP     #"MA,PRMNEM(R1) ;SEE IF (MA) JUST DEFAULTED
5284  016762  001023                        BNE     12$             ;BR IF NOT (MA)
5285  016764  062701  000002                ADD     #2,R1           ;INCREMENT INDEX
5286  016770  000420                        BR      12$             ;BR TO MOVE ON TO NEXT PARAMETER
5287  016772  022700  000010        10$:    CMP     #10,R0          ;SEE IF 8 CHARACTERS TYPED
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5288  016776  002431                        BLT     14$             ;BR IF MORE THAN 8 TYPED
5289  017000  012746  005264                MOV     #BUFFO,-(SP)    ;PUT BUFFER ADDR. ON STACK FOR OCTBIN
5290  017004  004737  052736                JSR     PC,OCTBIN       ;CHECK DIGITS AND CONVERT TO BINARY
5291  017010  017062                        14$                     ;ERROR RETURN ADDRESS FOR OCTBIN
5292  017012  012637  005470                MOV     (SP)+,LOWOCT    ;GET LOW BINARY BITS
5293  017016  013737  053070  005472        MOV     $HIOCT,HIGOCT   ;GET HIGH BINARY BITS
5294                        ;CHECK PARAMETER VALUE AND PUT INTO LIST
5295  017024  004737  033220                JSR     PC,CHKPRM       ;CHECK VALIDITY OF PARAM VALUE
5296  017030  017062                        14$                     ;ERROR RETURN ADDR. FOR CHKPRM
5297                        ;OPEN USER-DEFINED PATTERN 15 FOR MODIFICATION, IF NECESSARY
5298  017032  004737  032674        12$:    JSR     PC,MODP15
5299                        ;MOVE ON TO NEXT PARAMETER
5300  017036  062701  000002                ADD     #2,R1           ;INCREMENT THE PARAMETER INDEX
5301  017042  010102                        MOV     R1,R2           ;GET COPY OF INDEX
5302  017044  062702  005650                ADD     #PRMLST,R2      ;COMPUTE POSITION IN LIST
5303  017050  022702  005676                CMP     #PRDFLT,R2      ;SEE IF DONE WITH LIST
5304  017054  001322                        BNE     9$              ;BR IF NOT DONE YET
5305  017056  000137  016124                JMP     ASKMDE          ;JUMP TO ASK FOR NEW MODE
5306  017062  104400  005264        14$:    TYPE    ,BUFFO          ;ECHO BAD INPUT
5307  017066  104400  001314                TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
5308  017072  000713                        BR      8$              ;BR TO ASK AGAIN
5309
5310
5311
5312                        .SBTTL  SET (S) INDIVIDUAL PARAM ROUTINE
5313                        ;*THIS ROUTINE IS USED TO ALLOW SETTING OF ANY INDIVIDUAL
5314                        ;*PARAMETER VALUE BY TTY INPUT. A PROMPTER (>) IS
5315                        ;*TYPED AND THE ROUTINE WAITS FOR INPUT OF THE FORM
5316                        ;* XX=YYYYYY, WHERE XX IS THE MNEMONIC FOR ANY VALID
5317                        ;*PARAMETER IN THE LIST, AND YYYYYY IS THE DESIRED PARAMETER
5318                        ;*VALUE IN OCTAL DIGITS. THE PROGRAM THEN ASKS FOR ANOTHER
5319                        ;*PARAMETER BY TYPING "> " AGAIN. TYPING (↑C) CAUSES
5320                        ;*IMMEDIATE RETURN TO DRVTST, AND (↑Z) CAUSES RETURN TO
5321                        ;*ASKMDE.
5322
5323  017074                SETPRM:
5324  017074  104400  013445                TYPE    ,PRMPSP         ;TYPE "> " PROMPTER
5325                        ;READ AND CHECK INPUT, IF ANY
5326  017100  004737  032214                JSR     PC,RDCHRS       ;READ INPUT LINE
5327  017104  014520                        DRVTST                  ;(↑C) RETURN ADDRESS FOR RDCHRS
5328  017106  016124                        ASKMDE                  ;(↑Z) RETURN ADDRESS FOR RDCHRS
5329  017110  017074                        SETPRM                  ;(↑U) OR ERROR RETURN ADDR. FOR RDCHRS
5330  017112  020027  000004                CMP     R0,#4           ;SEE IF AT LEAST 4 CHARACTERS TYPED
5331  017116  002005                        BGE     6$              ;BR IF AT LEAST 4 TYPED
5332  017120  104400  005264        4$:     TYPE    ,BUFFO          ;ECHO BAD INPUT
5333  017124  104400  001314                TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
5334  017130  000761                        BR      SETPRM          ;BR TO ASK FOR INPUT AGAIN
5335  017132  020027  000013        6$:     CMP     R0,#11.         ;SEE IF ELEVEN OR LESS CHARS TYPED
5336  017136  003370                        BGT     4$              ;BR IF MORE THAN ELEVEN TYPED
5337                        ;SEE IF THIS MNEMONIC RESIDES IN PARAM MNEMONIC TABLE
5338  017140  005001                        CLR     R1              ;INITIALIZE PARAMETER INDEX
5339  017142  023761  005264  006000  8$:   CMP     BUFFO,PRMNEM(R1) ;TRY TO MATCH 2-CHAR MNEMONIC
5340  017150  001411                        BEQ     10$             ;BR IF PARAMETER FOUND IN TABLE
5341  017152  062701  000002                ADD     #2,R1           ;INCREMENT INDEX
5342  017156  010102                        MOV     R1,R2           ;GET COPY OF INDEX
5343  017160  062702  005650                ADD     #PRMLST,R2      ;SEE IF ALL ENTRIES HAVE BEEN CHECKED
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5344  017164  022702  005676                    CMP     #PRDFLT,R2
5345  017170  001364                            BNE     8$              ;BR IF MORE TO CHECK YET
5346  017172  000752                            BR      4$              ;BR TO ECHO BAD INPUT
5347                                    ;CHECK FOR VALID LINE FORMAT
5348  017174  012702  000002            10$:    MOV     #2,R2           ;INITIALIZE BUFFER POINTER
5349  017200  122762  000075  005264            CMPB    #'=,BUFFO(R2)   ;SEE IF NEXT CHAR IS "="
5350  017206  001411                            BEQ     12$             ;BR IF IT IS "="
5351  017210  122762  000040  005264            CMPB    #040,BUFFO(R2)  ;SEE IF NEXT CHAR IS A SPACE
5352  017216  001340                            BNE     4$              ;BR TO ECHO BAD INPUT
5353  017220  005202                            INC     R2              ;INCREMENT BUFFER POINTER
5354  017222  122762  000075  005264            CMPB    #'=,BUFFO(R2)   ;SEE IF NEXT CHAR IS "="
5355  017230  001333                            BNE     4$              ;BR TO ECHO INVALID INPUT
5356  017232  005202                    12$:    INC     R2              ;INCREMENT BUFFER POINTER
5357  017234  020200                            CMP     R2,R0           ;SEE IF MORE CHARS LEFT IN BUFFER
5358  017236  002330                            BGE     4$              ;BR TO ECHO INVALID INPUT
5359  017240  122762  000040  005264            CMPB    #040,BUFFO(R2)  ;SEE IF NEXT CHARACTER IS SPACE
5360  017246  001003                            BNE     14$             ;BR IF NOT A SPACE
5361  017250  005202                            INC     R2              ;INCREMENT BUFFER POINTER
5362  017252  020200                            CMP     R2,R0           ;SEE IF MORE CHARS LEFT IN BUFFER
5363  017254  002321                            BGE     4$              ;BR IF NONE LEFT
5364  017256  160200                    14$:    SUB     R2,R0           ;SUBTRACT POINTER FROM CHAR COUNT
5365  017260  020027  000010                    CMP     R0,#10          ;SEE HOW MANY CHARS LEFT
5366  017264  003315                            BGT     4$              ;BR IF TOO MANY LEFT
5367                                    ;CHECK FOR LEGAL PARAMETER VALUE
5368  017266  062702  005264                    ADD     #BUFFO,R2       ;GET ADDRESS OF DIGITS
5369  017272  010246                            MOV     R2,-(SP)        ;PUT IT ON STACK FOR OCTBIN
5370  017274  004737  052736                    JSR     PC,OCTBIN       ;CHECK DIGITS AND CONVERT TO BINARY
5371  017300  017120                            4$                      ;ERROR RETURN ADDR. FOR OCTBIN
5372  017302  012637  005470                    MOV     (SP)+,LOWOCT    ;GET LOW BINARY BITS
5373  017306  013737  053070  005472            MOV     $HIOCT,HIGOCT   ;GET HIGH BINARY BITS
5374  017314  004737  033220                    JSR     PC,CHKPRM       ;CHECK VALIDITY OF PARAMETER VALUE
5375  017320  017120                            4$                      ;ERROR RETURN ADDR. FOR CHKPRM
5376                                  ;OPEN USER-DEFINED PATTERN 15 FOR MODIFICATION, IF NECESSARY
5377  017322  004737  032674                    JSR     PC,MODP15
5378  017326  000662                            BR      SETPRM          ;RETURN TO ASK FOR ANOTHER PARAMETER
5379
5380
5381
5382                                  .SBTTL  RUN (R) TESTS ROUTINE
5383                                  ;*THIS ROUTINE IS ENTERED TO SET UP THE RUNNING OF TESTS,
5384                                  ;*WHOSE PARAMETERS HAVE BEEN DETERMINED. IT FIRST ASKS
5385                                  ;*FOR THE DESIRED NUMBER OF PROGRAM PASSES, AND STORES
5386                                  ;*THIS IN $EOPCT FOR THE END OF PASS ROUTINE. THEN, THE
5387                                  ;*DRIVE LIST IS SCANNED FOR THE FIRST DESIRED DRIVE, AND
5388                                  ;*THE HEADER ON SECTOR 0 IS READ TO GET THE FORMAT FOR THIS
5389                                  ;*DRIVE. THIS IS STORED IN THE FORMAT BYTE, AND A JUMP IS
5390                                  ;*MADE TO THE FIRST TEST.
5391                                  ;*THE END OF PASS ROUTINE RETURNS TO "NEWDRV" TO SELECT
5392                                  ;*EACH SUCCESSIVE DRIVE FOR TESTING, UNTIL THE ENTIRE PASS
5393                                  ;* (ALL DRIVES) IS COMPLETED.
5394
5395  017330                          RUNTST:
5396                                  ;INPUT THE DESIRED NUMBER OF PROGRAM PASSES
5397  017330  104400  011031          4$:     TYPE    ,ENTPAS         ;ASK FOR NUMBER OF PASSES
5398  017334  004737  032214                  JSR     PC,RDCHRS       ;READ RESPONSE
5399  017340  014520                          DRVTST                  ;(↑C) RETURN ADDRESS
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5400  017342  016124                        ASKMDE                  ;(↑Z) RETURN ADDRESS
5401  017344  017330                        4$                      ;(↑U) OR ERROR RETURN ADDRESS
5402  017346  005700                        TST     R0              ;SEE IF NULL INPUT
5403  017350  001403                        BEQ     6$              ;GO ASK AGAIN
5404  017352  022700  000005                CMP     #5,R0           ;SEE HOW MANY CHARS TYPED
5405  017356  002005                        BGE     8$              ;BR IF 5 OR LESS
5406  017360  104400  005264        6$:     TYPE    ,BUFFO          ;ECHO BAD INPUT
5407  017364  104400  001314                TYPE    ,$QUES
5408  017370  000757                        BR      4$              ;GO ASK AGAIN
5409  017372  012746  005264        8$:     MOV     #BUFFO,-(SP)    ;GET BUF ADDR ON STACK FOR OCTBIN
5410  017376  004737  052736                JSR     PC,OCTBIN       ;CHECK DIGITS AND CONVERT TO BINARY
5411  017402  017360                        6$                      ;ERROR RETURN ADDRESS FOR OCTBIN
5412  017404  012637  023506                MOV     (SP)+,$EOPCT    ;SET DESIRED NO. OF PASSES (1-77777)
5413  017410  001763                        BEQ     6$              ;BR IF 0, TO ASK AGAIN
5414                                ;THIS IS THE ACTUAL START OF A RUN WITH X PASSES
5415  017412  005037  001326        STPASS: CLR     $PASS           ;INIT. THE PASS NUMBER
5416  017416  112737  000001  003110        MOVB    #1,TSTING       ;SET "RUNNING TESTS" FLAG
5417  017424  012737  177777  005502  NEWPAS: MOV     #177777,DRIVE   ;INITIALIZE DRIVE NO. TO -1
5418  017432  005037  001330                CLR     $DEVCT          ;INIT APT DEVICE COUNT TO 0
5419                                ;CHECK DRIVE LIST FOR MORE DRIVES TO TEST ON THIS PASS
5420  017436  012737  000000  177776  NEWDRV: MOV     #PRO,@#PS       ;RE-ESTABLISH PRIORITY 0
5421  017444  012706  001100                MOV     #STACK,SP       ;RESTORE THE STACK
5422  017450  105037  003120                CLRB    DRVERS          ;CLEAR ERROR COUNT FOR CURRENT DRIVE
5423  017454  005037  005524                CLR     INTCHR          ;CLEAR TTY INPUT BUFFER WORD
5424  017460  005237  005502                INC     DRIVE           ;INCREMENT DRIVE NUMBER
5425  017464  022737  000010  005502        CMP     #10,DRIVE       ;SEE IF DONE WITH THIS PASS
5426  017472  001002                        BNE     2$              ;BR IF NOT DONE CHECKING LIST
5427  017474  000137  023454                JMP     DUNPAS          ;JUMP IF DONE WITH THIS PASS
5428  017500  013700  005502        2$:     MOV     DRIVE,R0        ;GET NEW DRIVE NUMBER
5429  017504  105760  005610                TSTB    DRVLST(R0)      ;SEE IF THIS DRIVE IS MARKED IN LIST
5430  017510  001752                        BEQ     NEWDRV          ;BR IF NOT MARKED, TO CHECK ANOTHER
5431  017512  105037  001102                CLRB    $TSTNM          ;INIT TEST NUMBER TO 0
5432  017516  005037  001304                CLR     $TIMES          ;INIT ITERATION COUNT
5433  017522  010037  001332                MOV     R0,$UNIT        ;SET DRIVE NO. FOR APT
5434                                ;READ THE HEADER ON SECTOR 0,TRACK 0,CYL 0, AND GET THE DRIVE FORMAT
5435  017526  004737  030726                JSR     PC,INITSS       ;INIT. DRIVER PARAMS AND S.S.
5436  017532  112765  000125  000001        MOVB    #RDHEAD,P.CMND(R5) ;SET READ HEADER COMMAND
5437  017540  004737  040716                JSR     PC,DRVCAL       ;DO READ HEADER
5438  017544  132765  000020  000007        BITB    #B.CFMT,P.CS1H(R5) ;COMPLEMENT THE FORMAT BIT
5439  017552  001404                        BEQ     4$              ;  GIVEN TO THE CONTROLLER,
5440  017554  142765  000020  000007        BICB    #B.CFMT,P.CS1H(R5) ;  AND DO READ HEADER. THIS
5441  017562  000403                        BR      6$              ;  WILL CAUSE SECTOR 0 HEADER
5442  017564  152765  000020  000007  4$:   BISB    #B.CFMT,P.CS1H(R5) ;  TO BE READ.
5443  017572  004737  040716        6$:     JSR     PC,DRVCAL       ;READ HEADER 0
5444  017576  105037  003115                CLRB    FORMAT          ;INITIALIZE FORMAT BYTE TO 0
5445  017602  013737  005664  005510        MOV     S2,FS           ;INIT SECTOR LIMITS FOR 22(DEC) SECTOR FMT
5446  017610  013737  005666  005512        MOV     S3,LS
5447  017616  005762  000024                TST     RKDB(R2)        ;POP SILO ONE TIME
5448  017622  032762  001000  000024        BIT     #BIT9,RKDB(R2)  ;TEST FORMAT BIT IN HEADER WORD 2
5449  017630  001411                        BEQ     8$              ;BR IF 22 SECTOR FORMAT
5450  017632  152737  000020  003115        BISB    #B.CFMT,FORMAT  ;SET 20 SECTOR FORMAT FOR THIS DRIVE
5451  017640  013737  005660  005510        MOV     S0,FS           ;INIT SECTOR LIMITS FOR 20(DEC) SECTOR FMT
5452  017646  013737  005662  005512        MOV     S1,LS
5453  017654  013737  005674  005504  8$:   MOV     ST,STALLS       ;SET NUMBER OF UNIT STALLS DESIRED
5454  017662  004737  030726                JSR     PC,INITSS       ;INIT THE S.S.
5455  017666  004737  037276                JSR     PC,REDBSF       ;READ BAD SECTOR FILE FOR THIS DRIVE
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5456  017672  113737  005502  011163          MOVB    DRIVE,DRVNO     ;GET DRIVE NO.
5457  017700  152737  000060  011163          BISB    #'0,DRVNO       ;CONVERT TO ASCII
5458  017706  104400  011142                  TYPE    ,TSTDRN         ;TYPE "TESTING DRIVE X"
5459  017712  005737  001326                  TST     $PASS           ;SEE IF THIS IS FIRST PASS
5460  017716  001012                          BNE     10$             ;BR IF NOT FIRST PASS
5461  017720  004737  033524                  JSR     PC,DRVSER       ;TYPE "DRIVE SER. NO.  XXX"
5462  017724  004737  033644                  JSR     PC,CRTSER       ;TYPE "CART. SER. NO.  XXXXXXXXXXX"
5463  017730  032737  000020  005672          BIT     #BIT4,CS        ;SEE IF BAD SECTORS SHOULD BE TYPED
5464  017736  001402                          BEQ     10$             ;BR IF NOT
5465  017740  004737  037564                  JSR     PC,TYPBSF       ;TYPE BAD SECTOR FILES
5466  017744  005037  005524          10$:    CLR     INTCHR          ;INIT. TTY INPUT CHAR BUFFER
5467
5468
5469
```

```
                                ;;*****************************************************************
                                ;*TEST 1         OFFSET-TO-FAILURE MEASUREMENTS
                                ;*IN THIS TEST A REPEATED PATTERN 072307(OCT) IS WRITTEN INTO ALL
                                ;*WORDS OF SECTORS FS AND LS ON TRACKS 0-2 OF CYLINDERS FC AND LC.
                                ;*THE SAME SECTORS ON ADJACENT CYLINDERS ARE THEN WRITTEN WITH
                                ;* 167230(OCT) (TO ESTABLISH A KNOWN PATTERN) , BUT THEY ARE NOT TESTED.
                                ;*THEN, EACH DESIRED SECTOR IS WRITE CHECKED WITH INCREASING POSITIVE
                                ;*OFFSETS, UNTIL EITHER A "DATA TYPE" ERROR OCCURS, OR THE FULL RANGE
                                ;*OF POSITIVE OFFSETS HAVE BEEN APPLIED. THEN, THE SAME SECTOR IS WRITE
                                ;*CHECKED WITH INCREASING NEGATIVE HEAD OFFSETS, UNTIL FAILURE OR
                                ;*MAXIMUM NEGATIVE OFFSET IS APPLIED. THIS IS DONE FOR ALL THE SECTORS
                                ;*ORIGINALLY WRITTEN, IN THE FOLLOWING ORDER : SECTORS FS AND LS ON
                                ;*CYLINDERS FC AND LC FOR TRACK 0, THEN FOR TRACK 1, AND FINALLY FOR
                                ;*TRACK 2. THE OFFSET-TO-FAILURE RESULTS ARE REPORTED IN ORDER OF
                                ;*INCREASING TRACKS, AS FOLLOWS :
                                ;*
                                ;* OFFSET-TO-FAILURE MEASUREMENTS :
                                ;*
                                ;* TRACK  CYLN  SECT  +OFST  -OFST
                                ;*                    (UIN)  (UIN)
                                ;*   X    XXX    XX   XXXX   XXXX
                                ;*   X    XXX    XX   XXXX   XXXX
                                ;*   X    XXX    XX   XXXX   XXXX
                                ;*          ETC.
                                ;*
                                ;*NOTE: IN AN ADRS 200 DEFAULT RUN, FS DEFAULTS TO 0, AND LS DEFAULTS
                                ;*TO 10(DEC), FOR THIS TEST.
                                ;*****************************************************************
017750  000004                  TST1:   SCOPE
017752  012737  000001  001324          MOV     #1,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
017760  004737  032060          JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
017764  004737  032126          JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
017770  000137  021060          JMP     TST2            ;JUMP TO NEXT TEST
                                ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
017774  004737  030726          JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
020000  004737  027250          JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
                                ;INITIALIZE PARAMETERS, WRITE THE SECTORS, AND WRITE CHECK THEM
020004  105737  003106          TSTB    MDFLAG          ;SEE IF ADRS 200 DEFAULT RUN
020010  001005                  BNE     3$              ;BR IF NOT
020012  005037  005510          CLR     FS              ;SET FS = 0
020016  012737  000012  005512  MOV     #10.,LS         ;SET LS = 10(DEC)
020024  013765  005650  000002  3$:     MOV     FC,P.CYLN(R5)   ;SET CYL = FC
020032  113765  005510  000004          MOVB    FS,P.SECT(R5)   ;SET SECTOR = FS
020040  105065  000005          CLRB    P.TRCK(R5)      ;SET TRACK = 0
020044  013737  005652  005506          MOV     LC,CYLNDR
020052  022737  000632  005652          CMP     #632,LC         ;SEE IF LC =632
020060  001002                  BNE     4$              ;BR IF NOT 632
020062  005337  005506          DEC     CYLNDR          ;MAKE IT 631 (PRESERVE BSF)
020066  012703  072307          4$:     MOV     #72307,R3       ;GET DATA PATTERN
020072  004737  035772          JSR     PC,WRTSEC       ;DO WRITE AND WRITE CHECK
020076  012703  167230          MOV     #167230,R3      ;DATA FOR AJACENT CYLS
020102  005365  000002          DEC     P.CYLN(R5)      ;NEXT LOWER CYL
020106  100402                  BMI     6$              ;BR IF CYL NEGATIVE
020110  004737  035772          JSR     PC,WRTSEC       ;DO WRITE AND WRITE CHECK
020114  062765  000002  000002  6$:     ADD     #2,P.CYLN(R5)   ;NEXT HIGHER CYL
020122  022765  000632  000002          CMP     #632,P.CYLN(R5) ;SEE IF CYL = 632
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5526  020130  001004                          BNE     8$                      ;BR IF NOT
5527  020132  122765  000002  000005          CMPB    #2,P.TRCK(R5)           ;SEE IF BSF
5528  020140  001402                          BEQ     10$                     ;BR IF YES, TO PROTECT IT
5529  020142  004737  035772          8$:     JSR     PC,WRTSEC               ;DO WRITE AND WRITE CHECK
5530  020146  005365  000002          10$:    DEC     P.CYLN(R5)              ;RESTORE CYL NO.
5531  020152  105265  000005                  INCB    P.TRCK(R5)              ;INCR TRACK
5532  020156  122765  000003  000005          CMPB    #3,P.TRCK(R5)           ;TRACK = 3 YET ?
5533  020164  001340                          BNE     4$                      ;BR IF NOT YET
5534  020166  126537  000004  005512          CMPB    P.SECT(R5),LS           ;SEE IF SECTOR = LS
5535  020174  001406                          BEQ     14$                     ;BR IF YES
5536  020176  113765  005512  000004          MOVB    LS,P.SECT(R5)           ;SET SECTOR = LS
5537  020204  105065  000005          12$:    CLRB    P.TRCK(R5)              ;SET TRACK = 0
5538  020210  000726                          BR      4$                      ;BR TO CONTINUE WRITING
5539  020212  026537  000002  005506  14$:    CMP     P.CYLN(R5),CYLNDR       ;SEE IF CYL = LC
5540  020220  001407                          BEQ     16$                     ;BR IF YES
5541  020222  013765  005506  000002          MOV     CYLNDR,P.CYLN(R5)       ;SET CYL = LC
5542  020230  113765  005510  000004          MOVB    FS,P.SECT(R5)           ;SET SECTOR = FS AGAIN
5543  020236  000762                          BR      12$                     ;BR TO CONTINUE WRITING
5544                                  ;INITIALIZE PARAMETERS FOR OFFSET MEASUREMENTS
5545  020240  032737  000002  005672  16$:    BIT     #BIT1,CS                ;SEE IF REPORTS ARE INHIBITED
5546  020246  001002                          BNE     18$                     ;BR IF INHIBITED
5547  020250  104400  011274                  TYPE    ,OFSHED                 ;TYPE HEADINGS
5548  020254  113765  005654  000005  18$:    MOVB    FT,P.TRCK(R5)           ;SET TRACK = FT
5549  020262  013765  005650  000002          MOV     FC,P.CYLN(R5)           ;SET CYLINDER = FC
5550  020270  113765  005510  000004          MOVB    FS,P.SECT(R5)           ;SET SECTOR = FS
5551                                  ;LOAD THE R/W BUFFER FOR WRITE CHECKS
5552  020276  012700  064574                  MOV     #RWBUF,R0               ;SET BUFFER ADDRESS
5553  020302  012701  000400                  MOV     #400,R1                 ;PREPARE TO LOAD 400(OCT) WORDS
5554  020306  012720  072307          19$:    MOV     #072307,(R0)+           ;LOAD A WORD INTO BUFFER
5555  020312  005301                          DEC     R1                      ;DECR COUNTER
5556  020314  001374                          BNE     19$                     ;BR IF NOT DONE YET
5557  020316  005004                  20$:    CLR     R4                      ;INIT (+) OFFSET VALUE
5558  020320  005000                          CLR     R0                      ;INIT OFFSET NUMBER TO 0
5559  020322  012737  177777  005546          MOV     #-1,PLOFST              ;INITIALIZE CURRENT FAILING (+) OFFSET
5560  020330  012737  177777  005550          MOV     #-1,NGOFST              ;INITIALIZE CURRENT FAILING (-) OFFSET
5561                                  ;PERFORM OFFSETS AND WRITE CHECKS
5562  020336  112765  000117  000001  22$:    MOVB    #SEEK,P.CMND(R5)        ;SET SEEK COMMAND
5563  020344  004737  040716                  JSR     PC,DRVCAL               ;PERFORM SEEK
5564  020350  110065  000006                  MOVB    R0,P.OFST(R5)           ;SET CURRENT OFFSET
5565  020354  112765  000115  000001          MOVB    #OFFSET,P.CMND(R5)      ;SET OFFSET COMMAND
5566  020362  004737  040716                  JSR     PC,DRVCAL               ;PERFORM OFFSET
5567  020366  112765  000131  000001          MOVB    #WRTCHK,P.CMND(R5)      ;SET WRITE CHECK COMMAND
5568  020374  012737  021024  003036          MOV     #WRCKHD,A.ABNL          ;SET SPECIAL ERROR HANDLER ADDRESS
5569  020402  105037  003131                  CLRB    WCEFLG                  ;CLEAR WRITE CHECK ERROR FLAG
5570  020406  004737  040716                  JSR     PC,DRVCAL               ;PERFORM A WRITE CHECK
5571  020412  012737  042410  003036          MOV     #ERRHDL,A.ABNL          ;RESTORE ERROR HANDLER ADDRESS
5572  020420  112765  000177  000001          MOVB    #SUBCLR,P.CMND(R5)      ;SET SUBSYS CLEAR CMND
5573  020426  004737  040716                  JSR     PC,DRVCAL               ;CLEAR THE SUBSYSTEM
5574  020432  105737  003131                  TSTB    WCEFLG                  ;SEE IF A WRITE CHECK ERROR OCCURRED
5575  020436  001020                          BNE     26$                     ;BR IF AN ERROR OCCURRED
5576  020440  010001                          MOV     R0,R1                   ;GET A COPY OF CURRENT OFFSET
5577  020442  005200                          INC     R0                      ;INCREMENT OFFSET
5578  020444  062704  000031                  ADD     #25.,R4                 ;INCR OFFSET VALUE BY 25(DEC) UIN
5579  020450  042701  177700                  BIC     #177700,R1              ;MASK FOR MAGNITUDE BITS
5580  020454  022701  000060                  CMP     #60,R1                  ;SEE IF MAX OFFSET APPLIED IN THIS DIRECTION
5581  020460  001326                          BNE     22$                     ;BR IF NOT YET
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5582  020462  032700  000200              BIT     #BIT7,R0        ;SEE IF NEG OFFSETS DONE YET
5583  020466  001015                      BNE     32$             ;BR IF YES, TO PRINT CURRENT SECTOR RESULT
5584  020470  012700  000200      24$:    MOV     #200,R0         ;INIT FOR NEG OFFSETS
5585  020474  005004                      CLR     R4              ;INIT (-) OFFSET VALUE TO 0
5586  020476  000717                      BR      22$             ;BR TO APPLY NEG OFFSETS
5587  020500  032700  000200      26$:    BIT     #BIT7,R0        ;SEE IF NEG OFFSETS DONE YET
5588  020504  001403                      BEQ     28$             ;BR IF NOT YET
5589  020506  010437  005550              MOV     R4,NGOFST       ;SAVE THIS FAILING (-) OFFSET VALUE
5590  020512  000403                      BR      32$             ;BR TO PRINT CURRENT SECTOR RESULT
5591  020514  010437  005546      28$:    MOV     R4,PLOFST       ;SAVE THIS FAILING (+) OFFSET VALUE
5592  020520  000763                      BR      24$             ;BR TO APPLY NEGATIVE OFFSETS
5593  020522  032737  000002  005672  32$:    BIT     #BIT1,CS        ;SEE IF REPORTS INHIBITED
5594  020530  001051                      BNE     43$             ;BR IF INHIBITED
5595                          ;TYPE OFFSET RESULTS FOR THIS SECTOR
5596  020532  116501  000005              MOVB    P.TRCK(R5),R1   ;GET TRACK NO.
5597  020536  010146                      MOV     R1,-(SP)        ;PUT IT ON STACK
5598  020540  104402                      TYPOS                   ;TYPE IT
5599  020542     003                      .BYTE   3               ;3 DIGITS
5600  020543     000                      .BYTE   0               ;SUPPRESS
5601  020544  104400  013420              TYPE    ,SPACE3
5602  020550  016546  000002              MOV     P.CYLN(R5),-(SP) ;PUT CYL ON STACK
5603  020554  104402                      TYPOS                   ;TYPE IT
5604  020556     004                      .BYTE   4               ;4 DIGITS
5605  020557     000                      .BYTE   0               ;SUPPRESS
5606  020560  104400  013421              TYPE    ,SPACE2
5607  020564  116501  000004              MOVB    P.SECT(R5),R1   ;GET SECTOR
5608  020570  010146                      MOV     R1,-(SP)        ;PUT IT ON STACK
5609  020572  104403                      TYPON                   ;TYPE SECTOR
5610  020574  104400  013422              TYPE    ,SPACE1
5611  020600  005737  005546              TST     PLOFST          ;SEE IF THERE WAS A FAILING (+) OFFSET
5612  020604  100003                      BPL     36$             ;BR IF THERE WAS
5613  020606  104400  011265              TYPE    ,NOFALS         ;TYPE "  NONE"
5614  020612  000403                      BR      38$             ;CONTINUE
5615  020614  013746  005546      36$:    MOV     PLOFST,-(SP)    ;PUT (+) OFFSET VALUE ON STACK
5616  020620  104404                      TYPDS                   ;TYPE IT IN DECIMAL
5617  020622  104400  013422      38$:    TYPE    ,SPACE1
5618  020626  005737  005550              TST     NGOFST          ;SEE IF THERE WAS A FAILING (-) OFFSET
5619  020632  100003                      BPL     40$             ;BR IF THERE WAS
5620  020634  104400  011265              TYPE    ,NOFALS         ;TYPE "  NONE"
5621  020640  000403                      BR      42$             ;CONTINUE
5622  020642  013746  005550      40$:    MOV     NGOFST,-(SP)    ;PUT (-) OFFSET VALUE ON STACK
5623  020646  104404                      TYPDS                   ;TYPE IT IN DECIMAL
5624  020650  104400  001315      42$:    TYPE    ,$CRLF          ;TYPE <CR>,<LF>
5625                          ;SET UP TO TEST NEXT SECTOR
5626  020654  126537  000004  005512  43$:    CMPB    P.SECT(R5),LS   ;SEE IF SECTOR = LS
5627  020662  001404                      BEQ     44$             ;BR IF YES
5628  020664  113765  005512  000004      MOVB    LS,P.SECT(R5)   ;SET SECTOR = LS
5629  020672  000611                      BR      20$             ;GO TEST THIS SECTOR
5630  020674  026537  000002  005506  44$:    CMP     P.CYLN(R5),CYLNDR ;SEE IF CYL = LC
5631  020702  001410                      BEQ     48$             ;BR IF YES
5632  020704  013765  005506  000002      MOV     CYLNDR,P.CYLN(R5) ;SET CYL = LC
5633  020712  113765  005510  000004  46$:    MOVB    FS,P.SECT(R5)   ;SET SECTOR = FS
5634  020720  000137  020316              JMP     20$             ;GO TEST THIS SECTOR
5635  020724  105265  000005      48$:    INCB    P.TRCK(R5)      ;INCREMENT TRACK
5636  020730  122765  000003  000005      CMPB    #3,P.TRCK(R5)   ;SEE IF TRACK = 3
5637  020736  001404                      BEQ     50$             ;BR IF YES
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5638  020740  013765  005650  000002          MOV     FC,P.CYLN(R5)   ;SET CYL = FC
5639  020746  000761                          BR      46$             ;GO TEST THIS SECTOR
5640  020750  112765  000113  000001  50$:    MOVB    #RECAL,P.CMND(R5) ;SET RECAL COMMAND
5641  020756  004737  040716                  JSR     PC,DRVCAL       ;DO CLEANUP RECALIBRATE
5642  020762  013737  005664  005510          MOV     S2,FS           ;RESTORE FS,LS FOR 22 SECTORS
5643  020770  013737  005666  005512          MOV     S3,LS
5644  020776  105737  003115                  TSTB    FORMAT          ;SEE IF 22 SECTORS
5645  021002  001406                          BEQ     54$             ;BR IF YES
5646  021004  013737  005660  005510          MOV     S0,FS           ;RESTORE FS,LS FOR 20 SECTORS
5647  021012  013737  005662  005512          MOV     S1,LS
5648  021020                          54$:
5649  021020  000137  021060                  JMP     TST2            ;JUMP TO NEXT TEST
5650
5651                                  ;*THIS IS THE ABNORMAL RETURN FROM THE DRIVER, USED WHEN A
5652                                  ;*   "DATA TYPE" ERROR IS EXPECTED (AND VALID).
5653  021024  032765  040000  000020  WRCKHD: BIT     #WCE,P.CS2(R5)  ;SEE IF WRITE CHECK ERROR OCCURRED
5654  021032  001006                          BNE     4$              ;BR IF WCE
5655                                  ;CHECK FOR OTHER "DATA TYPE" ERROR
5656  021034  032765  130400  000034          BIT     #HVRC!DTE!OPI!DCK,P.ER(R5)
5657  021042  001002                          BNE     4$              ;BR IF A DATA ERROR OCCURRED
5658  021044  000137  042410                  JMP     ERRHDL          ;GO HANDLE OTHER ERROR
5659  021050  105237  003131          4$:     INCB    WCEFLG          ;SET WRITE CHECK ERROR FLAG
5660  021054  000137  044624                  JMP     RETNML          ;TAKE NORMAL RETURN
5661
5662
5663
5664                                  ;;*****************************************************************
5665                                  ;*TEST 2         NPR/MEMORY WORD ADDRESSING TEST
5666                                  ;*IN THIS TEST, MEMORY WORD ADDRESSING CAPABILITY DURING RK06 NPR'S,
5667                                  ;*IS TESTED.
5668                                  ;*BEFORE TESTING BEGINS, THE XXDP LOADER IS SAVED, IF PRESENT, AT ADRS RWBUF.
5669                                  ;*THEN, STARTING AT THE FIRST ADDRESS OF THE NEXT 1K MEMORY BLOCK
5670                                  ;*BEYOND ADDRESS RWBUF+6000(OCTAL) , WRITE UNIQUE NUMBERS
5671                                  ;*(STARTING WITH 1), INTO EACH OF UP TO 64K WORDS (DEPENDING UPON THE
5672                                  ;*AMOUNT OF PHYSICAL MEMORY). THESE NUMBERS REFLECT UNIQUE ADDRESSES
5673                                  ;*WITHIN THE 64K BLOCK. NEXT, WRITE THE 64K WORDS (MAX) ONTO THE DISK
5674                                  ;*AT ADDRESS FC,FT,FS (SCALED, IF NECESSARY, TO AVOID PACK OVERFLOW
5675                                  ;*OR DESTRUCTION OF THE BAD SECTOR FILE). THEN ZERO THE ENTIRE BLOCK
5676                                  ;*IN MEMORY, AND READ THE DATA BACK FROM THE DISK, AT THE SAME PHYSICAL
5677                                  ;*ADDRESSES. COMPARE THE DATA READ TO THE DATA WRITTEN. TYPE THE FAILING
5678                                  ;*VIRTUAL (IF MEM. MGT.) AS WELL AS PHYSICAL ADDRESSES, AND THE GOOD
5679                                  ;*AND BAD DATA, FOR UP TO THE FIRST 10(DEC) FAILING LOCATIONS.
5680                                  ;* IF MEMORY MANAGEMENT IS INSTALLED AND THERE IS ADDITIONAL MEMORY TO
5681                                  ;*EXERCISE, REPEAT THE ABOVE WORD ADDRESSING TEST, FOR EACH OF THE
5682                                  ;*REMAINING 64K MEMORY BLOCKS.
5683                                  ;;*****************************************************************
5684  021060  000004                  TST2:   SCOPE
5685  021062  012737  000002  001324          MOV     #2,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
5686  021070  004737  032060                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
5687  021074  004737  032126                  JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
5688  021100  000137  021370                  JMP     TST3            ;JUMP TO NEXT TEST
5689                                  ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
5690  021104  004737  030726                  JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
5691  021110  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5692                                  ;SAVE XXDP LOADER, IF PRESENT
5693  021114  004737  030422                  JSR     PC,FNDXDP       ;COMPUTE STARTING ADR OF XXDP
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5694  021120  012737  064574  005542          MOV     #RWBUF,XDPSAV   ;SET XXDP SAVE AREA ADR
5695  021126  005037  005544                  CLR     XDPSAV+2
5696  021132  004737  030474                  JSR     PC,SAVXDP       ;GO SAVE XXDP LOADER
5697  021136  112737  000001  003124          MOVB    #1,XOVLAD       ;SET INDICATORS
5698  021144  112737  000001  003125          MOVB    #1,XDPSVD
5699  021152  012737  177777  005536          MOV     #-1,PATRN       ;SET FLAG FOR SVPRMS
5700                          ;INIT PARAMETERS, BEGIN TESTING
5701  021160  004737  037022                  JSR     PC,SETUPM       ;INIT PARAMS
5702  021164  004737  033450          4$:     JSR     PC,MXWRDC       ;COMPUTE MAX WORD COUNT FOR THIS MA
5703  021170  005701                          TST     R1              ;SEE IF ALL MEMORY TESTED YET
5704  021172  100467                          BMI     50$             ;BR IF ALL DONE
5705  021174  005065  000012                  CLR     P.WC(R5)        ;INIT WORD COUNT TO 65,536(DEC)
5706  021200  005701                          TST     R1              ;SEE IF WRD CNT SHOULD BE 65,536
5707  021202  001003                          BNE     6$              ;BR IF YES
5708  021204  005400                          NEG     R0
5709  021206  010065  000012                  MOV     R0,P.WC(R5)     ;SET WORD COUNT
5710  021212  013765  005600  000010  6$:     MOV     MA,P.BALO(R5)   ;SET BA BITS 0-15
5711  021220  013701  005602                  MOV     MA+2,R1         ;GET MA BITS 16-21
5712  021224  042701  177774                  BIC     #177774,R1      ;MASK FOR LO 2 BITS
5713  021230  150165  000007                  BISB    R1,P.BAHI(R5)   ;SET BA BITS 16,17
5714  021234  005737  056216                  TST     $KT11           ;SEE IF MEM MGT PRESENT
5715  021240  100010                          BPL     14$             ;BR IF NOT
5716                          ;SET UP MEM MGT
5717  021242  013737  005600  005604          MOV     MA,PMA          ;SET BUFFER ADDRESS
5718  021250  013737  005602  005606          MOV     MA+2,PMA+2
5719  021256  004737  030300                  JSR     PC,PREPAR       ;PREPARE MEM MGT REG'S AND UNIBUS MAP
5720                          ;PERFORM THE TESTS
5721  021262  012737  021262  001110  14$:     MOV     #.,$LPERR       ;SET NEW LOOP ON ERROR ADRS
5722  021270  004737  032060                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
5723  021274  004737  040226                  JSR     PC,SVPRMS       ;SAVE PARAMS FOR THIS XFER
5724  021300  004737  036066                  JSR     PC,LDMEM1       ;LOAD THIS MEM BLK WITH INCREMENTING DATA
5725  021304  112765  000123  000001          MOVB    #WRDATA,P.CMND(R5) ;SET WRITE DATA COMMAND
5726  021312  004737  040340                  JSR     PC,TRNSFR       ;WRITE THE DATA
5727  021316  005003                          CLR     R3              ;SET DATA WORD = 0
5728  021320  004737  036100                  JSR     PC,LDMEM2       ;LOAD MEM BLK WITH ALL ZEROS
5729  021324  112765  000121  000001          MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
5730  021332  004737  040340                  JSR     PC,TRNSFR       ;READ THE DATA FROM DISK
5731  021336  004737  036232                  JSR     PC,CKMEM1       ;PERFORM SOFTWARE COMPARE OF DATA
5732  021342  104410                          SCOPER                  ;CHECK FOR INTERNAL LOOP ON ERROR
5733                          ;GET NEW MA FOR NEXT TRANSFER
5734  021344  004737  037230                  JSR     PC,INCRMA       ;COMPUTE NEXT MA
5735  021350  000705                          BR      4$              ;GO SEE IF MORE MEMORY TO TEST
5736  021352  004737  030502          50$:    JSR     PC,GETXDP       ;RESTORE XXDP LOADER
5737  021356  105737  003134                  TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
5738  021362  001402                          BEQ     54$             ;BR IF NOT
5739  021364  005037  172516                  CLR     @#SR3           ;DISABLE UNIBUS MAP
5740  021370                          54$:
5741
5742
5743
5744                          ;;*****************************************************************
5745                          ;*TEST 3        NPR/MEMORY BLOCK ADDRESSING TEST
5746                          ;*IN THIS TEST, MEMORY BLOCK ADDRESSING CAPABILITY DURING RK06
5747                          ;*NPR'S IS TESTED.
5748                          ;*BEFORE TESTING BEGINS, THE XXDP LOADER IS SAVED, IF PRESENT, AT ADRS RWBUF.
5749                          ;*MEMORY WILL BE TESTED STARTING AT THE FIRST ADRS OF THE NEXT 1K
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                                        ;*BLOCK BEYOND RWBUF+6000(OCTAL).
                                        ;*THE TEST BEGINS BY WRITING A SINGLE NUMBER INTO ALL LOCATIONS OF
                                        ;*EACH MEMORY BLOCK OF UP TO 64K WORDS. THIS NUMBER UNIQUELY DEFINES
                                        ;*EACH BLOCK. THEN WRITE EACH BLOCK ONTO DISK AT ADDRESS FC,FS,FT
                                        ;*(SCALED, IF NECESSARY TO AVOID PACK OVERFLOW OR DESTRUCTION OF THE BAD
                                        ;*SECTOR FILE). ZERO THE BLOCK IN MEMORY, AND THEN READ THE DATA
                                        ;*BACK INTO THE PROPER PHYSICAL ADDRESSES. DO THIS FOR ALL 64K BLOCKS,
                                        ;*AND THEN COMPARE THE CONTENTS OF ALL THE MEMORY TO EXPECTED VALUES.
                                        ;*TYPE FAILURES AS DESCRIBED ABOVE FOR THE FIRST 10(DEC) FAILING
                                        ;*LOCATIONS IN EACH 64K MEMORY BLOCK.
                                        ;;*****************************************************************
021370  000004                  TST3:   SCOPE
021372  012737  000003  001324          MOV     #3,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
021400  004737  032060                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
021404  004737  032126                  JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
021410  000137  021730                  JMP     TST4            ;JUMP TO NEXT TEST
                                ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
021414  004737  030726                  JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
021420  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
                                ;SAVE XXDP LOADER, IF PRESENT
021424  004737  030422                  JSR     PC,FNDXDP       ;COMPUTE STARTING ADRS OF XXDP
021430  012737  064574  005542          MOV     #RWBUF,XDPSAV   ;SET XXDP SAVE AREA ADDRESS
021436  005037  005544                  CLR     XDPSAV+2
021442  004737  030474                  JSR     PC,SAVXDP       ;GO SAVE XXDP LOADER
021446  112737  000001  003124          MOVB    #1,XOVLAD       ;SET INDICATORS
021454  112737  000001  003125          MOVB    #1,XDPSVD
021462  012737  177777  005536          MOV     #-1,PATRN       ;SET FLAG FOR SVPRMS
                                ;INIT PARAMETERS, WRITE AND READ BACK ALL MEMORY BLOCKS
021470  005037  005526                  CLR     SELECT          ;INIT COMPARE FLAG
021474  004737  037022          2$:     JSR     PC,SETUPM       ;INIT PARAMS
021500  012704  000001                  MOV     #1,R4           ;INIT DATA WORD
021504  004737  033450          4$:     JSR     PC,MXWRDC       ;COMPUTE MAX WRD CNT FOR THIS MA
021510  005701                          TST     R1              ;SEE IF ALL MEMORY TESTED YET
021512  100473                          BMI     30$             ;BR IF DONE WRITING AND READING
021514  005065  000012                  CLR     P.WC(R5)        ;INIT WRD CNT TO 65,536(DEC)
021520  005701                          TST     R1              ;SEE IF WRD CNT SHOULD BE 65536
021522  001003                          BNE     6$              ;BR IF YES
021524  005400                          NEG     R0
021526  010065  000012                  MOV     R0,P.WC(R5)     ;SET WORD COUNT
021532  013765  005600  000010  6$:     MOV     MA,P.BALO(R5)   ;SET BA BITS 0-15
021540  013701  005602                  MOV     MA+2,R1         ;GET MA BITS 16-21
021544  042701  177774                  BIC     #177774,R1      ;MASK FOR LO 2 BITS
021550  150165  000007                  BISB    R1,P.BAHI(R5)   ;SET BA BITS 16,17
021554  005737  056216                  TST     $KT11           ;SEE IF MEM MGT PRESENT
021560  100010                          BPL     14$             ;BR IF NO
                                ;SET UP MEMORY MANAGEMENT
021562  013737  005600  005604          MOV     MA,PMA          ;SET BUFFER ADDRESS
021570  013737  005602  005606          MOV     MA+2,PMA+2
021576  004737  030300                  JSR     PC,PREPAR       ;PREPARE MEM MGT REG'S AND UNIBUS MAP
021602  005737  00552[          14$:    TST     SELECT          ;SEE IF COMPARES SHOULD BE DONE YET
021606  001026                          BNE     20$             ;BR IF YES
                                ;WRITE AND READ THIS MEM BLK ON RK06
021610  004737  040226          16$:    JSR     PC,SVPRMS       ;SAVE PARAMS FOR THIS XFER
021614  010403                          MOV     R4,R3           ;GET DATA WORD
021616  004737  036100                  JSR     PC,LDMEM2       ;LOAD MEMORY BLK WITH THIS WORD
021622  112765  000123  000001          MOVB    #WRDATA,P.CMND(R5) ;SET WRITE COMMAND
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5806  021630  004737  040340                  JSR     PC,TRNSFR       ;WRITE THE DATA
5807  021634  005003                          CLR     R3
5808  021636  004737  036100                  JSR     PC,LDMEM2       ;ZERO THE BLK IN MEMORY
5809  021642  112765  000121  000001          MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
5810  021650  004737  040340                  JSR     PC,TRNSFR       ;READ THIS DATA BACK
5811  021654  005204                          INC     R4              ;INCREMENT THE DATA WORD
5812  021656  004737  037230                  JSR     PC,INCRMA       ;COMPUTE NEW MA TO TRY
5813  021662  000710                          BR      4$              ;GO WRITE AND READ NEXT BLK
5814                                  ;PERFORM SOFTWARE COMPARES OF ALL MEMORY BLOCKS
5815  021664  010403                  20$:    MOV     R4,R3           ;GET DATA WORD
5816  021666  004737  036244                  JSR     PC,CKMEM2       ;COMPARE THIS BLK TO GOOD DATA WORD
5817  021672  005204                          INC     R4              ;INCREMENT THE DATA WORD
5818  021674  004737  037230                  JSR     PC,INCRMA       ;GET NEW MA TO TRY
5819  021700  000701                          BR      4$              ;GO COMPARE NEXT MEM BLK
5820
5821  021702  005137  005526          30$:    COM     SELECT          ;COMPLEMENT THE FLAG
5822  021706  001401                          BEQ     50$             ;BR IF ALL DONE NOW
5823  021710  000671                          BR      2$              ;BR IF COMPARES SHOULD BE DONE NOW
5824  021712  004737  030502          50$:    JSR     PC,GETXDP       ;RESTORE SAVED XXDP
5825  021716  105737  003134                  TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
5826  021722  001402                          BEQ     54$             ;BR IF NOT
5827  021724  005037  172516                  CLR     @#SR3           ;DISABLE UNIBUS MAP
5828  021730                          54$:
5829
5830
5831
5832                                  ;;*****************************************************************
5833                                  ;*TEST 4        NPR/MEMORY DATA PATTERN TEST
5834                                  ;*BEFORE TESTING, THE XXDP LOADER IS SAVED, IF PRESENT, AT ADRS
5835                                  ;*RWBUF. THEN, ALL PHYSICAL MEMORY LOCATIONS , STARTING AT THE
5836                                  ;*FIRST ADRS OF THE NEXT 1K MEMORY BLOCK BEYOND RWBUF+6000(OCT),
5837                                  ;* ARE EXERCISED WITH UP TO 16 DATA PATTERNS
5838                                  ;* CHOSEN IN PARAMETER PT. (THESE ARE THE SAME PATTERNS
5839                                  ;*PROVIDED FOR USE IN THE READ/WRITE DATA TEST). IF PT = 0, THE
5840                                  ;*DATA PATTERNS WILL DEFAULT TO PATS 08,09,10,AND 11.
5841                                  ;*MEMORY IS EXERCISED IN BLOCKS OF UP TO 64K WORDS, STARTING AT
5842                                  ;*THE FIRST ADDRESS OF THE NEXT 1K MEMORY BLOCK BEYOND THE BUFFER.
5843                                  ;*EACH BLOCK IS LOADED WITH DATA, AND WRITTEN ONTO DISK AT ADDRESS
5844                                  ;*FC,FT,FS (SCALED TO AVOID PACK OVERFLOW OR DESTRUCTION OF THE BAD
5845                                  ;*SECTOR FILE). THEN THE MEMORY BLOCK IS ZEROED AND READ BACK AND
5846                                  ;*COMPARED. THIS IS DONE FOR EACH OF THE DATA PATTERNS CHOSEN,
5847                                  ;*POSSIBLY INCLUDING THE USER-DEFINED PATTERN 15, IF SPECIFIED.
5848                                  ;*****************************************************************
5849  021730  000004                  TST4:   SCOPE
5850  021732  012737  000004  001324          MOV     #4,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
5851  021740  004737  032060                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
5852  021744  004737  032126                  JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
5853  021750  000137  022300                  JMP     TST5            ;JUMP TO NEXT TEST
5854                                  ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
5855  021754  004737  030726                  JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
5856  021760  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5857                                  ;SAVE XXDP LOADER, IF PRESENT
5858  021764  004737  030422                  JSR     PC,FNDXDP       ;COMPUTE STARTING ADR OF XXDP
5859  021770  012737  064574  005542          MOV     #RWBUF,XDPSAV   ;SET XXDP SAVE AREA ADR
5860  021776  005037  005544                  CLR     XDPSAV+2
5861  022002  004737  030474                  JSR     PC,SAVXDP       ;GO SAVE XXDP LOADER
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5862  022006  112737  000001  003124          MOVB    #1,XOVLAD       ;SET INDICATORS
5863  022014  112737  000001  003125          MOVB    #1,XDPSVD
5864  022022  004737  034212                  JSR     PC,LODP14       ;GENERATE PSEUDO-RAND PAT 14
5865  022026  013737  005670  005536          MOV     PT,PATRN        ;GET A COPY OF  PT
5866  022034  001003                          BNE     2$              ;BR IF PT NON-ZERO
5867  022036  012737  007400  005536          MOV     #7400,PATRN     ;SET DEFLT PATRNS = PAT 8,9,10,11
5868                        ;INIT PARAMETERS, BEGIN TESTING
5869  022044  004737  037022          2$:     JSR     PC,SETUPM       ;INIT PARAMS
5870  022050  004737  033450          4$:     JSR     PC,MXWRDC       ;COMPUTE MAX WORD COUNT FOR THIS MA
5871  022054  005701                          TST     R1              ;SEE IF ALL MEMORY TESTED YET
5872  022056  100501                          BMI     50$             ;BR IF ALL DONE
5873  022060  005065  000012                  CLR     P.WC(R5)        ;INIT WORD COUNT TO 65,536(DEC)
5874  022064  005701                          TST     R1              ;SEE IF WRD CNT SHOULD BE 65,536
5875  022066  001003                          BNE     6$              ;BR IF YES
5876  022070  005400                          NEG     R0
5877  022072  010065  000012                  MOV     R0,P.WC(R5)     ;SET WORD COUNT
5878  022076  013765  005600  000010  6$:     MOV     MA,P.BALO(R5)   ;SET BA BITS 0-15
5879  022104  013701  005602                  MOV     MA+2,R1         ;GET MA BITS 16-21
5880  022110  042701  177774                  BIC     #177774,R1      ;MASK FOR LO 2 BITS
5881  022114  150165  000007                  BISB    R1,P.BAHI(R5)   ;SET BA BITS 16,17
5882  022120  005737  056216                  TST     $KT11           ;SEE IF MEM MGT PRESENT
5883  022124  100010                          BPL     14$             ;BR IF NOT
5884                        ;SET UP MEM MGT
5885  022126  013737  005600  005604          MOV     MA,PMA          ;SET BUFFER ADDRESS
5886  022134  013737  005602  005606          MOV     MA+2,PMA+2
5887  022142  004737  030300                  JSR     PC,PREPAR       ;PREPARE MEM MGT REG'S AND UNIBUS MAP
5888  022146  012704  000001          14$:    MOV     #1,R4           ;SET PATTERN BIT POINTER
5889  022152  030437  005536          16$:    BIT     R4,PATRN        ;SEE IF THIS PATTERN IS CHOSEN
5890  022156  001003                          BNE     20$             ;BR IF YES
5891  022160  006304                  18$:    ASL     R4              ;SHIFT TO  POINT TO NEXT PATTERN
5892  022162  001434                          BEQ     24$             ;BR IF NO MORE LEFT TO CHECK
5893  022164  000772                          BR      16$             ;GO CHECK FOR ANOTHER PATTERN
5894  022166  010401                  20$:    MOV     R4,R1           ;GET A COPY OF BIT POINTER
5895                        ;PERFORM THE TESTS
5896  022170  012737  022170  001110  22$:    MOV     #.,$LPERR       ;SET NEW LOOP ON ERROR ADRS
5897  022176  004737  032060                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
5898  022202  004737  040226                  JSR     PC,SVPRMS       ;SAVE THE PARAMS FOR THIS XFER
5899  022206  004737  034426                  JSR     PC,LODBUF       ;LOAD THIS MEM BLK WITH SELECTED DATA
5900  022212  112765  000123  000001          MOVB    #WRDATA,P.CMND(R5) ;SET WRITE DATA COMMAND
5901  022220  004737  040340                  JSR     PC,TRNSFR       ;WRITE THE DATA
5902  022224  005003                          CLR     R3              ;SET DATA WORD = 0
5903  022226  004737  036100                  JSR     PC,LDMEM2       ;LOAD MEM BLK WITH ALL ZEROS
5904  022232  112765  000121  000001          MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
5905  022240  004737  040340                  JSR     PC,TRNSFR       ;READ THE DATA FROM DISK
5906  022244  004737  034654                  JSR     PC,CMPBUF       ;PERFORM SOFTWARE COMPARE OF DATA
5907  022250  104410                          SCOPER                  ;CHECK FOR INTERNAL LOOP ON ERROR
5908  022252  000742                          BR      18$             ;CHECK FOR  NEXT PATTERN
5909                        ;GET NEW MA FOR NEXT TRANSFER
5910  022254  004737  037230          24$:    JSR     PC,INCRMA       ;COMPUTE NEXT MA
5911  022260  000673                          BR      4$              ;GO SEE IF MORE MEMORY TO TEST
5912  022262  004737  030502          50$:    JSR     PC,GETXDP       ;RESTORE XXDP LOADER
5913  022266  105737  003134                  TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
5914  022272  001402                          BEQ     54$             ;BR IF NOT PRESENT
5915  022274  005037  172516                  CLR     @#SR3           ;DISABLE UNIBUS MAP
5916  022300                          54$:
5917
```

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5918
5919
5920                            ;;*****************************************************************
5921                            ;*TEST 5        UNIBUS CONTENTION TEST
5922                            ;*THE PURPOSE OF THIS TEST IS TO EXERCISE THE NPR CONTROL LOGIC
5923                            ;*WITHIN THE CONTROLLER IN SUCH A MANNER THAT A CONTENTION FOR
5924                            ;*UNIBUS CYCLES ARISES BETWEEN THE PROCESSOR AND THE RK06.
5925                            ;*
5926                            ;*FIRST, A WRITE DATA IS BEGUN AT ADDRESS FC,FT,SECTOR 0, WITH
5927                            ;*THE BUS ADDRESS INCREMENT INHIBIT BIT (BAI) SET IN THE CONTROLLER.
5928                            ;*USING A WORD COUNT OF 12000(OCT) OR 13000(OCT) (DEPENDING ON THE
5929                            ;*FORMAT), THE ENTIRE TRACK IS WRITTEN WITH THE FIRST WORD OF PATTERN
5930                            ;*15 (IF SELECTED) OR THE FIRST WORD OF PAT 13 (BY DEFAULT).
5931                            ;* THEN, AN INSTRUCTION LOOP IS ENTERED IN WHICH A NON-
5932                            ;*EXISTENT UNIBUS DEVICE ADDRESS IS REFERENCED ONCE PER PASS. THIS
5933                            ;*WILL RESULT IN A PROCESSOR SIEZURE OF THE UNIBUS, FOR 5-20 USEC,
5934                            ;*(DEPENDING ON THE PROCESSOR), FOLLOWED BY A NON-EXISTENT MEMORY
5935                            ;*PROCESSOR TRAP, ONCE PER PASS. THUS, FOR EACH PASS THROUGH THE
5936                            ;*INSTRUCTION LOOP THE CONTROLLER IS FORCED TO LOSE FROM ONE
5937                            ;*TO FOUR NPR BUS CYCLES. THE EXECUTION TIME OF THE LOOP DETERMINES THE
5938                            ;*REPETITION RATE OF THE NON-EXISTENT MEMORY REFERENCES, AND THIS
5939                            ;*IS CHOSEN TO ALLOW ENOUGH NPR'S SO THAT THERE SHOULD BE NO
5940                            ;*DATA LATE ERRORS IN A FAULT-FREE CONTROLLER.
5941                            ;*THE DATA IS THEN WRITE CHECKED FOR VERIFICATION, AND THE ABOVE
5942                            ;*TEST IS REPEATED USING A READ DATA COMMAND. NO ERRORS ARE EXPECTED.
5943                            ;*
5944                            ;*THE ABOVE OPERATIONS ARE REPEATED 15 MORE TIMES, USING THE NEXT WORD
5945                            ;*OF THE PROPER PATTERN (13 OR 15) EACH TIME, TO WRITE AND READ
5946                            ;*THE ENTIRE TRACK. IF A DATA LATE ERROR OCCURS ON A GIVEN TRANSFER,
5947                            ;*THAT DATA IS NOT WRITE-CHECKED OR COMPARED.
5948
5949                            ;;*****************************************************************
5950  022300  000004            TST5:   SCOPE
5951  022302  012737  000005  001324            MOV     #5,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
5952  022310  004737  032160                    JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
5953  022314  004737  032126                    JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
5954  022320  000137  022604                    JMP     TST6            ;JUMP TO NEXT TEST
5955                            ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
5956  022324  004737  030726                    JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
5957  022330  004737  027250                    JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
5958                            ;INITIALIZE PARAMETERS
5959  022334  013765  005650  000002            MOV     FC,P.CYLN(R5)   ;SET CYL = FC
5960  022342  113765  005654  000005            MOVB    FT,P.TRCK(R5)   ;SET TRACK = FT
5961  022350  105065  000004                    CLRB    P.SECT(R5)      ;SET SECTOR = 0
5962  022354  012765  165000  000012            MOV     #-13000,P.WC(R5) ;INIT WORD COUNT FOR FULL TRACK
5963  022362  105737  003115                    TSTB    FORMAT          ;DETERMINE THE FORMAT
5964  022366  001403                            BEQ     4$              ;BR IF 22 SECTORS
5965  022370  012765  166000  000012            MOV     #-12000,P.WC(R5) ;SET WORD COUNT FOR FULL TRACK
5966  022376  052765  100000  000014  4$:       BIS     #DTBAII,P.PRST(R5) ;SET BUS ADDRESS INCREMENT INHIBIT
5967                            ;WRITE DATA WITH ALLOWABLE UNIBUS CONTENTION, AND WRITE CHECK IT
5968  022404  012700  006766                    MOV     #PAT15,R0       ;SET DATA PATTERN ADDRESS
5969  022410  005737  005670                    TST     PT              ;SEE IF USER-DEFINED PATTERN 15 SELECTED
5970  022414  100402                            BMI     14$             ;BR IF YES
5971  022416  012700  006666                    MOV     #PAT13,R0       ;SET DATA PATTERN 13 ADDRESS
5972  022422  012701  000020  14$:       MOV     #16.,R1         ;SET COUNTER = 16
5973  022426  012703  000024                    MOV     #20.,R3         ;SET NON-EXISTENT MEMORY TIMER
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5974  022432  010065  000010          16$:    MOV     R0,P.BALO(R5)   ;SET BA BITS
5975  022436  105037  003132                  CLRB    DLTFLG          ;CLEAR DATA LATE FLAG
5976  022442  112737  000001  003133          MOVB    #1,NORTRY       ;SET "NO-RETRY" FLAG
5977  022450  112765  000123  000001          MOVB    #WRDATA,P.CMND(R5) ;SET WRITE DATA COMMAND
5978  022456  004737  037126                  JSR     PC,REFNEM       ;WRITE DATA DURING NEM REF.
5979  022462  105737  003132                  TSTB    DLTFLG          ;SEE IF DATA LATE ERROR OCCURRED
5980  022466  001011                          BNE     18$             ;BR IF NOT
5981  022470  032737  000002  005476          BIT     #BSERR,RECODE   ;SEE IF BAD SECTOR ERROR
5982  022476  001042                          BNE     24$             ;BR IF YES
5983  022500  112765  000131  000001          MOVB    #WRTCHK,P.CMND(R5) ;SET WRITE CHECK COMMAND
5984  022506  004737  040716                  JSR     PC,DRVCAL       ;DO WRITE CHECK
5985                          ;READ DATA WITH ALLOWABLE UNIBUS CONTENTION, AND COMPARE LAST WORD
5986  022512  012765  064574  000010  18$:    MOV     #RWBUF,P.BALO(R5) ;SET BA = RWBUF ADDRESS
5987  022520  005037  064574                  CLR     RWBUF           ;CLEAR THE BUFFER WORD
5988  022524  112765  000121  000001          MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
5989  022532  004737  037126                  JSR     PC,REFNEM       ;READ DATA DURING NEM REF.
5990  022536  105737  003132                  TSTB    DLTFLG          ;SEE IF DATA LATE ERROR OCCURRED
5991  022542  001014                          BNE     20$             ;BR IF YES
5992  022544  022037  064574                  CMP     (R0)+,RWBUF     ;COMPARE LAST DATA WORD
5993  022550  001411                          BEQ     20$             ;BR IF EQUAL
5994  022552  004737  042130                  JSR     PC,REPSUP       ;GATHER STATUS FOR PRINTOUT
5995  022556  016037  177776  001174          MOV     -2(R0),$REG5    ;GOOD DATA WORD
5996  022564  013737  064574  001176          MOV     RWBUF,$REG6     ;BAD DATA WORD
5997  022572  104110                          ERROR   110             ;"READ ERROR WHILE BAI SET"
5998                          ;SET UP FOR NEXT PASS THROUGH LOOP
5999  022574  005301                  20$:    DEC     R1              ;SEE IF ALL DONE YET
6000  022576  001402                          BEQ     24$             ;BR IF YES
6001  022600  000137  022432                  JMP     16$             ;JUMP TO CONTINUE TESTING
6002  022604                          24$:
6003
6004
6005
6006                          ;;*****************************************************************
6007                          ;*TEST 6        MULTI-DRIVE INTERFERENCE TEST
6008                          ;*THIS TEST PERFORMS MULTI-DRIVE POSITIONING OPERATIONS, WHILE A
6009                          ;*LARGE DATA TRANSFER IS IN PROGRESS ON THE DRIVE UNDER TEST, FOR
6010                          ;*THE PURPOSE OF DETECTING PROBLEMS OF CONCURRENT DRIVE OPERATION.
6011                          ;*THE TEST IS RUN ONLY IF THERE IS MORE THAN 1 DRIVE ON THE SUBSYSTEM.
6012                          ;*
6013                          ;*THE TEST PROCEEDS AS FOLLOWS :  IT IS FIRST DETERMINED WHICH DRIVE(S)
6014                          ;*(BESIDE THE ONE UNDER TEST) EXIST AND ARE OPERATIONAL. THESE DRIVES
6015                          ;*ARE THEN CLEARED AND A SEEK TO CYL 0 IS DONE ON EACH.NEXT, A SEEK IS
6016                          ;*DONE TO CYLINDER FC (SCALED, IF NECESSARY,) ON THE DRIVE UNDER
6017                          ;*TEST. A SEEK IS NOW BEGUN ON EACH OF THE OTHER DRIVES, EACH
6018                          ;*TO A DIFFERENT PSEUDO-RANDOM CYLINDER ADDRESS. THIS SHOULD REQUIRE
6019                          ;*FROM 10-67 MILLI-SEC TO COMPLETE. AS SOON AS THESE SEEKS ARE BEGUN,
6020                          ;*A WRITE DATA COMMAND IS BEGUN ON THE DRIVE UNDER TEST AT THE CURRENT
6021                          ;*CYLINDER (FC), SECTOR 0, TRACK 0, WITH THE BUS ADDRESS INCREMENT
6022                          ;*INHIBIT BIT SET IN THE CONTROLLER, AND WITH A WORD COUNT OF 15,616
6023                          ;*(DEC) WORDS IF 20 SECTOR FORMAT OR 17,152(DEC) WORDS IF 22 SECTOR
6024                          ;*FORMAT. THIS WORD COUNT AMOUNTS TO A FULL CYLINDER + 1 SECTOR OF DATA.
6025                          ;*THIS TRANSFER REQUIRES FROM 101-126 MILLI-SEC TO COMPLETE, AND IN
6026                          ;*THAT TIME, ALL THE OTHER DRIVES SHOULD HAVE COMPLETED POSITIONING.
6027                          ;*NEXT, A WRITE CHECK IS DONE TO VERIFY THE DATA WRITTEN ON THE DRIVE
6028                          ;*UNDER TEST, AND A CHECK IS MADE TO INSURE THAT ALL OTHER DRIVES WHICH
6029                          ;*PERFORMED SEEKS WERE ABLE TO COMPLETE THEM SUCCESSFULLY, BY CHECKING
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                                        ;*ATTENTION BITS AND COMPARING DRIVE CYLINDER ADDRESSES TO EXPECTED
                                        ;*VALUES.
                                        ;;*****************************************************************
022604  000004                  TST6:   SCOPE
022606  012737  000006  001324          MOV     #6,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
022614  004737  032060                  JSR     PC,SETTUP       ;SET UP FOR LOOP ON ERROR
022620  004737  032126                  JSR     PC,CHKITR       ;SEE IF ITER. NO. = 0 FOR THIS TEST
022624  000137  023442                  JMP     $EOP            ;JUMP TO END-OF-PASS ROUTINE
                                        ;RETURN HERE FROM CHKITR IF TEST SHOULD BE RUN
022630  004737  030726                  JSR     PC,INITSS       ;INITIALIZE DRIVER PARAMS AND SUB-SYS
022634  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
                                        ;CHECK DRVLST FOR OTHER AVAILABLE DRIVES, AND RECALIBRATE THEM!
022640  112765  000117  000001          MOVB    #SEEK,P.CMND(R5) ;SET SEEK COMMAND
022646  005001                          CLR     R1              ;INIT MULTIPLE-DRIVES FLAG
022650  005000                          CLR     R0              ;INIT DRIVE NO. TO 0
022652  005065  000002                  CLR     P.CYLN(R5)      ;SET CYL = 0
022656  022700  000010          4$:     CMP     #10,R0          ;SEE IF ALL DRIVES CHECKED YET
022662  001415                          BEQ     8$              ;BR IF ALL DONE
022664  105760  005610                  TSTB    DRVLST(R0)      ;SEE IF THIS DRIVE IS MARKED IN LIST
022670  001410                          BEQ     6$              ;BR IF NOT MARKED
022672  120037  005502                  CMPB    R0,DRIVE        ;SEE IF MARKED DRIVE IS DRIVE UNDER TEST
022676  001405                          BEQ     6$              ;BR IF YES
022700  110065  000000                  MOVB    R0,P.DRVN(R5)   ;SET DRIVE NO. PARAMETER
022704  004737  040716                  JSR     PC,DRVCAL       ;SEEK TO CYL 0 ON CURRENT DRIVE
022710  005201                          INC     R1              ;SET FLAG TO INDICATE MORE THAN 1 DRIVE
022712  005200          6$:     INC     R0                      ;INCR DRIVE NO.
022714  000760                  BR      4$                      ;KEEP CHECKING DRIVES
022716  005701          8$:     TST     R1                      ;SEE IF MORE THAN 1 DRIVE PRESENT
022720  001002                  BNE     9$                      ;BR IF YES, TO RUN TEST
022722  000137  023442          JMP     MULTI1                  ;NO, SKIP TEST
                                        ;SEEK TO CYLINDER FC ON DRIVE UNDER TEST, SET PARAMS FOR DATA XFER
022726  004737  030726          9$:     JSR     PC,INITSS       ;INIT S.S.
022732  013765  005650  000002          MOV     FC,P.CYLN(R5)   ;SET CYL = FC
022740  005065  000004                  CLR     P.SECT(R5)      ;SET TRACK AND SECTOR = 0
022744  012765  136400  000012          MOV     #-17152.,P.WC(R5) ;SET WC FOR 67(DEC) SECTORS
022752  105737  003115                  TSTB    FORMAT          ;CHECK THE FORMAT
022756  001403                          BEQ     12$             ;BR IF 22-SECTOR FORMAT
022760  012765  141400  000012          MOV     #-15616.,P.WC(R5) ;SET WC FOR 61(DEC) SECTORS
022766  012765  006666  000010  12$:    MOV     #PAT13,P.BALO(R5) ;SET BA BITS
022774  052765  100000  000014          BIS     #DTBAII,P.PRST(R5) ;SET BUS ADDRESS INCREMENT INHIBIT
023002  112765  000117  000001          MOVB    #SEEK,P.CMND(R5) ;SET SEEK COMMAND
023010  004737  040716                  JSR     PC,DRVCAL       ;SEEK TO CYL FC ON DRIVE UNDER TEST
                                        ;DO PSEUDO-RANDOM SEEKS ON ALL OTHER DRIVES
023014  105037  003110                  CLRB    TSTING          ;INHIBIT ↑C, ↑Z ESCAPE
023020  012701  000007                  MOV     #7,R1           ;SET LOOP COUNTER
023024  012700  003204                  MOV     #CYLLST,R0      ;ADRS OF RAND CYL LIST
023030  004737  034044          15$:    JSR     PC,RNDADR       ;GENERATE A PSEUDO-RANDOM CYL NO.
023034  013720  005506                  MOV     CYLNDR,(R0)+    ;SET CYL NO. IN TABLE
023040  001002                          BNE     16$             ;BR IF NOT 0
023042  005260  177776                  INC     -2(R0)          ;MAKE IT NON-ZERO
023046  005301          16$:    DEC     R1                      ;DECREMENT LOOP COUNTER
023050  001367                          BNE     15$             ;BR IF NOT DONE LOADING LIST YET
023052  012701  003204                  MOV     #CYLLST,R1      ;GET ADRS OF RAND CYL TABLE
023056  010537  023126                  MOV     R5,19$          ;SET PARAM BLK ADRS FOR DRIVER
023062  005000                          CLR     R0              ;INIT DRIVE NO. TO 0
023064  022700  000010          18$:    CMP     #10,R0          ;SEE IF ALL DRIVES CHECKED YET
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6086  023070  001421                          BEQ     22$             ;BR IF YES
6087  023072  105760  005610                  TSTB    DRVLST(R0)      ;SEE IF THIS DRIVE PRESENT
6088  023076  001414                          BEQ     20$             ;BR IF NO
6089  023100  120037  005502                  CMPB    R0,DRIVE        ;SEE IF THIS IS DRIVE UNDER TEST
6090  023104  001411                          BEQ     20$             ;BR IF YES
6091  023106  110065  000000                  MOVB    R0,P.DRVN(R5)   ;SET DRIVE NO. PARAMETER
6092  023112  012165  000002                  MOV     (R1)+,P.CYLN(R5) ;SET CYLINDER NO.
6093  023116  004737  041032                  JSR     PC,STRCMD       ;STORE PREV AND CURRENT CMNDS
6094  023122  004737  051042                  JSR     PC,C.INIT       ;GO START SEEK ON THIS DRIVE
6095  023126  000000                  19$:    .WORD                   ;P.B. ADRS GOES HERE
6096  023130  005200                  20$:    INC     R0              ;INCR DRIVE NO.
6097  023132  000754                          BR      18$             ;BR TO SEEK ON NEXT DRIVE
6098                                  ;WRITE DATA ON DRIVE UNDER TEST, WITH BAI SET
6099  023134  112765  000123  000001  22$:    MOVB    #WRDATA,P.CMND(R5) ;SET WRITE DATA COMMAND
6100  023142  113765  005502  000000          MOVB    DRIVE,P.DRVN(R5) ;SET DRIVE NO.
6101  023150  013765  005650  000002          MOV     FC,P.CYLN(R5)   ;SET CYL NO.
6102  023156  012737  023354  003034          MOV     #MULHDL,A.NORM  ;SET SPECIAL DRIVER RETURN ADDRESS
6103  023164  004737  040716                  JSR     PC,DRVCAL       ;WRITE 1 CYL + 1 SECTOR AT CYL FC
6104  023170  032737  000002  005476          BIT     #BSERR,RECODE   ;SEE IF BSE ERROR
6105  023176  001121                          BNE     MULTI1          ;BR IF YES
6106  023200  112765  000131  000001          MOVB    #WRTCHK,P.CMND(R5) ;SET WRITE CHECK COMMAND
6107  023206  004737  040716                  JSR     PC,DRVCAL       ;WRITE CHECK THE DATA WRITTEN
6108                                  ;CHECK ATTENTIONS AND CHECK CYLINDER ADDRESSES FROM ALL OTHER DRIVES
6109  023212  112737  000001  003110          MOVB    #1,TSTING       ;ALLOW ↑C, ↑Z ESCAPE
6110  023220  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ DRIVE STATUS COMMAND
6111  023226  012701  003204                  MOV     #CYLLST,R1      ;ADRS OF RAND CYL LIST
6112  023232  005000                          CLR     R0              ;INIT DRIVE NO.
6113  023234  022700  000010          26$:    CMP     #10,R0          ;SEE IF ALL DRIVES CHECKED YET
6114  023240  001500                          BEQ     MULTI1          ;BR IF YES
6115  023242  105760  005610                  TSTB    DRVLST(R0)      ;SEE IF THIS DRIVE MARKED IN LIST
6116  023246  001440                          BEQ     32$             ;BR IF NOT
6117  023250  120037  005502                  CMPB    R0,DRIVE        ;SEE IF THIS IS DRIVE UNDER TEST
6118  023254  001435                          BEQ     32$             ;BR IF YES
6119  023256  136037  003072  003202          BITB    I.DRV(R0),SAVWRD ;SEE IF GOT ATT'N FROM THIS DRIVE
6120  023264  001003                          BNE     28$             ;BR IF YES
6121  023266  004737  042130                  JSR     PC,REPSUP       ;PREPARE STATUS FOR PRINTOUT
6122  023272  104113                          ERROR   113             ;"NO ATTENTION ON SEEK"
6123  023274  110065  000000          28$:    MOVB    R0,P.DRVN(R5)   ;SET THIS DRIVE NO.
6124  023300  004737  040716                  JSR     PC,DRVCAL       ;READ STATUS OF THIS DRIVE
6125  023304  016503  000052                  MOV     P.B10(R5),R3    ;GET STATUS BYTE B10
6126  023310  006003                          ROR     R3              ;GET CYL ADRS RIGHT-JUSTIFIED
6127  023312  006003                          ROR     R3
6128  023314  006003                          ROR     R3
6129  023316  006003                          ROR     R3
6130  023320  042703  177000                  BIC     #177000,R3      ;CLEAR OFF UNUSED BITS
6131  023324  022103                          CMP     (R1)+,R3        ;COMPARE TO EXPECTED CYLINDER
6132  023326  001410                          BEQ     32$             ;BR IF EQUAL
6133  023330  016137  177776  001212          MOV     -2(R1),$REG14   ;GOOD CYL NO.
6134  023336  010337  001214                  MOV     R3,$REG15       ;BAD CYL NO.
6135  023342  004737  042130                  JSR     PC,REPSUP       ;GATHER STATUS FOR PRINTOUT
6136  023346  104114                          ERROR   114             ;"DRIVE'S CYLINDER INCORRECT"
6137  023350  005200                  32$:    INC     R0              ;INCREMENT DRIVE NO.
6138  023352  000730                          BR      26$             ;BR IF NOT DONE WITH ALL DRIVES YET
6139
6140                                  ;THIS IS THE NORMAL RETURN FROM THE DRIVER WHICH IS USED TO CHECK
6141                                  ;THE RESULTS OF MULTI-DRIVE OPERATIONS.
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 6142  023354  032737  000200  002770  MULHDL: BIT     #RDY,T.CS1      ;SEE IF CNTRLR RDY IS SET
 6143  023362  001010                          BNE     6$              ;BR IF RDY SET
 6144  023364  004737  050442                  JSR     PC,I.CSTS       ;READ CONTROLLER REGISTERS
 6145  023370  013765  002770  000016          MOV     T.CS1,P.CS1(R5) ;GET CS1 BITS
 6146  023376  004737  042130                  JSR     PC,REPSUP       ;PREPARE STATUS FOR PRINTOUT
 6147  023402  104112                          ERROR   112             ;"INTRPT WHEN CNTRLR NOT RDY"
 6148  023404  013737  003004  003202  6$:     MOV     T.ASOF,SAVWRD   ;SAVE ATT'N SUMMARY
 6149  023412  000337  003202                  SWAB    SAVWRD          ;GET ATT'N BITS IN BITS 0-7
 6150  023416  112765  000177  000001          MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR COMMAND
 6151  023424  012737  041142  003034          MOV     #ERRFRE,A.NORM  ;RESTORE NORMAL DRIVER RETURN ADDRESS
 6152  023432  004737  040716                  JSR     PC,DRVCAL       ;CLEAR SUB-SYS
 6153  023436  000137  041142                  JMP     ERRFRE          ;TAKE NORMAL RETURN
 6154
 6155  023442                          MULTI1:
 6156
 6157
 6158                                  .SBTTL  END OF PASS ROUTINE
 6159
 6160                                  ;;*****************************************************************
 6161                                  ;*INCREMENT THE PASS NUMBER ($PASS)
 6162                                  ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
 6163                                  ;*IF THERES A MONITOR GO TO IT
 6164                                  ;*IF THERE ISN'T JUMP TO NEWPAS
 6165
 6166
 6167  023442                          $EOP:
 6168  023442  000004                          SCOPE
 6169  023444  005237  001330                  INC     $DEVCT          ;INCREMENT DEVICE COUNT FOR APT
 6170  023450  000137  017436                  JMP     NEWDRV          ;GO SEE IF MORE DRIVES TO TEST ON THIS PASS
 6171  023454                          DUNPAS: ;THIS IS TRULY THE END OF A PASS
 6172  023454  042777  000100  155462          BIC     #BIT6,@$TKS     ;DISABLE TTY KBD INTERRUPT
 6173  023462  005037  001102                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
 6174  023466  005037  001304                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
 6175  023472  005237  001326                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
 6176  023476  042737  100000  001326          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
 6177  023504  005327                          DEC     (PC)+           ;;LOOP?
 6178  023506  000001                  $EOPCT: .WORD   1
 6179  023510  003022                          BGT     $DOAGN          ;;YES
 6180  023512  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
 6181  023514  000001                  $ENDCT: .WORD   1
 6182  023516  023506                          $EOPCT
 6183  023520  104400  023565                  TYPE    ,$ENDMG         ;;TYPE "END PASS #"
 6184  023524  013746  001326                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
 6185  023530  104404                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 6186  023532  104400  023562                  TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
 6187  023536  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
 6188  023542  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
 6189  023544  000005                          RESET                   ;;CLEAR THE WORLD
 6190  023546  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
 6191  023550  000240                          NOP                     ;;SAVE ROOM
 6192  023552  000240                          NOP                     ;;FOR
 6193  023554  000240                          NOP                     ;;ACT11
 6194  023556                          $DOAGN:
 6195  023556  000137                          JMP     @(PC)+          ;;RETURN
 6196  023560  017424                  $RTNAD: .WORD   NEWPAS
 6197  023562     377     377     000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
```

```
 6198  023565     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
 6199  023572  050040  051501  020123
 6200  023600  000043
 6201
 6202                                          .SBTTL  RK06 HEAD ALIGNMENT AID
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 6203  023602  012737  000340  177776  ASTART: MOV     #PR7,@#PS
 6204                                  .SBTTL  INITIALIZE THE COMMON TAGS
 6205                                  ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
 6206  023610  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
 6207  023614  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
 6208  023616  022706  001140                  CMP     #SWR,R6 ;;DONE?
 6209  023622  001374                          BNE     .-6             ;;LOOP BACK IF NO
 6210  023624  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
 6211                                  ;;INITIALIZE A FEW VECTORS
 6212  023630  012737  055426  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
 6213  023636  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
 6214  023644  012737  054722  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
 6215  023652  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
 6216  023660  012737  056562  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
 6217  023666  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
 6218  023674  012737  055272  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
 6219  023702  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
 6220  023710  013737  023514  023506          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
 6221  023716  005037  001304                  CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
 6222  023722  005037  001306                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
 6223  023726  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
 6224  023734  012737  023734  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
 6225  023742  012737  023742  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
 6226                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
 6227                                  ;;EQUAL TO A "-1"  SETUP FOR A SOFTWARE SWITCH REGISTER.
 6228  023750  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
 6229  023754  012737  024010  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
 6230  023762  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
 6231  023770  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
 6232  023776  022777  177777  155134          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
 6233  024004  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
 6234                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
 6235  024006  000403                  BR      65$                     ;;BRANCH IF NO TIMEOUT
 6236  024010  012716  024016          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
 6237  024014  000002                  RTI
 6238  024016  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
 6239  024024  012737  000174  001142          MOV     #DISPREG,DISPLAY
 6240  024032  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
 6241
 6242  024036  005037  001326                  CLR     $PASS           ;;CLEAR PASS COUNT
 6243  024042  132737  000200  001341          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
 6244  024050  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
 6245  024052  012737  001342  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
 6246  024060                          67$:
 6247                                  .SBTTL  RK06 HEAD ALIGNMENT AID
 6248  024060  000005                  RESET                           ;RESET UNIBUS
 6249  024062  104400  007026          TYPE    ,DZR6N                  ;TYPE PROGRAM I.D. FOR PART 2
 6250  024066  104400  007040          TYPE    ,SUBVER
 6251  024072  104400  007121          TYPE    ,PART2
 6252  024076  012737  000176  001140  MOV     #SWREG,SWR      ;ADRS OF SOFTWARE SWR
 6253  024104  005077  155030          CLR     @SWR            ;MAKE SWR BITS ALL 0
 6254  024110  012737  027110  000060  MOV     #KBDHDL,@#TKVEC ;LOAD VECTOR FOR TTY KBD
 6255  024116  012737  000200  000062  MOV     #PR4,@#TKVEC+2  ;SET KBD PRIORITY = 4
 6256  024124  013701  003030          MOV     RKVEC,R1        ;GET ADDRESS OF VECTOR STORAGE
 6257  024130  012721  045542          MOV     #I.INTR,(R1)+   ;SET IT TO INTERRUPT HNDLR
 6258  024134  012711  000340          MOV     #PR7,(R1)       ;SET INTERRUPT HANDLER PR7
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6259  024140  012737  000000  177776          MOV     #PRO,@#PS       ;ALLOW ALL INTERRUPTS
6260  024146  012737  000000  005650          MOV     #0,FC           ;SET FIRST CYL = 0
6261  024154  012737  000632  005652          MOV     #LSTCYL,LC      ;SET LAST CYL = 410(10)
6262
6263  024162                          GIVEID:
6264  024162  012737  176543  053170          MOV     #176543,$HINUM  ;INITIALIZE PSEUDO-RANDOM NUMBERS
6265  024170  012737  123456  053172          MOV     #123456,$LONUM
6266  024176  105037  003106                  CLRB    MDFLAG          ;CLEAR PARAM INP FLAG
6267  024202  105037  003110                  CLRB    TSTING          ;CLEAR "RUNNING TESTS" FLAG
6268  024206  005037  005504                  CLR     STALLS          ;DON'T STALL ON OPERATIONS
6269  024212  012701  005224                  MOV     #PRVCMD,R1      ;ZERO OUT PREV COMMAND
6270  024216  012700  000006                  MOV     #6,R0
6271  024222  005021                  42$:    CLR     (R1)+
6272  024224  005300                  DEC     R0
6273  024226  001375                  BNE     42$
6274  024230  105037  003116                  CLRB    ERRCNT          ;CLEAR ERROR COUNT FOR RESTARTS
6275  024234  104400  011431                  TYPE    ,IDENT          ;TYPE PROGRAM IDENTIFICATION
6276  024240  105737  003136                  TSTB    HLPOVL          ;SEE IF HELP FILE OVERLAID
6277  024244  001011                  BNE     ASKMOD          ;BR IF YES
6278  024246  104400  011476                  TYPE    ,FORHLP         ;ASK IF HELP DESIRED
6279  024252  104405                  RDCHR                   ;READ RESPONSE
6280  024254  112601                  MOVB    (SP)+,R1        ;GET CHARACTER
6281  024256  122701  000015                  CMPB    #015,R1         ;SEE IF <CR> TYPED
6282  024262  001402                  BEQ     ASKMOD          ;BR IF NO HELP NEEDED
6283  024264  104400  065213                  TYPE    ,HLPFIL         ;HELP REQUESTED- TYPE INFO.
6284
6285
6286                                  ;DETERMINE DESIRED OPERATIONAL MODE
6287  024270  104400  011533  ASKMOD: TYPE    ,TYPMOD         ;ASK FOR DESIRED OPERATIONAL MODE
6288  024274  004737  027250          JSR     PC,PREPKB       ;PREPARE FOR KBD INPUT
6289  024300  005737  005524  1$:     TST     INTCHR          ;CHECK FOR TTY INPUT
6290  024304  001775                  BEQ     1$              ;BR IF NO INPUT YET
6291  024306  013701  005524          MOV     INTCHR,R1       ;GET INPUT CHAR INTO R1
6292  024312  022701  000022          CMP     #022,R1         ;SEE IF (↑R) TYPED
6293  024316  001721                  BEQ     GIVEID          ;BR IF (↑R), TO RESTART
6294  024320  022701  000115          CMP     #'M,R1          ;IS IT MANUAL MODE ?
6295  024324  001002                  BNE     2$              ;BR IF NOT MANUAL
6296  024326  000137  024352          JMP     MANUAL          ;JUMP TO MANUAL MODE ROUTINE
6297  024332  022701  000101  2$:     CMP     #'A,R1          ;IS IT AUTO MODE ?
6298  024336  001002                  BNE     3$              ;BR IF  NOT AUTO
6299  024340  000137  025300          JMP     AUTO            ;JUMP TO AUTO MODE ROUTINE
6300  024344  004737  027270  3$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
6301  024350  000747                  BR      ASKMOD          ;BR TO  ASK  FOR MODE AGAIN
6302
6303
6304
6305                                  ;MANUAL SELECT MODE ROUTINE
6306  024352                  MANUAL:
6307  024352  104400  011574          TYPE    ,TYPMAN         ;TYPE "MANUAL SELECT MODE"
6308  024356  104400  011627  ASKDRV: TYPE    ,ENTDRV         ;ASK FOR DRIVE  NUMBER
6309  024362  004737  027250          JSR     PC,PREPKB       ;PREPARE FOR KBD  INPUT
6310  024366  005737  005524  1$:     TST     INTCHR          ;SEE IF ANY INPUT
6311  024372  001775                  BEQ     1$              ;BR IF NONE TO CHECK AGAIN
6312  024374  013701  005524          MOV     INTCHR,R1       ;GET CHARACTER INTO R1
6313  024400  020127  000022          CMP     R1,#022         ;TEST FOR  (↑R) TYPED
6314  024404  001666                  BEQ     GIVEID          ;BR IF (↑R) TO RESTART
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6315  024406  020127  000060                  CMP     R1,#'0          ;COMPARE TO ASCII  0
6316  024412  002410                          BLT     2$              ;BR IF <0 (BAD INPUT)
6317  024414  020127  000067                  CMP     R1,#'7          ;COMPARE TO ASCII  7
6318  024420  003005                          BGT     2$              ;BR IF  >7 (BAD INPUT)
6319  024422  042701  000060                  BIC     #'0,R1          ;STRIP  ASCII BITS
6320  024426  010137  005502                  MOV     R1,DRIVE        ;STORE DRIVE NUMBER
6321  024432  000403                          BR      3$              ;PROCEED WITH DESIRED DRIVE
6322  024434  004737  027270          2$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
6323  024440  000746                          BR      ASKDRV          ;GO BACK TO ASK AGAIN
6324  024442  004737  030726          3$:     JSR     PC,INITSS       ;INITIALIZE SUBSYSTEM
6325                                  ;CHECK DESIRED DRIVE FOR PROPER STATUS
6326  024446  004737  031460                  JSR     PC,CHKDRV       ;CHECK DRIVE FOR ON-LINE,READY,WRITE LOCK
6327  024452  024356                          ASKDRV                  ;ADDRESS OF ERROR RETURN FOR CHKDRV
6328  024454  004737  033524                  JSR     PC,DRVSER       ;TYPE "DRIVE SER. NO.  XXX"
6329                                  ;SET UP DESIRED SUB-MODE OF OPERATION
6330  024460                          SUBMOD:
6331  024460  105037  011430                  CLRB    VERIFY          ;CLEAR VERIFY MODE FLAG
6332  024464  104400  012412                  TYPE    ,ENTMOD         ;ASK FOR ALIGN OR EXERCISE SUB-MODE
6333  024470  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR KBD INPUT
6334  024474  005737  005524          1$:     TST     INTCHR          ;SEE IF ANY INPUT
6335  024500  001775                          BEQ     1$              ;BR IF NONE TO CHECK AGAIN
6336  024502  013701  005524                  MOV     INTCHR,R1       ;GET CHAR INTO R1
6337  024506  020127  000022                  CMP     R1,#022         ;SEE IF (↑R) TYPED
6338  024512  001002                          BNE     2$              ;BR IF NOT (↑R)
6339  024514  000137  024162                  JMP     GIVEID          ;JUMP TO RESTART
6340  024520  020127  000003          2$:     CMP     R1,#003         ;SEE IF (↑C) TYPED
6341  024524  001002                          BNE     3$              ;BR IF NOT (↑C)
6342  024526  000137  024356                  JMP     ASKDRV          ;JUMP TO ASK FOR DRIVE AGAIN
6343  024532  020127  000101          3$:     CMP     R1,#'A          ;SEE IF ALIGNMENT REQUESTED
6344  024536  001415                          BEQ     MANAL           ;BR IF MANUAL ALIGNMENT REQUESTED
6345  024540  020127  000105                  CMP     R1,#'E          ;SEE IF EXERCISES REQUESTED
6346  024544  001002                          BNE     4$              ;BR IF NOT EXERCISES
6347  024546  000137  025044                  JMP     MANEX           ;JUMP TO DO MANUAL EXERCISES
6348  024552  020127  000126          4$:     CMP     R1,#'V          ;SEE IF VERIFY REQUESTED
6349  024556  001002                          BNE     6$              ;BR IF NOT VERIFY
6350  024560  000137  025026                  JMP     MANVR           ;JUMP TO VERIFY MODE
6351  024564  004737  027270          6$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
6352  024570  000733                          BR      SUBMOD          ;ASK FOR SUB-MODE AGAIN
6353
6354
6355
6356                                  ;MANUAL ALIGNMENT MODE
6357  024572                          MANAL:
6358  024572  104400  012552                  TYPE    ,MANALN         ;REPORT MANUAL ALIGNMENT MODE
6359                                  ;REQUEST AND CHECK DESIRED HEAD
6360  024576  104400  012720          ASKHED: TYPE    ,ENTHED         ;ASK FOR DESIRED HEAD
6361  024602  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR KBD INPUT
6362  024606  005737  005524          1$:     TST     INTCHR          ;SEE IF ANY INPUT
6363  024612  001775                          BEQ     1$              ;BR IF NONE TO CHECK AGAIN
6364  024614  013701  005524                  MOV     INTCHR,R1       ;GET CHAR INTO R1
6365  024620  020127  000022                  CMP     R1,#022         ;SEE IF (↑R)
6366  024624  001007                          BNE     2$              ;BR IF NOT (↑R)
6367  024626  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6368  024634  004737  040716                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6369  024640  000137  024162                  JMP     GIVEID          ;JUMP TO RESTART
6370  024644  020127  000003          2$:     CMP     R1,#003         ;SEE IF (↑C)
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6371  024650  001007                          BNE     3$              ;BR IF NOT (↑C)
6372  024652  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6373  024660  004737  040716                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6374  024664  000137  024356                  JMP     ASKDRV          ;JUMP TO ASK FOR DRIVE AGAIN
6375  024670  020127  000032          3$:     CMP     R1,#032         ;SEE IF (↑Z)
6376  024674  001007                          BNE     4$              ;BR IF NOT (↑Z)
6377  024676  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6378  024704  004737  040716                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6379  024710  000137  024460                  JMP     SUBMOD          ;JUMP TO ASK FOR NEW MANUAL SUB-MODE
6380  024714  020127  000060          4$:     CMP     R1,#'0          ;COMPARE TRACK TO ASCII 0
6381  024720  002410                          BLT     5$              ;BR IF <0 (BAD INPUT)
6382  024722  020127  000062                  CMP     R1,#'2          ;COMPARE TRACK TO ASCII 2
6383  024726  003005                          BGT     5$              ;BR IF >2 (BAD INPUT)
6384  024730  042701  000060                  BIC     #'0,R1          ;STRIP ASCII BITS
6385  024734  010137  005522                  MOV     R1,TRACK        ;STORE TRACK (HEAD) NUMBER
6386  024740  000404                          BR      6$              ;GO SELECT HEAD
6387  024742  004737  027270          5$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
6388  024746  000137  024576                  JMP     ASKHED          ;ASK AGAIN FOR HEAD NUMBER
6389                                  ;UNLOAD HEADS,AND WHEN READY, START SPINDLE AND SEEK TO ALN CYL
6390  024752  105737  011430          6$:     TSTB    VERIFY          ;SEE IF VERIFY MODE
6391  024756  001002                          BNE     8$              ;BR IF VERIFY
6392  024760  004737  031754                  JSR     PC,WAIT4R       ;UNLOAD HEADS, WAIT FOR <R> TYPED, LOAD
6393  024764  113765  005522  000005  8$:     MOVB    TRACK,P.TRCK(R5) ;SET DESIRED HEAD NUMBER
6394  024772  004737  031720                  JSR     PC,ALNSEK       ;SEEK TO ALIGNMENT CYLINDER
6395  024776  104400  012647                  TYPE    ,HEDPOS         ;TYPE HEADS POSITIONED MSG
6396  025002  013701  005522                  MOV     TRACK,R1        ;GET BINARY TRACK NO.
6397  025006  152701  000060                  BISB    #'0,R1          ;CONVERT TO ASCII
6398  025012  110137  013006                  MOVB    R1,HEADNO       ;GET HEAD NO. INTO MSG BUFF.
6399  025016  104400  013001                  TYPE    ,HEDSEL         ;TYPE HEAD SELECTED MSG
6400  025022  000137  024576                  JMP     ASKHED          ;GO BACK TO ASK FOR NEW HEAD SELECT
6401
6402
6403
6404                                  ;MANUAL SELECT VERIFY MODE
6405  025026  112737  000001  011430  MANVR:  MOVB    #1,VERIFY       ;SET VERIFY MODE FLAG
6406  025034  104400  012612                  TYPE    ,MANVRF         ;REPORT MANUAL VERIFY MODE
6407  025040  000137  024576                  JMP     ASKHED          ;GO ASK FOR DESIRED HEAD
6408
6409
6410
6411                                  ;MANUAL RANDOM SEEK EXERCISE ROUTINE
6412  025044                          MANEX:
6413  025044  004737  031754                  JSR     PC,WAIT4R       ;UNLOAD HEADS, WAIT FOR <R> TYPED, LOAD
6414  025050  013701  005502                  MOV     DRIVE,R1        ;GET DRIVE NUMBER
6415  025054  052701  000060                  BIS     #'0,R1          ;CONVERT TO ASCII
6416  025060  110137  012544                  MOVB    R1,DRIEXR       ;PUT DRIVE NUMBER INTO OUTPUT BUFFER
6417  025064  104400  012465                  TYPE    ,MANEXR         ;TYPE RANDOM SEEKS MSG
6418  025070  012700  016514                  MOV     #RNDLNG,R0      ;INITIALIZE RANDOM SEEK COUNTER
6419  025074  112765  000117  000001          MOVB    #SEEK,P.CMND(R5) ;SET SEEK COMMAND
6420  025102  004737  027250          1$:     JSR     PC,PREPKB       ;PREPARE FOR KBD INPUT
6421  025106  004737  034044          2$:     JSR     PC,RNDADR       ;SELECT RANDOM CYLINDER ADDRESS
6422  025112  013765  005506  000002          MOV     CYLNDR,P.CYLN(R5) ;SET RANDOM CYLINDER ADDRESS
6423  025120  004737  040716                  JSR     PC,DRVCAL       ;DO A RANDOM SEEK
6424                                  ;CHECK FOR TTY INPUT DURING EXERCISES
6425  025124  005737  005524                  TST     INTCHR          ;SEE IF ANY INPUT
6426  025130  001016                          BNE     3$              ;BR IF A CHAR WAS TYPED
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6427  025132  005300                          DEC     R0              ;DECREMENT SEEK COUNTER
6428  025134  001364                          BNE     2$              ;BR IF NOT DONE SEEKING YET
6429  025136  042777  000100  154000          BIC     #BIT6,@$TKS     ;DISABLE KBD INTERRUPT
6430  025144  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6431  025152  004737  040716                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6432  025156  104400  001310                  TYPE    ,$BELL          ;RING BELL TO SIGNIFY END OF EXERCISES
6433  025162  000137  024460                  JMP     SUBMOD          ;GO ASK FOR NEW MANUAL SUB-MODE
6434  025166  013701  005524          3$:     MOV     INTCHR,R1       ;GET CHARACTER INTO R1
6435  025172  020127  000022                  CMP     R1,#022         ;SEE IF (↑R)
6436  025176  001007                          BNE     4$              ;BR IF NOT (↑R)
6437  025200  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6438  025206  004737  040716                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6439  025212  000137  024162                  JMP     GIVEID          ;JUMP TO RESTART
6440  025216  020127  000003          4$:     CMP     R1,#003         ;SEE IF (↑C)
6441  025222  001007                          BNE     5$              ;BR IF NOT (↑C)
6442  025224  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6443  025232  004737  040716                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6444  025236  000137  024356                  JMP     ASKDRV          ;JUMP TO ASK FOR NEW DRIVE NUMBER
6445  025242  020127  000032          5$:     CMP     R1,#032         ;SEE IF (↑Z)
6446  025246  001007                          BNE     6$              ;BR IF NOT (↑Z)
6447  025250  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6448  025256  004737  040716                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6449  025262  000137  024460                  JMP     SUBMOD          ;JUMP TO ASK FOR NEW MANUAL SUB-MODE
6450  025266  004737  027270          6$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
6451  025272  104400  012465                  TYPE    ,MANEXR         ;VERIFY STILL IN MANUAL EXERCISES
6452  025276  000701                          BR      1$              ;BR TO CONTINUE EXERCISES
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6456                                  ;AUTO SELECT MODE ROUTINE
6457  025300                          AUTO:
6458  025300  004737  030726                  JSR     PC,INITSS       ;INITIALIZE SUBSYSTEM
6459  025304  104400  013023                  TYPE    ,TYPAUT         ;TYPE "AUTO SELECT MODE"
6460  025310  105037  011430          1$:     CLRB    VERIFY          ;CLEAR VERIFY MODE FLAG
6461  025314  104400  012412                  TYPE    ,ENTMOD         ;ASK FOR ALIGN,VERIFY, OR EXERCISE
6462  025320  004737  027250                  JSR     PC,PREPKB       ;PREPARE FOR KEYBOARD INPUT
6463  025324  005737  005524          2$:     TST     INTCHR          ;SEE IF ANY INPUT
6464  025330  001775                          BEQ     2$              ;BR IF NONE, TO CHECK AGAIN
6465  025332  013701  005524                  MOV     INTCHR,R1       ;GET CHAR INTO R1
6466  025336  020127  000022                  CMP     R1,#022         ;SEE IF (↑R) TYPED
6467  025342  001002                          BNE     3$              ;BR IF NOT (↑R)
6468  025344  000137  024162                  JMP     GIVEID          ;JUMP TO RESTART
6469  025350  020127  000101          3$:     CMP     R1,#'A          ;SEE IF AUTO ALIGNMENT REQUESTED
6470  025354  001417                          BEQ     AUTAL           ;BR IF AUTO ALIGNMENT REQUESTED
6471  025356  020127  000105                  CMP     R1,#'E          ;SEE IF AUTO EXERCISES REQUESTED
6472  025362  001002                          BNE     4$              ;BR IF EXERCISES NOT REQUESTED
6473  025364  000137  026410                  JMP     AUTEX           ;JUMP TO DO AUTO EXERCISES
6474  025370  020127  000126          4$:     CMP     R1,#'V          ;SEE IF VERIFY REQUESTED
6475  025374  001004                          BNE     6$              ;BR IF NOT VERIFY
6476  025376  112737  000001  011430          MOVB    #1,VERIFY       ;SET VERIFY MODE FLAG
6477  025404  000403                          BR      AUTAL           ;PROCEED IN VERIFY MODE
6478  025406  004737  027270          6$:     JSR     PC,ECOBAD       ;ECHO BAD INPUT
6479  025412  000736                          BR      1$              ;BR TO ASK FOR A OR E AGAIN
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6481
6482
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6483                                        ;AUTO ALIGNMENT MODE
6484  025414                                AUTAL:
6485  025414  105737  011430                       TSTB    VERIFY          ;SEE IF AUTO VERIFY MODE
6486  025420  001403                               BEQ     3$              ;BR IF NOT
6487  025422  104400  013112                       TYPE    ,AUTVRF         ;REPORT AUTO VERIFY MODE
6488  025426  000402                               BR      4$
6489  025430  104400  013054              3$:      TYPE    ,AUTALN         ;TYPE ALIGNMENT MESSAGE
6490  025434  004737  027250              4$:      JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE KBD INPUT
6491  025440  005037  003014                       CLR     T.MR2           ;CLEAR MR2 STORAGE WORD
6492  025444  005037  005526                       CLR     SELECT          ;INITIALIZE AUTO-SELECTED DRIVE INDICATOR
6493  025450  012737  000377  005530               MOV     #377,ONLINE     ;INIT. OLD ONLINE DRIVE INDICATOR
6494  025456  012737  000377  005532               MOV     #377,NEWON      ;INIT. NEW ONLINE DRIVE INDICATOR
6495  025464  012737  000377  005534               MOV     #377,SCRACH     ;INITIALIZE LAST DRIVE INDICATOR
6496  025472  005737  005524              DRVLUP:  TST     INTCHR          ;SEE IF ANY KBD INPUT
6497  025476  001445                               BEQ     6$              ;BR IF NO INPUT
6498  025500  113765  005534  000000               MOVB    SCRACH,P.DRVN(R5) ;DRIVE NO. FOR POSSIBLE RECALIBRATE
6499  025506  123727  005524  000032               CMPB    INTCHR,#032     ;SEE IF (↑Z) TYPED
6500  025514  001013                               BNE     2$              ;BR IF NOT (↑Z)
6501  025516  022737  000377  005534               CMP     #377,SCRACH     ;SEE IF ANY DRIVE SELECTED YET
6502  025524  001405                               BEQ     1$              ;BR IF NONE
6503  025526  112765  000113  000001               MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6504  025534  004737  040716                       JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6505  025540  000137  025300              1$:      JMP     AUTO            ;RESTART AUTO MODE
6506  025544  123727  005524  000022      2$:      CMPB    INTCHR,#022     ;SEE IF (↑R) TYPED
6507  025552  001013                               BNE     4$              ;BR IF NOT (↑R)
6508  025554  022737  000377  005534               CMP     #377,SCRACH     ;SEE IF ANY DRIVE SELECTED YET
6509  025562  001405                               BEQ     3$              ;BR IF NONE
6510  025564  112765  000113  000001               MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
6511  025572  004737  040716                       JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
6512  025576  000137  024162              3$:      JMP     GIVEID          ;RESTART ALIGNMENT AID
6513  025602  004737  027270              4$:      JSR     PC,ECOBAD       ;ECHO BAD INPUT
6514  025606  004737  027250                       JSR     PC,PREPKB       ;PREPARE FOR POSSIBLE  KBD INPUT
6515  025612  005037  005502              6$:      CLR     DRIVE           ;ZERO THE DRIVE NUMBER
6516  025616  012700  000001                       MOV     #1,R0           ;INITIALIZE DRIVE BIT MASK
6517  025622  012737  027032  003036      8$:      MOV     #NEDHDL,A.ABNL  ;SET NED ABNORMAL RETURN ADDRESS
6518  025630  050037  005532                       BIS     R0,NEWON        ;SET ON-LINE BIT FOR THIS DRIVE
6519                                      ;SELECT CURRENT DRIVE, CHECK FOR NON-EXISTENT DRIVE (NED) INDICATION
6520  025634  113765  005502  000000               MOVB    DRIVE,P.DRVN(R5) ;SET DRIVE NUMBER
6521  025642  112765  000101  000001               MOVB    #SELDRV,P.CMND(R5) ;SET SELECT DRIVE COMMAND
6522  025650  004737  040716                       JSR     PC,DRVCAL       ;SELECT THIS DRIVE
6523  025654  022737  000007  005502               CMP     #7,DRIVE        ;SEE IF WE JUST CHECKED DRIVE 7
6524  025662  001405                               BEQ     10$             ;BR IF IT WAS DRIVE 7
6525  025664  005237  005502                       INC     DRIVE           ;ADD 1 TO  DRIVE NUMBER
6526  025670  000241                               CLC                     ;CLEAR CARRY BEFORE ROTATE
6527  025672  006100                               ROL     R0              ;SHIFT BIT POINTER
6528  025674  000752                               BR      8$              ;BR TO SELECT NEXT DRIVE
6529  025676  013701  005532              10$:     MOV     NEWON,R1
6530                                      ;****** TO BE REMOVED *******
6531  025702  023737  005532  005530               CMP     NEWON,ONLINE
6532  025710  001670                               BEQ     DRVLUP
6533  025712  012703  000001                       MOV     #1,R3           ;NUMBER OF 200 MILLI-SEC STALLS
6534  025716  012700  177777              LOOP1:   MOV     #177777,R0
6535  025722  005300                      LOOP2:   DEC     R0
6536  025724  005700                               TST     R0
6537  025726  001375                               BNE     LOOP2
6538  025730  005303                               DEC     R3
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6539  025732  001371                          BNE     LOOP1
6540
6541  025734  043701  005530                  BIC     ONLINE,R1       ;GET CHANGED ONLINE BITS
6542  025740  013737  005532  005530          MOV     NEWON,ONLINE    ;UPDATE ONLINE DRIVE BITS
6543  025746  005701                          TST     R1              ;SEE IF ANY DRIVE JUST WENT ON-LINE
6544  025750  001650                          BEQ     DRVLUP          ;BR IF NO DRIVE JUST WENT ONLINE
6545                                  ;SERVICE THE DRIVE WHICH WAS JUST SELECTED
6546  025752  012737  042410  003036          MOV     #ERRHDL,A.ABNL  ;RESTORE USUAL  ERROR HANDLER ADDRESS
6547  025760  005037  005502                  CLR     DRIVE           ;INITIALIZE DRIVE NO.
6548  025764  010103                          MOV     R1,R3           ;COPY NEW SELECTED DRIVE BITS
6549  025766  012700  000001                  MOV     #1,R0           ;INITIALIZE BIT POINTER
6550  025772  030003                  12$:    BIT     R0,R3           ;SEE IF THIS BIT  IS  SET
6551  025774  001005                          BNE     14$             ;BR IF THIS BIT SET
6552  025776  005237  005502                  INC     DRIVE           ;INCREMENT DRIVE NO.
6553  026002  000241                          CLC                     ;CLEAR CARRY BEFORE ROTATE
6554  026004  006100                          ROL     R0              ;SHIFT BIT POINTER
6555  026006  000771                          BR      12$             ;TRY AGAIN
6556  026010  040003                  14$:    BIC     R0,R3           ;CLEAR OUT THIS BIT
6557  026012  001415                          BEQ     16$             ;BR IF ONLY ONE DRIVE SELECTED
6558                                  ;ERROR  -  MORE THAN ONE DRIVE SELECTED SIMULTANEOUSLY
6559  026014  104400  012313                  TYPE    ,MULSEL         ;REPORT ERROR
6560  026020  042762  000100  000000          BIC     #IE,RKCS1(R2)   ;INHIBIT RK06 INTERRUPT
6561  026026  000000                          HALT                    ;HALT  FOR  MANUAL  INTERVENTION
6562                                                                  ;    PRESS 'CONT' TO  PROCEED
6563  026030  112765  000177  000001          MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR COMMAND
6564  026036  004737  040716                  JSR     PC,DRVCAL       ;CLEAR THE SUBSYSTEM
6565  026042  000137  025414                  JMP     AUTAL           ;RESTART  AUTO ALIGNMENT
6566                                  ;CONTINUE WITH SELECTED DRIVE
6567  026046  020137  005526          16$:    CMP     R1,SELECT       ;SEE IF  STILL  ALIGNING SAME  DRIVE
6568  026052  001506                          BEQ     26$             ;BR IF SAME DRIVE
6569                                  ;PROCEED WITH NEWLY-SELECTED DRIVE
6570  026054  022737  000377  005534          CMP     #377,SCRACH     ;SEE IF THIS IS FIRST DRIVE SELECTED
6571  026062  001421                          BEQ     23$             ;BR IF FIRST DRIVE
6572  026064  113765  005534  000000          MOVB    SCRACH,P.DRVN(R5) ;GET LAST DRIVE NUMBER
6573  026072  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ STATUS COMMAND
6574  026100  004737  040716                  JSR     PC,DRVCAL       ;READ STATUS OF PREVIOUS DRIVE
6575  026104  032765  000040  000044          BIT     #S.HDHM,P.A01(R5) ;SEE IF HEADS ARE UNLOADED
6576  026112  001405                          BEQ     23$             ;BR IF HEADS NOT UNLOADED
6577  026114  112765  000111  000001          MOVB    #SRTSPL,P.CMND(R5) ;SET START SPINDLE COMMAND
6578  026122  004737  040716                  JSR     PC,DRVCAL       ;START SPINDLE ON PREVIOUS DRIVE
6579  026126  113737  005502  005534  23$:    MOVB    DRIVE,SCRACH    ;STORE DRIVE NO. FOR LATER CLEANUP STRT SPL
6580  026134  010137  005526                  MOV     R1,SELECT       ;UPDATE SELECTED DRIVE NUMBER
6581  026140  013701  005502                  MOV     DRIVE,R1        ;GET DRIVE NUMBER
6582  026144  052701  000060                  BIS     #'0,R1          ;CONVERT TO ASCII
6583  026150  110137  013154                  MOVB    R1,DRVSEL       ;GET DRIVE NUMBER INTO OUTPUT BUFFER
6584  026154  104400  013145                  TYPE    ,DRISEL         ;TYPE "DRIVE X SELECTED"
6585  026160  004737  031460                  JSR     PC,CHKDRV       ;CHECK DRIVE FOR RDY, WRITE PROT.
6586  026164  025414                          AUTAL                   ;ERROR RETURN ADDRESS
6587  026166  112737  000377  011427          MOVB    #377,UNLOD      ;SET DRIVE UNLOADED INDICATOR
6588  026174  012737  000002  005522          MOV     #2,TRACK        ;SET TRACK = 2
6589  026202  113765  005502  000000          MOVB    DRIVE,P.DRVN(R5) ;SET DRIVE NUMBER
6590  026210  105737  011430          24$:    TSTB    VERIFY          ;SEE IF AUTO VERIFY
6591  026214  001016                          BNE     32$             ;SKIP UNLOAD IF VERIFY
6592  026216  112765  000107  000001          MOVB    #UNLOAD,P.CMND(R5) ;SET UNLOAD COMMAND
6593  026224  004737  040716                  JSR     PC,DRVCAL       ;UNLOAD THE DRIVE
6594  026230  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ STATUS COMMAND
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6595  026236  004737  040716          25$:    JSR     PC,DRVCAL           ;READ STATUS OF DRIVE
6596  026242  032765  000040  000044          BIT     #S.HDHM,P.A01(R5)   ;SEE IF HEADS ARE UNLODED YET
6597  026250  001772                          BEQ     25$                 ;BR IF NOT YET
6598  026252  112765  000177  000001  32$:    MOVB    #SUBCLR,P.CMND(R5)  ;SET SUBSYSTEM CLEAR COMMAND
6599  026260  004737  040716                  JSR     PC,DRVCAL           ;CLEAR THE S.S.
6600  026264  000137  025472                  JMP     DRVLUP              ;GO BACK TO SCAN DRIVES AGAIN
6601                                  ;PROCEED WITH SAME DRIVE
6602  026270  113765  005502  000000  26$:    MOVB    DRIVE,P.DRVN(R5)    ;SET DRIVE NO.
6603  026276  105137  011427                  COMB    UNLOD               ;COMPLEMENT UNLOAD INDICATOR
6604  026302  001342                          BNE     24$                 ;BR IF DRIVE SHOULD BE UNLOADED
6605  026304  105737  011430                  TSTB    VERIFY              ;SEE IF AUTO VERIFY
6606  026310  001005                          BNE     33$                 ;SKIP START SPL IF VERIFY
6607  026312  112765  000111  000001          MOVB    #SRTSPL,P.CMND(R5)  ;SET START SPINDLE COMMAND
6608  026320  004737  040716                  JSR     PC,DRVCAL           ;START SPINDLE ON THIS DRIVE
6609  026324  022737  000002  005522  33$:    CMP     #2,TRACK            ;SEE IF LAST TRACK WAS 2
6610  026332  001003                          BNE     28$                 ;BR IF IT WAS NOT 2
6611  026334  005037  005522                  CLR     TRACK               ;SET TRACK = 0
6612  026340  000402                          BR      30$                 ;GO SEEK TO ALIGNMENT CYLINDER
6613  026342  005237  005522          28$:    INC     TRACK               ;INCREMENT TRACK NUMBER
6614  026346  113765  005522  000005  30$:    MOVB    TRACK,P.TRCK(R5)    ;SET TRACK NO.
6615  026354  004737  031720                  JSR     PC,ALNSEK           ;SEEK IN INCREMENTS TO ALIGN. CYL
6616  026360  104400  012647                  TYPE    ,HEDPOS             ;TYPE HEADS POSITIONED MSG
6617  026364  013701  005522                  MOV     TRACK,R1            ;GET CURRENT TRACK  NO.
6618  026370  152701  000060                  BISB    #'0,R1              ;CONVERT  TO  ASCII
6619  026374  110137  013006                  MOVB    R1,HEADNO           ;GET TRACK  INTO  MSG BUFFER
6620  026400  104400  013001                  TYPE    ,HEDSEL             ;TYPE "HEAD X SELECTED"
6621  026404  000137  025472                  JMP     DRVLUP              ;GO BACK TO SCAN DRIVES AGAIN
6622
6623
6624                                  ;AUTO RANDOM SEEK EXERCISE ROUTINE
6625  026410                          AUTEX:
6626  026410  004737  030726                  JSR     PC,INITSS           ;INITIALIZE SUBSYSTEM
6627  026414  004737  027250                  JSR     PC,PREPKB           ;PREPARE FOR KBD INPUT
6628  026420  104400  013172                  TYPE    ,AUTEXR             ;ASK FOR SHORT OR LONG SEEK EXERCISES
6629  026424  005737  005524          1$:     TST     INTCHR              ;SEE IF ANY INPUT
6630  026430  001775                          BEQ     1$                  ;BR IF NO INPUT
6631  026432  023727  005524  000022          CMP     INTCHR,#022         ;SEE IF (↑R) TYPED
6632  026440  001002                          BNE     2$                  ;BR IF NOT (↑R)
6633  026442  000137  024162                  JMP     GIVEID              ;JUMP TO RESTART ALIGNMENT AID
6634  026446  023727  005524  000032  2$:     CMP     INTCHR,#032         ;SEE IF (↑Z) TYPED
6635  026454  001002                          BNE     3$                  ;BR IF NOT (↑Z)
6636  026456  000137  025300                  JMP     AUTO                ;JUMP TO RESTART AUTO MODE
6637  026462  023727  005524  000123  3$:     CMP     INTCHR,#'S          ;SEE IF SHORT EXERCISES DESIRED
6638  026470  001004                          BNE     4$                  ;BR IF NOT SHORT
6639  026472  012737  002734  005534          MOV     #RNDSHT,SCRACH      ;SET 1 MINUTE SEEK COUNT
6640  026500  000413                          BR      6$                  ;PROCEED WITH SHORT EXERCISES
6641  026502  023727  005524  000114  4$:     CMP     INTCHR,#'L          ;SEE IF LONG EXERCISES DESIRED
6642  026510  001004                          BNE     5$                  ;BR IF NOT LONG
6643  026512  012737  016514  005534          MOV     #RNDLNG,SCRACH      ;SET 5 MINUTE SEEK COUNT
6644  026520  000403                          BR      6$                  ;PROCEED WITH LONG EXERCISES
6645  026522  004737  027270          5$:     JSR     PC,ECOBAD           ;ECHO BAD INPUT
6646  026526  000730                          BR      AUTEX               ;BR TO ASK AGAIN
6647  026530  005037  005502          6$:     CLR     DRIVE               ;SET DRIVE = 0
6648                                  ;SELECT CURRENT DRIVE AND CHECK FOR NON-EXISTENT DRIVE INDICATION
6649  026534  012737  027032  003036  8$:     MOV     #NEDHDL,A.ABNL      ;SET NED ABNORMAL RETURN ADDRESS
6650  026542  113765  005502  000000          MOVB    DRIVE,P.DRVN(R5)    ;SET DRIVE NUMBER
```

```
 6651  026550  112765  000101  000001          MOVB    #SELDRV,P.CMND(R5) ;SET SELECT DRIVE COMMAND
 6652  026556  012737  000377  005532          MOV     #377,NEWON         ;INITIALIZE ON-LINE INDICATOR
 6653  026564  004737  040716                  JSR     PC,DRVCAL          ;SELECT THIS DRIVE
 6654  026570  012737  042410  003036          MOV     #ERRHDL,A.ABNL     ;RESTORE ABNORMAL DRIVER RETURN ADDRESS
 6655  026576  022737  000377  005532          CMP     #377,NEWON         ;SEE IF NED INDICATION ON THIS DRIVE
 6656  026604  001075                          BNE     18$                ;BR IF NED, TO SKIP THIS DRIVE
 6657                                  ;CHECK DRIVE FOR RDY, WRITE PROTECT
 6658  026606  004737  031460                  JSR     PC,CHKDRV          ;CHECK THIS DRIVE
 6659  026612  026410                          AUTEX                      ;ERROR RETURN ADDRESS FOR CHKDRV
 6660                                  ;PROCEED WITH SEEK EXERCISES ON THIS DRIVE
 6661  026614  013701  005502                  MOV     DRIVE,R1           ;GET DRIVE NUMBER
 6662  026620  052701  000060                  BIS     #'0,R1             ;CONVERT TO ASCII
 6663  026624  110137  013304                  MOVB    R1,AUTODR          ;GET DRIVE NUMBER INTO OUTPUT BUFFER
 6664  026630  104400  013263                  TYPE    ,AUTOEX            ;TYPE "EXERCISING DRIVE X"
 6665  026634  112765  000117  000001          MOVB    #SEEK,P.CMND(R5)   ;SET SEEK COMMAND
 6666  026642  013700  005534                  MOV     SCRACH,R0          ;SEEK COUNT
 6667  026646  004737  027250          10$:    JSR     PC,PREPKB          ;PREPARE FOR POSSIBLE KBD INPUT
 6668  026652  004737  034044                  JSR     PC,RNDADR          ;SELECT RANDOM CYLINDER ADDRESS
 6669  026656  013765  005506  000002          MOV     CYLNDR,P.CYLN(R5)  ;SET RANDOM CYLINDER ADDRESS
 6670  026664  004737  040716                  JSR     PC,DRVCAL          ;DO A RANDOM SEEK
 6671  026670  005737  005524                  TST     INTCHR             ;SEE IF ANY KBD INPUT
 6672  026674  001432                          BEQ     16$                ;BR IF NO INPUT
 6673  026676  023727  005524  000022          CMP     INTCHR,#022        ;SEE IF (↑R) TYPED
 6674  026704  001007                          BNE     12$                ;BR IF NOT (↑R)
 6675  026706  112765  000113  000001          MOVB    #RECAL,P.CMND(R5)  ;SET RECALIBRATE COMMAND
 6676  026714  004737  040716                  JSR     PC,DRVCAL          ;RECALIBRATE DRIVE
 6677  026720  000137  024162                  JMP     GIVEID             ;JUMP TO RESTART ALIGNMENT AID
 6678  026724  023727  005524  000032  12$:    CMP     INTCHR,#032        ;SEE IF (↑Z) TYPED
 6679  026732  001007                          BNE     14$                ;BR IF NOT (↑Z)
 6680  026734  112765  000113  000001          MOVB    #RECAL,P.CMND(R5)  ;SET RECALIBRATE COMMAND
 6681  026742  004737  040716                  JSR     PC,DRVCAL          ;RECALIBRATE DRIVE
 6682  026746  000137  025300                  JMP     AUTO               ;JUMP TO RESTART AUTO MODE
 6683  026752  004737  027270          14$:    JSR     PC,ECHBAD          ;ECHO BAD INPUT
 6684  026756  004737  027250                  JSR     PC,PREPKB          ;ENABLE KBD INPUT AGAIN
 6685  026762  005300                  16$:    DEC     R0                 ;DECREMENT SEEK COUNT
 6686  026764  001330                          BNE     10$                ;BR IF NOT DONE WITH THIS DRIVE
 6687  026766  112765  000113  000001          MOVB    #RECAL,P.CMND(R5)  ;SET RECALIBRATE COMMAND
 6688  026774  004737  040716                  JSR     PC,DRVCAL          ;RECALIBRATE DRIVE
 6689  027000  005237  005502          18$:    INC     DRIVE              ;INCREMENT DRIVE NUMBER
 6690  027004  022737  000010  005502          CMP     #10,DRIVE          ;SEE IF DONE WITH ALL DRIVES
 6691  027012  001250                          BNE     8$                 ;BR IF MORE DRIVES TO EXERCISE YET
 6692  027014  042777  000100  152122          BIC     #BIT6,@$TKS        ;DISABLE KBD INTERRUPT
 6693  027022  104400  001310                  TYPE    ,$BELL             ;RING BELL AT END OF AUTO-EXERCISES
 6694  027026  000137  025300                  JMP     AUTO               ;RESTART AUTO MODE
 6695
 6696
 6697                                  ;THIS IS THE ABNORMAL RETURN FROM THE DRIVER,
 6698                                  ;  WHICH IS USED WHEN NED INDICATION IS EXPECTED (AND VALID).
 6699                                  ;    (NED = NON-EXISTENT DRIVE)
 6700  027032  032765  010000  000020  NEDHDL: BIT     #NED,P.CS2(R5)     ;SEE IF NED ON DRIVE SELECT
 6701  027040  001002                          BNE     1$                 ;BR IF NED SET
 6702  027042  000137  042410                  JMP     ERRHDL             ;GO HANDLE  OTHER ERROR
 6703  027046  010046                  1$:     MOV     R0,-(SP)           ;SAVE R0,R1
 6704  027050  010146                          MOV     R1,-(SP)
 6705  027052  012700  000001                  MOV     #1,R0              ;SET BIT POINTER
 6706  027056  005001                          CLR     R1                 ;CLEAR COUNTER
```

I12

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6707  027060  120137  005502          2$:     CMPB    R1,DRIVE        ;SEE IF R1 = CURRENT DRIVE NUMBER
6708  027064  001403                          BEQ     3$              ;BR IF  =
6709  027066  005201                          INC     R1              ;INCREMENT COUNTER
6710  027070  006300                          ASL     R0              ;SHIFT BIT POINTER
6711  027072  000772                          BR      2$              ;TRY AGAIN
6712  027074  040037  005532          3$:     BIC     R0,NEWON        ;CLEAR ONLINE BIT FOR  THIS DRIVE
6713  027100  012601                          MOV     (SP)+,R1        ;RESTORE R0,R1
6714  027102  012600                          MOV     (SP)+,R0
6715  027104  000137  044624                  JMP     RETNML          ;TAKE  NORMAL  RETURN
6716
6717
6718                                  ;;*****************************************************************
6719                                  .SBTTL  KBDHDL - TTY KEYBOARD INTERRUPT HANDLER
6720                                  ;;*****************************************************************
6721
6722  027110  010146                  KBDHDL: MOV     R1,-(SP)        ;SAVE R1 ON STACK
6723  027112  017701  152030                  MOV     @$TKB,R1        ;READ A CHAR FROM KBD BUFFER
6724  027116  042701  177600                  BIC     #177600,R1      ;MASK OUT UNUSED BITS
6725  027122  120127  000172                  CMPB    R1,#172         ;SEE IF LOWER CASE TYPED
6726  027126  003005                          BGT     20$             ;BR IF NOT
6727  027130  120127  000141                  CMPB    R1,#141
6728  027134  002402                          BLT     20$             ;BR IF NOT
6729  027136  042701  000040                  BIC     #BIT5,R1        ;MAKE IT UPPER CASE
6730  027142  010137  005524          20$:    MOV     R1,INTCHR       ;SAVE INPUT CHARACTER
6731  027146  122701  000003                  CMPB    #003,R1         ;SEE IF (↑C) TYPED
6732  027152  001007                          BNE     2$              ;BR IF NOT (↑C)
6733  027154  104400  013354                  TYPE    ,CNTRLC         ;ECHO (↑C)
6734  027160  042777  000100  151756  1$:     BIC     #BIT6,@$TKS     ;CLEAR KBD INTERRUPT ENABLE BIT
6735  027166  012601                          MOV     (SP)+,R1        ;RESTORE R1
6736  027170  000002                          RTI                     ;RETURN
6737  027172  122701  000032          2$:     CMPB    #032,R1         ;SEE IF (↑Z) TYPED
6738  027176  001003                          BNE     3$              ;BR IF NOT (↑Z)
6739  027200  104400  013361                  TYPE    ,CNTRLZ         ;ECHO (↑Z)
6740  027204  000765                          BR      1$              ;RETURN
6741  027206  122701  000022          3$:     CMPB    #022,R1         ;SEE IF (↑R) TYPED
6742  027212  001003                          BNE     4$              ;BR IF NOT (↑R)
6743  027214  104400  013366                  TYPE    ,CNTRLR         ;ECHO (↑R)
6744  027220  000757                          BR      1$              ;RETURN
6745  027222  122701  000007          4$:     CMPB    #007,R1         ;SEE IF (↑G) TYPED
6746  027226  001003                          BNE     5$              ;BR IF NOT (↑G)
6747  027230  104400  013400                  TYPE    ,CNTRLG         ;ECHO (↑G)
6748  027234  000751                          BR      1$              ;RETURN
6749  027236  104400  005524          5$:     TYPE    ,INTCHR         ;ECHO INPUT
6750  027242  104400  001315                  TYPE    ,$CRLF          ;DO <CR> AND <LF>
6751  027246  000744                          BR      1$              ;RETURN
6752
6753
6754
6755                                  ;;*****************************************************************
6756                                  .SBTTL  PREPKB - PREPARE FOR KEYBOARD INPUT
6757                                  ;*THIS SUBROUTINE CLEARS THE KEYBOARD BUFFER AND THE
6758                                  ;*DONE BIT, AND CLEARS THE TTY INTERRUPT INPUT WORD
6759                                  ;*INTCHR, IN PREPARATION FOR NEW TTY INPUT. IT ALSO
6760                                  ;*ENABLES KBD INTERRUPT.
6761                                  ;* CALL:
6762                                  ;*      JSR     PC,PREPKB
```

```
                                ;;*****************************************************************
                                ;;*****************************************************************
027250  005077  151672          PREPKB: CLR     @$TKB           ;CLEAR KBD BUFFER AND DONE BIT
027254  005037  005524                  CLR     INTCHR          ;CLEAR TTY INPUT WORD
027260  052777  000100  151656          BIS     #BIT6,@$TKS     ;ENABLE KBD INTERRUPT
027266  000207                          RTS     PC              ;RETURN


                                ;;*****************************************************************
                                .SBTTL  ECOBAD - ECHO BAD TTY INPUT
                                ;*THIS SUBROUTINE ECHOS A CHARACTER WHICH HAD BEEN
                                ;*TYPED IN AND WAS DETERMINED TO BE INVALID FOR SOME
                                ;*REASON, FOLLOWED BY A QUESTION MARK (?). THEN, A <CR>
                                ;*AND <LF> ARE DONE.
                                ;* CALL -     JSR     PC,ECOBAD
                                ;;*****************************************************************
027270  104400  005524          ECOBAD: TYPE    ,INTCHR         ;ECHO BAD CHARACTER
027274  104400  001314                  TYPE    ,$QUES          ;TYPE <?> AND <CR>, <LF>
027300  000207                          RTS     PC              ;RETURN


                                ;;*****************************************************************
                                ;*SIZMEM - SIZE MEMORY, SET LIMITS
                                ;*THIS SUBROUTINE SIZES MEMORY BY CALLING SUBROUTINE $SIZE, AND
                                ;*IT USES THE VALUES RETURNED, TO SET THE LIMITS ON PARAMETER MA.
                                ;*IT ALSO TYPES "LAST PHYS MEM ADR = XXXXXXXX" (LEAD ZEROS SUPRS'D),
                                ;*AND SETS THE FLAG UBMPRS = 1 IF 22-BIT ADDRESSES ARE USED (11/70).
                                ;;*****************************************************************
027302  104406                  SIZMEM: SAVREG                  ;SAVE R0-R5
027304  012737  000200  056216          MOV     #200,$KT11      ;SET MEM MGT KEY FOR $SIZE
027312  004737  056132                  JSR     PC,$SIZE        ;SIZE MEMORY
027316  005737  056216                  TST     $KT11           ;SEE IF MEM MGT PRESENT
027322  100406                          BMI     8$              ;BR IF MEM MGT PRESENT
027324  013737  056462  005574          MOV     $LSTAD,MAHILM   ;SET MEM LIMIT LO BITS
027332  005037  005576                  CLR     MAHILM+2        ;CLEAR MEM LIMIT HI BITS
027336  000427                          BR      16$             ;GO TYPE LAST ADDRESS
                                ;SHIFT SAF LEFT 6, AND PUT IN R1-R0
027340  013700  056464          8$:     MOV     $LSTBK,R0       ;LO BITS
027344  005001                          CLR     R1              ;HI BITS
027346  012702  000006                  MOV     #6,R2           ;SET LOOP COUNT = 6
027352  000241                  12$:    CLC                     ;ROTATE LOOP
027354  006100                          ROL     R0
027356  006101                          ROL     R1
027360  005302                          DEC     R2
027362  001373                          BNE     12$
                                ;ADD VIRTUAL ADDRESS TO SHIFTED SAF TO GET PHYSICAL ADDRESS
027364  063700  056462                  ADD     $LSTAD,R0       ;ADD LO BITS
027370  005501                          ADC     R1              ;HI BITS
027372  010037  005574                  MOV     R0,MAHILM       ;SET LO BITS OF MEM LIMIT
027376  010137  005576                  MOV     R1,MAHILM+2     ;SET HI BITS OF MEM LIMIT
027402  042701  000003                  BIC     #3,R1           ;CLEAR ADRS BITS 16,17
027406  001403                          BEQ     16$             ;BR IF NOT 22-BIT ADDRESSES
027410  112737  000001  003134          MOVB    #1,UBMPRS       ;SET "UNIBUS MAP PRESENT" FLAG
```

```
 6819                                   ;TYPE "LAST PHYS MEM ADR = XXXXXXXX"
 6820  027416  104400  007125  16$:     TYPE    ,LSTMEM         ;TYPE "LAST PHYS MEM ADR ="
 6821  027422  012746  005574          MOV     #MAHILM,-(SP)   ;PUT POINTER ON STACK
 6822  027426  004737  053674          JSR     PC,@#$DB2O      ;CONVERT BINARY TO OCTAL ASCII
 6823  027432  004737  054210          JSR     PC,@#$SUPRS     ;TYPE "XXXXXXXX"
 6824  027436  104400  001315          TYPE    ,$CRLF          ;TYPE <CR>,<LF>
 6825  027442  104400  001315          TYPE    ,$CRLF
 6826  027446  104407                  RESREG                  ;RESTORE R0-R5
 6827  027450  000207                  RTS     PC              ;RETURN
 6828
 6829
 6830
 6831                                   ;;*****************************************************************
 6832                                   ;* GETPRM - INPUT A SIX-DIGIT OCTAL NO. ON TTY KBD
 6833                                   ;*ENTER SUBROUTINE WITH OLD PARAMETER VALUE ON STACK. SUBROUTINE
 6834                                   ;*TYPES OLD VALUE, AND INPUTS NEW VALUE, RETURNING NEW VALUE ON
 6835                                   ;*TOP OF STACK.
 6836                                   ;;*****************************************************************
 6837  027452  016646  000002  GETPRM: MOV     2(SP),-(SP)     ;GET OLD VALUE
 6838  027456  104402                  TYPOS                   ;TYPE IT
 6839  027460     006                  .BYTE   6               ;SIX DIGITS
 6840  027461     000                  .BYTE   0               ;SUPPRESS LEADING ZEROS
 6841  027462  104400  007333          TYPE    ,NEWMSG         ;TYPE "  NEW = "
 6842  027466  004737  032214          JSR     PC,RDCHRS       ;READ NEW VALUE FROM KBD
 6843  027472  027524                  7$                      ;(↑C) RETURN ADDRESS
 6844  027474  027524                  7$                      ;(↑Z) RETURN ADDRESS
 6845  027476  027524                  7$                      ;(↑U) OR ERROR RETURN ADDRESS
 6846  027500  005700                  TST     R0              ;SEE IF ANY CHARS TYPED
 6847  027502  001001                  BNE     4$              ;BR IF YES
 6848  027504  000207                  RTS     PC              ;RETURN - OLD VALUE UNCHANGED
 6849  027506  020027  000006  4$:     CMP     R0,#6           ;SEE IF > 6 CHARS TYPED
 6850  027512  003407                  BLE     8$              ;BR IF NOT BAD
 6851  027514  104400  005264  6$:     TYPE    ,BUFFO          ;ECHO BAD INPUT
 6852  027520  104400  001314          TYPE    ,$QUES
 6853  027524  162716  000010  7$:     SUB     #10,(SP)        ;FIX ERROR RETURN PC
 6854  027530  000207                  RTS     PC              ;ERROR RETURN
 6855  027532  012746  005264  8$:     MOV     #BUFFO,-(SP)    ;PUT POINTER TO CHARS ON STACK
 6856  027536  004737  052736          JSR     PC,OCTBIN       ;CONVERT DIGITS TO BINARY
 6857  027542  027514                  6$                      ;ERROR RETURN ADDRESS
 6858  027544  012600                  MOV     (SP)+,R0        ;GET NEW BINARY VALUE
 6859  027546  005737  053070          TST     $HIOCT          ;SEE IF HI BITS ARE 0
 6860  027552  001360                  BNE     6$              ;BR IF NOT
 6861  027554  010066  000002          MOV     R0,2(SP)        ;PUT NEW VALUE ON STACK
 6862  027560  000207                  RTS     PC              ;RETURN
 6863
 6864
 6865
 6866                                   ;;*****************************************************************
 6867                                   .SBTTL  GTSWRG - OPEN SOFTWARE SWITCH REGISTER FOR MODIFICATION
 6868                                   ;*THIS SUBROUTINE ALLOWS THE CONTENTS OF THE SOFTWARE SWITCH
 6869                                   ;*REGISTER TO BE MODIFIED BY TTY INPUT. THE SUBROUTINE TYPES
 6870                                   ;* "SWR = XXXXXX  NEW = ", AND WAITS FOR A NEW OCTAL VALUE
 6871                                   ;*OF UP TO SIX DIGITS TO BE TYPED.
 6872                                   ;;*****************************************************************
 6873  027562  022737  000176  001140  GTSWRG: CMP     #SWREG,SWR      ;SEE IF SOFTWARE SWR SELECTED
 6874  027570  001010                  BNE     6$              ;BR IF NOT
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6875  027572  013746  000176                  MOV     SWREG,-(SP)     ;PUT OLD VALUE ON STACK
6876  027576  104400  007324                  TYPE    ,SWRMSG         ;TYPE "SWR = "
6877  027602  004737  027452                  JSR     PC,GETPRM       ;TYPE OLD, GET NEW SWREG VALUE
6878  027606  012637  000176                  MOV     (SP)+,SWREG     ;STORE NEW VALUE
6879  027612  000207                  6$:     RTS     PC              ;RETURN
6880
6881
6882
6883                                  ;;*****************************************************************
6884                                  ;*INITMM - INITIALIZE MEMORY MANAGEMENT REGISTERS
6885                                  ;*THIS SUBROUTINE INITIALIZES KIPAR'S AND KIPDR'S, FOR
6886                                  ;*CONTIGUOUS 4K PAGES, STARTING AT PHYSICAL ADDRESS 0.
6887                                  ;*KIPAR7 IS LOADED WITH 177600, TO PRESERVE THE I/O PAGE.
6888                                  ;*22-BIT MODE AND THE UNIBUS MAP ARE ENABLED, IF PRESENT,
6889                                  ;*BUT MEM MGT IS NOT TURNED ON IN THIS SUBROUTINE. HOWEVER,
6890                                  ;*MEM MGT TRAPS ARE ENABLED.
6891
6892                                  ;;*****************************************************************
6893  027614  104406                  INITMM: SAVREG                  ;SAVE R0-R5
6894  027616  005001                          CLR     R1              ;INIT FOR PAR LOADING
6895  027620  012702  172340                  MOV     #KIPAR0,R2      ;ADDR OF FIRST PAR
6896  027624  012703  000010                  MOV     #8.,R3          ;LOAD 8 PAR'S AND 8 PDR'S
6897  027630  012762  077406  177740  4$:     MOV     #77406,-40(R2)  ;PDR = 4K,UP,READ/WRITE
6898  027636  010122                          MOV     R1,(R2)+        ;LOAD A PAR
6899  027640  062701  000200                  ADD     #200,R1         ;UPDATE FOR NEXT PAR
6900  027644  005303                          DEC     R3              ;DECREMENT LOOP COUNTER
6901  027646  001370                          BNE     4$              ;LOOP UNTIL ALL 8 ARE LOADED
6902  027650  012742  177600                  MOV     #177600,-(R2)   ;SET UP KIPAR7 FOR I/O PAGE
6903  027654  105737  003134                  TSTB    UBMPRS          ;SEE IF 22-BIT ADDRESSES
6904  027660  001403                          BEQ     10$             ;BR IF NOT
6905  027662  012737  000060  172516          MOV     #60,@#SR3       ;ENABLE 22-BIT MODE,AND UNIBUS MAP
6906  027670  012737  001000  177572  10$:    MOV     #BIT9,@#SR0     ;ENABLE KT11 TRAPS
6907  027676  104407                          RESREG                  ;RESTORE R0-R5
6908  027700  000207                          RTS     PC              ;RETURN
6909
6910
6911
6912                                  ;;*****************************************************************
6913                                  ;*SERVICE ROUTINE FOR MEM MGT TRAPS
6914                                  ;;*****************************************************************
6915  027702  004737  042130          KTERHD: JSR     PC,REPSUP       ;GATHER STATUS FOR PRINTOUT
6916  027706  013737  177572  001174          MOV     @#SR0,$REG5     ;GET SR0
6917  027714  013737  177574  001176          MOV     @#SR1,$REG6     ;GET SR1
6918  027722  013737  177576  001200          MOV     @#SR2,$REG7     ;GET SR2
6919  027730  012737  027754  000004          MOV     #8$,@#ERRVEC    ;SET TIME-OUT VECTOR
6920  027736  012737  000340  000006          MOV     #PR7,@#ERRVEC+2
6921  027744  013737  172516  001202          MOV     @#SR3,$REG10    ;GET SR3
6922  027752  000406                          BR      10$
6923  027754  022626                  8$:     CMP     (SP)+,(SP)+     ;CLEAN UP STACK
6924  027756  112737  000003  064546          MOVB    #3,DF30+18.     ;FIX PRINTOUT FOR NO SR3
6925  027764  105037  063207                  CLRB    DH704+11.
6926  027770  104121                  10$:    ERROR   121             ;KT11 FAILURE
6927  027772  000137  044420                  JMP     HLTPRG          ;ABORT !!!
6928
6929
6930
```

```
                                        ;;*****************************************************************
                                        ;*ENBCSR - ENABLE MEMORY CSR'S FOR PARITY ERRORS
                                        ;;*****************************************************************
030776  010146                  ENBCSR: MOV     R1,-(SP)          ;SAVE R1
030000  013746  000004                  MOV     @#ERRVEC,-(SP)    ;SAVE OLD VECTORS
030004  013746  000006                  MOV     @#ERRVEC+2,-(SP)
030010  012737  030034  000004          MOV     #8$,@#ERRVEC      ;SET TIME-OUT VECTOR
030016  012701  172100                  MOV     #MEMCSR,R1        ;ADRS OF MEMORY CSR'S
030022  005021                  4$:     CLR     (R1)+             ;ZERO THIS CSR
030024  012761  000001  177776          MOV     #BIT0,-2(R1)      ;SET ENABLE IN THIS CSR
030032  000401                          BR      10$
030034  022626                  8$:     CMP     (SP)+,(SP)+       ;CLEAN UP THE STACK
030036  020127  172140          10$:    CMP     R1,#MEMCSR+40     ;SEE IF DONE CHECKING YET
030042  001367                          BNE     4$                ;BR IF NOT
030044  012637  000006                  MOV     (SP)+,@#ERRVEC+2  ;RESTORE OLD VECTORS
030050  012637  000004                  MOV     (SP)+,@#ERRVEC
030054  012601                          MOV     (SP)+,R1          ;RESTORE R1
030056  000207                          RTS     PC                ;RETURN


                                        ;;*****************************************************************
                                        ;*SERVICE ROUTINE FOR MEM PARITY ERRORS
                                        ;;*****************************************************************
030060  010146                  MPERHD: MOV     R1,-(SP)          ;SAVE R1
030062  013746  000004                  MOV     @#ERRVEC,-(SP)    ;SAVE OLD VECTORS
030066  013746  000006                  MOV     @#ERRVEC+2,-(SP)
030072  004737  042130                  JSR     PC,REPSUP         ;GATHER STATUS FOR PRINTOUT
030076  016637  000006  001174          MOV     6(SP),$REG5       ;GET PC OF ERROR
030104  012737  030230  000004          MOV     #10$,@#ERRVEC     ;SET T.O. VECTOR
030112  012737  000340  000006          MOV     #PR7,@#ERRVEC+2
                                ;HANDLE 11/70 MEMORY PARITY ERROR
030120  013737  177740  001176          MOV     @#LOERAD,$REG6    ;LOW ERROR ADRS REG
030126  013737  177742  001200          MOV     @#HIERAD,$REG7    ;HI ERROR ADRS REG
030134  013737  177744  001202          MOV     @#MEMSYS,$REG10   ;MEMORY SYSTEM REG
030142  012737  063243  064570          MOV     #DH707,DF31+16.   ;FIX ERROR MSG FOR 11/70
030150  112737  000004  064572          MOVB    #4,DF31+18.
030156  104122                          ERROR   122               ;11/70 MEM PARITY ERROR
030160  005737  001200                  TST     $REG7             ;SEE IF BAD MEMORY IS IN PROGRAM AREA
030164  001011                          BNE     6$                ;BR IF NOT
030166  023727  001176  072574          CMP     $REG6,#RWBUF+6000 ;SEE IF BAD MEM IS IN PROG. AREA
030174  103005                          BHIS    6$                ;BR IF NOT
030176  105737  003135          4$:     TSTB    MEMABT            ;SEE IF ABORT DESIRED
030202  001002                          BNE     6$                ;BR IF NOT
030204  000137  044420                  JMP     HLTPRG            ;ABORT !!!
030210  012637  000006          6$:     MOV     (SP)+,@#ERRVEC+2  ;RESTORE T.O. VECTOR
030214  012637  000004                  MOV     (SP)+,@#ERRVEC
030220  012601                          MOV     (SP)+,R1          ;RESTORE R1
030222  004737  027776                  JSR     PC,ENBCSR         ;GO CLEAR AND ENABLE CSR'S
030226  000002                          RTI                       ;RETURN
                                ;HANDLE ALL OTHER MEMORY PARITY ERRORS  (NON-11/70)
030230  022626                  10$:    CMP     (SP)+,(SP)+       ;CLEAN UP THE STACK
030232  012737  030262  000004          MOV     #14$,@#ERRVEC     ;SET T.O. VECTOR
030240  012701  172100                  MOV     #MEMCSR,R1        ;GET FIRST CSR ADDRESS
030244  011137  001200          12$:    MOV     (R1),$REG7        ;CHECK FOR A MEMORY CSR
030250  100005                          BPL     16$               ;BR IF NO ERROR SET HERE
```

```
 6987  030252  010137  001176                MOV     R1,$REG6        ;GET CSR ADDRESS
 6988  030256  104122                        ERROR   122             ;MEMORY PARITY ERROR (NON-11/70)
 6989  030260  000746                        BR      4$              ;GO SEE IF SHOULD ABORT
 6990  030262  022626              14$:      CMP     (SP)+,(SP)+     ;CLEAN UP STACK
 6991  030264  062701  000002      16$:      ADD     #2,R1           ;INCR R1 TO POINT TO NEXT CSR
 6992  030270  020127  172140                CMP     R1,#MEMCSR+40   ;SEE IF DONE CHECKING
 6993  030274  103763                        BLO     12$             ;BR IF NOT
 6994  030276  000744                        BR      6$              ;RETURN
 6995
 6996
 6997                                  ;;*****************************************************************
 6998                                  ;*PREPAR - PREPARE MEM MGT FOR RELOCATION
 6999                                  ;*THIS SUBROUTINE CALLS INITMM, AND THEN SETS UP CONSTANT
 7000                                  ;*FOR KIPAR6 IN SAVPAR, AND LOADS THE UNIBUS MAP REGISTERS,
 7001                                  ;*IF PRESENT.
 7002                                  ;;*****************************************************************
 7003  030300  104406          PREPAR: SAVREG                          ;SAVE R0-R5
 7004  030302  004737  027614          JSR     PC,INITMM               ;INIT MEM MGT REGISTERS
 7005  030306  013700  005604          MOV     PMA,R0                  ;LO BITS OF MA
 7006  030312  042700  017777          BIC     #17777,R0               ;MASK FOR BITS 13-15
 7007  030316  013701  005606          MOV     PMA+2,R1                ;HI BITS OF MA
 7008  030322  010003                  MOV     R0,R3                   ;SAVE THESE BITS
 7009  030324  010104                  MOV     R1,R4
 7010  030326  006100                  ROL     R0                      ;GET MA BITS 13-21 INTO R1 BITS 7-15
 7011  030330  006101                  ROL     R1
 7012  030332  006100                  ROL     R0
 7013  030334  006101                  ROL     R1
 7014  030336  000301                  SWAB    R1
 7015  030340  006100                  ROL     R0
 7016  030342  106001                  RORB    R1
 7017  030344  010137  003200          MOV     R1,SAVPAR               ;CONSTANT FOR LOADING PAR6 LATER
 7018  030350  042701  007777          BIC     #7777,R1                ;SEE IF 22-BIT ADDRESSES USED (PDP 11/70)
 7019  030354  001420                  BEQ     9$                      ;BR IF NOT (NO UNIBUS MAPPING)
 7020                                  ;PREPARE FOR 22-BIT ADDRESSING -  LOAD UNIBUS MAP REGISTERS
 7021  030356  012700  170200          MOV     #MAPLOO,R0              ;STARTING ADDR OF MAP REGISTERS
 7022  030362  012701  000037          MOV     #31.,R1                 ;SET REGISTER COUNTER
 7023  030366  010320          4$:     MOV     R3,(R0)+                ;LOAD A MAP REGISTER
 7024  030370  010420                  MOV     R4,(R0)+
 7025  030372  062703  020000          ADD     #20000,R3               ;ADD 4K WORDS
 7026  030376  005504                  ADC     R4
 7027  030400  077106                  SOB     R1,4$                   ;LOOP UNTIL 31(DEC) ARE LOADED
 7028  030402  042765  160000  000010  BIC     #160000,P.BALO(R5) ;CLEAR BA BITS 13-17
 7029  030410  142765  000003  000007  BICB    #3,P.BAHI(R5)
 7030  030416  104407          9$:     RESREG                          ;RESTORE R0-R5
 7031  030420  000207                  RTS     PC                      ;RETURN
 7032
 7033
 7034
 7035                                  ;;*****************************************************************
 7036                                  ;* FNDXDP - FIND STARTING ADR OF XXDP LOADER , AND STORE IT
 7037                                  ;*IN XXDPAD.
 7038                                  ;;*****************************************************************
 7039  030422  005737  005576  FNDXDP: TST     MAHILM+2                ;TEST HI BITS OF UPPER MEMORY LIMIT
 7040  030426  001404                  BEQ     6$                      ;BR IF HI BITS ARE 0
 7041  030430  012737  160000  005540  4$:     MOV     #160000,XXDPAD  ;START OF 28K IS END OF XXDP
```

```
 7043  030436  000412                        BR      8$
 7044  030440  023727  005574  157776  6$:   CMP     MAHILM,#157776  ;SEE IF MEM LIMIT > OR = 157776
 7045  030446  103370                        BHIS    4$              ;BR IF YES
 7046  030450  013737  005574  005540        MOV     MAHILM,XXDPAD   ;HI MEM LIMIT IS END OF XXDP
 7047  030456  062737  000002  005540        ADD     #2,XXDPAD       ;ADD 2 BYTES
 7048  030464  162737  006000  005540  8$:   SUB     #6000,XXDPAD    ;COMPUTE START OF XXDP
 7049  030472  000207                        RTS     PC              ;RETURN
 7050
 7051
 7052
 7053                                  ;;*****************************************************************
 7054                                  ;* SAVXDP - SAVE THE XXDP LOADER IN HI MEMORY
 7055                                  ;*THIS SUBROUTINE MOVES THE XXDP LOADER, WHICH RESIDES AT THE
 7056                                  ;*PHYSICAL ADDRESS STORED IN XXDPAD, TO THE PHYSICAL ADDRESS
 7057                                  ;*STORED IN XDPSAV AND XDPSAV+2. A TOTAL OF 1536(DEC) WORDS ARE MOVED.
 7058                                  ;*
 7059                                  ;* GETXDP - RESTORE THE XXDP LOADER TO ORIGINAL LOCATION
 7060                                  ;*THIS SUBROUTINE MOVES THE RELOCATED XXDP LOADER FROM THE ADDRESS
 7061                                  ;*STORED IN XDPSAV,XDPSAV+2, BACK TO LOCATION XXDPAD (ITS ORIGINAL
 7062                                  ;*ADDRESS).
 7063                                  ;;*****************************************************************
 7064  030474  104406                  SAVXDP: SAVREG                  ;SAVE R0-R5
 7065  030476  005004                          CLR     R4              ;SET INDICATOR TO SAVE XXDP
 7066  030500  000410                          BR      XDP1
 7067  030502  104406                  GETXDP: SAVREG                  ;SAVE R0-R5
 7068  030504  105037  003124                  CLRB    XOVLAD          ;CLEAR XXDP OVERLAID INDICATOR
 7069  030510  105737  003125                  TSTB    XDPSVD          ;SEE IF XXDP WAS SAVED
 7070  030514  001427                          BEQ     XDP2            ;BR IF NOT SAVED
 7071  030516  012704  000001                  MOV     #1,R4           ;SET INDICATOR TO GET XXDP
 7072  030522  105737  000041          XDP1:   TSTB    @#41            ;SEE IF LOADED BY XXDP
 7073  030526  001422                          BEQ     XDP2            ;BR IF NOT
 7074  030530  012702  003000                  MOV     #1536.,R2       ;GET SET TO MOVE 1536(DEC) WORDS
 7075  030534  013703  005540                  MOV     XXDPAD,R3       ;GET ORIG ADR OF START OF XXDP
 7076  030540  013700  005542                  MOV     XDPSAV,R0       ;GET SAVE ADR LO BITS
 7077  030544  013701  005544                  MOV     XDPSAV+2,R1     ;HI BITS
 7078  030550  005737  056216                  TST     $KT11           ;SEE IF MEM MGT PRESENT
 7079  030554  100411                          BMI     XDP3            ;BR IF PRESENT
 7080  030556  005704                  6$:     TST     R4              ;SEE IF WANT TO SAVE OR GET XXDP
 7081  030560  001002                          BNE     8$              ;BR IF WANT TO GET XXDP
 7082  030562  012320                          MOV     (R3)+,(R0)+     ;SAVE A WORD
 7083  030564  000401                          BR      10$
 7084  030566  012023                  8$:     MOV     (R0)+,(R3)+     ;GET A WORD
 7085  030570  005302                  10$:    DEC     R2              ;SEE IF 1536(DEC) WORDS YET
 7086  030572  001371                          BNE     6$              ;BR IF NOT YET
 7087  030574  104407                  XDP2:   RESREG                  ;RESTORE R0-R5
 7088  030576  000207                          RTS     PC              ;RETURN
 7089                                  ;COME HERE IF MEM MGT
 7090  030600  004737  027614          XDP3:   JSR     PC,INITMM       ;INIT MEM MGT REGISTERS
 7091  030604  006100                          ROL     R0              ;GET ADR BITS 13-21 INTO R1 BITS 7-15
 7092  030606  006101                          ROL     R1
 7093  030610  006100                          ROL     R0
 7094  030612  006101                          ROL     R1
 7095  030614  000301                          SWAB    R1
 7096  030616  006100                          ROL     R0
 7097  030620  106001                          RORB    R1
 7098  030622  010137  172354                  MOV     R1,@#KIPAR6     ;SET UP PAR6
```

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7099  030626  013701  005542                    MOV     XDPSAV,R1       ;GET LO ADRS BITS
7100  030632  042701  160000                    BIC     #160000,R1      ;FIX UP R1 TO REFERENCE PAR6
7101  030636  052701  140000                    BIS     #140000,R1
7102  030642  005704                    16$:    TST     R4              ;SEE IF WANT TO SAVE OR GET XXDP
7103  030644  001007                            BNE     18$             ;BR IF WANT TO GET XXDP
7104  030646  012305                            MOV     (R3)+,R5        ;SAVE A WORD
7105  030650  005237  177572                    INC     @#SR0           ;TURN ON MEMORY MANAGEMENT
7106  030654  010521                            MOV     R5,(R1)+
7107  030656  005337  177572                    DEC     @#SR0           ;TURN OFF MEMORY MANAGEMENT
7108  030662  000406                            BR      20$
7109  030664  005237  177572            18$:    INC     @#SR0           ;TURN ON MEMORY MANAGEMENT
7110  030670  012105                            MOV     (R1)+,R5        ;GET A WORD
7111  030672  005337  177572                    DEC     @#SR0           ;TURN OFF MEMORY MANAGEMENT
7112  030676  010523                            MOV     R5,(R3)+
7113  030700  032701  020000            20$:    BIT     #BIT13,R1       ;SEE IF OVERFLOW TO PAGE 7
7114  030704  001405                            BEQ     22$             ;BR IF NOT
7115  030706  042701  020000                    BIC     #BIT13,R1       ;SET PAGE = 6 AGAIN
7116  030712  062737  000200  172354            ADD     #200,@#KIPAR6   ;UPDATE PAR BY 4K
7117  030720  005302                    22$:    DEC     R2              ;SEE IF 1536 WORDS YET
7118  030722  001347                            BNE     16$             ;BR IF NOT YET
7119  030724  000723                            BR      XDP2            ;BR TO RETURN
7120
7121
7122
7123                                    ;;*****************************************************************
7124                                    .SBTTL  INITSS - INITIALIZE SUBSYSTEM
7125                                    ;*
7126                                    ;*THIS SUBROUTINE INITIALIZES THE DRIVER AND ITS PARAMETERS
7127                                    ;*AND DOES A SUBSYSTEM CLEAR.
7128                                    ;* USES -   R2,R5
7129                                    ;* CALL:
7130                                    ;*              JSR     PC,INITSS
7131                                    ;;*****************************************************************
7132
7133  030726  012737  042410  003036  INITSS: MOV     #ERRHDL,A.ABNL  ;SET UP ABNORMAL ERROR RETURN ADDRESS
7134  030734  012737  041142  003034           MOV     #ERRFRE,A.NORM  ;SET UP NORMAL RETURN ADDRESS
7135  030742  013702  003026                   MOV     RKBAS,R2        ;GET ADDRESS OF RK611 REGISTERS
7136  030746  012705  002620                   MOV     #PARM0,R5       ;GET ADDRESS OF PARAMETER BLOCK
7137  030752  105037  003133                   CLRB    NORTRY          ;CLEAR "NO-RETRY" FLAG
7138  030756  004737  031020                   JSR     PC,CLRPRM       ;CLEAR DRIVER INPUT PARAMETERS
7139  030762  112765  000177  000001           MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR COMMAND
7140  030770  004737  040716                   JSR     PC,DRVCAL       ;DO SUBSYSTEM CLEAR
7141  030774  113765  005502  000000           MOVB    DRIVE,P.DRVN(R5) ;SET CURRENT DRIVE NO.
7142  031002  113737  005502  002704           MOVB    DRIVE,PARM1     ;SET DRIVE NO. IN ALTERNATE P.B.
7143  031010  113765  003115  000007           MOVB    FORMAT,P.CS1H(R5) ;SET CURRENT DRIVE FORMAT
7144  031016  000207                           RTS     PC              ;SUBROUTINE EXIT
7145
7146
7147
7148                                    ;;*****************************************************************
7149                                    .SBTTL  CLRPRM - CLEAR DRIVER INPUT PARAMETERS
7150                                    ;*THIS SUBROUTINE ZEROS THE FIRST 14 BYTES IN THE DRIVER
7151                                    ;*PARAMETER BLOCK (WHOSE ADDRESS IS IN R5).
7152                                    ;* CALL -       JSR     PC,CLRPRM
7153                                    ;;*****************************************************************
7154
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7155  031020  010046                CLRPRM: MOV     R0,-(SP)        ;SAVE R0
7156  031022  010546                        MOV     R5,-(SP)        ;SAVE R5
7157  031024  010500                        MOV     R5,R0           ;GET PARAMETER BLOCK ADDRESS
7158  031026  062705  000016                ADD     #P.CS1,R5       ;COMPUTE LIMIT ADDRESS
7159  031032  005020                1$:     CLR     (R0)+           ;CLEAR A WORD IN PARAMETER BLOCK
7160  031034  020005                        CMP     R0,R5           ;SEE IF DONE YET
7161  031036  001375                        BNE     1$              ;BR IF  NOT DONE  YET
7162  031040  012605                        MOV     (SP)+,R5        ;RESTORE R5
7163  031042  012600                        MOV     (SP)+,R0        ;RESTORE R0
7164  031044  000207                        RTS     PC              ;RETURN
7165
7166
7167
7168                                ;;*****************************************************************
7169                                .SBTTL  SCNDRV - SCAN DRIVE FOR STATUS
7170                                ;*THIS SUBROUTINE SCANS THE SELECTED DRIVE TO INSURE
7171                                ;*THAT THE DRIVE IS ON-LINE, READY, NOT WRITE-LOCKED,
7172                                ;*AND NOT LOADED WITH AN ALIGNMENT CARTRIDGE. IF ANY
7173                                ;*OF THESE CONDITIONS ARE NOT MET, AN APPROPRIATE
7174                                ;*MESSAGE IS TYPED, RK06 INTERRUPT IS DISABLED, AND
7175                                ;*A RETURN IS MADE TO THE ADDRESS LISTED IMMEDIATELY
7176                                ;*AFTER THE CALL TO SCNDRV. THE REQUESTED DRIVE NO.
7177                                ;*MUST BE PASSED TO THE SUBROUTINE IN WORD "DRIVE".
7178                                ;*ALSO, IF RUNNING FROM ADRS 200 AND RK06 IS LOAD MEDIUM,
7179                                ;*DRIVE 0 WILL BE REJECTED FOR USE.
7180                                ;* CALL -    JSR     PC,SCNDRV
7181                                ;*          <ERROR RETURN ADDRESS>
7182                                ;*
7183                                ;;*****************************************************************
7184
7185  031046  004737  030726        SCNDRV: JSR     PC,INITSS       ;INITIALIZE DRIVER AND CLEAR SUBSYSTEM
7186  031052  113765  005502  000000        MOVB    DRIVE,P.DRVN(R5) ;GET DRIVE NUMBER
7187                                ;SEE IF DRIVE 0 IS XXDP LOAD MEDIUM
7188  031060  001012                        BNE     3$              ;BR IF NOT DRIVE 0
7189  031062  122737  000013  000041        CMPB    #13,@#41        ;SEE IF RK06 IS XXDP MEDIUM
7190  031070  001006                        BNE     3$              ;BR IF NOT
7191  031072  105737  003106                TSTB    MDFLAG          ;SEE IF 200 START
7192  031076  001003                        BNE     3$              ;BR IF NOT
7193  031100  104400  007667                TYPE    ,DR0XDP         ;TYPE "DRIVE 0 IS LOAD MEDIUM"
7194  031104  000434                        BR      2$              ;TAKE ERROR EXIT
7195  031106  112765  000141  000001  3$:   MOVB    #RDSTAT,P.CMND(R5) ;SET READ DRIVE STATUS COMMAND
7196  031114  012737  027032  003036        MOV     #NEDHDL,A.ABNL  ;SET NED ABNORMAL RETURN ADDRESS
7197  031122  012737  000377  005532        MOV     #377,NEWON      ;INIT. ON-LINE INDICATOR
7198  031130  004737  040716                JSR     PC,DRVCAL       ;READ ALL DRIVE STATUS
7199                                ;SEE IF THIS DRIVE EXISTS AND IS ON-LINE
7200  031134  012737  042410  003036        MOV     #ERRHDL,A.ABNL  ;RESTORE ABNL RETURN ADDRESS
7201  031142  022737  000377  005532        CMP     #377,NEWON      ;SEE IF NED INDICATION ON THIS DRIVE
7202  031150  001420                        BEQ     4$              ;BR IF NED NOT SET
7203  031152  113737  005502  007370        MOVB    DRIVE,BADDRV+6  ;GET DRIVE NO. INTO BUF
7204  031160  152737  000060  007370        BISB    #'0,BADDRV+6    ;CONVERT TO ASCII
7205  031166  104400  007362                TYPE    ,BADDRV         ;TYPE "DRIVE X"
7206  031172  104400  007373                TYPE    ,NXDRIV         ;TYPE "NON-EXISTENT"
7207                                ;SERVICE ERRORS HERE
7208  031176  042762  000100  000000  2$:   BIC     #IE,RKCS1(R2)   ;DISABLE RK06 INTERRUPT
7209  031204  017616  000000                MOV     @(SP),(SP)      ;SET UP ERROR RETURN ADDRESS
7210  031210  000207                        RTS     PC              ;ERROR RETURN
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7211                                        ;SEE IF DRIVE IS READY
7212  031212  032765  000200  000040  4$:   BIT     #S.DRY,P.ADD(R5) ;TEST FOR DRIVE READY
7213  031220  001013                        BNE     6$              ;BR IF DRIVE IS READY
7214  031222  113737  005502  007370        MOVB    DRIVE,BADDRV+6  ;GET DRIVE NO. INTO BUF
7215  031230  152737  000060  007370        BISB    #'0,BADDRV+6    ;CONVERT TO ASCII
7216  031236  104400  007362                TYPE    ,BADDRV         ;TYPE "DRIVE X"
7217  031242  104400  007412                TYPE    ,NTREDY         ;TYPE "NOT READY"
7218  031246  000753                        BR      2$              ;TAKE ERROR EXIT
7219                                        ;SEE IF DRIVE IS WRITE ENABLED
7220  031250  032765  004000  000040  6$:   BIT     #S.WRL,P.ADD(R5) ;SEE IF WRITE LOCK SET
7221  031256  001413                        BEQ     8$              ;BR IF WRITE LOCK NOT SET
7222  031260  113737  005502  007370        MOVB    DRIVE,BADDRV+6  ;GET DRIVE NO.
7223  031266  152737  000060  007370        BISB    #'0,BADDRV+6    ;CONVERT TO ASCII
7224  031274  104400  007362                TYPE    ,BADDRV         ;TYPE "DRIVE X"
7225  031300  104400  007426                TYPE    ,WRTLOK         ;TYPE "WRITE-LOCKED"
7226  031304  000734                        BR      2$              ;TAKE ERROR EXIT
7227                                        ;SEE IF DRIVE NOT LOADED WITH ALIGNMENT CARTRIDGE
7228  031306  112765  000103  000001  8$:   MOVB    #PACK,P.CMND(R5) ;SET PACK ACKNOWLEDGE COMMAND
7229  031314  004737  040716                JSR     PC,DRVCAL       ;SET VOLUME VALID
7230  031320  112765  000121  000001        MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
7231  031326  012765  000632  000002        MOV     #LSTCYL,P.CYLN(R5) ;SET CYLINDER = 632(8)
7232  031334  112765  000002  000005        MOVB    #LSTTRK,P.TRCK(R5) ;SET TRACK = 2
7233  031342  012765  064574  000010        MOV     #RWBUF,P.BAL0(R5) ;BUS ADDRESS
7234  031350  012765  177774  000012        MOV     #-4,P.WC(R5)    ;READ 4 WORDS
7235  031356  105065  000007                CLRB    P.CS1H(R5)      ;SET 22-SECTOR FORMAT
7236  031362  004737  040716                JSR     PC,DRVCAL       ;READ 4 WORDS OF BAD SECTOR FILE
7237  031366  032737  100000  005476        BIT     #ANYDER,RECODE  ;SEE IF DATA ERROR
7238  031374  001402                        BEQ     10$             ;BR IF OK
7239  031376  104400  013310                TYPE    ,BAD632         ;TYPE READ ERROR MESSAGE
7240  031402  022737  177777  064602  10$:   CMP     #177777,RWBUF+6 ;SEE IF ALL 1'S IN I.D. WORD 3
7241  031410  001013                        BNE     12$             ;BR IF NOT ALL 1'S
7242  031412  113737  005502  007370        MOVB    DRIVE,BADDRV+6  ;GET DRIVE NO.
7243  031420  152737  000060  007370        BISB    #'0,BADDRV+6    ;CONVERT TO ASCII
7244  031426  104400  007362                TYPE    ,BADDRV         ;TYPE "DRIVE X"
7245  031432  104400  007445                TYPE    ,ALNPAK         ;TYPE "LOADED WITH ALIGN PACK"
7246  031436  000657                        BR      2$              ;TAKE ERROR EXIT
7247                                    ;ERROR FREE RETURN
7248  031440  112765  000113  000001  12$:   MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
7249  031446  004737  040716                JSR     PC,DRVCAL       ;RECALIBRATE THIS DRIVE
7250  031452  062716  000002                ADD     #2,(SP)         ;FIX UP RETURN PC
7251  031456  000207                        RTS     PC              ;RETURN
7252
7253
7254
7255                                    ;;*****************************************************************
7256                                    .SBTTL  CHKDRV - CHECK STATUS OF DRIVE
7257                                    ;*THIS SUBROUTINE CHECKS THE DESIRED DRIVE TO DETERMINE
7258                                    ;*IF THE DRIVE IS ON-LINE,READY,WRITE-PROTECTED. IF NOT, THE
7259                                    ;*APPROPRIATE ERROR MESSAGE IS TYPED,AND THE CPU HALTS
7260                                    ;*WHILE MANUAL  INTERVENTION TAKES PLACE TO CORRECT THE
7261                                    ;*PROBLEM. THE OPERATOR THEN DEPRESSES 'CONT' TO  PROCEED,
7262                                    ;*AND A RETURN IS MADE TO THE ADDRESS LISTED IMMEDIATELY
7263                                    ;*AFTER THE CALL. IF THERE ARE NO  PROBLEMS WITH THIS
7264                                    ;*DRIVE, A NORMAL  RETURN IS MADE.
7265                                    ;*R5 MUST CONTAIN THE ADDRESS OF THE PARAMETER BLOCK,
7266                                    ;*AND R2 MUST CONTAIN THE RK06 REGISTER BASE ADDRESS.
```

```
                                        ;*
                                        ;* CALL:
                                        ;*      JSR     PC,CHKDRV
                                        ;*      ERROR ADDRESS
                                        ;;*****************************************************************
031460  113765  005502  000000  CHKDRV: MOVB    DRIVE,P.DRVN(R5) ;SET DESIRED DRIVE NUMBER
031466  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ DRIVE STATUS COMMAND
031474  012737  027032  003036          MOV     #NEDHDL,A.ABNL  ;SET NED ABNORMAL RETURN ADDRESS
031502  012737  000377  005532          MOV     #377,NEWON      ;INITIALIZE ON-LINE INDICATOR
031510  004737  040716                  JSR     PC,DRVCAL       ;READ ALL DRIVE STATUS
                        ;SEE IF THIS DRIVE EXISTS AND IS ON-LINE
031514  012737  042410  003036          MOV     #ERRHDL,A.ABNL  ;RESTORE ABNORMAL DRIVER RETURN ADDRESS
031522  022737  000377  005532          CMP     #377,NEWON      ;SEE IF NED INDICATION ON THIS DRIVE
031530  001411                          BEQ     1$              ;BR IF NED NOT SET
031532  113701  005502                  MOVB    DRIVE,R1        ;GET DRIVE NUMBER
031536  152701  000060                  BISB    #'0,R1          ;CONVERT TO ASCII
031542  110137  012037                  MOVB    R1,DRVNED       ;PUT DRIVE NO. INTO MSG BUFFER
031546  104400  012025                  TYPE    ,NONEXD         ;TYPE NON-EXISTENT DRIVE MESSAGE
031552  000414                          BR      3$              ;SERVICE THE ERROR
                        ;SEE IF DESIRED DRIVE IS READY
031554  032765  000200  000040  1$:     BIT     #S.DRY,P.ADD(R5) ;TEST FOR DRIVE READY
031562  001024                          BNE     4$              ;BR IF DRIVE READY
031564  113701  005502                  MOVB    DRIVE,R1        ;GET DRIVE NUMBER
031570  152701  000060                  BISB    #'0,R1          ;CONVERT TO ASCII
031574  110137  011673                  MOVB    R1,DRNRDY       ;PUT DRIVE NUMBER IN MESSAGE BUFFER
031600  104400  011661                  TYPE    ,NOTRDY         ;TYPE DRIVE NOT READY MESSAGE
                        ;SERVICE ALL ERRORS HERE
031604  042762  000100  000000  3$:     BIC     #IE,RKCS1(R2)   ;CLEAR RK06 INTERRUPT ENABLE BIT
031612  000000                          HALT                    ;HALT IS NECESSARY DURING MANUAL
                                                                ;  INTERVENTIONS, TO CHANGE PACK,
                                                                ;  WRITE LOCK,START DRIVE,ETC.
                                                                ;PRESS 'CONT' TO PROCEED !
031614  112765  000177  000001          MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR COMMAND
031622  004737  040716                  JSR     PC,DRVCAL       ;CLEAR THE SUBSYSTEM
031626  017616  000000                  MOV     @(SP),(SP)      ;SET UP ERROR RETURN ADDRESS
031632  000207                          RTS     PC              ;ERROR RETURN
                        ;SEE IF DRIVE IS WRITE-LOCKED
031634  032765  004000  000040  4$:     BIT     #S.WRL,P.ADD(R5) ;SEE IF WRITE LOCK SET
031642  001011                          BNE     5$              ;BR IF WRITE-PROTECTED
031644  113701  005502                  MOVB    DRIVE,R1        ;GET DRIVE NUMBER
031650  152701  000060                  BISB    #'0,R1          ;CONVERT TO ASCII
031654  110137  012166                  MOVB    R1,NODRLK       ;PUT DRIVE NUMBER IN MSG BUFFER
031660  104400  012154                  TYPE    ,NOTLOK         ;TYPE "DRIVE NOT WRITE-LOCKED"
031664  000747                          BR      3$              ;SERVICE THE ERROR
                        ;RECALIBRATE DESIRED DRIVE, SET VOLUME VALID
031666  112765  000113  000001  5$:     MOVB    #RECAL,P.CMND(R5) ;SET RECALIBRATE COMMAND
031674  004737  040716                  JSR     PC,DRVCAL       ;RECALIBRATE DRIVE
031700  112765  000103  000001          MOVB    #PACK,P.CMND(R5) ;SET PACK ACKNOWLEDGE COMMAND
031706  004737  040716                  JSR     PC,DRVCAL       ;DO PACK ACK. (SETS VOLUME VALID)
                        ;RETURN HERE
031712  062716  000002          7$:     ADD     #2,(SP)         ;FIX UP RETURN ADDRESS ON STACK
031716  000207                          RTS     PC              ;ERROR-FREE RETURN
```

```
                                        ;;*****************************************************************
                                        ;* ALNSEK - SEEK IN SINGLE INCREMENTS FROM CYL 0 TO ALIGNMENT CYL (365 OCT).
                                        ;;*****************************************************************
031720  112765  000117  000001  ALNSEK: MOVB    #SEEK,P.CMND(R5) ;SET SEEK COMMAND
031726  005065  000002                  CLR     P.CYLN(R5)       ;INIT CYL TO 0
031732  004737  040716            2$:   JSR     PC,DRVCAL        ;SEEK TO THIS CYL
031736  005265  000002                  INC     P.CYLN(R5)       ;INCR CYL NO.
031742  022765  000366  000002          CMP     #ALNCYL+1,P.CYLN(R5) ;SEE IF 365 REACHED YET
031750  001370                          BNE     2$               ;BR IF NOT YET
031752  000207                          RTS     PC               ;RETURN


                                        ;;*****************************************************************
                                        ;* WAIT4R - THIS SUBROUTINE UNLOADS HEADS ON THE CURRENT DRIVE, TYPES
                                        ;* "TYPE <R> WHEN READY", AND THEN LOADS THE HEADS WHEN <R> IS TYPED.
                                        ;;*****************************************************************
031754  112765  000107  000001  WAIT4R: MOVB    #UNLOAD,P.CMND(R5) ;SET UNLOAD COMMAND
031762  004737  040716                  JSR     PC,DRVCAL        ;UNLOAD HEADS ON THIS DRIVE
031766  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;SET READ STATUS COMMAND
031774  004737  040716            1$:   JSR     PC,DRVCAL        ;READ STATUS OF DRIVE
032000  032765  000040  000044          BIT     #S.HDHM,P.A01(R5) ;SEE IF HEADS UNLOADED YET
032006  001772                          BEQ     1$               ;BR IF NOT YET
032010  104400  012751            2$:   TYPE    ,RWNRDY          ;TYPE "TYPE <R> WHEN READY"
032014  004737  027250                  JSR     PC,PREPKB        ;PREPARE FOR KBD INPUT
032020  005737  005524            4$:   TST     INTCHR           ;SEE IF ANY INPUT YET
032024  001775                          BEQ     4$               ;BR IF NOT YET
032026  022737  000122  005524          CMP     #'R,INTCHR       ;SEE IF <R> TYPED
032034  001403                          BEQ     6$               ;BR IF <R> TYPED
032036  004737  027270                  JSR     PC,ECOBAD        ;ECHO BAD INPUT
032042  000762                          BR      2$               ;GO ASK AGAIN
032044  112765  000111  000001  6$:     MOVB    #SRTSPL,P.CMND(R5) ;SET START SPINDLE COMMAND
032052  004737  040716                  JSR     PC,DRVCAL        ;START SPINDLE AND LOAD HEADS
032056  000207                          RTS     PC               ;RETURN


                                        ;;*****************************************************************
                                        ;*SETTUP - SET UP FOR LOOP ON ERROR
                                        ;*THIS SUBROUTINE CANNOT BE CALLED BY ANY OTHER
                                        ;*SUBROUTINE --- ONLY MAIN-LINE CODE !!!!
                                        ;;*****************************************************************
032060  011637  001076          SETTUP: MOV     (SP),@#STACK-2   ;MOVE RETURN PC ON STACK
032064  012706  001076                  MOV     #STACK-2,SP      ;RE-INIT THE STACK POINTER
032070  005037  005476                  CLR     RECODE           ;CLEAR ERROR RECOVERY FLAGS
032074  105037  003116                  CLRB    ERRCNT           ;CLEAR RETRY ERROR COUNT
032100  012705  002620                  MOV     #PARMD,R5        ;SET PARAM BLK ADRS
032104  112765  000177  000001          MOVB    #SUBCLR,P.CMND(R5) ;SET SUBSYSTEM CLEAR CMND
032112  004737  040716                  JSR     PC,DRVCAL        ;CLEAR THE SUBSYSTEM
032116  012737  000000  177776          MOV     #PRO,@#PS        ;RE-ESTABLISH PRIORITY 0
032124  000207                          RTS     PC               ;RETURN


                                        ;;*****************************************************************
                                        .SBTTL  CHKITR - CHECK CURRENT TEST ITERATION NUMBER
```

```
7379                                    ;*THIS SUBROUTINE LOADS THE ITERATION NUMBER FOR THE CURRENT
7380                                    ;*TEST INTO $TIMES, AND CHECKS IT TO DETERMINE IF THIS TEST
7381                                    ;*SHOULD BE RUN. IF ITERATION NO. = 0, THE SUBROUTINE RETURNS
7382                                    ;*TO THE STORED PC (AND THE TEST WILL BE SKIPPED). IF IT IS
7383                                    ;*NOT 0, THE RETURN IS MADE TO PC+2, AND THE TEST WILL
7384                                    ;*BE RUN. HOWEVER, ON THE FIRST PASS (QUICK VERIFY) OF A RUN
7385                                    ;*WHICH STARTED AT ADRS 200, ALL TESTS WILL BE RUN ONCE.
7386
7387  032126  010146                    CHKITR: MOV     R1,-(SP)        ;SAVE R1
7388  032130  105737  003126                    TSTB    DULACS          ;SEE IF DUAL-ACCESS FLAG SET
7389  032134  001006                            BNE     3$              ;BR IF YES
7390  032136  105737  003106                    TSTB    MDFLAG          ;SEE IF 200 START
7391  032142  001007                            BNE     4$              ;BR IF NOT
7392  032144  005737  001326                    TST     $PASS           ;SEE IF FIRST PASS
7393  032150  001004                            BNE     4$              ;BR IF NOT
7394  032152  012737  000001  001304    3$:     MOV     #1,$TIMES       ;SET UP FOR 1 ITERATION
7395  032160  000410                            BR      1$              ;GO RUN DUAL-ACCESS TEST
7396  032162  013701  001102            4$:     MOV     $TSTNM,R1       ;GET CURRENT TEST NUMBER
7397  032166  005301                            DEC     R1              ;DECREMENT BY 1
7398  032170  006301                            ASL     R1              ;DOUBLE IT, TO GET TEST LIST INDEX
7399  032172  016137  005620  001304            MOV     TSTLST(R1),$TIMES ;LOAD ITERATION NUMBER
7400  032200  001403                            BEQ     2$              ;BR IF TEST SHOULD BE SKIPPED
7401  032202  062766  000004  000002  1$:     ADD     #4,2(SP)        ;ADJUST RETURN PC TO RUN THIS TEST
7402  032210  012601                    2$:     MOV     (SP)+,R1        ;RESTORE R1
7403  032212  000207                            RTS     PC              ;RETURN
7404
7405
7406
7407                                    ;;******************************************************************
7408                                    .SBTTL  RDCHRS - READ A STRING OF KBD INPUT CHARS
7409                                    ;*THIS SUBROUTINE READS A STRING OF UP TO EIGHTY INPUT
7410                                    ;*CHARACTERS AT THE KBD, TERMINATED BY <CR>, AND PLACES
7411                                    ;*THEM IN BUFFO, TERMINATED BY A NULL (0) BYTE.
7412                                    ;*RUB-OUT AND (↑U) FEATURES ARE PROVIDED.
7413                                    ;*IMMEDIATELY FOLLOWING THE SUBROUTINE CALL, THREE SPECIAL
7414                                    ;*RETURN ADDRESSES MUST BE LISTED: THE FIRST RETURN IS
7415                                    ;*TAKEN IF (↑C) IS TYPED, THE SECOND IS TAKEN IF (↑Z) IS
7416                                    ;*TYPED, AND THE THIRD IS TAKEN IF (↑U) OR INVALID INPUT IS TYPED.
7417                                    ;*IF (↑G) IS TYPED, THE SOFTWARE SWITCH REGISTER IS OPENED
7418                                    ;*FOR MODIFICATION, IF SELECTED, AND THEN THE (↑G) RETURN
7419                                    ;*IS TAKEN.
7420                                    ;*THE NUMBER OF INPUT CHARACTERS IN THE BUFFER IS RETURNED
7421                                    ;*IN R0.
7422                                    ;*
7423                                    ;*  CALL -      JSR     PC,RDCHRS
7424                                    ;*              <CONTROL-C RETURN ADDRESS>
7425                                    ;*              <CONTROL-Z RETURN ADDRESS>
7426                                    ;*              <CONTROL-U OR ERROR RETURN ADDRESS>
7427                                    ;*              RETURN
7428                                    ;;******************************************************************
7429
7430  032214                            RDCHRS:
7431  032214  010146                            MOV     R1,-(SP)        ;SAVE R1
7432  032216  010246                            MOV     R2,-(SP)        ;SAVE R2
7433  032220  005000                            CLR     R0              ;INITIALIZE CHARACTER COUNT
7434  032222  005001                            CLR     R1              ;INITIALIZE RUB-OUT INDICATOR
```

```
                                        ;READ A CHARACTER
032224  104405                  2$:     RDCHR                   ;READ A CHARACTER
032226  112602                          MOVB    (SP)+,R2        ;GET CHARACTER INTO R2
                                        ;CHECK FOR (↑C)
032230  122702  000003                  CMPB    #003,R2         ;SEE IF (↑C) TYPED
032234  001006                          BNE     4$              ;BR IF NOT (↑C)
032236  104400  013354                  TYPE    ,CNTRLC         ;ECHO (↑C)
032242  017666  000004  000004  3$:     MOV     @4(SP),4(SP)    ;PUT RETURN ADDRESS ON STACK
032250  000523                          BR      24$             ;BR TO TAKE EXIT
                                        ;CHECK FOR (↑Z)
032252  122702  000032          4$:     CMPB    #032,R2         ;SEE IF (↑Z) TYPED
032256  001006                          BNE     6$              ;BR IF NOT (↑Z)
032260  104400  013361                  TYPE    ,CNTRLZ         ;ECHO (↑Z)
032264  062766  000002  000004          ADD     #2,4(SP)        ;MAKE OLD PC POINT TO NEXT RETURN ADR.
032272  000763                          BR      3$              ;BR TO TAKE (↑Z) EXIT
                                        ;CHECK FOR (↑U)
032274  122702  000025          6$:     CMPB    #025,R2         ;SEE IF (↑U) TYPED
032300  001006                          BNE     8$              ;BR IF NOT (↑U)
032302  104400  013373                  TYPE    ,CNTRLU         ;ECHO (↑U)
032306  062766  000004  000004  7$:     ADD     #4,4(SP)        ;MAKE OLD PC POINT TO NEXT RETURN ADDR.
032314  000752                          BR      3$              ;BR TO TAKE (↑U) EXIT
                                        ;CHECK FOR (↑G)
032316  122702  000007          8$:     CMPB    #007,R2         ;SEE IF (↑G) TYPED
032322  001005                          BNE     9$              ;BR IF NOT (↑G)
032324  104400  013400                  TYPE    ,CNTRLG         ;ECHO (↑G)
032330  004737  027562                  JSR     PC,GTSWRG       ;OPEN SOFTWARE SWITCH REG. FOR CHANGE
032334  000764                          BR      7$              ;TAKE (↑U) RETURN
                                        ;CHECK FOR RUB-OUT (DELETE)
032336  122702  000177          9$:     CMPB    #177,R2         ;SEE IF RUB-OUT (DEL) TYPED
032342  001020                          BNE     14$             ;BR IF NOT RUB-OUT
032344  005700                          TST     R0              ;CHECK THE CHARACTER COUNT
032346  001726                          BEQ     2$              ;BR IF COUNT = 0
032350  005701                          TST     R1              ;CHECK THE RUB-OUT INDICATOR
032352  001003                          BNE     11$             ;BR IF WE HAD A PREVIOUS RUB-OUT
032354  005201                          INC     R1              ;SET RUB-OUT INDICATOR
032356  104400  013411                  TYPE    ,BKSLSH         ;TYPE A BACK-SLASH (\)
032362  005037  005534          11$:    CLR     SCRACH          ;USE SCRATCH WORD FOR TEMP. BUFFER
032366  005300                          DEC     R0              ;DECREMENT COUNT
032370  116037  005264  005534          MOVB    BUFFO(R0),SCRACH ;GET LAST CHAR. INTO BUFFER
032376  104400  005534                  TYPE    ,SCRACH         ;ECHO CHARACTER TO BE DELETED
032402  000710                          BR      2$              ;GO READ ANOTHER CHARACTER
032404  005701                  14$:    TST     R1              ;CHECK THE RUB-OUT INDICATOR
032406  001403                          BEQ     16$             ;BR IF INDICATOR IS NOT SET
032410  104400  013411                  TYPE    ,BKSLSH         ;TYPE A BACK-SLASH
032414  005001                          CLR     R1              ;CLEAR THE RUB-OUT INDICATOR
                                        ;CHECK FOR CARRIAGE RETURN
032416  122702  000015          16$:    CMPB    #015,R2         ;SEE IF <CR> TYPED
032422  001426                          BEQ     19$             ;BR IF <CR>
                                        ;HANDLE POSSIBLE DIGIT
032424  005037  005534                  CLR     SCRACH          ;USE SCRATCH WORD FOR TEMP. BUFFER
032430  110237  005534                  MOVB    R2,SCRACH       ;GET THIS CHARACTER INTO BUFFER
032434  104400  005534                  TYPE    ,SCRACH         ;ECHO THE CHARACTER TYPED
032440  110260  005264                  MOVB    R2,BUFFO(R0)    ;PUT CHARACTER INTO BUFFER
032444  005200                          INC     R0              ;INCREMENT CHARACTER COUNTER
032446  022700  000120                  CMP     #80.,R0         ;SEE IF TOO MANY CHARACTERS TYPED
032452  001264                          BNE     2$              ;BR IF NOT TOO MANY
```

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7491  032454  104400  001315                  TYPE    $CRLF           ;TYPE <CR> AND <LF>
7492  032460  112760  000000  005264          MOVB    #0,BUFFO(R0)    ;PUT TERMINATING NULL INTO BUFFER
7493  032466  104400  005264                  TYPE    ,BUFFO          ;ECHO INPUT STRING
7494  032472  104400  001314                  TYPE    ,$QUES          ;TYPE <?>,<CR>,<LF>
7495  032476  000703                          BR      7$              ;TAKE ERROR EXIT FROM RDCHRS
7496  032500  104400  001315          19$:    TYPE    ,$CRLF          ;TYPE <CR>,<LF>
7497  032504  112760  000000  005264          MOVB    #0,BUFFO(R0)    ;PUT TERMINATING NULL INTO BUFFER
7498  032512  062766  000006  000004          ADD     #6,4(SP)        ;FIX UP RETURN ADDRESS
7499  032520  012602                  24$:    MOV     (SP)+,R2        ;RESTORE R2
7500  032522  012601                          MOV     (SP)+,R1        ;RESTORE R1
7501  032524  000207                          RTS     PC              ;SUBROUTINE EXIT
7502
7503
7504
7505                                  ;;*****************************************************************
7506                                  .SBTTL  TYPTST - TYPE CURRENT TEST AND ITERATION NUMBER
7507                                  ;*THIS SUBROUTINE TYPES : "XX     YYYYYY", WITH NO <CR>
7508                                  ;*OR <LF>. XX IS THE NUMBER OF THE CURRENT TEST AND
7509                                  ;*YYYYYY IS THE NUMBER OF ITERATIONS FOR THAT TEST.
7510                                  ;*R1 MUST CONTAIN THE INDEX INTO THE TEST LIST FOR
7511                                  ;*THE CURRENT TEST.
7512                                  ;* CALL -   JSR    PC,TYPTST
7513                                  ;;*****************************************************************
7514
7515  032526  104400  013422  TYPTST: TYPE    ,SPACE1         ;TYPE A SPACE
7516  032532  010146                  MOV     R1,-(SP)        ;PUT INDEX ONTO STACK
7517  032534  006216                  ASR     (SP)            ;DIVIDE BY 2
7518  032536  005216                  INC     (SP)            ;INCREMENT TO GET TEST NO.
7519  032540  104402                  TYPOS                   ;TYPE TEST NO. IN OCTAL
7520  032542     002                  .BYTE   2               ;TYPE 2 DIGITS
7521  032543     000                  .BYTE   0               ;SUPPRESS LEADING ZEROS
7522  032544  104400  013415          TYPE    ,SPACE6         ;TYPE 6 SPACES
7523  032550  016146  005620          MOV     TSTLST(R1),-(SP) ;PUT CURRENT ITERATION NO. ONTO STACK
7524  032554  104402                  TYPOS                   ;TYPE ITERATION NO. IN OCTAL
7525  032556     006                  .BYTE   6               ;TYPE 6 DIGITS
7526  032557     000                  .BYTE   0               ;SUPPRESS LEADING ZEROS
7527  032560  000207                  RTS     PC              ;RETURN
7528
7529
7530                                  ;;*****************************************************************
7531                                  .SBTTL  TYPPRM - TYPE CURRENT PARAMETER
7532                                  ;*THIS SUBROUTINE TYPES THE LINE : XX=YYYYYYYY ,
7533                                  ;*WHERE XX IS THE CURRENT PARAMETER MNEMONIC, AND
7534                                  ;*YYYYYYYY IS ITS VALUE IN OCTAL DIGITS, WITH LEADING
7535                                  ;*ZEROS SUPPRESSED. NOTE: <CR> AND <LF> ARE NOT DONE.
7536                                  ;*ON ENTRY, R1 MUST CONTAIN THE INDEX INTO THE
7537                                  ;*PARAMETER TABLES, FOR THE CURRENT PARAMETER.
7538                                  ;* CALL -      JSR     PC,TYPPRM
7539                                  ;;*****************************************************************
7540
7541  032562  016137  006000  013424  TYPPRM: MOV     PRMNEM(R1),PRMBUF ;PUT MNEMONIC INTO OUTPUT BUFFER
7542  032570  104400  013424                  TYPE    ,PRMBUF         ;TYPE "XX="
7543  032574  016137  005650  005470          MOV     PRMLST(R1),LOWOCT ;PUT LOW BITS OF PARAM. INTO LOWOCT
7544  032602  005037  005472                  CLR     HIGOCT          ;CLEAR HIGH BINARY BITS
7545  032606  022761  040515  006000          CMP     #"MA,PRMNEM(R1) ;SEE IF PARAMETER IS (MA)
7546  032614  001003                          BNE     1$              ;BR IF NOT (MA)
```

```
7547  032616  016137  005652  005472          MOV     PRMLST+2(R1),HIGOCT ;PUT HI BITS OF PARAM. INTO HIGOCT
7548  032624  012746  005470          1$:     MOV     #LOWOCT,-(SP)       ;PUT ADDRESS OF BINARY VALUE ON STACK
7549  032630  004737  053674                  JSR     PC,@#$DB2O          ;CONVERT BINARY TO OCTAL ASCII
7550  032634  004737  054210                  JSR     PC,@#$SUPRS         ;TYPE YYYYYYYY, SUPPRESSING LEADING O'S
7551  032640  000207                          RTS     PC                  ;RETURN
7552
7553
7554
7555                                  ;;*****************************************************************
7556                                  .SBTTL  TYPPAT - TYPE CURRENT WORD OF DATA PATTERN 15
7557                                  ;*THIS SUBROUTINE TYPES THE LINE : WORD XX = YYYYYY,
7558                                  ;*WHERE XX IS THE NUMBER OF THE CURRENT WORD OF
7559                                  ;*USER-DEFINED PATTERN 15, AND YYYYYY IS ITS 16-BIT
7560                                  ;*VALUE, IN OCTAL DIGITS. <CR> AND <LF> ARE NOT TYPED.
7561                                  ;*ON ENTRY, R1 MUST CONTAIN THE INDEX OF THE CURRENT
7562                                  ;*WORD IN THE PATTERN 15 TABLE.
7563                                  ;*  CALL -      JSR       PC,TYPPAT
7564                                  ;;*****************************************************************
7565
7566  032642                          TYPPAT:
7567  032642  104400  013430                  TYPE    ,WORDSP             ;TYPE "WORD "
7568  032646  010146                          MOV     R1,-(SP)            ;PUT INDEX ONTO STACK
7569  032650  006216                          ASR     (SP)                ;DIVIDE BY TWO FOR WORD NO.
7570  032652  104402                          TYPOS                       ;GO TYPE WORD NUMBER
7571  032654     002                          .BYTE   2                   ;DIGIT COUNT = 2 FOR TYPOC
7572  032655     001                          .BYTE   1                   ;TELL TYPOS TO TYPE LEADING ZEROS
7573  032656  104400  013436                  TYPE    ,EQUALS             ;TYPE " = "
7574  032662  016146  006766                  MOV     PAT15(R1),-(SP)     ;GET BINARY VALUE OF THIS WORD
7575  032666  104402                          TYPOS                       ;TYPE VALUE IN OCTAL
7576  032670     006                          .BYTE   6                   ;TYPE 6 DIGITS
7577  032671     001                          .BYTE   1                   ;TYPE LEADING ZEROS
7578  032672  000207                          RTS     PC                  ;RETURN
7579
7580
7581
7582                                  ;;*****************************************************************
7583                                  .SBTTL  MODP15 - MODIFY USER-DEFINED PATTERN 15
7584                                  ;*THIS SUBROUTINE DETERMINES WHETHER OR NOT USER-DEFINED
7585                                  ;*DATA PATTERN 15 SHOULD BE OPENED FOR MODIFICATION, AND
7586                                  ;*IF SO, IT REQUESTS THE NEW VALUES AND CONTROLS THEIR
7587                                  ;*INPUT ON THE TTY. IT CHECKS VALUES FOR VALIDITY, AND
7588                                  ;*LOADS THE 16 WORDS INTO THE PATTERN 15 TABLE (PAT15).
7589                                  ;*IF THE OPERATOR ANSWERS THE REQUEST FOR A PATTERN WORD
7590                                  ;*WITH EXCLAMATION POINT (!) (CR), THE SUBROUTINE
7591                                  ;*PROPAGATES THE LAST WORD TYPED INTO ALL REMAINING
7592                                  ;*WORDS OF THE PATTERN 15 TABLE.
7593                                  ;*  CALL -    JSR       PC,MODP15
7594                                  ;;*****************************************************************
7595
7596  032674                          MODP15:
7597  032674  010046                          MOV     R0,-(SP)            ;SAVE R0
7598  032676  010146                          MOV     R1,-(SP)            ;SAVE R1
7599  032700  010246                          MOV     R2,-(SP)            ;SAVE R2
7600                                  ;SEE IF PARAMETER IS PT
7601  032702  022761  052120  006000          CMP     #"PT,PRMNEM(R1)     ;SEE IF CURRENT PARAMETER IS (PT)
7602  032710  001127                          BNE     22$                 ;BR IF NOT (PT)
```

```
                                        ;SEE IF PATTERN 15 IS SPECIFIED
032712  032737  100000  005670          BIT     #BIT15,PT       ;SEE IF PATTERN 15 SPECIFIED
032720  001523                          BEQ     22$             ;BR IF NOT SPECIFIED
                                        ;SEE IF PATTERN 15 SHOULD BE MODIFIED
032722  104400  010750          4$:     TYPE    ,MDFY15         ;ASK WHETHER PATTERN 15 SHOULD BE MODIFIED
032726  004737  032214                  JSR     PC,RDCHRS       ;READ RESPONSE
032732  033200                          24$                     ;(↑C) RETURN ADDRESS
032734  033210                          26$                     ;(↑Z) RETURN ADDRESS
032736  032774                          8$                      ;(↑U) OR ERROR RETURN ADDRESS
032740  005700                          TST     R0              ;SEE IF NULL INPUT
032742  001512                          BEQ     22$             ;BR IF MODIFICATION NOT REQUESTED
032744  022737  000115  005264          CMP     #'M,BUFFO       ;SEE IF (M) TYPED
032752  001405                          BEQ     6$              ;BR IF MODIFICATION REQUESTED
032754  104400  005264                  TYPE    ,BUFFO          ;ECHO BAD INPUT
032760  104400  001314                  TYPE    ,$QUES
032764  000756                          BR      4$              ;GO ASK AGAIN
                                        ;MODIFY PATTERN 15
032766  104400  010720          6$:     TYPE    ,SELP15         ;TYPE "MODIFY PATTERN 15"
032772  005001                          CLR     R1              ;INITIALIZE WORD INDEX
032774  004737  032642          8$:     JSR     PC,TYPPAT       ;TYPE CURRENT WORD AND VALUE
033000  104400  013422                  TYPE    ,SPACE1         ;TYPE A SPACE
033004  104400  013442                  TYPE    ,PROMPT         ;TYPE ASTERISK AND SPACE
                                        ;READ AND CHECK INPUT, IF ANY
033010  004737  032214                  JSR     PC,RDCHRS       ;READ NEW DATA PATTERN WORD
033014  033200                          24$                     ;(↑C) RETURN ADDRESS FOR RDCHRS
033016  033210                          26$                     ;(↑Z) RETURN ADDRESS FOR RDCHRS
033020  032774                          8$                      ;(↑U) OR ERROR RETURN ADDR. FOR RDCHRS
033022  005700                          TST     R0              ;SEE IF ANY INPUT
033024  001006                          BNE     12$             ;BR IF ANY INPUT
033026  062701  000002          10$:    ADD     #2,R1           ;INCREMENT WORD INDEX
033032  022701  000040                  CMP     #32.,R1         ;SEE IF ALL DONE
033036  001454                          BEQ     22$             ;BR IF DONE, TO RETURN
033040  000755                          BR      8$              ;CONTINUE WITH NEXT WORD
033042  022737  000041  005264  12$:    CMP     #'!,BUFFO       ;SEE IF (!) TYPED
033050  001431                          BEQ     16$             ;BR TO PROPAGATE CURRENT VALUE
033052  005002                          CLR     R2              ;INIT. (!) INDICATOR
033054  122760  000041  005263          CMPB    #'!,BUFFO-1(R0) ;SEE IF LAST CHAR IN BUF IS (!)
033062  001004                          BNE     14$             ;BR IF NOT (!)
033064  105060  005263                  CLRB    BUFFO-1(R0)     ;INSERT TERMINATOR BYTE
033070  005300                          DEC     R0              ;DECREMENT CHAR COUNT
033072  005202                          INC     R2              ;SET (!) INDICATOR
033074  022700  000006          14$:    CMP     #6,R0           ;SEE HOW MANY CHARS NOW
033100  002426                          BLT     20$             ;BR IF TOO MANY
033102  012746  005264                  MOV     #BUFFO,-(SP)    ;GET BUF. ADDR. ON STACK FOR OCTBIN
033106  004737  052736                  JSR     PC,OCTBIN       ;CHECK DIGITS AND CONVERT TO BINARY
033112  033156                          20$                     ;ERROR RETURN ADDRESS FOR OCTBIN
033114  012600                          MOV     (SP)+,R0        ;GET BINARY VALUE
033116  005737  053070                  TST     $HIOCT          ;SEE IF VALUE EXCEEDS 16 BITS
033122  001015                          BNE     20$             ;BR TO ECHO BAD INPUT
033124  010061  006766                  MOV     R0,PAT15(R1)    ;PUT NEW WORD VALUE INTO TABLE
033130  005702                          TST     R2              ;SEE IF (!) WAS TYPED
033132  001735                          BEQ     10$             ;BR IF (!) WAS NOT TYPED
                                        ;PROPAGATE CURRENT WORD TO END OF PATTERN 15 TABLE
033134  022701  000036          16$:    CMP     #30.,R1         ;SEE IF ALL DONE YET
033140  001413                          BEQ     22$             ;BR IF DONE
033142  016161  006766  006770          MOV     PAT15(R1),PAT15+2(R1) ;PROPAGATE TO NEXT WORD
```

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 7659  033150  062701  000002                ADD     #2,R1           ;INCREMENT WORD INDEX
 7660  033154  000767                        BR      16$             ;LOOP UNTIL DONE
 7661                                ;ECHO BAD INPUT
 7662  033156  104400  005264      20$:      TYPE    ,BUFFO          ;ECHO BAD INPUT
 7663  033162  104400  001314              TYPE    ,$QUES          ;TYPE <?> AND <CR>,<LF>
 7664  033166  000702                        BR      8$              ;BR TO ASK AGAIN
 7665                                ;NORMAL RETURN
 7666  033170  012602                22$:      MOV     (SP)+,R2        ;RESTORE R2
 7667  033172  012601                        MOV     (SP)+,R1        ;RESTORE R1
 7668  033174  012600                        MOV     (SP)+,R0        ;RESTORE R0
 7669  033176  000207                        RTS     PC              ;RETURN
 7670                                ;(↑C) RETURN
 7671  033200  012766  014520  000006  24$:      MOV     #DRVTST,6(SP)   ;PC FOR (↑C) RETURN
 7672  033206  000770                        BR      22$             ;BR TO RETURN
 7673                                ;(↑Z) RETURN
 7674  033210  012766  016124  000006  26$:      MOV     #ASKMDE,6(SP)   ;PC FOR (↑Z) RETURN
 7675  033216  000764                        BR      22$             ;BR TO RETURN
 7676
 7677
 7678
 7679                                ;;*****************************************************************
 7680                                .SBTTL  CHKPRM - CHECK VALUE OF INPUT PARAMETER
 7681                                ;*THIS SUBROUTINE CHECKS THE CONTENTS OF LOWOCT AND
 7682                                ;*HIGOCT (IF 32-BIT VALUE) AGAINST LOWER AND UPPER
 7683                                ;*LIMITS FOR THE CURRENT PARAMETER. THE PARAMETER TABLE
 7684                                ;*INDEX FOR THE CURRENT PARAMETER MUST BE PASSED
 7685                                ;*TO CHKPRM IN R1 ON ENTRY. IF THE PARAMETER VALUE
 7686                                ;*IS LEGAL, IT IS ENTERED INTO THE PARAMETER TABLE
 7687                                ;*(PRMLST). IF NOT, A RETURN IS MADE TO THE ADDR. FOLLOWING
 7688                                ;*THE CALL TO CHKPRM. IF THE PARAMETER HAS A 2-WORD
 7689                                ;*VALUE (32 BITS) R1 IS INCREMENTED BY 2 BEFORE RETURN.
 7690                                ;* CALL -      JSR     PC,CHKPRM
 7691                                ;*           <ERROR RETURN ADDRESS>
 7692                                ;*           RETURN
 7693                                ;;*****************************************************************
 7694
 7695  033220  104406                CHKPRM: SAVREG                          ;SAVE R0-R5
 7696  033222  010102                        MOV     R1,R2                   ;GET COPY OF INDEX
 7697  033224  006302                        ASL     R2                      ;DOUBLE IT
 7698  033226  022761  040515  006000        CMP     #"MA,PRMNEM(R1) ;SEE IF PARAMETER IS (MA)
 7699  033234  001422                        BEQ     20$                     ;BR IF (MA)
 7700  033236  005737  005472                TST     HIGOCT                  ;SEE IF HIGH BITS = 0
 7701  033242  001403                        BEQ     18$                     ;BR IF ZERO
 7702  033244  017616  000000        16$:    MOV     @(SP),(SP)              ;GET ERROR RETURN PC
 7703  033250  000475                        BR      30$                     ;GO TO RETURN
 7704                                ;CHECK VALIDITY OF 16-BIT PARAMETER VALUE
 7705  033252  023762  005470  005724  18$:    CMP     LOWOCT,PRMLIM(R2) ;SEE IF INPUT VALUE IS TOO SMALL
 7706  033260  103771                        BLO     16$                     ;BR IF INPUT VALUE TOO SMALL
 7707  033262  023762  005470  005726        CMP     LOWOCT,PRMLIM+2(R2) ;SEE IF INPUT VALUE IS TOO LARGE
 7708  033270  101365                        BHI     16$                     ;BR IF INPUT VALUE IS TOO LARGE
 7709                                ;UPDATE 16-BIT PARAMETER VALUE IN LIST
 7710  033272  013761  005470  005650        MOV     LOWOCT,PRMLST(R1) ;PUT NEW PARAMETER VALUE INTO LIST
 7711  033300  000457                        BR      28$                     ;BR TO RETURN
 7712                                ;CHECK VALIDITY OF 32-BIT PARAMETER VALUE
 7713  033302  032737  000001  005470  20$:    BIT     #BIT0,LOWOCT    ;SEE IF MA IS ODD
 7714  033310  001355                        BNE     16$             ;BR IF MA IS ODD
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 7715  033312  023762  005472  005726          CMP     HIGOCT,PRMLIM+2(R2) ;SEE IF HIGH WORD TOO SMALL
 7716  033320  103751                          BLO     16$                 ;BR IF HIGH WORD IS TOO SMALL
 7717  033322  001004                          BNE     24$                 ;BR IF HIGH WORD NOT EQUAL TO LOW LIMIT
 7718  033324  023762  005470  005724          CMP     LOWOCT,PRMLIM(R2)  ;SEE IF LOW WORD IS TOO SMALL
 7719  033332  103744                          BLO     16$                 ;BR IF LOW WORD IS TOO SMALL
 7720  033334  023762  005472  005732  24$:     CMP     HIGOCT,PRMLIM+6(R2) ;SEE IF HIGH WORD IS TOO BIG
 7721  033342  101340                          BHI     16$                 ;BR IF HIGH WORD TOO BIG
 7722  033344  001004                          BNE     26$                 ;BR IF HI WORD NOT EQUAL TO UPPER LIMIT
 7723  033346  023762  005470  005730          CMP     LOWOCT,PRMLIM+4(R2) ;SEE IF LOW WORD IS TOO LARGE
 7724  033354  101333                          BHI     16$                 ;BR IF LOW WORD IS TOO LARGE
 7725                                  ;UPDATE 32-BIT PARAMETER VALUE IN LIST
 7726  033356  013761  005470  005650  26$:     MOV     LOWOCT,PRMLST(R1) ;PUT LOW WORD INTO LIST
 7727  033364  013761  005472  005652          MOV     HIGOCT,PRMLST+2(R1) ;PUT HIGH WORD INTO LIST
 7728                                  ;COMPUTE AND TYPE MAX ALLOWABLE WORD COUNT FOR THIS MA
 7729  033372  004737  033450                  JSR     PC,MXWRDC           ;GET WORD COUNT IN R1-R0
 7730  033376  104400  010451                  TYPE    ,MAWRDC             ;TYPE "MAX WORD COUNT = "
 7731  033402  010037  003170                  MOV     R0,SUML01
 7732  033406  010137  003172                  MOV     R1,SUMHI1
 7733  033412  012746  003170                  MOV     #SUML01,-(SP)       ;PUT POINTER ON STACK
 7734  033416  004737  053674                  JSR     PC,$DB2O            ;CONVERT TO OCTAL
 7735  033422  004737  054210                  JSR     PC,$SUPRS           ;TYPE IT
 7736  033426  104400  001315                  TYPE    ,$CRLF              ;TYPE <CR>,<LF>
 7737  033432  062766  000002  000014          ADD     #2,14(SP)           ;INCREMENT R1 INDEX
 7738  033440  062716  000002          28$:     ADD     #2,(SP) ;GET NORMAL RETURN PC
 7739  033444  104407                  30$:     RESREG                      ;RESTORE R0-R5
 7740  033446  000207                          RTS     PC                  ;RETURN
 7741
 7742
 7743
 7744                                  ;;*****************************************************************
 7745                                  ;*MXWRDC - GET MAX WORD COUNT FOR CURRENT MEM LIMITS AND CURRENT MA,
 7746                                  ;*AND LEAVE THE WORD COUNT IN R1-R0. NO REGISTERS ARE SAVED.
 7747                                  ;;*****************************************************************
 7748  033450  013700  005574  MXWRDC: MOV     MAHILM,R0           ;GET LO BITS OF MEM LIM
 7749  033454  013701  005576          MOV     MAHILM+2,R1         ;HI BITS OF MEM LIM
 7750  033460  163700  005600          SUB     MA,R0               ;SUBTRACT MA FROM MAHILM
 7751  033464  005601                  SBC     R1
 7752  033466  163701  005602          SUB     MA+2,R1
 7753  033472  100413                  BMI     27$                 ;IF NEGATIVE, RETURN
 7754  033474  000241                  CLC                         ;DIVIDE BY 2 TO GET WORDS
 7755  033476  006001                  ROR     R1
 7756  033500  006000                  ROR     R0
 7757  033502  062700  000001          ADD     #1,R0               ;INCREMENT BY 1 WORD
 7758  033506  005501                  ADC     R1
 7759  033510  005701                  TST     R1
 7760  033512  001403                  BEQ     27$                 ;BR IF WORD COUNT < 65,536 DEC
 7761  033514  005000                  CLR     R0                  ;MAKE WORD COUNT = 65,536
 7762  033516  012701  000001          MOV     #1,R1
 7763  033522  000207          27$:    RTS     PC                  ;RETURN
 7764
 7765
 7766
 7767                                  ;;*****************************************************************
 7768                                  .SBTTL  DRVSER - TYPE DRIVE SERIAL NUMBER (LOW 3 DIGITS)
 7769                                  ;*THIS SUBROUTINE TYPES "DRIVE SER. NO.  XXX" (IN DECIMAL), WITH LEADING
 7770                                  ;*ZEROS SUPPRESSED.
```

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7771
7772  033524  104406                    ;;*****************************************************************
7773  033526  004737  030726            DRVSER: SAVREG                  ;SAVE R0-R5
7774  033532  112765  000141  000001            JSR     PC,INITSS       ;CLEAR S.S. AND PARAMETERS
7775  033540  004737  040716                    MOVB    #RDSTAT,P.CMND(R5) ;SET READ STATUS COMMAND
7776  033544  104400  011167                    JSR     PC,DRVCAL       ;READ STATUS OF THIS DRIVE
7777  033550  104400  011205                    TYPE    ,DRIV           ;TYPE "DRIVE"
7778  033554  016501  000054                    TYPE    ,SERNM          ;TYPE " SER. NO.  "
7779  033560  012704  053776                    MOV     P.A11(R5),R1    ;GET "A" STATUS BYTE 11
7780  033564  010446                    MOV     #$OCTVL,R4      ;GET ADDR OF CHAR BUFFER
7781  033566  012703  000003                    MOV     R4,-(SP)        ;STORE IT ON STACK FOR $SUPRS
7782  033572  006101                    MOV     #3,R3           ;INIT CHAR COUNT
7783  033574  006101                    ROL     R1              ;INITIALIZE BIT POSITIONS
7784  033576  006101            4$:     ROL     R1
7785  033600  006101                    ROL     R1              ;GET NEXT 4 BITS
7786  033602  006101                    ROL     R1
7787  033604  006101                    ROL     R1
7788  033606  010100                    MOV     R1,R0           ;GET A WORKING COPY
7789  033610  042700  177760                    BIC     #177760,R0      ;CLEAR ALL BUT LOW 4 BITS
7790  033614  052700  000060                    BIS     #'0,R0          ;CONVERT A DIGIT TO ASCII
7791  033620  110024                    MOVB    R0,(R4)+        ;PUT ASCII DIGIT INTO CHAR BUFFER
7792  033622  005303                    DEC     R3              ;DECREMENT CHAR COUNT
7793  033624  001364                    BNE     4$              ;BR IF NOT 3 CHARS YET
7794  033626  105014                    CLRB    (R4)            ;INSERT NULL TERMINATOR
7795  033630  004737  054210                    JSR     PC,@#$SUPRS     ;TYPE DRIVE SER. NUMBER
7796  033634  104400  001315                    TYPE    ,$CRLF          ;TYPE <CR> AND <LF>
7797  033640  104407                    RESREG                  ;RESTORE R0-R5
7798  033642  000207                    RTS     PC              ;RETURN
7799
7800
7801
7802                                    ;;*****************************************************************
7803                                    .SBTTL  CRTSER - TYPE CARTRIDGE SERIAL NUMBER
7804                                    ;*THIS SUBROUTINE TYPES "CART. SER. NO.  XXXXXXXXXXX" (IN OCTAL),
7805                                    ;*WITH LEADING ZEROS SUPPRESSED.
7806                                    ;;*****************************************************************
7807  033644  004737  030726            CRTSER: JSR     PC,INITSS       ;CLEAR S.S. AND PARAMETERS
7808  033650  105065  000007                    CLRB    P.CS1H(R5)      ;SET 22-SECTOR FORMAT
7809  033654  105737  003115                    TSTB    FORMAT          ;CHECK THE ACTUAL FORMAT
7810  033660  001402                    BEQ     4$              ;BR IF 22 SECTORS
7811  033662  105265  000004                    INCB    P.SECT(R5)      ;IF 20 SECTORS, READ SECTOR 1
7812  033666  112765  000121  000001    4$:     MOVB    #RDDATA,P.CMND(R5) ;SET READ COMMAND
7813  033674  012765  000632  000002            MOV     #LSTCYL,P.CYLN(R5) ;SET CYL = 632(OCT)
7814  033702  112765  000002  000005            MOVB    #LSTTRK,P.TRCK(R5) ;SET TRACK = 2
7815  033710  012765  064574  000010            MOV     #RWBUF,P.BALO(R5) ;SET READ BUFFER ADDRESS
7816  033716  012765  177776  000012            MOV     #-2,P.WC(R5)    ;SET WORD COUNT TO READ 2 WORDS
7817  033724  004737  040716                    JSR     PC,DRVCAL       ;READ SERIAL NO. IN BSF
7818  033730  104400  011176                    TYPE    ,CART           ;TYPE   "CART."
7819  033734  104400  011205                    TYPE    ,SERNM          ;TYPE "SER. NO.  "
7820  033740  012746  064574                    MOV     #RWBUF,-(SP)    ;GET POINTER FOR $DB2O
7821  033744  004737  053674                    JSR     PC,@#$DB2O      ;CONVERT BINARY TO OCTAL
7822  033750  004737  054210                    JSR     PC,@#$SUPRS     ;TYPE CART. SERIAL NO. IN OCTAL
7823  033754  104400  001315                    TYPE    ,$CRLF          ;TYPE <CR> AND <LF>
7824  033760  000207                    RTS     PC              ;RETURN
7825
7826
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7827
7828                                    ;;*****************************************************************
7829                                    .SBTTL  STALL - STALL FOR ST UNIT STALL TIMES
7830                                    ;*IF SWR BIT 8 = 0, THIS SUBROUTINE STALLS FOR ST STALL TIMES,
7831                                    ;*WHERE A STALL TIME = 40 US, FOR AN "AVERAGE" CPU. IF BIT 8
7832                                    ;*IS EQUAL TO 1, A RANDOM STALL IS APPLIED.
7833                                    ;* CALL -   JSR     PC,STALL
7834                                    ;;*****************************************************************
7835
7836  033762  010046                    STALL:  MOV     R0,-(SP)        ;SAVE R0
7837  033764  010146                            MOV     R1,-(SP)        ;SAVE R1
7838  033766  032777  000400  145144            BIT     #BIT08,@SWR     ;APPLY RANDOM STALL ?
7839  033774  001407                            BEQ     1$              ;BR IF NOT RANDOM
7840  033776  004737  053072                    JSR     PC,$RAND        ;GENERATE PSEUDO-RANDOM NUMBER
7841  034002  013700  053172                    MOV     $LONUM,R0       ;GET IT INTO R0
7842  034006  006200                            ASR     R0              ;SCALE IT DOWN
7843  034010  006200                            ASR     R0
7844  034012  000403                            BR      2$              ;GO STALL WITH RANDOM NO.
7845  034014  013700  005504            1$:     MOV     STALLS,R0       ;GET REQUESTED NO. OF STALLS
7846  034020  001406                            BEQ     6$              ;RETURN IF NO STALL REQUIRED
7847  034022  012701  000016            2$:     MOV     #14.,R1         ;SET CONSTANT FOR 40 US
7848  034026  005301                    4$:     DEC     R1              ;INNER LOOP COUNTER
7849  034030  001376                            BNE     4$              ;INNER LOOP BR
7850  034032  005300                            DEC     R0              ;OUTER LOOP COUNTER
7851  034034  001372                            BNE     2$              ;OUTER LOOP BR
7852  034036  012601                    6$:     MOV     (SP)+,R1        ;RESTORE R1
7853  034040  012600                            MOV     (SP)+,R0        ;RESTORE R0
7854  034042  000207                            RTS     PC              ;RETURN
7855
7856
7857
7858                                    ;;*****************************************************************
7859                                    .SBTTL  RNDADR - RANDOM CYLINDER ADDRESS GENERATOR
7860                                    ;*THIS SUBROUTINE GENERATES A PSEUDO-RANDOM 9-BIT CYLINDER
7861                                    ;*ADDRESS, AND LEAVES IT IN "CYLNDR". IT REQUIRES THE SYSMAC
7862                                    ;*SUBROUTINE $RAND.
7863                                    ;* CALL -   JSR     PC,RNDADR
7864                                    ;;*****************************************************************
7865  034044  004737  053072            RNDADR: JSR     PC,$RAND        ;GENERATE 2 16-BIT RANDOM NUMBERS
7866  034050  013737  053172  005506            MOV     $LONUM,CYLNDR   ;GET A RANDOM NUMBER
7867  034056  042737  177000  005506            BIC     #177000,CYLNDR  ;SCALE IT TO 9 BITS
7868  034064  022737  000632  005506            CMP     #632,CYLNDR     ;SEE IF CYL IS TOO BIG
7869  034072  002003                            BGE     2$              ;BR IF CYL IS OK
7870  034074  042737  000400  005506            BIC     #BIT08,CYLNDR   ;SCALE DOWN TO A VALID CYLINDER
7871  034102  000207                    2$:     RTS     PC              ;RETURN
7872
7873
7874
7875                                    ;;*****************************************************************
7876                                    ;* LODSEC - THIS SUBROUTINE LOADS THE CONTENTS OF R0 INTO ALL
7877                                    ;*256(DEC) WORDS OF THE DATA BUFFER (RWBUF).
7878                                    ;;*****************************************************************
7879  034104  104406                    LODSEC: SAVREG                  ;SAVE R0-R5
7880  034106  012701  064574                    MOV     #RWBUF,R1       ;GET ADDRESS OF DATA BUF INTO R1
7881  034112  010021                    2$:     MOV     R0,(R1)+        ;PUT WORD INTO BUFFER
7882  034114  020127  065574                    CMP     R1,#RWBUF+512.  ;SEE IF 256 WORDS WRITTEN YET
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7883  034120  001374                        BNE     2$              ;BR IF NOT DONE YET
7884  034122  104407                        RESREG                  ;RESTORE R0-R5
7885  034124  000207                        RTS     PC              ;RETURN
7886
7887
7888
7889                                ;;*****************************************************************
7890                                ;* TRKCHK - THIS SUBROUTINE DOES A WRITE-CHECK OF SECTOR FS ON CYL
7891                                ;*FC, FOR EACH OF TRACKS 0, 1, AND 2. THE DATA IS COMPARED TO THE
7892                                ;*TRACK NUMBER + 100(OCT) FOR THAT PARTICULAR BLOCK OF DATA WRITTEN.
7893                                ;*THE PARAMETER BLOCK MUST BE PRE-LOADED WITH THE PROPER PARAMETERS.
7894                                ;;*****************************************************************
7895  034126  104406                TRKCHK: SAVREG                  ;SAVE R0-R5
7896  034130  016546  000004                MOV     P.SECT(R5),-(SP) ;SAVE TRACK AND SECTOR PARAMETERS
7897  034134  105065  000005                CLRB    P.TRCK(R5)      ;CLEAR THE TRACK NO.
7898                                ;LOAD THE DATA BUFFER WITH THE CURRENT TRACK NO.
7899  034140  116500  000005          2$:   MOVB    P.TRCK(R5),R0   ;GET TRACK NO. INTO R0
7900  034144  062700  000100                ADD     #100,R0         ;ADD 100(OCT) TO TRACK NO.
7901  034150  004737  034104                JSR     PC,LODSEC       ;LOAD DATA BUF WITH TRACK NO. + 100(OCT)
7902  034154  112765  000131  000001        MOVB    #WRTCHK,P.CMND(R5) ;SET WRITE CHECK COMMAND
7903  034162  004737  040716                JSR     PC,DRVCAL       ;PERFORM THE WRITE CHECK
7904  034166  105265  000005                INCB    P.TRCK(R5)      ;INCREMENT THE TRACK NO.
7905  034172  122765  000003  000005        CMPB    #3,P.TRCK(R5)   ;SEE IF DONE WITH ALL TRACKS
7906  034200  001357                        BNE     2$              ;BR IF NOT DONE YET
7907  034202  012665  000004                MOV     (SP)+,P.SECT(R5) ;RESTORE TRACK AND SECTOR PARAMETERS
7908  034206  104407                        RESREG                  ;RESTORE R0-R5
7909  034210  000207                        RTS     PC              ;RETURN
7910
7911
7912
7913                                ;;*****************************************************************
7914                                ;*LODP14 - GENERATE SIXTEEN PSEUDO-RANDOM NUMBERS AND LOAD THEM
7915                                ;*INTO THE PATTERN 14 TABLE.
7916                                ;;*****************************************************************
7917  034212  104406                LODP14: SAVREG                  ;SAVE R0-R5
7918  034214  012701  000010                MOV     #8.,R1          ;INIT LOOP COUNTER TO 8.
7919  034220  012700  006726                MOV     #PAT14,R0       ;GET ADDRESS OF PATTERN 14 BUFFER
7920  034224  004737  053072          4$:   JSR     PC,$RAND        ;GENERATE 2 16-BIT RANDOM NUMBERS
7921  034230  013720  053172                MOV     $LONUM,(R0)+    ;PUT ONE NUMBER INTO PATTERN
7922  034234  013720  053170                MOV     $HINUM,(R0)+    ;PUT OTHER NO. INTO PATTERN
7923  034240  005301                        DEC     R1              ;SEE IF 16 WORDS LOADED YET
7924  034242  001370                        BNE     4$              ;BR IF NOT YET
7925  034244  104407                        RESREG                  ;RESTORE R0-R5
7926  034246  000207                        RTS     PC              ;RETURN
7927
7928
7929
7930                                ;;*****************************************************************
7931                                .SBTTL  FINADR - COMPUTE FINAL PACK ADDRESS
7932                                ;*THIS SUBROUTINE IS USED AFTER A DATA TRANSFER HAS COMPLETED, TO
7933                                ;*COMPUTE THE FINAL PACK ADDRESS AT TERMINATION. THE 2'S COMP. OF THE
7934                                ;*WORD NO. AT THE POINT OF INTEREST IS PASSED IN LASTWC. THIS IS USED WITH
7935                                ;*P.CYLN(R5), P.TRCK(R5), AND P.SECT(R5) TO COMPUTE THE CORRESPONDING
7936                                ;*PACK ADDRESS, WHICH IS RETURNED IN FINCYL, FINTRK, AND FINSEC.
7937                                ;*THE SUBROUTINE IS USED TO DETERMINE THE PACK ADDRESS OF A SOFTWARE
7938                                ;*DATA MISCOMPARE.
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7939                                    ;;*****************************************************************
7940  034250  104406                    FINADR: SAVREG                  ;SAVE R0-R5
7941  034252  013746  005572                    MOV     LASTWC,-(SP)    ;STORE WORD COUNT
7942  034256  005416                            NEG     (SP)            ;MAKE IT POSITIVE
7943  034260  005046                    18$:    CLR     -(SP)           ;MAKE ROOM ON STACK
7944  034262  116616  000003                    MOVB    3(SP),(SP)      ;STORE NO. OF SECTORS TRANSFERRED
7945  034266  005066  000002                    CLR     2(SP)           ;CLEAR LOCATION ON STACK
7946  034272  116566  000004  000002            MOVB    P.SECT(R5),2(SP) ;STORE STARTING SECTOR
7947  034300  066616  000002                    ADD     2(SP),(SP)      ;DETERMINE FINAL SECTOR ADDRESS
7948  034304  005066  000002                    CLR     2(SP)           ;CLEAR NO. OF TRACKS TRANSFERRED
7949  034310  012700  000026                    MOV     #22.,R0         ;SET FOR 22 SECTORS
7950  034314  105737  003115                    TSTB    FORMAT          ;DETERMINE THE FORMAT
7951  034320  001402                            BEQ     19$             ;BR IF 22 SECTORS
7952  034322  012700  000024                    MOV     #20.,R0         ;SET FOR 20 SECTORS
7953  034326  020016                    19$:    CMP     R0,(SP)         ;CHECK FOR SECTOR OVERFLOW
7954  034330  101004                            BHI     20$             ;NO, CHECK IF SECTOR CORRECT
7955  034332  160016                            SUB     R0,(SP)         ;DECREMENT SECTOR COUNT BY 20 OR 22
7956  034334  005266  000002                    INC     2(SP)           ;INCREMENT TRACKS TRANSFERRED
7957  034340  000772                            BR      19$             ;CHECK FOR SECTOR OVERFLOW
7958  034342  112637  005571            20$:    MOVB    (SP)+,FINSEC    ;STORE FINAL SECTOR
7959  034346  005046                            CLR     -(SP)           ;MAKE ROOM FOR TRACKS TRANSFERRED
7960  034350  116516  000005                    MOVB    P.TRCK(R5),(SP) ;STORE STARTING TRACK
7961  034354  066616  000002                    ADD     2(SP),(SP)      ;DETERMINE FINAL TRACK ADDRESS
7962  034360  005066  000002                    CLR     2(SP)           ;CLEAR FINAL CYLINDER
7963  034364  122716  000003            21$:    CMPB    #3,(SP)         ;CHECK FOR TRACK OVERFLOW
7964  034370  101005                            BHI     22$             ;NO, CHECK FINAL TRACK
7965  034372  162716  000003                    SUB     #3,(SP)         ;DECREMENT TRACK COUNT BY 3
7966  034376  005266  000002                    INC     2(SP)           ;INCR CYL COUNT
7967  034402  000770                            BR      21$             ;CHECK FOR TRACK OVERFLOW
7968  034404  112637  005570            22$:    MOVB    (SP)+,FINTRK    ;STORE FINAL TRACK
7969  034410  066516  000002                    ADD     P.CYLN(R5),(SP) ;CALCULATE FINAL CYLINDER
7970  034414  011637  005566                    MOV     (SP),FINCYL     ;STORE FINAL  CYLINDER
7971  034420  005726                            TST     (SP)+           ;CLEAN OFF STACK
7972  034422  104407                            RESREG                  ;RESTORE R0-R5
7973  034424  000207                            RTS     PC              ;RETURN
7974
7975
7976
7977                                    ;;*****************************************************************
7978                                    .SBTTL  LODBUF - LOAD THE READ/WRITE DATA BUFFER
7979                                    ;*THIS SUBROUTINE LOADS THE READ/WRITE DATA BUFFER (POINTED TO BY
7980                                    ;* PMA AND PMA+2) WITH THE APPROPRIATE REPEATING DATA PATTERN. IF
7981                                    ;*PARAMETER PATRN = 0 ON ENTRY, THE DATA WHICH IS LOADED IS COMPRISED
7982                                    ;*OF ALL THE PATTERNS 00-15 (QUICK VERIFY DEFAULT DATA TEST).
7983                                    ;*IF PATRN IS NOT 0, THE NO. OF WORDS IN THE WORD WDSXFR
7984                                    ;*OF THE PATTERN IDENTIFIED BY THE NO. OF THE BIT SET IN R1 ON
7985                                    ;*ENTRY, ARE LOADED INTO THE BUFFER.
7986                                    ;;*****************************************************************
7987
7988  034426  104406                    LODBUF: SAVREG                  ;SAVE R0-R5
7989  034430  013702  005564                    MOV     WDSXFR,R2       ;GET NO. OF WORDS
7990  034434  005737  005536                    TST     PATRN           ;SEE IF QUICK VERIFY DATA TEST DESIRED
7991  034440  001007                            BNE     3$              ;BR IF NOT QUICK VERIFY
7992  034442  012700  006026                    MOV     #PAT00,R0       ;SET DATA PATTERN STARTING ADDRESS
7993  034446  012746  000400                    MOV     #256.,-(SP)     ;SET PATTERN WORD COUNT
7994  034452  012701  064574                    MOV     #RWBUF,R1       ;SET BUFFER ADDRESS
```

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 7995  034456  000463                        BR      30$             ;PROCEED
 7996  034460  005000                3$:     CLR     R0              ;INIT PATTERN NUMBER
 7997  034462  032701  000001        4$:     BIT     #BIT0,R1        ;SEE IF THIS BIT IS SET
 7998  034466  001003                        BNE     6$              ;BR IF THIS BIT IS SET
 7999  034470  005200                        INC     R0              ;INCREMENT PATTERN NO.
 8000  034472  006201                        ASR     R1              ;SHIFT TO EXAMINE NEXT BIT
 8001  034474  000772                        BR      4$              ;BR TO CHECK NEXT BIT
 8002  034476  006300                6$:     ASL     R0              ;MULTIPLY PATTERN NO. BY 32(DEC)
 8003  034500  006300                        ASL     R0
 8004  034502  006300                        ASL     R0
 8005  034504  006300                        ASL     R0
 8006  034506  006300                        ASL     R0
 8007  034510  062700  006026                ADD     #PAT00,R0       ;GET ADDRESS OF DESIRED PATTERN
 8008  034514  012746  000020                MOV     #16.,-(SP)      ;SET PATTERN WORD COUNT
 8009  034520  013701  005604                MOV     PMA,R1          ;SET BUFFER ADDRESS
 8010  034524  005737  056216                TST     $KT11           ;SEE IF MEM MGT PRESENT
 8011  034530  100036                        BPL     30$             ;BR IF NOT PRESENT
 8012                          ;BUFFER LOAD LOOP FOR MEM MGT STARTS HERE
 8013  034532  013737  003200  172354        MOV     SAVPAR,@#KIPAR6 ;SET UP WORKING PAR
 8014  034540  052737  000001  177572        BIS     #BIT0,@#SR0     ;TURN ON MEMORY MANAGEMENT
 8015  034546  042701  160000                BIC     #160000,R1      ;FORCE RELOCATION THRU KIPAR6
 8016  034552  052701  140000                BIS     #140000,R1
 8017  034556  010003                22$:     MOV     R0,R3           ;GET A COPY OF PATTERN ADDRESS
 8018  034560  011604                        MOV     (SP),R4         ;INIT PATTERN WORD COUNT
 8019  034562  012321                24$:     MOV     (R3)+,(R1)+     ;LOAD A DATA WORD INTO BUFFER
 8020  034564  032701  020000                BIT     #BIT13,R1       ;SEE IF OVERFLOW TO NEXT PAGE
 8021  034570  001405                        BEQ     26$             ;BR IF NO OVERFLOW
 8022  034572  062737  000200  172354        ADD     #200,@#KIPAR6   ;INCREMENT PAR BY 4K FOR NEW PAGE
 8023  034600  042701  020000                BIC     #BIT13,R1       ;SET PAGE = 6 AGAIN
 8024  034604  005302                26$:     DEC     R2              ;DECREMENT WORD COUNTER
 8025  034606  001403                        BEQ     28$             ;BR IF ALL DONE
 8026  034610  005304                        DEC     R4              ;DECREMENT PATTERN WORD COUNT
 8027  034612  001363                        BNE     24$             ;BR IF NOT DONE WITH PATTERN YET
 8028  034614  000760                        BR      22$             ;BR TO REPEAT THE PATTERN
 8029  034616  042737  000001  177572  28$:  BIC     #BIT0,@#SR0     ;DISABLE MEMORY MANAGEMENT
 8030  034624  000410                        BR      44$             ;GO TO RETURN
 8031                          ;BUFFER LOAD LOOP FOR NO MEM MGT STARTS HERE
 8032  034626  010003                30$:     MOV     R0,R3           ;GET A COPY OF PATTERN ADDRESS
 8033  034630  011604                        MOV     (SP),R4         ;INIT PATTERN WORD COUNT
 8034  034632  012321                34$:     MOV     (R3)+,(R1)+     ;LOAD A DATA WORD INTO BUFFER
 8035  034634  005302                        DEC     R2              ;DECREMENT WORD COUNTER
 8036  034636  001403                        BEQ     44$             ;BR IF ALL DONE
 8037  034640  005304                        DEC     R4              ;DECREMENT PATTERN WORD COUNT
 8038  034642  001373                        BNE     34$             ;BR IF NOT DONE WITH PATTERN YET
 8039  034644  000770                        BR      30$             ;BR TO REPEAT THE PATTERN
 8040  034646  005726                44$:     TST     (SP)+           ;POP THE STACK
 8041  034650  104407                        RESREG                  ;RESTORE R0-R5
 8042  034652  000207                        RTS     PC              ;RETURN
 8043
 8044
 8045
 8046                          ;;*****************************************************************
 8047                          .SBTTL  CMPBUF - SOFTWARE COMPARE DATA
 8048                          ;*THIS SUBROUTINE PERFORMS A SOFTWARE COMPARE OF THE R/W DATA BUFFER (POINTED
 8049                          ;*TO BY PMA AND PMA+2) TO THE APPROPRIATE REPEATING DATA PATTERN. IF
 8050                          ;*PARAMETER PATRN = 0 ON ENTRY, THE DATA IS COMPRISED OF ALL THE PATTERNS
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 8051                                   ;*00-15 (QUICK VERIFY DEFAULT DATA TEST).
 8052                                   ;*IF PATRN IS NOT 0, THE NO. OF THE BIT SET IN R1 ON ENTRY IDENTIFIES THE
 8053                                   ;*REPEATING DATA PATTERN TO COMPARE AGAINST.
 8054                                   ;;*****************************************************************
 8055  034654  104406                  CMPBUF: SAVREG                  ;SAVE R0-R5
 8056  034656  112737  000040  063113          MOVB    #40,DH701+38.   ;RESTORE ERROR MSG PARAMS
 8057  034664  012737  000007  064466          MOV     #7,DF25+2
 8058  034672  013702  005564                  MOV     WDSXFR,R2       ;SET NO. OF WORDS
 8059  034676  005037  005534                  CLR     SCRACH          ;CLEAR COMPARE ERROR COUNT
 8060  034702  004737  042130                  JSR     PC,REPSUP       ;STORE PREV CMND FOR POSS. PRINT
 8061  034706  005737  005536                  TST     PATRN           ;SEE IF THIS IS QUICK VERIFY DEFAULT DATA TEST
 8062  034712  001007                          BNE     3$              ;BR IF NOT
 8063  034714  012700  006026                  MOV     #PAT00,R0       ;GET DATA PATTERN STARTING ADDR
 8064  034720  012746  000400                  MOV     #256.,-(SP)     ;SET PATTERN WORD COUNT
 8065  034724  012701  064574                  MOV     #RWBUF,R1       ;SET BUFFER ADDRESS
 8066  034730  000466                          BR      30$             ;PROCEED
 8067  034732  005000                  3$:     CLR     R0              ;INIT PATTERN NO.
 8068  034734  032701  000001          4$:     BIT     #BIT0,R1        ;SEE IF THIS BIT IS SET
 8069  034740  001003                          BNE     6$              ;BR IF THIS BIT IS SET
 8070  034742  005200                          INC     R0              ;INCREMENT PATTERN NUMBER
 8071  034744  006201                          ASR     R1              ;SHIFT TO EXAMINE NEXT BIT
 8072  034746  000772                          BR      4$              ;BR TO CHECK NEXT BIT
 8073  034750  006300                  6$:     ASL     R0              ;MULTIPLY PATTERN NO. BY 32(DEC)
 8074  034752  006300                          ASL     R0
 8075  034754  006300                          ASL     R0
 8076  034756  006300                          ASL     R0
 8077  034760  006300                          ASL     R0
 8078  034762  062700  006026                  ADD     #PAT00,R0       ;GET ADDRESS OF DESIRED PATTERN
 8079  034766  012746  000020                  MOV     #16.,-(SP)      ;PATTERN WORD COUNT
 8080  034772  013701  005604                  MOV     PMA,R1          ;SET BUFFER ADDRESS
 8081  034776  005737  056216                  TST     $KT11           ;SEE IF MEM MGT PRESENT
 8082  035002  100041                          BPL     30$             ;BR IF NOT PRESENT
 8083                                  ;COMPARE LOOP FOR MEM MGT STARTS HERE
 8084  035004  013737  003200  172354          MOV     SAVPAR,@#KIPAR6 ;SET UP WORKING PAR
 8085  035012  052737  000001  177572          BIS     #BIT0,@#SR0     ;TURN ON MEM MGT
 8086  035020  042701  160000                  BIC     #160000,R1      ;FORCE RELOCATION THRU KIPAR6
 8087  035024  052701  140000                  BIS     #140000,R1
 8088  035030  010003                  22$:    MOV     R0,R3           ;GET A COPY OF PATTERN ADDRESS
 8089  035032  011604                          MOV     (SP),R4         ;INIT PATTERN WORD COUNT
 8090  035034  022321                  24$:    CMP     (R3)+,(R1)+     ;COMPARE DATA WORD TO PATTERN WORD
 8091  035036  001404                          BEQ     25$             ;BR IF NO ERROR
 8092  035040  013737  172354  001216          MOV     @#KIPAR6,$REG16 ;SET PAR FOR PRINTOUT
 8093  035046  000432                          BR      35$             ;GO HANDLE ERROR
 8094  035050  032701  020000          25$:    BIT     #BIT13,R1       ;SEE IF OVERFLOW TO NEXT PAGE
 8095  035054  001405                          BEQ     26$             ;BR IF NO OVERFLOW
 8096  035056  062737  000200  172354          ADD     #200,@#KIPAR6   ;INCR PAR BY 4K FOR NEW PAGE
 8097  035064  042701  020000                  BIC     #BIT13,R1       ;SET PAGE = 6 AGAIN
 8098  035070  005302                  26$:    DEC     R2              ;DECREMENT WORD COUNTER
 8099  035072  001002                          BNE     27$             ;BR IF NOT ALL DONE YET
 8100  035074  000137  035540                  JMP     54$             ;ALL DONE - GET OUT
 8101  035100  005304                  27$:    DEC     R4              ;DECREMENT PATTERN WORD COUNT
 8102  035102  001354                          BNE     24$             ;BR IF NOT DONE WITH PATTERN YET
 8103  035104  000751                          BR      22$             ;BR TO REPEAT THE PATTERN
 8104                                  ;COMPARE LOOP FOR NO MEM MGT STARTS HERE
 8105  035106  010003                  30$:    MOV     R0,R3           ;GET COPY OF PATTERN ADDRESS
 8106  035110  011604                          MOV     (SP),R4         ;INIT PATTERN WORD COUNT
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 8107  035112  022321                    34$:    CMP     (R3)+,(R1)+     ;COMPARE DATA WORD TO PATTERN WORD
 8108  035114  001002                            BNE     31$             ;BR IF COMPARE ERROR
 8109  035116  000137  035520                    JMP     40$             ;JUMP IF DATA COMPARES OK
 8110  035122  105037  063113              31$:  CLRB    DH701+38.       ;ADJUST DATA HEADER FOR MSG
 8111  035126  012737  000005  064466            MOV     #5,DF25+2       ;ADJUST ERROR DATA WORD COUNT
 8112                                    ;COMMON COMPARE ERROR HANDLER
 8113  035134  010237  001202              35$:  MOV     R2,$REG10       ;GET WORD NO.
 8114  035140  163737  005564  001202            SUB     WDSXFR,$REG10
 8115  035146  013737  001202  005572            MOV     $REG10,LASTWC   ;GET 2'S COMP OF WORD NO.
 8116  035154  004737  034250                    JSR     PC,FINADR       ;COMPUTE ACTUAL PACK ADRS
 8117  035160  104406                            SAVREG                  ;SAVE R0-R5
 8118  035162  013700  005566                    MOV     FINCYL,R0       ;GET CYL
 8119  035166  113701  005570                    MOVB    FINTRK,R1       ;GET TRACK
 8120  035172  113702  005571                    MOVB    FINSEC,R2       ;GET SECTOR
 8121  035176  004737  040612                    JSR     PC,BDSRCK       ;SEE IF THIS SECTOR LISTED BAD
 8122  035202  104407                            RESREG                  ;RESTORE R0-R5
 8123  035204  032737  001000  005476            BIT     #BADSEC,RECODE
 8124  035212  001132                            BNE     50$             ;BR IF LISTED- DON'T REPORT ERROR
 8125  035214  005737  005534                    TST     SCRACH          ;CHECK THE ERROR COUNT
 8126  035220  001024                            BNE     36$             ;BR IF THIS IS NOT FIRST ERROR
 8127  035222  105737  003134                    TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
 8128  035226  001411                            BEQ     46$             ;BR IF NOT
 8129  035230  013737  005262  001174            MOV     CRMPHO,$REG5    ;GET CURRENT MAP REG 0
 8130  035236  013737  005260  001176            MOV     CRMPLO,$REG6
 8131  035244  104116                            ERROR   116             ;DATA MISCOMPARE (11/70)
 8132  035246  104117                            ERROR   117
 8133  035250  000401                            BR      48$
 8134  035252  104034                    46$:    ERROR   34              ;TYPE HEADING FOR ERROR MSG
 8135  035254  012737  177777  001174    48$:    MOV     #-1,$REG5       ;INIT CYL NO.
 8136  035262  005037  001176                    CLR     $REG6
 8137  035266  005037  001200                    CLR     $REG7
 8138  035272  005237  005534              36$:  INC     SCRACH          ;INCREMENT THE ERROR COUNT
 8139  035276  032777  000001  143634            BIT     #BIT0,@SWR      ;SEE IF ALL ERRORS SHOULD BE REPORTED
 8140  035304  001004                            BNE     38$             ;BR TO REPORT ALL ERRORS
 8141  035306  022737  000012  005534            CMP     #10.,SCRACH     ;SEE IF 10(DEC) ERRORS YET
 8142  035314  002511                            BLT     54$             ;BR IF ERROR LIMIT EXCEEDED
 8143  035316  023737  001174  005566    38$:    CMP     $REG5,FINCYL    ;SEE IF DIFFERENT CYL
 8144  035324  001010                            BNE     42$             ;BR IF YES
 8145  035326  123737  001176  005570            CMPB    $REG6,FINTRK    ;SEE IF DIFFERENT TRACK
 8146  035334  001004                            BNE     42$             ;BR IF YES
 8147  035336  123737  001200  005571            CMPB    $REG7,FINSEC    ;SEE IF DIFFERENT SECTOR
 8148  035344  001412                            BEQ     44$             ;BR IF SAME PACK ADDRESS
 8149  035346  013737  005566  001174    42$:    MOV     FINCYL,$REG5    ;SET NEW PACK ADRS FOR PRINTOUT
 8150  035354  113737  005570  001176            MOVB    FINTRK,$REG6
 8151  035362  113737  005571  001200            MOVB    FINSEC,$REG7
 8152  035370  104115                            ERROR   115             ;TYPE NEW PACK ADDRESS
 8153  035372  005437  001202              44$:  NEG     $REG10          ;GET WORD NO.
 8154  035376  016337  177776  001204            MOV     -2(R3),$REG11   ;GET GOOD DATA
 8155  035404  016137  177776  001206            MOV     -2(R1),$REG12   ;GET BAD DATA
 8156  035412  013737  001202  001212            MOV     $REG10,$REG14   ;COMPUTE PHYSICAL ADDRESS
 8157  035420  005037  001210                    CLR     $REG13
 8158  035424  006137  001212                    ROL     $REG14
 8159  035430  006137  001210                    ROL     $REG13
 8160  035434  063737  005604  001212            ADD     PMA,$REG14
 8161  035442  005537  001210                    ADC     $REG13
 8162  035446  063737  005606  001210            ADD     PMA+2,$REG13
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 8163  035454  010137  001214                      MOV     R1,$REG15       ;GET VIRT. ADRS FOR PRINTOUT
 8164  035460  162737  000002  001214              SUB     #2,$REG15
 8165  035466  104063                              ERROR   63              ;TYPE GOOD AND BAD DATA, MEM. ADRS.
 8166  035470  032777  000100  143442              BIT     #BIT6,@SWR      ;SEE IF JUST 1 ERROR SHOULD BE REPORTED
 8167  035476  001020                              BNE     54$             ;BR IF JUST 1 ERROR SHOULD BE REPORTED
 8168  035500  005737  005536          50$:        TST     PATRN           ;SEE IF DEFAULT DATA TEST
 8169  035504  001405                              BEQ     40$             ;BR IF YES
 8170  035506  005737  056216                      TST     $KT11           ;SEE IF MEM MGT PRESENT
 8171  035512  100002                              BPL     40$             ;BR IF NOT PRESENT
 8172  035514  000137  035050                      JMP     25$             ;GO HANDLE MEM MGT
 8173  035520  005302                  40$:        DEC     R2              ;DECREMENT WORD COUNTER
 8174  035522  001406                              BEQ     54$             ;BR IF ALL DONE
 8175  035524  005304                              DEC     R4              ;DECREMENT PATTERN WORD COUNT
 8176  035526  001002                              BNE     53$             ;BR IF NOT DONE WITH PATTERN YET
 8177  035530  000137  035106                      JMP     30$             ;JUMP TO REPEAT THE PATTERN
 8178  035534  000137  035112          53$:        JMP     34$
 8179  035540  005737  056216          54$:        TST     $KT11           ;SEE IF MEM MGT PRESENT
 8180  035544  100003                              BPL     56$             ;BR IF NOT PRESENT
 8181  035546  042737  000001  177572              BIC     #BIT0,@#SR0     ;DISABLE MEM MGT
 8182  035554  005726                  56$:        TST     (SP)+           ;POP THE STACK
 8183  035556  104407                              RESREG                  ;RESTORE R0-R5
 8184  035560  000207                              RTS     PC              ;RETURN
 8185
 8186
 8187
 8188                                  ;;**********************************************************************
 8189                                  ;* CTLOUT - THIS SUBROUTINE CHECKS FOR (↑C) OR (↑Z) TTY INPUT.
 8190                                  ;*IF (↑C) WAS TYPED, THE SUBROUTINE RETURNS TO DRVTST. IF (↑Z)
 8191                                  ;*WAS TYPED, THE SUBROUTINE RETURNS TO INPUTP. IN EITHER CASE,
 8192                                  ;*A RESET INSTRUCTION IS EXECUTED, AND THE STACK IS RE-INIT-
 8193                                  ;*IALIZED. IF THERE IS NO INPUT, OR INPUT OTHER THAN (↑C) OR (↑Z),
 8194                                  ;*NO ACTION IS TAKEN.
 8195                                  ;*  CALL -   JSR     PC,CTLOUT
 8196                                  ;*    OR -   CKEXIT
 8197                                  ;;**********************************************************************
 8198  035562  122737  000001  003110  CTLOUT: CMPB    #1,TSTING       ;SEE IF CURRENTLY RUNNING TESTS
 8199  035570  001077                          BNE     10$             ;BR IF NOT RUNNING TESTS
 8200  035572  005737  005524                  TST     INTCHR          ;SEE IF ANY TTY INPUT
 8201  035576  001474                          BEQ     10$             ;BR IF NO INPUT
 8202  035600  105737  003106                  TSTB    MDFLAG          ;SEE IF DEFAULT MODE RUN
 8203  035604  001446                          BEQ     12$             ;BR IF YES
 8204  035606  122737  000003  005524          CMPB    #003,INTCHR     ;SEE IF (↑C) TYPED
 8205  035614  001033                          BNE     4$              ;BR IF NOT (↑C)
 8206  035616  012700  014520                  MOV     #DRVTST,R0      ;SET RETURN ADDR = DRVTST
 8207  035622  105737  003124          2$:     TSTB    XOVLAD          ;SEE IF XXDP CURRENTLY OVERLAID
 8208  035626  001402                          BEQ     6$              ;BR IF NOT
 8209  035630  004737  030502                  JSR     PC,GETXDP       ;RESTORE SAVED XXDP, IF NECESSARY
 8210  035634  000005                  6$:     RESET                   ;RESET ALL DEVICES
 8211  035636  005037  005524                  CLR     INTCHR          ;CLEAR TTY CHAR BUFFER WORD
 8212  035642  005037  001304                  CLR     $TIMES          ;CLEAR THE ITER. COUNT
 8213  035646  105037  003125                  CLRB    XDPSVD          ;CLEAR THE XXDP SAVED FLAG
 8214  035652  012737  042410  003036          MOV     #ERRHDL,A.ABNL  ;RESTORE ERROR HANDLER ADDRESS
 8215  035660  012706  001100                  MOV     #STACK,SP       ;RESET THE STACK
 8216  035664  112765  000113  000001          MOVB    #RECAL,P.CMND(R5) ;SET RECAL COMMAND
 8217  035672  004737  040716                  JSR     PC,DRVCAL       ;DO CLEANUP RECALIBRATE
 8218  035676  005037  001102                  CLR     $TSTNM          ;CLEAR THE TEST NO.
```

```
 8219  035702  000110                          JMP     @R0             ;EXIT FROM TESTS
 8220  035704  122737  000032  005524  4$:     CMPB    #032,INTCHR     ;SEE IF (↑Z) TYPED
 8221  035712  001016                          BNE     7$              ;BR IF NOT (↑Z)
 8222  035714  012700  016120                  MOV     #INPUTP,R0      ;SET RETURN ADDR = INPUTP
 8223  035720  000740                          BR      2$              ;TAKE EXIT
 8224  035722  122737  000003  005524  12$:    CMPB    #003,INTCHR     ;SEE IF (↑C) TYPED
 8225  035730  001007                          BNE     7$              ;BR IF NOT
 8226  035732  104400  007646                  TYPE    ,HLTRQD         ;TYPE "HALT REQUESTED"
 8227  035736  104400  007616                  TYPE    ,CNTRDY         ;TYPE "PRESS CONT WHEN RDY"
 8228  035742  012700  044420                  MOV     #HLTPRG,R0      ;SET HALT ADDRESS
 8229  035746  000725                          BR      2$              ;TAKE EXIT
 8230  035750  122737  000007  005524  7$:     CMPB    #007,INTCHR     ;SEE IF (↑G) TYPED
 8231  035756  001002                          BNE     8$              ;BR IF NOT (↑G)
 8232  035760  004737  027562                  JSR     PC,GTSWRG       ;OPEN SOFTWARE SWR FOR MODIFICATION
 8233  035764  004737  027250          8$:     JSR     PC,PREPKB       ;ENABLE KBD INPUT AGAIN
 8234  035770  000207                  10$:    RTS     PC              ;RETURN
 8235
 8236
 8237
 8238                                  ;;*****************************************************************
 8239                                  ;*WRTSEC - WRITE A BLOCK OF 400(OCT) WORDS ONTO DISK AND PERFORM
 8240                                  ;*A WRITE CHECK. PARAMETER BLOCK MUST BE PRE-LOADED WITH PACK
 8241                                  ;*ADDRESS. DATA WORD IS PASSED IN R3 ON ENTRY. RWBUF IS THE BUFFER
 8242                                  ;*USED.
 8243                                  ;;*****************************************************************
 8244  035772  104406                  WRTSEC: SAVREG                  ;SAVE R0-R5
 8245                                  ;LOAD THE R/W BUFFER WITH DATA
 8246  035774  012700  064574                  MOV     #RWBUF,R0       ;BUFFER ADDRESS
 8247  036000  012701  000400                  MOV     #400,R1         ;400(OCT) WORDS
 8248  036004  010320                  4$:     MOV     R3,(R0)+        ;LOAD A BUFFER WORD
 8249  036006  005301                          DEC     R1              ;DECR COUNTER
 8250  036010  001375                          BNE     4$              ;BR IF NOT DONE YET
 8251                                  ;SET UP PARAMETERS
 8252  036012  012765  064574  000010          MOV     #RWBUF,P.BALO(R5) ;SET BUS ADDRESS
 8253  036020  012765  177400  000012          MOV     #-400,P.WC(R5)  ;SET WORD COUNT
 8254                                  ;WRITE THE DATA
 8255  036026  112765  000123  000001          MOVB    #WRDATA,P.CMND(R5) ;SET WRITE COMMAND
 8256  036034  032777  000002  143076          BIT     #BIT1,@SWR      ;SEE IF WRITES INHIBITED
 8257  036042  001002                          BNE     6$              ;BR IF YES
 8258  036044  004737  040716                  JSR     PC,DRVCAL       ;WRITE THE DATA
 8259                                  ;PERFORM WRITE CHECK
 8260  036050  112765  000131  000001  6$:     MOVB    #WRTCHK,P.CMND(R5) ;SET WRITE CHECK COMMAND
 8261  036056  004737  040716                  JSR     PC,DRVCAL       ;PERFORM WRITE CHECK
 8262  036062  104407                          RESREG                  ;RESTORE R0-R5
 8263  036064  000207                          RTS     PC              ;RETURN
 8264
 8265
 8266
 8267                                  ;;*****************************************************************
 8268                                  ;*LDMEM1 - LOAD MEMORY WITH INCREASING NUMBERS, STARTING WITH 1.
 8269                                  ;*LDMEM2 - LOAD MEMORY WITH REPEATED WORD, IN R3 ON ENTRY.
 8270                                  ;*BOTH SUBROUTINES REQUIRE MEMORY ADDRESS IN PMA, PMA+2, AND WORD COUNT
 8271                                  ;*MUST BE IN WDSXFR.
 8272                                  ;;*****************************************************************
 8273  036066  104406                  LDMEM1: SAVREG                  ;SAVE R0-R5
 8274  036070  005004                          CLR     R4              ;R4=0 INDICATES LDMEM1
```

```
8275  036072  012703  000001                  MOV     #1,R3           ;INIT DATA WORD TO 1
8276  036076  000403                          BR      LDMO            ;PROCEED
8277  036100  104406                  LDMEM2: SAVREG                  ;SAVE R0-R5
8278  036102  012704  177777                  MOV     #-1,R4          ;R4=177777 INDICATES LDMEM2
8279  036106  013702  005564          LDMO:   MOV     WDSXFR,R2       ;GET NO. OF WORDS
8280  036112  013701  005604                  MOV     PMA,R1          ;GET MEM ADRS
8281  036116  005737  056216                  TST     $KT11           ;SEE IF MEM MGT
8282  036122  100012                          BPL     6$              ;BR IF NOT
8283  036124  042701  160000                  BIC     #160000,R1      ;FORCE RELOCATION THRU PAR6
8284  036130  052701  140000                  BIS     #140000,R1
8285  036134  013737  003200  172354          MOV     SAVPAR,@#KIPAR6 ;INIT PAR6
8286  036142  052737  000001  177572          BIS     #BIT0,@#SR0     ;TURN ON MEM MGT
8287  036150  010321                  6$:     MOV     R3,(R1)+        ;LOAD A WORD INTO BUFFER
8288  036152  005704                          TST     R4              ;SEE WHICH DATA DESIRED
8289  036154  001001                          BNE     8$              ;BR IF NOT INCREMENTING DATA
8290  036156  005203                          INC     R3              ;INCREMENT THE DATA
8291  036160  005737  056216          8$:     TST     $KT11           ;SEE IF MEM MGT
8292  036164  100010                          BPL     10$             ;BR IF NOT
8293  036166  032701  020000                  BIT     #BIT13,R1       ;SEE IF OVERFLOW TO NEXT PAGE
8294  036172  001405                          BEQ     10$             ;BR IF NO OVERFLOW
8295  036174  062737  000200  172354          ADD     #200,@#KIPAR6   ;INCR PAR BY 4K FOR NEW PAGE
8296  036202  042701  020000                  BIC     #BIT13,R1       ;SET PAGE = 6 AGAIN
8297  036206  005302                  10$:    DEC     R2              ;DECREMENT COUNTER
8298  036210  001357                          BNE     6$              ;BR IF NOT DONE LOADING YET
8299  036212  005737  056216                  TST     $KT11           ;SEE IF MEM MGT
8300  036216  100003                          BPL     12$             ;BR IF NOT
8301  036220  042737  000001  177572          BIC     #BIT0,@#SR0     ;TURN OFF MEM MGT
8302  036226  104407                  12$:    RESREG                  ;RESTORE R0-R5
8303  036230  000207                          RTS     PC              ;RETURN
8304
8305
8306
8307                                  ;;*****************************************************************
8308                                  ;*CKMEM1 - PERFORM SOFTWARE COMPARE OF MEMORY, WITH INCREASING
8309                                  ;*NUMBERS, STARTING WITH 1.
8310                                  ;*CKMEM2 - PERFORM SOFTWARE COMPARE OF MEMORY, WITH REPEATED DATA WORD
8311                                  ;*IN R3 ON ENTRY.
8312                                  ;*BOTH SUBROUTINES REQUIRE MEM ADRS IN PMA, PMA+2, AND WORD COUNT MUST BE
8313                                  ;*IN WDSXFR.
8314                                  ;;*****************************************************************
8315  036232  104406                  CKMEM1: SAVREG                  ;SAVE R0-R5
8316  036234  005004                          CLR     R4              ;R4=0 INDICATES CKMEM1
8317  036236  012703  000001                  MOV     #1,R3           ;INIT DATA TO 1
8318  036242  000403                          BR      CKMO            ;PROCEED
8319  036244  104406                  CKMEM2: SAVREG                  ;SAVE R0-R5
8320  036246  012704  177777                  MOV     #-1,R4          ;R4=177777 INDICATES CKMEM2
8321  036252  013702  005564          CKMO:   MOV     WDSXFR,R2       ;GET NO. OF WORDS
8322  036256  013701  005604                  MOV     PMA,R1          ;GET MEM ADRS
8323  036262  005037  005534                  CLR     SCRACH
8324  036266  112737  000040  063113          MOVB    #40,DH701+38.   ;RESTORE ERROR MSG PARAMS
8325  036274  012737  000007  064466          MOV     #7,DF25+2
8326  036302  004737  042130                  JSR     PC,REPSUP       ;STORE PREV CMND FOR POSS. PRINT
8327  036306  005737  056216                  TST     $KT11           ;SEE IF MEM MGT
8328  036312  100012                          BPL     6$              ;BR IF NOT
8329  036314  042701  160000                  BIC     #160000,R1      ;FORCE RELOCATION THRU PAR6
8330  036320  052701  140000                  BIS     #140000,R1
```

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8331  036324  013737  003200  172354          MOV     SAVPAR,@#KIPAR6 ;INIT PAR6
8332  036332  052737  000001  177572          BIS     #BIT0,@#SR0     ;TURN ON MEM MGT
8333  036340  020321                  6$:     CMP     R3,(R1)+        ;COMPARE A DATA WORD
8334  036342  001575                          BEQ     16$             ;BR IF DATA COMPARES OK
8335                                  ;COMPARE ERROR HANDLER
8336  036344  010237  001202                  MOV     R2,$REG10       ;GET WORD NO.
8337  036350  163737  005564  001202          SUB     WDSXFR,$REG10
8338  036356  013737  001202  005572          MOV     $REG10,LASTWC   ;GET 2'S COMP OF WORD NO.
8339  036364  004737  034250                  JSR     PC,FINADR       ;COMPUTE ACTUAL PACK ADRS
8340  036370  104406                          SAVREG                  ;SAVE R0-R5
8341  036372  013700  005566                  MOV     FINCYL,R0       ;GET CYL
8342  036376  113701  005570                  MOVB    FINTRK,R1       ;GET TRACK
8343  036402  113702  005571                  MOVB    FINSEC,R2       ;GET SECTOR
8344  036406  004737  040612                  JSR     PC,BDSRCK       ;SEE IF THIS SECTOR LISTED BAD
8345  036412  104407                          RESREG                  ;RESTORE R0-R5
8346  036414  032737  001000  005476          BIT     #BADSEC,RECODE
8347  036422  001145                          BNE     16$             ;BR IF LISTED- DON'T REPORT ERROR
8348  036424  005737  056216                  TST     $KT11           ;SEE IF MEM MGT.
8349  036430  100406                          BMI     8$              ;BR IF YES
8350  036432  105037  063113                  CLRB    DH701+38.       ;ADJUST DATA HEADER FOR MSG
8351  036436  012737  000005  064466          MOV     #5,DF25+2       ;ADJ. ERROR DATA WORD COUNT
8352  036444  000403                          BR      9$
8353  036446  013737  172354  001216  8$:     MOV     @#KIPAR6,$REG16 ;SET PAR FOR PRINTOUT
8354  036454  005737  005534          9$:     TST     SCRACH          ;SEE IF FIRST ERROR IN THIS BLOCK
8355  036460  001024                          BNE     10$             ;BR IF NOT FIRST ERROR
8356  036462  105737  003134                  TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
8357  036466  001411                          BEQ     17$             ;BR IF NOT
8358  036470  013737  005262  001174          MOV     CRMPH0,$REG5    ;CURRENT UB MAP REG 0
8359  036476  013737  005260  001176          MOV     CRMPL0,$REG6
8360  036504  104116                          ERROR   116             ;DATA MISCOMPARE (11/70)
8361  036506  104117                          ERROR   117
8362  036510  000401                          BR      11$
8363  036512  104034                  17$:    ERROR   34              ;TYPE HEADING FOR ERROR MSG
8364  036514  012737  177777  001174  11$:    MOV     #-1,$REG5       ;INIT CYL NO.
8365  036522  005037  001176                  CLR     $REG6
8366  036526  005037  001200                  CLR     $REG7
8367  036532  005237  005534          10$:    INC     SCRACH          ;INCREMENT THE ERROR COUNT
8368  036536  032777  000001  142374          BIT     #BIT0,@SWR      ;SEE IF ALL ERRORS SHOULD BE REPORTED
8369  036544  001004                          BNE     12$             ;BR TO REPORT ALL ERRORS
8370  036546  022737  000012  005534          CMP     #10.,SCRACH     ;SEE IF 10(DEC) ERRORS YET
8371  036554  002512                          BLT     21$             ;BR IF ERROR LIMIT EXCEEDED
8372  036556  023737  001174  005566  12$:    CMP     $REG5,FINCYL    ;SEE IF DIFFERENT CYL
8373  036564  001010                          BNE     14$             ;BR IF YES
8374  036566  123737  001176  005570          CMPB    $REG6,FINTRK    ;SEE IF DIFFERENT TRACK
8375  036574  001004                          BNE     14$             ;BR IF YES
8376  036576  123737  001200  005571          CMPB    $REG7,FINSEC    ;SEE IF DIFFERENT SECTOR
8377  036604  001412                          BEQ     15$             ;BR IF SAME PACK ADDRESS
8378  036606  013737  005566  001174  14$:    MOV     FINCYL,$REG5    ;SET NEW PACK ADR FOR PRINTOUT
8379  036614  113737  005570  001176          MOVB    FINTRK,$REG6
8380  036622  113737  005571  001200          MOVB    FINSEC,$REG7
8381  036630  104115                          ERROR   115             ;TYPE NEW PACK ADRS
8382  036632  005437  001202          15$:    NEG     $REG10          ;GET WORD NO.
8383  036636  010337  001204                  MOV     R3,$REG11       ;GOOD DATA
8384  036642  016137  177776  001206          MOV     -2(R1),$REG12   ;BAD DATA
8385  036650  013737  001202  001212          MOV     $REG10,$REG14   ;COMPUTE PHYSICAL ADDRESS
8386  036656  005037  001210                  CLR     $REG13
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8387  036662  006137  001212                  ROL     $REG14
8388  036666  006137  001210                  ROL     $REG13
8389  036672  063737  005604  001212          ADD     PMA,$REG14
8390  036700  005537  001210                  ADC     $REG13
8391  036704  063737  005606  001210          ADD     PMA+2,$REG13
8392  036712  010137  001214                  MOV     R1,$REG15       ;GET VIRT ADRS FOR PRINTOUT
8393  036716  162737  000002  001214          SUB     #2,$REG15
8394  036724  104063                          ERROR   63              ;TYPE GOOD AND BAD DATA
8395  036726  032777  000100  142204          BIT     #BIT6,@SWR      ;SEE IF JUST 1 ERROR SHOULD BE REPORTED
8396  036734  001022                          BNE     21$             ;BR IF JUST 1
8397                                  ;PROCEED WITH COMPARISONS
8398  036736  005704                  16$:    TST     R4              ;SEE WHICH DATA DESIRED
8399  036740  001001                          BNE     18$             ;BR IF NOT INCREASING DATA
8400  036742  005203                          INC     R3              ;INCREMENT THE DATA WORD
8401  036744  005737  056216          18$:    TST     $KT11           ;SEE IF MEM MGT
8402  036750  100010                          BPL     20$             ;BR IF NOT
8403  036752  032701  020000                  BIT     #BIT13,R1       ;SEE IF OVERFLOW TO NEXT PAGE
8404  036756  001405                          BEQ     20$             ;BR IF NO OVERFLOW
8405  036760  062737  000200  172354          ADD     #200,@#KIPAR6   ;INCR. PAR BY 4K FOR NEW PAGE
8406  036766  042701  020000                  BIC     #BIT13,R1       ;SET PAGE = 6 AGAIN
8407  036772  005302                  20$:    DEC     R2              ;DECR COUNTER
8408  036774  001402                          BEQ     21$             ;BR IF DONE COMPARING
8409  036776  000137  036340                  JMP     6$              ;CONTINUE COMPARING WORDS
8410  037002  005737  056216          21$:    TST     $KT11           ;SEE IF MEM MGT PRESENT
8411  037006  100003                          BPL     22$             ;BR IF NOT
8412  037010  042737  000001  177572          BIC     #BIT0,@#SR0     ;TURN OFF MEM MGT
8413  037016  104407                  22$:    RESREG                  ;RESTORE R0-R5
8414  037020  000207                          RTS     PC              ;RETURN
8415
8416
8417
8418                                  ;;*****************************************************************
8419                                  ;*SETUPM - SUBROUTINE TO INIT PARAMS FOR NPR/MEMORY TESTS.
8420                                  ;;*****************************************************************
8421  037022  013765  005650  000002  SETUPM: MOV     FC,P.CYLN(R5)   ;SET CYL
8422  037030  113765  005510  000004          MOVB    FS,P.SECT(R5)   ;SET SECTOR
8423  037036  113765  005654  000005          MOVB    FT,P.TRCK(R5)   ;SET TRACK
8424  037044  023727  005650  000624          CMP     FC,#624         ;SEE IF CYL SHOULD BE SCALED DOWN
8425  037052  003403                          BLE     2$              ;BR IF NOT
8426  037054  012765  000624  000002          MOV     #624,P.CYLN(R5) ;SCALE DOWN THE CYLINDER
8427  037062  012737  064574  005600  2$:     MOV     #RWBUF,MA       ;GET MEMORY ADDRESS
8428  037070  105737  000041                  TSTB    @#41            ;SEE IF LOADED BY XXDP
8429  037074  001403                          BEQ     4$              ;BR IF NOT
8430  037076  062737  006000  005600          ADD     #6000,MA        ;LEAVE ROOM TO SAVE XXDP
8431  037104  042737  003777  005600  4$:     BIC     #3777,MA
8432  037112  062737  004000  005600          ADD     #4000,MA
8433  037120  005037  005602                  CLR     MA+2
8434  037124  000207                          RTS     PC              ;RETURN
8435
8436
8437
8438                                  ;;*****************************************************************
8439                                  ;* REFNEM - THIS SUBROUTINE PERFORMS A SUBSYSTEM COMMAND, WHILE
8440                                  ;*REPEATEDLY REFERENCING A NON-EXISTENT MEMORY LOCATION (760000). THIS
8441                                  ;*IS DONE FOR THE PURPOSE OF CAUSING UNIBUS CONTENTION DURING DISK
8442                                  ;*NPR'S, SINCE THE BUS IS SIEZED FOR 5-20 USEC AT EACH NEM TIME-OUT.
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8443                                    ;*ALL DRIVER PARAMETERS (INCLUDING THE COMMAND) MUST BE SET IN THE
8444                                    ;*PARAMETER BLOCK ON ENTRY, AND R3 MUST CONTAIN THE TIMING CONSTANT
8445                                    ;*WHICH REGULATES THE FREQUENCY OF NEM REFERENCES, WHILE WAITING FOR
8446                                    ;*COMMAND COMPLETION.
8447                                    ;;*****************************************************************
8448  037126                            REFNEM:
8449  037126  004737  035562                   JSR     PC,CTLOUT       ;CHECK FOR (↑C) OR (↑Z) KBD INPUT
8450  037132  105037  003113                   CLRB    DONE            ;CLEAR THE DONE FLAG
8451  037136  004737  041032                   JSR     PC,STRCMD       ;STORE PREV AND CURRENT COMMANDS
8452  037142  010537  037160                   MOV     R5,4$           ;SET PARAM BLK ADDRESS
8453  037146  012737  037214  000004         MOV     #20$,@#ERRVEC   ;SET TIME-OUT VECTOR ADDRESS
8454  037154  004737  051042                   JSR     PC,C.INIT       ;CALL DRIVER
8455  037160  000000                    4$:     .WORD
8456  037162  004737  045412            6$:     JSR     PC,W.WTCH       ;CALL WATCH DOG
8457  037166  105737  003113                   TSTB    DONE            ;DONE SET ?
8458  037172  001012                           BNE     26$             ;BR IF YES
8459  037174  010304                           MOV     R3,R4           ;GET COPY OF R3
8460  037176  001402                           BEQ     12$             ;BR IF TIMER = 0
8461  037200  005304                    10$:    DEC     R4              ;DECREMENT TIMER
8462  037202  001376                           BNE     10$             ;BR IF NOT DONE TIMING
8463  037204  005737  160000            12$:    TST     @#160000        ;REFERENCE NON-EXISTENT MEMORY
8464  037210  104111                           ERROR   111             ;"NO NEM WHEN EXPECTED"
8465  037212  000401                           BR      22$
8466  037214  022626                    20$:    CMP     (SP)+,(SP)+     ;RESTORE THE STACK
8467  037216  000761                    22$:    BR      6$              ;KEEP WAITING FOR COMMAND COMPLETION
8468  037220  012737  000006  000004    26$:    MOV     #6,@#ERRVEC     ;RESTORE TIME-OUT VECTOR
8469  037226  000207                           RTS     PC              ;RETURN
8470
8471
8472                                    ;;*****************************************************************
8473                                    ;*INCRMA - INCREMENT MA BY WORD COUNT IN P.WC(R5).
8474                                    ;;*****************************************************************
8475  037230  104406                    INCRMA: SAVREG                  ;SAVE R0-R5
8476  037232  005001                            CLR     R1
8477  037234  016500  000012                   MOV     P.WC(R5),R0     ;GET WORD COUNT
8478  037240  001002                           BNE     4$              ;BR IF NOT 65,536(DEC)
8479  037242  005201                           INC     R1              ;SET HI BIT
8480  037244  000401                           BR      6$              ;CONTINUE
8481  037246  005400                    4$:     NEG     R0              ;GET TRUE WORD COUNT
8482  037250  000241                    6$:     CLC                     ;DOUBLE THE WORD COUNT TO GET BYTES
8483  037252  006100                           ROL     R0
8484  037254  006101                           ROL     R1
8485  037256  060037  005600                   ADD     R0,MA           ;ADD IT TO COMPUTE NEW MA
8486  037262  005537  005602                   ADC     MA+2
8487  037266  060137  005602                   ADD     R1,MA+2
8488  037272  104407                           RESREG                  ;RESTORE R0-R5
8489  037274  000207                           RTS     PC              ;RETURN
8490
8491
8492
8493                                    ;;*****************************************************************
8494                                    ;*REDBSF - READ FACTORY BSF INTO BSFACT, AND READ SOFTWARE BSF
8495                                    ;*INTO BSSOFT.
8496                                    ;;*****************************************************************
8497  037276                            REDBSF:
8498  037276  004737  030726                   JSR     PC,INITSS       ;INIT THE S.S.
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8499  037302  105065  000007                  CLRB    P.CS1H(R5)          ;SET 22-SECTOR FORMAT
8500  037306  112765  000121  000001          MOVB    #RDDATA,P.CMND(R5) ;SET READ DATA COMMAND
8501  037314  012765  000632  000002          MOV     #632,P.CYLN(R5) ;SET CYL = 632
8502  037322  112765  000002  000005          MOVB    #2,P.TRCK(R5)       ;SET TRACK = 2
8503  037330  012703  000012                  MOV     #10.,R3             ;SET FACTORY BSF SECTOR LIMIT
8504  037334  105737  003115                  TSTB    FORMAT
8505  037340  001403                          BEQ     6$                  ;BR IF 22 SECTORS
8506  037342  105265  000004                  INCB    P.SECT(R5)          ;SET STARTING FACTORY BSF SECTOR NO.
8507  037346  005203                          INC     R3
8508  037350  012765  177400  000012  6$:     MOV     #-400,P.WC(R5)      ;SET WORD COUNT FOR 1 SECTOR
8509  037356  012765  004224  000010          MOV     #BSFACT,P.BALO(R5) ;SET BA FOR FACTORY BSF
8510  037364  012737  037540  003036  8$:     MOV     #BDSCHD,A.ABNL ;SET ERROR HANDLER FOR BSF READ
8511  037372  105037  003131                  CLRB    WCEFLG              ;INIT THE ERROR FLAG
8512  037376  004737  040716                  JSR     PC,DRVCAL           ;READ THE FACTORY BSF
8513  037402  105737  003131                  TSTB    WCEFLG              ;SEE IF ANY ERRORS
8514  037406  001413                          BEQ     12$                 ;BR IF NOT
8515  037410  062765  000002  000004          ADD     #2,P.SECT(R5)       ;CHECK NEXT SECTOR
8516  037416  126503  000004                  CMPB    P.SECT(R5),R3       ;SEE IF LIMIT EXCEEDED YET
8517  037422  001360                          BNE     8$                  ;BR IF NOT YET
8518  037424  004737  042130          10$:    JSR     PC,REPSUP           ;GATHER STATUS FOR PRINTOUT
8519  037430  104120                          ERROR   120                 ;ABORTING- BAD BSF READ
8520  037432  000137  044420                  JMP     HLTPRG              ;HALT- CAN'T PROCEED
8521  037436  012765  003224  000010  12$:    MOV     #BSSOFT,P.BALO(R5) ;SET BA FOR SOFTWARE RECORD
8522  037444  110365  000004                  MOVB    R3,P.SECT(R5)       ;SET STARTING SECTOR NO.
8523  037450  012703  000026                  MOV     #22.,R3             ;SET 22 SECTOR LIMIT
8524  037454  105737  003115                  TSTB    FORMAT              ;SEE IF 22 SECTOR FORMAT
8525  037460  001402                          BEQ     14$                 ;BR IF YES
8526  037462  012703  000023                  MOV     #19.,R3             ;SET 20 SECTOR LIMIT
8527  037466  012737  037540  003036  14$:    MOV     #BDSCHD,A.ABNL ;SET ERROR HANDLER FOR BSF READ
8528  037474  105037  003131                  CLRB    WCEFLG              ;INIT THE ERROR FLAG
8529  037500  004737  040716                  JSR     PC,DRVCAL           ;READ THE SOFTWARE BSF
8530  037504  105737  003131                  TSTB    WCEFLG              ;SEE IF ANY ERRORS
8531  037510  001407                          BEQ     16$                 ;BR IF NOT
8532  037512  062765  000002  000004          ADD     #2,P.SECT(R5)       ;CHECK NEXT SECTOR
8533  037520  126503  000004                  CMPB    P.SECT(R5),R3       ;SEE IF LIMIT EXCEEDED YET
8534  037524  003760                          BLE     14$                 ;BR IF NOT YET
8535  037526  000736                          BR      10$                 ;REPORT ERROR AND ABORT
8536  037530  012737  042410  003036  16$:    MOV     #ERRHDL,A.ABNL ;RESTORE ERROR HANDLER ADRS
8537  037536  000207                          RTS     PC                  ;RETURN
8538
8539                                  ;*THIS IS THE ABNORMAL DRIVER RETURN WHICH IS USED TO HANDLE
8540                                  ;*POSSIBLE ERRORS IN READING BAD SECTORS.
8541  037540  032765  130600  000034  BDSCHD: BIT     #BSE!HVRC!DTE!OPI!DCK,P.ER(R5) ;SEE IF ANY READ ERRORS
8542  037546  001002                          BNE     4$                  ;BR IF A READ ERROR OCCURRED
8543  037550  000137  042410                  JMP     ERRHDL              ;GO HANDLE OTHER ERROR
8544  037554  105237  003131          4$:     INCB    WCEFLG              ;SET ERROR FLAG
8545  037560  000137  044624                  JMP     RETNML              ;TAKE NORMAL DRIVER RETURN
8546
8547
8548
8549                                  ;;*****************************************************************
8550                                  ;*TYPBSF - TYPE FACTORY AND SOFTWARE BAD SECTOR FILES (BSF'S)
8551                                  ;*WITH THE CYLINDER, TRACK, AND SECTOR NO. OF EACH BAD SECTOR
8552                                  ;*LISTED SEPARATELY, IN A TABLE OF OCTAL VALUES, FOR EACH OF THE
8553                                  ;*2 BSF'S.
8554                                  ;;*****************************************************************
```

```
8555  037564  104406                TYPBSF: SAVREG                  ;SAVE R0-R5
8556  037566  005001                        CLR     R1              ;INIT LIMIT COUNTER
8557  037570  005004                        CLR     R4              ;INIT BSF FILE INDICATOR
8558  037572  012700  004234              MOV     #BSFACT+10,R0   ;ADRS OF DATA IN FACTORY BSF
8559  037576  104400  011220              TYPE    ,FACTBS         ;TYPE "FACTORY"
8560  037602  104400  011245              TYPE    ,BDSECT         ;TYPE "BAD SECTORS"
8561  037606  104400  062660        3$:   TYPE    ,DH6041         ;TYPE   "CYLNDR  TRACK   SECTOR"
8562  037612  104400  001315              TYPE    ,$CRLF
8563  037616  005710              4$:   TST     (R0)            ;SEE IF A SECTOR LISTED HERE
8564  037620  100007                    BPL     8$              ;BR IF YES
8565  037622  005701                    TST     R1              ;SEE IF FILE IS EMPTY
8566  037624  001032                    BNE     14$             ;BR IF NOT EMPTY
8567  037626  104400  011265              TYPE    ,NOFALS         ;TYPE "NONE"
8568  037632  104400  001315              TYPE    ,$CRLF          ;TYPE <CR>,<LF>
8569  037636  000425                    BR      14$
8570  037640  012046              8$:   MOV     (R0)+,-(SP)     ;GET A CYL NO.
8571  037642  104401                    TYPOC                   ;TYPE IT
8572  037644  104400  013421              TYPE    ,SPACE2         ;TYPE SEPARATORS
8573  037650  011003                    MOV     (R0),R3         ;GET TRACK AND SECTOR
8574  037652  105003                    CLRB    R3
8575  037654  000303                    SWAB    R3              ;GET THE TRACK NO.
8576  037656  010346                    MOV     R3,-(SP)
8577  037660  104401                    TYPOC                   ;TYPE IT
8578  037662  104400  013421              TYPE    ,SPACE2         ;TYPE SEPARATORS
8579  037666  111003                    MOVB    (R0),R3         ;GET SECTOR NO.
8580  037670  010346                    MOV     R3,-(SP)
8581  037672  104401                    TYPOC                   ;TYPE IT
8582  037674  104400  001315              TYPE    ,$CRLF
8583  037700  005720                    TST     (R0)+           ;INCR THE POINTER
8584  037702  005201                    INC     R1              ;INCR THE COUNTER
8585  037704  020127  000176              CMP     R1,#126.        ;SEE IF LIMIT REACHED IN THIS FILE
8586  037710  002742                    BLT     4$              ;BR IF NOT YET
8587  037712  005704              14$:  TST     R4              ;SEE IF BOTH FILES TYPED YET
8588  037714  001006                    BNE     18$             ;BR IF NOT YET
8589  037716  005204                    INC     R4              ;SET INDICATOR FOR SOFT. FILE
8590  037720  012700  003234              MOV     #BSSOFT+10,R0   ;ADRS OF DATA IN SOFTWARE BSF
8591  037724  104400  011233              TYPE    ,SOFTBS         ;TYPE "SOFTWARE BAD SECTORS :"
8592  037730  000726                    BR      3$              ;GO TYPE SOFT. BSF
8593  037732  104407              18$:  RESREG                  ;RESTORE R0-R5
8594  037734  000207                    RTS     PC              ;RETURN
8595
8596
8597
8598                                  ;;*****************************************************************
8599                                  ;*FINMEM - COMPUTE NO. OF WORDS XFERRED ON PARTIAL XFER
8600                                  ;*(TERMINATED BY BSE ERROR), AND STORE IT IN WDSXFR.
8601                                  ;;*****************************************************************
8602  037736  104406              FINMEM: SAVREG                  ;SAVE R0-R5
8603  037740  016500  000002              MOV     P.CYLN(R5),R0   ;GET ORIG. CYL NO.
8604  037744  116501  000005              MOVB    P.TRCK(R5),R1   ;GET TRACK NO.
8605  037750  116502  000004              MOVB    P.SECT(R5),R2   ;SECTOR NO.
8606  037754  005003                    CLR     R3              ;INIT SECTOR COUNT TO 0
8607  037756  026500  000030        6$:   CMP     P.DCYL(R5),R0   ;COMPARE ORIG. AND CURRENT CYLS
8608  037762  001006                    BNE     8$              ;BR IF NOT EQUAL
8609  037764  126501  000027              CMPB    P.DTS+1(R5),R1  ;COMPARE TRACKS
8610  037770  001003                    BNE     8$              ;BR IF NOT EQUAL
```

```
8611  037772  126502  000026                  CMPB    P.DTS(R5),R2    ;COMPARE SECTORS
8612  037776  001404                          BEQ     12$             ;BR IF ADRS ARE EQUAL
8613  040000  005203                  8$:     INC     R3              ;INCR SECTOR COUNT
8614  040002  004737  040022                  JSR     PC,INCRSC       ;INCR PACK ADRS BY 1 SECTOR
8615  040006  000763                          BR      6$              ;GO COMPARE ADDRESSES
8616  040010  000303                  12$:    SWAB    R3              ;COMPUTE NO. OF WORDS XFERRED
8617  040012  010337  005564                  MOV     R3,WDSXFR       ;STORE IT
8618  040016  104407                          RESREG                  ;RESTORE R0-R5
8619  040020  000207                          RTS     PC              ;RETURN
8620
8621
8622
8623                                  ;;*****************************************************************
8624                                  ;*INCRSC - INCREMENT PACK ADDRESS TO NEXT SECTOR
8625                                  ;*THE CYLINDER IS PASSED AND RETURNED IN R0, TRACK IN R1, AND SECTOR
8626                                  ;*IN R2.
8627                                  ;;*****************************************************************
8628  040022  012704  000025          INCRSC: MOV     #21.,R4         ;SET SECTOR LIMIT
8629  040026  105737  003115                  TSTB    FORMAT          ;SEE IF 22 SECTOR FORMAT
8630  040032  001402                          BEQ     4$              ;BR IF YES
8631  040034  012704  000023                  MOV     #19.,R4         ;SET SECTOR LIMIT
8632  040040  005202                  4$:     INC     R2              ;INCR. SECTOR NO.
8633  040042  020204                          CMP     R2,R4           ;SEE IF SECTOR LIMIT EXCEEDED
8634  040044  003407                          BLE     6$              ;BR IF NOT
8635  040046  005002                          CLR     R2              ;SET SECTOR = 0
8636  040050  005201                          INC     R1              ;INCR. TRACK NO.
8637  040052  020127  000002                  CMP     R1,#2           ;SEE IF TRACK LIMIT EXCEEDED
8638  040056  003402                          BLE     6$              ;BR IF NOT
8639  040060  005001                          CLR     R1              ;SET TRACK = 0
8640  040062  005200                          INC     R0              ;INCR. CYLINDER NO.
8641  040064  000207                  6$:     RTS     PC              ;RETURN
8642
8643
8644
8645                                  ;;*****************************************************************
8646                                  ;*MIDXFR - MID-TRANSFER PARAMETER UPDATE SUBROUTINE
8647                                  ;*THIS SUBROUTINE UPDATES PMA,PMA+2,MEM MGT REGS,UNIBUS MAP,P.BALO(R5),
8648                                  ;*P.BAHI(R5), AND P.WC(R5), IN PREPARATION TO RESUME A TRANSFER
8649                                  ;*TERMINATED BY A BAD SECTOR ERROR (BSE).
8650                                  ;;*****************************************************************
8651  040066  104406                  MIDXFR: SAVREG                  ;SAVE R0-R5
8652  040070  004737  037736                  JSR     PC,FINMEM       ;COMPUTE NO. OF WORDS XFERRED
8653  040074  016500  000030                  MOV     P.DCYL(R5),R0   ;GET CYL NO.
8654  040100  116501  000027                  MOVB    P.DTS+1(R5),R1  ;GET TRACK NO.
8655  040104  116502  000026                  MOVB    P.DTS(R5),R2    ;GET SECTOR NO.
8656  040110  004737  040022                  JSR     PC,INCRSC       ;INCREMENT PACK ADRS TO NEXT SECTOR
8657  040114  010065  000002                  MOV     R0,P.CYLN(R5)   ;UPDATE CYLINDER
8658  040120  110165  000005                  MOVB    R1,P.TRCK(R5)   ;UPDATE TRACK
8659  040124  110265  000004                  MOVB    R2,P.SECT(R5)   ;UPDATE SECTOR
8660  040130  013703  005564                  MOV     WDSXFR,R3       ;GET NO. OF WORDS XFERRED
8661  040134  062703  000400                  ADD     #400,R3         ;SKIP BAD SECTOR
8662  040140  060365  000012                  ADD     R3,P.WC(R5)     ;UPDATE P.WC(R5)
8663  040144  005004                          CLR     R4              ;GET BYTES XFERRED
8664  040146  006103                          ROL     R3
8665  040150  006104                          ROL     R4
8666  040152  060337  005604                  ADD     R3,PMA          ;UPDATE PMA,PMA+2
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 8667  040156  005537  005606                    ADC     PMA+2
 8668  040162  060437  005606                    ADD     R4,PMA+2
 8669  040166  013765  005604  000010            MOV     PMA,P.BALO(R5)  ;UPDATE P.BALO(R5)
 8670  040174  013700  005606                    MOV     PMA+2,R0
 8671  040200  042700  177774                    BIC     #177774,R0
 8672  040204  150065  000007                    BISB    R0,P.BAHI(R5)   ;UPDATE P.BAHI(R5)
 8673  040210  005737  056216                    TST     $KT11           ;SEE IF MEM MGT
 8674  040214  100002                            BPL     16$
 8675  040216  004737  030300                    JSR     PC,PREPAR       ;UPDATE MEM MGT AND UNIBUS MAP
 8676  040222  104407                  16$:      RESREG                  ;RESTORE R0-R5
 8677  040224  000207                            RTS     PC              ;RETURN
 8678
 8679
 8680
 8681                                  ;;*****************************************************************
 8682                                  ;*SVPRMS - SAVE INITIAL PARAMETERS FOR TRANSFER
 8683                                  ;*GTPRMS - RESTORE SAVED TRANSFER PARAMETERS
 8684                                  ;;*****************************************************************
 8685  040226  104406                  SVPRMS: SAVREG                  ;SAVE R0-R5
 8686  040230  012700  002622                  MOV     #PARM0+2,R0     ;ADRS OF PARAMS
 8687  040234  012701  005552                  MOV     #SAVPRS,R1      ;ADRS OF SAVE AREA
 8688  040240  016537  000012  005564          MOV     P.WC(R5),WDSXFR  ;GET WORD COUNT
 8689  040246  005437  005564                  NEG     WDSXFR          ;MAKE IT POSITIVE
 8690  040252  012737  064574  005604          MOV     #RWBUF,PMA      ;INIT PMA TO RWBUF
 8691  040260  005037  005606                  CLR     PMA+2           ;INIT PMA+2 TO 0
 8692  040264  005737  005536                  TST     PATRN           ;SEE IF DEFAULT DATA TEST
 8693  040270  001414                          BEQ     GTO             ;BR IF YES
 8694  040272  013737  005600  005604          MOV     MA,PMA          ;SET PMA=MA
 8695  040300  013737  005602  005606          MOV     MA+2,PMA+2      ;SET PMA+2=MA+2
 8696  040306  000405                          BR      GTO
 8697  040310  104406                  GTPRMS: SAVREG                  ;SAVE R0-R5
 8698  040312  012700  005552                  MOV     #SAVPRS,R0      ;ADRS OF SAVE AREA
 8699  040316  012701  002622                  MOV     #PARM0+2,R1     ;ADRS OF PARAMS
 8700  040322  012702  000005          GTO:    MOV     #5,R2           ;SET FOR 5 WORDS
 8701  040326  012021                  6$:     MOV     (R0)+,(R1)+     ;MOVE A WORD
 8702  040330  005302                          DEC     R2              ;SEE IF DONE YET
 8703  040332  001375                          BNE     6$              ;BR IF NOT YET
 8704  040334  104407                          RESREG                  ;RESTORE R0-R5
 8705  040336  000207                          RTS     PC              ;RETURN
 8706
 8707
 8708
 8709                                  ;;*****************************************************************
 8710                                  ;*TRNSFR - PERFORM A DATA TRANSFER, AND HANDLE BAD SECTORS, IF
 8711                                  ;*ENCOUNTERED. THE COMMAND MUST BE SET IN THE PARAM BLK. THIS SUB-
 8712                                  ;*ROUTINE IS SUBSTITUTED FOR DRVCAL WHEN BAD SECTORS MUST BE HANDLED.
 8713                                  ;;*****************************************************************
 8714  040340  010446                  TRNSFR: MOV     R4,-(SP)        ;SAVE R4 ON STACK
 8715  040342  005004                          CLR     R4              ;CLEAR BSE ERROR INDICATOR
 8716  040344  105037  003131                  CLRB    WCEFLG          ;INIT WCE ERROR FLAG TO 0
 8717  040350  004737  040716          4$:     JSR     PC,DRVCAL       ;PERFORM THE S.S. FUNCTION
 8718  040354  032737  000100  005476          BIT     #WCERR,RECODE   ;SEE IF WCE ERROR OCCURRED
 8719  040362  001403                          BEQ     5$              ;BR IF NOT
 8720  040364  112737  000001  003131          MOVB    #1,WCEFLG       ;SET WCE ERROR FLAG
 8721  040372  032737  000002  005476  5$:     BIT     #BSERR,RECODE   ;SEE IF BSE ERROR OCCURRED
 8722  040400  001406                          BEQ     6$              ;BR IF NOT
```

```
8723  040402  005204                          INC     R4              ;INCR BSE ERROR INDICATOR
8724  040404  004737  040066                  JSR     PC,MIDXFR       ;UPDATE PARAMS TO RESUME XFER
8725  040410  005765  000012                  TST     P.WC(R5)        ;SEE IF ENTIRE XFER IS COMPLETED
8726  040414  001355                          BNE     4$              ;BR IF NOT
8727  040416  005704                  6$:     TST     R4              ;SEE IF ANY BSE ERRORS OCCURRED
8728  040420  001411                          BEQ     8$              ;BR IF NOT
8729  040422  004737  040310                  JSR     PC,GTPRMS       ;RESTORE ORIGINAL PARAMS OF XFER
8730  040426  004737  040226                  JSR     PC,SVPRMS       ;RESTORE WDSXFR,PMA,PMA+2
8731  040432  005737  056216                  TST     $KT11           ;SEE IF MEM MGT PRESENT
8732  040436  100002                          BPL     8$              ;BR IF NOT
8733  040440  004737  030300                  JSR     PC,PREPAR       ;PREPARE MEM MGT AND U.M.
8734  040444  012604                  8$:     MOV     (SP)+,R4        ;RESTORE R4
8735  040446  000207                          RTS     PC              ;RETURN
8736
8737
8738
8739                                          ;*****************************************************************
8740                                          .SBTTL  SEARCH BAD SECTOR TABLES ROUTINE
8741                                          ;*THIS ROUTINE RETURNS A LIST OF BAD SECTORS FOUND IN
8742                                          ;*THE SPECIFIC TABLE (BAD SECTOR SOFTWARE OR BAD SECTOR FACTORY)
8743                                          ;*FOR THE SPECIFIC CYLINDER AND TRACK DESIRED. R0 AND R1 MUST
8744                                          ;*CONTAIN THE CYLINDER AND TRACK, RESPECTIVELY.
8745                                          ;*
8746                                          ;*THE LIST OF BAD SECTORS IS FOUND ON THE STACK WHEN THE ROUTINE
8747                                          ;*RETURNS TO THE CALLER. THE FIRST ENTRY ON THE STACK WILL BE THE
8748                                          ;*NUMBER OF BAD SECTORS FOUND FOR THIS CYLINDER AND TRACK.
8749                                          ;*****************************************************************
8750  040450  010237  001266          $RHTBS: MOV     R2,$TMP2
8751  040454  010337  001270                  MOV     R3,$TMP3
8752  040460  012637  001272                  MOV     (SP)+,$TMP4     ;STORE RETURN CONTENTS OF R4
8753  040464  011402                          MOV     (R4),R2 ;GET ADDRESS OF BAD SECTOR TABLE TO SEARCH
8754  040466  012437  001264                  MOV     (R4)+,$TMP1     ;SETUP FOR LENGTH OF BAD SECTOR TABLE
8755  040472  062737  001000  001264          ADD     #1000,$TMP1
8756  040500  005003                          CLR     R3              ;CLEAR R3 FOR COUNT
8757  040502  062702  000010                  ADD     #10,R2          ;SET R2 FOR POINTER TO CYLINDER ENTRY
8758  040506  005712                  1$:     TST     (R2)            ;TEST IF ALL ONES
8759  040510  100430                          BMI     5$              ;YES-DONE
8760  040512  020012                          CMP     R0,(R2)         ;TEST IF BAD SECTOR IN PRESENT CYL
8761  040514  001406                          BEQ     3$              ;YES-GO CHECK TRACK
8762  040516  062702  000004                  ADD     #4,R2           ;ELSE BUMP POINTER
8763  040522  020237  001264                  CMP     R2,$TMP1        ;TEST IF OUT OF TABLE
8764  040526  002021                          BGE     5$              ;YES-EXIT
8765  040530  000766                          BR      1$              ;LOOP
8766  040532  005722                  3$:     TST     (R2)+           ;TRACK CHECK - PUT POINTER AT TRK/SEC BYTE
8767  040534  011237  001302                  MOV     (R2),$TMP10     ;GET TRK/SEC WORD
8768  040540  042737  174377  001302          BIC     #174377,$TMP10  ;CLEAR ALL BUT TRACK
8769  040546  123701  001303                  CMPB    $TMP10+1,R1     ;CHECK IF BAD SECTOR IN THIS TRACK
8770  040552  001402                          BEQ     4$              ;YES - GO PUT SECTOR NUMBER ON STACK
8771  040554  005722                          TST     (R2)+           ;ELSE BUMP POINTER TO NEXT CYL WORD
8772  040556  000753                          BR      1$              ;GO TEST NEXT CYL
8773  040560  005203                  4$:     INC     R3              ;BUMP BAD SECTOR COUNT
8774  040562  012246                          MOV     (R2)+,-(SP)     ;PUT TRK/SEC WORD ON STACK
8775  040564  042716  177700                  BIC     #177700,(SP)    ;CLEAR ALL BUT SECTOR NUMBER
8776  040570  000746                          BR      1$              ;GO CHECK REST OF FILE
8777  040572  010346                  5$:     MOV     R3,-(SP)        ;EXIT - PUT NUMBER OF BAD
8778  040574  013702  001266                  MOV     $TMP2,R2        ;SECTORS ON STACK-RESTORE
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8779  040600  013703  001270                  MOV     $TMP3,R3        ;REGISTERS
8780  040604  013746  001272                  MOV     $TMP4,-(SP)     ;PUT RETURN ON STACK
8781  040610  000204                          RTS     R4              ;RETURN
8782                                  ;;*****************************************************************
8783                                  .SBTTL  BAD SECTOR CHECK ROUTINE
8784                                  ;*THIS ROUTINE WILL SEARCH BOTH TABLES TO DETERMINE IF A
8785                                  ;*SPECIFIC SECTOR IS LISTED AS BAD. IF THE SECTOR IS LISTED IN THE
8786                                  ;*TABLES THE ROUTINE SETS THE "BADSEC" FLAG AND RETURNS. IF THE SECTOR
8787                                  ;*IS NOT LISTED THE FLAG IS RESET.
8788                                  ;;*****************************************************************
8789  040612  104406                  BDSRCK: SAVREG
8790  040614  012737  004224  040626          MOV     #BSFACT,1$      ;SET TABLE TO SEARCH
8791  040622  004437  040450          2$:     JSR     R4,SRHTBS       ;GO SEARCH IT
8792  040626  000000                  1$:     .WORD                   ;TABLE ADDRESS GOES HERE
8793  040630  012603                          MOV     (SP)+,R3        ;GET NUMBER OF BAD SECTORS, IF ANY
8794  040632  001015                          BNE     6$              ;IF ANY, GO TEST WHICH ONES
8795  040634  023727  040626  003224  7$:     CMP     1$,#BSSOFT      ;ELSE TEST IF OTHER TABLE ALREADY SEARCHED
8796  040642  001404                          BEQ     3$              ;IF YES-EXIT
8797  040644  012737  003224  040626          MOV     #BSSOFT,1$      ;SET OTHER TABLE FOR SEARCH
8798  040652  000763                          BR      2$              ;GO SEARCH IT
8799  040654  042737  001000  005476  3$:     BIC     #BADSEC,RECODE  ;CLEAR BAD SECTOR BIT
8800  040662  104407                  4$:     RESREG
8801  040664  000207                          RTS     PC              ;RETURN
8802  040666  022602                  6$:     CMP     (SP)+,R2        ;THIS SECTOR IN TABLE?
8803  040670  001403                          BEQ     8$              ;YES-GO SET BIT & EXIT
8804  040672  005303                          DEC     R3              ;DECREMENT BAD SECTOR COUNT
8805  040674  001374                          BNE     6$              ;IF NOT ZERO-CHECK NEXT ENTRY
8806  040676  000756                          BR      7$              ;ELSE GO SEARCH OTHER TABLE
8807  040700  052737  001000  005476  8$:     BIS     #BADSEC,RECODE  ;SET BAD SECTOR BIT
8808  040706  005303                  9$:     DEC     R3              ;CLEAR STACK OF OTHER BAD SECTOR
8809  040710  001764                          BEQ     4$              ;NUMBER
8810  040712  005726                          TST     (SP)+
8811  040714  000774                          BR      9$              ;EXIT
8812
8813
8814
8815                                  ;;*****************************************************************
8816                                  .SBTTL  CALL DRIVER ROUTINE
8817                                  ;*ENTRY JSR PC,DRVCAL
8818                                  ;*              WITH R5 POINTING TO PARAMETER BLOCK
8819                                  ;*RETURN RTS PC
8820                                  ;*
8821                                  ;*THIS ROUTINE IS USED TO INITIATE A SUBSYSTEM OPERATION BY
8822                                  ;*CALLING THE DRIVER. THE PARAMETER BLOCK MUST BE SET UP
8823                                  ;*BY THE CALLER AND R5 MUST POINT TO THE PARAMETER
8824                                  ;*BLOCK WHEN THE ROUTINE IS CALLED.
8825                                  ;*
8826                                  ;*THIS ROUTINE WAITS FOR THE OPERATION TO BE COMPLETED.
8827                                  ;*WHILE WAITING THE WATCHDOG TIMER IS CALLED TO PREVENT
8828                                  ;*SILENT DEATH IN CASE THE SUBSYSTEM DOES NOT PROVIDE AN
8829                                  ;*INTERRUPT. THE TERMINATION HANDLER ROUTINES WILL SET THE DONE
8830                                  ;*FLAG WHICH KEYS THE ROUTINE TO RETURN TO THE CALLER.
8831                                  ;;*****************************************************************
8832  040716                          DRVCAL:
8833  040716  004737  033762                  JSR     PC,STALL        ;PERFORM A STALL IF REQUIRED
8834  040722  004737  035562                  JSR     PC,CTLOUT       ;CHECK FOR (↑C) OR (↑Z) KBD INPUT
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8835  040726  105037  003113                CLRB    DONE            ;CLEAR DONE FLAG
8836  040732  105037  003127                CLRB    DRNAFG          ;CLEAR DRIVE SIEZED BY OTHER PORT FLAG
8837  040736  004737  041032                JSR     PC,STRCMD       ;STORE PREV AND CURRENT COMMANDS
8838  040742  010537  040752                MOV     R5,4$           ;GET PARAM BLOCK ADDRESS
8839  040746  004737  051042                JSR     PC,C.INIT       ;CALL DRIVER
8840  040752  000000              4$:       .WORD                   ;P.B. ADDRESS GOES HERE
8841  040754  004737  045412        6$:     JSR     PC,W.WTCH       ;CALL WATCH DOG
8842  040760  105737  003113                TSTB    DONE            ;DONE SET?
8843  040764  001773                        BEQ     6$              ;NO-LOOP
8844  040766  105737  003127                TSTB    DRNAFG          ;SEE IF DRIVE WAS SIEZED BY OTHER PORT
8845  040772  001416                        BEQ     12$             ;BR IF NOT
8846  040774  105037  003113                CLRB    DONE            ;CLEAR DONE FLAG
8847  041000  105037  003127                CLRB    DRNAFG          ;CLEAR DRIVE NOT AVAIL FLAG
8848  041004  010537  041014                MOV     R5,8$           ;GET PARAMETER BLOCK ADDRESS
8849  041010  004737  051042                JSR     PC,C.INIT       ;RE-ISSUE THE COMMAND
8850  041014  000000              8$:       .WORD                   ;P.B. ADDRESS GOES HERE
8851  041016  004737  045412        10$:    JSR     PC,W.WTCH       ;CALL WATCH DOG
8852  041022  105737  003113                TSTB    DONE            ;DONE SET ?
8853  041026  001773                        BEQ     10$             ;NO - LOOP
8854  041030  000207              12$:      RTS     PC              ;YES-RETURN
8855
8856
8857
8858                                ;;*****************************************************************
8859                                ;*STRCMD - STORE PREVIOUS AND CURRENT SUBSYSTEM COMMANDS
8860                                ;;*****************************************************************
8861  041032  104406                STRCMD: SAVREG                  ;SAVE R0-R5
8862  041034  012701  005224                MOV     #PRVCMD,R1      ;ADDR OF PREV COMMAND STORAGE
8863  041040  012700  005240                MOV     #COMSTR,R0      ;ADDR OF CURRENT COMMAND STORAGE
8864                                ;STORE PREVIOUS COMMAND
8865  041044  012021                        MOV     (R0)+,(R1)+
8866  041046  012021                        MOV     (R0)+,(R1)+
8867  041050  012021                        MOV     (R0)+,(R1)+
8868  041052  012021                        MOV     (R0)+,(R1)+
8869  041054  012021                        MOV     (R0)+,(R1)+
8870  041056  012021                        MOV     (R0)+,(R1)+
8871  041060  105737  003134                TSTB    UBMPRS          ;SEE IF UNIBUS MAP PRESENT
8872  041064  001414                        BEQ     4$              ;BR IF NOT
8873  041066  013737  005262  005256        MOV     CRMPH0,PRMPH0   ;STORE PREV U.B. MAP REG 0
8874  041074  013737  005260  005254        MOV     CRMPL0,PRMPL0
8875  041102  013737  170202  005262        MOV     @#MAPH00,CRMPH0 ;STORE CURRENT U.B. MAP REG 0
8876  041110  013737  170200  005260        MOV     @#MAPL00,CRMPL0
8877                                ;STORE CURRENT COMMAND
8878  041116  012701  005240        4$:     MOV     #COMSTR,R1
8879  041122  012521                        MOV     (R5)+,(R1)+     ;R5 POINTS TO DRIVER PARAM BLK
8880  041124  012521                        MOV     (R5)+,(R1)+
8881  041126  012521                        MOV     (R5)+,(R1)+
8882  041130  012521                        MOV     (R5)+,(R1)+
8883  041132  012521                        MOV     (R5)+,(R1)+
8884  041134  012521                        MOV     (R5)+,(R1)+
8885  041136  104407                        RESREG                  ;RESTORE R0-R5
8886  041140  000207                        RTS     PC              ;RETURN
8887
8888
8889
8890                                ;;*****************************************************************
```

```
 8891                                   .SBTTL  DRIVE ERROR FREE RETURN ROUTINE
 8892                                   ;*THIS ROUTINE IS CALLED BY THE DRIVER WHEN NO ERROR
 8893                                   ;*HAS BEEN DETECTED IN THE OPERATION. THE ROUTINE SETS THE
 8894                                   ;*DONE FLAG THAT IS TESTED IN THE DRIVER CALLING
 8895                                   ;*ROUTINE.
 8896                                   ;;*****************************************************************
 8897  041142  152737  000377  003113  ERRFRE: BISB    #377,DONE          ;SET THE DONE FLAG
 8898  041150  032737  100000  005476         BIT     #ANYDER,RECODE     ;TEST IF ANY DATA ERROR
 8899  041156  001403                        BEQ     2$                 ;IF NO - DO ERROR RECOVERY PRINT TEST
 8900  041160  105037  003116               CLRB    ERRCNT             ;CLEAR ERROR COUNT
 8901  041164  000413                        BR      1$                 ;EXIT
 8902  041166  105737  003116         2$:   TSTB    ERRCNT             ;CHECK IF ANY ERRORS HAVE OCCURRED
 8903  041172  001410                        BEQ     1$                 ;NO - SKIP TO EXIT
 8904  041174  005037  001174               CLR     $REGS
 8905  041200  113737  003116  001174       MOVB    ERRCNT,$REGS       ;GET RETRY COUNT
 8906  041206  104101                        ERROR   101                ;PRINT RETRY SUCCESSFUL MESSAGE
 8907  041210  105037  003116               CLRB    ERRCNT             ;CLEAR ERROR COUNT
 8908  041214  005037  005476         1$:   CLR     RECODE             ;CLEAR RECOVERY FLAGS
 8909  041220  000207                        RTS     PC                 ;RETURN
 8910                                   ;;*****************************************************************
 8911                                   .SBTTL  TYPE ERROR ROUTINE
 8912                                   ;*ENTRY -       JSR     PC,TYPERR
 8913                                   ;*RETURN -      RTS     PC
 8914                                   ;*
 8915                                   ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
 8916                                   ;*ERROR IS TO BE REPORTED. IT THEN USES THE "ERROR TABLE" ($ERRTB)
 8917                                   ;*ENTRY TO DEFINE WHAT INFORMATION IS TO BE REPORTED CONCERNING
 8918                                   ;*THE ERROR.
 8919                                   ;;*****************************************************************
 8920  041222  104406                  TYPERR: SAVREG
 8921  041224  105237  003120                  INCB    DRVERS             ;INCR ERROR COUNT FOR THIS DRIVE
 8922  041230  032737  000040  005672         BIT     #BIT5,CS           ;SEE IF DRIVE SHOULD BE DROPPED
 8923                                                                     ;  IF ERROR LIMIT EXCEEDED
 8924  041236  001412                        BEQ     9$                 ;BR IF NOT
 8925  041240  123727  003120  000024         CMPB    DRVERS,#20.        ;SEE IF 20(DEC) ERRORS EXCEEDED
 8926  041246  002406                        BLT     9$                 ;BR IF NOT
 8927  041250  105037  003120               CLRB    DRVERS             ;CLEAR DRIVE ERROR COUNT
 8928  041254  104400  011077               TYPE    ,DROPDR            ;TYPE "DROPPING DRIVE"
 8929  041260  000137  017436               JMP     NEWDRV             ;PROCEED TO TEST NEXT DRIVE
 8930  041264  032777  020000  137646  9$:   BIT     #SW13,@SWR         ;INHIBIT ERROR TYPEOUTS?
 8931  041272  001402                        BEQ     6$                 ;BR IF NO
 8932  041274  000137  041700               JMP     20$
 8933  041300  005000                  6$:   CLR     R0                 ;CLR R0 FOR ERROR NUMBER
 8934  041302  005005                        CLR     R5                 ;INIT INDENT INDICATOR
 8935  041304  005105                        COM     R5
 8936  041306  113700  001114               MOVB    $ITEMB,R0          ;ENTER ERROR NUMBER
 8937  041312  005300                        DEC     R0                 ;FORM INDEX FOR ERROR TABLE
 8938  041314  006300                        ASL     R0
 8939  041316  006300                        ASL     R0
 8940  041320  006300                        ASL     R0
 8941  041322  062700  001400         1$:   ADD     #$ERRTB,R0         ;FORM ADDRESS OF ERROR ENTRY
 8942  041326  012037  041346               MOV     (R0)+,2$           ;GET EM POINTER
 8943  041332  001406                        BEQ     3$                 ;BRANCH IF THERE ISN'T ONE
 8944  041334  104400  013405               TYPE    ,CR2LF
 8945  041340  104400  056640               TYPE    ,AS2SP2            ;TYPE "**  "
 8946  041344  104400                        TYPE                       ;TYPE ERROR MESSAGE (EM)
```

```
8947  041346  000000                    2$:   .WORD   0               ;EM POINTER GOES HERE
8948  041350  012037  041524            3$:   MOV     (R0)+,4$        ;GET DH POINTER
8949  041354  001467                          BEQ     5$              ;BR IF THERE ISN'T ONE
8950  041356  104400  001315                  TYPE    ,$CRLF
8951  041362  104400  056626                  TYPE    ,TSTMSG         ;TYPE "    TEST "
8952  041366  013746  001102                  MOV     $TSTNM,-(SP)    ;GET TEST NO. ON STACK
8953  041372  104402                          TYPOS                   ;TYPE IT
8954  041374     002                          .BYTE   2               ;2 DIGITS
8955  041375     000                          .BYTE   0               ;SUPPRESS LEADING ZEROS
8956  041376  104400  013405                  TYPE    ,CR2LF
8957  041402  032777  010000  137530          BIT     #BIT12,@SWR     ;REPORT DESCRIPTION ONLY ?
8958  041410  001133                          BNE     20$             ;BR IF YES
8959  041412  104400  061762                  TYPE    ,DH105          ;TYPE "PREVIOUS COMMAND :"
8960  041416  104400  001315                  TYPE    ,$CRLF
8961  041422  104400  062154                  TYPE    ,DH101+10       ;TYPE PREV COMMAND HEADER
8962  041426  104400  001315                  TYPE    ,$CRLF
8963  041432  012701  000006                  MOV     #6,R1           ;SIX COMMAND VALUES
8964  041436  012702  001236                  MOV     #$REG26,R2      ;STARTING ADDR OF PREV CMND VALUES
8965  041442  012246                    30$:  MOV     (R2)+,-(SP)     ;PUT A WORD ON STACK
8966  041444  104401                          TYPOC                   ;TYPE IT
8967  041446  104400  013421                  TYPE    ,SPACE2         ;TYPE SEPARATORS
8968  041452  005301                          DEC     R1              ;SEE IF 7 VALUES TYPED YET
8969  041454  001372                          BNE     30$             ;BR IF NOT
8970  041456  104400  001315                  TYPE    ,$CRLF
8971  041462  104400  013421                  TYPE    ,SPACE2         ;INDENT
8972  041466  104400  062233                  TYPE    ,DH102          ;TYPE HDR FOR BA DATA
8973  041472  104400  001315                  TYPE    ,$CRLF
8974  041476  104400  013421                  TYPE    ,SPACE2         ;INDENT
8975  041502  012246                          MOV     (R2)+,-(SP)
8976  041504  104401                          TYPOC                   ;TYPE PREV. HI BA BITS
8977  041506  104400  013421                  TYPE    ,SPACE2
8978  041512  011246                          MOV     (R2),-(SP)
8979  041514  104401                          TYPOC                   ;TYPE PREV. LO BA BITS
8980  041516  104400  013405                  TYPE    ,CR2LF
8981  041522  104400                          TYPE                    ;TYPE DATA HEADER
8982  041524  000000                    4$:   .WORD   0               ;DH POINTER GOES HERE
8983  041526  104400  001315                  TYPE    ,$CRLF
8984  041532  005005                          CLR     R5              ;INIT INDENT INDICATOR
8985  041534  032777  010000  137376    5$:   BIT     #BIT12,@SWR     ;REPORT DESCRIPTION ONLY ?
8986  041542  001056                          BNE     20$             ;BR IF YES
8987  041544  012001                          MOV     (R0)+,R1        ;GET DT POINTER
8988  041546  001454                          BEQ     20$             ;BRANCH IF THERE ARE NONE
8989  041550  012000                          MOV     (R0)+,R0        ;GET DF POINTER
8990  041552  012002                          MOV     (R0)+,R2        ;STORE NUMBER OF DH'S
8991  041554  112003                    10$:  MOVB    (R0)+,R3        ;GET & STORE NUMBER OF DATA WORDS
8992  041556  105720                          TSTB    (R0)+           ;BUMP PAST FORMAT WORD
8993  041560  005703                          TST     R3              ;TEST IF ANY DATA FOR THIS HEADER
8994  041562  001417                          BEQ     14$             ;NO - SKIP DATA PRINT
8995  041564  005705                          TST     R5              ;SEE IF SHOULD INDENT
8996  041566  001002                          BNE     11$             ;BR IF NOT
8997  041570  104400  013421                  TYPE    ,SPACE2         ;INDENT
8998  041574  013146                    11$:  MOV     @(R1)+,-(SP)    ;PUT FIRST DATA WORD ON STACK
8999  041576  104401                          TYPOC                   ;TYPE IT
9000  041600  005303                          DEC     R3              ;MORE DATA WORDS
9001  041602  001403                          BEQ     12$             ;NO-BRANCH
9002  041604  104400  013421                  TYPE    ,SPACE2         ;TYPE SEPARATORS
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 9003  041610  000771                        BR      11$             ;LOOP
 9004  041612  005702                12$:    TST     R2              ;SEE IF <CR>,<LF> NEEDED
 9005  041614  001402                        BEQ     14$             ;BR IF NOT
 9006  041616  104400  001315                TYPE    ,$CRLF          ;TYPE IT
 9007  041622  005302                14$:    DEC     R2              ;MORE DH'S?
 9008  041624  003425                        BLE     20$             ;NO-BRANCH
 9009  041626  012037  041660        15$:    MOV     (R0)+,16$       ;GET NEXT DH POINTER
 9010  041632  105710                        TSTB    (R0)            ;SEE IF ANY DATA FOR HDR
 9011  041634  001004                        BNE     34$             ;BR IF YES
 9012  041636  104400  001315                TYPE    ,$CRLF          ;SKIP EXTRA LINE
 9013  041642  005005                        CLR     R5              ;RE-INIT INDENT INDICATOR
 9014  041644  000404                        BR      36$
 9015  041646  005105                34$:    COM     R5              ;COMPLEMENT INDENT INDICATOR
 9016  041650  001002                        BNE     36$             ;BR IF NO INDENT REQUIRED
 9017  041652  104400  013421                TYPE    ,SPACE2         ;INDENT
 9018  041656  104400                36$:    TYPE                    ;TYPE DH
 9019  041660  000000                16$:    .WORD   0               ;DH POINTER GOES HERE
 9020  041662  104400  001315                TYPE    ,$CRLF
 9021  041666  105710                        TSTB    (R0)            ;TYPE A DT?
 9022  041670  001331                        BNE     10$             ;YES-BRANCH
 9023  041672  062700  000002                ADD     #2,R0           ;INCREMENT DF POINTER
 9024  041676  000751                        BR      14$             ;SEE IF END OF DF BLOCK
 9025  041700  104407                20$:    RESREG
 9026  041702  000207                        RTS     PC
 9027                          ;;*****************************************************************
 9028                          .SBTTL  CONTROLLER ERROR REPORTER ROUTINE
 9029                          ;*ENTRY:        JSR PC, CONERR
 9030                          ;*RETURN:       RTS PC
 9031                          ;*
 9032                          ;*THIS ROUTINE DECODES THE CONTROLLER ERROR WORD AND
 9033                          ;*REPORTS THE APPROPRIATE MESSAGE. THE RK611 REGISTERS ARE
 9034                          ;*RETRIEVED FROM THE RK611 AND PLACED IN THE PARAMETER
 9035                          ;*BLOCK. THIS IS DONE BECAUSE PARM 0 MAY NOT BE VALID
 9036                          ;*AT THIS TIME.
 9037                          ;;*****************************************************************
 9038  041704  104406        CONERR: SAVREG                          ;SAVE R0-R5
 9039  041706  152737  000377  003113        BISB    #377,DONE       ;SET DONE FLAG
 9040  041714  105237  003116                INCB    ERRCNT          ;INCREMENT ERROR COUNT
 9041  041720  004737  044634                JSR     PC,TOPROC       ;LOAD RK REGS INTO $REGS
 9042  041724  032737  000001  003042        BIT     #BIT0,E.CONT    ;ERROR 0?
 9043  041732  001402                        BEQ     1$              ;NO-BRANCH
 9044  041734  104064                        ERROR   64              ;CLEAR CONT DID NOT CLEAR ERROR
 9045  041736  000470                        BR      7$
 9046  041740  032737  000002  003042  1$:   BIT     #BIT1,E.CONT    ;ERROR 1?
 9047  041746  001402                        BEQ     2$              ;NO-BRANCH
 9048  041750  104065                        ERROR   65              ;NO ATTENTION IN ATTENTION SUM REG
 9049  041752  000462                        BR      7$
 9050  041754  032737  000004  003042  2$:   BIT     #BIT2,E.CONT    ;ERROR 2?
 9051  041762  001407                        BEQ     3$              ;NO-BRANCH
 9052  041764  105737  003127                TSTB    DRNAFG          ;SEE IF DRIVE WAS SIEZED BY OTHER PORT
 9053  041770  001402                        BEQ     15$             ;BR IF NOT
 9054  041772  105237  003130                INCB    REISSU          ;SET FLAG TO RE-ISSUE COMMAND
 9055  041776  104066                15$:    ERROR   66              ;UNSOLICITED ATTENTION
 9056  042000  000447                        BR      7$
 9057  042002  032737  000010  003042  3$:   BIT     #BIT3,E.CONT    ;ERROR 3?
 9058  042010  001402                        BEQ     4$              ;NO-BRANCH
```

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                                                ERROR   67              ;UNEXPECTED DATA TYPE ERROR
                                                BR      7$
                        000020  003042  4$:     BIT     #BIT4,E.CONT    ;ERROR 4?
                                                BEQ     5$              ;NO-BRANCH
                                                ERROR   70              ;ATTENTION DID NOT RESET WITH CLEAR
                                                BR      7$
                        000040  003042  5$:     BIT     #BIT5,E.CONT    ;ERROR 5?
                                                BEQ     6$              ;NO-BRANCH
                                                ERROR   71              ;SUBSYS CLEAR DIDN'T CLEAR DRIVE ATTENTION
                                                BR      7$
                        000400  003042  6$:     BIT     #BIT8,E.CONT
                                                BEQ     8$
                                                ERROR   72              ;DATA LATE WHEN UNLOADING HEADER
                        001000  003042  8$:     BIT     #BIT9,E.CONT
                                                BEQ     9$
                                                ERROR   73              ;CONTROLLER ERROR DURING DRIVER SERVICE
                        002000  003042  9$:     BIT     #BIT10,E.CONT
                                                BEQ     10$
                                                ERROR   74              ;DRIVE DETECTED PARITY ERROR
                        100000  003042  10$:    BIT     #BIT15,E.CONT
                                                BEQ     11$
                                                ERROR   52              ;MULTIPLE DRIVE SELECT
                                        11$:    ERROR   75              ;UNDEFINED ERROR
                        003042          7$:     CLR     E.CONT          ;CLEAR CONTROLLER ERROR WORD
                        044434                  JMP     BGNRTY          ;GO DO RETRY
                                ;;*****************************************************************
                                .SBTTL  REPORT SUPPORT ROUTINE
                                ;*THIS ROUTINE LOADS ALL THE PARAMETER BLOCK DATA TO BE REPORTED
                                ;*INTO THE PROPER TEMPORARY REGISTERS FOR REPORTING.  ALL THESE MAY
                                ;*NOT BE INCLUDED IN THE REPORT, BUT THEY ARE LOADED ANYWAY.
                                REPSUP:
                                        SAVREG
                        005500          CLR     ERRCOM          ;CLEAR ERROR COMMAND STORE
                        000001  005500  MOVB    P.CMND(R5),ERRCOM ;STORE COMMAND START VALUES
                        001162          MOV     #$REG0,R0       ;FOR REPORTING
                        000002          MOV     P.CYLN(R5),(R0)+
                        000005          MOVB    P.TRCK(R5),(R0)+
                                        CLRB    (R0)+
                        000004          MOVB    P.SECT(R5),(R0)+
                                        CLRB    (R0)+
                        000012          MOV     P.WC(R5),(R0)+
                        001174          MOV     #$REG5,R0
                        000007          MOVB    P.BAHI(R5),R3
                        177774          BIC     #177774,R3
                        001256          MOV     R3,$REG36       ;HI BA BITS
                        000010  001260  MOV     P.BALO(R5),$REG37 ;LO BA BITS
                        000016          MOV     P.CS1(R5),(R0)+ ;GET ALL THE VALUES FROM THE
                        000020          MOV     P.CS2(R5),(R0)+ ;PARAMETER BLOCK AND LOAD
                        000030          MOV     P.DCYL(R5),(R0)+ ;THE TEMPORARY REGISTERS
                        000026          MOV     P.DTS(R5),(R0)+ ;FOR REPORTING. ALL THIS
                        000022          MOV     P.WCR(R5),(R0)+ ;DATA MAY NOT BE VALID
                                                                ;FOR ALL REPORTS (TO BE
                        000024          MOV     P.BAR(R5),(R0)+ ;DETERMINED LATER) BUT IT IS
                        000032          MOV     P.ASOF(R5),(R0)+ ;STORED ANY WAY.
                        000036          MOV     P.DS(R5),(R0)+
                        000034          MOV     P.ER(R5),(R0)+
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                                        MOV     P.A00(R5),(R0)+
                                        MOV     P.B00(R5),(R0)+
                                        MOV     P.A01(R5),(R0)+
                                        MOV     P.B01(R5),(R0)+
                                        MOV     P.A10(R5),(R0)+
                                        MOV     P.B10(R5),(R0)+
                                        MOV     P.A11(R5),(R0)+
                                        MOV     P.B11(R5),(R0)+
                                ;STORE PREVIOUS COMMAND FOR PRINTOUT
                                        MOV     #$REG26,R1      ;ADRS OF PRINT BUF AREA
                                        MOV     #PRVCMD,R0      ;ADRS OF PREV CMND STORAGE
                                        MOVB    (R0)+,(R1)+     ;DRIVE NO.
                                        CLRB    (R1)+
                                        MOVB    (R0)+,(R1)+     ;COMMAND
                                        CLRB    (R1)+
                                        MOV     (R0)+,(R1)+     ;CYL ADDRESS
                                        MOVB    1(R0),(R1)+     ;TRACK
                                        CLRB    (R1)+
                                        MOVB    (R0),(R1)+      ;SECTOR
                                        CLRB    (R1)+
                                        MOV     6(R0),(R1)+     ;WORD COUNT
                                        MOVB    3(R0),R3        ;HI BA BITS
                                        BIC     #177774,R3
                                        MOV     R3,(R1)+
                                        MOV     4(R0),(R1)      ;LO BA BITS
                                        RESREG
                                        RTS     PC
                                ;;**************************************************************
                                .SBTTL  REPORT ERROR ROUTINE
                                ;* ENTRY          JSR     PC, ERRHDL
                                ;*RETURN         RTS     PC
                                ;*
                                ;*THIS ROUTINE IS CALLED BY THE DRIVER WHEN AN ERROR IS DETECTED
                                ;*IN THE OPERATION.  THE ROUTINE DETERMINES WHICH COMMAND WAS
                                ;*BEING EXECUTED AND GENERATES THE PROPER ERROR MESSAGE.
                                ;;**************************************************************
                                ERRHDL: SAVREG
                                        BISB    #377,DONE       ;SET DONE FLAG
                                        INCB    ERRCNT          ;INCREMENT ERROR COUNT
                                        CLR     RECODE          ;CLEAR RECOVERY CODE WORD
                                ER2ENT: BIT     #LEV2EP,RECODE  ;TEST IF 2ND LEVEL ERROR
                                        BEQ     52$             ;NO - SKIP PARAM BLOCK CHANGE
                                        MOV     #PARM1,R5       ;ELSE SET R5 TO PARAMETER BLOCK 1
                                52$:    MOV     #RETANL,A.ABNL  ;SET NOW ABNORMAL AND NORMAL RETURN FOR
                                        MOV     #RETNML,A.NORM  ;DRIVER OPERATIONS IN ERROR PROCESSING
                                        JSR     PC,REPSUP       ;GO SET UP REGISTERS FOR REPORT
                                                                ;NOW BEGIN TESTING THE ERROR
                                                                ;BITS. THE SEQUENCE IN
                                                                ;WHICH THEY ARE TESTED IS
                                                                ;CONSIDERED SIGNIFICANT IN
                                                                ;THAT ERRORS OF A MORE
                                                                ;CATASTROPHIC NATURE ARE FIRST
                                                                ;TESTED.
                                                                ;
                                                                ;IF AN ERROR IS FOUND SET,
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                                                                ;THAT ERROR IS REPORTED AND
                                                                ;THE REPORTING IS TERMINATED.
                                                                ;IF ADDITIONAL ERRORS ARE SET,
                                                                ;THE RK611 REGISTER PRINTOUTS
                                                                ;WILL SHOW THIS BUT THE
                                                                ;REGISTER CONTENTS MUST BE
                                                                ;MANUALLY DECODED TO LOCATE THE
                                                                ;SECOND ERROR
042464  016504  000034                MOV     P.ER(R5),R4       ;SET R4 TO ERROR REGISTER
042470  032765  020000  000020        BIT     #UPE,P.CS2(R5)    ;TEST UPE. IF UES-SET
042476  001406                        BEQ     1$                ;REPORT ERROR
042500  104001                        ERROR   1
042502  052737  000200  005476        BIS     #ABORT,RECODE
042510  000137  044160                JMP     37$
042514  032765  004000  000020  1$:   BIT     #NEM,P.CS2(R5)    ;TEST NON-EXISTANT MEMORY
042522  001406                        BEQ     2$
042524  104002                        ERROR   2
042526  052737  000200  005476        BIS     #ABORT,RECODE
042534  000137  044160                JMP     37$
042540  032765  010000  000020  2$:   BIT     #NED,P.CS2(R5)    ;TEST NON-EXISTANT DRIVE
042546  001412                        BEQ     3$
042550  032765  000400  000020        BIT     #UFE,P.CS2(R5)    ;TEST IF NED & UFE BOTH SET
042556  001403                        BEQ     38$
042560  104035                        ERROR   35                ;NED & UFE BOTH SET ERROR
042562  000137  044160                JMP     37$
042566  104003                38$:    ERROR   3                 ;NED ONLY
042570  000137  044160                JMP     37$
042574  032765  000400  000020  3$:   BIT     #UFE,P.CS2(R5)    ;TEST UNIT FIELD ERROR
042602  001412                        BEQ     4$
042604  032765  010000  000020        BIT     #NED,P.CS2(R5)    ;TEST IF UFE & NED BOTH SET
042612  001403                        BEQ     39$               ;NO-SKIP
042614  104035                        ERROR   35                ;REPORT NED & UFE BOTH SET
042616  000137  044160                JMP     37$
042622  104004                39$:    ERROR   4                 ;REPORT UFE ONLY
042624  000137  044160                JMP     37$
042630  032765  000100  000014  4$:   BIT     #CMDTO,P.PRST(R5) ;
042636  001423                        BEQ     5$
042640  004737  044634                JSR     PC,TOPROC         ;GO PROCESS TIMEOUT
042644  032737  002000  005476        BIT     #TWOTOS,RECODE    ;2ND TIMEOUT IN TIMEOUT PROC?
042652  001007                        BNE     40$               ;YES - SKIP TO ERROR 56
042654  032737  000400  005476        BIT     #LEV2ER,RECODE    ;TEST IF LEVEL 2 ERROR
042662  001006                        BNE     41$               ;YES - SKIP TO ERROR 57
042664  104005                        ERROR   5                 ;ELSE MAKE FULL TIMEOUT REPORT
042666  000137  044160                JMP     37$
042672  104056                40$:    ERROR   56                ;TWO TIMEOUTS ERROR REPORT
042674  000137  044160                JMP     37$
042700  104057                41$:    ERROR   57                ;2ND LEVEL ERROR REPORT
042702  000137  042430                JMP     ER2ENT            ;GO BUILD AND MAKE 2ND REPORT
042706  032765  010000  000014  5$:   BIT     #DRVSZD,P.PRST(R5) ;SEE IF DRIVE SIEZED BY OTHER PORT
042714  001431                        BEQ     65$               ;BR IF DRIVE IS AVAILABLE
042716  105737  003126                TSTB    DULACS            ;SEE IF DUAL-ACCESS FLAG SET
042722  001003                        BNE     63$               ;BR IF DUAL-ACCESS TEST
042724  104107                        ERROR   107               ;DRIVE SIEZED BY OTHER PORT
042726  000137  044160                JMP     37$
042732  105237  003127        63$:    INCB    DRNAFG            ;SET DRIVE NOT AVAILABLE FLAG
042736  012762  100000  000000        MOV     #100000,RKCS1(R2) ;CLEAR CONTROLLER ERROR
```

```
 9227  042744  013737  003056  003104          MOV     W.MIN,W.DRV     ;SET TIMER FOR ABOUT A MINUTE
 9228  042752  113700  005502                  MOVB    DRIVE,R0        ;DRIVE NUMBER
 9229  042756  116037  003072  003071          MOVB    I.DRV(R0),INTMSK ;SET MASK FOR THIS DRIVE
 9230  042764  113737  003071  003070          MOVB    INTMSK,W.TIME   ;SET DRIVE NUMBER FOR THIS DRIVE
 9231  042772  105037  003113                  CLRB    DONE            ;CLEAR THE DONE FLAG
 9232  042776  000207                          RTS     PC              ;GO WAIT FOR DRIVE ATT'N
 9233  043000  032765  020000  000016  65$:    BIT     #SPAR,P.CS1(R5) ;TEST SERCON PARITY ERROR
 9234  043006  001406                          BEQ     6$
 9235  043010  104006                          ERROR   6
 9236  043012  052737  004000  005476          BIS     #RCLREQ,RECODE
 9237  043020  000137  044160                  JMP     37$
 9238  043024  032704  000010          6$:     BIT     #DRPAR,R4       ;TEST DRIVE DETECTED PARITY ERROR
 9239  043030  001406                          BEQ     7$
 9240  043032  104007                          ERROR   7
 9241  043034  052737  004000  005476          BIS     #RCLREQ,RECODE
 9242  043042  000137  044160                  JMP     37$
 9243  043046  032765  000010  000036  7$:     BIT     #ACLO,P.DS(R5)  ;TEST AC LOW
 9244  043054  001403                          BEQ     8$
 9245  043056  104010                          ERROR   10
 9246  043060  000137  044160                  JMP     37$
 9247  043064  032765  000020  000036  8$:     BIT     #SPDLSS,P.DS(R5) ;TEST SPEED LOSS
 9248  043072  001403                          BEQ     24$
 9249  043074  104011                          ERROR   11
 9250  043076  000137  044160                  JMP     37$
 9251  043102  032765  004000  000016  24$:    BIT     #CTO,P.CS1(R5)  ;TEST FOR CONTROLLER TIMEOUT
 9252  043110  001401                          BEQ     25$
 9253  043112  104027                          ERROR   27
 9254  043114  032704  000001          25$:    BIT     #ILC,R4         ;TEST ILLEGAL FUNCTION CODE
 9255  043120  001403                          BEQ     10$
 9256  043122  104012                          ERROR   12
 9257  043124  000137  044160                  JMP     37$
 9258  043130  032765  002000  000020  10$:    BIT     #PGE,P.CS2(R5)  ;TEST PROGRAMMING ERROR
 9259  043136  001403                          BEQ     11$
 9260  043140  104013                          ERROR   13
 9261  043142  000137  044160                  JMP     37$
 9262  043146  032704  000004          11$:    BIT     #ILF,R4         ;TEST ILLEGAL DRIVE FUNCTION
 9263  043152  001403                          BEQ     12$
 9264  043154  104014                          ERROR   14
 9265  043156  000137  044160                  JMP     37$
 9266  043162  032704  000040          12$:    BIT     #DTYE,R4        ;TEST DRIVE TYPE ERROR
 9267  043166  001403                          BEQ     13$
 9268  043170  104015                          ERROR   15
 9269  043172  000137  044160                  JMP     37$
 9270  043176  032704  000020          13$:    BIT     #FMTE,R4        ;TEST FORMAT ERROR
 9271  043202  001403                          BEQ     14$
 9272  043204  104016                          ERROR   16
 9273  043206  000137  044160                  JMP     37$
 9274  043212  032704  004000          14$:    BIT     #WLE,R4         ;TEST WRITE LOCK ERROR
 9275  043216  001403                          BEQ     15$
 9276  043220  104017                          ERROR   17
 9277  043222  000137  044160                  JMP     37$
 9278  043226  032704  040000          15$:    BIT     #UNS,R4         ;TEST DRIVE UNSAFE
 9279  043232  001406                          BEQ     16$
 9280  043234  104020                          ERROR   20
 9281  043236  052737  000200  005476          BIS     #ABORT,RECODE
 9282  043244  000137  044260                  JMP     ALLTRM
```

```
9283  043250  032704  000002          16$:    BIT     #SKI,R4         ;TEST SEEK INCOMPLETE
9284  043254  001406                          BEQ     17$
9285  043256  104021                          ERROR   21
9286  043260  052737  004000  005476          BIS     #RCLREQ,RECODE
9287  043266  000137  044160                  JMP     37$
9288  043272  032704  001000          17$:    BIT     #COE,R4         ;TEST CYLINDER OVERFLOW
9289  043276  001406                          BEQ     18$
9290  043300  104022                          ERROR   22
9291  043302  052737  004000  005476          BIS     #RCLREQ,RECODE
9292  043310  000137  044160                  JMP     37$
9293  043314  032704  002000          18$:    BIT     #IDAE,R4        ;TEST ILLEGAL CYLINDER
9294  043320  001406                          BEQ     19$
9295  043322  104023                          ERROR   23
9296  043324  052737  004000  005476          BIS     #RCLREQ,RECODE
9297  043332  000137  044160                  JMP     37$
9298  043336  032765  000040  000036  19$:    BIT     #DROT,P.DS(R5)  ;TEST DRIVE OFF TRACK
9299  043344  001406                          BEQ     20$
9300  043346  104024                          ERROR   24
9301  043350  052737  004000  005476          BIS     #RCLREQ,RECODE
9302  043356  000137  044160                  JMP     37$
9303  043362  032704  010000          20$:    BIT     #DTE,R4         ;TEST DRIVE TIMING ERROR
9304  043366  001406                          BEQ     21$
9305  043370  104025                          ERROR   25
9306  043372  052737  000200  005476          BIS     #ABORT,RECODE
9307  043400  000137  044160                  JMP     37$
9308  043404  032765  100000  000020  21$:    BIT     #DLT,P.CS2(R5)  ;TEST DATA LATE
9309  043412  001403                          BEQ     22$
9310  043414  104026                          ERROR   26
9311  043416  000137  044160                  JMP     37$
9312  043422  032704  020000          22$:    BIT     #OPI,R4         ;TEST IF OPI ERROR
9313  043426  001457                          BEQ     29$
9314  043430  052737  000010  005476          BIS     #OPIERR,RECODE
9315  043436  105737  003111                  TSTB    DERCNT          ;TEST IF FIRST ERROR
9316  043442  001402                          BEQ     50$
9317  043444  000137  044160                  JMP     37$             ;NO - SKIP REPORT
9318  043450  032737  000400  005476  50$:    BIT     #LEV2ER,RECODE  ;TEST IF A SECOND LEVEL 2 ERROR
9319  043456  001403                          BEQ     26$             ;HAS ALREADY OCCURRED
9320  043460  104054                  27$:    ERROR   54
9321  043462  000137  044160                  JMP     37$             ;GET OUT OF ERROR REPORT
9322  043466  004737  045264          26$:    JSR     PC,BLDEXH       ;GO BUILD EXPECTED HEADER
9323  043472  004737  045004                  JSR     PC,RDHD0        ;GET HEADER OF SECTOR 0
9324  043476  032737  000400  005476          BIT     #LEV2ER,RECODE  ;TEST IF ERROR GETTING HDR
9325  043504  001025                          BNE     28$             ;IF YES-GO MAKE ABREVIATED REPORT
9326  043506  013702  003026                  MOV     RKBAS,R2        ;STORE HEADER 0 INTO REGISTERS
9327  043512  042762  000100  000000          BIC     #IE,RKCS1(R2)   ;RESET INTERRUPT ENABLE
9328  043520  016237  000024  001202          MOV     RKDB(R2),$REG10 ;FOR REPORTING
9329  043526  016237  000024  001204          MOV     RKDB(R2),$REG11
9330  043534  016237  000024  001206          MOV     RKDB(R2),$REG12
9331  043542  032762  100000  000000          BIT     #CERR,RKCS1(R2) ;TEST IF ERROR DURING STORAGE
9332  043550  001343                          BNE     27$
9333  043552  104030                          ERROR   30              ;MAKE OPI REPORT
9334  043554  000137  044160                  JMP     37$
9335  043560  104054                  28$:    ERROR   54
9336  043562  000137  042430                  JMP     ER2ENT          ;GO MAKE 2ND LEVEL REPORT
9337  043566  032704  000400          29$:    BIT     #HVRC,R4        ;TEST IF HVRC ERROR
9338  043572  001457                          BEQ     23$
```

```
 9339  043574  052737  000004  005476          BIS     #HVRCER,RECODE
 9340  043602  105737  003111                  TSTB    DERCNT          ;TEST IF FIRST ERROR
 9341  043606  001402                          BEQ     30$             ;YES - REPORT
 9342  043610  000137  044160                  JMP     37$             ;JUMP TO RETURN
 9343  043614  032737  000400  005476  30$:    BIT     #LEV2ER,RECODE  ;TEST IF A 2ND LEVEL ERROR HAS ALREADY
 9344  043622  001403                          BEQ     31$             ;OCCURRED. NO-SKIP EXIT
 9345  043624  104055                  51$:    ERROR   55
 9346  043626  000137  044160                  JMP     37$             ;GET OUT OF ERROR REPORT
 9347  043632  004737  045264          31$:    JSR     PC,BLDEXH       ;GO BUILD EXPECTED HEADER
 9348  043636  004737  045004                  JSR     PC,RDHDO        ;GO GET HDR 0
 9349  043642  032737  000400  005476          BIT     #LEV2ER,RECODE  ;TEST IF ERROR IN GETTING HDR
 9350  043650  001025                          BNE     32$             ;IF YES-GO MAKE ABREVIATED REPORT
 9351  043652  013702  003026                  MOV     RKBAS,R2        ;GET RK611 BASE ADDRESS
 9352  043656  042762  000100  000000          BIC     #IE,RKCS1(R2)   ;CLEAR INTERRUPT ENABLE
 9353  043664  016237  000024  001202          MOV     RKDB(R2),$REG10 ;STORE OFF HEADER
 9354  043672  016237  000024  001204          MOV     RKDB(R2),$REG11
 9355  043700  016237  000024  001206          MOV     RKDB(R2),$REG12
 9356  043706  032762  100000  000000          BIT     #CERR,RKCS1(R2) ;TEST IN ANY ERROR IN UNLOAD
 9357  043714  001343                          BNE     51$             ;IY YES - GO MAKE SHORT REPORT
 9358  043716  104031                          ERROR   31              ;MAKE FULL REPORT
 9359  043720  000137  044160                  JMP     37$
 9360  043724  104055                  32$:    ERROR   55              ;ABREVIATED HVRC ERROR RPORT
 9361  043726  000137  042430                  JMP     ER2ENT          ;GO REPORT 2ND LEVEL ERROR
 9362  043732  032704  000200          23$:    BIT     #BSE,R4         ;TEST FOR BAD SECTOR ERROR
 9363  043736  001430                          BEQ     33$             ;NO - SKIP
 9364  043740  052737  000002  005476          BIS     #BSERR,RECODE   ;SET ERROR FLAG
 9365  043746  016500  000030                  MOV     P.DCYL(R5),R0   ;GET CYL NO.
 9366  043752  116501  000027                  MOVB    P.DTS+1(R5),R1  ;GET TRACK NO.
 9367  043756  042701  177774                  BIC     #177774,R1      ;CLEAR ALL BITS EXCEPT TRACK
 9368  043762  016502  000026                  MOV     P.DTS(R5),R2    ;GET SECTOR IN ERROR
 9369  043766  042702  177740                  BIC     #177740,R2      ;CLEAR ALL BITS EXCEPT SECTOR
 9370  043772  004737  040612                  JSR     PC,BDSRCK       ;GO SEE IF THIS SECTOR LISTED
 9371  043776  032737  001000  005476          BIT     #BADSEC,RECODE  ;TEST RESULT
 9372  044004  001065                          BNE     37$             ;YES - EXIT, NO ERROR OR REPORT
 9373  044006  104104                          ERROR   104             ;ELSE REPORT BAD BSE
 9374  044010  042737  000002  005476          BIC     #BSERR,RECODE   ;RESET BSE ERROR FLAG
 9375  044016  000460                          BR      37$             ;GO EXIT
 9376  044020  032704  100000          33$:    BIT     #DCK,R4         ;TEST IF DATA CHECK
 9377  044024  001435                          BEQ     36$
 9378  044026  052737  000020  005476          BIS     #DCKERR,RECODE  ;SET DATA CHECK ERROR IN RECOVERY CODE
 9379  044034  032704  000100                  BIT     #ECH,R4         ;TEST IF ECC IS HARD. IF
 9380  044040  001406                          BEQ     34$             ;YES SET UNCORRECTABLE IN
 9381  044042  052737  000040  005476          BIS     #ECCNC,RECODE   ;RECOVERY FLAG AND A 0 IN
 9382  044050  005037  001206                  CLR     $REG12          ;REG12 TO INDICATE UNCORRECTABLE,
 9383  044054  000403                          BR      35$             ;A 1 IN REG 12 FOR CORRECTABLE
 9384  044056  012737  000001  001206  34$:    MOV     #1,$REG12
 9385  044064  105737  003111          35$:    TSTB    DERCNT          ;TEST IF FIRST ERROR
 9386  044070  001033                          BNE     37$             ;NO SKIP REPORT
 9387  044072  004737  045140                  JSR     PC,GTPKAD       ;GO GET PACK ADDRESS OF ERROR
 9388  044076  016537  000060  001202          MOV     P.EPOS(R5),$REG10 ;STORE ECC POSITION &
 9389  044104  016537  000062  001204          MOV     P.EPAT(R5),$REG11 ;PATTERN
 9390  044112  104032                          ERROR   32              ;REPORT DCK ERROR
 9391  044114  000137  044160                  JMP     37$
 9392  044120  032765  040000  000020  36$:    BIT     #WCE,P.CS2(R5)  ;TEST WRITE CHECK ERROR
 9393  044126  001414                          BEQ     37$
 9394  044130  042737  000200  005476          BIC     #ABORT,RECODE   ;CLEAR ABORT & SET WRITE
```

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 9395  044136  052737  000100  005476          BIS     #WCERR,RECODE   ;CHECK ERROR IN RECODE
 9396  044144  105737  003111                  TSTB    DERCNT          ;TEST IF FIRST ERROR
 9397  044150  001003                          BNE     37$             ;NO - SKIP
 9398  044152  004737  045140                  JSR     PC,GTPKAD       ;GO GET ADDRESS OF ERROR
 9399  044156  104033                          ERROR   33              ;REPORT WCE
 9400
 9401  044160  032765  000020  000014  37$:    BIT     #DRVHRD,P.PRST(R5) ;TEST HARD ERROR
 9402  044166  001404                          BEQ     43$
 9403  044170  104036                          ERROR   36
 9404  044172  052737  000200  005476          BIS     #ABORT,RECODE
 9405
 9406  044200  032765  000040  000014  43$:    BIT     #DRVDSC,P.PRST(R5) ;TEST STATUS CHANGE NOT CLEARED
 9407  044206  001404                          BEQ     44$
 9408  044210  104037                          ERROR   37
 9409  044212  052737  000200  005476          BIS     #ABORT,RECODE
 9410
 9411  044220  032765  004000  000014  44$:    BIT     #NODSC,P.PRST(R5) ;IFST ATTENTION BUT NO FAULT OR DSC
 9412  044226  001404                          BEQ     46$
 9413  044230  104040                          ERROR   40
 9414  044232  052737  000200  005476          BIS     #ABORT,RECODE
 9415
 9416  044240  032765  000010  000014  46$:    BIT     #UEXATT,P.PRST(R5) ;TEST UNEXPECTED ATTENTION
 9417  044246  001404                          BEQ     ALLTRM
 9418  044250  104042                          ERROR   42
 9419  044252  052737  000200  005476          BIS     #ABORT,RECODE
 9420
 9421
 9422                                  ;ALL ERRORS MUST EXIT THROUGH THIS POINT
 9423
 9424  044260  012705  002620          ALLTRM: MOV     #PARM0,R5       ;RESTORE PARAMETER BLOCK SELECTION
 9425  044264  012737  042410  003036          MOV     #ERRHDL,A.ABNL  ;RESTORE INTERRUPT VECTORS FOR RETRY
 9426  044272  012737  041142  003034          MOV     #ERRFRE,A.NORM  ;DRIVER OPERATIONS, IF ANY
 9427  044300  032737  000200  005476          BIT     #ABORT,RECODE   ;IF ABORT IS NOT SET AND
 9428  044306  001043                          BNE     48$             ;THE DRIVE IS READY (HAS NOT
 9429                                                                  ;CYCLED DOWN)
 9430  044310  013702  003026                  MOV     RKBAS,R2        ;GET BASE ADDRESS
 9431  044314  032762  000200  000012          BIT     #RDY,RKDS(R2)   ;TEST IF DRIVE READY SET
 9432  044322  001004                          BNE     47$             ;RECALIBRATE REQUIRED BIT IS SET
 9433  044324  052737  000200  005476          BIS     #ABORT,RECODE   ;ELSE ABORT WITH ABORT MESSAGE
 9434  044332  000431                          BR      48$
 9435  044334  032737  004000  005476  47$:    BIT     #RCLREQ,RECODE  ;IF RECALIBRATE IS REQUIRED
 9436  044342  001434                          BEQ     BGNRTY          ;FOR RETRY SET UP PARAM
 9437  044344  112737  000113  000001          MOVB    #RECAL,P.CMND   ;BLOCK TO DO IT.
 9438  044352  012737  044606  003036          MOV     #RETANL,A.ABNL
 9439  044360  004737  040716                  JSR     PC,DRVCAL
 9440  044364  012737  042410  003036          MOV     #ERRHDL,A.ABNL  ;RESTORE ERROR RETURN
 9441  044372  032737  000400  005476          BIT     #LEV2ER,RECODE  ;IF AN ERROR OCCURRED IN THE
 9442  044400  001415                          BEQ     BGNRTY          ;RECAL ATTEMP SET ABORT,
 9443  044402  052737  000200  005476          BIS     #ABORT,RECODE   ;PRINT THE RECAL ERROR MESSAGE, AND
 9444  044410  104060                          ERROR   60              ;GO REPORT DETAILS
 9445  044412  000137  042430                  JMP     ER2ENT
 9446  044416  104061                  48$:    ERROR   61              ;REPORT ABORT-RETRY FAILED
 9447
 9448                                  ;THE PROGRAM WILL HALT HERE IF THE ABORT FLAG HAS BEEN SET OR
 9449                                  ;IF THE DRIVE READY BIT IS RESET.
 9450
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                                HLTPRG: HALT
                                        CLRB    ERRCNT          ;CLEAR ERROR COUNT
                                        RESET                   ;RESET ALL DEVICES
                                        JMP     CMSTRT
                                ;THE FOLLOWING CODE WILL DETERMINE IF AND DATA TYPE ERROR
                                ;HAS OCCURRED. IF YES, THE RETRY IS NOT DONE HERE BUT RETURNS TO
                                ; THE INITIATING ROUTINE FOR RETRY.  ANY OTHER ERROR IS TO BE
                                ;RETRIED HERE. IF RETRY IS UNSUCCESSFUL AFTER 4 ATTEMPTS, THE ABORT
                                ;FLAG IS SET AND PROGRAM HALTS.
044434  032737  000136  005476  BGNRTY: BIT     #BSERR!HVRCER!OPIERR!DCKERR!WCERR,RECODE ;TEST IF ANY DATA ERROR
044442  001404                        BEQ     3$
044444  052737  100000  005476  9$:     BIS     #ANYDER,RECODE
044452  000453                        BR      2$
044454                          3$:
044454  105737  003133                TSTB    NORTRY          ;SEE IF "NO-RETRY" FLAG SET
044460  001371                        BNE     9$              ;BR IF YES
044462  032737  001000  005476        BIT     #BADSEC,RECODE  ;TEST IF BAD SECTOR FLAG SET
044470  001044                        BNE     2$              ;IF YES-EXIT TO CALLER
044472  123737  003116  003117        CMPB    ERRCNT,ERRLMT   ;BEGIN RETRY IF ERROR COUNT HAS
044500  001012                        BNE     1$              ;NOT BEEN EXCEEDED
044502  005037  001174                CLR     $REG5
044506  113737  003116  001174        MOVB    ERRCNT,$REG5    ;GET ERROR RETRY COUNT
044514  104102                        ERROR   102             ;REPORT RETRY UNSUCCESSFUL
044516  052737  000200  005476        BIS     #ABORT,RECODE   ;SET ABORT & QUIT
044524  000735                        BR      HLTPRG
044526  013702  003026          1$:   MOV     RKBAS,R2        ;GET RK BASE ADDRESS
044532  112765  000177  000001        MOVB    #SUBCLR,P.CMND(R5)  ;SET UP TO CLEAR SUBSYSTEM
044540  004737  040716                JSR     PC,DRVCAL       ;GO DO IT
044544  012700  005240                MOV     #COMSTR,R0      ;GO AND REESTABLISH THE COMMAND
044550  012025                        MOV     (R0)+,(R5)+     ;AS IT WAS ENTERED INTO THE
044552  012025                        MOV     (R0)+,(R5)+     ;PARAMETER BLOCK
044554  012025                        MOV     (R0)+,(R5)+
044556  012025                        MOV     (R0)+,(R5)+
044560  012025                        MOV     (R0)+,(R5)+
044562  012025                        MOV     (R0)+,(R5)+
044564  012705  002620                MOV     #PARM0,R5
044570  012737  000000  177776        MOV     #PR0,@#PSW      ;LOWER PRIORITY TO ALLOW INTERRUPT
044576  004737  040716                JSR     PC,DRVCAL       ;CALL DRIVER
044602  104407                  2$:   RESREG                  ;IF RETURN GETS HERE, NO ERROR
044604  000207                        RTS     PC              ;OCCURRED, RECOVERY WAS SUCCESSFUL

044606  152737  000377  003113  RETANL: BISB    #377,DONE       ;SET DONE
044614  052737  000400  005476          BIS     #LEV2ER,RECODE  ;SET LEVEL TWO ERROR
044622  000207                        RTS     PC
044624  152737  000377  003113  RETNML: BISB    #377,DONE       ;SET DONE
044632  000207                        RTS     PC

                                ;;*****************************************************************
                                .SBTTL  TIME OUT PROCESSOR ROUTINE
                                ;*THIS ROUTINE SUPPORTS THE ERROR HANDLER BY PROCESSING TIME OUT STATUS
                                ;*GATHERING DUTIES.
```

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9507                                    ;;*****************************************************************
9508  044634                            TOPROC:
9509  044634  104406                            SAVREG
9510  044636  013702  003026                    MOV     RKBAS,R2
9511  044642  012701  001174                    MOV     #$REGS,R1       ;SET UP R1 FOR RK REGISTER STORAGE
9512  044646  016221  000000                    MOV     RKCS1(R2),(R1)+ ;STORE ALL VALID RK611
9513  044652  016221  000010                    MOV     RKCS2(R2),(R1)+ ;REGISTERS
9514  044656  016221  000020                    MOV     RKDC(R2),(R1)+
9515  044662  016221  000006                    MOV     RKDA(R2),(R1)+
9516  044666  016221  000002                    MOV     RKWC(R2),(R1)+
9517  044672  016221  000004                    MOV     RKBA(R2),(R1)+
9518  044676  016221  000016                    MOV     RKASOF(R2),(R1)+
9519  044702  016221  000012                    MOV     RKDS(R2),(R1)+
9520  044706  016221  000014                    MOV     RKER(R2),(R1)+
9521  044712  005000                            CLR     R0              ;THIS CODE WILL ATTEMPT TO
9522                                                                    ;RETRIEVE THE STATUS FROM THE
9523                                                                    ;DRIVE.
9524  044714  012705  002704                    MOV     #PARM1,R5       ;SET UP TO USE PARM1
9525  044720  112765  000141  000001          MOVB    #RDSTAT,P.CMND(R5) ;DO READ DRIVE STATUS COMMAND
9526  044726  004737  040716                    JSR     PC,DRVCAL       ;CALL DRIVER
9527  044732  032765  000100  000014          BIT     #CMDTO,P.PRST(R5) ;TEST FOR TIMEOUT
9528  044740  001403                            BEQ     1$              ;NO - SKIP
9529  044742  052737  002000  005476          BIS     #TWOTOS,RECODE  ;SET TWO TIMEOUTS FLAG
9530  044750  062705  000040            1$:     ADD     #P.ADD,R5       ;BUMP R5 TO POINT TO DRIVE STATUS
9531  044754  012521                            MOV     (R5)+,(R1)+     ;MOVE ALL THE DRIVE STATUS INTO THE
9532  044756  012521                            MOV     (R5)+,(R1)+     ;TEMP REGS FOR REPORTING.
9533  044760  012521                            MOV     (R5)+,(R1)+
9534  044762  012521                            MOV     (R5)+,(R1)+
9535  044764  012521                            MOV     (R5)+,(R1)+
9536  044766  012521                            MOV     (R5)+,(R1)+
9537  044770  012521                            MOV     (R5)+,(R1)+
9538  044772  012521                            MOV     (R5)+,(R1)+
9539
9540  044774  012705  002620                    MOV     #PARM0,R5       ;RESTORE PARM 0
9541  045000  104407                            RESREG
9542  045002  000207                            RTS     PC
9543
9544
9545
9546                                    ;;*****************************************************************
9547                                    .SBTTL  READ HEADER 0 ROUTINE
9548                                    ;;*****************************************************************
9549  045004                            RDHD0:
9550  045004  104406                            SAVREG
9551  045006  016501  000026                    MOV     P.DTS(R5),R1    ;STORE TRACK AND SECTOR
9552  045012  016500  000052                    MOV     P.B10(R5),R0    ;GET THE CYLINDER ADRS
9553  045016  042700  160017                    BIC     #160017,R0      ;FROM THE DRIVE STATUS. CLEAR
9554  045022  006200                            ASR     R0              ;OFF UNUSED BITS AND POSITION
9555  045024  006200                            ASR     R0              ;FOR USE AS THE DESIRED
9556  045026  006200                            ASR     R0              ;CYLINDER IN THE READ
9557  045030  006200                            ASR     R0              ;HEADER COMMAND.
9558  045032  012705  002704                    MOV     #PARM1,R5       ;SET UP TO USE P.B. 1
9559  045036  010165  000004                    MOV     R1,P.SECT(R5)   ;INSERT TRK,SECT FOR READ HDR
9560  045042  010065  000002                    MOV     R0,P.CYLN(R5)   ;SET CYL NO.
9561  045046  132737  000020  003115          BITB    #B.CFMT,FORMAT  ;TEST PRESENT FMT AND CHANGE IT
9562  045054  001404                            BEQ     1$              ;TO THE OPPOSITE. THIS WILL CAUSE
```

```
9563  045056  142765  000020  000007          BICB    #B.CFMT,P.CS1H(R5) ;A READ OF SECT 0 HDR ON
9564  045064  000403                          BR      2$                 ;THE READ HDR COMMAND
9565  045066  152765  000020  000007  1$:     BISB    #B.CFMT,P.CS1H(R5)
9566  045074  112765  000125  000001  2$:     MOVB    #RDHEAD,P.CMND(R5) ;SET READ HDR COMMAND
9567  045102  012737  000000  177776          MOV     #PRO,@#PSW         ;ALLOW INTERRUPTS
9568  045110  004737  040716                  JSR     PC,DRVCAL          ;DO READ HDR
9569  045114  142765  000020  000007          BICB    #B.CFMT,P.CS1H(R5) ;CLEAR THE FORMAT BIT
9570  045122  153765  003115  000007          BISB    FORMAT,P.CS1H(R5) ;RESTORE TYPE AND FMT IN USE
9571  045130  012705  002620                  MOV     #PARM0,R5          ;RESTORE P.B. 0 ADDRESS
9572  045134  104407                          RESREG                     ;RESTORE R0-R5
9573  045136  000207                          RTS     PC                 ;RETURN
9574
9575
9576
9577                                  ;;*****************************************************************
9578                                  .SBTTL  GET PACK ADDRESS ROUTINE
9579                                  ;;*****************************************************************
9580  045140  016537  000030  001174  GTPKAD: MOV     P.DCYL(R5),$REG5 ;GET CYLINDER NUMBER
9581  045146  005037  001176                  CLR     $REG6              ;CLEAR REGISTERS FOR
9582  045152  005037  001200                  CLR     $REG7              ;TRACK & SECTOR STORAGE
9583  045156  116537  000026  001200          MOVB    P.DTS(R5),$REG7 ;STORE THE TRACK AND SECTOR
9584  045164  116537  000027  001176          MOVB    P.DTS+1(R5),$REG6
9585  045172  005737  001200                  TST     $REG7                      ;ADJUST THE ADDRESS CONTAINED IN
9586                                                                             ;THE RK REGISTERS FOR THE AUTOMATIC
9587  045176  001403                          BEQ     1$                         ;INCREMENT
9588  045200  005337  001200                  DEC     $REG7
9589  045204  000426                          BR      5$
9590  045206  032765  010000  000016  1$:     BIT     #CFMT,P.CS1(R5)
9591  045214  001404                          BEQ     2$
9592  045216  012737  000023  001200          MOV     #19.,$REG7
9593  045224  000403                          BR      3$
9594  045226  012737  000025  001200  2$:     MOV     #21.,$REG7
9595  045234  005737  001176          3$:     TST     $REG6
9596  045240  001403                          BEQ     4$
9597  045242  005337  001176                  DEC     $REG6
9598  045246  000405                          BR      5$
9599  045250  012737  000002  001176  4$:     MOV     #2,$REG6
9600  045256  005337  001174                  DEC     $REG5
9601  045262  000207                  5$:     RTS     PC
9602
9603
9604
9605                                  ;;*****************************************************************
9606                                  .SBTTL  BUILD EXPECTED HEADER
9607                                  ;*USES DESIRED CYLINDER, TRACK AND SECTOR REGISTERS TO DETERMINE
9608                                  ;*WHICH HEADER WAS EXPECTED. LOADS EXPECTED VALUES IN $REG5, 6, AND
9609                                  ;*7 FOR REPORTING.
9610                                  ;;*****************************************************************
9611  045264  104406                  BLDEXH: SAVREG
9612  045266  016537  000030  001174          MOV     P.DCYL(R5),$REG5 ;CONSTRUCT EXPECTED HDR
9613  045274  016501  000026                  MOV     P.DTS(R5),R1 ;DESIRED CYLINDER & DESIRED TRACK
9614  045300  042701  174377                  BIC     #174377,R1         ;CLEAR ALL BUT TRACK BITS
9615  045304  006201                          ASR     R1                 ;AND SECTOR. SHIFT THE TRACK
9616  045306  006201                          ASR     R1                 ;OVER TO CONFORM TO HEADER FORMAT
9617  045310  006201                          ASR     R1                 ;CHECK THE FORMAT BIT AND
9618                                                                     ;IF SET, SET THE HEADER FORMAT
```

```
 9619  045312  016537  000026  001176          MOV     P.DTS(R5),$REG6 ;BIT.
 9620  045320  042737  177740  001176          BIC     #177740,$REG6   ;CLEAR ALL BUT SECTOR
 9621  045326  060137  001176                  ADD     R1,$REG6        ;ADD TRACK AND SECTOR TOGETHER
 9622  045332  052737  140000  001176          BIS     #140000,$REG6   ;INSERT BSE BITS
 9623  045340  032765  010000  000016          BIT     #CFMT,P.CS1(R5)
 9624  045346  001403                          BEQ     23$
 9625  045350  052737  001000  001176          BIS     #1000,$REG6
 9626  045356  013737  001174  001200  23$:    MOV     $REG5,$REG7     ;COMPUTE THE HEADER VRC
 9627  045364  013701  001176                  MOV     $REG6,R1
 9628  045370  043737  001176  001200          BIC     $REG6,$REG7
 9629  045376  043701  001174                  BIC     $REG5,R1
 9630  045402  050137  001200                  BIS     R1,$REG7
 9631  045406  104407                          RESREG
 9632  045410  000207                          RTS     PC
 9633
```

```
                                .SBTTL  RK611/RK06 UNIBUS DRIVER FOR SEQUENTIAL OPERATIONS (REV. 0.08)

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                                ;*MAYNARD, MA. 01754
                                ;*AUTHOR: ROY SPITZER

                                .SBTTL   *WATCH-DOG TIMER

                                ;;*****************************************************************
                                ;;*
                                ;;*      THE WATCH-DOG TIMER DOES A PSEUDO-TIMING OF RK06 UNIBUS
                                ;;*      SUBSYSTEM COMMAND. SINCE ONE CAN NOT GUARANTEE THAT A
                                ;;*      REAL-TIME CLOCK (KW11-P OR KW11-L) IS ON THE SYSTEM
                                ;;*      THE RK06 DRIVER WILL USE THE LOCATION W.MTIM FOR
                                ;;*      MILLI-SECOND TIMING. WHEN W.MTIM REACHES ZERO THE
                                ;;*      WATCH-DOG TIMER WILL SCAN THE DRIVES IN USE AS
                                ;;*      DETERMINED BY THE LOCATION W.TIME. THE TIMER COUNTS
                                ;;*      (ONE FOR EACH DRIVE) ARE KEPT IN THE TABLE W.DRV.
                                ;;*      IF ANY COUNT IN THE TABLE W.DRV REACHES ZERO A COMMAND
                                ;;*      TIME-OUT WILL BE DESIGNATED IN THE PROGRAM DEVICE STATUS
                                ;;*      REGISTER OF THAT DRIVE'S PARAMETER BLOCK.
                                ;;*
                                ;;*      THE DRIVER WILL USE THE LOCATION W.MIN AS THE NUMBER
                                ;;*      OF MILLISECONDS FOR AN UNLOAD OR START SPINDLE COMMAND.
                                ;;*      THE DRIVER WILL USE THE LOCATION W.SEC AS THE TIME
                                ;;*      LIMIT FOR ALL OTHER COMMANDS.
                                ;;*
                                ;;*      FOR QUEUED OPERATIONS THE WATCH-DOG TIMER WILL
                                ;;*      WATCH UP TO 8 OPERATIONS SIMULATEOUSLY. FOR SEQUENTIAL
                                ;;*      OPERATIONS ONLY ONE OPERATION WILL BE WATCHED.
                                ;;*
                                ;;*CALL  JSR     PC,W.WTCH
                                ;;*      RETURN          IF NO DRIVE ORDER EXCEEDED ITS TIME LIMIT
                                ;;*
                                ;;*      OTHERWISE AN ABNORMAL RETURN TO THE ROUTINE ADDRESS
                                ;;*      BY LOCATION A.ABNL WILL OCCUR AND THE CMDTO FLAG
                                ;;*      IN THE PROGRAM DEVICE STATUS REGISTER OF THE
                                ;;*      APPROPRIATE PARAMETER BLOCK WILL BE SET.
                                ;;*
                                ;;*****************************************************************

045412  010546          W.WTCH: MOV     R5,-(SP)        ;SAVE R5 ON THE STACK
045414  010446                  MOV     R4,-(SP)        ;SAVE R4 ON THE STACK
045416  010346                  MOV     R3,-(SP)        ;SAVE R3 ON THE STACK
045420  010246                  MOV     R2,-(SP)        ;SAVE R2 ON STACK
045422  013746  177776          MOV     PS,-(SP)        ;SAVE PROGRAM STATUS WORD ON STACK
045426  005337  003046          DEC     W.MTIM          ;DECREMENT MILLISECOND TIMER
045432  001034                  BNE     20$             ;IF NOT ZERO RETURN
045434  013737  003050  003046  MOV     W.MILI,W.MTIM   ;REINITIALIZE MILLISECOND TIMER
045442  105737  003070          TSTB    W.TIME          ;CHECK IF DRIVE IS BEING TIMED
045446  001426                  BEQ     20$             ;NO, RETURN
045450  013737  003032  177776  MOV     RKPRI,PS        ;LOCK OUT RK06 INTERRUPTS
045456  013702  003026          MOV     RKBAS,R2        ;LOAD BASE OF RK06 REGISTERS
045462  005337  003104          DEC     W.DRV           ;DECREMENT COMMAND TIMER
045466  001016                  BNE     20$             ;RETURN IF NO TIME OUT
```

```
 9690  045470  105037  003070                    CLRB    W.TIME              ;RESET TIMING INDICATOR
 9691  045474  013705  003102                    MOV     PBLKT,R5            ;LOAD ADDRESS OF PARAMETER BLOCK
 9692                                                                        ;   TABLE FOR INDEXING
 9693  045500  052765  000100  000014            BIS     #CMDTO,P.PRST(R5)   ;SET COMMAND TIME OUT
 9694  045506  020537  003044                    CMP     R5,O.WAIT           ;CHECK IF DRIVER IS WAITING FOR
 9695                                                                        ;   COMMAND COMPLETION
 9696  045512  001002                            BNE     5$                  ;NO, DO NOT ALTER WAITING FOR
 9697                                                                        ;   COMMAND COMPLETION
 9698  045514  005037  003044                    CLR     O.WAIT              ;CLEAR WAIT FOR COMMAND COMPLETION
 9699  045520  004737  050774          5$:       JSR     PC,R.ABNL           ;BRANCH TO ERROR ROUTINE
 9700  045524  012637  177776          20$:      MOV     (SP)+,PS            ;RESTORE PSW
 9701  045530  012602                            MOV     (SP)+,R2            ;RESTORE R2
 9702  045532  012603                            MOV     (SP)+,R3            ;RESTORE R3
 9703  045534  012604                            MOV     (SP)+,R4            ;RESTORE R4
 9704  045536  012605                            MOV     (SP)+,R5            ;RESTORE R5
 9705  045540  000207                            RTS     PC                  ;RETURN
```

```
                                .SBTTL  *RK06 INTERRUPT SERVICE ROUTINE

                                ;;*****************************************************************
                                ;*
                                ;*      THIS ROUTINE WILL SERVICE ALL RK06 INTERRUPTS.
                                ;*
                                ;*      UPON RECEIVING AN INTERRUPT, THIS ROUTINE WILL
                                ;*      PERFORM ONE OF THE FOLLOWING SERVICES:
                                ;*
                                ;*      1.) SERVICE PORT WAS SEIZED BY OTHER PORT
                                ;*      2.) SERVICE DRIVER IS WAIT FOR COMMAND COMPLETION
                                ;*      3.) SERVICE POSITIONING COMPLETION
                                ;*      4.) REQUEUE COMMAND IF DRIVE WAS RELEASED
                                ;*          FOR THE QUEUED RK06 DRIVER.
                                ;*      5.) IF NO SERVICE IS REQUIRED, THE COMMAND WILL BE ISSUED
                                ;*          FOR THE QUEUED RK06 DRIVER.
                                ;*
                                ;*      THREE LINKS ARE PROVIDED TO THE DRIVING PROGRAM.
                                ;*      THEY ARE:
                                ;*
                                ;*      1.) A.NORM ADDRESS OF NORMAL RETURN (SUCESSFUL COMPLETION OF COMMAND)
                                ;*      2.) A.ABNL ADDRESS OF ABNORMAL RETURN (UNSUCESSFUL COMPLETION OF COMMAND)
                                ;*      3.) A.CONT ADDRESS OF CONTROL ERROR RETURN
                                ;*
                                ;*      FOR NORMAL AND ABNORMAL RETURNS, THE ADDRESS OF THE APPROPRIATE
                                ;*      PARAMETER BLOCK WILL BE IN R5.
                                ;*
                                ;*      FOR THE CONTROLLER ERROR RETURN, THE LOCATION E.CONT CONTAINS
                                ;*      THE REASON FOR THE CONTROLLER ERROR.
                                ;*
                                ;*      ROUTINES USED:
                                ;*              C.OPT   (QUEUED ONLY)
                                ;*              Q.PUSH  (QUEUED ONLY)
                                ;*              Q.RMOV  (QUEUED ONLY)
                                ;*              R.CONT  (SEQUENTIAL ONLY)
                                ;*              R.NORM  (SEQUENTIAL ONLY)
                                ;*              R.ABNL  (SEQUENTIAL ONLY)
                                ;*              I.CSTS
                                ;*              I.STAT
                                ;*              I.ISSU
                                ;*              I.CCLR
                                ;*
                                ;;*****************************************************************

045542  010546                  I.INTR: MOV     R5,-(SP)        ;STORE R5 ON THE STACK
045544  010446                          MOV     R4,-(SP)        ;STORE R4 ON THE STACK
045546  010346                          MOV     R3,-(SP)        ;STORE R3 ON THE STACK
045550  010246                          MOV     R2,-(SP)        ;STORE R2 ON THE STACK
045552  010146                          MOV     R1,-(SP)        ;STORE R1 ON THE STACK
045554  010046                          MOV     R0,-(SP)        ;STORE R0 ON THE STACK
045556  013702  003026                  MOV     RKBAS,R2        ;LOAD R2 TO ADDRESS RK06 REGISTER
045562  016237  000010  002772          MOV     RKCS2(R2),T.CS2 ;STORE CS2
045570  032737  001000  002772          BIT     #MDS,T.CS2      ;CHECK IF MULTIPLE DRIVE SELECT
045576  001407                          BEQ     1$              ;NO, CONTINUE PROCESSING
045600  052737  100000  003042          BIS     #E.MDS,E.CONT   ;SET MULTIPLE DRIVE SELECT
045606  004737  051020                  JSR     PC,R.CONT       ;REPORT ERROR -
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```
 9762  045612  000137  047772                    JMP     I.RTRN          ;RETURN
 9763
 9764  045616  105737  003064          1$:       TSTB    I.ISRL          ;CHECK IF INTERRUPT OR RELEASE
 9765  045622  001410                             BEQ     6$              ;NO, CHECK IF DRIVE AVAILABLE
 9766  045624  100403                             BMI     5$              ;CHECK IF RELEASE COMMAND
 9767  045626  105037  003064                    CLRB    I.ISRL          ;YES,CLEAR FLAG
 9768  045632  000473                             BR      I.IOC           ;CONTINUE PROCESSING INTERRUPT
 9769
 9770  045634  105037  003064          5$:       CLRB    I.ISRL          ;CLEAR FLAG
 9771  045640  000137  046754                    JMP     I.ATTN          ;GO PROCESS DRIVE ATTENTIONS
 9772
 9773  045644  032737  010400  002772  6$:       BIT     #NED!UFE,T.CS2  ;CHECK FOR NON-EXISTENT DRIVE OR
 9774                                                                    ;  UNIT FIELD ERROR
 9775  045652  001413                             BEQ     7$              ;NO, WAIT FOR DUAL ACCESS INTERRUPT
 9776  045654  013704  002772                    MOV     T.CS2,R4        ;LOAD R4 FOR DRIVE NUMBER
 9777  045660  042704  177770                    BIC     #^C<DRVMSK>,R4  ;KEEP DRIVE BITS
 9778  045664  013705  003102                    MOV     PBLKT,R5        ;STORE PARAMETER BLOCK ADDRESS
 9779  045670  016237  000000  002770            MOV     RKCS1(R2),T.CS1 ;LOAD TEMPORARY CS1 FOR STATUS REPORT
 9780  045676  000137  046164                    JMP     I.ERRC          ;REPORT ERROR
 9781
 9782  045702  016237  000012  003010  7$:       MOV     RKDS(R2),T.DS   ;STORE STATUS REGISTER FOR COMPARISON
 9783  045710  032737  000001  003010            BIT     #DRA,T.DS       ;CHECK IF DRIVE SEIZED BY OTHER
 9784                                                                    ;  PORT
 9785  045716  001041                             BNE     I.IOO           ;NO, CONTINUE PROCESSING INTERRUPT
 9786
 9787                                            ;CHECK IF ANY DATA TRANSFER ERROR EXISTS
 9788  045720  032737  164000  002772            BIT     #DLT!WCE!UPE!NEM,T.CS2
 9789
 9790  045726  001007                             BNE     10$             ;INDICATE ERROR
 9791  045730  016237  000014  003006            MOV     RKER(R2),T.ER   ;STORE ERROR REGISTER
 9792
 9793                                  ;         CHECK FOR DATA TRANSFER ERROR TYPE ERROR
 9794  045736  032737  125700  003006            BIT     #DCK!OPI!WLE!COE!HVRC!BSE!ECH,T.ER
 9795
 9796  045744  001407                             BEQ     11$             ;NO, WAIT FOR RELEASE OF RK06 DRIVE
 9797
 9798  045746  052737  000010  003042  10$:      BIS     #E.UDAT,E.CONT  ;SET UNEXPECTED DATA TYPE ERROR
 9799  045754  004737  051020                    JSR     PC,R.CONT       ;REPORT ERROR
 9800  045760  000137  047772                    JMP     I.RTRN          ;RESTORE REGISTERS
 9801
 9802  045764  105037  003070          11$:      CLRB    W.TIME          ;RESET TIMING ON THIS DRIVE
 9803  045770  005037  003104                    CLR     W.DRV           ;CLEAR TIMING COUNT FOR THIS DRIVE
 9804  045774  013705  003102                    MOV     PBLKT,R5        ;LOAD R5 WITH PARAMETER BLOCK
 9805                                                                    ;  ADDRESS
 9806  046000  052765  010000  000014            BIS     #DRVSZD,P.PRST(R5) ;SET DRIVE SEIZED IN THE
 9807                                                                    ;  PROGRAM DRIVE STATUS REGISTER
 9808  046006  005037  003044                    CLR     O.WAIT          ;CLEAR WAIT FOR COMMAND COMPLETION
 9809  046012  004737  050774                    JSR     PC,R.ABNL       ;INDICATE ABNORMAL TERMINATION
 9810  046016  000137  047772                    JMP     I.RTRN          ;GO RESTORE REGISTERS
 9811
 9812  046022  013705  003044          I.IOO:    MOV     O.WAIT,R5       ;LOAD PARAMETER BLOCK ADDRESS INTO R5
 9813  046026  001002                             BNE     2$              ;IS COMMAND WAITING PROCESSING
 9814                                                                    ;  YES, DO PROCESSING
 9815  046030  000137  046754                    JMP     I.ATTN          ;NO, PROCESS ATTENTION
 9816
 9817  046034  013704  002772          2$:       MOV     T.CS2,R4        ;STORE RKCS2 FOR DRIVE NUMBER
```

```
 9818  046040  042704  177770                    BIC     #^C<DRVMSK>,R4  ;MASK OUT UNNECESSARY BITS
 9819
 9820
 9821  046044  126504  000000                    CMPB    P.DRVN(R5),R4   ;CHECK IF DRIVE NUMBER IS EXPECTED
 9822  046050  001401                            BEQ     3$              ;YES, CONTINUE
 9823  046052  000000                            HALT                    ;NO, DRIVER ERROR
 9824  046054  122765  000164  000001  3$:     CMPB    #RDALHD,P.CMND(R5) ;CHECK IF READ ALL HEADERS
 9825  046062  001002                            BNE     10$             ;NO, EXECUTE NORMAL DATA TRANSFER
 9826  046064  000137  046422                    JMP     I.HDAL          ;GO EXECUTE SPECIAL HEADER SEQUENCE
 9827
 9828  046070  005037  003044          10$:     CLR     O.WAIT          ;CLEAR WAIT FOR COMMAND COMPLETION
 9829  046074  005037  003104                    CLR     W.DRV           ;CLEAR WATCH-DOG TIME
 9830  046100  105037  003070                    CLRB    W.TIME          ;RESET TIMING ON THIS DRIVE
 9831  046104  016237  000000  002770            MOV     RKCS1(R2),T.CS1 ;STORE COMMAND AND STATUS REGISTER 1
 9832  046112  032737  100000  002770            BIT     #CERR,T.CS1     ;CHECK IF CONTROLLER ERROR
 9833  046120  001021                            BNE     I.ERRC          ;YES, PROCESS ERROR
 9834  046122  016237  000016  003004            MOV     RKASOF(R2),T.ASOF ;STORE ATTENTION SUMMARY
 9835  046130  133737  003071  003005            BITB    INTMSK,T.ASOF+1 ;CHECK IF DRIVE ATTENTION SET
 9836  046136  001004                            BNE     15$             ;YES, REPORT ERROR
 9837  046140  004737  051006                    JSR     PC,R.NORM       ;INDICATE NORMAL RETURN
 9838  046144  000137  047772                    JMP     I.RTRN          ;RESTORE REGISTERS
 9839
 9840  046150  052765  000010  000014  15$:     BIS     #UEXATT,P.PRST(R5) ;SET UNEXPECTED ATTENTION
 9841
 9842  046156  004737  050442          I.ERRA:  JSR     PC,I.CSTS       ;STORE CONTROLLER STATUS
 9843  046162  000405                            BR      I.ERR           ;STORE PATTERN AND POSITION INFORMATION
 9844
 9845  046164  013765  002770  000016  I.ERRC:  MOV     T.CS1,P.CS1(R5) ;GET ERROR RKCS1
 9846  046172  004737  050464                    JSR     PC,I.CST1       ;GET REST OF CONTROLLER STATUS
 9847  046176  016265  000032  000062  I.ERR:   MOV     RKECPT(R2),P.EPAT(R5) ;STORE ECC PATTERN
 9848  046204  016265  000030  000060          MOV     RKECPS(R2),P.EPOS(R5) ;STORE ECC POSITION
 9849  046212  004037  050010                    JSR     R0,I.CCLR       ;CLEAR CONTROLLER
 9850  046216  047772                            I.RTRN                  ;ERROR RETURN
 9851  046220  032765  010400  000020            BIT     #NED!UFE,P.CS2(R5) ;CHECK IF IT WAS NON-EXISTENT DRIVE OR
 9852                                                                    ;  UNIT FIELD ERROR
 9853  046226  001046                            BNE     5$              ;YES, REPORT ERROR
 9854  046230  004037  050546                    JSR     R0,I.STAT       ;GATHER DRIVE STATUS
 9855  046234  047772                            I.RTRN                  ;ERROR RETURN
 9856  046236  112737  000005  002770            MOVB    #DR.CLR,T.CS1   ;LOAD COMMAND
 9857  046244  004037  050072                    JSR     R0,I.ISSU       ;ISSUE DRIVE CLEAR
 9858  046250  047772                            I.RTRN                  ;ERROR RETURN
 9859  046252  133737  003071  003005            BITB    INTMSK,T.ASOF+1 ;CHECK IF ATTENTION RESET
 9860  046260  001407                            BEQ     2$              ;NO, INDICATE DRIVE ERROR
 9861  046262  052737  000020  003042            BIS     #E.CLAT,E.CONT  ;SET ATTENTION DID NOT RESET
 9862                                                                    ;  WITH CLEAR
 9863  046270  004737  051020                    JSR     PC,R.CONT       ;REPORT CONTROLLER ERROR
 9864  046274  000137  047772                    JMP     I.RTRN          ;GO RESTORE REGISTERS
 9865
 9866  046300  032737  040000  003014  2$:      BIT     #S.DSC,T.MR2    ;CHECK IF DRIVE STATUS CHANGE CLEARED
 9867  046306  001403                            BEQ     3$              ;YES, CHECK FAULT
 9868  046310  052765  000040  000014            BIS     #DRVDSC,P.PRST(R5) ;SET DSC DID NOT CLEAR
 9869  046316  032737  001000  003016  3$:      BIT     #S.PAR,T.MR3    ;CHECK IF DRIVE PARITY ERROR
 9870  046324  001407                            BEQ     5$              ;NO, INDICATE ABNORMAL TERMINATION
 9871  046326  052737  002000  003042            BIS     #E.DPAR,E.CONT  ;SET DRIVE PARITY ERROR
 9872  046334  004737  051020                    JSR     PC,R.CONT       ;INDICATE CONTROLLER ERROR
 9873  046340  000137  047772                    JMP     I.RTRN          ;RETURN
```

```
9874
9875  046344  032765  000020  000014  5$:     BIT     #DRVHRD,P.PRST(R5) ;CHECK IF HARD DRIVE ERROR
9876  046352  001017                          BNE     10$                ;YES, GO REPORT ERROR
9877  046354  032737  020000  003014          BIT     #S.PIP,T.MR2       ;CHECK IF DRIVE IS CYCLING DOWN
9878  046362  001413                          BEQ     10$                ;NO, REPORT ERROR
9879  046364  052765  020000  000014          BIS     #E.UNLD,P.PRST(R5) ;SET DRIVE UNLOADING
9880  046372  113737  003071  003070          MOVB    INTMSK,W.TIME      ;SET UP 8 SECONDS FOR DRIVE TO CYCLE UP
9881  046400  013737  003054  003104          MOV     W.BSEC,W.DRV
9882  046406  000137  047772                  JMP     I.RTRN             ;GO RESTORE REGISTERS
9883
9884  046412  004737  050774          10$:    JSR     PC,R.ABNL          ;GO REPORT ERROR
9885  046416  000137  047772                  JMP     I.RTRN             ;GO RESTORE REGISTERS
9886
9887                                  .SBTTL   *READ ALL HEADERS INTERRUPT SEQUENCE
9888
9889  046422  016237  000000  002770  I.HDAL: MOV     RKCS1(R2),T.CS1 ;STORE CS1 TO CHECK CONTROLLER
9890                                                                  ;  ERROR
9891  046430  032737  100000  002770          BIT     #CERR,T.CS1        ;CHECK IF CONTROLLER ERROR
9892  046436  001422                          BEQ     5$                 ;NO, CHECK FOR ATTENTION
9893
9894  046440  005037  003044                  CLR     O.WAIT             ;CLEAR WAITING FOR COMMAND COMPLETE
9895  046444  105037  003070                  CLRB    W.TIME             ;RESET TIMING ON DRIVE
9896  046450  005037  003104                  CLR     W.DRV              ;CLEAR TIME OUT COUNT
9897  046454  013765  002770  000016          MOV     T.CS1,P.CS1(R5)    ;STORE ERROR RKCS1
9898  046462  004737  050464                  JSR     PC,I.CST1          ;STORE CONTROLLER REGISTERS
9899  046466  004037  050010                  JSR     R0,I.CCLR          ;CLEAR CONTROLLER
9900  046472  047772                          I.RTRN                     ;ERROR RETURN
9901  046474  004737  050774                  JSR     PC,R.ABNL          ;INDICATE ERROR RETURN
9902  046500  000137  047772                  JMP     I.RTRN             ;RESTORE REGISTERS
9903
9904  046504  016537  000016  003004  5$:     MOV     RKASOF(R5),T.ASOF ;STORE ATTENTION SUMMARY
9905  046512  133737  003071  003005          BITB    INTMSK,T.ASOF+1    ;CHECK IF DRIVE ATTENTION IS SET
9906  046520  001410                          BEQ     7$                 ;NO, CHECK IF READ ALL HEADERS
9907  046522  005037  003044                  CLR     O.WAIT             ;CLEAR WAITING FOR COMMAND COMPLETION
9908  046526  105037  003070                  CLRB    W.TIME             ;RESET TIMING ON DRIVE
9909  046532  005037  003104                  CLR     W.DRV              ;CLEAR TIME OUT COUNT
9910  046536  000137  046156                  JMP     I.ERRA             ;GO REPORT ERROR
9911
9912  046542  013701  003060          7$:     MOV     HDR.AD,R1          ;GET MAIN MEMORY ADDRESS
9913  046546  016221  000024                  MOV     RKDB(R2),(R1)+     ;GET FIRST WORD OF HEADER
9914  046552  016221  000024                  MOV     RKDB(R2),(R1)+     ;GET SECOND WORD OF HEADER
9915  046556  016221  000024                  MOV     RKDB(R2),(R1)+     ;GET THIRD WORD OF HEADER
9916  046562  010137  003060                  MOV     R1,HDR.AD          ;STORE ADDRESS FOR NEXT HEADER
9917  046566  016237  000010  002772          MOV     RKCS2(R2),T.CS2    ;STORE CS2 TO CHECK FOR DATA LATE
9918  046574  032737  100000  002772          BIT     #DLT,T.CS2         ;CHECK FOR DATA LATE
9919  046602  001055                          BNE     35$                ;YES, REPORT ERROR
9920  046604  005337  003062                  DEC     HDR.CT             ;DECREMENT NUMBER OF HEADER YET TO READ
9921  046610  001026                          BNE     25$                ;IF NON-ZERO, GO ISSUE NEXT READ HEADER
9922  046612  005037  003044                  CLR     O.WAIT             ;CLEAR DRIVER WAITING FOR COMMAND COMPLETION
9923  046616  005037  003104                  CLR     W.DRV              ;CLEAR TIME OUT COUNT FOR THIS DRIVE
9924  046622  105037  003070                  CLRB    W.TIME             ;CLEAR WATCH DOG TIME ON THIS DRIVE
9925  046626  012762  000003  000026          MOV     #3,RKMR1(R2)       ;LOAD MAINTENANCE REGISTER FOR SECTOR COUNT
9926  046634  112737  000001  002770          MOVB    #DR.SEL,T.CS1      ;LOAD SELECT COMMAND
9927  046642  004037  050072                  JSR     R0,I.ISSU          ;GET SECTOR COUNT
9928  046646  047772                          I.RTRN                     ;ERROR RETURN
9929  046650  013765  003016  000056          MOV     T.MR3,P.B11(R5)    ;LOAD SECTOR COUNT
```

```
9930  046656  004737  051006                    JSR     PC,R.NORM       ;INDICATE NORMAL TERMINATION
9931  046662  000137  047772                    JMP     I.RTRN          ;RESTORE REGISTERS
9932
9933  046666  016562  000002  000020  25$:      MOV     P.CYLN(R5),RKDCYL(R2) ;LOAD CYLINDER ADDRESS REGISTER
9934  046674  016562  000004  000006            MOV     P.SECT(R5),RKDA(R2) ;LOAD SECTOR AND TRACK
9935  046702  116565  000007  000017            MOVB    P.CS1H(R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
9936  046710  042765  165777  000016            BIC     #^C<CDT!CFMT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT FORMAT AND
9937                                                    ;  DRIVE TYPE
9938  046716  112765  000125  000016            MOVB    #RDHEAD,P.CS1(R5)  ;STORE COMMAND ISSUED
9939  046724  016562  000016  000000            MOV     P.CS1(R5),RKCS1(R2)  ;ISSUE READ HEADER
9940  046732  000137  047772                    JMP     I.RTRN          ;RESTORE REGISTERS
9941
9942  046736  052737  000400  003042  35$:      BIS     #E.DLT,E.CONT   ;SET DATA LATE WHILE UNLOADING HEADER
9943  046744  004737  051020                    JSR     PC,R.CONT       ;REPORT ERROR
9944  046750  000137  047772                    JMP     I.RTRN          ;RESTORE REGISTERS
9945
9946                                    .SBTTL  *DRIVE ATTENTION SCANNER
9947
9948  046754  016237  000000  002770  I.ATTN:   MOV     RKCS1(R2),T.CS1 ;STORE COMMAND AND STATUS
9949                                                    ;  REGISTER 1 FOR COMPARISON
9950  046762  032737  100000  002770            BIT     #CERR,T.CS1     ;CHECK IF CONTROLLER ERROR OCCURRED
9951  046770  001441                            BEQ     5$              ;NO, CHECK IF ATTENTION
9952
9953                                            ;CHECK IF ANY DATA TRANSFER TYPE ERROR EXISTS
9954  046772  032737  164000  002772            BIT     #DLT!WCE!UPE!NEM,T.CS2
9955
9956  047000  001007                            BNE     1$              ;INDICATE ERROR
9957  047002  016237  000014  003006            MOV     RKER(R2),T.ER   ;STORE ERROR REGISTER
9958
9959                                    ;       CHECK FOR DATA TRANSFER ERROR TYPE
9960  047010  032737  125700  003006            BIT     #DCK!OPI!WLE!COE!HVRC!BSE!ECH,T.ER
9961
9962  047016  001407                            BEQ     2$              ;NO DATA TRANSFER ERROR
9963
9964  047020  052737  000010  003042  1$:       BIS     #E.UDAT,E.CONT  ;SET UNEXPECTED DATA TYPE ERROR
9965  047026  004737  051020                    JSR     PC,R.CONT       ;REPORT ERROR
9966  047032  000137  047772                    JMP     I.RTRN          ;RESTORE REGISTERS
9967
9968  047036  013704  002772            2$:     MOV     T.CS2,R4        ;SAVE CS2 FOR REGISTER NUMBER
9969  047042  042704  177770                    BIC     #^C<DRVMSK>,R4  ;STRIP OFF JUNK
9970  047046  105037  003070                    CLRB    W.TIME          ;CLEAR WATCH DOG TIMER
9971  047052  005037  003104                    CLR     W.DRV           ;RESET TIMER VALUE
9972  047056  013705  003102                    MOV     PBLKT,R5        ;STORE PARAMETER BLOCK ADDRESS IN R5
9973
9974                                    ;       CLEAR DRIVE POSITIONING AND DRIVE POSITIONED FOR DATA TRANSFER
9975                                    ;         IN PROGRAM DEVICE STATUS REGISTER
9976  047062  042765  000006  000014            BIC     #DRVPOS!DRVPDT,P.PRST(R5)
9977
9978  047070  000137  046164                    JMP     I.ERRC          ;GO REPORT ERROR
9979
9980  047074  032737  040000  002770  5$:       BIT     #DI,T.CS1       ;CHECK IF ANY DRIVE ATTENTION
9981  047102  001002                            BNE     6$              ;YES, PROCESS INTERRUPT
9982  047104  000137  047772                    JMP     I.RTRN          ;RESTORE REGISTERS
9983
9984  047110  016237  000016  003004  6$:       MOV     RKASOF(R2),T.ASOF ;STORE ATTENTION SUMMARY
9985  047116  105737  003005                    TSTB    T.ASOF+1        ;CHECK IF ANY ATTENTIONS SET
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 9986  047122  001007                        BNE     7$                  ;YES GO PROCESS INTERRUPT
 9987  047124  052737  000002  003042        BIS     #E.NOAT,E.CONT      ;SET NO ATTENTION IN ATTENTION SUMMARY
 9988  047132  004737  051020                JSR     PC,R.CONT           ;GO REPORT ERROR
 9989  047136  000137  047772                JMP     I.RTRN              ;GO RESTORE REGISTERS
 9990
 9991  047142  133737  003071  003005  7$:   BITB    INTMSK,T.ASOF+1     ;CHECK IF DESIRED INTERRUPT
 9992  047150  001007                        BNE     8$                  ;YES, GO PROCESS IT
 9993  047152  052737  000004  003042        BIS     #E.UATT,E.CONT      ;SET UNSOLICATED ATTENTION
 9994  047160  004737  051020                JSR     PC,R.CONT           ;GO REPORT ERROR
 9995  047164  000137  047772                JMP     I.RTRN              ;GO RESTORE REGISTERS
 9996
 9997  047170  013705  003102          8$:   MOV     PBLKT,R5            ;STORE PARAMETER BLOCK TABLE
 9998  047174  116504  000000                MOVB    P.DRVN(R5),R4       ;STORE DRIVE NUMBER
 9999  047200  032765  020000  000014        BIT     #E.UNLD,P.PRST(R5)  ;CHECK IF DRIVE UNLOADING
10000  047206  001402                        BEQ     11$                 ;NO, CONTINUE
10001  047210  000137  047672                JMP     I.UNLD              ;SERVICE DRIVE IN POSITION AFTER ERROR
10002
10003  047214  042765  000002  000014  11$:   BIC     #DRVPOS,P.PRST(R5)  ;RESET DRIVE POSITIONING
10004  047222  005062  000026                CLR     RKMR1(R2)           ;CLEAR MAINTENANCE REGISTER 1
10005  047226  112737  000001  002770        MOVB    #DR.SEL,T.CS1       ;LOAD COMMAND
10006  047234  004037  050072                JSR     R0,I.ISSU           ;SELECT DRIVE WITH ATTENTION HIGH
10007  047240  047772                        I.RTRN                      ;ERROR RETURN
10008  047242  013765  003016  000042        MOV     T.MR3,P.B00(R5)     ;STORE STATUS BYTE 00 MESS B
10009  047250  032765  000200  000042        BIT     #S.FLT,P.B00(R5)    ;CHECK IF DRIVE FAULT
10010  047256  001401                        BEQ     12$                 ;NO, CHECK FOR DRIVE STATUS CHANGE
10011  047260  000461                        BR      I.AERR              ;PROCESS ERROR
10012
10013  047262  013765  003014  000040  12$:   MOV     T.MR2,P.A00(R5)     ;STORE MAINTENANCE REGISTER 2
10014  047270  032765  040000  000040        BIT     #S.DSC,P.A00(R5)    ;CHECK FOR DRIVE STATUS CHANGE
10015  047276  001004                        BNE     13$                 ;YES, PROCESS DRIVE STATUS CHANGE
10016  047300  052765  004000  000014        BIS     #NODSC,P.PRST(R5)   ;SET NO DRIVE STATUS CHANGE
10017  047306  000446                        BR      I.AERR              ;PROCESS ERROR
10018
10019  047310  112737  000005  002770  13$:   MOVB    #DR.CLR,T.CS1       ;LOAD COMMAND
10020  047316  004037  050072                JSR     R0,I.ISSU           ;CLEAR DRIVE STATUS CHANGE
10021  047322  047772                        I.RTRN                      ;ERROR RETUN
10022  047324  013765  003004  000032        MOV     T.ASOF,P.ASOF(R5)   ;STORE ATTENTION SUMMARY
10023  047332  133765  003071  000033        BITB    INTMSK,P.ASOF+1(R5) ;CHECK IF ATTENTION RESET
10024  047340  001407                        BEQ     15$                 ;YES, CONTINUE INTERRUPT PROCESSING
10025  047342  052737  000020  003042        BIS     #E.CLAT,E.CONT      ;SET ATTENTION DID NOT RESET
10026                                                                     ;  WITH DRIVE CLEAR
10027  047350  004737  051020                JSR     PC,R.CONT           ;FLAG ERROR
10028  047354  000137  047772                JMP     I.RTRN              ;RESTORE REGISTERS
10029
10030  047360  013765  003014  000040  15$:   MOV     T.MR2,P.A00(R5)     ;STORE MAINTENANCE REGISTER 2
10031  047366  032765  040000  000040        BIT     #S.DSC,P.A00(R5)    ;CHECK IF DRIVE STATUS CHANGE
10032                                                                     ;  RESET
10033  047374  001404                        BEQ     16$                 ;YES, CONTINUE INTERRUPT PROCESSING
10034  047376  052765  000040  000014        BIS     #DRVDSC,P.PRST(R5)  ;SET DRIVE STATUS CHANGE DID NOT CLEAR
10035  047404  000407                        BR      I.AERR              ;GO PROCESS ERROR
10036
10037  047406  105037  003070          16$:   CLRB    W.TIME              ;RESET TIMING ON THIS DRIVE
10038  047412  005037  003104                CLR     W.DRV               ;CLEAR DRIVE TIMING COUNT
10039  047416  004737  051006                JSR     PC,R.NORM           ;REPORT SUCCESSFUL COMMAND COMPLETETION
10040  047422  000563                        BR      I.RTRN              ;RESTORE REGISTERS
10041
```

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10042                                   .SBTTL   *ATTENTION ERROR HANDLER
10043
10044  047424  042765  000004  000014  I.AERR: BIC     #DRVPDT,P.PRST(R5) ;RESET POSITIONING IN PROGRESS BECAUSE
10045                                                                    ;  OF DATA TRANSFER
10046  047432  105037  003070                  CLRB    W.TIME             ;CLEAR TIMING FOR THIS DRIVE
10047  047436  005037  003104                  CLR     W.DRV              ;RESET WATCH-DOG TIME
10048  047442  042765  177741  000016          BIC     #177741,P.CS1(R5)  ;KEEP COMMAND ISSUED
10049  047450  042737  000036  002770          BIC     #36,T.CS1          ;KEEP CURRENT CONTROLLER STATUS
10050  047456  053765  002770  000016          BIS     T.CS1,P.CS1(R5)    ;MAKE GOOD MESSAGE
10051  047464  013765  002772  000020          MOV     T.CS2,P.CS2(R5)    ;STORE CONTROLLER REGISTERS
10052  047472  013765  002774  000022          MOV     T.WCR,P.WCR(R5)
10053  047500  013765  002776  000024          MOV     T.BA,P.BAR(R5)
10054  047506  013765  003000  000026          MOV     T.DA,P.DTS(R5)
10055  047514  013765  003002  000030          MOV     T.DC,P.DCYL(R5)
10056  047522  013765  003004  000032          MOV     T.ASOF,P.ASOF(R5)
10057  047530  013765  003006  000034          MOV     T.ER,P.ER(R5)
10058  047536  013765  003010  000036          MOV     T.DS,P.DS(R5)
10059  047544  004037  050546                  JSR     R0,I.STAT          ;GATHER DRIVE STATUS
10060  047550  047772                          I.RTRN                     ;ERROR RETURN
10061  047552  112737  000005  002770          MOVB    #DR.CLR,T.CS1      ;LOAD COMMAND
10062  047560  004037  050072                  JSR     R0,I.ISSU          ;CLEAR DRIVE ERRORS
10063  047564  047772                          I.RTRN                     ;ERROR RETURN
10064  047566  133737  003071  003005          BITB    INTMSK,T.ASOF+1    ;CHECK IF ATTENTION RESET
10065  047574  001407                          BEQ     2$                 ;YES, FLAG DRIVE ERROR
10066  047576  052737  000020  003042          BIS     #E.CLAT,E.CONT     ;SET ATTENTION DID NOT RESET
10067  047604  004737  051020                  JSR     PC,R.CONT          ;REPORT ERROR
10068  047610  000137  047772                  JMP     I.RTRN             ;RESTORE REGISTERS
10069
10070  047614  032765  000020  000014  2$:     BIT     #DRVHRD,P.PRST(R5) ;CHECK IF AHARD DRIVE ERROR
10071  047622  001017                          BNE     10$                ;YES, REPORT ERROR
10072  047624  032737  020000  003014          BIT     #S.PIP,T.MR2       ;CHECK IF DRIVE IS UNLOADING
10073  047632  001413                          BEQ     10$                ;NO, REPORT ERROR
10074  047634  052765  020000  000014          BIS     #E.UNLD,P.PRST(R5) ;SET DRIVE UNLOADING DUE TO ERROR
10075  047642  113737  003071  003070          MOVB    INTMSK,W.TIME      ;SET TIMING ON THIS DRIVE
10076  047650  013737  003054  003104          MOV     W.BSEC,W.DRV       ;LOAD 8 SECONDS FOR CYCLE UP TIME
10077  047656  000137  047772                  JMP     I.RTRN             ;RESTORE REGISTERS
10078
10079  047662  004737  050774          10$:    JSR     PC,R.ABNL          ;REPORT ERROR
10080  047666  000137  047772                  JMP     I.RTRN             ;RESTORE REGISTERS
10081
10082                                   .SBTTL   *ERROR CAUSING DRIVE TO UNLOAD
10083
10084  047672  052765  020000  000014  I.UNLD: BIS     #E.UNLD,P.PRST(R5) ;CLEAR DRIVE UNLOADING BECAUSE OF ERROR
10085  047700  112737  000005  002770          MOVB    #DR.CLR,T.CS1      ;LOAD IN DRIVE CLEAR
10086  047706  004037  050072                  JSR     R0,I.ISSU          ;GO ISSUE DRIVE CLEAR
10087  047712  047772                          I.RTRN                     ;ERROR RETURN
10088  047714  136437  003071  003005          BITB    INTMSK(R4),T.ASOF+1 ;CHECK IF ATTENTION CLEARED
10089  047722  001406                          BEQ     15$                ;YES, CONTINUE
10090  047724  012737  000020  003042          MOV     #E.CLAT,E.CONT     ;SET ATTENTION DID NOT RESET
10091  047732  004737  051020                  JSR     PC,R.CONT          ;REPORT ERROR
10092  047736  000415                          BR      I.RTRN             ;RESTORE REGISTERS
10093
10094  047740  032737  040000  003014  15$:     BIT     #S.DSC,T.MR2       ;CHECK IF DRIVE STAUS CHANGE RESET
10095  047746  001403                          BEQ     20$                ;YES, CONTINUE
10096  047750  052765  000040  000014          BIS     #DRVDSC,P.PRST(R5) ;SET DRIVE STAUS CHANGE DID NOT CLEAR
10097  047756  105037  003070          20$:     CLRB    W.TIME             ;RESET TIMING ON THIS DRIVE
```

```
10098  047762  005037  003104                  CLR     W.DRV           ;CLEAR TIME COUNT
10099  047766  004737  050774                  JSR     PC,R.ABNL       ;REPORT ERROR
10100
10101  047772  012600                I.RTRN:   MOV     (SP)+,R0        ;RESTORE R0
10102  047774  012601                          MOV     (SP)+,R1        ;RESTORE R1
10103  047776  012602                          MOV     (SP)+,R2        ;RESTORE R2
10104  050000  012603                          MOV     (SP)+,R3        ;RESTORE R3
10105  050002  012604                          MOV     (SP)+,R4        ;RESTORE R4
10106  050004  012605                          MOV     (SP)+,R5        ;RESTORE R5
10107  050006  000002                          RTI                     ;RETURN
10108
```

```
                                .SBTTL   *CONTROLLER CLEAR ROUTINE

                                ;;*****************************************************************
                                ;*
                                ;*      THIS ROUTINE WILL BE USED BY THE DRIVER TO CLEAR THE CONTROLLER
                                ;*      AND CHECK IF THE CONTROLLER ERRORS ARE RESET.  IF THE ERROR IS NOT
                                ;*      CLEARED, THE ROUTINE AS SPECIFIED IN A.CONT WILL BE CALLED WITH
                                ;*      E.CCLR SET IN E.CONT.
                                ;*
                                ;*      REGISTER        USE
                                ;*      --------        ---
                                ;*
                                ;*      R2              ADDRESS OF RK06 REGISTERS
                                ;*      R5              ADDRESS OF PARAMETER BLOCK
                                ;*
                                ;*CALL  JSR     R0,I.CCLR
                                ;*      <ADDRESS OF ERROR RETURN>
                                ;*      RETURN
                                ;*
                                ;;*****************************************************************

050010  012762  100000  000000  I.CCLR: MOV     #CCLR,RKCS1(R2) ;CLEAR CONTROLLER
050016  016237  000000  002770          MOV     RKCS1(R2),T.CS1 ;STORE COMMAND AND STATUS REGISTER 1
050024  032737  100000  002770          BIT     #CERR,T.CS1     ;CHECK IF CONTROLLER CLEAR DID
                                                                ;  CLEAR ERROR
050032  001407                          BEQ     5$              ;YES, RETURN TO DRIVER PROCESSING
050034  052737  000001  003042          BIS     #E.CCLR,E.CONT  ;SET CLEAR CONTROLLER DID NOT CLEAR ERROR
050042  004737  051020                  JSR     PC,R.CONT       ;REPORT CONTROLLER ERROR
050046  011000                          MOV     (R0),R0         ;SET UP ERROR RETURN
050050  000200                          RTS     R0              ;RETURN

050052  012762  000100  000000  5$:     MOV     #IE,RKCS1(R2)   ;SET INTERRUPT ENABLE
050060  112737  177777  003064          MOVB    #-1,I.ISRL      ;SET INTERRUPT ENABLE ISSUED
050066  005720                          TST     (R0)+           ;ADJUST FOR NORMAL RETURN
050070  000200                          RTS     R0              ;RETURN
```

```
                                .SBTTL   *COMMAND ISSUED BY DRIVER SERVICE ROUTINE

                                ;;*****************************************************************
                                ;;*
                                ;;*      THIS ROUTINE WILL ISSUE THE COMMAND AS SPECIFIED IN T.CS1
                                ;;*      AND CHECK IF A CONTROLLER ERROR OCCURRED.  IF A CONTROLLER
                                ;;*      ERROR OCCURRED, E.CERR WILL BE SET IN E.CONT AND
                                ;;*      CONTROL WILL BE TURN OVER TO THE ROUTINE SPECIFIED BY THE
                                ;;*      ADDRESS IN A.CONT.
                                ;;*
                                ;;*      REGISTER        USE
                                ;;*      --------        ---
                                ;;*
                                ;;*      R2              ADDDRESS OF RK06 REGISTERS
                                ;;*      R5              ADDRESS OF PARAMETER BLOCK
                                ;;*
                                ;;*CALL  JSR     R0,I.ISSU
                                ;;*      <ADDRESS OF ERROR RETURN>
                                ;;*      RETURN
                                ;;*
                                ;;*      ROUTINES USED:
                                ;;*      --------------
                                ;;*
                                ;;*              I.CCLR
                                ;;*              I.STOR
                                ;;*
                                ;;*****************************************************************

050072  013746  002770        I.ISSU: MOV     T.CS1,-(SP)     ;STORE COMMAND ISSUED
050076  005037  002772                CLR     T.CS2           ;CLEAR TEMPORARY CS2
050102  116537  000000  002772        MOVB    P.DRVN(R5),T.CS2 ;LOAD IN DRIVE NUMBER
050110  013762  002772  000010        MOV     T.CS2,RKCS2(R2) ;LOAD DRIVE NUMBER FOR COMMAND
050116  116537  000007  002771        MOVB    P.CS1H(R5),T.CS1+1 ;STORE BITS 8-15 OF CS1
050124  142737  177753  002771        BICB    #^C<B.CDT!B.CFMT>,T.CS1+1 ;CLEAR ALL BITS EXCEPT
                                                                ;  FORMAT AND DRIVE TYPE
050132  013762  002770  000000        MOV     T.CS1,RKCS1(R2) ;ISSUE COMMAND
050140  105762  000000        1$:     TSTB    RKCS1(R2)       ;WAIT FOR READY
050144  100375                        BPL     1$
050146  004737  050314                JSR     PC,I.STOR       ;GO STORE REGISTERS
050152  032737  100000  002770        BIT     #CERR,T.CS1     ;CHECK IF CONTROLLER ERROR OCCUERED
050160  001437                        BEQ     5$              ;NO, RETURN
050162  032737  001000  002772        BIT     #MDS,T.CS2      ;CHECK IF MULTIPLE DRIVE SELECT
050170  001406                        BEQ     2$              ;NO, CHECK FOR OTHER CONTROLLER ERRORS
050172  052737  100000  003042        BIS     #E.MDS,E.CONT   ;SET MULTIPLE DRIVE SELECT FLAG
050200  004737  051020                JSR     PC,R.CONT       ;REPORT CONTROLLER ERROR
050204  000440                        BR      10$             ;RETURN

                                ;CHECK IF ANY CONTROLLER ERROR IS SET
050206  032737  024000  002770  2$:   BIT     #CTO!SPAR,T.CS1
050214  001027                        BNE     7$
050216  032737  176400  002772        BIT     #UFE!PGE!NEM!NED!UPE!WCE!DLT,T.CS2
050224  001023                        BNE     7$
050226  032737  131761  003006        BIT     #ILC!DTYE!FMTE!ECH!BSE!HVRC!COE!DTE!OPI!DCK,T.ER
050234  001017                        BNE     7$

050236  122716  000005                CMPB    #DR.CLR,(SP)    ;CHECK IF CLEAR DRIVE
```

```
10200  050242  001003                        BNE     3$                ;NO, DO NOT SET DRIVE HARD ERROR
10201  050244  052765  000020  000014        BIS     #DRVHRD,P.PRST(R5) ;SET HARD DRIVE ERROR
10202  050252  004037  050010          3$:   JSR     R0,I.CCLR         ;GO ISSUE A CONTROLLER CLEAR
10203  050256  050306                        10$                       ;ERROR RETURN
10204  050260  012762  000100  000000  5$:   MOV     #IE,RKCS1(R2)     ;SET INTERRUPT ENABLE
10205  050266  005726                        TST     (SP)+             ;ADJUST STACK
10206  050270  005720                        TST     (R0)+             ;ADJUST R0 FOR NORMAL RETURN
10207  050272  000200                        RTS     R0                ;RETURN
10208
10209  050274  052737  001000  003042  7$:   BIS     #E.CERR,E.CONT    ;SET CONTROLLER ERROR DURING
10210                                                                  ;  DRIVER SERVICING
10211  050302  004737  051020                JSR     PC,R.CONT         ;REPORT ERROR
10212  050306  005726                  10$:  TST     (SP)+             ;ADJUST STACK
10213  050310  011000                        MOV     (R0),R0           ;ADJUST R0 FOR ERROR RETURN
10214  050312  000200                        RTS     R0                ;RETURN
```

```
10215                                   .SBTTL   *STORE RK611 UNIBUS REGISTERS
10216
10217                                   ;;*****************************************************************
10218                                   ;*
10219                                   ;*      THIS SUBROUTINE IS CALLED BY THE RK06 DRIVER TO STORE ALL
10220                                   ;*      RK611 REGISTER IN TEMPORARY LOCATIONS.
10221                                   ;*
10222                                   ;*CALL  JSR     PC,I.STOR
10223                                   ;*      RETURN
10224                                   ;*
10225                                   ;*      REGISTER        USE
10226                                   ;*      --------        ---
10227                                   ;*
10228                                   ;*      R2              ADDRESS OF RK611 REGISTERS
10229                                   ;*
10230                                   ;;*****************************************************************
10231
10232  050314  016237  000000  002770  I.STOR: MOV     RKCS1(R2),T.CS1 ;STORE ALL CONTROLLER REGISTERS
10233  050322  016237  000010  002772          MOV     RKCS2(R2),T.CS2 ;  EXCEPT DATA BUFFER
10234  050330  016237  000002  002774          MOV     RKWC(R2),T.WCR
10235  050336  016237  000004  002776          MOV     RKBA(R2),T.BA
10236  050344  016237  000006  003000          MOV     RKDA(R2),T.DA
10237  050352  016237  000012  003010          MOV     RKDS(R2),T.DS
10238  050360  016237  000014  003006          MOV     RKER(R2),T.ER
10239  050366  016237  000016  003004          MOV     RKASOF(R2),T.ASOF
10240  050374  016237  000020  003002          MOV     RKDCYL(R2),T.DC
10241  050402  016237  000026  003012          MOV     RKMR1(R2),T.MR1
10242  050410  016237  000034  003014          MOV     RKMR2(R2),T.MR2
10243  050416  016237  000036  003016          MOV     RKMR3(R2),T.MR3
10244  050424  016237  000030  003020          MOV     RKECPS(R2),T.POS
10245  050432  016237  000032  003022          MOV     RKECPT(R2),T.PAT
10246  050440  000207                          RTS     PC                      ;RETURN
```

```
                                .SBTTL   *STORE CONTROLLER STATUS

                                ;;*****************************************************************
                                ;*
                                ;*      THIS SUBROUTINE IS CALLED BY THE RK06 DRIVER AT PRIORITY 7.
                                ;*      THE FOLLOWING REGISTERS WILL BE STORED:
                                ;*
                                ;*              COMMAND AND STATUS REGISTER 2
                                ;*              WORD COUNT REGISTER
                                ;*              BUS ADDRESS REGISTER
                                ;*              DESIRED TRACK AND SECTOR
                                ;*              STATUS REGISTER
                                ;*              ERROR REGISTER
                                ;*              ATTENTION SUMMARY/OFFSET REGISTER
                                ;*              CYLINDER ADDRESS REGISTER
                                ;*
                                ;*CALL  JSR     PC,I.CSTS
                                ;*      RETURN
                                ;*
                                ;*      THIS ROUTINE ASSUMES THE FOLLOWING REGISTERS CONTAIN:
                                ;*
                                ;*              REGISTER                CONTENTS
                                ;*              --------                --------
                                ;*
                                ;*              R2                      RK06 BASE ADDRESS
                                ;*              R5                      ADDRESS OF PARAMETER BLOCK
                                ;*
                                ;;*****************************************************************

050442  042765  177741  000016  I.CSTS: BIC     #177741,P.CS1(R5)       ;CLEAR ALL BITS EXCEPT FUNCTION
                                                                        ;OF LAST COMMAND ISSUED
050450  042737  000036  002770          BIC     #36,T.CS1               ;CLEAR FUNCTION OF CS1 STATUS
050456  053765  002770  000016          BIS     T.CS1,P.CS1(R5)         ;GENERATE CS1 STATUS INFORMATION
050464  016265  000010  000020  I.CST1: MOV     RKCS2(R2),P.CS2(R5)     ;STORE COMMAND AND STATUS REGISTER 2
050472  016265  000002  000022          MOV     RKWC(R2),P.WCR(R5)      ;STORE WORD COUNT REGISTER
050500  016265  000004  000024          MOV     RKBA(R2),P.BAR(R5)      ;STORE BUS ADDRESS REGISTER
050506  016265  000006  000026          MOV     RKDA(R2),P.DTS(R5)      ;STORE DESIRED TRACK AND SECTOR
050514  016265  000012  000036          MOV     RKDS(R2),P.DS(R5)       ;STORE DRIVE STATUS REGISTER
050522  016265  000014  000034          MOV     RKER(R2),P.ER(R5)       ;STORE ERROR REGISTER
050530  016265  000016  000032          MOV     RKASOF(R2),P.ASOF(R5)   ;STORE ATTENTION SUMMARY AND
                                                                        ;  OFFSET
050536  016265  000020  000030          MOV     RKDCYL(R2),P.DCYL(R5)   ;STORE CYLINDER ADDRESS
050544  000207                          RTS     PC                      ;RETURN
```

```
10292                                   .SBTTL   *GATHER DRIVE STATUS
10293
10294                                   ;;*****************************************************************
10295                                   ;*
10296                                   ;*      THIS SUBROUTINE WILL BE USED TO GATHER DRIVE STATUS
10297                                   ;*      BYTE 01, 10, AND 11. IT IS ASSUMED THAT THE DRIVE
10298                                   ;*      HAS PREVIOUSLY BEEN SEIZED.  IT RUNS AT PRIORITY 7.
10299                                   ;*
10300                                   ;*CALL  JSR     R0,I.STAT
10301                                   ;*      <ADDRESS OF ERROR RETURN>
10302                                   ;*      RETURN
10303                                   ;*
10304                                   ;*      THIS ROUTINE ASSUMES THE FOLLOWING REGISTERS CONTAIN:
10305                                   ;*
10306                                   ;*
10307                                   ;*              REGISTER                CONTENTS
10308                                   ;*              --------                --------
10309                                   ;*
10310                                   ;*              R2                      RK06 BASE ADDRESS
10311                                   ;*              R5                      ADDRESS OF PARAMETER BLOCK
10312                                   ;*
10313                                   ;*      ROUTINES USED:
10314                                   ;*              I.ISSU
10315                                   ;*
10316                                   ;;*****************************************************************
10317
10318  050546  012762  000001  000026  I.STAT: MOV     #1,RKMR1(R2)            ;LOAD MAINTENANCE REGISTER 1
10319                                                                          ;  FOR STATUS BYTE 01
10320  050554  112737  000001  002770          MOVB    #DR.SEL,T.CS1           ;LOAD COMMAND
10321  050562  004037  050072                  JSR     R0,I.ISSU               ;GET STATUS BYTES 01
10322  050566  050756                          3$                              ;ERROR RETURN
10323  050570  013765  003014  000044          MOV     T.MR2,P.A01(R5)         ;STORE STATUS BYTE 01 MESS A
10324  050576  013765  003016  000046          MOV     T.MR3,P.B01(R5)         ;STORE STATUS BYTE 01 MESS B
10325  050604  012762  000002  000026          MOV     #2,RKMR1(R2)            ;LOAD MAINTENANCE REGISTER 1
10326                                                                          ;  FOR STATUS BYTE 10
10327  050612  112737  000001  002770          MOVB    #DR.SEL,T.CS1           ;LOAD COMMAND
10328  050620  004037  050072                  JSR     R0,I.ISSU               ;GET STATUS BYTES 10
10329  050624  050756                          3$                              ;ERROR RETURN
10330  050626  013765  003014  000050          MOV     T.MR2,P.A10(R5)         ;STORE STATUS BYTE 10 MESS A
10331  050634  013765  003016  000052          MOV     T.MR3,P.B10(R5)         ;STORE STATUS BYTE 10 MESS B
10332  050642  012762  000003  000026          MOV     #3,RKMR1(R2)            ;LOAD MAINTENANCE REGISTER
10333                                                                          ;  FOR STATUS BYTE 11
10334  050650  112737  000001  002770          MOVB    #DR.SEL,T.CS1           ;LOAD COMMAND
10335  050656  004037  050072                  JSR     R0,I.ISSU               ;GET STATUS BYTES 11
10336  050662  050756                          3$                              ;ERROR RETURN
10337  050664  013765  003014  000054          MOV     T.MR2,P.A11(R5)         ;STORE STATUS BYTE 11 MESS A
10338  050672  013765  003016  000056          MOV     T.MR3,P.B11(R5)         ;STORE STATUS BYTE 11 MESS B
10339  050700  005062  000026                  CLR     RKMR1(R2)               ;LOAD MAINTENANCE REGISTER 1
10340                                                                          ;  FOR STATUS BYTE 00
10341  050704  112737  000001  002770          MOVB    #DR.SEL,T.CS1           ;LOAD COMMAND
10342  050712  004037  050072                  JSR     R0,I.ISSU               ;GET STATUS BYTES 00
10343  050716  050756                          3$                              ;ERROR RETURN
10344  050720  013765  003014  000040          MOV     T.MR2,P.A00(R5)         ;STORE STATUS BYTE 00 MESS A
10345  050726  013765  003016  000042          MOV     T.MR3,P.B00(R5)         ;STORE STATUS BYTE 00 MESS B
10346  050734  032737  001000  003016          BIT     #S.PAR,T.MR3            ;CHECK IF BAD PARITY DETECTED BY DRIVE
10347  050742  001407                          BEQ     5$                      ;NO, RETURN NORMALLY
```

```
10348  050744  052737  002000  003042          BIS     #E.DPAR,E.CONT          ;INDICATE BAD PARITY DETECTED BY DRIVE
10349  050752  004737  051020                  JSR     PC,R.CONT               ;REPORT ERROR
10350  050756  011000                  3$:     MOV     (R0),R0                 ;LOAD R0 FOR ERROR RETURN
10351  050760  000200                          RTS     R0                      ;RETURN
10352
10353  050762  052765  001000  000014  5$:     BIS     #PBSVAL,P.PRST(R5)      ;SET PARAMETER BLOCK STATUS VALID
10354  050770  005720                          TST     (R0)+                   ;ADJUST R0 FOR NORMAL RETURN
10355  050772  000200                          RTS     R0                      ;RETURN
10356
```

```
10357                                           .SBTTL   *COMMON DRIVER RETURNS
10358
10359  050774  105037  003071          R.ABNL: CLRB    INTMSK          ;INHIBIT FUTURE DRIVE INTERRUPT REPORTING
10360  051000  004777  132032                  JSR     PC,@A.ABNL      ;INDICATE ABNORMAL RETURN
10361  051004  000207                          RTS     PC              ;RETURN
10362
10363  051006  105037  003071          R.NORM: CLRB    INTMSK          ;INHIBIT FUTURE DRIVE INTERRUPT REPORTING
10364  051012  004777  132016                  JSR     PC,@A.NORM      ;INDICATE NORMAL RETURN
10365  051016  000207                          RTS     PC              ;RETURN
10366
10367  051020  105037  003071          R.CONT: CLRB    INTMSK          ;INHIBIT FUTURE DRIVE INTERRUPT REPORTING
10368  051024  105037  003070                  CLRB    W.TIME          ;RESET WATCH DOG TIMING ON THIS DRIVE
10369  051030  005037  003104                  CLR     W.DRV           ;CLEAR TIMING COUNT FOR THIS DRIVE
10370  051034  004777  132000                  JSR     PC,@A.CONT      ;INDICATE CONTROLLER ERROR RETURN
10371  051040  000207                          RTS     PC              ;RETURN
```

```
                        .SBTTL   *COMMAND INITATOR

                        ;;*****************************************************************
                        ;*
                        ;*      THIS SUBROUTINE WILL INITIATE ALL COMMANDS AS SPECIFIED
                        ;*      BY THE COMMAND FIELD OF THE PARAMETER BLOCK. THE FOLLOWING
                        ;*      SPECIAL COMMAND ARE ALSO EXECUTED:
                        ;*
                        ;*              RELEASE
                        ;*              CONROLLER CLEAR
                        ;*              SUBSYSTEM CLEAR
                        ;*              READ ALL DRIVE STATUS
                        ;*              READ SPECIFIED HEADER
                        ;*
                        ;*      THE ABOVE COMMANDS ARE TRANSLATED INTO A SEQUENCE OF COMMANDS
                        ;*
                        ;*CALL  JSR     PC,C.INIT
                        ;*      <ADDRESS OF PARAMETER BLOCK>
                        ;*      RETURN
                        ;*
                        ;*      FOR THE SEQUENTIAL OPERATIONS, THE DRIVER WILL LOAD THE
                        ;*      LOCATIONS, PBLKT AND INTMSK.
                        ;*
                        ;*      ROUTINES USED:
                        ;*              W.WTCH
                        ;*              T.CSTS
                        ;*              I.STAT
                        ;*              I.CCLR
                        ;*
                        ;;*****************************************************************

051042  010546                C.INIT: MOV     R5,-(SP)        ;STORE R5 ON STACK
051044  010446                        MOV     R4,-(SP)        ;STORE R4 ON STACK
051046  010346                        MOV     R3,-(SP)        ;STORE R3 ON STACK
051050  010246                        MOV     R2,-(SP)        ;STORE R2 ON STACK
051052  010146                        MOV     R1,-(SP)        ;STORE R1 ON STACK
051054  010046                        MOV     R0,-(SP)        ;STORE R0 ON STACK
051056  013746  177776              MOV     PS,-(SP)        ;STORE PSW ON STACK
051062  013737  003032  177776        MOV     RKPRI,PS        ;LOCK OUT RK06 INTERRUPTS
051070  017605  000016              MOV     @16(SP),R5      ;STORE PARAMETER BLOCK ADDRESS
051074  062766  000002  000016        ADD     #2,16(SP)       ;ADJUST RETURN
051102  016504  000000              MOV     P.DRVN(R5),R4   ;STORE DRIVE NUMBER
051106  042704  177770              BIC     #^C<DRVMSK>,R4  ;MASK OUT JUNK
051112  010537  003102              MOV     R5,PBLKT        ;LOAD PARAMETER BLOCK TABLE
051116  116437  003072  003071        MOVB    I.DRV(R4),INTMSK ;LOAD INTERRUPT MASK
051124  116437  003072  003070        MOVB    I.DRV(R4),W.TIME ;SET WATCH-DOG TIMER FLAG
051132  013737  003052  003104        MOV     W.SEC,W.DRV     ;LOAD WATCH-DOG TIME

051140  013702  003026              MOV     RKBAS,R2        ;LOAD R2 WITH RK06 ADDRESS BASE

                        ;       RESET ALL BITS IN PROGRAM DEVICE STATUS REGISTER EXCEPT
                        ;               DRIVE IN USE
                        ;               WRITE FOR WRITE CHECK
                        ;               NO CHECK
                        ;               DROP DRIVE FROM TEST SEQUENCE
                        ;               INHIBIT BUS ADDRESS INCREMENT
```

```
10428  051144  042765  075176  000014          BIC     #^C<DRVUSE!W.WCK!NOCHK!DRPDRV!DTBAII>,P.PRST(R5)
10429
10430  051152  010500                          MOV     R5,R0           ;STORE PARAMETER BLOCK ADDRESS
10431  051154  062700  000016                  ADD     #P.CS1,R0       ;CALCULATE FIRST LOCATION TO BE CLEARED
10432  051160  010501                          MOV     R5,R1           ;STORE PARAMETER BLOCK ADDRESS
10433  051162  062701  000062                  ADD     #P.EPAT,R1      ;CALCULATE LAST LOCATION TO BE CLEARED
10434
10435  051166  005020                  1$:     CLR     (R0)+           ;CLEAR RETURN PARAMETER
10436  051170  020001                          CMP     R0,R1           ;CHECK IF FINISHED
10437  051172  101775                          BLOS    1$              ;NO, CLEAR NEXT RETURN PARAMETER
10438  051174  105037  003064                  CLRB    I.ISRL          ;CLEAR RELEASE OR INTERRUPT ISSUED
10439  051200  010465  000020                  MOV     R4,P.CS2(R5)    ;STORE DRIVE NUMBER
10440  051204  005062  000026                  CLR     RKMR1(R2)       ;CLEAR RK06 MAINTENANCE REGISTER 1
10441  051210  132765  000040  000001          BITB    #BIT5,P.CMND(R5) ;CHECK IF SPECIAL COMMAND
10442  051216  001402                          BEQ     3$              ;NO, PROCESS
10443  051220  000137  051734                  JMP     C.SPEC          ;JUMP TO SPECIAL COMMAND PROCESSOR
10444
10445  051224  122765  000107  000001  3$:     CMPB    #UNLOAD,P.CMND(R5) ;CHECK IF POSITIONING COMMAND
10446                                                                  ;  START SPINDLE
10447                                                                  ;  RECALIBRATE
10448                                                                  ;  OFFSET
10449                                                                  ;  SEEK
10450                                                                  ;  UNLOAD
10451
10452  051232  101174                          BHI     25$             ;NO, DRIVE COMMAND
10453                                                                  ;  SELECT DRIVE
10454                                                                  ;  PACK ACKNOWLEDGE
10455                                                                  ;  CLEAR
10456
10457  051234  122765  000117  000001          CMPB    #SEEK,P.CMND(R5) ;CHECK IF DATA TRANSFER
10458  051242  103540                          BLO     20$             ;YES, DATA TRANSFER COMMAND
10459                                                                  ;  READ DATA
10460                                                                  ;  WRITE DATA
10461                                                                  ;  READ HEADER
10462                                                                  ;  WRITE HEADER
10463                                                                  ;  WRITE CHECK
10464  051244  016562  000020  000010          MOV     P.CS2(R5),RKCS2(R2) ;LOAD DRIVE NUMBER
10465  051252  052765  000002  000014          BIS     #DRVPOS,P.PRST(R5) ;SET DRIVE POSITIONING
10466  051260  005037  003044                  CLR     @.WAIT          ;CLEAR WAIT FOR COMMAND
10467  051264  122765  000117  000001          CMPB    #SEEK,P.CMND(R5) ;CHECK IF SEEK
10468  051272  001007                          BNE     5$              ;NO, CHECK FOR OFFSET
10469  051274  016562  000002  000020          MOV     P.CYLN(R5),RKDCYL(R2) ;LOAD CYLINDER ADDRESS
10470  051302  016562  000004  000006          MOV     P.SECT(R5),RKDA(R2) ;LOAD SECTOR AND TRACK
10471  051310  000431                          BR      8$              ;GO ISSUE COMMAND
10472
10473  051312  122765  000115  000001  5$:     CMPB    #OFFSET,P.CMND(R5) ;CHECK IF OFFSET
10474  051320  001007                          BNE     6$              ;NO, CHECK FOR UNLOAD
10475  051322  116565  000006  000032          MOVB    P.OFST(R5),P.ASOF(R5) ;STORE OFFSET
10476  051330  016562  000032  000016          MOV     P.ASOF(R5),RKASOF(R2) ;LOAD OFFSET REGISTER
10477  051336  000416                          BR      8$              ;GO ISSUE COMMAND
10478
10479  051340  122765  000111  000001  6$:     CMPB    #SRTSPL,P.CMND(R5) ;CHECK IF START SPINDLE
10480  051346  001003                          BNE     7$              ;NO, CHECK IF RECAL
10481  051350  013737  003056  003104          MOV     W.MIN,W.DRV     ;LOAD WATCH DOG TIME FOR 1 MINUTE
10482  051356  122765  000113  000001  7$:     CMPB    #RECAL,P.CMND(R5) ;CHECK IF RECAL
10483  051364  001003                          BNE     8$              ;NO, CONTINUE
```

```
10484  051366  013737  003054  003104          MOV     W.8SEC,W.DRV     ;LOAD RECAL TIME FOR 8 SECONDS
10485  051374  116565  000007  000017  8$:     MOVB    P.CS1H(R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
10486  051402  042765  165777  000016          BIC     #^C<CFMT!CDT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT FORMAT
10487                                                                  ;  AND DRIVE TYPE
10488  051410  116565  000001  000016          MOVB    P.CMND(R5),P.CS1(R5) ;MOVE COMMAND INTO CS1
10489  051416  042765  000200  000014          BIC     #W.WCK,P.PRST(R5) ;RESET WRITE FOR WRITE CHECK
10490  051424  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IN NO CHECK MODE
10491  051432  001533                          BEQ     30$              ;NO, SKIP CLEAR OF INTERRUPT ENABLE
10492  051434  042765  000100  000016          BIC     #IE,P.CS1(R5)    ;CLEAR INTERRUPT ENABLE
10493  051442  016562  000016  000000          MOV     P.CS1(R5),RKCS1(R2) ;ISSUE COMMAND
10494  051450  004737  045412          10$:    JSR     PC,W.WTCH        ;CALL WATCH DOG TIMER
10495  051454  016237  000000  002770          MOV     RKCS1(R2),T.CS1  ;STORE COMMAND AND STATUS REGISTER 1
10496  051462  032737  000200  002770          BIT     #RDY,T.CS1       ;WAIT FOR READY
10497  051470  001767                          BEQ     10$
10498  051472  032737  100000  002770          BIT     #CERR,T.CS1      ;CHECK FOR ERROR
10499  051500  001011                          BNE     15$              ;YES, GIVE NORMAL RETURN
10500  051502  004737  045412          11$:    JSR     PC,W.WTCH        ;CALL WATCH DOG TIMER
10501  051506  016237  000016  003004          MOV     RKASOF(R2),T.ASOF ;STORE ATTENTION SUMMARY
10502  051514  133737  003071  003005          BITB    INTMSK,T.ASOF+1  ;CHECK IF INTERRUPT HAS OCCURRED
10503  051522  001767                          BEQ     11$              ;WAIT FOR DRIVE INTERRUPT
10504  051524  105037  003070          15$:    CLRB    W.TIME           ;RESET TIMING ON THIS DRIVE
10505  051530  005037  003104                  CLR     W.DRV            ;CLEAR DRIVE TIMING COUNT
10506  051534  004737  051006                  JSR     PC,R.NORM        ;INDICATE COMMAND IS FINISHED
10507  051540  000137  052714                  JMP     C.RTRN           ;RESTORE REGISTERS
10508
10509  051544  016562  000010  000004  20$:     MOV     P.BALO(R5),RKBA(R2) ;LOAD BUS ADDRESS REGISTER
10510  051552  016562  000012  000002          MOV     P.WC(R5),RKWC(R2) ;LOAD WORD COUNT REGISTER
10511  051560  016562  000002  000020          MOV     P.CYLN(R5),RKDCYL(R2) ;LOAD CYLINDER ADDRESS REGISTER
10512  051566  016562  000004  000006          MOV     P.SECT(R5),RKDA(R2) ;LOAD SECTOR AND TRACK NUMBER
10513  051574  122765  000131  000001          CMPB    #WRTCHK,P.CMND(R5)  ;CHECK IF WRITE CHECK COMMAND
10514  051602  001010                          BNE     25$              ;NO, GO ISSUE THE COMMAND
10515  051604  032765  000200  000014          BIT     #W.WCK,P.PRST(R5)   ;CHECK IF WRITE COMMAND SHOULD BE ISSUED
10516  051612  001404                          BEQ     25$              ;NO, GO ISSUE THE COMMAND
10517  051614  012765  000123  000016          MOV     #WRDATA,P.CS1(R5)   ;ISSUE WRITE COMMAND
10518  051622  000406                          BR      26$              ;GO ISSUE COMMAND
10519
10520  051624  116565  000001  000016  25$:     MOVB    P.CMND(R5),P.CS1(R5) ;MOVE COMMAND INTO CS1
10521  051632  042765  000200  000014          BIC     #W.WCK,P.PRST(R5) ;RESET WRITE FOR WRITE CHECK
10522  051640  116565  000007  000017  26$:     MOVB    P.CS1H(R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
10523  051646  142765  177750  000017          BICB    #^C<B.CFMT!B.CDT!B.BA16!B.BA17>,P.CS1+1(R5) ;CLEAR ALL BITS EXCEPT
10524                                                                  ;  FORMAT, DRIVE TYPE, AND BUS ADDRESS
10525                                                                  ;  BITS 16-17
10526  051654  010537  003044                  MOV     R5,O.WAIT        ;LOAD WAITING FOR COMMAND
10527  051660  032765  100000  000014          BIT     #DTBAII,P.PRST(R5) ;CHECK IF INHIBIT BUS ADDRESS INCREMENT
10528  051666  001403                          BEQ     27$              ;NO, LOAD CS2
10529  051670  052765  000020  000020          BIS     #BAI,P.CS2(R5)   ;SET INHIBIT BUS ADDRESS INCREMENT
10530  051676  016562  000020  000010  27$:     MOV     P.CS2(R5),RKCS2(R2) ;LOAD CS2
10531  051704  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IN NO CHECK MODE
10532  051712  001403                          BEQ     30$              ;NO, SKIP CLEAR OF INTERRUPT ENABLE
10533  051714  042765  000100  000016          BIC     #IE,P.CS1(R5)    ;CLEAR INTERRUPT ENABLE
10534  051722  016562  000016  000000  30$:     MOV     P.CS1(R5),RKCS1(R2) ;ISSUE COMMAND
10535  051730  000137  052714                  JMP     C.RTRN           ;RESTORE REGISTERS
10536
10537                                  .SBTTL   *SPECIAL COMMAND PROCESSING
10538
10539  051734  122765  000141  000001  C.SPEC: CMPB    #RDSTAT,P.CMND(R5) ;CHECK IF READ DRIVE STATUS
```

```
10540  051742  001132                          BNE     10$             ;NO, PROCESS OTHER COMMANDS
10541  051744  016562  000020  000010          MOV     P.CS2(R5),RKCS2(R2) ;LOAD CS2 FOR COMMAND
10542  051752  116565  000007  000017          MOVB    P.CS1H(R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
10543  051760  042765  165777  000016          BIC     #^C<CFMT!CDT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT FORMAT
10544                                                                  ;  AND DRIVE TYPE
10545  051766  112765  000001  000016          MOVB    #DR.SEL,P.CS1(R5) ;STORE COMMAND
10546  051774  016562  000016  000000          MOV     P.CS1(R5),RKCS1(R2) ;ISSUE COMMAND
10547  052002  004737  045412          2$:     JSR     PC,W.WTCH       ;CALL WATCH-DOG TIMER
10548  052006  016265  000000  000016          MOV     RKCS1(R2),P.CS1(R5) ;STORE COMMAND AND STATUS REG. 1
10549  052014  032765  000200  000016          BIT     #RDY,P.CS1(R5)  ;WAIT FOR READY
10550  052022  001767                          BEQ     2$
10551  052024  004737  050464                  JSR     PC,I.CST1       ;STORE CONTROLLER REGISTERS
10552  052030  016265  000034  000040          MOV     RKMR2(R2),P.ADD(R5) ;STORE STATUS BYTE DD MESSAGE A
10553  052036  016265  000036  000042          MOV     RKMR3(R2),P.BDD(R5) ;STORE STATUS BYTE DD MESSAGE B
10554  052044  032765  100000  000016          BIT     #CERR,P.CS1(R5) ;CHECK IF CONTROLLER ERROR
10555  052052  001436                          BEQ     6$              ;NO, GATHER DRIVE STATUS
10556  052054  105037  003070                  CLRB    W.TIME          ;RESET WATCH DOG TIMING ON THIS DRIVE
10557  052060  005037  003104                  CLR     W.DRV           ;CLEAR WATCH DOG COUNT
10558  052064  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10559  052072  001043                          BNE     8$              ;YES, INDICATE NORMAL RETURN
10560  052074  032765  001000  000020          BIT     #MDS,P.CS2(R5)  ;CHECK IF MULTIPLE DRIVE SELECT
10561  052102  001043                          BNE     9$              ;YES, INDICATE CONTROLLER ERROR
10562  052104  004037  050010                  JSR     R0,I.CCLR       ;CLEAR ERROR
10563  052110  052714                          C.RTRN                  ;ERROR RETURN
10564  052112  032765  010400  000020          BIT     #NED!UFE,P.CS2(R5) ;CHECK IF NON-EXISTENT DRIVE OR UNIT FIELD ERROR
10565  052120  001007                          BNE     5$              ;REPORT ERROR
10566  052122  032765  000001  000036          BIT     #DRA,P.DS(R5)   ;CHECK IF DRIVE AVAILIABLE
10567  052130  001003                          BNE     5$              ;YES, REPORT ERROR
10568  052132  052765  010000  000014          BIS     #DRVSZD,P.PRST(R5) ;INDICATE DRIVE IS SEIZED BY OTHER PORT
10569  052140  004737  050774          5$:     JSR     PC,R.ABNL       ;INDICATE ABNORMAL RETURN
10570  052144  000137  052714                  JMP     C.RTRN          ;RESTORE REGISTERS
10571
10572  052150  004037  050546          6$:     JSR     R0,I.STAT       ;GATHER DRIVE STATUS
10573  052154  052714                          C.RTRN                  ;ERROR RETURN
10574  052156  105037  003070                  CLRB    W.TIME          ;STOP WATCH-DOG TIMING ON DRIVE
10575  052162  005037  003104                  CLR     W.DRV           ;RESET WATCH-DOG TIME
10576  052166  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10577  052174  001402                          BEQ     8$              ;NO, REPORT ERROR
10578  052176  005062  000000                  CLR     RKCS1(R2)       ;CLEAR INTERRUPT ENABLE
10579  052202  004737  051006          8$:     JSR     PC,R.NORM       ;REPORT COMMAND COMPLETE
10580  052206  000137  052714                  JMP     C.RTRN          ;RESTORE REGISTERS
10581
10582  052212  052737  100000  003042  9$:     BIS     #E.MDS,E.CONT   ;SET MULTIPLE DRIVE SELECT
10583  052220  004737  051020                  JSR     PC,R.CONT       ;INDICATE CONTROLLER ERROR
10584  052224  000137  052714                  JMP     C.RTRN
10585
10586  052230  122765  000140  000001  10$:    CMPB    #RELEAS,P.CMND(R5) ;CHECK IF RELEASE COMMAND
10587  052236  001040                          BNE     13$             ;NO, CHECK IF READ ALL HEADERS
10588  052240  010537  003044                  MOV     R5,O.WAIT       ;STORE PARAMETER BLOCK ADDRESS IN
10589                                                                  ;  WAIT FOR COMMAND
10590  052244  052765  000010  000020          BIS     #RLS,P.CS2(R5)  ;SET RELEASE BIT
10591  052252  016562  000020  000010          MOV     P.CS2(R5),RKCS2(R2) ;LOAD CS2 FOR DESELECT
10592  052260  112737  000001  003064          MOVB    #1,I.ISRL       ;SET FLAG FOR RELEASE COMMAND
10593  052266  116565  000007  000017          MOVB    P.CS1H(R5),P.CS1+1(R5);STORE BITS 8-15 OF CS1
10594  052274  042765  165777  000016          BIC     #^C<CFMT!CDT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT FORMAT
10595                                                                  ;  AND DRIVE TYPE
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10596  052302  112765  000101  000016          MOVB    #SELDRV,P.CS1(R5) ;STORE COMMAND
10597  052310  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10598  052316  001403                          BEQ     11$               ;NO, DO NOT RESET INTERRUPT ENABLE
10599  052320  042765  000100  000016          BIC     #IE,P.CS1(R5)     ;RESET INTERRUPT ENABLE
10600  052326  016562  000016  000000  11$:    MOV     P.CS1(R5),RKCS1(R2) ;ISSUE COMMAND
10601  052334  000137  052714                  JMP     C.RTRN            ;RESTORE REGISTERS
10602
10603  052340  122765  000164  000001  13$:    CMPB    #RDALHD,P.CMND(R5) ;CHECK IF READ ALL HEADERS
10604  052346  001053                          BNE     30$               ;NO, CHECK IF CONTROLLER CLEAR
10605  052350  010537  003044                  MOV     R5,O.WAIT         ;SET WAITING FOR COMMAND COMMPLETION
10606  052354  016537  000010  003060          MOV     P.BALO(R5),HDR.AD ;LOAD HEADER ADDRESS
10607  052362  132765  000020  000007          BITB    #B.CFMT,P.CS1H(R5) ;CHECK IF 22 SECTOR FORMANT
10608  052370  001404                          BEQ     14$               ;YES, LOAD 22 IN HEADER COUNT
10609  052372  012737  000024  003062          MOV     #20.,HDR.CT       ;LOAD 20 IN SECTOR COUNT
10610  052400  000403                          BR      22$               ;GO ISSUE READ HEADER COMMAND
10611
10612  052402  012737  000026  003062  14$:    MOV     #22.,HDR.CT       ;LOAD 22 IN SECTOR COUNT
10613  052410  016562  000002  000020  22$:    MOV     P.CYLN(R5),RKDCYL(R2) ;LOAD CYLINDER ADDRESS
10614  052416  016562  000004  000006          MOV     P.SECT(R5),RKDA(R2) ;LOAD TRACK NUMBER
10615  052424  016562  000020  000010          MOV     P.CS2(R5),RKCS2(R2) ;LOAD DRIVE NUMBER
10616  052432  116565  000007  000017          MOVB    P.CS1H(R5),P.CS1+1(R5) ;STORE BITS 8-15 OF CS1
10617  052440  042765  165777  000016          BIC     #^C<CFMT!CDT>,P.CS1(R5) ;CLEAR ALL BITS EXCEPT DRIVE TYPE
10618                                                                  ;  AND FORMAT
10619  052446  112765  000125  000016          MOVB    #RDHEAD,P.CS1(R5) ;STORE READ HEADER COMMAND
10620  052454  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10621  052462  001027                          BNE     34$               ;YES, INDICATE ILLEGAL DRIVER COMMAND
10622  052464  016562  000016  000000          MOV     P.CS1(R5),RKCS1(R2) ;ISSUE READ HEADER
10623  052472  000137  052714                  JMP     C.RTRN            ;RESTORE REGISTERS
10624
10625  052476  122765  000176  000001  30$:    CMPB    #CONCLR,P.CMND(R5) ;CHECK IF CONTROLLER CLEAR
10626  052504  001012                          BNE     32$               ;NO, CHECK IF SUBSYSTEM CLEAR
10627  052506  004037  050010                  JSR     R0,I.CCLR         ;CLEAR CONTROLLER
10628  052512  052714                          C.RTRN                    ;ERROR RETURN
10629  052514  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10630  052522  001472                          BEQ     40$               ;NO, INDICATE NORMAL RETURN
10631  052524  005062  000000                  CLR     RKCS1(R2)         ;RESET INTERRUPT ENABLE
10632  052530  000467                          BR      40$               ;INDICATE NORMAL RETURN
10633
10634  052532  122765  000177  000001  32$:    CMPB    #SUBCLR,P.CMND(R5) ;CHECK IF SUBSYSTEM CLEAR
10635  052540  001406                          BEQ     36$               ;YES, CLEAR SUBSYSTEM
10636  052542  052737  000100  003042  34$:    BIS     #E.ILLD,E.CONT    ;SET ILLEGAL DRIVER COMMAND
10637  052550  004737  051020                  JSR     PC,R.CONT         ;REPORT ERROR
10638  052554  000457                          BR      C.RTRN            ;RESTORE REGISTERS
10639
10640  052556  012762  000040  000010  36$:    MOV     #SCLR,RKCS2(R2)   ;ISSUE SUBSYSTEM CLEAR
10641  052564  016265  000000  000016          MOV     RKCS1(R2),P.CS1(R5) ;STORE COMMAND AND STATUS REGISTER 1
10642  052572  032765  100000  000016          BIT     #CERR,P.CS1(R5)   ;CLEAR IF CONTROLLER ERROR RESET
10643  052600  001406                          BEQ     37$               ;NO, FINISH COMMAND
10644  052602  052737  000001  003042          BIS     #BIT0,E.CONT      ;SET CLEAR SUBSYSTEM DID NOT CLEAR
10645                                                                  ;  CONTROLLER ERROR
10646  052610  004737  051020                  JSR     PC,R.CONT         ;REPORT ERROR
10647  052614  000437                          BR      C.RTRN            ;RESTORE REGISTERS
10648
10649  052616  013746  003050          37$:    MOV     W.MILI,-(SP)      ;LOAD 16 MILI-SECOND COUNT FOR ATTENTION
10650                                                                  ;  TO DISAPPEAR
10651  052622  016265  000000  000016  38$:    MOV     RKCS1(R2),P.CS1(R5) ;STORE CS1
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10652  052630  032765  040000  000016          BIT     #DI,P.CS1(R5)   ;CHECK IF ATTENTIONS CLEARED
10653  052636  001411                          BEQ     39$             ;YES, FINISH COMMAND
10654  052640  005316                          DEC     (SP)            ;DECREMENT 16 MILISECOND COUNT
10655  052642  001367                          BNE     38$             ;CHECK DRIVE INTERRUPT AGAIN
10656  052644  005726                          TST     (SP)+           ;ADJUST STACK
10657  052646  052737  000040  003042          BIS     #E.SCLR,E.CONT  ;SET SUBSYSTEM CLEAR DID NOT CLEAR
10658                                                                  ;  DRIVE ATTENTIONS
10659  052654  004737  051020                  JSR     PC,R.CONT       ;REPORT ERROR
10660  052660  000415                          BR      C.RTRN          ;RESTORE REGISTER
10661
10662  052662  005726                  39$:    TST     (SP)+           ;ADJUST STACK
10663  052664  032765  000400  000014          BIT     #NOCHK,P.PRST(R5) ;CHECK IF NO CHECK MODE
10664  052672  001010                          BNE     C.RTRN          ;YES, RESTORE REGISTERS
10665  052674  112737  177777  003064          MOVB    #-1,I.ISRL      ;SET INTERRUPT ENABLE SET
10666  052702  012762  000100  000000          MOV     #IE,RKCS1(R2)   ;SET INTERRUPT ENABLE
10667  052710  004737  051006          40$:    JSR     PC,R.NORM       ;INDICATE NORMAL TERMINATION
10668
10669  052714  012637  177776          C.RTRN: MOV     (SP)+,PS        ;RESTORE PSW
10670  052720  012600                          MOV     (SP)+,R0        ;RESTORE R0
10671  052722  012601                          MOV     (SP)+,R1        ;RESTORE R1
10672  052724  012602                          MOV     (SP)+,R2        ;RESTORE R2
10673  052726  012603                          MOV     (SP)+,R3        ;RESTORE R3
10674  052730  012604                          MOV     (SP)+,R4        ;RESTORE R4
10675  052732  012605                          MOV     (SP)+,R5        ;RESTORE R5
10676  052734  000207                          RTS     PC              ;RETURN
10677                                  .SBTTL  OCTAL TO BINARY CONVERSION ROUTINE
10678
10679                                  ;;*****************************************************************
10680                                  ;*
10681                                  ;*      THIS ROUTINE WILL CHECK A STRING OF ASCII CHARACTERS TERMINATED
10682                                  ;*      WITH A NULL <000> OR COMMA.  IF THE CHARACTERS ARE LEGAL
10683                                  ;*      IT  WILL GENERATE TWO BINARY WORDS PLACING THE LOW 16 BITS
10684                                  ;*      ON THE STACK AND THE HIGH 16 BITS IN LOCATION $HIOCT.
10685                                  ;*
10686                                  ;*CALL
10687                                  ;*      MOV     <ADDRESS OF ASCII STRING>,-(SP)
10688                                  ;*      JSR     PC,OCTBIN
10689                                  ;*      <ADDRESS OF ERROR RETURN>
10690                                  ;*      RETURN
10691                                  ;*
10692                                  ;;*****************************************************************
10693
10694  052736  010046          OCTBIN: MOV     R0,-(SP)        ;SAVE R0
10695  052740  010146                  MOV     R1,-(SP)        ;SAVE R1
10696  052742  010246                  MOV     R2,-(SP)        ;SAVE R2
10697  052744  016600  000010          MOV     10(SP),R0       ;GET ADDRESS OF ASCII STRING
10698  052750  005001                  CLR     R1              ;CLEAR DATA WORDS
10699  052752  005002                  CLR     R2
10700  052754  112046          2$:     MOVB    (R0)+,-(SP)     ;PICK THIS CHARACTER
10701  052756  001423                  BEQ     3$              ;IF ZERO GET OUT
10702  052760  121627  000054          CMPB    (SP),#',        ;CHECK IF COMMA
10703  052764  001420                  BEQ     3$              ;IF COMMA GET OUT
10704  052766  122716  000060          CMPB    #'0,(SP)        ;MAKE SURE THIS CHARACTER IS
10705  052772  003030                  BGT     4$              ;  AN OCTAL DIGIT
10706  052774  122716  000067          CMPB    #'7,(SP)
10707  053000  002425                  BLT     4$
```

```
10708  053002  006301                        ASL     R1              ; *2
10709  053004  006102                        ROL     R2
10710  053006  006301                        ASL     R1              ; *4
10711  053010  006102                        ROL     R2
10712  053012  006301                        ASL     R1              ; *8
10713  053014  006102                        ROL     R2
10714  053016  042716  177770              BIC     #^C7,(SP)       ;STRIP THE ASCII JUNK
10715  053022  062601                        ADD     (SP)+,R1        ;ADD THIS DIGIT
10716  053024  000753                        BR      2$              ;LOOP
10717  053026  005726                3$:     TST     (SP)+           ;CLEAN PARTIAL FROM STACK
10718  053030  010166  000010              MOV     R1,10(SP)       ;SAVE RESULT
10719  053034  010237  053070              MOV     R2,$HIOCT
10720  053040  012602                        MOV     (SP)+,R2        ;RESTORE R2
10721  053042  012601                        MOV     (SP)+,R1        ;RESTORE R1
10722  053044  012600                        MOV     (SP)+,R0        ;RESTORE R0
10723  053046  062716  000002              ADD     #2,(SP)         ;ADJUST RETURN
10724  053052  000207                        RTS     PC              ;RETURN
10725
10726  053054  005726                4$:     TST     (SP)+           ;CLEAN UP PARTIAL FROM STACK
10727  053056  012602                        MOV     (SP)+,R2        ;RESTORE R2
10728  053060  012601                        MOV     (SP)+,R1        ;RESTORE R1
10729  053062  012600                        MOV     (SP)+,R0        ;RESTORE R0
10730  053064  013616                        MOV     @(SP)+,(SP)     ;PUT ADDRESS OF ERROR ROUTINE ON STACK
10731  053066  000207                        RTS     PC              ;GO PROCESS ERROR
10732  053070  000000                $HIOCT: .WORD   0               ;HIGH ORDER BITS GO HERE
10733                                 .SBTTL  RANDOM NUMBER GENERATOR ROUTINE
10734
10735                                 ;;**************************************************************
10736                                 ;*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
10737                                 ;*WITH A RANGE OF 0 TO 2(+33)-1.
10738                                 ;*CALL:
10739                                 ;*      JSR     PC,$RAND        ;;CALL THE ROUTINE
10740                                 ;*      RETURN                  ;;RETURN HERE THE RANDOM
10741                                 ;*                              ;;NUMBER WILL BE IN
10742                                 ;*                              ;;$HINUM,$LONUM
10743
10744  053072                        $RAND:
10745  053072  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
10746  053074  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
10747  053076  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
10748  053100  013700  053172              MOV     $LONUM,R0       ;;SET R0 WITH LOW
10749  053104  013701  053170              MOV     $HINUM,R1       ;;SET R1 WITH HIGH
10750  053110  012702  177771              MOV     #-7,R2          ;;SET SHIFT COUNT
10751  053114  006300                1$:     ASL     R0              ;;SHIFT R0 LEFT AND
10752  053116  006101                        ROL     R1              ;;ROTATE CARRY INTO R1 AND
10753  053120  005202                        INC     R2              ;;CHECK FOR DONE
10754  053122  001374                        BNE     1$              ;;CONTINUE SHIFT LOOP
10755  053124  063700  053172              ADD     $LONUM,R0       ;;ADD NUMBER TO MAKE X 129
10756  053130  005501                        ADC     R1              ;;PROPOGATE CARRY
10757  053132  063701  053170              ADD     $HINUM,R1       ;;ADD NUMBER TO MAKE X 129
10758  053136  062700  001057              ADD     #1057,R0        ;;ADD LOW CONSTANT
10759  053142  005501                        ADC     R1              ;;PROPOGATE CARRY
10760  053144  062701  047401              ADD     #47401,R1       ;;ADD HIGH CONSTANT
10761  053150  010037  053172              MOV     R0,$LONUM       ;;SAVE R0
10762  053154  010137  053170              MOV     R1,$HINUM       ;;SAVE R1
10763  053160  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
```

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10764  053162  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
10765  053164  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
10766  053166  000207                          RTS     PC              ;;RETURN
10767  053170  176543                  $HINUM: .WORD   176543
10768  053172  123456                  $LONUM: .WORD   123456
10769                                   .SBTTL  TYPE ROUTINE
10770
10771                                   ;;*****************************************************************
10772                                   ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
10773                                   ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
10774                                   ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
10775                                   ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
10776                                   ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
10777                                   ;*
10778                                   ;*CALL:
10779                                   ;*1) USING A TRAP INSTRUCTION
10780                                   ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
10781                                   ;*OR
10782                                   ;*      TYPE
10783                                   ;*      MESADR
10784                                   ;*
10785
10786  053174  105737  001157  $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
10787  053200  100002                  BPL     1$              ;;BR IF YES
10788  053202  000000                  HALT                    ;;HALT HERE IF NO TERMINAL
10789  053204  000430                  BR      3$              ;;LEAVE
10790  053206  010046          1$:     MOV     R0,-(SP)        ;;SAVE R0
10791  053210  017600  000002          MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
10792  053214  122737  000001  001340  CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
10793  053222  001011                  BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
10794  053224  132737  000100  001341  BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
10795  053232  001405                  BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
10796  053234  010037  053244          MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
10797  053240  004737  055672          JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
10798  053244  000000          61$:    .WORD   0               ;;MESSAGE ADDRESS
10799  053246  132737  000040  001341  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
10800  053254  001003                  BNE     60$             ;;YES,SKIP TYPE OUT
10801  053256  112046          2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
10802  053260  001005                  BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
10803  053262  005726                  TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
10804  053264  012600          60$:    MOV     (SP)+,R0        ;;RESTORE R0
10805  053266  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
10806  053272  000002                  RTI                     ;;RETURN
10807  053274  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
10808  053300  001430                  BEQ     8$
10809  053302  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
10810  053306  001006                  BNE     5$
10811  053310  005726                  TST     (SP)+           ;;POP  <CR><LF> EQUIV
10812  053312  104400                  TYPE                    ;;TYPE A CR AND LF
10813  053314  001315                  $CRLF
10814  053316  105037  053452                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
10815  053322  000755                  BR      2$              ;;GET NEXT CHARACTER
10816  053324  004737  053406          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
10817  053330  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
10818  053334  001350                  BNE     2$              ;;IF NO GO GET NEXT CHAR.
10819  053336  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
```

```
10820
10821  053342  105366  000001          7$:     DECB    1(SP)           ;;AND THE NULL CHAR.
10822  053346  002770                          BLT     6$              ;;DOES A NULL NEED TO BE TYPED?
10823  053350  004737  053406                  JSR     PC,$TYPEC       ;;BR IF NO--GO POP THE NULL OFF OF STACK
10824  053354  105337  053452                  DECB    $CHARCNT        ;;GO TYPE A NULL
10825  053360  000770                          BR      7$              ;;DO NOT COUNT AS A COUNT
10826                                                                  ;;LOOP
10827                                  ;HORIZONTAL TAB PROCESSOR
10828
10829  053362  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
10830  053366  004737  053406          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
10831  053372  132737  000007  053452          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
10832  053400  001372                          BNE     9$              ;;TAB STOP
10833  053402  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
10834  053404  000724                          BR      2$              ;;GET NEXT CHARACTER
10835  053406  105777  125536          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
10836  053412  100375                          BPL     $TYPEC
10837  053414  116677  000002  125530          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
10838  053422  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
10839  053430  001003                          BNE     1$              ;;BRANCH IF NO
10840  053432  105037  053452                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
10841  053436  000406                          BR      $TYPEX          ;;EXIT
10842  053440  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
10843  053446  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
10844  053450  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
10845  053452  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
10846  053454  000207          $TYPEX: RTS     PC
10847
10848
10849
10850
10851                          ;;*****************************************************************
10852                          .SBTTL  DOUBLE-PRECISION MULTIPLY SUBROUTINE
10853                          ;*      SUBROUTINE TO MULTIPLY TWO DOUBLE PRECISION INTEGERS
10854                          ;*      USES ALL REGISTERS (R0-R5)
10855                          ;*
10856                          ;*      ENTER WITH   JSR   PC,M.DPIM
10857                          ;*              MULTIPLIER IN R2-R3
10858                          ;*              MULTIPLICAND IN R4-R5
10859                          ;*              PRODUCT RETURNED IN R0-R1-R2-R3
10860                          ;*
10861                          ;*****************************************************************
10862  053456  005000          M.DPIM: CLR     R0                      ;CLEAR HI ORDER WORDS
10863  053460  005001                  CLR     R1
10864  053462  012746  000041          MOV     #41,-(SP)               ;MOVE 33 (DEC) TO COUNTER
10865  053466  006000          M.DP01: ROR     R0
10866  053470  006001                  ROR     R1
10867  053472  006002                  ROR     R2                      ;SHIFT TO ADD
10868  053474  006003                  ROR     R3
10869  053476  103003                  BCC     M.DP02                  ;NO CARRY NO ADD
10870  053500  060501                  ADD     R5,R1
10871  053502  005500                  ADC     R0                      ;ADD DOUBLE PRECISION TO OBTAIN NEW PARTIAL
10872  053504  060400                  ADD     R4,R0                   ;  PRODUCT
10873  053506  005316          M.DP02: DEC     @SP                     ;DECREMENT COUNTER
10874  053510  001366                  BNE     M.DP01
10875  053512  005726                  TST     (SP)+                   ;REMOVE THE COUNTER
```

```
10876  053514  000207                          RTS     PC
10877
10878
10879                                  ;;*****************************************************************
10880                                  .SBTTL  DOUBLE-PRECISION DIVIDE SUBROUTINE
10881                                  ;*              SUBROUTINE TO PERFORM DOUBLE-PRECISION INTEGER DIVISION
10882                                  ;*              USES ALL REGISTERS (R0-R5)
10883                                  ;*
10884                                  ;*              ENTER WITH  JSR   PC,M.DPID
10885                                  ;*                      DIVIDEND IN R0-R1-R2-R3
10886                                  ;*                      DIVISOR IN R4-R5
10887                                  ;*                      REMAINDER RETURNED IN R0-R1
10888                                  ;*                      QUOTIENT RETURNED IN R2-R3
10889                                  ;*
10890                                  ;;*****************************************************************
10891  053516  012746  000040         M.DPID: MOV     #40,-(SP)       ;COUNTER FOR DIVISION CYCLES
10892  053522  010446                          MOV     R4,-(SP)        ;HI ORDER
10893  053524  010546                          MOV     R5,-(SP)        ;LO ORDER DIVISOR TO THE STACK
10894  053526  005466  000002                 NEG     2(SP)           ;FORM NEGATIVE
10895  053532  005416                          NEG     @SP             ;   VERSION OF THE DIVISOR
10896  053534  005666  000002                 SBC     2(SP)
10897  053540  061601                          ADD     @SP,R1
10898  053542  005500                          ADC     R0              ;PERFORM THE INITIAL SUBTRACTION
10899  053544  066600  000002                 ADD     2(SP),R0
10900  053550  103445                          BCS     M.DP50          ;IF CARRY THEN OVERFLOW HAS OCCURRED
10901  053552  005046                          CLR     -(SP)           ;THIS IS A LONGER LASTING CARRY BIT
10902  053554  006103                 M.DP40: ROL     R3
10903  053556  006102                          ROL     R2
10904  053560  006101                          ROL     R1
10905  053562  006100                          ROL     R0
10906  053564  005716                          TST     @SP             ;TEST "CARRY INDICATOR"
10907  053566  001410                          BEQ     M.DP41          ;IF NO "CARRY" THEN ADD ELSE SUBTRACT
10908  053570  005016                          CLR     @SP             ;CLEAR UP FOR NEXT TIME
10909  053572  066601  000002                 ADD     2(SP),R1
10910  053576  005500                          ADC     R0              ;ADD -(DIVISOR)
10911  053600  005516                          ADC     @SP     ; I     ;SET "CARRY"
10912  053602  066600  000004                 ADD     4(SP),R0;<
10913  053606  000404                          BR      M.DP42
10914  053610  060501                 M.DP41: ADD     R5,R1
10915  053612  005500                          ADC     R0              ;ADD +(DIVISOR)
10916  053614  005516                          ADC     @SP     ; I     ;SET "CARRY"
10917  053616  060400                          ADD     R4,R0   ;<
10918  053620  005516                 M.DP42: ADC     @SP             ;SET "CARRY"
10919  053622  005716                          TST     @SP             ;TEST THE UPDATE INDICATOR
10920  053624  001401                          BEQ     .+4     ;>      ;IF ZERO FORGET IT
10921  053626  005203                          INC     R3      ; I     ;NO CARRY POSSIBLE HERE
10922  053630  005366  000006                 DEC     6(SP)   ;<      ;DECREMENT COUNTER
10923  053634  003347                          BGT     M.DP40          ;BR IF MORE TO DO
10924  053636  006003                          ROR     R3
10925  053640  103404                          BCS     M.DP44
10926  053642  060501                          ADD     R5,R1
10927  053644  005500                          ADC     R0
10928  053646  060400                          ADD     R4,R0
10929  053650  000241                          CLC
10930  053652  006103                 M.DP44: ROL     R3
10931  053654  062706  000010                 ADD     #10,SP          ;ADJUST STACK BY 4 WORDS
```

```
10932  053660  000242                          CLV
10933  053662  000207                          RTS     PC
10934  053664  062706  000006          M.DP50: ADD     #6,SP
10935  053670  000262                          SEV
10936  053672  000207                          RTS     PC
10937
10938
10939
10940                                  .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
10941
10942                                  ;;**********************************************************************
10943                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
10944                                  ;*UNSIGNED OCTAL ASCIZ NUMBER.
10945                                  ;*CALL
10946                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
10947                                  ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
10948                                  ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
10949
10950
10951  053674  104406          $DB20:  SAVREG                          ;;SAVE ALL REGISTERS
10952  053676  016601  000002          MOV     2(SP),R1                ;;PICKUP THE POINTER TO LOW WORD
10953  053702  012705  054013          MOV     #$OCTVL+13.,R5          ;;POINTER TO DATA TABLE
10954  053706  012704  000014          MOV     #12.,R4                 ;;DO ELEVEN CHARACTERS
10955  053712  012703  177770          MOV     #^C7,R3                 ;;MASK
10956  053716  012100                  MOV     (R1)+,R0                ;;LOWER WORD
10957  053720  012101                  MOV     (R1)+,R1                ;;HIGH WORD
10958  053722  005002                  CLR     R2                      ;;TERMINATOR
10959  053724  110245          1$:     MOVB    R2,-(R5)                ;;PUT CHARACTER IN DATA TABLE
10960  053726  010002                  MOV     R0,R2                   ;;GET THIS DIGIT
10961  053730  005304                  DEC     R4                      ;;COUNT THIS CHARACTER
10962  053732  003007                  BGT     3$                      ;;BR IF NOT THE LAST DIGIT
10963  053734  001405                  BEQ     2$                      ;;BR IF IT IS THE LAST DIGIT
10964  053736  005205                  INC     R5                      ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
10965  053740  010566  000002          MOV     R5,2(SP)                ;;ASCIZ CHAR. & PUT IT ON THE STACK
10966  053744  104407                  RESREG                          ;;RESTORE ALL REGISTERS
10967  053746  000207                  RTS     PC                      ;;RETURN TO USER
10968  053750  006203          2$:     ASR     R3                      ;;POSITION THE MASK FOR THE LAST DIGIT
10969  053752  006001          3$:     ROR     R1                      ;;POSITION THE BINARY NUMBER FOR
10970  053754  006000                  ROR     R0                      ;;       THE NEXT OCTAL DIGIT
10971  053756  006001                  ROR     R1
10972  053760  006000                  ROR     R0
10973  053762  006001                  ROR     R1
10974  053764  006000                  ROR     R0
10975  053766  040302                  BIC     R3,R2                   ;;MASK OUT ALL JUNK
10976  053770  062702  000060          ADD     #'0,R2                  ;;MAKE THIS CHAR. ASCII
10977  053774  000753                  BR      1$                      ;;GO PUT IT IN THE DATA TABLE
10978  053776  000016          $OCTVL: .BLKB   14.                     ;;RESERVE DATA TABLE
10979                                  .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
10980
10981                                  ;;**********************************************************************
10982                                  ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
10983                                  ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
10984                                  ;*POSITIVE.
10985                                  ;*CALL
10986                                  ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
10987                                  ;*      JSR     PC,@#$DB2D
```

```
10988                                   ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
10989                                                                   ;;IS ON THE STACK
10990
10991
10992  054014  104406                          $DB2D:  SAVREG
10993  054016  016602  000002                        MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
10994  054022  012700  054174                        MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
10995  054026  010066  000002                        MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
10996  054032  012201                                MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
10997  054034  012202                                MOV     (R2)+,R2
10998  054036  012737  000012  054112                MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
10999  054044  012704  054124                        MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
11000  054050  012705  054126                        MOV     #$TNPWR+2,R5
11001  054054  005003                          1$:   CLR     R3              ;;CLEAR PARTIAL
11002  054056  161401                          2$:   SUB     (R4),R1         ;;SUBTRACT TEN POWER
11003  054060  005602                                SBC     R2
11004  054062  161502                                SUB     (R5),R2
11005  054064  002402                                BLT     3$              ;;BR IF TEN POWER TO LARGE
11006  054066  005203                                INC     R3              ;;ADD 1 TO PARTIAL
11007  054070  000772                                BR      2$              ;;LOOP
11008  054072  062401                          3$:   ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
11009  054074  005502                                ADC     R2
11010  054076  062402                                ADD     (R4)+,R2
11011  054100  022525                                CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
11012  054102  052703  000060                        BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
11013  054106  110320                                MOVB    R3,(R0)+        ;;SAVE IT
11014  054110  005327                                DEC     (PC)+           ;;DONE?
11015  054112  000000                          4$:   .WORD   0
11016  054114  001357                                BNE     1$              ;;BR IF NO
11017  054116  105020                                CLRB    (R0)+           ;;TERMINATOR
11018  054120  104407                                RESREG                  ;;RESTORE REGISTERS
11019  054122  000207                                RTS     PC              ;;RETURN
11020  054124  145000                  $TNPWR: 145000                        ;;1.0E09
11021  054126  035632                          35632
11022  054130  160400                          160400                        ;;1.0E08
11023  054132  002765                          2765
11024  054134  113200                          113200                        ;;1.0E07
11025  054136  000230                          230
11026  054140  041100                          041100                        ;;1.0E06
11027  054142  000017                          17
11028  054144  103240                          103240                        ;;1.0E05
11029  054146  000001                          1
11030  054150  023420                          23420                         ;;1.0E04
11031  054152  000000                          0
11032  054154  001750                          1750                          ;;1.0E03
11033  054156  000000                          0
11034  054160  000144                          144                           ;;1.0E02
11035  054162  000000                          0
11036  054164  000012                          12                            ;;1.0E01
11037  054166  000000                          0
11038  054170  000001                          1                             ;;1.0E00
11039  054172  000000                          0
11040  054174  000014                  $DECVL: .BLKB   12.                   ;;RESERVE STORAGE FOR ASCIZ STRING
11041                                  .SBTTL  TYPE NUMERICAL ASCIZ STRING SUPPRESS LEADING ZEROS
11042
11043                                   ;;**********************************************************************
```

```
11044                                   ;*THIS ROUTINE IS USED TO TYPE AN ASCIZ NUMBER SUPPRESSING THE
11045                                   ;*LEADING NUMBERS.
11046                                   ;*CALL
11047                                   ;*      MOV     #NUMADR,-(SP)   ;;FIRST ADDRESS OF ASCIZ STRING
11048                                   ;*      JSR     PC,@#$SUPRS
11049
11050
11051  054210  010046                  $SUPRS: MOV     R0,-(SP)        ;;SAVE R0
11052  054212  016600  000004                  MOV     4(SP),R0        ;;PICKUP THE POINTER
11053  054216  105710                  1$:     TSTB    (R0)            ;;TERMINATEOR?
11054  054220  001403                          BEQ     2$              ;;BR IF YES
11055  054222  122720  000060                  CMPB    #'0,(R0)+       ;;IS THIS AN ASCII "0" ?
11056  054226  001773                          BEQ     1$              ;;BR IF YES
11057  054230  005300                  2$:     DEC     R0              ;;BACKUP BY "1"
11058  054232  010037  054240                  MOV     R0,3$           ;;SAVE FOR TYPING
11059  054236  104400                          TYPE                    ;;GO TYPE
11060  054240  000000                  3$:     .WORD   0               ;;ASCIZ POINTER GOES HERE
11061  054242  012600                          MOV     (SP)+,R0        ;;RESTORE R0
11062  054244  012616                          MOV     (SP)+,(SP)      ;;RESTORE THE STACK
11063  054246  000207                          RTS     PC              ;;RETURN
11064                                   .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
11065
11066                                   ;;**************************************************************
11067                                   ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
11068                                   ;*OCTAL (ASCII) NUMBER AND TYPE IT.
11069                                   ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
11070                                   ;*CALL:
11071                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
11072                                   ;*      TYPOS                   ;;CALL FOR TYPEOUT
11073                                   ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
11074                                   ;*      .BYTE   M               ;;M=1 OR 0
11075                                   ;*                                      ;;1=TYPE LEADING ZEROS
11076                                   ;*                                      ;;0=SUPPRESS LEADING ZEROS
11077                                   ;*
11078                                   ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
11079                                   ;*$TYPOS OR $TYPOC
11080                                   ;*CALL:
11081                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
11082                                   ;*      TYPON                   ;;CALL FOR TYPEOUT
11083                                   ;*
11084                                   ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
11085                                   ;*CALL:
11086                                   ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
11087                                   ;*      TYPOC                   ;;CALL FOR TYPEOUT
11088
11089  054250  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
11090  054254  116637  000001  054473          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
11091  054262  112637  054475                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
11092  054266  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
11093  054272  000406                          BR      $TYPON
11094  054274  112737  000001  054473  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
11095  054302  112737  000006  054475          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
11096  054310  112737  000005  054472  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
11097  054316  010346                          MOV     R3,-(SP)        ;;SAVE R3
11098  054320  010446                          MOV     R4,-(SP)        ;;SAVE R4
11099  054322  010546                          MOV     R5,-(SP)        ;;SAVE R5
```

```
11100  054324  113704  054475          MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
11101  054330  005404                  NEG     R4
11102  054332  062704  000006          ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
11103  054336  110437  054474          MOVB    R4,$OMODE       ;;SAVE IT FOR USE
11104  054342  113704  054473          MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
11105  054346  016605  000012          MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
11106  054352  005003                  CLR     R3              ;;CLEAR THE OUTPUT WORD
11107  054354  006105          1$:     ROL     R5              ;;ROTATE MSB INTO "C"
11108  054356  000404                  BR      3$              ;;GO DO MSB
11109  054360  006105          2$:     ROL     R5              ;;FORM THIS DIGIT
11110  054362  006105                  ROL     R5
11111  054364  006105                  ROL     R5
11112  054366  010503                  MOV     R5,R3
11113  054370  006103          3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
11114  054372  105337  054474          DECB    $OMODE          ;;TYPE THIS DIGIT?
11115  054376  100016                  BPL     7$              ;;BR IF NO
11116  054400  042703  177770          BIC     #177770,R3      ;;GET RID OF JUNK
11117  054404  001002                  BNE     4$              ;;TEST FOR 0
11118  054406  005704                  TST     R4              ;;SUPPRESS THIS 0?
11119  054410  001403                  BEQ     5$              ;;BR IF YES
11120  054412  005204          4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
11121  054414  052703  000060          BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
11122  054420  052703  000040          BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
11123  054424  110337  054470          MOVB    R3,8$           ;;SAVE FOR TYPING
11124  054430  104400  054470          TYPE    ,8$             ;;GO TYPE THIS DIGIT
11125  054434  105337  054472  7$:     DECB    $OCNT           ;;COUNT BY 1
11126  054440  003347                  BGT     2$              ;;BR IF MORE TO DO
11127  054442  002402                  BLT     6$              ;;BR IF DONE
11128  054444  005204                  INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
11129  054446  000744                  BR      2$              ;;GO DO THE LAST DIGIT
11130  054450  012605          6$:     MOV     (SP)+,R5        ;;RESTORE R5
11131  054452  012604                  MOV     (SP)+,R4        ;;RESTORE R4
11132  054454  012603                  MOV     (SP)+,R3        ;;RESTORE R3
11133  054456  016666  000002  000004  MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
11134  054464  012616                  MOV     (SP)+,(SP)
11135  054466  000002                  RTI                     ;;RETURN
11136  054470     000          8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
11137  054471     000                  .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
11138  054472     000          $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
11139  054473     000          $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
11140  054474  000000          $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
11141                          .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
11142
11143                          ;;**************************************************************
11144                          ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
11145                          ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
11146                          ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
11147                          ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
11148                          ;*REPLACED WITH SPACES.
11149                          ;*CALL:
11150                          ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
11151                          ;*      TYPDS                   ;;GO TO THE ROUTINE
11152
11153  054476                  $TYPDS:
11154  054476  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
11155  054500  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
```

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11156  054502  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
11157  054504  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
11158  054506  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
11159  054510  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
11160  054514  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
11161  054520  100004                          BPL     1$              ;;BR IF INPUT IS POS.
11162  054522  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
11163  054524  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
11164  054532  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
11165  054534  012703  054712                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
11166  054540  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
11167  054544  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
11168  054546  016001  054702                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
11169  054552  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
11170  054554  002402                          BLT     4$              ;;BR IF DONE
11171  054556  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
11172  054560  000774                          BR      3$
11173  054562  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
11174  054564  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
11175  054566  001002                          BNE     5$              ;;FALL THROUGH IF 0
11176  054570  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
11177  054572  100407                          BMI     7$              ;;BR IF YES
11178  054574  106316                  5$:     ASLB    (SP)            ;;MSD?
11179  054576  103003                          BCC     6$              ;;BR IF NO
11180  054600  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
11181  054606  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
11182  054612  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
11183  054616  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
11184  054620  005720                          TST     (R0)+           ;;JUST INCREMENTING
11185  054622  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
11186  054626  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
11187  054630  003002                          BGT     8$              ;;GO TO EXIT
11188  054632  010502                          MOV     R5,R2           ;;GET THE LSD
11189  054634  000764                          BR      6$              ;;GO CHANGE TO ASCII
11190  054636  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
11191  054640  100003                          BPL     9$              ;;BR IF NO
11192  054642  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
11193  054650  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
11194  054652  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
11195  054654  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
11196  054656  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
11197  054660  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
11198  054662  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
11199  054664  104400  054712                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
11200  054670  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
11201  054676  012616                          MOV     (SP)+,(SP)
11202  054700  000002                          RTI                     ;;RETURN TO USER
11203  054702  023420                  $DTBL:  10000.
11204  054704  001750                          1000.
11205  054706  000144                          100.
11206  054710  000012                          10.
11207  054712  000004                  $DBLK:  .BLKW   4
11208                                  .SBTTL  ERROR HANDLER ROUTINE
11209
11210                                  ;;**************************************************************************
11211                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
```

```
11212                                   ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
11213                                   ;*AND GO TO TYPERR ON ERROR
11214                                   ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
11215                                   ;*SW15=1        HALT ON ERROR
11216                                   ;*SW13=1        INHIBIT ERROR TYPEOUTS
11217                                   ;*SW10=1        BELL ON ERROR
11218                                   ;*SW09=1        LOOP ON ERROR
11219                                   ;*CALL
11220                                   ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
11221
11222  054722                           $ERROR:
11223  054722  105237  001103           7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
11224  054726  001775                           BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
11225  054730  013777  001102  124204           MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
11226  054736  032777  002000  124174           BIT     #BIT10,@SWR     ;;BELL ON ERROR?
11227  054744  001402                           BEQ     1$              ;;NO - SKIP
11228  054746  104400  001310                   TYPE    ,$BELL          ;;RING BELL
11229  054752  005237  001112           1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
11230  054756  011637  001116                   MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
11231  054762  162737  000002  001116           SUB     #2,$ERRPC
11232  054770  117737  124122  001114           MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
11233  054776  032777  020000  124134           BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
11234  055004  001004                           BNE     20$             ;;SKIP TYPEOUTS
11235  055006  004737  041222                   JSR     PC,TYPERR       ;;GO TO USER ERROR ROUTINE
11236  055012  104400  001315                   TYPE    ,$CRLF
11237  055016                           20$:
11238  055016  122737  000001  001340           CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
11239  055024  001007                           BNE     2$              ;;NO,SKIP APT ERROR REPORT
11240  055026  113737  001114  055040           MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
11241  055034  004737  055702                   JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
11242  055040     000           21$:    .BYTE   0
11243  055041     000                   .BYTE   0
11244  055042  000777           22$:    BR      22$             ;;APT ERROR LOOP
11245  055044  005777  124070           2$:     TST     @SWR            ;;HALT ON ERROR
11246  055050  100001                           BPL     3$              ;;SKIP IF CONTINUE
11247  055052  000000                           HALT                    ;;HALT ON ERROR!
11248  055054  032777  001000  124056   3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
11249  055062  001402                           BEQ     4$              ;;BR IF NO
11250  055064  013716  001110                   MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
11251  055070  005737  001306           4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
11252  055074  001402                           BEQ     5$              ;;BR IF NONE
11253  055076  013716  001306                   MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
11254  055102                           5$:
11255  055102  022737  023546  000042           CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
11256  055110  001001                           BNE     6$              ;;BRANCH IF NO
11257  055112  000000                           HALT                    ;;YES
11258  055114                           6$:
11259  055114  000002                           RTI                     ;;RETURN
11260                                   .SBTTL  TTY INPUT ROUTINE
11261
11262                                   ;;**************************************************************************
11263                                   .ENABL  LSB
11264
11265                                   .DSABL  LSB
11266
11267
```

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11268                                   ;;*****************************************************************
11269                                   ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
11270                                   ;*CALL:
11271                                   ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
11272                                   ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
11273                                   ;*                              ;;WITH PARITY BIT STRIPPED OFF
11274                                   ;
11275
11276  055116  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
11277  055120  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
11278  055126  105777  124012          1$:     TSTB    @$TKS           ;;WAIT FOR
11279  055132  100375                          BPL     1$              ;;A CHARACTER
11280  055134  117766  124006  000004        MOVB    @$TKB,4(SP)     ;;READ THE TTY
11281  055142  042766  177600  000004        BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
11282  055150  026627  000004  000023        CMP     4(SP),#23       ;;IS IT A CONTROL-S?
11283  055156  001013                        BNE     3$              ;;BRANCH IF NO
11284  055160  105777  123760          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
11285  055164  100375                        BPL     2$              ;;LOOP UNTIL ITS THERE
11286  055166  117746  123754                MOVB    @$TKB,-(SP)     ;;GET CHARACTER
11287  055172  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
11288  055176  022627  000021                CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
11289  055202  001366                        BNE     2$              ;;IF NOT DISCARD IT
11290  055204  000750                        BR      1$              ;;YES, RESUME
11291  055206  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
11292  055214  002407                        BLT     4$              ;;BRANCH IF YES
11293  055216  026627  000004  000175        CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
11294  055224  003003                        BGT     4$              ;;BRANCH IF YES
11295  055226  042766  000040  000004        BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
11296  055234  000002                  4$:     RTI                     ;;GO BACK TO USER
11297  055236  052536  005015     000  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
11298  055243     136  006507  000012  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
11299  055250  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
11300  055256  020075     000
11301  055261     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
11302  055266  036440  000040
11303
11304
11305
11306                                   .SBTTL  POWER DOWN AND UP ROUTINES
11307
11308                                   ;POWER DOWN ROUTINE
11309  055272  012737  055304  000024  $PWRDN: MOV     #$PWRUP,PWRVEC  ;SET VECTOR FOR POWER UP
11310  055300  000000                          HALT                    ;HANG UP
11311  055302  000776                          BR      .-2
11312
11313                                   ;POWER UP ROUTINE
11314  055304  005037  055356          $PWRUP: CLR     $PWRCT          ;WAIT LOOP FOR TTY TO COME UP
11315  055310  005237  055356          4$:     INC     $PWRCT
11316  055314  001375                          BNE     4$
11317  055316  012737  055272  000024        MOV     #$PWRDN,PWRVEC  ;SET VECTOR FOR POWER DOWN
11318  055324  012737  000340  000026        MOV     #PR7,PWRVEC+2   ;RE-ESTABLISH POWER AND TRAP PRIORITIES
11319  055332  012737  000340  000036        MOV     #PR7,TRAPVEC+2
11320  055340  012706  001100                MOV     #STACK,SP       ;RE-INITIALIZE THE STACK
11321  055344  104400  055360                TYPE    ,PWRMSG         ;TYPE "POWER FAILED"
11322  055350  000005                        RESET                   ;CLEAR THE UNIBUS
11323  055352  000177  123530                JMP     @$LPADR         ;RESTART THE CURRENT TEST
```

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11324  055356  000000                  $PWRCT: .WORD   0
11325  055360  005015  047520  042527  PWRMSG: .ASCIZ  <15><12>/POWER FAILED/<15><12>
11326  055366  020122  040506  046111
11327  055374  042105  005015     000
11328          055402                          .EVEN
11329
11330
11331
11332                                  ;;**********************************************************************
11333                                  ;* SCOPE1 - INTERNAL SCOPE ON ERROR ROUTINE
11334                                  ;*CALLED BY "SCOPER"
11335                                  ;;**********************************************************************
11336  055402  105737  001103         SCOPE1: TSTB    $ERFLG          ;SEE IF AN ERROR HAS OCCURRED
11337  055406  001406                          BEQ     6$              ;BR IF NOT
11338  055410  032777  001000  123522          BIT     #BIT9,@SWR      ;SEE IF LOOP ON ERROR DESIRED
11339  055416  001402                          BEQ     6$              ;BR IF NOT
11340  055420  013716  001110                  MOV     $LPERR,(SP)     ;SET ERROR LOOP ADDRESS ON STACK
11341  055424  000002                  6$:     RTI                     ;RETURN
11342
11343
11344
11345                                  .SBTTL  SCOPE HANDLER ROUTINE
11346
11347                                  ;;**********************************************************************
11348                                  ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
11349                                  ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
11350                                  ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
11351                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
11352                                  ;*SW14=1         LOOP ON TEST
11353                                  ;*SW11=1         INHIBIT ITERATIONS
11354                                  ;*SW09=1         LOOP ON ERROR
11355                                  ;*CALL
11356                                  ;*      SCOPE           ;;SCOPE=IOT
11357
11358  055426                  $SCOPE:
11359  055426  005737  001304                  TST     $TIMES          ;CHECK CURRENT ITERATION NUMBER
11360  055432  001404                          BEQ     $XTSTR          ;BR IF 0, TO SKIP CHECK OF SWR BIT 14
11361  055434  032777  040000  123476  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
11362  055442  001101                          BNE     $OVER           ;;YES IF SW14=1
11363                                  ;#####START OF CODE FOR THE XOR TESTER#####
11364  055444  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
11365                                                                  ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
11366  055446  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
11367  055452  012737  055472  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
11368  055460  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
11369  055464  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
11370  055470  000450                          BR      $SVLAD          ;;GO TO THE NEXT TEST
11371  055472  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
11372  055474  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
11373  055500  000413                          BR      7$              ;;LOOP ON THE PRESENT TEST
11374  055502                  6$:;#####END OF CODE FOR THE XOR TESTER#####
11375  055502  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
11376  055506  001421                          BEQ     3$              ;;BR IF NO
11377  055510  123737  001115  001103          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
11378  055516  101015                          BHI     3$              ;;BR IF NO
11379  055520  032777  001000  123412          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
```

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11380  055526  001404                          BEQ     4$              ;;BR IF NO
11381  055530  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
11382  055536  000443                          BR      $OVER
11383  055540  105037  001103          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
11384  055544  005037  001304                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
11385  055550  000412                          BR      1$              ;;ESCAPE TO THE NEXT TEST
11386  055552  032777  004000  123360  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
11387  055560  001006                          BNE     1$              ;;BR IF YES
11388  055562  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
11389  055566  023737  001304  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
11390  055574  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
11391  055576  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
11392  055604  013737  055662  001304          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
11393  055612  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
11394  055616  113737  001102  001324          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
11395  055624  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
11396  055630  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
11397  055634  005037  001306                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
11398  055640  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
11399  055646  013777  001102  123266  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
11400  055654  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
11401  055660  000002                          RTI                     ;;FIXES PS
11402  055662  003720                  $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
11403                                  .SBTTL  APT COMMUNICATIONS ROUTINE
11404
11405                                  ;;**************************************************************
11406  055664  112737  000001  056130  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
11407  055672  112737  000001  056126  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
11408  055700  000403                          BR      $ATYC
11409  055702  112737  000001  056130  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
11410  055710                          $ATYC:
11411  055710  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
11412  055712  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
11413  055714  105737  056126                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
11414  055720  001450                          BEQ     5$              ;;IF NOT:  BR
11415  055722  122737  000001  001340          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
11416  055730  001031                          BNE     3$              ;;IF NOT:  BR
11417  055732  132737  000100  001341          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
11418  055740  001425                          BEQ     3$              ;;IF NOT:  BR
11419  055742  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
11420  055746  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
11421  055754  005737  001320          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
11422  055760  001375                          BNE     1$              ;;IF NOT:  WAIT
11423  055762  010037  001334                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
11424  055766  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
11425  055770  001376                          BNE     2$
11426  055772  163700  001334                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
11427  055776  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
11428  056000  010037  001336                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
11429  056004  012737  000004  001320          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
11430  056012  000413                          BR      5$
11431  056014  017637  000004  056040  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
11432  056022  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
11433  056030  013746  177776                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
11434  056034  004737  053174                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
11435  056040  000000          4$:     .WORD   0
```

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11436  056042                          5$:
11437  056042  105737  056130          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
11438  056046  001416                          BEQ     12$             ;;IF NOT:  BR
11439  056050  005737  001340                  TST     $ENV            ;;RUNNING UNDER APT?
11440  056054  001413                          BEQ     12$             ;;IF NOT:  BR
11441  056056  005737  001320          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
11442  056062  001375                          BNE     11$             ;;IF NOT:  WAIT
11443  056064  017637  000004  001322          MOV     @4(SP),$FATAL   ;;GET ERROR #
11444  056072  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
11445  056100  005237  001320                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
11446  056104  105037  056130          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
11447  056110  105037  056127                  CLRB    $LFLG           ;;CLEAR LOG FLAG
11448  056114  105037  056126                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
11449  056120  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
11450  056122  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
11451  056124  000207                          RTS     PC              ;;RETURN
11452  056126     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
11453  056127     000          $LFLG:  .BYTE   0               ;;LOG FLAG
11454  056130     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
11455          056132                  .EVEN
11456          000200          APTSIZE=200
11457          000001          APTENV=001
11458          000100          APTSPOOL=100
11459          000040          APTCSUP=040
11460                          .SBTTL  ROUTINE TO SIZE MEMORY
11461
11462                          ;;*****************************************************************
11463                          ;*CALL:
11464                          ;*      JSR     PC,$SIZE
11465                          ;*      RETURN
11466                          ;*$LSTAD WILL CONTAIN:
11467                          ;*      WITH KT11 OPTION        -- LAST VIRTUAL ADDRESS OF THE LAST BANK
11468                          ;*      WITHOUT KT11 OPTION     -- LAST ABSOLUTE ADDRESS OF AVAILABLE MEMORY
11469                          ;*$LSTBK WILL CONTAIN THE LAST BANK AS A SAF
11470                          ;*$KT11 IS THE MEMORY MANAGEMENT KEY
11471                          ;*BIT07 = 0 DON'T USE MEMORY MANAGEMENT
11472                          ;*      MUST BE SETUP BEFORE THE CALL
11473                          ;*BIT15 = 0 DON'T HAVE MEMORY MANAGEMENT OPTION
11474                          ;*      DETERMINED BY ROUTINE
11475
11476  056132  010046          $SIZE:  MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
11477  056134  010146                  MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
11478  056136  010246                  MOV     R2,-(SP)        ;;SAVE R2 ON THE STACK
11479  056140  010346                  MOV     R3,-(SP)        ;;SAVE R3 ON THE STACK
11480  056142  013746  000004          MOV     @#ERRVEC,-(SP)  ;;SAVE PRESENT ERROR VECTOR PS & PC
11481  056146  013746  000006          MOV     @#ERRVEC+2,-(SP)
11482  056152  010600                  MOV     SP,R0           ;;SAVE THE STACK POINTER
11483                          ;;SET THE ERRVEC PS TO THE PRESENT PS
11484  056154  013746  000034          MOV     @#TRAPVEC,-(SP) ;;SAVE CURRENT TRAP VECTOR
11485  056160  012737  056170  000034  MOV     #64$,@#TRAPVEC  ;;SETUP NEW TRAP VECTOT
11486  056166  104400                  TRAP                    ;;PUSH OLD PSW AND PC ON STACK
11487  056170  016637  000002  000006  64$:    MOV     2(SP),@#ERRVEC+2        ;;SAVE PSW IN @#ERRVEC+2
11488  056176  012716  056204          MOV     #65$,(SP)               ;;REPLACE OLD PC WITH NEW
11489  056202  000002                  RTI                     ;;RESTORE PSW
11490  056204  012637  000034          65$:    MOV     (SP)+,@#TRAPVEC ;;RESTORE OLD TRAP  VECTOR
11491  056210  012701  003776          MOV     #3776,R1        ;;SETUP ADDRESS
```

```
11492  056214  105727                          TSTB    (PC)+           ;;USE MEMORY MANAGEMENT?
11493  056216  000200                  $KT11:  .WORD   200             ;;SET TO USE MEMORY MANAGEMENT
11494  056220  100062                          BPL     $CORE           ;;BR IF NO
11495  056222  012737  056360  000004          MOV     #$KTNEX,@#ERRVEC ;;SET FOR TIMEOUT
11496  056230  005737  177572                  TST     @#SR0           ;;KT11 ARE YOU THERE?
11497  056234  052737  100000  056216          BIS     #100000,$KT11   ;;YES--SET KT11 KEY
11498  056242  005046                          CLR     -(SP)           ;;INITIALIZE FOR "PAR" LOADING
11499  056244  012702  172340                  MOV     #KIPAR0,R2      ;;ADDRESS OF FIRST "PAR"
11500  056250  012703  000010                  MOV     #^D8,R3         ;;LOAD EIGHT "PAR.'S" AND EIGHT "PDR.'S"
11501  056254  012762  077406  177740  1$:     MOV     #77406,-40(R2)  ;;PDR = 4K, UP, READ/WRITE
11502  056262  011622                          MOV     (SP),(R2)+      ;;LOAD "PAR"
11503  056264  062716  000200                  ADD     #200,(SP)       ;;UPDATE FOR NEXT "PAR"
11504  056270  077307                          SOB     R3,1$           ;;LOOP UNTIL ALL EIGHT ARE LOADED
11505  056272  012742  177600                  MOV     #177600,-(R2)   ;;SETUP KIPAR7 FOR I/O
11506  056276  005042                          CLR     -(R2)           ;;SETUP KIPAR6 FOR TESTING
11507  056300  012737  056316  000004          MOV     #2$,@#ERRVEC    ;;CATCH TIMEOUT IF NO SR3
11508  056306  012737  000020  172516          MOV     #20,@#SR3       ;;ENABLE 22 BIT MODE
11509  056314  000401                          BR      3$              ;;THIS PDP-11 HAS A SR3 REGISTER
11510  056316  022626                  2$:     CMP     (SP)+,(SP)+     ;;CLEAN OFF THE STACK--NO SR3
11511  056320  005237  177572          3$:     INC     @#SR0           ;;TURN ON MEMORY MANAGEMENT
11512  056324  012737  056350  000004          MOV     #$KTOUT,@#ERRVEC ;;SET FOR TIME OUT
11513  056332  005737  143776          4$:     TST     @#143776        ;;TRAP ON NON-EX-MEM
11514  056336  062712  000040                  ADD     #40,(R2)        ;;MAKE A 1K STEP
11515  056342  023712  172356                  CMP     @#KIPAR7,(R2)   ;;LAST ONE?
11516  056346  101371                          BHI     4$              ;;NO--TRY IT
11517  056350  011202                  $KTOUT: MOV     (R2),R2         ;;GET LAST BANK+1
11518  056352  005037  177572                  CLR     @#SR0           ;;TURN OFF MEMORY MANAGEMENT
11519  056356  000421                          BR      $SIZEX
11520  056360  042737  100000  056216  $KTNEX: BIC     #100000,$KT11   ;;KT11 NON-EXISTENT
11521  056366  012737  056416  000004  $CORE:  MOV     #$CROUT,@#ERRVEC ;;SET FOR TIMEOUT
11522  056374  005002                          CLR     R2              ;;SET UP BANK
11523  056376  062701  004000          1$:     ADD     #4000,R1        ;;INCREMENT BY 1K
11524  056402  062702  000040                  ADD     #40,R2          ;;1K STEP
11525  056406  005711                          TST     (R1)            ;;TRAP ON TIME OUT
11526  056410  022701  177776                  CMP     #177776,R1      ;;LAST ONE
11527  056414  001370                          BNE     1$              ;;NO--TRY AGAIN
11528  056416  162701  004000  $CROUT: SUB     #4000,R1
11529  056422  162702  000040  $SIZEX: SUB     #40,R2          ;;DROP BACK
11530  056426  010006                          MOV     R0,SP           ;;RESTORE THE STACK
11531  056430  012637  000006                  MOV     (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
11532  056434  012637  000004                  MOV     (SP)+,@#ERRVEC
11533  056440  010137  056462                  MOV     R1,$LSTAD       ;;LAST ADDRESS
11534  056444  010237  056464                  MOV     R2,$LSTBK       ;;LAST BANK
11535  056450  012603                          MOV     (SP)+,R3        ;;RESTORE R3
11536  056452  012602                          MOV     (SP)+,R2        ;;RESTORE R2
11537  056454  012601                          MOV     (SP)+,R1        ;;RESTORE R1
11538  056456  012600                          MOV     (SP)+,R0        ;;RESTORE R0
11539  056460  000207                          RTS     PC
11540  056462  000000          $LSTAD: .WORD   0               ;;CONTAINS THE LAST ADDRESS
11541  056464  000000          $LSTBK: .WORD   0               ;;CONTAINS THE LAST BANK
11542                           .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
11543
11544                           ;;*****************************************************************
11545                           ;*SAVE R0-R5
11546                           ;*CALL:
11547                           ;*      SAVREG
```

```
11548                                   ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
11549                                   ;*
11550                                   ;*TOP---(+16)
11551                                   ;*  +2---(+18)
11552                                   ;*  +4---R5
11553                                   ;*  +6---R4
11554                                   ;*  +8---R3
11555                                   ;*+10---R2
11556                                   ;*+12---R1
11557                                   ;*+14---R0
11558
11559  056466                           $SAVREG:
11560  056466  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
11561  056470  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
11562  056472  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
11563  056474  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
11564  056476  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
11565  056500  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
11566  056502  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
11567  056506  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
11568  056512  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
11569  056516  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
11570  056522  000002                          RTI
11571
11572                                   ;*RESTORE R0-R5
11573                                   ;*CALL:
11574                                   ;*      RESREG
11575  056524                           $RESREG:
11576  056524  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
11577  056530  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
11578  056534  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
11579  056540  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
11580  056544  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
11581  056546  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
11582  056550  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
11583  056552  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
11584  056554  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
11585  056556  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
11586  056560  000002                          RTI
11587                                   .SBTTL  TRAP DECODER
11588
11589                                   ;;*****************************************************************
11590                                   ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
11591                                   ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
11592                                   ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
11593                                   ;*GO TO THAT ROUTINE.
11594
11595  056562  010046                   $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
11596  056564  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
11597  056570  005740                          TST     -(R0)           ;;BACKUP BY 2
11598  056572  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
11599  056574  006300                          ASL     R0              ;;POSITION FOR INDEXING
11600  056576  016000  056604                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
11601  056602  000200                          RTS     R0              ;;GO TO ROUTINE
11602
11603                                   .SBTTL  TRAP TABLE
```

```
11604
11605                                   ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
11606                                   ;*BY THE "TRAP" INSTRUCTION.
11607
11608                                   ;       ROUTINE
11609                                   ;       -------
11610  056604                           $TRPAD:
11611  056604  053174                           $TYPE   ;;CALL=TYPE     TRAP+0(104400)  TTY TYPEOUT ROUTINE
11612  056606  054274                           $TYPOC  ;;CALL=TYPOC    TRAP+1(104401)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
11613  056610  054250                           $TYPOS  ;;CALL=TYPOS    TRAP+2(104402)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
11614  056612  054310                           $TYPON  ;;CALL=TYPON    TRAP+3(104403)  TYPE OCTAL NUMBER (AS PER LAST CALL)
11615  056614  054476                           $TYPDS  ;;CALL=TYPDS    TRAP+4(104404)  TYPE DECIMAL NUMBER (WITH SIGN)
11616
11617
11618  056616  055116                           $RDCHR  ;;CALL=RDCHR    TRAP+5(104405)  TTY TYPEIN CHARACTER ROUTINE
11619  056620  056466                           $SAVREG ;;CALL=SAVREG   TRAP+6(104406)  SAVE R0-R5 ROUTINE
11620  056622  056524                           $RESREG ;;CALL=RESREG   TRAP+7(104407)  RESTORE R0-R5 ROUTINE
11621  056624  055402                           SCOPE1  ;;CALL=SCOPER   TRAP+10(104410) INTERNAL LOOP ON ERROR ROUTINE
11622
11623  056626  020040  020040  042524  TSTMSG: .ASCIZ  /    TEST /
11624  056634  052123  000040
11625  056640  025052  020040     000  AS2SP2: .ASCIZ  /**  /
11626  056645     125  044516  052502  EM1:    .ASCIZ  /UNIBUS PARITY ERROR/
11627  056652  020123  040520  044522
11628  056660  054524  042440  051122
11629  056666  051117     000
11630  056671     116  047117  042455  EM2:    .ASCIZ  /NON-EXISTANT MEMORY/
11631  056676  044530  052123  047101
11632  056704  020124  042515  047515
11633  056712  054522     000
11634  056715     116  047117  042455  EM3:    .ASCIZ  /NON-EXISTANT DRIVE/
11635  056722  044530  052123  047101
11636  056730  020124  051104  053111
11637  056736  000105
11638  056740  047125  052111  043040  EM4:    .ASCIZ  /UNIT FIELD ERROR/
11639  056746  042511  042114  042440
11640  056754  051122  051117     000
11641  056761     123  041125  054523  EM5:    .ASCIZ  /SUBSYS TIMEOUT/
11642  056766  020123  044524  042515
11643  056774  052517  000124
11644  057000  042523  041522  047117  EM6:    .ASCIZ  /SERCON PARITY ERROR/
11645  057006  050040  051101  052111
11646  057014  020131  051105  047522
11647  057022  000122
11648  057024  051104  053111  020105  EM7:    .ASCIZ  /DRIVE DETECTED PARITY ERROR/
11649  057032  042504  042524  052103
11650  057040  042105  050040  051101
11651  057046  052111  020131  051105
11652  057054  047522  000122
11653  057060  041501  046040  053517  EM10:   .ASCIZ  /AC LOW/
11654  057066     000
11655  057067     123  042520  042105  EM11:   .ASCIZ  /SPEED LOSS/
11656  057074  046040  051517  000123
11657  057102  046111  042514  040507  EM12:   .ASCIZ  /ILLEGAL FUNCTION/
11658  057110  020114  052506  041516
11659  057116  044524  047117     000
```

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11660  057123     120  047522  051107  EM13:   .ASCIZ  /PROGRAMMING ERROR/
11661  057130  046501  044515  043516
11662  057136  042440  051122  051117
11663  057144     000
11664  057145     116  047117  042455  EM14:   .ASCIZ  /NON-EXISTANT FUNCTION/
11665  057152  044530  052123  047101
11666  057160  020124  052506  041516
11667  057166  044524  047117     000
11668  057173     104  044522  042526  EM15:   .ASCIZ  /DRIVE TYPE ERROR/
11669  057200  052040  050131  020105
11670  057206  051105  047522  000122
11671  057214  047506  046522  052101  EM16:   .ASCIZ  /FORMAT ERROR/
11672  057222  042440  051122  051117
11673  057230     000
11674  057231     127  044522  042524  EM17:   .ASCIZ  /WRITE LOCK ERROR/
11675  057236  046040  041517  020113
11676  057244  051105  047522  000122
11677  057252  051104  053111  020105  EM20:   .ASCIZ  /DRIVE UNSAFE/
11678  057260  047125  040523  042506
11679  057266     000
11680  057267     123  042505  020113  EM21:   .ASCIZ  /SEEK INCOMPLETE/
11681  057274  047111  047503  050115
11682  057302  042514  042524     000
11683  057307     103  046131  047111  EM22:   .ASCIZ  /CYLINDER OVERFLOW/
11684  057314  042504  020122  053117
11685  057322  051105  046106  053517
11686  057330     000
11687  057331     111  046114  043505  EM23:   .ASCIZ  /ILLEGAL CYLINDER ADDRESS/
11688  057336  046101  041440  046131
11689  057344  047111  042504  020122
11690  057352  042101  051104  051505
11691  057360  000123
11692  057362  051104  053111  020105  EM24:   .ASCIZ  /DRIVE OFF TRACK/
11693  057370  043117  020106  051124
11694  057376  041501  000113
11695  057402  051104  053111  020105  EM25:   .ASCIZ  /DRIVE TIMING ERROR/
11696  057410  044524  044515  043516
11697  057416  042440  051122  051117
11698  057424     000
11699  057425     104  052101  020101  EM26:   .ASCIZ  /DATA LATE/
11700  057432  040514  042524     000
11701  057437     103  047117  051124  EM27:   .ASCIZ  /CONTROLLER TIMEOUT/
11702  057444  046117  042514  020122
11703  057452  044524  042515  052517
11704  057460  000124
11705  057462  050117  051105  052101  EM30:   .ASCIZ  /OPERATION INCOMPLETE/
11706  057470  047511  020116  047111
11707  057476  047503  050115  042514
11708  057504  042524     000
11709  057507     110  040505  042504  EM31:   .ASCIZ  /HEADER VRC ERROR/
11710  057514  020122  051126  020103
11711  057522  051105  047522  000122
11712  057530  040504  040524  041440  EM32:   .ASCIZ  /DATA CHECK ERROR/
11713  057536  042510  045503  042440
11714  057544  051122  051117     000
11715  057551     127  044522  042524  EM33:   .ASCIZ  /WRITE CHECK ERROR/
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11716  057556  041440  042510  045503
11717  057564  042440  051122  051117
11718  057572     000
11719  057573     104  052101  020101  EM34:   .ASCIZ  /DATA MISCOMPARE/
11720  057600  044515  041523  046517
11721  057606  040520  042522     000
11722  057613     116  020117  051104  EM35:   .ASCIZ  /NO DRIVE RESPONSE-UFE & NXD/
11723  057620  053111  020105  042522
11724  057626  050123  047117  042523
11725  057634  052455  042506  023040
11726  057642  047040  042130     000
11727  057647     104  044522  042526  EM36:   .ASCIZ  /DRIVE ERROR WILL NOT CLEAR/
11728  057654  042440  051122  051117
11729  057662  053440  046111  020114
11730  057670  047516  020124  046103
11731  057676  040505  000122
11732  057702  051104  053111  020105  EM37:   .ASCIZ  /DRIVE STATUS CHANGE WILL NOT CLEAR/
11733  057710  052123  052101  051525
11734  057716  041440  040510  043516
11735  057724  020105  044527  046114
11736  057732  047040  052117  041440
11737  057740  042514  051101     000
11738  057745     101  052124  047047  EM40:   .ASCIZ  /ATT'N BUT NO STATUS CHANGE OR FAULT/
11739  057752  041040  052125  047040
11740  057760  020117  052123  052101
11741  057766  051525  041440  040510
11742  057774  043516  020105  051117
11743  060002  043040  052501  052114
11744  060010     000
11745  060011     101  052124  047047  EM41:   .ASCIZ  /ATT'N BUT DRIVE NOT AVAILABLE/
11746  060016  041040  052125  042040
11747  060024  044522  042526  047040
11748  060032  052117  040440  040526
11749  060040  046111  041101  042514
11750  060046     000
11751  060047     101  052124  047047  EM42:   .ASCIZ  /ATT'N WHEN NOT EXPECTED/
11752  060054  053440  042510  020116
11753  060062  047516  020124  054105
11754  060070  042520  052103  042105
11755  060076     000
11756  060077     105  051122  051117  EM43:   .ASCIZ  /ERROR GATHERING DRIVE STATUS/
11757  060104  043440  052101  042510
11758  060112  044522  043516  042040
11759  060120  044522  042526  051440
11760  060126  040524  052524  000123
11761  060134  052515  052114  050111  EM52:   .ASCIZ  /MULTIPLE DRIVE SELECT/
11762  060142  042514  042040  044522
11763  060150  042526  051440  046105
11764  060156  041505  000124
11765  060162  042510  042101  051105  EM53:   .ASCIZ  /HEADER COMPARE ERROR/
11766  060170  041440  046517  040520
11767  060176  042522  042440  051122
11768  060204  051117     000
11769  060207     123  041125  054523  EM56:   .ASCIZ  /SUBSYS TIMEOUT/
11770  060214  020123  044524  042515
11771  060222  052517  000124
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11772  060226  051105  047522  020122  EM60:   .ASCIZ  /ERROR IN RECAL FOR RECOVERY/
11773  060234  047111  051040  041505
11774  060242  046101  043040  051117
11775  060250  051040  041505  053117
11776  060256  051105  000131
11777  060262  051120  043517  040522  EM61:   .ASCIZ  /PROGRAM ABORTING FATAL ERROR IN RETRY/
11778  060270  020115  041101  051117
11779  060276  044524  043516  043040
11780  060304  052101  046101  042440
11781  060312  051122  051117  044440
11782  060320  020116  042522  051124
11783  060326  000131
11784  060330  054503  044514  042116  EM62:   .ASCIZ  /CYLINDER MISCOMPARE/
11785  060336  051105  046440  051511
11786  060344  047503  050115  051101
11787  060352  000105
11788  060354  046103  040505  020122  EM63:   .ASCIZ  /CLEAR CONTROLLER DID NOT CLEAR ERROR/
11789  060362  047503  052116  047522
11790  060370  046114  051105  042040
11791  060376  042111  047040  052117
11792  060404  041440  042514  051101
11793  060412  042440  051122  051117
11794  060420     000
11795  060421     116  020117  052101  EM64:   .ASCIZ  /NO ATT'N IN ATT'N SUMMARY REGISTER/
11796  060426  023524  020116  047111
11797  060434  040440  052124  047047
11798  060442  051440  046525  040515
11799  060450  054522  051040  043505
11800  060456  051511  042524  000122
11801  060464  047125  047523  044514  EM65:   .ASCIZ  /UNSOLICITED ATTENTION/
11802  060472  044503  042524  020104
11803  060500  052101  042524  052116
11804  060506  047511  000116
11805  060512  047125  054105  042520  EM66:   .ASCIZ  /UNEXPECTED DATA TYPE ERROR/
11806  060520  052103  042105  042040
11807  060526  052101  020101  054524
11808  060534  042520  042440  051122
11809  060542  051117     000
11810  060545     101  052124  047047  EM67:   .ASCIZ  /ATT'N DID NOT RESET WITH CLEAR/
11811  060552  042040  042111  047040
11812  060560  052117  051040  051505
11813  060566  052105  053440  052111
11814  060574  020110  046103  040505
11815  060602  000122
11816  060604  052523  051502  051531  EM70:   .ASCIZ  /SUBSYS CLEAR DID NOT CLEAR DRIVE ATT'N/
11817  060612  041440  042514  051101
11818  060620  042040  042111  047040
11819  060626  052117  041440  042514
11820  060634  051101  042040  044522
11821  060642  042526  040440  052124
11822  060650  047047     000
11823  060653     104  052101  020101  EM71:   .ASCIZ  /DATA LATE WHEN UNLOADING HEADER/
11824  060660  040514  042524  053440
11825  060666  042510  020116  047125
11826  060674  047514  042101  047111
11827  060702  020107  042510  042101
```

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11828  060710  051105     000
11829  060713     103  047117  051124  EM72:   .ASCIZ  /CONTROLLER ERROR WHEN DRIVER SERVICING/
11830  060720  046117  042514  020122
11831  060726  051105  047522  020122
11832  060734  044127  047105  042040
11833  060742  044522  042526  020122
11834  060750  042523  053122  041511
11835  060756  047111  000107
11836  060762  051104  053111  020105  EM73:   .ASCIZ  /DRIVE DETECTED PARITY ERROR/
11837  060770  042504  042524  052103
11838  060776  042105  050040  051101
11839  061004  052111  020131  051105
11840  061012  047522  000122
11841  061016  047125  042504  044506  EM74:   .ASCIZ  /UNDEFINED ERROR/
11842  061024  042516  020104  051105
11843  061032  047522  000122
11844  061036  040515  045522  047111  EM75:   .ASCIZ  /MARKING THIS SECTOR BAD/
11845  061044  020107  044124  051511
11846  061052  051440  041505  047524
11847  061060  020122  040502  000104
11848  061066  040502  020104  040504  EM76:   .ASCIZ  /BAD DATA VERIF'N WITH READ. ECC OF LAST RETRY IS:/
11849  061074  040524  053040  051105
11850  061102  043111  047047  053440
11851  061110  052111  020110  042522
11852  061116  042101  020056  041505
11853  061124  020103  043117  046040
11854  061132  051501  020124  042522
11855  061140  051124  020131  051511
11856  061146  000072
11857  061150  042522  051124  020131  EM77:   .ASCIZ  /RETRY SUCCESSFUL/
11858  061156  052523  041503  051505
11859  061164  043123  046125     000
11860  061171     122  052105  054522  EM100:  .ASCIZ  /RETRY UNSUCCESSFUL/
11861  061176  052440  051516  041525
11862  061204  042503  051523  052506
11863  061212  000114
11864  061214  040503  047116  052117  EM101:  .ASCIZ  /CANNOT FIND A VALID HEADER IN TRACK JUST READ/
11865  061222  043040  047111  020104
11866  061230  020101  040526  044514
11867  061236  020104  042510  042101
11868  061244  051105  044440  020116
11869  061252  051124  041501  020113
11870  061260  052512  052123  051040
11871  061266  040505  000104
11872  061272  040502  020104  042523  EM102:  .ASCIZ  /BAD SECTOR ERROR ON SECTOR NOT LISTED BAD/
11873  061300  052103  051117  042440
11874  061306  051122  051117  047440
11875  061314  020116  042523  052103
11876  061322  051117  047040  052117
11877  061330  046040  051511  042524
11878  061336  020104  040502  000104
11879  061344  044524  042515  026504  EM103:  .ASCIZ  /TIMED-OUT ON READ HDR/
11880  061352  052517  020124  047117
11881  061360  051040  040505  020104
11882  061366  042110  000122
11883  061372  044524  042515  026504  EM104:  .ASCIZ  /TIMED-OUT ON SEEK/
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11884  061400  052517  020124  047117
11885  061406  051440  042505  000113
11886  061414  051104  053111  020105  EM105:  .ASCIZ  /DRIVE SIEZED BY OTHER PORT/
11887  061422  044523  055105  042105
11888  061430  041040  020131  052117
11889  061436  042510  020122  047520
11890  061444  052122     000
11891  061447     104  052101  020101  EM106:  .ASCIZ  /DATA MISCMPR WHILE BAI SET/
11892  061454  044515  041523  050115
11893  061462  020122  044127  046111
11894  061470  020105  040502  020111
11895  061476  042523  000124
11896  061502  047516  047040  046505  EM107:  .ASCIZ  /NO NEM ERROR WHEN REF'ING LOC 760000/
11897  061510  042440  051122  051117
11898  061516  053440  042510  020116
11899  061524  042522  023506  047111
11900  061532  020107  047514  020103
11901  061540  033067  030060  030060
11902  061546     000
11903  061547     111  052116  050122  EM110:  .ASCIZ  /INTRPT WHEN CNTRLR NOT RDY/
11904  061554  020124  044127  047105
11905  061562  041440  052116  046122
11906  061570  020122  047516  020124
11907  061576  042122  000131
11908  061602  047516  040440  052124  EM111:  .ASCIZ  /NO ATT'N ON SEEK/
11909  061610  047047  047440  020116
11910  061616  042523  045505     000
11911  061623     104  044522  042526  EM112:  .ASCIZ  /DRIVE'S CYLINDER INCORRECT/
11912  061630  051447  041440  046131
11913  061636  047111  042504  020122
11914  061644  047111  047503  051122
11915  061652  041505  000124
11916  061656  041101  051117  026524  EM113:  .ASCIZ  /ABORT- CAN'T READ BSF/
11917  061664  041440  047101  052047
11918  061672  051040  040505  020104
11919  061700  051502  000106
11920  061704  052113  030461  043040  EM114:  .ASCIZ  /KT11 FAILURE/
11921  061712  044501  052514  042522
11922  061720     000
11923  061721     115  046505  050040  EM115:  .ASCIZ  /MEM PARITY ERR/
11924  061726  051101  052111  020131
11925  061734  051105  000122
11926  061740  052503  051122  047105  DH100:  .ASCIZ  /CURRENT COMMAND :/
11927  061746  020124  047503  046515
11928  061754  047101  020104  000072
11929  061762  051120  053105  047511  DH105:  .ASCIZ  /PREVIOUS COMMAND :/
11930  061770  051525  041440  046517
11931  061776  040515  042116  035040
11932  062004     000
11933  062005     122  033113  030461  DH200:  .ASCIZ  /RK611 REGISTERS :/
11934  062012  051040  043505  051511
11935  062020  042524  051522  035040
11936  062026     000
11937  062027     122  046505  044501  DH500:  .ASCIZ  /REMAINING REGISTERS NOT VALID/
11938  062034  044516  043516  051040
11939  062042  043505  051511  042524
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11940  062050  051522  047040  052117
11941  062056  053040  046101  042111
11942  062064     000
11943  062065     124  042510  043040  DH501:  .ASCIZ  /THE FOLLOWING REGISTER DATA MAY BE INCORRECT :/
11944  062072  046117  047514  044527
11945  062100  043516  051040  043505
11946  062106  051511  042524  020122
11947  062114  040504  040524  046440
11948  062122  054501  041040  020105
11949  062130  047111  047503  051122
11950  062136  041505  020124  000072
11951  062144  051105  020122  041520  DH101:  .ASCIZ  /ERR PC  DRIVE   CMND    CYLNDR  TRACK   SECTOR  WD CNT/
11952  062152  020040  051104  053111
11953  062160  020105  020040  046503
11954  062166  042116  020040  020040
11955  062174  054503  047114  051104
11956  062202  020040  051124  041501
11957  062210  020113  020040  042523
11958  062216  052103  051117  020040
11959  062224  042127  041440  052116
11960  062232     000
11961  062233     110  020111  040502  DH102:  .ASCIZ  /HI BA   LO BA/
11962  062240  020040  046040  020117
11963  062246  040502     000
11964  062251     120  042522  027126  DH103:  .ASCIZ  /PREV. UNIBUS MAP :/
11965  062256  052440  044516  052502
11966  062264  020123  040515  020120
11967  062272  000072
11968  062274  044510  051040  043505  DH104:  .ASCIZ  /HI REGO LO REGO/
11969  062302  020060  047514  051040
11970  062310  043505  000060
11971  062314  052503  027122  052440  DH106:  .ASCIZ  /CUR. UNIBUS MAP :/
11972  062322  044516  052502  020123
11973  062330  040515  020120  000072
11974  062336  045522  051503  020061  DH201:  .ASCIZ  /RKCS1   RKCS2   RKDC    RKDA    RKWCR   RKBA    RKASOF/
11975  062344  020040  045522  051503
11976  062352  020062  020040  045522
11977  062360  041504  020040  020040
11978  062366  045522  040504  020040
11979  062374  020040  045522  041527
11980  062402  020122  020040  045522
11981  062410  040502  020040  020040
11982  062416  045522  051501  043117
11983  062424     000
11984  062425     122  042113  020123  DH202:  .ASCIZ  /RKDS    RKER/
11985  062432  020040  051040  042513
11986  062440  000122
11987  062442  030101  020060  020040  DH203:  .ASCIZ  /A00     B00     A01     B01     A02     B02     A03     B03/
11988  062450  020040  030102  020060
11989  062456  020040  020040  030101
11990  062464  020061  020040  020040
11991  062472  030102  020061  020040
11992  062500  020040  030101  020062
11993  062506  020040  020040  030102
11994  062514  020062  020040  020040
11995  062522  030101  020063  020040
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11996  062530  020040  030102  000063
11997  062536  042510  042101  051105  DH601:  .ASCIZ  /HEADER SHOULD BE:/
11998  062544  051440  047510  046125
11999  062552  020104  042502  000072
12000  062560  042510  042101  051105  DH602:  .ASCIZ  /HEADER OF SECTOR 0 THIS CYLINDER IS:/
12001  062566  047440  020106  042523
12002  062574  052103  051117  030040
12003  062602  052040  044510  020123
12004  062610  054503  044514  042116
12005  062616  051105  044440  035123
12006  062624     000
12007  062625     120  041501  020113  DH604:  .ASCIZ  /PACK ADDRESS OF ERROR(S) :/
12008  062632  042101  051104  051505
12009  062640  020123  043117  042440
12010  062646  051122  051117  051450
12011  062654  020051  000072
12012  062660  054503  047114  051104  DH6041: .ASCIZ  /CYLNDR  TRACK   SECTOR/
12013  062666  020040  051124  041501
12014  062674  020113  020040  042523
12015  062702  052103  051117     000
12016  062707     103  046131  042116  DH6042: .ASCIZ  /CYLNDR  TRACK/
12017  062714  020122  052040  040522
12018  062722  045503     000
12019  062725     105  041503  042040  DH605:  .ASCIZ  /ECC DATA IS:/
12020  062732  052101  020101  051511
12021  062740  000072
12022  062742  047520  020123  020040  DH6051: .ASCIZ  /POS     PAT     CORRECTABLE?/
12023  062750  020040  040520  020124
12024  062756  020040  020040  047503
12025  062764  051122  041505  040524
12026  062772  046102  037505     000
12027  062777     127  051117  030504  DH606:  .ASCIZ  /WORD1   WORD2   WORD3/
12028  063004  020040  053440  051117
12029  063012  031104  020040  053440
12030  063020  051117  031504     000
12031  063025     102  042101  044040  DH607:  .ASCIZ  /BAD HEADER IS :/
12032  063032  040505  042504  020122
12033  063040  051511  035040     000
12034  063045     127  020104  020043  DH701:  .ASCIZ  /WD #    GOOD    BAD     HI PHY  LO PHY  VRT AD  KIPAR6/
12035  063052  020040  043440  047517
12036  063060  020104  020040  041040
12037  063066  042101  020040  020040
12038  063074  044040  020111  044120
12039  063102  020131  046040  020117
12040  063110  044120  020131  053040
12041  063116  052122  040440  020104
12042  063124  045440  050111  051101
12043  063132  000066
12044  063134  047507  042117  020040  DH702:  .ASCIZ  /GOOD    BAD/
12045  063142  020040  040502  000104
12046  063150  040506  046111  047111  DH703:  .ASCIZ  /FAILING DATA WORD :/
12047  063156  020107  040504  040524
12048  063164  053440  051117  020104
12049  063172  000072
12050  063174  051123  004460  051123  DH704:  .ASCIZ  /SR0    SR1     SR2     SR3/
12051  063202  004461  051123  004462
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12052  063210  051123  000063
12053  063214  052113  030461  051040  DH705:  .ASCIZ  /KT11 REGS :/
12054  063222  043505  020123  000072
12055  063230  042515  020115  042522  DH706:  .ASCIZ  /MEM REGS :/
12056  063236  051507  035040     000
12057  063243     120  004503  047514  DH707:  .ASCIZ  /PC     LOERAD  HIERAD  MEMSYS/
12058  063250  051105  042101  044011
12059  063256  042511  040522  004504
12060  063264  042515  051515  051531
12061  063272     000
12062  063273     120  004503  051503  DH710:  .ASCIZ  /PC     CSR AD  CSR/
12063  063300  020122  042101  041411
12064  063306  051123     000
12065  063311     103  046131  047111  DH711:  .ASCIZ  /CYLINDERS :/
12066  063316  042504  051522  035040
12067  063324     000
12068  063325     122  042113  020123  DH204:  .ASCIZ  /RKDS    RKER    RKMR2   RKMR3/
12069  063332  020040  051040  042513
12070  063340  020122  020040  051040
12071  063346  046513  031122  020040
12072  063354  051040  046513  031522
12073  063362     000
12074  063363     105  051122  051117  DH502:  .ASCIZ  /ERROR TRYING TO GET FAILURE INFO/
12075  063370  052040  054522  047111
12076  063376  020107  047524  043440
12077  063404  052105  043040  044501
12078  063412  052514  042522  044440
12079  063420  043116  000117
12080  063424  042523  047503  042116  DH503:  .ASCIZ  /SECOND TIMEOUT OCCURRED GETTING DRIVE STATUS/
12081  063432  052040  046511  047505
12082  063440  052125  047440  041503
12083  063446  051125  042522  020104
12084  063454  042507  052124  047111
12085  063462  020107  051104  053111
12086  063470  020105  052123  052101
12087  063476  051525     000
12088  063501     116  046525  042502  DH800:  .ASCIZ  /NUMBER OF RETRIES:/
12089  063506  020122  043117  051040
12090  063514  052105  044522  051505
12091  063522  000072
12092                                  .EVEN
12093  063524  001116  005502  005500  DT100:  .WORD   $ERRPC,DRIVE,ERRCOM,$REG0,$REG1,$REG2,$REG3
12094  063532  001162  001164  001166
12095  063540  001170
12096  063542  001256  001260          DT102:  .WORD   $REG36,$REG37
12097  063546  001174  001176  001200  DT201:  .WORD   $REG5,$REG6,$REG7,$REG10,$REG11,$REG12,$REG13
12098  063554  001202  001204  001206
12099  063562  001210
12100  063564  001212  001214          DT202:  .WORD   $REG14,$REG15
12101  063570  001216  001220  001222  DT203:  .WORD   $REG16,$REG17,$REG20,$REG21,$REG22,$REG23,$REG24,$REG25
12102  063576  001224  001226  001230
12103  063604  001232  001234
12104  063610  001174  001176  001200  DT601:  .WORD   $REG5,$REG6,$REG7
12105  063616  001202  001204  001206  DT602:  .WORD   $REG10,$REG11,$REG12,$REG13,$REG14,$REG15,$REG16
12106  063624  001210  001212  001214
12107  063632  001216
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12108  063634  005256  005254          DT103:  .WORD   PRMPHO,PRMPLO
12109
12110  063640  000006                  DF01:   .WORD   6               ;NUMBER OF HEADER LINES
12111  063642     000                          .BYTE   0               ;NUMBER OF COL FOR FIRST HDR
12112  063643     000                          .BYTE   0               ;ALL CHARACTERS OCTAL
12113  063644  062144                          .WORD   DH101           ;SECOND HDR LINE
12114  063646     007     000                  .BYTE   7,0             ;NUM OF COL-ALL OCTAL
12115  063650  062233                          .WORD   DH102
12116  063652     002     000                  .BYTE   2,0
12117  063654  062005                          .WORD   DH200
12118  063656     000     000                  .BYTE   0,0
12119  063660  062336                          .WORD   DH201
12120  063662     007     000                  .BYTE   7,0
12121  063664  062027                          .WORD   DH500
12122  063666     000     000                  .BYTE   0,0
12123
12124  063670  000007                  DF02:   .WORD   7
12125  063672     000     000                  .BYTE   0,0
12126  063674  062144                          .WORD   DH101
12127  063676     007     000                  .BYTE   7,0
12128  063700  062233                          .WORD   DH102
12129  063702     002     000                  .BYTE   2,0
12130  063704  062005                          .WORD   DH200
12131  063706     000     000                  .BYTE   0,0
12132  063710  062336                          .WORD   DH201
12133  063712     007     000                  .BYTE   7,0
12134  063714  062425                          .WORD   DH202
12135  063716     002     000                  .BYTE   2,0
12136  063720  062442                          .WORD   DH203
12137  063722     010     000                  .BYTE   10,0
12138
12139  063724  000010                  DF03:   .WORD   10
12140  063726     000     000                  .BYTE   0,0
12141  063730  062144                          .WORD   DH101
12142  063732     007     000                  .BYTE   7,0
12143  063734  062233                          .WORD   DH102
12144  063736     002     000                  .BYTE   2,0
12145  063740  062005                          .WORD   DH200
12146  063742     000     000                  .BYTE   0,0
12147  063744  062336                          .WORD   DH201
12148  063746     007     000                  .BYTE   7,0
12149  063750  062065                          .WORD   DH501           ;"THE FOLLOWING REG DATA MB INCORRECT"
12150  063752     000     000                  .BYTE   0,0
12151  063754  062425                          .WORD   DH202
12152  063756     002     000                  .BYTE   2,0
12153  063760  062442                          .WORD   DH203
12154  063762     010     000                  .BYTE   10,0
12155
12156  063764  000003                  DF04:   .WORD   3
12157  063766     000     000                  .BYTE   0,0
12158  063770  062144                          .WORD   DH101
12159  063772     007     000                  .BYTE   7,0
12160  063774  062233                          .WORD   DH102
12161  063776     002     000                  .BYTE   2,0
12162
12163  064000  000007                  DF05:   .WORD   7               ;OPI, HVRC
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12164  064002  000     000                .BYTE   0,0
12165  064004  062144                     .WORD   DH101
12166  064006  007     000                .BYTE   7,0
12167  064010  062233                     .WORD   DH102
12168  064012  002     000                .BYTE   2,0
12169  064014  062536                     .WORD   DH601
12170  064016  000     000                .BYTE   0,0
12171  064020  062777                     .WORD   DH606
12172  064022  003     000                .BYTE   3,0
12173  064024  062560                     .WORD   DH602
12174  064026  000     000                .BYTE   0,0
12175  064030  062777                     .WORD   DH606
12176  064032  003     000                .BYTE   3,0
12177
12178  064034  000007              DF07:  .WORD   7
12179  064036  000     000                .BYTE   0,0
12180  064040  062144                     .WORD   DH101
12181  064042  007     000                .BYTE   7,0
12182  064044  062233                     .WORD   DH102
12183  064046  002     000                .BYTE   2,0
12184  064050  062625                     .WORD   DH604
12185  064052  000     000                .BYTE   0,0
12186  064054  062660                     .WORD   DH6041
12187  064056  003     000                .BYTE   3,0
12188  064060  062725                     .WORD   DH605
12189  064062  000     000                .BYTE   0,0
12190  064064  062742                     .WORD   DH6051
12191  064066  003     000                .BYTE   3,0
12192
12193  064070  000005              DF10:  .WORD   5
12194  064072  000     000                .BYTE   0,0
12195  064074  062144                     .WORD   DH101
12196  064076  007     000                .BYTE   7,0
12197  064100  062233                     .WORD   DH102
12198  064102  002     000                .BYTE   2,0
12199  064104  062625                     .WORD   DH604
12200  064106  000     000                .BYTE   0,0
12201  064110  062660                     .WORD   DH6041
12202  064112  003     000                .BYTE   3,0
12203
12204  064114  000004              DF11:  .WORD   4
12205  064116  000     000                .BYTE   0,0
12206  064120  062625                     .WORD   DH604
12207  064122  000     000                .BYTE   0,0
12208  064124  062660                     .WORD   DH6041
12209  064126  003     000                .BYTE   3,0
12210  064130  063045                     .WORD   DH701
12211  064132  000     000                .BYTE   0,0
12212
12213  064134  000006              DF12:  .WORD   6
12214  064136  000     000                .BYTE   0,0
12215  064140  062144                     .WORD   DH101
12216  064142  007     000                .BYTE   7,0
12217  064144  062233                     .WORD   DH102
12218  064146  002     000                .BYTE   2,0
12219  064150  062005                     .WORD   DH200
```

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12220  064152  000      000                .BYTE   0,0
12221  064154  062336                      .WORD   DH201
12222  064156  007      000                .BYTE   7,0
12223  064160  063325                      .WORD   DH204
12224  064162  004      000                .BYTE   4,0
12225
12226  064164  000006                DF13: .WORD   6                ;FORMAT FOR 2ND LEVEL ERROR
12227  064166  000      000                .BYTE   0,0             ;IN HEADER COMPARE ERROR
12228  064170  062144                      .WORD   DH101           ;AND 2ND LEVEL HEADER
12229  064172  007      000                .BYTE   7,0             ;VRC ERROR
12230  064174  062233                      .WORD   DH102
12231  064176  002      000                .BYTE   2,0
12232  064200  062536                      .WORD   DH601
12233  064202  000      000                .BYTE   0,0
12234  064204  062777                      .WORD   DH606
12235  064206  003      000                .BYTE   3,0
12236  064210  063363                      .WORD   DH502
12237  064212  000      000                .BYTE   0,0
12238
12239  064214  000006                DF14: .WORD   6                ;FORMAT FOR 2ND LEVEL ERROR
12240  064216  000      000                .BYTE   0,0             ;IN OPERATION INCOMPLETE ERROR
12241  064220  062144                      .WORD   DH101
12242  064222  007      000                .BYTE   7,0
12243  064224  062233                      .WORD   DH102
12244  064226  002      000                .BYTE   2,0
12245  064230  062536                      .WORD   DH601
12246  064232  000      000                .BYTE   0,0
12247  064234  062777                      .WORD   DH606
12248  064236  003      000                .BYTE   3,0
12249  064240  063363                      .WORD   DH502
12250  064242  000      000                .BYTE   0,0
12251
12252  064244  000011                DF15: .WORD   11
12253  064246  000      000                .BYTE   0,0
12254  064250  062144                      .WORD   DH101
12255  064252  007      000                .BYTE   7,0
12256  064254  062233                      .WORD   DH102
12257  064256  002      000                .BYTE   2,0
12258  064260  062005                      .WORD   DH200
12259  064262  000      000                .BYTE   0,0
12260  064264  062336                      .WORD   DH201
12261  064266  007      000                .BYTE   7,0
12262  064270  062425                      .WORD   DH202
12263  064272  002      000                .BYTE   2,0
12264  064274  063424                      .WORD   DH503
12265  064276  000      000                .BYTE   0,0
12266  064300  062065                      .WORD   DH501
12267  064302  000      000                .BYTE   0,0
12268  064304  062442                      .WORD   DH203
12269  064306  010      000                .BYTE   10,0
12270
12271  064310  000011                DF16: .WORD   11
12272  064312  000      000                .BYTE   0,0
12273  064314  062144                      .WORD   DH101
12274  064316  007      000                .BYTE   7,0
12275  064320  062233                      .WORD   DH102
```

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12276  064322  002  000                    .BYTE   2,0
12277  064324  062005                      .WORD   DH200
12278  064326  000  000                    .BYTE   0,0
12279  064330  062336                      .WORD   DH201
12280  064332  007  000                    .BYTE   7,0
12281  064334  062425                      .WORD   DH202
12282  064336  002  000                    .BYTE   2,0
12283  064340  063363                      .WORD   DH502
12284  064342  000  000                    .BYTE   0,0
12285  064344  062065                      .WORD   DH501
12286  064346  000  000                    .BYTE   0,0
12287  064350  062442                      .WORD   DH203
12288  064352  010  000                    .BYTE   10,0
12289
12290  064354  000005              DF17:   .WORD   5
12291  064356  000  000                    .BYTE   0,0
12292  064360  062144                      .WORD   DH101
12293  064362  007  000                    .BYTE   7,0
12294  064364  062233                      .WORD   DH102
12295  064366  002  000                    .BYTE   2,0
12296  064370  063311                      .WORD   DH711
12297  064372  000  000                    .BYTE   0,0
12298  064374  063134                      .WORD   DH702
12299  064376  002  000                    .BYTE   2,0
12300
12301  064400  000002              DF20:   .WORD   2
12302  064402  000  000                    .BYTE   0,0
12303  064404  062274                      .WORD   DH104
12304  064406  002  000                    .BYTE   2,0
12305
12306  064410  000002              DF21:   .WORD   2
12307  064412  000  000                    .BYTE   0,0
12308  064414  062742                      .WORD   DH6051
12309  064416  003  000                    .BYTE   3,0
12310
12311  064420  000006              DF22:   .WORD   6
12312  064422  000  000                    .BYTE   0,0
12313  064424  061740                      .WORD   DH100
12314  064426  000  000                    .BYTE   0,0
12315  064430  062144                      .WORD   DH101
12316  064432  007  000                    .BYTE   7,0
12317  064434  062233                      .WORD   DH102
12318  064436  002  000                    .BYTE   2,0
12319  064440  062314                      .WORD   DH106
12320  064442  000  000                    .BYTE   0,0
12321  064444  062274                      .WORD   DH104
12322  064446  002  000                    .BYTE   2,0
12323
12324  064450  000002              DF23:   .WORD   2
12325  064452  000  000                    .BYTE   0,0
12326  064454  063501                      .WORD   DH800
12327  064456  001  000                    .BYTE   1,0
12328
12329  064460  000001              DF24:   .WORD   1
12330  064462  002  000                    .BYTE   2,0
12331
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12332  064464  000000                  DF25:   .WORD   0
12333  064466     007      000                 .BYTE   7,0
12334
12335  064470  000002                  DF26:   .WORD   2
12336  064472     002      000                 .BYTE   2,0
12337  064474  062442                          .WORD   DH203
12338  064476     010      000                 .BYTE   10,0
12339
12340  064500  000005                  DF27:   .WORD   5
12341  064502     000      000                 .BYTE   0,0
12342  064504  062144                          .WORD   DH101
12343  064506     007      000                 .BYTE   7,0
12344  064510  062233                          .WORD   DH102
12345  064512     002      000                 .BYTE   2,0
12346  064514  063150                          .WORD   DH703
12347  064516     000      000                 .BYTE   0,0
12348  064520  063134                          .WORD   DH702
12349  064522     002      000                 .BYTE   2,0
12350
12351  064524  000005                  DF30:   .WORD   5
12352  064526     000      000                 .BYTE   0,0
12353  064530  062144                          .WORD   DH101
12354  064532     007      000                 .BYTE   7,0
12355  064534  062233                          .WORD   DH102
12356  064536     002      000                 .BYTE   2,0
12357  064540  063214                          .WORD   DH705
12358  064542     000      000                 .BYTE   0,0
12359  064544  063174                          .WORD   DH704
12360  064546     004      000                 .BYTE   4,0
12361
12362  064550  000005                  DF31:   .WORD   5
12363  064552     000      000                 .BYTE   0,0
12364  064554  062144                          .WORD   DH101
12365  064556     007      000                 .BYTE   7,0
12366  064560  062233                          .WORD   DH102
12367  064562     002      000                 .BYTE   2,0
12368  064564  063230                          .WORD   DH706
12369  064566     000      000                 .BYTE   0,0
12370  064570  063273                          .WORD   DH710
12371  064572     003      000                 .BYTE   3,0
12372
12373  064574                  RWBUF:                  ;READ/WRITE DATA BUF <AT LEAST 512(DEC) WORDS>
12374
12375  064574  005015  020040  020040  NOTMSG: .ASCII  <15><12>/          *** NOTE ***/<15><12><12>
12376  064602  020040  020040  020040
12377  064610  025052  020052  047516
12378  064616  042524  025040  025052
12379  064624  005015     012
12380  064627     101  046114  042040          .ASCII  /ALL DRIVES TO BE TESTED MUST HAVE :/<15><12><12>
12381  064634  044522  042526  020123
12382  064642  047524  041040  020105
12383  064650  042524  052123  042105
12384  064656  046440  051525  020124
12385  064664  040510  042526  035040
12386  064672  005015     012
12387  064675     061  020056  020101          .ASCII  /1. A 20 OR 22 SECTOR FORMATTED CARTRIDGE/<15><12>
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12388  064702  030062  047440  020122
12389  064710  031062  051440  041505
12390  064716  047524  020122  047506
12391  064724  046522  052101  042524
12392  064732  020104  040503  052122
12393  064740  044522  043504  006505
12394  064746     012
12395  064747     062  020056  042510          .ASCII  /2. HEADS MANUALLY LOADED/<15><12>
12396  064754  042101  020123  040515
12397  064762  052516  046101  054514
12398  064770  046040  040517  042504
12399  064776  006504     012
12400  065001     063  020056  042504          .ASCII  /3. DESIRED PORT SELECTED/<15><12>
12401  065006  044523  042522  020104
12402  065014  047520  052122  051440
12403  065022  046105  041505  042524
12404  065030  006504     012
12405  065033     064  020056  051127          .ASCII  /4. WRITE LOCK DISABLED/<15><12>
12406  065040  052111  020105  047514
12407  065046  045503  042040  051511
12408  065054  041101  042514  006504
12409  065062     012
12410  065063     065  020056  051104          .ASCII  /5. DRIVE READY LIGHT ON/<15><12><12>
12411  065070  053111  020105  042522
12412  065076  042101  020131  044514
12413  065104  044107  020124  047117
12414  065112  005015     012
12415  065115     104  044522  042526          .ASCII  /DRIVES NOT TO BE TESTED MUST HAVE BOTH/<15><12>
12416  065122  020123  047516  020124
12417  065130  047524  041040  020105
12418  065136  042524  052123  042105
12419  065144  046440  051525  020124
12420  065152  040510  042526  041040
12421  065160  052117  006510     012
12422  065165     120  051117  051524          .ASCIZ  /PORTS DE-SELECTED./<15><12><12>
12423  065172  042040  026505  042523
12424  065200  042514  052103  042105
12425  065206  006456  005012     000
12426
12427  065213     015  044412  051516  HLPFIL: .ASCII  <15><12>/INSTRUCTIONS FOR USING RK06 HEAD ALIGNMENT AID :/<15><12>
12428  065220  051124  041525  044524
12429  065226  047117  020123  047506
12430  065234  020122  051525  047111
12431  065242  020107  045522  033060
12432  065250  044040  040505  020104
12433  065256  046101  043511  046516
12434  065264  047105  020124  044501
12435  065272  020104  006472     012
12436  065277     052  025052  025052          .ASCII  /**************************************************/<15><12>
12437  065304  025052  025052  025052
12438  065312  025052  025052  025052
12439  065320  025052  025052  025052
12440  065326  025052  025052  025052
12441  065334  025052  025052  025052
12442  065342  025052  025052  025052
12443  065350  025052  025052  006452
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12444  065356     012
12445  065357     115  052517  052116          .ASCII  /MOUNT AN RK06 ALIGNMENT CARTRIDGE ON THE DESIRED /<15><12>
12446  065364  040440  020116  045522
12447  065372  033060  040440  044514
12448  065400  047107  042515  052116
12449  065406  041440  051101  051124
12450  065414  042111  042507  047440
12451  065422  020116  044124  020105
12452  065430  042504  044523  042522
12453  065436  020104  005015
12454  065442  051104  053111  026105          .ASCII  /DRIVE, AND INSURE THAT THE DRIVE IS WRITE-LOCKED. /<15><12>
12455  065450  040440  042116  044440
12456  065456  051516  051125  020105
12457  065464  044124  052101  052040
12458  065472  042510  042040  044522
12459  065500  042526  044440  020123
12460  065506  051127  052111  026505
12461  065514  047514  045503  042105
12462  065522  020056  005015
12463  065526  047503  047116  041505          .ASCII  /CONNECT THE ALIGNMENT INDICATOR TO THE DESIRED DRIVE,/<15><12>
12464  065534  020124  044124  020105
12465  065542  046101  043511  046516
12466  065550  047105  020124  047111
12467  065556  044504  040503  047524
12468  065564  020122  047524  052040
12469  065572  042510  042040  051505
12470  065600  051111  042105  042040
12471  065606  044522  042526  006454
12472  065614     012
12473  065615     126  040511  052040          .ASCII  /VIA THE HEAD ALIGNMENT CABLE ONLY, AND CYCLE UP THE/<15><12>
12474  065622  042510  044040  040505
12475  065630  020104  046101  043511
12476  065636  046516  047105  020124
12477  065644  040503  046102  020105
12478  065652  047117  054514  020054
12479  065660  047101  020104  054503
12480  065666  046103  020105  050125
12481  065674  052040  042510  005015
12482  065702  051104  053111  027105          .ASCII  /DRIVE./<15><12>
12483  065710  005015
12484  065712  042522  050123  047117          .ASCII  /RESPOND TO ALL REQUESTS FOR PARAMETERS, BY ENTERING /<15><12>
12485  065720  020104  047524  040440
12486  065726  046114  051040  050505
12487  065734  042525  052123  020123
12488  065742  047506  020122  040520
12489  065750  040522  042515  042524
12490  065756  051522  020054  054502
12491  065764  042440  052116  051105
12492  065772  047111  020107  005015
12493  066000  044124  020105  042504          .ASCII  /THE DESIRED PARAMETER VALUE (NO <CR> NEEDED)./<15><12>
12494  066006  044523  042522  020104
12495  066014  040520  040522  042515
12496  066022  042524  020122  040526
12497  066030  052514  020105  047050
12498  066036  020117  041474  037122
12499  066044  047040  042505  042504
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12500  066052  024504  006456     012
12501  066057     124  042510  042522          .ASCII  /THERE ARE TWO MODES OF OPERATION :  MANUAL MODE /<15><12>
12502  066064  040440  042522  052040
12503  066072  047527  046440  042117
12504  066100  051505  047440  020106
12505  066106  050117  051105  052101
12506  066114  047511  020116  020072
12507  066122  046440  047101  040525
12508  066130  020114  047515  042504
12509  066136  006440     012
12510  066141     101  046114  053517          .ASCII  /ALLOWS SELECTION OF DRIVES AND HEADS BY TTY INPUT,/<15><12>
12511  066146  020123  042523  042514
12512  066154  052103  047511  020116
12513  066162  043117  042040  044522
12514  066170  042526  020123  047101
12515  066176  020104  042510  042101
12516  066204  020123  054502  052040
12517  066212  054524  044440  050116
12518  066220  052125  006454     012
12519  066225     101  042116  040440          .ASCII  /AND AUTO MODE ALLOWS DRIVES AND HEADS TO BE SELECTED/<15><12>
12520  066232  052125  020117  047515
12521  066240  042504  040440  046114
12522  066246  053517  020123  051104
12523  066254  053111  051505  040440
12524  066262  042116  044040  040505
12525  066270  051504  052040  020117
12526  066276  042502  051440  046105
12527  066304  041505  042524  006504
12528  066312     012
12529  066313     102  020131  043117          .ASCII  /BY OFF-ON OPERATION OF DRIVE PORT SELECT SWITCHES./<15><12>
12530  066320  026506  047117  047440
12531  066326  042520  040522  044524
12532  066334  047117  047440  020106
12533  066342  051104  053111  020105
12534  066350  047520  052122  051440
12535  066356  046105  041505  020124
12536  066364  053523  052111  044103
12537  066372  051505  006456     012
12538  066377     111  020116  044505          .ASCII  /IN EITHER MODE, UP TO 5 MINUTES OF SEEK EXERCISES/<15><12>
12539  066404  044124  051105  046440
12540  066412  042117  026105  052440
12541  066420  020120  047524  032440
12542  066426  046440  047111  052125
12543  066434  051505  047440  020106
12544  066442  042523  045505  042440
12545  066450  042530  041522  051511
12546  066456  051505  005015
12547  066462  040515  020131  042502          .ASCII  /MAY BE REQUESTED FOR EACH DRIVE. /<15><12>
12548  066470  051040  050505  042525
12549  066476  052123  042105  043040
12550  066504  051117  042440  041501
12551  066512  020110  051104  053111
12552  066520  027105  006440     012
12553  066525     101  051514  020117          .ASCII  /ALSO IN EITHER MODE, A VERIFY OPTION ALLOWS HEAD/<15><12>
12554  066532  047111  042440  052111
12555  066540  042510  020122  047515
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12556   066546  042504  020054  020101
12557   066554  042526  044522  054506
12558   066562  047440  052120  047511
12559   066570  020116  046101  047514
12560   066576  051527  044040  040505
12561   066604  006504     012
12562   066607     123  046105  041505          .ASCII  /SELECTION WITHOUT THE UNLOADING AND LOADING OF /<15><12>
12563   066614  044524  047117  053440
12564   066622  052111  047510  052125
12565   066630  052040  042510  052440
12566   066636  046116  040517  044504
12567   066644  043516  040440  042116
12568   066652  046040  040517  044504
12569   066660  043516  047440  020106
12570   066666  005015
12571   066670  044124  020105  051104          .ASCII  /THE DRIVE BY THE PROGRAM, WHICH OTHERWISE OCCURS/<15><12>
12572   066676  053111  020105  054502
12573   066704  052040  042510  050040
12574   066712  047522  051107  046501
12575   066720  020054  044127  041511
12576   066726  020110  052117  042510
12577   066734  053522  051511  020105
12578   066742  041517  052503  051522
12579   066750  005015
12580   066752  047524  040440  046114          .ASCII  /TO ALLOW MANIPULATION OF THE ALIGNMENT TOOL./<15><12>
12581   066760  053517  046440  047101
12582   066766  050111  046125  052101
12583   066774  047511  020116  043117
12584   067002  052040  042510  040440
12585   067010  044514  047107  042515
12586   067016  052116  052040  047517
12587   067024  027114  005015
12588   067030  047524  051040  051505          .ASCII  /TO RESTART EITHER MODE, TYPE <↑Z>./<15><12>
12589   067036  040524  052122  042440
12590   067044  052111  042510  020122
12591   067052  047515  042504  020054
12592   067060  054524  042520  036040
12593   067066  055136  027076  005015
12594   067074  047524  051040  051505          .ASCII  /TO RESTART ALIGNMENT AID, TYPE <↑R>./<15><12>
12595   067102  040524  052122  040440
12596   067110  044514  047107  042515
12597   067116  052116  040440  042111
12598   067124  020054  054524  042520
12599   067132  036040  051136  027076
12600   067140  005015
12601   067142  047524  051440  046105          .ASCII  /TO SELECT NEW DRIVES IN MANUAL MODE, TYPE <↑C>./<15><12><12>
12602   067150  041505  020124  042516
12603   067156  020127  051104  053111
12604   067164  051505  044440  020116
12605   067172  040515  052516  046101
12606   067200  046440  042117  026105
12607   067206  052040  050131  020105
12608   067214  057074  037103  006456
12609   067222  005012
12610   067224  047506  020122  042510          .ASCII  /FOR HEAD ALIGNMENT PROCEDURE, REFER TO FIELD /<15><12>
12611   067232  042101  040440  044514
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12612  067240  047107  042515  052116
12613  067246  050040  047522  042503
12614  067254  052504  042522  020054
12615  067262  042522  042506  020122
12616  067270  047524  043040  042511
12617  067276  042114  006440     012
12618  067303     124  051505  020124          .ASCIZ  /TEST BOX (RK06TA, RK06TB) OPERATOR'S MANUAL./<15><12>
12619  067310  047502  020130  051050
12620  067316  030113  052066  026101
12621  067324  051040  030113  052066
12622  067332  024502  047440  042520
12623  067340  040522  047524  023522
12624  067346  020123  040515  052516
12625  067354  046101  006456  000012
12626
12627
12628
12629          000001                  .END
```

```
ABASE = 177440          2248#   2340    2381    4797
ABORT = 000200          4226#   9183    9188    9281    9306    9394    9404    9409    9414    9419    9427    9433    9443
                        9477
ABVMX1  003164          3689#
ABVMX2  003166          3690#
ACDW1 = 000000          2340
ACDW2 = 000000          2340
ACLO  = 000010          3289#   9243
ACPUOP= 000000          2340    2355
ADDW0 = 000000          2340
ADDW1 = 000000          2340
ADDW10= 000000          2340
ADDW11= 000000          2340
ADDW12= 000000          2340
ADDW13= 000000          2340
ADDW14= 000000          2340
ADDW15= 000000          2340
ADDW2 = 000000          2340
ADDW3 = 000000          2340
ADDW4 = 000000          2340
ADDW5 = 000000          2340
ADDW6 = 000000          2340
ADDW7 = 000000          2340
ADDW8 = 000000          2340
ADDW9 = 000000          2340
ADEVCT= 000000          2340    2346
ADEVM = 000377          2249#   2340    2382
AENV  = 000000          2340    2351
AENVM = 000000          2340    2352
AFATAL= 000000          2340    2343
ALDRVS  007720          4319#   4865
ALLDRV  015216          4803    4874    4969#
ALLTRM  044260          9282    9417    9424#
ALNCYL= 000365          4219#   7330
ALNPAK  007445          4287#   7245
ALNSEK  031720          6394    6615    7326#
AMADR1= 000000          2340    2368
AMADR2= 000000          2340    2372
AMADR3= 000000          2340    2375
AMADR4= 000000          2340    2378
AMAMS1= 000000          2340    2362
AMAMS2= 000000          2340    2370
AMAMS3= 000000          2340    2373
AMAMS4= 000000          2340    2376
AMSGAD= 000000          2340    2348
AMSGLG= 000000          2340    2349
AMSGTY= 000000          2340    2342
AMTYP1= 000000          2340    2363
AMTYP2= 000000          2340    2371
AMTYP3= 000000          2340    2374
AMTYP4= 000000          2340    2377
ANYDER= 100000          4232#   7237    8898    9465
APASS = 000000          2340    2345
APRIOR= 000000          2340
APTCSU= 000040         10799   11459#
APTENV= 000001         10792   11238   11415   11457#
```

DZR6NB.CMB CROSS REFERENCE TABLE -- USER SYMBOLS

```
APTSIZ= 000200          4745    6243   11456#
APTSPO= 000100         10794   11417   11458#
ASKDRV  024356          6308#   6323    6327    6342    6374    6444
ASKHED  024576          6360#   6388    6400    6407
ASKMDE  016124          5139#   5145    5146    5151    5166    5171    5176    5201    5215    5226    5235    5251    5270
                        5279    5305    5328    5400    7674
ASKMOD  024270          6277    6282    6287#   6301
ASKTMD  015360          5021#   5024    5025    5030    5054    5062    5068    5084    5095    5104    5129
ASKTST  015354          4935    5020#
ASTART  023602          2211    6203#
ASWREG= 000000          2340    2353
AS2SP2  056640          8945   11625#
ATESTN= 000000          2340    2344
AUNIT = 000000          2340    2347
AUSWR = 000000          2340    2354
AUTAL   025414          6470    6477    6484#   6565    6586
AUTALN  013054          4632#   6489
AUTEX   026410          6473    6625#   6646    6659
AUTEXR  013172          4647#   6628
AUTO    025300          6299    6457#   6505    6636    6682    6694
AUTODR  013304          4660#   6663*
AUTOEX  013263          4657#   6664
AUTVRF  013112          4637#   6487
AVECT1= 120210          2247#   2340    2379    4796
AVECT2= 000000          2340    2380
A.ABNL  003036          3570#   5568*   5571*   6517*   6546*   6649*   6654*   7133*   7196*   7200*   7275*   7279*   8214*
                        8510*   8527*   8536*   9159*   9425*   9438*   9440*  10360
A.CONT  003040          3571#  10370
A.NORM  003034          3569#   6102*   6151*   7134*   9160*   9426*  10364
BADDRV  007362          4277#   7203*   7204*   7205    7214*   7215*   7216    7222*   7223*   7224    7242*   7243*   7244
BADSEC= 001000          4228#   8123    8346    8799    8807    9371    9470
BAD632  013310          4662#   7239
BAI   = 000020          3248#  10529
BA16  = 000400          3224#
BA17  = 001000          3225#
BDSCHD  037540          8510    8527    8541#
BDSECT  011245          4457#   8560
BDSRCK  040612          8121    8344    8789#   9370
BGNRTY  044434          9083    9436    9442    9463#
BIT0  = 000001          2141#   3221    3238    3264    3286    3434    3578    3671    4882    4974    6940    7713    7997
                        6014    8029    8068    8085    8139    8181    8286    8301    8332    8368    8412    9042   10644
BIT00 = 000001          2131#   2141
BIT01 = 000002          2130#   2140
BIT02 = 000004          2129#   2139
BIT03 = 000010          2128#   2138
BIT04 = 000020          2127#   2137
BIT05 = 000040          2126#   2136
BIT06 = 000100          2125#   2135
BIT07 = 000200          2124#   2134
BIT08 = 000400          2123#   2133    7838    7870
BIT09 = 001000          2122#   2132   11248   11379
BIT1  = 000002          2140#   3239    3266    3435    3579    3672    4220    5545    5593    8256    9046
BIT10 = 002000          2121#   3226    3255    3277    3312    3326    3339    3354    3368    3447    3588    4229    9075
                       11226
BIT11 = 004000          2120#   3227    3256    3278    3297    3313    3327    3340    3355    3369    3448    4230   11386
BIT12 = 010000          2119#   3229    3257    3279    3314    3328    3341    3342    3356    3370    3449    4231    8957
```

```
                    8985
BIT13 = 020000      2118#  3230   3258   3280   3298   3315   3329   3343   3357   3371   3450   7113   7115
                    8020   8023   8094   8097   8293   8296   8403   8406  11233
BIT14 = 040000      2117#  3231   3259   3281   3299   3316   3330   3344   3358   3372   3451   3589  11361
BIT15 = 100000      2116#  3232   3233   3260   3282   3300   3317   3377   3452   3590   4232   5212   7604
                    9078
BIT2  = 000004      2139#  3240   3267   3268   3288   3436   3580   3673   4221   9050
BIT3  = 000010      2138#  3246   3247   3269   3289   3437   3581   3674   4222   9057
BIT4  = 000020      2137#  3241   3248   3270   3290   3291   3306   3348   3362   3438   3582   3675   4223
                    5463   9061
BIT5  = 000040      2136#  3249   3250   3271   3292   3307   3321   3334   3349   3363   3439   3583   4224
                    6729   8922   9065  10441
BIT6  = 000100      2135#  3222   3251   3272   3293   3308   3322   3335   3350   3364   3440   3585   4225
                    5061   5214   5234   6172   6429   6692   6734   6767   8166   8395
BIT7  = 000200      2134#  3223   3252   3273   3294   3295   3309   3323   3336   3351   3365   3442   4226
                    4794   4971   4983   5582   5587
BIT8  = 000400      2133#  3224   3253   3274   3275   3296   3310   3324   3337   3352   3366   3443   3586
                    4227   9069
BIT9  = 001000      2132#  3225   3254   3276   3311   3325   3338   3353   3367   3444   3587   4228   5448
                    6906   9072  11338
BKSLSH  013411      4674#  7470   7478
BLDEXH  045264      9322   9347   9611#
BLWMIN  003162      3688#
BPTVEC= 000014      2148#
BSE   = 000200      3273#  8541   9362   9794   9960  10196
BSERR = 000002      4220#  5981   6104   8721   9364   9374   9463
BSFACT  004224      3699#  8509   8558   8790
BSSOFT  003224      3698#  8521   8590   8795   8797
BUFFO   005264      3706#  4840   4872   4875   4918   4939   4943   4945   4950   4961   4965   5028   5031
                    5034   5037   5072   5074   5105   5108   5110*  5115   5133   5149   5152   5155   5158
                    5161   5255   5257   5289   5306   5332   5339   5349   5351   5354   5359   5368   5406
                    5409   6851   6855   7473   7487*  7492*  7493   7497*  7614   7616   7636   7639   7641*
                    7646   7662
BUFPRT  005474      3709#
B.BA16= 000001      3238#  10523
B.BA17= 000002      3239#  10523
B.CDT = 000004      3240#  10177  10523
B.CFMT= 000020      3241#   5438   5440   5442   5450   9561   9563   9565   9569  10177  10523  10607
CART    011176      4449#   7818
CCLR  = 100000      3233#  10130
CDT   = 002000      3226#   9936  10486  10543  10594  10617
CERR  = 100000      3232#   9331   9356   9832   9891   9950  10132  10183  10498  10554  10642
CFMT  = 010000      3229#   9590   9623   9936  10486  10543  10594  10617
CHGTST  015576      5036   5065#  5069   5076
CHKDRV  031460      6326   6585   6658   7273#
CHKITR  032126      5501   5687   5764   5852   5953   6036   7387#
CHKLST  015310      4847   4924   4967   4984   4987#
CHKPRM  033220      5295   5374   7695#
CKMEM1  036232      5731   8315#
CKMEM2  036244      5816   8319#
CKMO    036252      8318   8321#
CLEAR = 000105      3192#
CLR   = 000040      3249#
CLRPRM  031020      7138   7155#
CMDTO = 000100      3440#   9206   9527   9693
CMPBUF  034654      5906   8055#
```

```
CMSTRT  013516          4699    4705#   9454
CNTRDY  007616          4307#   4920    8227
CNTRLC  013354          4668#   6733    7441
CNTRLG  013400          4672#   6747    7459
CNTRLR  013366          4670#   6743
CNTRLU  013373          4671#   7453
CNTRLZ  013361          4669#   6739    7447
COE   = 001000          3276#   9288    9794    9960    10196
COMMA   013413          4675#   4887
COMSTR  005240          3701#   8863    8878    9482
CONCLR= 000176          3210#   10625
CONERR  041704          3571    9038#
CR    = 000015          2056#   10838   10848
CRLF  = 000200          2057#   10809   10848
CRMPHO  005262          3705#   8129    8358    8873    8875*
CRMPLO  005260          3704#   8130    8359    8874    8876*
CRTSER  033644          5462    7807#
CR2LF   013405          4673#   8944    8956    8980
CS      005672          3794#   5463    5545    5593    8922
CTLOUT  035562          8198#   8449    8834
CTO   = 004000          3227#   9251    10192
CYLLST  003204          3697#   6075    6082    6111
CYLNDR  005506          3714#   5514*   5517*   5539    5541    5630    5632    6077    6422    6669    7866*   7867*   7868
                        7870*
C.INIT  051042          6094    8454    8839    8849    10403#
C.RTRN  052714          10507   10535   10563   10570   10573   10580   10584   10601   10623   10628   10638   10647   10660
                        10664   10669#
C.SPEC  051734          10443   10539#
DCK   = 100000          3282#   5656    8541    9376    9794    9960    10196
DCKERR= 000020          4223#   9378    9463
DCLO  = 000020          3291#
DDISP = 177570          2063#   2278    4733    6231
DDT   = 000400          3296#
DERCNT  003111          3647#   9315    9340    9385    9396
DESL  = 000010          3246#
DFLTST  005634          3771#   3780    5059    5078    5081    5102    5127
DFQUES  010600          4403#   5248
DFSTRT  013450          2207    4693#
DFTEST  010133          4346#   5065
DF01    063640          2405    2411    2417    2423    2465    2573    2843    2879    12110#
DF02    063670          2429    2447    2453    2459    2471    2477    2483    2489    2495    2501    2507    2513    2519
                        2525    2531    2537    2591    2597    2603    2711    2717    2723    2729    2735    2741    2747
                        2753    2759    2765    2807    2825    2849    12124#
DF03    063724          2435    2441    2813    2819    12139#
DF04    063764          2567    12156#
DF05    064000          2543    2549    12163#
DF07    064034          2555    12178#
DF10    064070          2561    12193#
DF11    064114          2861    12204#
DF12    064134          2609    2615    2621    2627    2633    2639    2645    2651    12213#
DF13    064164          2657    2669    12226#
DF14    064214          2663    12239#
DF15    064244          2675    12252#
DF16    064310          2681    12271#
DF17    064354          2699    12290#
DF20    064400          2867    12301#
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DF21    064410          2777  12306#
DF22    064420          2873  12311#
DF23    064450          2783   2789   2795  12324#
DF24    064460          2801  12329#
DF25    064464          2705   8057*  8111*  8325*  8351*  12332#
DF26    064470          2855  12335#
DF27    064500          2831  12340#
DF30    064524          2885   6924*  12351#
DF31    064550          2891   6966*  6967*  12362#
DH100   061740          2403   2409   2415   2421   2427   2433   2439   2445   2451   2457   2463   2469   2475
                        2481   2487   2493   2499   2505   2511   2517   2523   2529   2535   2541   2547   2553
                        2559   2565   2571   2589   2595   2601   2607   2613   2619   2625   2631   2637   2643
                        2649   2655   2661   2667   2673   2679   2697   2709   2715   2721   2727   2733   2739
                        2745   2751   2757   2763   2805   2811   2817   2823   2829   2841   2847   2877   2883
                        2889  11926#  12313
DH101   062144          8961  11951#  12113  12126  12141  12158  12165  12180  12195  12215  12228  12241  12254
                       12273  12292   12315  12342  12353  12364
DH102   062233          8972  11961#  12115  12128  12143  12160  12167  12182  12197  12217  12230  12243  12256
                       12275  12294   12317  12344  12355  12366
DH103   062251          2865  11964#
DH104   062274         11968#  12303  12321
DH105   061762          8959  11929#
DH106   062314         11971#  12319
DH200   062005         11933#  12117  12130  12145  12219  12258  12277
DH201   062336         11974#  12119  12132  12147  12221  12260  12279
DH202   062425         11984#  12134  12151  12262  12281
DH203   062442         11987#  12136  12153  12268  12287  12337
DH204   063325         12068#  12223
DH500   062027         11937#  12121
DH501   062065         11943#  12149  12266  12285
DH502   063363         12074#  12236  12249  12283
DH503   063424         12080#  12264
DH601   062536         11997#  12169  12232  12245
DH602   062560         12000#  12173
DH604   062625         12007#  12184  12199  12206
DH6041  062660          8561   12012#  12186  12201  12208
DH6042  062707          2799   12016#
DH605   062725          2775   12019#  12188
DH6051  062742         12022#  12190  12308
DH606   062777         12027#  12171  12175  12234  12247
DH607   063025         12031#
DH701   063045          8056*  8110*  8324*  8350*  12034#  12210
DH702   063134          2853  12044#  12298  12348
DH703   063150         12046#  12346
DH704   063174          6925*  12050#  12359
DH705   063214         12053#  12357
DH706   063230         12055#  12368
DH707   063243          6966   12057#
DH710   063273         12062#  12370
DH711   063311         12065#  12296
DH800   063501         12088#  12326
DI    = 040000          3231#   9980  10652
DISPLA  001142          2278#   4733*  4741*  6231*  6239*  11225*  11399*
DISPRE  000174          2204#   4741   6239
DLT   = 100000          3260#   9308   9788   9918   9954   10194
DLTFLG  003132          3664#   5975*  5979   5990
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DMD    = 000040          3307#
DONE     003113          3649#   8450*   8457    8835*   8842    8846*   8852    8897*   9039*   9153*   9231*   9496*   9499*
DOTIM    003123          3657#
DRA    = 000001          3286#   9783   10566
DRDY   = 000200          3295#
DRIEXR   012544          4594#   6416*
DRISEL   013145          4642#   6584
DRIV     011167          4447#   7776
DRIVE    005502          3712#   4990*   5417*   5424*   5425    5428    5456    6050    6089    6100    6117    6320*   6414
                         6515*   6520    6523    6525*   6547*   6552*   6579    6581    6589    6602    6647*   6650    6661
                         6689*   6690    6707    7141    7142    7186    7203    7214    7222    7242    7273    7282    7290
                         7307    9228   12093
DRNAFG   003127          3661#   8836*   8844    8847*   9052    9225*
DRNAVL=  010000          4231#
DRNRDY   011673          4516#   7292*
DROPDR   011077          4437#   8928
DROT   = 000040          3292#   9298
DRPAR  = 000010          3269#   9238
DRPDRV=  002000          3447#  10428
DRVCAL   040716          5437    5443    5563    5566    5570    5573    5641    5984    6053    6071    6103    6107    6124
                         6152    6368    6373    6378    6423    6431    6438    6443    6448    6504    6511    6522    6564
                         6574    6578    6593    6595    6599    6608    6653    6670    6676    6681    6688    7140    7198
                         7229    7236    7249    7277    7301    7314    7316    7328    7341    7343    7355    7371    7775
                         7817    7903    8217    8258    8261    8512    8529    8717    8832#   9439    9481    9491    9526
                         9568
DRVDSC=  000040          3439#   9406    9868   10034   10096
DRVERS   003120          3654#   4755*   5422*   8921*   8925   8927*
DRVHRD=  000020          3438#   9401    9875   10070   10201
DRVLST   005610          3746#   4883    4908    4955    4963*   4975*   4978*   4988    4999*   5429    6048    6087    6115
DRVLUP   025472          6496#   6532    6544    6600    6621
DRVMSK=  000007          3245#   9777    9818    9969   10414
DRVNED   012037          4535#   7284*
DRVNO    011163          4446#   5456*   5457*
DRVPDT=  000004          3436#   9976   10044
DRVPOS=  000002          3435#   9976   10003   10465
DRVSEL   013154          4644#   6583*
DRVSEQ   007344          4274#   4879
DRVSER   033524          5461    6328    7772#
DRVSZD=  010000          3449#   9219    9806   10568
DRVTST   014520          4696    4845    4861#   4867    4868    4869    4877    4928    4929    5023    5051    5067    5094
                         5144    5198    5223    5250    5278    5327    5399    7671    8206
DRVUSE=  000001          3434#  10428
DRY    = 000200          3294#
DR.CLR=  000005          3217#   9856   10019   10061   10085   10199
DR.SEL=  000001          3216#   9926   10005   10320   10327   10334   10341   10545
DROXDP   007667          4314#   7193
DSC    = 040000          3299#
DSWR   = 177570          2062#   2277    4732    6230
DTBAII=  100000          3452#   5966    6069   10428   10527
DTE    = 010000          3279#   5656    8541    9303   10196
DTYE   = 000040          3271#   9266   10196
DT100    063524          2404    2410    2416    2422    2428    2434    2440    2446    2452    2458    2464    2470    2476
                         2482    2488    2494    2500    2506    2512    2518    2524    2530    2536    2542    2548    2554
                         2560    2566    2572    2590    2596    2602    2608    2614    2620    2626    2632    2638    2644
                         2650    2656    2662    2668    2674    2680    2698    2710    2716    2722    2728    2734    2740
                         2746    2752    2758    2764    2806    2812    2818    2824    2830    2842    2848    2872    2878
```

```
                    2884    2890   12093#
DT102   063542     12096#
DT103   063634      2866   12108#
DT201   063546     12097#
DT202   063564      2854   12100#
DT203   063570     12101#
DT601   063610      2776    2782    2788    2794    2800    2860   12104#
DT602   063616      2704   12105#
DUACES  010413      4379#   4766
DULACS  003126      3660#   4694*   4703*   4764    4933    7388    9221
DUNPAS  023454      5427    6171#
DZR6N   007026      4234#   4757    6249
ECCNC = 000040      4224#   9381
ECCW  = 020000      3315#
ECH   = 000100      3272#   9379    9794    9960   10196
ECOBAD  027270      5055    5202    5227    6300    6322    6351    6387    6450    6478    6513    6645    6683    6781#
                    7352
EMTVEC= 000030      2151#   4716*   4717*   6214*   6215*
EM1     056645      2402   11626#
EM10    057060      2444   11653#
EM100   061171      2792   11860#
EM101   061214      2798   11864#
EM102   061272      2804   11872#
EM103   061344      2810   11879#
EM104   061372      2816   11883#
EM105   061414      2822   11886#
EM106   061447      2828   11891#
EM107   061502      2834   11896#
EM11    057067      2450   11655#
EM110   061547      2840   11903#
EM111   061602      2846   11908#
EM112   061623      2852   11911#
EM113   061656      2876   11916#
EM114   061704      2882   11920#
EM115   061721      2888   11923#
EM12    057102      2456   11657#
EM13    057123      2462   11660#
EM14    057145      2468   11664#
EM15    057173      2474   11668#
EM16    057214      2480   11671#
EM17    057231      2486   11674#
EM2     056671      2408   11630#
EM20    057252      2492   11677#
EM21    057267      2498   11680#
EM22    057307      2504   11683#
EM23    057331      2510   11687#
EM24    057362      2516   11692#
EM25    057402      2522   11695#
EM26    057425      2528   11699#
EM27    057437      2534   11701#
EM3     056715      2414   11634#
EM30    057462      2540    2660   11705#
EM31    057507      2546    2666   11709#
EM32    057530      2552   11712#
EM33    057551      2558   11715#
EM34    057573      2564    2864   11719#
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EM35    057613          2570   11722#
EM36    057647          2576   11727#
EM37    057702          2582   11732#
EM4     056740          2420   11638#
EM40    057745          2588   11738#
EM41    060011          2594   11745#
EM42    060047          2600   11751#
EM43    060077          2606   11756#
EM5     056761          2426   11641#
EM52    060134          2648   11761#
EM53    060162          2654   11765#
EM56    060207          2672    2678   11769#
EM6     057000          2432   11644#
EM60    060226          2684   11772#
EM61    060262          2690   11777#
EM62    060330          2696   11784#
EM63    060354          2612    2708   11788#
EM64    060421          2618    2714   11795#
EM65    060464          2624    2720   11801#
EM66    060512          2630    2726   11805#
EM67    060545          2636    2732   11810#
EM7     057024          2438   11648#
EM70    060604          2642    2738   11816#
EM71    060653          2744   11823#
EM72    060713          2750   11829#
EM73    060762          2756   11836#
EM74    061016          2762   11841#
EM75    061036          2768   11844#
EM76    061066          2774   11848#
EM77    061150          2780    2786   11857#
ENBCSR  027776          4754    4864    5140   6934#  6979
ENTDRV  011627          4509#   6308
ENTHED  012720          4613#   6360
ENTLCI  010105          4342#   5021
ENTMOD  012412          4577#   6332    6461
ENTPAS  011031          4430#   5397
EQUALS  013436          4684#   7573
ERRCNT  003116          3652#   4695*   4844*  6274*  7368*  8900*  8902   8905   8907*  9040*  9154*  9452*  9472
                        9475
ERRCOM  005500          3711#   9091*   9092*  12093
ERRFRE  041142          3569    6151    6153   7134   8897#  9426
ERRHDL  042410          3570    5571    5658   6546   6654   6702   7133   7200   7279   8214   8536   8543   9152#
                        9425    9440
ERRLMT  003117          3653#   9472
ERRVEC= 000004          2144#   4730    4731*  4742*  4750*  4751*  6228   6229*  6240*  6919*  6920*  6935   6936
                        6937*   6945*   6946*  6956   6957   6960*  6961*  6976*  6977*  6983*  8453*  8468*  11366
                       11367*  11369*  11372*  11480  11481  11487*  11495*  11507*  11512*  11521*  11531*  11532*
ER2ENT  042430          9156#   9218    9336   9361   9445
EXPLAN  010237          4359#   5138
E.CCLR= 000001          3578#  10135
E.CERR= 001000          3587#  10209
E.CLAT= 000020          3582#   9861   10025  10066  10090
E.CMTO= 040000          3589#
E.CONT  003042          3572#   9042    9046   9050   9057   9061   9065   9069   9072   9075   9078   9082*  9760*
                        9798*   9861*   9871*  9942*  9964*  9987*  9993*  10025*  10066*  10090*  10135*  10187*  10209*
                       10348*  10582*  10636*  10644*  10657*
```

```
E.DLT = 000400          3586#   9942
E.DPAR= 002000          3588#   9871   10348
E.ILLD= 000100          3585#  10636
E.MDS = 100000          3590#   9760   10187   10582
E.NOAT= 000002          3579#   9987
E.SCLR= 000040          3583#  10657
E.UATT= 000004          3580#   9993
E.UDAT= 000010          3581#   9798    9964
E.UNLD= 020000          3450#   9879    9999   10074   10084
FACTBS  011220          4453#   8559
FC      005650          3785#   5511    5549    5638    5959    6062    6101    6260*   8421    8424
FINADR  034250          7940#   8116    8339
FINCYL  005566          3733#   7970*   8118    8143    8149    8341    8372    8378
FINMEM  037736          8602#   8652
FINSEC  005571          3735#   7958*   8120    8147    8151    8343    8376    8380
FINTRK  005570          3734#   7968*   8119    8145    8150    8342    8374    8379
FMTE  = 000020          3270#   9270   10196
FNDXDP  030422          5693    5770    5858    7040#
FORHLP  011476          4493#   6278
FORMAT  003115          3651#   5444*   5450*   5644    5963    6065    7143    7809    7950    8504    8524    8629    9561
                        9570
FS      005510          3715#   5445*   5451*   5509*   5512    5542    5550    5633    5642*   5646*   8422
FT      005654          3787#   5172    5548    5960    8423
GETPRM  027452          4813    4818    4827    6837#   6877
GETXDP  030502          4788    5736    5824    5912    7067#   8209
GIVEID  024162          6263#   6293    6314    6339    6369    6439    6468    6512    6633    6677
GNS   = ****** U        2203   11611   11612   11613   11614   11615   11618   11619   11620   11621
GO    = 000001          3221#
GTPKAD  045140          9387    9398    9580#
GTPRMS  040310          8697#   8729
GTSWRG  027562          4782    6873#   7460    8232
GTD     040322          8693    8696    8700#
HALTER  012127          4545#
HCRC  = 000400          3274#
HDR.AD  003060          3612#   9912    9916*  10606*
HDR.CT  003062          3613#   9920*  10609*  10612*
HEADNO  013006          4624#   6398*   6619*
HEDPOS  012647          4606#   6395    6616
HEDSEL  013001          4623#   6399    6620
HIERAD= 177742          2195#   6964
HIGOCT  005472          3708#   5293*   5373*   7544*   7547*   7700    7715    7720    7727
HLPFIL  065213          6283   12427#
HLPOVL  003136          3669#   4756*   6276
HLTPRG  044420          4901    6927    6975    8228    8520    9451#   9478
HLTRQD  007646          4311#   8226
HT    = 000011          2054#  10807   10848
HVRC  = 000400          3275#   5656    8541    9337    9794    9960   10196
HVRCER= 000004          4221#   9339    9463
HZ      003154          3684#
H.HEAD  003065          3616#
IDAE  = 002000          3277#   9293
IDENT   011431          4486#   6275
IE    = 000100          3222#   4921    6560    7208    7295    9327    9352   10140   10204   10492   10533   10599   10666
ILC   = 000001          3264#   9254   10196
ILF   = 000004          3267#   9262
INCRMA  037230          5734    5812    5818    5910    8475#
```

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INCRSC  040022          9614    8628*   8656
INITMM  027614          6893*   7005    7090
INITSS  030726          4923    5435    5454    5504    5690    5767    5855    5956    6039    6061    6324    6458    6626
                        7133*   7185    7773    7807    8498
INPUTP  016120          4936    5039    5138*   8222
INTCHR  005524          3721*   5047    5049    5052    5194    5196    5199    5219    5221    5224    5423*   5466*   6289
                        6291    6310    6312    6334    6336    6362    6364    6425    6434    6463    6465    6496    6499
                        6506    6629    6631    6634    6637    6641    6671    6673    6678    6730*   6749    6766*   6781
                        7348    7350    8200    8204    8211*   8220    8224    8230
INTMSK  003071          3621*   9229*   9230    9835    9859    9880    9905    9991    10023   10064   10075   10088   10359*
                       10363*  10367*  10416*  10502
INTR  = 000300          3212*
IOTVEC= 000020          2149*   4714*   4715*   6212*   6213*
IR    = 000100          3251*
I.AERR  047424         10011   10017   10035   10044*
I.ATTN  046754          9771    9815    9948*
I.CCLR  050010          9849    9899   10130*  10202   10562   10627
I.CSTS  050442          6144    9842   10277*
I.CSTI  050464          9846    9898   10281*  10551
I.DRV   003072          3625*   6119    9229   10416   10417
I.ERR   046176          9843    9847*
I.ERRA  046156          9842*   9910
I.ERRC  046164          9780    9833    9845*   9978
I.HDAL  046422          9826    9889*
I.INTR  045542          4770    6257    9750*
I.ISRL  003064          3615*   9764    9767*   9770*  10141*  10438*  10592*  10665*
I.ISSU  050072          9857    9927   10006   10020   10062   10086   10172*  10321   10328   10335   10342
I.IOO   046022          9768    9785    9812*
I.RTRN  047772          9762    9800    9810    9838    9850    9855    9858    9864    9873    9882    9885    9900    9902
                        9928    9931    9940    9944    9966    9982    9989    9995   10007   10021   10028   10040   10060
                       10063   10068   10077   10080   10087   10092   10101*
I.STAT  050546          9854   10059   10318*  10572
I.STOR  050314         10182   10232*
I.UNLD  047672         10001   10084*
KBDHDL  027110          4767    6254    6722*
KIPAR0= 172340          2182*   6895   11466   11499
KIPAR1= 172342          2183*
KIPAR2= 172344          2184*
KIPAR3= 172346          2185*
KIPAR4= 172350          2186*
KIPAR5= 172352          2187*
KIPAR6= 172354          2188*   7098*   7116*   8013*   8022*   8084*   8092    8096*   8285*   8295*   8331*   8353    8405*
KIPAR7= 172356          2189*  11515
KIPDR0= 172300          2171*
KIPDR1= 172302          2172*
KIPDR2= 172304          2173*
KIPDR3= 172306          2174*
KIPDR4= 172310          2175*
KIPDR5= 172312          2176*
KIPDR6= 172314          2177*
KIPDR7= 172316          2178*
KTERHD  027702          4772    6915*
LASTWC  005572          3736*   7941    8115*   8338*
LC      005652          3786*   5514    5515    6261*
LCVEC   003150          3682*
LDMEM1  036066          5724    8273*
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LDMEM2  036100          5728    5804    5808    5903    8277#
LDMO    036106          8276    8279#
LEV2ER= 000400          4227#   9156    9211    9318    9324    9343    9349    9441    9497
LF    = 000012          2055#  10842   10848
LKS     003140          3678#
LODBUF  034426          5899    7988#
LODFLS  015642          4905    5073    5078#
LODFPT  016654          5085    5256    5261#
LODP14  034212          5864    7917#
LODSEC  034104          7879#   7901
LOERAD= 177740          2194#   6963
LOOP1   025716          6534#   6539
LOOP2   025722          6535#   6537
LOWOCT  005470          3707#   5292*   5372*   7543*   7548    7705    7707    7710    7713    7718    7723    7726
LS      005512          3716#   5446*   5452*   5510*   5534    5536    5626    5628    5643*   5647*
LSTCYL= 000632          4217#   6261    7231    7813
LSTMEM  007125          4246#   6820
LSTTRK= 000002          4218#   7232    7814
LSTTST  015460          5033    5042#
LT      005656          3788#   5172
MA      005600          3739#   5710    5711    5717    5718    5789    5790    5796    5797    5878    5879    5885    5886
                        7750    7752    8427*   8430*   8431*   8432*   8433*   8485*   8486*   8487*   8694    8695
MAHILM  005574          3737#   6799*   6800*   6814*   6815*   6821    7040    7044    7046    7748    7749
MANAL   024572          6344    6357#
MANALN  012552          4595#   6358
MANEX   025044          6347    6412#
MANEXR  012465          4585#   6417    6451
MANUAL  024352          6296    6306#
MANVR   025026          6350    6405#
MANVRF  012612          4601#   6406
MAPHOD= 170202          2192#   8875
MAPLOD= 170200          2191#   7022    8876
MAWRDC  010451          4385#   7730
MAXHI1= 000000          4208#
MAXHI2= 000000          4210#
MAXHI3= 000000          4212#
MAXHI4= 000001          4214#
MAXLO1= 062031          4207#
MAXLO2= 017500          4209#
MAXLO3= 112160          4211#
MAXLO4= 022370          4213#
MCLK  = 000400          3310#
MDFLAG  003106          3644#   4693*   4702*   4790    4903    5063    5266    5507    6266*   7191    7390    8202
MDFY15  010750          4421#   7607
MDS   = 001000          3254#   9758   10185   10560
MEMABT  003135          3667#   6973
MEMCSR= 172100          2193#   6938    6943    6984    6992
MEMSYS= 177744          2196#   6965
MEMVEC= 000114          3685#   4752*   4753*
MERD  = 001000          3311#
MESMSK= 000017          3304#
MEWD  = 002000          3312#
MIDXFR  040066          8651#   8724
MIND  = 000200          3309#
MINHI1= 000000          4206#
MINLO1= 057467          4205#
```

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MMVEC = 000250          2160#   4772*   4773*
MODP15  032674          5298    5377    7596#
MPERHD  030060          4752    6955#
MSP   = 000100          3308#
MULHDL  023354          6102    6142#
MULSEL  012313          4566#   6559
MULTII  023442          6059    6105    6114    6155#
MXWRDC  033450          5702    5781    5870    7729    7748#
M.CADD= 017760          3380#
M.CDIF= 017760          3379#
M.DPID  053516         10891#
M.DPIM  053456         10862#
M.DP01  053466         10865#  10874
M.DP02  053506         10869   10873#
M.DP40  053554         10902#  10923
M.DP41  053610         10907   10914#
M.DP42  053620         10913   10918#
M.DP44  053652         10925   10930#
M.DP50  053664         10900   10934#
M.DRV = 000007          3376#
M.HEAD= 007000          3383#
M.ID  = 000003          3378#
M.PAR = 100000          3377#
M.SECT= 000760          3382#
M.SER = 077770          3381#
NCYL1   005514          3717#
NCYL2   005516          3718#
NED   = 010000          3257#   6700    9190    9200    9773    9851   10194   10564
NEDHDL  027032          6517    6649    6700#   7196    7275
NEM   = 004000          3256#   9185    9788    9954   10194
NEWDRV  017436          5420#   5430    6170    8929
NEWMSG  007333          4272#   6841
NEWON   005532          3724#   6494*   6518*   6529    6531    6542   6652*   6655   6712*   7197*   7201   7276*   7280
NEWPAS  017424          4698    5417#   6196
NGOFST  005550          3730#   5560*   5589*   5618    5622
NMTSTS= 000006          3780#   5502    5649    5688    5765    5853   5954    6037
NOCHK = 000400          3443#  10428   10490   10531   10558   10576  10597   10620  10629  10663
NODRLK  012166          4551#   7309*
NODRTS  007565          4302#   4899
NODSC = 004000          3448#   9411   10016
NOFALS  011265          4460#   4898    5613    5620    8567
NONEXD  012025          4533#   7285
NORTRY  003133          3665#   5976*   7137*   9468
NOTALD  010504          4391#   5170    5175
NOTDFT  016720          5254    5271#
NOTLOK  012154          4549#   7310
NOTMSG  064574          4762   12375#
NOTRDY  011661          4514#   7293
NOTYPE  003137          3670#   4760    4763*
NTREDY  007412          4282#   7217
NULINP  015674          5071    5086#
NXDRIV  007373          4279#   7206
NXF   = 000004          3268#
OCTBIN  052736          5116    5290    5370    5410    6856    7647   10694#
OFFSET= 000115          3196#   5565   10473
OFINUS  005520          3719#
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OFSHED  011274          4465#  5547
OFST  = 000004          3288#
ONLINE  005530          3723#  6493*  6531   6541   6542*
OPCOMP  003112          3648#
OPCONT  003121          3655#
OPI   = 020000          3280#  5656   8541   9312   9794   9960   10196
OPIERR= 000010          4222#  9314   9463
OPNLST  016610          5157   5247#  5252   5259
OR    = 000200          3252#
OREQSW= 000020          3675#
OVLOOR  007155          4251#
O.WAIT  003044          3592#  9694   9698*  9808*  9812   9828*  9894*  9907*  9922*  10466*  10526*  10588*  10605*
PACK  = 000103          3191#  7228   7315
PARMDE  010365          4375#  5141
PARM0   002620          3481#  3636   7136   7369   8686   8699   9424   9489   9540   9571
PARM1   002704          3513#  7142*  9158   9524   9558
PART  = 000001          1990#  2007   2013   2035   2044   2210   2225   3697   3737   3761   3772   3787   3789
                        3793   3794   3796   3802   3804   3808   3809   3811   3820   3824   3832   3834   3838
                        3845   3847   3851   3852   3854   4234   4463   4464   4701   4757   4785   5177   5467
                        5470   6202   7053   7255   7828   7875   8188   8256   8267   8813   12373  12422  12427
PART1   007115          4244#
PART2   007121          4245#  4759   6251
PAT   = 000020          3306#
PATRN   005536          3726#  5699*  5776*  5865*  5867*  5889   7990   8061   8168   8692
PAT00   006026          3859#  7992   8007   8063   8078
PAT01   006066          3881#
PAT02   006126          3903#
PAT03   006166          3925#
PAT04   006226          3947#
PAT05   006266          3969#
PAT06   006326          3990#
PAT07   006366          4012#
PAT08   006426          4033#
PAT09   006466          4055#
PAT10   006526          4077#
PAT11   006566          4099#
PAT12   006626          4121#
PAT13   006666          4143#  5971   6068
PAT14   006726          4165#  7919
PAT15   006766          4185#  5968   7574   7652*  7658*
PBLKT   003102          3636#  9691   9778   9804   9972   9997   10415*
PBSVAL= 001000          3444#  10353
PC    =%000007          2075#  4754*  4782*  4785*  4788*  4813*  4818*  4827*  4864*  4866*  4912*  4923*  4927*
                        4991*  5022*  5044*  5045*  5055*  5066*  5089*  5093*  5116*  5140*  5143*  5191*  5192*
                        5202*  5203*  5227*  5228*  5229*  5249*  5273*  5277*  5290*  5295*  5298*  5326*  5370*
                        5374*  5377*  5398*  5410*  5435*  5437*  5443*  5454*  5455*  5461*  5462*  5465*  5500*
                        5501*  5504*  5505*  5519*  5523*  5529*  5563*  5566*  5570*  5573*  5641*  5686*  5687*
                        5690*  5691*  5693*  5696*  5701*  5702*  5719*  5722*  5723*  5724*  5726*  5728*  5730*
                        5731*  5734*  5736*  5763*  5764*  5767*  5768*  5770*  5773*  5779*  5781*  5798*  5802*
                        5804*  5806*  5808*  5810*  5812*  5816*  5818*  5824*  5851*  5852*  5855*  5856*  5858*
                        5861*  5864*  5869*  5870*  5887*  5897*  5898*  5899*  5901*  5903*  5905*  5906*  5910*
                        5912*  5952*  5953*  5956*  5957*  5978*  5984*  5989*  5994*  6035*  6036*  6039*  6040*
                        6053*  6061*  6071*  6076*  6093*  6094*  6103*  6107*  6121*  6124*  6135*  6144*  6146*
                        6152*  6177*  6180*  6190*  6195   6288*  6300*  6309*  6322*  6324*  6326*  6328*  6333*
                        6351*  6361*  6368*  6373*  6378*  6387*  6392*  6394*  6413*  6420*  6421*  6423*  6431*
                        6438*  6443*  6448*  6450*  6458*  6462*  6478*  6490*  6504*  6511*  6513*  6514*  6522*
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                    6564*  6574*  6578*  6585*  6593*  6595*  6599*  6608*  6615*  6626*  6627*  6645*  6653*
                    6658*  6667*  6668*  6670*  6676*  6681*  6683*  6684*  6688*  6768*  6783*  6796*  6822*
                    6823*  6827*  6842*  6848*  6854*  6856*  6862*  6877*  6879*  6908*  6915*  6948*  6958*
                    6979*  7005*  7032*  7049*  7088*  7090*  7138*  7140*  7144*  7164*  7185*  7198*  7210*
                    7229*  7236*  7249*  7251*  7277*  7301*  7303*  7314*  7316*  7319*  7328*  7332*  7341*
                    7343*  7347*  7352*  7355*  7356*  7371*  7373*  7403*  7460*  7501*  7527*  7549*  7550*
                    7551*  7578*  7608*  7622*  7626*  7647*  7669*  7729*  7734*  7735*  7740*  7763*  7773*
                    7775*  7795*  7798*  7807*  7817*  7821*  7822*  7824*  7840*  7854*  7865*  7871*  7885*
                    7901*  7903*  7909*  7920*  7926*  7973*  8042*  8060*  8116*  8121*  8184*  8209*  8217*
                    8232*  8233*  8234*  8258*  8261*  8263*  8303*  8326*  8339*  8344*  8414*  8434*  8449*
                    8451*  8454*  8456*  8469*  8489*  8498*  8512*  8518*  8529*  8537*  8594*  8614*  8619*
                    8641*  8652*  8656*  8675*  8677*  8705*  8717*  8724*  8729*  8730*  8733*  8735*  8801*
                    8833*  8834*  8837*  8839*  8841*  8849*  8851*  8854*  8886*  8909*  9026*  9041*  9141*
                    9161*  9208*  9232*  9322*  9323*  9347*  9348*  9370*  9387*  9398*  9439*  9481*  9491*
                    9493*  9498*  9500*  9526*  9542*  9568*  9573*  9601*  9632*  9699*  9705*  9761*  9799*
                    9809*  9837*  9842*  9846*  9863*  9872*  9884*  9898*  9901*  9930*  9943*  9965*  9988*
                    9994*  10027*  10039*  10067*  10079*  10091*  10099*  10136*  10182*  10188*  10211*  10246*  10290*
                   10349*  10360*  10361*  10364*  10365*  10370*  10371*  10494*  10500*  10506*  10547*  10551*  10569*
                   10579*  10583*  10637*  10646*  10659*  10667*  10676*  10724*  10731*  10766*  10797*  10816*  10823*
                   10830*  10844*  10846*  10876*  10933*  10936*  10967*  11014*  11019*  11063*  11235*  11241*  11434*
                   11451*  11492   11539*
PCA     = 004000    3313#
PCD     = 010000    3314#
PCLKF     003122    3656#
PCVEC     003152    3683#
PFIFTN    010662    4412#  5217
PGE     = 002000    3255#  9258   10194
PIP     = 020000    3298#
PIRQ    = 177772    2061#
PIRQVE= 000240      2155#
PKRB      003146    3681#
PKS       003142    3679#
PKSB      003144    3680#
PLOFST    005546    3729#  5559*  5591*  5611   5615
PMA       005604    3741#  5717*  5718*  5796*  5797*  5885*  5886*  7006   7008   8009   8080   8160   8162
                    8280   8322   8389   8391   8666*  8667*  8668*  8669   8670   8690*  8691*  8694*  8695*
PROFLT    005676    3799#  5210   5261   5264   5303   5344
PREPAR    030300    5719   5798   5887   7004#  8675   8733
PREPKB    027250    5044   5191   5203   5228   5505   5691   5768   5856   5957   6040   6288   6309   6333
                    6361   6420   6462   6490   6514   6627   6667   6684   6765#  7347   8233
PRMBUF    013424    4682#  7541*  7542
PRMINP    007212    4256#  4808
PRMLIM    005724    3815#  7705   7707   7715   7718   7720   7723
PRMLST    005650    3784#  5209   5262   5302   5343   7543   7547   7710*  7726*  7727*
PRMNEM    006000    3842#  5204   5283   5339   7541   7545   7601   7698
PRMPHO    005256    3703#  8873*  12108
PRMPLO    005254    3702#  8874*  12108
PRMPSP    013445    4686#  5324
PROMPT    013442    4685#  4925   5091   5142   5275   7624
PRVCMD    005224    3700#  4776   6269   8862   9125
PR0     = 000000    2078#  4775   5420   6259   7372   9490   9567
PR1     = 000040    2079#
PR2     = 000100    2080#
PR3     = 000140    2081#
PR4     = 000200    2082#  4768   6255
PR5     = 000240    2083#  3568
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PR6     = 000300  2084#
PR7     = 000340  2085#  4705   4753   4773   6203   6258   6920   6961  11318  11319
PS      = 177776  2058#  2059   4705*  4775*  5420*  6203*  6259*  7372*  9680   9686*  9700*  10409  10410*
                 10669*
PSTART  013504    2209   4702#
PSW     = 177776  2059#  9490*  9567*
PT      005670    3793#  5212   5865   5969   7604
PWRMSG  055360   11321  11325#
PWRVEC= 000024    2150#  4720*  4721*  6218*  6219*  11309*  11317*  11318*
P.ASOF= 000032    3465#  9112   10022*  10023  10056*  10287*  10475*  10476
P.AD0   = 000040  3468#  7212   7220   7288   7305   9115   9530   10013*  10014  10030*  10031  10344*  10552*
P.AD1   = 000044  3470#  6575   6596   7344   9117   10323*
P.A10   = 000050  3472#  9119   10330*
P.A11   = 000054  3474#  7778   9121   10337*
P.BAHI= 000007    3427#  5713*  5792*  5881*  7030*  8672*  9101
P.BALO= 000010    3428#  5710*  5789*  5878*  5974*  5986*  6068*  7029*  7233*  7815*  8252*  8509*  8521*
                  8669*  9104   10509  10606
P.BAR   = 000024  3462#  9111   10053*  10283*
P.BD0   = 000042  3469#  9116   10008*  10009  10345*  10553*
P.BD1   = 000046  3471#  9118   10324*
P.B10   = 000052  3473#  6125   9120   9552   10331*
P.B11   = 000056  3475#  9122   9929*  10338*
P.CMND= 000001    3421#  5436*  5562*  5565*  5567*  5572*  5640*  5725*  5729*  5805*  5809*  5900*  5904*
                  5977*  5983*  5988*  6042*  6070*  6099*  6106*  6110*  6150*  6367*  6372*  6377*  6419*
                  6430*  6437*  6442*  6447*  6503*  6510*  6521*  6563*  6573*  6577*  6592*  6594*  6598*
                  6607*  6651*  6665*  6675*  6680*  6687*  7139*  7195*  7228*  7230*  7248*  7274*  7300*
                  7313*  7315*  7326*  7340*  7342*  7354*  7370*  7774*  7812*  7902*  8216*  8255*  8260*
                  8500*  9092   9437*  9480*  9525*  9566*  9824   10441  10445  10457  10467  10473  10479
                 10482  10488  10513  10520  10539  10586  10603  10625  10634
P.CS1 = 000016    3459#  6145*  7158   9105   9233   9251   9590   9623   9845*  9897*  9935*  9936*  9938*
                  9939   10048*  10050*  10277*  10280*  10431  10485*  10486*  10488*  10492*  10493  10517*  10520*
                 10522*  10523*  10533*  10534  10542*  10543*  10545*  10546  10548*  10549  10554  10593*  10594*
                 10596*  10599*  10600  10616*  10617*  10619*  10622  10641*  10642  10651*  10652
P.CS1H= 000007    3426#  5438   5440*  5442*  7143*  7235*  7808*  8499*  9563*  9565*  9569*  9570*  9935
                 10176  10485  10522  10542  10593  10607  10616
P.CS2   = 000020  3460#  5653   6700   9106   9180   9185   9190   9192   9198   9200   9258   9308   9392
                  9851   10051*  10281*  10439*  10464  10529*  10530  10541  10560  10564  10590*  10591  10615
P.CYLN= 000002    3422#  5511*  5521*  5524*  5525   5530*  5539   5541*  5549*  5602   5630   5632*  5638*
                  5959*  6045*  6062*  6092*  6101*  6422*  6669*  7231*  7327*  7329*  7330   7813*  7969
                  8421*  8426*  8501*  8603   8657*  9094   9560*  9933   10469  10511  10613
P.DCYL= 000030    3464#  8607   8653   9107   9365   9580   9612   10055*  10289*
P.DRVN= 000000    3420#  6052*  6091*  6100*  6123*  6498*  6520*  6572*  6589*  6602*  6650*  7141*  7186*
                  7273*  9821   9998   10174  10413
P.DS    = 000036  3467#  9113   9243   9247   9298   10058*  10285*  10566
P.DTS   = 000026  3463#  8609   8611   8654   8655   9108   9366   9368   9551   9583   9584   9613   9619
                 10054*  10284#
P.EPAT= 000062    3477#  9389   9847*  10433
P.EPOS= 000060    3476#  9388   9848#
P.ER    = 000034  3466#  5656   8541   9114   9179   10057*  10286*
P.OFST= 000006    3425#  5564#  10475
P.PRST= 000014    3430#  5966*  6069*  9206   9219   9401   9406   9411   9416   9527   9693*  9806*  9840*
                  9868*  9875   9879*  9976*  9999   10003*  10016*  10034*  10044*  10070  10074*  10084*  10096*
                 10201*  10353*  10428*  10465*  10489*  10490  10515  10521*  10527  10531  10558  10568*  10576
                 10597  10620  10629  10663
P.SECT= 000004    3423#  5512*  5534   5536*  5542*  5550*  5607   5626   5628*  5633*  5961*  6063*  7811*
                  7896   7907*  7946   8422*  8506*  8515*  8516   8522*  8532*  8533   8605   8659*  9097
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                    9559*  9934   10470  10512  10614
P.TRCK= 000005      3424*  5513*  5527   5531*  5532   5537*  5548*  5596   5635*  5636   5960*  6393*  6614*
                    7232*  7814*  7897*  7899   7904*  7905   7960   8423*  8502*  8604   8658*  9095
P.WC  = 000012      3429*  5705*  5709*  5784*  5788*  5873*  5877*  5962*  5965*  6064*  6067*  7234*  7816*
                    8253*  8477   8508*  8662*  8688   8725   9099   10510
P.WCR = 000022      3461*  9109   10052* 10282*
QNEWSW= 000000      3180
Q.INIT= 040000      3451*
RCDASW= 000010      3674*
RCLREQ= 004000      4230*  9236   9241   9286   9291   9296   9301   9435
RDALHD= 000164      3209*  9824   10603
RDCHR = 104405      6279   7436   11618*
RDCHRS  032214      4866   4912   4927   5022   5066   5093   5143   5249   5277   5326   5398   6842   7430*
                    7608   7626
RDDATA= 000121      3198*  5729   5809   5904   5988   7230   7812   8500
RDGATE= 100000      3317*
RDHDO   045004      9323   9348   9549*
RDHEAD= 000125      3200*  5436   9566   9938   10619
RDSTAT= 000141      3208*  6110   6573   6594   7195   7274   7342   7774   9525   10539
RDY   = 000200      3223*  6142   9431   10496  10549
RECAL = 000113      3195*  5640   6367   6372   6377   6430   6437   6442   6447   6503   6510   6675   6680
                    6687   7248   7313   8216   9437   10482
RECODE  005476      3710*  5981   6104   7237   7367*  8123   8346   8718   8721   8799*  8807*  8898   8908*
                    9155*  9156   9183*  9188*  9209   9211   9236*  9241*  9281*  9286*  9291*  9296*  9301*
                    9306*  9314*  9318   9324   9339*  9343   9349   9364*  9371   9374*  9378*  9381*  9394*
                    9395*  9404*  9409*  9414*  9419*  9427   9433*  9435   9441   9443*  9463   9465*  9470
                    9477*  9497*  9529*
REDBSF  037276      5455   8497*
REFNEM  037126      5978   5989   8448*
REISSU  003130      3662*  9054*
RELEAS= 000140      3207*  10586
REPLPK  007476      4292*  4910
REPSUP  042130      5994   6121   6135   6146   6915   6958   8060   8326   8518   9089*  9161
RESREG= 104407      6826   6907   7031   7087   7739   7797   7884   7908   7925   7972   8041   8122   8183
                    8262   8302   8345   8413   8488   8593   8618   8676   8704   8800   8885   9025   9140
                    9492   9541   9572   9631   10966  11018  11620*
RESVEC= 000010      2145*
RETANL  044606      9159   9438   9496*
RETNML  044624      5660   6715   8545   9160   9499*
RKASOF= 000016      3176*  9518   9834   9904   9984   10239  10287  10476* 10501
RKBA  = 000004      3171*  9517   10235  10283  10509*
RKBADR  007244      4261*  4812
RKBAS   003026      3566*  4793*  4797*  4811   4814*  7135   9326   9351   9430   9479   9510   9687   9756
                    10420
RKCS1 = 000000      3169*  4921*  6560*  7208*  7295*  9226*  9327*  9331   9352*  9356   9512   9779   9831
                    9889   9939*  9948   10130* 10131  10140* 10179* 10180  10204* 10232  10493* 10495  10534*
                    10546* 10548  10578* 10600* 10622* 10631* 10641  10651  10666*
RKCS2 = 000010      3173*  9513   9757   9917   10175* 10233  10281  10464* 10530* 10541* 10591* 10615* 10640*
RKDA  = 000006      3172*  9515   9934*  10236  10284  10470* 10512* 10614*
RKDB  = 000024      3179*  5447   5448   9328   9329   9330   9353   9354   9355   9913   9914   9915
RKDC  = 000020      3177*  9514
RKDCYL= 000020      3178*  9933*  10240  10289  10469* 10511* 10613*
RKDS  = 000012      3174*  9431   9519   9782   10237  10285
RKECPS= 000030      3184*  9848   10244
RKECPT= 000032      3186*  9847   10245
RKER  = 000014      3175*  9520   9791   9957   10238  10286
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RKMR1 = 000026          3180#   9925*  10004*  10241   10318*  10325*  10332*  10339*  10440*
RKMR2 = 000034          3181#  10242   10552
RKMR3 = 000036          3182#  10243   10553
RKPAT = 000032          3185#
RKPOS = 000030          3183#
RKPRI   003032          3568#   4771    4802*   4821    4837*   9686   10410
RKPRTY  007304          4267#   4826
RKVADR  007264          4264#   4817
RKVEC   003030          3567#   4769    4798*   4799*   4816    4819*   6256
RKWC  = 000002          3170#   9516   10234   10282   10510*
RLS   = 000010          3247#  10590
RNDADR  034044          6076    6421    6668    7865#
RNDLNG= 016514          4216#   6418    6643
RNDSHT= 002734          4215#   6639
RUNTST  017330          5177    5395#
RWBUF   064574          3739    5552    5694    5771    5859    5986    5987*   5992    5996    6971    7233    7240    7815
                        7820    7880    7882    7994    8065    8246    8252    8427    8690   12373#
RWNRDY  012751          4618#   7346
R.ABNL  050774          9699    9809    9884    9901   10079   10099   10359#  10569
R.CONT  051020          9761    9799    9863    9872    9943    9965    9988    9994   10027   10067   10091   10136   10188
                       10211   10349   10367#  10583   10637   10646   10659
R.NORM  051006          9837    9930   10039   10363#  10506   10579   10667
R0    =%000000          2066#   4777*   4779*   4792*   4796*   4798    4800*   4801*   4802    4828*   4829    4831    4833*
                        4834*   4835*   4836*   4837    4870    4881*   4885    4891*   4896    4916    4931    4937    4948
                        4960*   4961    4964*   4965    4969*   4975*   4978*   4980*   4981    4987*   4988    4990    4995*
                        4996    4999*   5026    5070    5078*   5080    5097    5108    5110*   5111*   5113    5118*   5119
                        5121    5147    5253    5261*   5263    5281    5287    5330    5335    5357    5362    5364*   5365
                        5402    5404    5428*   5429    5433    5552*   5554*   5558*   5564    5576    5577*   5582    5584*
                        5587    5708*   5709    5787*   5788    5876*   5877    5968*   5971*   5974    5992*   5995    6044*
                        6046    6048    6050    6052    6055*   6075*   6077*   6079*   6084*   6085    6087    6089    6091
                        6096*   6112*   6113    6115    6117    6119    6123    6137*   6187*   6190    6270*   6272*   6418*
                        6427*   6516*   6518    6527*   6534*   6535*   6536    6549*   6550    6554*   6556    6666*   6685*
                        6703    6705*   6710*   6712    6714*   6803*   6807*   6812*   6814    6846    6849    6858*   6861
                        7006*   7007*   7009    7011*   7013*   7016*   7022*   7024*   7025*   7076*   7082*   7084    7091*
                        7093*   7096*   7155    7157*   7159*   7160    7163*   7433*   7465    7472*   7473    7487*   7488*
                        7489    7492*   7497*   7597    7612    7630    7639    7641*   7642*   7644    7649*   7652    7668*
                        7731    7748*   7750*   7756*   7757*   7761*   7788*   7789*   7790*   7791    7836    7841*   7842*
                        7843*   7845*   7850*   7853*   7881    7899*   7900*   7919*   7921*   7922*   7949*   7952*   7953
                        7955    7992*   7996*   7999*   8002*   8003*   8004*   8005*   8006*   8007*   8017    8032    8063*
                        8067*   8070*   8073*   8074*   8075*   8076*   8077*   8078*   8088    8105    8118*   8206*   8219
                        8222*   8228*   8246*   8248*   8341*   8477*   8481*   8483*   8485    8558*   8563    8570    8573
                        8579    8583    8590*   8603*   8607    8640*   8653*   8657    8670*   8671*   8672    8686*   8698*
                        8701    8760    8863*   8865    8866    8867    8868    8869    8870    8933*   8936*   8937*   8938*
                        8939*   8940*   8941*   8942    8948    8987    8989*   8990    8991    8992    9009    9010    9021
                        9023*   9093*   9094*   9095*   9096*   9097*   9098*   9099*   9100*   9105*   9106*   9107*   9108*
                        9109*   9111*   9112*   9113*   9114*   9115*   9116*   9117*   9118*   9119*   9120*   9121*   9122*
                        9125*   9126    9128    9130    9131    9133    9135    9136    9139    9228*   9229    9365*   9482*
                        9483    9484    9485    9486    9487    9488    9521*   9552*   9553*   9554*   9555*   9556*   9557*
                        9560    9755    9849*   9854*   9857*   9899*   9927*  10006*  10020*  10059*  10062*  10086*  10101*
                       10137*  10138*  10142   10143*  10202*  10206   10207*  10213*  10214*  10321*  10328*  10335*  10342*
                       10350*  10351*  10354   10355*  10408   10430*  10431*  10435*  10436   10562*  10572*  10627*  10670*
                       10694   10697*  10700   10722*  10729*  10745   10748*  10751*  10755*  10758*  10761   10765*  10790
                       10791*  10796   10801   10804*  10862*  10865*  10871*  10872*  10898*  10899*  10905*  10910*  10912*
                       10915*  10917*  10927*  10928*  10956*  10960   10970*  10972*  10974*  10994*  10995   11013*  11017*
                       11051   11052*  11053   11055   11057*  11058   11061*  11154   11164*  11168   11184   11185   11198*
                       11411   11419*  11423   11424   11426*  11427*  11428   11450*  11476   11482*  11530   11538*  11560
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                    11585*  11595   11596*  11597   11598*  11599*  11600*  11601*
R1      =%000001     2067*   4769*   4770*   4771*   4776*   4778*   4880*   4883    4888    4892*   4894    4942*   4943
                     4945    4947*   4948    4950    4952*   4955*   4956*   4957*   4958*   4959*   4961*   4962*   4963*
                     4974*   4976    4979*   5043*   5056*   5057    5086*   5099*   5100    5121*   5125    5130*   5131*
                     5190*   5204    5206*   5207*   5208    5218*   5231*   5232    5271*   5283    5285*   5300*   5301
                     5338*   5339    5341*   5342    5553*   5555*   5576*   5579*   5580    5596*   5597    5607*   5608
                     5703    5706    5711*   5712*   5713    5782    5785    5790*   5791*   5792    5871    5874    5879*
                     5880*   5881    5894*   5972*   5999*   6043*   6054*   6057    6074*   6080*   6082*   6092    6111*
                     6131    6133    6256*   6257*   6258*   6269*   6271*   6280*   6281    6291*   6292    6294    6297
                     6312*   6313    6315    6317    6319*   6320    6336*   6337    6340    6343    6345    6348    6364*
                     6365    6370    6375    6380    6382    6384*   6385    6396*   6397*   6398    6414*   6415*   6416
                     6434*   6435    6440    6445    6465*   6466    6469    6471    6474    6529*   6541*   6543    6548
                     6567    6580    6581*   6582*   6583    6617*   6618*   6619    6661*   6662*   6663    6704    6706*
                     6707    6709*   6713*   6722    6723*   6724*   6725    6727    6729*   6730    6731    6735*   6737
                     6741    6745    6804*   6808*   6813*   6815    6816*   6894*   6898    6899*   6934    6938*   6939*
                     6940*   6943    6947*   6955    6978*   6984*   6985    6987    6991*   6992    7008*   7010    7012*
                     7014*   7015*   7017*   7018    7019*   7023*   7028*   7077*   7092*   7094*   7095*   7097*   7098
                     7099*   7100*   7101*   7106*   7110    7113    7115*   7282*   7283*   7284    7290*   7291*   7292
                     7307*   7308*   7309    7387    7396*   7397*   7398*   7399    7402*   7431    7434*   7467    7469*
                     7476    7479*   7500*   7516    7523    7541    7543    7545    7547    7568    7574    7598    7601
                     7621*   7632*   7633    7652*   7656    7658*   7659*   7667*   7696    7698    7710*   7726*   7727*
                     7732    7749*   7751*   7752*   7755*   7758*   7759    7762*   7778*   7782*   7783*   7784*   7785*
                     7786*   7787*   7788    7837    7847*   7848*   7852*   7880*   7881*   7882    7918*   7923*   7994*
                     7997    8000*   8009*   8015*   8016*   8019*   8020    8023*   8034*   8065*   8068    8071*   8080*
                     8086*   8087*   8090    8094    8097*   8107    8119*   8155    8163    8247*   8249*   8280*   8283*
                     8284*   8287*   8293    8296*   8322*   8329*   8330*   8333    8342*   8384    8392    8403    8406*
                     8476*   8479*   8484*   8487    8556*   8565    8584*   8585    8604*   8609    8636*   8637    8639*
                     8654*   8658    8687*   8699*   8701*   8769    8862*   8865*   8866*   8867*   8868*   8869*   8870*
                     8878*   8879*   8880*   8881*   8882*   8883*   8884*   8963*   8968*   8987*   8998    9124*   9126*
                     9127*   9128*   9129*   9130*   9131*   9132*   9133*   9134*   9135*   9138*   9139*   9366*   9367*
                     9511*   9512*   9513*   9514*   9515*   9516*   9517*   9518*   9519*   9520*   9531*   9532*   9533*
                     9534*   9535*   9536*   9537*   9538*   9551*   9559    9613*   9614*   9615*   9616*   9617*   9621
                     9627*   9629*   9630    9754    9912*   9913*   9914*   9915*   9916    10102*  10407   10432*  10433*
                    10436   10671*  10695   10698*  10708*  10710*  10712*  10715*  10718   10721*  10728*  10746   10749*
                    10752*  10756*  10757*  10759*  10760*  10762   10764*  10863*  10866*  10870*  10897*  10904*  10909*
                    10914*  10926*  10952*  10956   10957*  10969*  10971*  10973*  10996*  11002*  11008*  11155   11168*
                    11169   11173   11197*  11412   11449*  11477   11491*  11523*  11525   11526   11528*  11533   11537*
                    11561   11584*
R2      =%000002     2068*   4921*   5057*   5058*   5059    5079*   5080*   5081    5100*   5101*   5102    5107*   5112*
                     5122    5125*   5126*   5127    5208*   5209*   5210    5262*   5263*   5264    5301*   5302*   5303
                     5342*   5343*   5344    5348*   5349    5351    5353*   5354    5356*   5357    5359    5361*   5362
                     5364    5368*   5369    5447    5448    6560*   6805*   6809*   6895*   6897*   6898*   6902*   7074*
                     7085*   7117*   7135*   7208*   7295*   7432    7437*   7439    7445    7451    7457    7463    7481
                     7485    7487    7499*   7599    7638*   7643*   7653    7666*   7696*   7697*   7705    7707    7715
                     7718    7720    7723    7989*   8024*   8035*   8058*   8098*   8113    8120*   8173*   8279*   8297*
                     8321*   8336    8343*   8407*   8605*   8611    8632*   8633    8635*   8655*   8659    8700*   8702*
                     8750    8753*   8757*   8758    8760    8762*   8763    8766    8767    8771    8774    8778*   8802
                     8964*   8965    8975    8978    8990*   9004    9007*   9226*   9326*   9327*   9328    9329    9330
                     9331    9351*   9352*   9353    9354    9355    9356    9368*   9369*   9430*   9431    9479*   9510*
                     9512    9513    9514    9515    9516    9517    9518    9519    9520    9679    9687*   9701*   9753
                     9756*   9757    9779    9782    9791    9831    9834    9847    9848    9889    9913    9914    9915
                     9917    9925*   9933*   9934*   9939*   9948    9957    9984    10004*  10103*  10130*  10131   10140*
                    10175*  10179*  10180   10204*  10232   10233   10234   10235   10236   10237   10238   10239   10240
                    10241   10242   10243   10244   10245   10281   10282   10283   10284   10285   10286   10287   10289
                    10318*  10325*  10332*  10339*  10406   10420*  10440*  10464*  10469*  10470*  10476*  10493*  10495
                    10501   10509*  10510*  10511*  10512*  10530*  10534*  10541*  10546*  10548   10552   10553   10578*
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                10591* 10600* 10613* 10614* 10615* 10622* 10631* 10640* 10641  10651  10666* 10672* 10696
                10699* 10709* 10711* 10713* 10719  10720* 10727* 10747  10750* 10753* 10763* 10867* 10903*
                10958* 10959  10960* 10975* 10976* 10993* 10996  10997* 11003* 11004* 11009* 11010* 11156
                11167* 11171* 11174  11181* 11182* 11183  11188* 11196* 11478  11499* 11501* 11502* 11505*
                11506* 11514* 11515  11517* 11522* 11524* 11529* 11534  11536* 11562  11583*
R3      =%000003 2069#  4882*  4893*  4970*  4973*  4976   5518*  5520*  5727*  5803*  5807*  5815*  5902*
                5973*  6125*  6126*  6127*  6128*  6129*  6130*  6131   6134   6533*  6538*  6548*  6550
                6556*  6896*  6900*  7009*  7024   7026*  7075*  7082   7084*  7104   7112*  7781*  7792*
                8017*  8019   8032*  8034   8088*  8090   8105*  8107   8154   8248   8275*  8287   8290*
                8317*  8333   8383   8400*  8459   8503*  8507*  8516   8522   8523*  8526*  8533   8573*
                8574*  8575*  8576   8579*  8580   8606*  8613*  8616*  8617   8660*  8661*  8662   8664*
                8666   8751   8756*  8773*  8777   8779*  8793*  8804*  8808*  8991*  8993   9000*  9101*
                9102*  9103   9136*  9137*  9138   9678   9702*  9752   10104*  10405  10673*  10868*  10902*
                10921* 10924* 10930* 10955* 10968* 10975  11001* 11006* 11012* 11013  11097  11106* 11112*
                11113* 11116* 11121* 11122* 11123  11132* 11157  11165* 11166* 11180* 11183* 11192* 11193*
                11195* 11479  11500* 11504* 11535* 11563  11582*
R4      =%000004 2070#  5557*  5578*  5585*  5589   5591   5780*  5803   5811*  5815   5817*  5888*  5889
                5891*  5894   7010*  7025   7027*  7065*  7071*  7080   7102   7779*  7780   7791*  7794*
                8018*  8026*  8033*  8037*  8089*  8101*  8106*  8175*  8274*  8278*  8288   8316*  8320*
                8398   8459*  8461*  8557*  8587   8589*  8628*  8631*  8633   8663*  8665*  8668   8714
                8715*  8723*  8727   8734*  8753   8754   8781*  8791*  9179*  9238   9254   9262   9266
                9270   9274   9278   9283   9288   9293   9303   9312   9337   9362   9376   9379   9677
                9703*  9751   9776*  9777*  9817*  9818*  9821   9968*  9969*  9998*  10088  10105*  10404
                10413* 10414* 10416  10417  10439  10674* 10872  10892  10917  10928  10954* 10961* 10999*
                11002  11008  11010  11098  11100* 11101* 11102* 11103  11104* 11118  11120* 11128* 11131*
                11564  11581*
R5      =%000005 2071#  5436*  5438   5440*  5442*  5511*  5512*  5513*  5521*  5524*  5525   5527   5530*
                5531*  5532   5534   5536*  5537*  5539   5541*  5542*  5548*  5549*  5550*  5562*  5564*
                5565*  5567*  5572*  5596   5602   5607   5626   5628*  5630   5632*  5633*  5635*  5636
                5638*  5640*  5653   5656   5705*  5709*  5710*  5713*  5725*  5729*  5784*  5788*  5789*
                5792*  5805*  5809*  5873*  5877*  5878*  5881*  5900*  5904*  5959*  5960*  5961*  5962*
                5965*  5966*  5974*  5977*  5983*  5986*  5988*  6042*  6045*  6052*  6062*  6063*  6064*
                6067*  6068*  6069*  6070*  6083   6091*  6092*  6099*  6100*  6101*  6106*  6110*  6123*
                6125   6145*  6150*  6367*  6372*  6377*  6393*  6419*  6422*  6430*  6437*  6442*  6447*
                6498*  6503*  6510*  6520*  6521*  6563*  6572*  6573*  6575   6577*  6589*  6592*  6594*
                6596   6598*  6602*  6607*  6614*  6650*  6651*  6665*  6669*  6675*  6680*  6687*  6700
                7029*  7030*  7104*  7106   7110*  7112   7136*  7139*  7141*  7143*  7156   7157   7158*
                7160   7162*  7186*  7195*  7212   7220   7228*  7230*  7231*  7232*  7233*  7234*  7235*
                7248*  7273*  7274*  7288   7300*  7305   7313*  7315*  7326*  7327*  7329*  7330   7340*
                7342*  7344   7354*  7369*  7370*  7774*  7778   7808*  7811*  7812*  7813*  7814*  7815*
                7816*  7896   7897*  7899   7902*  7904*  7905   7907*  7946   7960   7969   8216*  8252*
                8253*  8255*  8260*  8421*  8422*  8423*  8426*  8452   8477   8499*  8500*  8501*  8502*
                8506*  8508*  8509*  8515*  8516   8521*  8522*  8532*  8533   8541   8603   8604   8605
                8607   8609   8611   8653   8654   8655   8657*  8658*  8659*  8662*  8669*  8672*  8688
                8725   8838   8848   8879   8880   8881   8882   8883   8884   8934*  8935*  8984*  8995
                9013*  9015*  9092   9094   9095   9097   9099   9101   9104   9105   9106   9107   9108
                9109   9111   9112   9113   9114   9115   9116   9117   9118   9119   9120   9121   9122
                9158*  9179   9180   9185   9190   9192   9198   9200   9206   9219   9233   9243   9247
                9251   9258   9298   9308   9365   9366   9368   9388   9389   9392   9401   9406   9411
                9416   9424*  9480*  9483*  9484*  9485*  9486*  9487*  9488*  9489*  9524*  9525*  9527
                9530*  9531   9532   9533   9534   9535   9536   9537   9538   9540*  9551   9552   9558*
                9559*  9560*  9563*  9565*  9566*  9569*  9570*  9571*  9580   9583   9584   9590   9612
                9613   9619   9623   9676   9691*  9693*  9694   9704*  9750   9778*  9804*  9806*  9812*
                9821   9824   9840*  9845*  9847*  9848*  9851   9868*  9875   9879*  9897*  9904   9929*
                9933   9934   9935*  9936*  9938*  9939   9972*  9976*  9997*  9998   9999   10003*  10008*
                10009  10013* 10014  10016* 10022* 10023  10030* 10031  10034* 10044* 10048* 10050* 10051*
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DZR6NB.CMB CROSS REFERENCE TABLE -- USER SYMBOLS

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                    10052*  10053*  10054*  10055*  10056*  10057*  10058*  10070   10074*  10084*  10096*  10106*  10174
                    10176   10201*  10277*  10280*  10281*  10282*  10283*  10284*  10285*  10286*  10287*  10289*  10323*
                    10324*  10330*  10331*  10337*  10338*  10344*  10345*  10353*  10403   10411*  10413   10415   10428*
                    10430   10432   10439*  10441   10445   10457   10464   10465*  10467   10469   10470   10473   10475*
                    10476   10479   10482   10485*  10486*  10488*  10489*  10490   10492*  10493   10509   10510   10511
                    10512   10513   10515   10517*  10520*  10521*  10522*  10523*  10526   10527   10529*  10530   10531
                    10533*  10534   10539   10541   10542*  10543*  10545*  10546   10548*  10549   10552*  10553*  10554
                    10558   10560   10564   10566   10568*  10576   10586   10588   10590*  10591   10593*  10594*  10596*
                    10597   10599*  10600   10603   10605   10606   10607   10613   10614   10615   10616*  10617*  10619*
                    10620   10622   10625   10629   10634   10641*  10642   10651*  10652   10663   10675*  10870   10893
                    10914   10926   10953*  10959*  10964*  10965   11000*  11004   11011   11099   11105*  11107*  11109*
                    11110*  11111*  11112   11130*  11158   11160*  11162*  11169*  11173*  11188   11194*  11565   11580*
R6      =%000006     2072#   2074    4708*   4709*   4710    6206*   6207*   6208
R7      =%000007     2073#   2075
SAVPAR  003200       3695#   7018*   8013    8084    8285    8331
SAVPRS  005552       3731#   8687    8698
SAVREG= 104406       6794    6893    7004    7064    7067    7695    7772    7879    7895    7917    7940    7988    8055
                     8117    8244    8273    8277    8315    8319    8340    8475    8555    8602    8651    8685    8697
                     8789    8861    8920    9038    9090    9152    9509    9550    9611    10951   10992   11619#
SAVWRD  003202       3696#   6119    6148*   6149*
SAVXDP  030474       5696    5773    5861    7064#
SCLR    = 000040     3250#   10640
SCNDRV  031046       4991    7185#
SCOPER= 104410       5732    5907    11621#
SCOPE1  055402      11336#  11621
SCRACH  005534       3725#   4888*   4889*   4890    6495*   6498    6501    6508    6570    6572    6579*   6639*   6643*
                     6666    7471*   7473*   7474    7484*   7485*   7486    8059*   8125    8138*   8141    8323*   8354
                     8367*   8370
SECNL1  010473       4389#   5165
SECNL2  010523       4394#   5169
SEEK    = 000117     3197#   5562    6042    6070    6419    6665    7326    10457   10467
SELDRV= 000101       3190#   6521    6651   10596
SELECT  005526       3722#   5778*   5799    5821*   6492*   6567    6580*
SELP15  010720       4417#   7620
SERNM   011205       4451#   7777    7819
SETPRM  017074       5160    5323#   5329    5334    5378
SETTUP  032060       5500    5686    5722    5763    5851    5897    5952    6035    7365#
SETUPM  037022       5701    5779    5869    8421#
SIZMEM  027302       4785    6794#
SKI     = 000002     3266#   9283
SOFTBS  011233       4455#   8591
SP      =%000006     2074#   4712*   4730*   4738*   4742    4811*   4814    4816*   4819    4821*   4822*   4823*   4824*
                     4825*   4828    4862*   5115*   5118    5289*   5292    5369*   5372    5409*   5412    5421*   5597*
                     5602*   5608*   5615*   5622*   6184*   6210*   6228*   6236*   6240    6280    6703*   6704*   6713
                     6714    6722*   6735    6821*   6837*   6853*   6855*   6858    6861*   6875*   6878    6923    6934*
                     6935*   6936*   6942    6945    6946    6947    6955*   6956*   6957*   6959    6976    6977    6978
                     6982    6990    7155*   7156*   7162    7163    7209*   7250*   7302*   7318*   7365    7366*   7387*
                     7401*   7402    7431*   7432*   7437    7442*   7448*   7454*   7498*   7499    7500    7516*   7517*
                     7518*   7523*   7548*   7568*   7569*   7574*   7597*   7598*   7599*   7646*   7649    7666    7667
                     7668    7671*   7674*   7702*   7733*   7737*   7738*   7780*   7820*   7836*   7837*   7852    7853
                     7896*   7907    7941*   7942*   7943*   7944*   7945*   7946*   7947*   7948*   7953    7955*   7956*
                     7958    7959*   7960*   7961*   7962*   7963    7965*   7966*   7968    7969*   7970    7971    7993*
                     8008*   8018    8033    8040    8064*   8079*   8089    8106    8182    8215*   8466    8570*   8576*
                     8580*   8714*   8734    8752    8774*   8775*   8777*   8780*   8793    8802    8810    8952*   8965*
                     8975*   8978*   8998*   9676*   9677*   9678*   9679*   9680*   9700    9701    9702    9703    9704
                     9750*   9751*   9752*   9753*   9754*   9755*  10101   10102   10103   10104   10105   10106   10172*
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                    10199   10205   10212   10403*  10404*  10405*  10406*  10407*  10408*  10409*  10411   10412*  10649*
                    10654*  10656   10662   10669   10670   10671   10672   10673   10674   10675   10694*  10695*  10696*
                    10697   10700*  10702   10704   10706   10714*  10715   10717   10718*  10720   10721   10722   10723*
                    10726   10727   10728   10729   10730*  10745*  10746*  10747*  10763   10764   10765   10790*  10791
                    10801*  10803   10804   10805*  10807   10809   10811   10817   10819*  10821*  10829*  10833   10837
                    10838   10842   10864*  10873*  10875   10891*  10892*  10893*  10894*  10895*  10896*  10897   10899
                    10901*  10906   10908*  10909   10911*  10912   10916*  10918*  10919   10922*  10931*  10934*  10952
                    10965*  10993   10995*  11051*  11052   11061   11062*  11089*  11090   11091   11092*  11097*  11098*
                    11099*  11105   11130   11131   11132   11133*  11134*  11154*  11155*  11156*  11157*  11158*  11159*
                    11160   11163*  11176   11178*  11180   11190   11192   11194   11195   11196   11197   11198   11200*
                    11201*  11230   11250*  11253*  11276*  11277*  11280*  11281*  11282   11286*  11287*  11288   11291
                    11293   11295*  11320*  11340*  11366*  11369   11371   11372   11395   11396   11400*  11411*  11412*
                    11419   11420*  11431   11432*  11433*  11443   11444*  11449   11450   11476*  11477*  11478*  11479*
                    11480*  11481*  11482   11484*  11487   11488*  11490   11498*  11502   11503*  11510   11530*  11531
                    11532   11535   11536   11537   11538   11560*  11561*  11562*  11563*  11564*  11565*  11566*  11567*
                    11568*  11569*  11576*  11577*  11578*  11579*  11580   11581   11582   11583   11584   11585   11595*
                    11596
SPACE1  013422       4680#   5090    5274    5610    5617    7515    7623
SPACE2  013421       4679#   5606    8572    8578    8967    8971    8974    8977    8997    9002    9017
SPACE3  013420       4678#   5601
SPACE4  013417       4677#
SPACE6  013415       4676#   7522
SPAR   = 020000      3230#   9233    10192
SPDLSS= 000020       3290#   9247
SRHTBS  040450       8750#   8791
SRTSPL= 000111       3194#   6577    6607    7354    10479
SR0    = 177572      2164#   6906*   6916    7105*   7107*   7109*   7111*   8014*   8029*   8085*   8181*   8286*   8301*
                     8332*   8412*   11496   11511*  11518*
SR1    = 177574      2165#   6917
SR2    = 177576      2166#   6918
SR3    = 172516      2167#   5739*   5827*   5915*   6905*   6921    11508*
ST       005674      3795#   5453
STACK  = 001100      2049#   4712    4862    5421    6210    7365*   7366    8215    11320
STALL    033762      7836#   8833
STALLS   005504      3713#   4781*   4863*   5139*   5453*   6268*   7845
STKLMT= 177774       2060#
STPASS   017412      5269    5415#
STRCMD   041032      6093    8451    8837    8861#
SUBCLR= 000177       3211#   5572    6150    6563    6598    7139    7300    7370    9480    10634
SUBMOD   024460      6330#   6352    6379    6433    6449
SUBVER   007040      4236#   4758    6250
SUMHI1   003172      3692#   7732*
SUMHI2   003176      3694#
SUMLO1   003170      3691#   7731*   7733
SUMLO2   003174      3693#
SVAL   = 100000      3300#
SVPRMS   040226      5723    5802    5898    8685#   8730
SWR      001140      2277#   4710    4732*   4734    4740*   4747*   6208    6230*   6232    6238*   6245*   6252*   6253*
                     6873    7838    8139    8166    8256    8368    8395    8930    8957    8985    11226   11233   11245
                    11248   11338   11361   11379   11386
SWREG    000176      2205#   4740    6238    6252    6873    6875    6878*
SWRMSG   007324      4270#   6876
SWO    = 000001      2113#
SWO0   = 000001      2103#   2113
SWO1   = 000002      2102#   2112
SWO2   = 000004      2101#   2111
```

DZR6NB.CMB CROSS REFERENCE TABLE -- USER SYMBOLS

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SW03   = 000010          2100#   2110
SW04   = 000020          2099#   2109
SW05   = 000040          2098#   2108
SW06   = 000100          2097#   2107
SW07   = 000200          2096#   2106
SW08   = 000400          2095#   2105
SW09   = 001000          2094#   2104
SW1    = 000002          2112#
SW10   = 002000          2093#
SW11   = 004000          2092#
SW12   = 010000          2091#
SW13   = 020000          2090#   8930
SW14   = 040000          2089#
SW15   = 100000          2088#
SW2    = 000004          2111#
SW3    = 000010          2110#
SW4    = 000020          2109#
SW5    = 000040          2108#
SW6    = 000100          2107#
SW7    = 000200          2106#
SW8    = 000400          2105#
SW9    = 001000          2104#
S.ACLO= 000100           3335#
S.BRHM= 000100           3350#
S.BRKE= 040000           3372#
S.CART= 000400           3352#
S.DCLO= 010000           3342#
S.DIB  = 002000          3368#
S.DOOR= 000200           3351#
S.DRA  = 000040          3321#
S.DROT= 020000           3343#
S.DRY  = 000200          3323#   7212    7288
S.DSC  = 040000          3330#   9866   10014   10031   10094
S.FLT  = 000200          3336#  10009
S.FORM= 001000           3325#
S.FWD  = 002000          3354#
S.HDFL= 000200           3365#
S.HDHM= 000040           3349#   6575    6596    7344
S.ICYL= 000040           3334#
S.ILF  = 000400          3337#
S.LIMD= 020000           3371#
S.LOAD= 010000           3356#
S.MHD  = 000400          3366#
S.NMOV= 010000           3370#
S.OFF  = 002000          3326#
S.PAR  = 001000          3338#   9869   10346
S.PIP  = 020000          3329#   9877   10072
S.PLO  = 004000          3369#
S.REV  = 004000          3355#
S.RTZ  = 020000          3357#
S.SECT= 000020           3362#
S.SKI  = 002000          3339#
S.SPIN= 010000           3328#
S.SPLS= 010000           3341#
S.SPOK= 001000           3353#
S.TYPE= 000400           3324#
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S.UNLD= 040000          3358#
S.UNS = 040000          3344#
S.VV  = 000100          3322#
S.WCLK= 000040          3363#
S.WGAT= 000100          3364#
S.WLE = 004000          3340#
S.WRL = 004000          3327#   7220    7305
S.XDOK= 000020          3348#
S.XERR= 001000          3367#
S0      005660          3789#   5163    5451    5646
S1      005662          3790#   5163    5452    5647
S2      005664          3791#   5167    5445    5642
S3      005666          3792#   5167    5446    5643
TBITVE= 000014          2146#
TCONHI  003160          3687#
TCONLO  003156          3686#
TELDRV  014604          4871    4879#   4930    4941    4985    4998
TKVEC = 000060          2153#   4767*   4768*   6254*   6255*
TLSTHD  010207          4354#   5042    5087
TOPROC  044634          9041    9208    9508#
TPVEC = 000064          2154#
TRACK   005522          3720#   6385*   6393    6396    6588*   6609    6611*   6613*   6614    6617
TRAPVE= 000034          2152#   4718*   4719*   6216*   6217*   11319*  11484   11485*  11490*
TRKCHK  034126          7895#
TRKNLW  010535          4396#   5174
TRNSFR  040340          5726    5730    5806    5810    5901    5905    8714#
TRTVEC= 000014          2147#
TSTDRN  011142          4443#   5458
TSTING  003110          3646#   4774*   5416*   6073*   6109*   6267*   8198
TSTLST  005620          3760#   3780    5058    5079    5101    5121*   5126    5130*   7399    7523
TSTMDS  010003          4328#   5020
TSTMSG  056626          8951    11623#
TST1    017750          5498#
TST2    021060          5502    5649    5684#
TST3    021370          5688    5761#
TST4    021730          5765    5849#
TST5    022300          5853    5950#
TST6    022604          5954    6033#
TWOTOS= 002000          4229#   9209    9529
TYPAUT  013023          4627#   6459
TYPBSF  037564          5465    8555#
TYPDS = 104404          5616    5623    6185    11615#
TYPE  = 104400          4757    4758    4759    4762    4766    4808    4812    4817    4826    4838    4840    4841    4865
                        4875    4876    4879    4887    4890    4898    4899    4902    4910    4920    4925    4939    4940
                        5020    5021    5028    5029    5042    5046    5065    5074    5075    5087    5090    5091    5133
                        5134    5138    5141    5142    5149    5150    5165    5169    5170    5174    5175    5193    5217
                        5230    5248    5257    5258    5274    5275    5306    5307    5324    5332    5333    5397    5406
                        5407    5458    5547    5601    5606    5610    5613    5617    5620    5624    6183    6186    6249
                        6250    6251    6275    6278    6283    6287    6307    6308    6332    6358    6360    6395    6399
                        6406    6417    6432    6451    6459    6461    6487    6489    6559    6584    6616    6620    6628
                        6664    6693    6733    6739    6743    6747    6749    6750    6781    6782    6820    6824    6825
                        6841    6851    6852    6876    7193    7205    7206    7216    7217    7224    7225    7239    7244
                        7245    7285    7293    7310    7346    7441    7447    7453    7459    7470    7474    7478    7486
                        7491    7493    7494    7496    7515    7522    7542    7567    7573    7607    7616    7617    7620
                        7623    7624    7662    7663    7730    7736    7776    7777    7796    7818    7819    7823    8226
                        8227    8559    8560    8561    8562    8567    8568    8572    8578    8582    8591    8928    8944
```

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                    8945   8946   8950   8951   8956   8959   8960   8961   8962   8967   8970   8971   8972
                    8973   8974   8977   8980   8981   8983   8997   9002   9006   9012   9017   9018   9020
                   10812  11059  11124  11199  11228  11236  11321  11611#
TYPERR  041222      8920# 11235
TYPFMT  003114      3650#
TYPLST  016336      5154   5189#
TYPMAN  011574      4504#  6307
TYPMOD  011533      4498#  6287
TYPOC = 104401      8571   8577   8581   8966   8976   8979   8999  11612#
TYPON = 104403      5609  11614#
TYPOS = 104402      5598   5603   6838   7519   7524   7570   7575   8953  11613#
TYPPAT  032642      5229   7566#  7622
TYPPRM  032562      5192   5273   7541#
TYPTST  032526      5045   5089   7515#
T.ASOF  003004      3553#  6148   9834*  9835   9859   9904*  9905   9984*  9985   9991  10022  10056  10064
                   10088  10234* 10501* 10502
T.BA    002776      3550#  10053  10235*
T.CS1   002770      3545#  6142   6145   9779*  9831*  9832   9845   9856*  9889*  9891   9897   9926*  9948*
                    9950   9980  10005* 10019* 10049* 10050 10061* 10085* 10131* 10132 10172  10176* 10177*
                   10179  10183  10192  10232* 10279* 10280 10320* 10327* 10334* 10341* 10495* 10496  10498
T.CS2   002772      3547#  9757*  9758   9773   9776   9788   9817   9917*  9918   9954   9968   10051  10173*
                   10174* 10175  10185  10194  10233*
T.DA    003000      3551#  10054  10236*
T.DB    003024      3562#
T.DC    003002      3552#  10055  10240*
T.DS    003010      3556#  9782*  9783   10058  10237*
T.ER    003006      3555#  9791*  9794   9957*  9960   10057  10196  10238*
T.MR1   003012      3557#  10241*
T.MR2   003014      3558#  6491*  9866   9877   10013  10030  10072  10094  10242* 10323  10330  10337  10344
T.MR3   003016      3559#  9869   9929   10008  10243* 10324  10331  10338  10345  10346
T.PAT   003022      3561#  10245*
T.POS   003020      3560#  10244*
T.WCR   002774      3549#  10052  10234*
UBMPRS  003134      3666#  5737   5825   5913   6818*  6903   8127   8356   8871
UEXATT= 000010      3437#  9416   9840
UFE   = 000400      3253#  9192   9198   9773   9851   10194  10564
UNLOAD= 000107      3193#  6592   7340   10445
UNLOD   011427      4484#  6587*  6603*
UNS   = 040000      3281#  9278
UPE   = 020000      3258#  9180   9788   9954   10194
VERIFY  011430      4485#  6331*  6390   6405*  6460*  6476*  6485   6590   6605
VFHDSW= 000002      3672#
VV    = 000100      3293#
WAIT4R  031754      6392   6413   7340#
WCDASW= 000004      3673#
WCE   = 040000      3259#  5653   9392   9788   9954   10194
WCEFLG  003131      3663#  5569*  5574   5659*  8511*  8513   8528*  8530   8544*  8716*  8720*
WCERR = 000100      4225#  8718   9395   9463
WC2BIG  010547      4398#
WDSXFR  005564      3732#  7989   8058   8114   8279   8321   8337   8617*  8660   8688*  8689*
WHDSW = 000001      3671#
WLE   = 004000      3278#  9274   9794   9960
WORDSP  013430      4683#  7567
WRCKHD  021024      5568   5653#
WRDATA= 000123      3199#  5725   5805   5900   5977   6099   8255  10517
WRHEAD= 000127      3201#
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WRL    = 004000          3297#
WRTCHK= 000131           3202#  5567   5983   6106   7902   8260  10513
WRTGAT= 040000           3316#
WRTLOK  007426           4284#  7225
WRTSEC  035772           5519   5523   5529   8244#
W.DRV   003104           3642#  9227*  9688*  9803*  9829*  9881*  9896*  9909*  9923*  9571*  10038*  10047*  10076*
                        10098*  10369*  10418*  10481*  10484*  10505*  10557*  10575*
W.MILI  003050           3595#  9683   10649
W.MIN   003056           3611#  9227   10481
W.MTIM  003046           3594#  9681*  9683*
W.SEC   003052           3608#  10418
W.TIME  003070           3617#  9230*  9684   9690*  9802*  9830*  9880*  9895*  9908*  9924*  9970*  10037*  10046*
                        10075*  10097*  10368*  10417*  10504*  10556*  10574*
W.WCK  = 000200          3442#  10428  10489  10515  10521
W.WTCH  045412           8456   8841   8851   9676%  10494  10500  10547
W.8SEC  003054           3610#  9881   10076  1048%
XDPSAV  005542           3728#  5694*  5695*  5771*  5772*  5859*  5860*  7076   7077   7099
XDPSVD  003125           3659#  4786   4789*  5698*  5775*  5863*  7069   8213*
XDP1    030522           7066   7072#
XDP2    030574           7070   7073   7087#  7119
XDP3    030600           7079   7090#
XOVLAD  003124           3658#  5697*  5774*  5862*  7068*  8207
XXDPAD  005540           3727#  7042*  7046*  7047*  7048*  7075
XXDPCH  003107           3645#
$APTHD  001000           2234   2240#
$ASTAT= ****** U        11437  11452
$ATYC   055710          11408  11410#
$ATY1   055664          11406#
$ATY3   055672          10797  11407#
$ATY4   055702          11241  11409#
$AUTOB  001134           2274#
$BASE   001374           2381#  4793
$BDADR  001122           2269#
$BDDAT  001126           2271#
$BELL   001310           2332#  6432   6693   11228  11260
$CHARC  053452          10814*  10824*  10831  10840*  10845#
$CKSWR= ****** U        11618
$CMTAG  001100           2257#  4707   4708   4716   4722   4723   4724   6205   6206   6214   6220   6221   6222
$CM1   = 000040          2289#  2290#  2291#  2292#  2293#  2294#  2295#  2296#  2297#  2298#  2299#  2300#  2301#
                         2302#  2303#  2304#  2305#  2306#  2307#  2308#  2309#  2310#  2311#  2312#  2313#  2314#
                         2315#  2316#  2317#  2318#  2319#  2320#  2321#
$CM2   = 000100          2289#  2290#  2291#  2292#  2293#  2294#  2295#  2296#  2297#  2298#  2299#  2300#  2301#
                         2302#  2303#  2304#  2305#  2306#  2307#  2308#  2309#  2310#  2311#  2312#  2313#  2314#
                         2315#  2316#  2317#  2318#  2319#  2320#  2321#
$CM3   = 000040          2287#  2289
$CM4   = 000011          2321#  2322#  2323#  2324#  2325#  2326#  2327#  2328#  2329#  2330#
$CNTLG  055243          11298#
$CNTLU  055236          11297#
$CORE   056366          11494  11521#
$CPUOP  001346           2355#
$CRLF   001315           2334#  4838   4902   5046   5193   5230   5624   6750   6824   6825   7491   7496   7736
                         7796   7823   8562   8568   8582   8950   8960   8962   8970   8973   8983   9006   9012
                         9020  10813  10848  11236  11260
$CROUT  056416          11521  11528#
$DBLK   054712          11165  11199  11207#
$DB2D   054014          10992#
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$DB20   053674          6822    7549    7734    7821   10951#
$DECVL  054174         10994   11040#
$DEVCT  001330          2346#   5418*   6169*
$DEVM   001376          2382#   4970
$DOAGN  023556          6179    6188    6194#
$DTBL   054702         11168   11203#
$ENDAD  023546          2220    6190#  11255
$ENDCT  023514          4722    6181#   6220
$ENDMG  023565          6183    6198#
$ENULL  023562          6186    6197#
$ENV    001340          2351#  10792   11238   11415   11439
$ENVM   001341          2352#   4745    4794    4971    4983    6243   10794   10799   11417
$EOP    023442          6037    6167#
$EOPCT  023506          4722*   5268*   5412*   6178#   6182    6220*
$ERFLG  001103          2260#  11223*  11260   11336   11350   11375   11377   11383*  11403
$ERMAX  001115          2266#   4725*   6223*  11377   11398*  11403
$ERROR  054722          4716    6214   11222#
$ERRPC  001116          2267#  11230*  11231*  11232   11260   12093
$ERRTB  001400          2399#   8941
$ERTTL  001112          2264#  11229*  11260
$ESCAP  001306          2331#   4724*   6222*  11251   11253   11260   11397*
$ETABL  001340          2350#
$ETEND  001400          2246    2383#
$FATAL  001322          2343#  11443*
$FFLG   056130         11406*  11409*  11437   11446*  11454#
$FILLC  001156          2285#  10817   10848
$FILLS  001155          2284#  10848
$GDADR  001120          2268#
$GDDAT  001124          2270#
$GET42  023536          6187#
$GTSWR= ******  U      11617
$HD     =  000000       2023
$HIBTS  001000          2241#
$HINUM  053170          4783*   6264*   7922   10749   10757   10762*  10767#
$HIOCT  053070          5293    5373    6859    7650   10719*  10732#
$ICNT   001104          2261#  11388*  11389   11391*  11402
$INTAG  001135          2275#
$ITEMB  001114          2265#   8936   11232*  11240   11260
$KTNEX  056360         11495   11520#
$KTOUT  056350         11512   11517#
$KT11   056216          5714    5793    5882    6795*   6797    7078    8010    8081    8170    8179    8281    8291    8299
                        8327    8348    8401    8410    8673    8731   11493#  11497*  11520*
$LF     001316          2335#  10848   11260
$LFLG   056127         11447*  11453#
$LONUM  053172          4784*   6265*   7841    7866    7921   10748   10755   10761*  10768#
$LPADR  001106          2262#   4726*   6224*  11323   11381*  11395*  11400   11402
$LPERR  001110          2263#   4727*   5721*   5896*   6225*  11250   11340   11381   11396*  11402
$LSTAD  056462          6799    6812   11533*  11540#
$LSTBK  056464          6803   11534*  11541#
$MADR1  001352          2368#
$MADR2  001356          2372#
$MADR3  001362          2375#
$MADR4  001366          2378#
$MAIL   001320          2242    2246    2341#   4744    5499    5685    5762    5850    5951    6034    6242   10792   11238
                       11394
$MAMS1  001350          2362#
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$MAMS2  001354          2370#
$MAMS3  001360          2373#
$MAMS4  001364          2376#
$MBADR  001002          2242#
$MFLG   056126         11407*  11413   11448*  11452#
$MNEW   055261         11301#
$MSGAD  001334          2348#  11423*  11426
$MSGLG  001336          2349#  11428#
$MSGTY  001320          2342#  11421   11429*  11441   11445*
$MSWR   055250         11299#
$MTYP1  001351          2363#
$MTYP2  001355          2371#
$MTYP3  001361          2374#
$MTYP4  001365          2377#
$MXCNT  055662         11392   11402#
$NULL   001154          2283#  10819   10848
$NWTST= 000001          5470#   5472    5664#   5666    5744#   5746    5832#   5834    5920#   5922    6006#   6008
$OCNT   054472         11096*  11125*  11138#
$OCTVL  053776          7779   10953   10978#
$OMODE  054474         11091*  11095*  11100   11103*  11114*  11140#
$OVER   055646         11362   11382   11390   11399#
$PASS   001326          2345#   4744*   5415*   5459    6175*   6176*   6184    6197    6242*   7392
$PASTM  001006          2244#
$PWRCT  055356         11314*  11315*  11324#
$PWRDN  055272          4720    6218   11309#  11317
$PWRUP  055304         11309   11314#
$QUES   001314          2333#   4841    4876    4940    5029    5075    5134    5150    5258    5307    5333    5407    6782
                        6852    7494    7617    7663   10848   11260
$RAND   053072          7840    7865    7920   10744#
$RDCHR  055116         11276#  11618
$RDDEC= ****** U       11619
$RDLIN= ****** U       11619
$RDOCT= ****** U       11619
$RDSZ = 000000         11297#
$REGAD  001160          2287#
$REGD   001162          2289#   9093   12093
$REGI   001164          2290#  12093
$REG10  001202          2297#   6921*   6965*   8113*   8114*   8115    8153*   8156    8336*   8337*   8338    8382*   8385
                        9328*   9353*   9388*  12097   12105
$REG11  001204          2298#   8154*   8383*   9329*   9354*   9389*  12097   12105
$REG12  001206          2299#   8155*   8384*   9330*   9355*   9382*   9384*  12097   12105
$REG13  001210          2300#   8157*   8159*   8161*   8162*   8386*   8388*   8390*   8391*  12097   12105
$REG14  001212          2301#   6133*   8156*   8158*   8160*   8385*   8387*   8389*  12100   12105
$REG15  001214          2302#   6134*   8163*   8164*   8392*   8393*  12100   12105
$REG16  001216          2303#   8092*   8353*  12101   12105
$REG17  001220          2304#  12101
$REG2   001166          2291#  12093
$REG20  001222          2305#  12101
$REG21  001224          2306#  12101
$REG22  001226          2307#  12101
$REG23  001230          2308#  12101
$REG24  001232          2309#  12101
$REG25  001234          2310#  12101
$REG26  001236          2311#   8964    9124
$REG27  001240          2312#
$REG3   001170          2292#  12093
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$REG30  001242          2313#
$REG31  001244          2314#
$REG32  001246          2315#
$REG33  001250          2316#
$REG34  001252          2317#
$REG35  001254          2318#
$REG36  001256          2319#   9103*  12096
$REG37  001260          2320#   9104*  12096
$REG4   001172          2293#
$REG5   001174          2294#   5995*  6916*  6959*  8129*  8135*  8143   8149*  8358*  8364*  8372   8378*  8904*
                        8905*   9100   9474*  9475*  9511   9580*  9600*  9612*  9626   9629   12097  12104
$REG6   001176          2295#   5996*  6917*  6963*  6971   6987*  8130*  8136*  8145   8150*  8359*  8365*  8374
                        8379*   9581*  9584*  9595   9597*  9599*  9619*  9620*  9621*  9622*  9625*  9627   9628
                       12097   12104
$REG7   001200          2296#   6918*  6964*  6969   6985*  8137*  8147   8151*  8366*  8376   8380*  9582*  9583*
                        9585    9588*  9592*  9594*  9626*  9628*  9630*  12097  12104
$RESRE  056524         11575#  11620
$RTNAD  023560          6196#
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$SAVRE  056466         11559#  11619
$SCOPE  055426          4714    6212   11358#
$SETUP= 000037          4689#   4713    4714   4716   4718   4720   4722   4723   4724   4726   6173   6211   6212
                        6214    6216    6218   6220   6221   6222   6224  11223  11248  11255  11265  11303  11359
$SIZE   056132          6796   11476#
$SIZEX  056422         11519   11529#
$STUP = 177777          4689#
$SUPRS  054210          6823    7550   7735   7795   7822  11051#
$SVLAD  055612         11370   11393#
$SVPC = 000234          2218#   2223
$SWR  = 167000          2003#   2023   2027   2028   2029   2030   2031   2032   2033   2034   2330   2331   2332
                        4723    4724   4726   4727   5499   5685   5762   5850   5951   6034   6164   6174   6189
                        6195    6197   6221   6222   6224   6225  11214  11215  11216  11217  11218  11226  11233
                       11245   11248  11260  11351  11352  11353  11354  11355  11361  11373  11375  11376  11377
                       11384   11385  11386  11396  11399  11402
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$SWRMK= 000000         11355
$TESTN  001324          2344#   5499*  5685*  5762*  5850*  5951*  6034*  11394*
$TIMES  001304          2330#   4723*  5432*  6174*  6221*  7394*  7399*  8212*  11359  11384*  11389  11392*  11402
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$TKS    001144          2279#   5061*  5214*  5234*  6172*  6429*  6692*  6734*  6767*  11263  11278  11284
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$TMP1   001264          2322#   8754*  8755*  8763
$TMP10  001302          2329#   8767*  8768*  8769
$TMP2   001266          2323#   8750*  8778
$TMP3   001270          2324#   8751*  8779
$TMP4   001272          2325#   8752*  8780
$TMP5   001274          2326#
$TMP6   001276          2327#
$TMP7   001300          2328#
$TN   = 000007          2012#   2023   5470   5499#  5502   5648   5649   5664   5685#  5688   5744   5762#  5765
                        5832    5850#  5853   5920   5951#  5954   6006   6034#  6037
$TNPWR  054124         10999   11000  11020#
$TPB    001152          2282#  10837*  10848
$TPFLG  001157          2286#  10786   10848
$TPS    001150          2281#  10835   10848
$TRAP   056562          4718    6216   11595#
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DZR6NB.CMB CROSS REFERENCE TABLE -- USER SYMBOLS

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$TRPAD  056604           11600   11610#
$TSTM   001004            2243#
$TSTNM  001102            2259#   5431*   6173*   7396    8218*   8952    11225   11260   11350   11393*  11394   11399   11403
$TYPBN= ****** U         11616
$TYPDS  054476           11153#  11615
$TYPE   053174           10786#  11434   11603   11611
$TYPEC  053406           10816   10823   10830   10835#  10836
$TYPEX  053454           10841   10843   10846#
$TYPOC  054274           11094#  11612
$TYPON  054310           11093   11096#  11614
$TYPOS  054250           11089#  11613
$UNIT   001332            2347#   5433*
$UNITM  001010            2245#
$USWR   001344            2354#
$VECT1  001370            2379#   4792
$VECT2  001372            2380#
$XTSTR  055444           11360   11364#
$$GET4= 000000            6189#
$.$.SM= ****** U          3594    9705    9940    10131   10142   10180   10494   10535   10547   10601   10623   10641   10668
                         10677
$OFILL  054473           11090*  11094*  11104   11139#
$40CAT= ****** U         11235   11361
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                           2256#   2336    3697#   3698#   3699#   3700#   3701#   3706#   3728#   3731#   3741#   4711    4726
                           4727    5721    5896    6197    6201    6209    6224    6225    10848   10920   10978#  11040#  11207#
                          11260   11263   11303   11311   11328#  11402   11403   11455#
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..LOW   000230            2212#
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B4SCOP  11345#  11359
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ENDCOM   2156#
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          9080  9081  9182  9187  9194  9196  9202  9204  9213  9215  9217  9223  9235  9240  9245
          9249  9253  9256  9260  9264  9268  9272  9276  9280  9285  9290  9295  9300  9305  9310
          9320  9333  9335  9345  9358  9360  9373  9390  9399  9403  9408  9413  9418  9444  9446
          9476
ESCAPE   2156#
GETPRI   2156#  11484
GETSWR   2156#
MSG      5470#  5472  5664#  5666  5744#  5746  5832#  5834  5920#  5922  6006#  6008
MULT     2156#
NEWTST   2156#  5470  5664  5744  5832  5920  6006
NEXTAD   2896#
NXTAD    2895#
NXTST    2893#  5502  5648  5688  5765  5853  5954  6037
PARMBK      1#  3478  3510
PARMDF      1#  3384
POP      2156#  10763  11194  11449  11450  11580
PUSH     2156#  10744  11153  11410  11412  11433  11560
P.DRVR      1#  3542
REGDEF      1#  3166
REPORT   2156#
R.DRIV      1#  9634
R.QDRV      1#
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SETPRI   2156#
SETTRA  11603#  11612  11613  11614  11615  11618  11619  11620  11621
SETUP    2156#  4706  6204
SKIP     2156#
SLASH    2156#
SPACE    2156#
STARS    2004  2010  2156#  2216  2227  2229  2236  2252  2336  2339  4851  4859  5003  5017  5470
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         8831  8858  8860  8890  8896  8910  8919  9027  9037  9084  9142  9150  9503  9507  9546
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SWRSU    1998#  2156#  4728#  6226#
S.DRVE      1#  3318
TEST     2894#  5470  5664  5744  5832  5920  6006
TRMTRP  11603#
TYPBIN   2156#
TYPDEC   2156#  6184
TYPNAM   2156#
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TYPOCT   2156#
TYPTXT   2156#
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         2318    2319   2320
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$$SKIP   2156#
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.HEADE   1998#   2013
.KT11    2001#   2156
.SETUP   1998#   4689
.SWRHI   1998#   2023
.SWRLO   1998#   2035#  2036   2037
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.$APTB   2337#
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.$APTY   2002#  11403
.$CATC   1998#   2197
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.$POWE   1999#
.$RAND   2000#   2001#  10733
.$READ   2000#  11260
.$SAVE   2000#  11542
.$SCOP   2001#  11345
.$SIZE   2000#  11460
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.$TYPD   2000#  11141
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.$TYPO   1999#  11064
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DZR6NB.CMB CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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       10918 10927 11009
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        8668  8755  8757  8762  8941  9023  9530  9621 10412 10431 10433 10715 10723 10755 10757
       10758 10760 10805 10870 10872 10897 10899 10909 10912 10914 10917 10926 10928 10931 10934
       10976 11008 11010 11092 11102 11173 11420 11432 11444 11503 11514 11523 11524
ASL     4822  4823  4824  4893  4979  5891  6710  7398  7697  8002  8003  8004  8005  8006  8073
        8074  8075  8076  8077  8938  8939  8940 10708 10710 10712 10751 11599
ASLB   11178
ASR     4834  4835  4836  7517  7569  7842  7843  8000  8071  9554  9555  9556  9557  9615  9616
        9617 10968 11427
BCC    10869 11179
BCS    10900 10925
BEQ     4746  4765  4787  4871  4884  4886  4909  4917  4949  4977  4984  4989  5048  5071  5073
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       10010 10024 10033 10065 10073 10089 10095 10134 10184 10186 10347 10442 10491 10497 10503
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       10808 10843 10907 10920 10963 11054 11056 11119 11224 11227 11249 11252 11337 11339 11360
       11376 11380 11414 11418 11438 11440
BGE     4938  5331  5358  5363  5405  7869  8764 11390
BGT     4832  4946  5336  5366  6179  6318  6383  6726 10705 10923 10962 11126 11187 11294
BHI     5120  7708  7721  7724  7954  7964 10452 11378 11516
BHIS    6972  7045
BIC     4801  4921  4962  5061  5214  5234  5579  5712  5791  5880  6130  6172  6176  6319  6384
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       11281 11287 11295 11520
BICB    5440  7030  9563  9569 10177 10523
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        9993 10016 10025 10034 10050 10066 10074 10084 10096 10135 10187 10201 10209 10280 10348
       10353 10465 10529 10568 10582 10590 10636 10644 10657 11012 11121 11122 11181 11182 11497
BISB    5442  5450  5457  5713  5792  5881  6397  6618  7204  7215  7223  7243  7283  7291  7308
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DZR6NB.CMB CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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BIT     4976  5212  5448  5463  5545  5582  5587  5593  5653  5656  5889  5981  6104  6142  6550
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        8922  8930  8957  8985  9042  9046  9050  9057  9061  9065  9069  9072  9075  9078  9156
        9180  9185  9190  9192  9198  9200  9206  9209  9211  9219  9233  9238  9243  9247  9251
        9254  9258  9262  9266  9270  9274  9278  9283  9288  9293  9298  9303  9308  9312  9318
        9324  9331  9337  9343  9349  9356  9362  9371  9376  9379  9392  9401  9406  9411  9416
        9427  9431  9435  9441  9463  9470  9527  9590  9623  9758  9773  9783  9788  9794  9832
        9851  9866  9869  9875  9877  9891  9918  9950  9954  9960  9980  9999 10009 10014 10031
       10070 10072 10094 10132 10183 10185 10192 10194 10196 10346 10490 10496 10498 10515 10527
       10531 10549 10554 10558 10560 10564 10566 10576 10597 10620 10629 10642 10652 10663 11226
       11233 11248 11338 11361 11379 11386
BITB    4745  4794  4971  4983  5438  6119  6243  9561  9835  9859  9905  9991 10023 10064 10088
       10441 10502 10607 10794 10799 10831 11417
BLE     5164  5168  5173  6850  8425  8534  8634  8638  9008
BLO     6993  7706  7716  7719 10458
BLOS   10437
BLT     4830  4944  5114  5288  6316  6381  6728  7645  8142  8371  8586  8926 10707 10822 11005
       11127 11170 11186 11292
BMI     5522  5704  5783  5872  5970  6798  7079  7753  8349  8759  9766 11177
BNE     4697  4711  4735  4761  4780  4791  4795  4873  4895  4897  4904  4907  4919  4932  4934
        4951  4966  4972  4982  4997  5027  5032  5035  5038  5050  5053  5060  5082  5084  5098
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        5233  5265  5267  5282  5284  5304  5345  5352  5355  5360  5426  5460  5508  5516  5526
        5533  5546  5556  5575  5581  5583  5594  5654  5657  5707  5786  5800  5866  5875  5890
        5980  5982  5991  6058  6078  6081  6105  6120  6143  6209  6233  6273  6277  6295  6298
        6338  6341  6346  6349  6366  6371  6376  6391  6426  6428  6436  6441  6446  6467  6472
        6475  6500  6507  6537  6539  6551  6591  6604  6606  6610  6632  6635  6638  6642  6656
        6674  6679  6686  6691  6701  6732  6738  6742  6746  6810  6847  6860  6874  6901  6944
        6970  6974  7081  7086  7103  7118  7161  7188  7190  7192  7213  7241  7289  7306  7331
        7389  7391  7393  7440  7446  7452  7458  7464  7468  7490  7546  7602  7631  7640  7651
        7714  7717  7722  7793  7849  7851  7883  7906  7924  7991  7998  8027  8038  8062  8069
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       10540 10559 10561 10565 10567 10587 10604 10621 10626 10655 10664 10754 10793 10800 10802
       10810 10818 10832 10839 10874 11016 11117 11175 11234 11239 11256 11283 11289 11316 11362
       11387 11416 11422 11425 11442 11527
BPL     5612  5619  5715  5794  5883  6986  8011  8082  8171  8180  8282  8292  8300  8328  8402
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DZR6NB.CMB CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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DECB   10821 10824 11114 11125
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DZR6NB.CMB CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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.WORD    2203   2204   2205   2212   2213   2222   2241   2242   2243   2244   2245   2246   2258   2261   2262
         2263   2264   2267   2268   2269   2270   2271   2272   2273   2276   2277   2278   2287   2289   2290
         2291   2292   2293   2294   2295   2296   2297   2298   2299   2300   2301   2302   2303   2304   2305
         2306   2307   2308   2309   2310   2311   2312   2313   2314   2315   2316   2317   2318   2319   2320
         2321   2322   2323   2324   2325   2326   2327   2328   2329   2342   2343   2344   2345   2346   2347
         2348   2349   2353   2354   2355   2368   2372   2375   2378   2379   2380   2381   2382   3483   3488
         3489   3490   3491   3492   3493   3494   3495   3496   3497   3498   3499   3500   3501   3502   3503
```

DZR6NB.CMB CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
 3504  3505  3506  3507  3508  3509  3515  3520  3521  3522  3523  3524  3525  3526  3527
 3528  3529  3530  3531  3532  3533  3534  3535  3536  3537  3538  3539  3540  3541  3545
 3547  3549  3550  3551  3552  3553  3555  3556  3557  3558  3559  3560  3561  3562  3566
 3567  3568  3572  3592  3594  3595  3608  3610  3611  3612  3613  3642  3678  3679  3680
 3681  3682  3683  3684  3686  3687  3688  3689  3690  3691  3692  3693  3694  3695  3696
 3702  3703  3704  3705  3707  3708  3709  3710  3711  3712  3713  3714  3715  3716  3717
 3718  3719  3720  3721  3722  3723  3724  3725  3726  3727  3729  3730  3732  3733  3736
 3737  3738  3739  3740  3761  3762  3763  3764  3765  3766  3772  3773  3774  3775  3776
 3777  3785  3786  3787  3788  3789  3790  3791  3792  3793  3794  3795  3800  3801  3802
 3803  3804  3805  3806  3807  3808  3809  3810  3816  3817  3818  3819  3820  3821  3822
 3823  3824  3825  3826  3827  3828  3829  3830  3831  3832  3833  3834  3835  3836  3837
 4166  4167  4168  4169  4170  4171  4172  4173  4174  4175  4176  4177  4178  4179  4180
 4181  6095  6178  6181  6196  8455  8792  8840  8850  8947  8982  9019 10732 10767 10768
10798 10845 11015 11060 11140 11324 11435 11493 11540 11541 12093 12096 12097 12100 12101
12104 12105 12108 12110 12113 12115 12117 12119 12121 12124 12126 12128 12130 12132 12134
12136 12139 12141 12143 12145 12147 12149 12151 12153 12156 12158 12160 12163 12165 12167
12169 12171 12173 12175 12178 12180 12182 12184 12186 12188 12190 12193 12195 12197 12199
12201 12204 12206 12208 12210 12213 12215 12217 12219 12221 12223 12226 12228 12230 12232
12234 12236 12239 12241 12243 12245 12247 12249 12252 12254 12256 12258 12260 12262 12264
12266 12268 12271 12273 12275 12277 12279 12281 12283 12285 12287 12290 12292 12294 12296
12298 12301 12303 12306 12308 12311 12313 12315 12317 12319 12321 12324 12326 12329 12332
12335 12337 12340 12342 12344 12346 12348 12351 12353 12355 12357 12359 12362 12364 12366
12368 12370
```

```
ERRORS DETECTED:  0
DEFAULT GLOBALS GENERATED:  0

*,DZR6NB.SEQ/SOL/CRF/NL:TOC=DRIVEB.P11/EQ:QNEWSW,DZR6NB.CMB
RUN-TIME:  158  129  19 SECONDS
RUN-TIME RATIO:  2271/308=7.3
CORE USED:  50K  (99 PAGES)
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Spooler runtime 45 Seconds, 184 KCS, 1299 disk reads, 4 disk writes, 304 pages